Suction Dredge Permitting Program

Draft Subsequent Environmental Impact Report

California Department of Fish and Game

February 2011

Horizon
WATER and ENVIRONMENT

RESOURCES AGENCY
CALIFORNIA
DEPARTMENT
FISH & GAME

Suction Dredge Permitting Program

Draft
Subsequent Environmental Impact Report

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LIST OF ACRONYMS

§	section
°C	Celsius
°F	Fahrenheit
µg	micrograms
µg/kg	micrograms per kilograms
µg/kg/d	micrograms per kilograms per day
µg/L	micrograms per liter
µg/m3	micrograms per cubic meter
µm	micrometers
AB	Assembly Bill
APA	Administrative Procedure Act
ATV	all-terrain vehicle
BAF	bioaccumulation factor
BLM	U.S. Bureau of Land Management
CAA	Clean Air Act
CAAQSs	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCR	California Code of Regulations
CDC	California Department of Conservation
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHRIS	California Historical Resources Information System
CMAC	California Mining Active Claim
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CRHR	California Register of Historical Resources
CRP	certified regulatory program
CTR	California Toxics Rule
CTR CCC	California Toxics Rule Criteria Continuous Concentration
CTR CMC	California Toxics Rule Criteria Maximum Concentration
CVP	Central Valley Project
CWA	Clean Water Act
cwd	coarse woody debris

CWHR	California Wildlife Habitat Relationships
CWQG	Canadian Water Quality Guideline
cy	cubic yards
dB	decibel
dBA	A weighted decibel
DDT	dichlorodiphenyltrichloroethane
Delta	Sacramento River-San Joaquin River Delta
DMV	Department of Motor Vehicles
DO	dissolved oxygen
DOSH	Division of Occupational Safety and Health
DSEIR	Draft Subsequent Environmental Impact Report
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	electrical conductivity
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
FC	federal candidate species for listing
FE	federally endangered species
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act of 1976
FP	fully protected species
FR	Federal Register
FSC	federal species of concern
FT	federally threatened species
ft	feet
GHG	greenhouse gas
GIS	geographic information system
Hg	mercury
Hg(0)	elemental mercury
Hg(II)	oxidized mercury
$Hg(II)_R$	reactive oxidized mercury
HHW	household hazardous waste
hp	horse power
kg	kilogram
kg/yr	kilograms per year
km	kilometer
km^2	square kilometer
L_{dn}	day-night level
LEPC	Local Emergency Planning Committee
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
L_{xx}	percentile-exceeded sound level
m	meter
m^2	square meter
m^3	cubic meter

MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant levels
MeHg	methylmercury
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mg/m3	milligrams per cubic meter
mm	millimeters
MMeHg	monomethylmercury
MRZ	Mineral Resource Zones
MSDS	material safety data sheets
msl	mean sea level
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAWQA	National Water-Quality Assessment Program
NCLS	National Landscape Conservation System
NEPA	National Environmental Policy Act
ng	nanogram
ng/L	nanogram per liter
NGSA	National Sporting Goods Association
NHD	USGS National Hydrograph Dataset
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NPS	National Park Service
NTR	National Toxics Rule
NTUs	Nephelometric Turbidity Units
OEHHA	Office of Environmental Health Hazard Assessment
OHP	California Office of Historic Preservation
OHWM	ordinary high water mark
OMR	Office of Mine Reclamation, California Department of Conservation
OSHA	Occupational Safety and Health Administration
OSHSB	Occupational Safety and Health Standards Board
PAC	Public Advisory Committee
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyl compounds
PCC	Portland cement concrete
PEL	permissible exposure limit
PM_{10}	Particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
Porter-Cologne	Porter-Cologne Water Quality Control Act of 1969
ppm	parts per million (volume)
RCRA	Resource Conservation and Recovery Act
Resources Act	Forest and Rangeland Renewable Resources Planning Act
RV	recreational vehicle

RWQCB	Regional Water Quality Control Board
S&PF	State and Private Forestry
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SC	state candidate species
SCUBA	self contained underwater breathing apparatus
SE	state endangered species
SEIR	Subsequent Environmental Impact Report
SERC	State Emergency Response Commission
SIP	State Implementation Policy
SMPRA	Surface Mining and Reclamation Act of 1975
SSC	species of special concern
ST	state threatened species
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCP	traditional cultural properties
TEC	threshold effect concentration
THg	total mercury
TMDL	total Maximum Daily Load
TSS	total suspended solids
TWA	time-weighted average
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Government Code
USDA	U.S. Department of Agriculture
USFS or Forest Service	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USSCS	U.S. Soil Conservation Service
WDR	waste discharge requirements
ww	wet weight

EXECUTIVE SUMMARY

Introduction

The California Department of Fish and Game (CDFG) has prepared this document to comply with a court order and to meet its broader obligations of environmental protection with respect to its existing suction dredge mining permitting program. CDFG has prepared a draft subsequent environmental impact report (DSEIR) to analyze the potential of any new significant or substantially more severe environmental impacts than were previously disclosed in an environmental impact report (EIR) prepared in 1994. The proposed project, for the purposes of this DSEIR, consists of the proposed amendments to CDFG's previous regulations governing suction dredge mining throughout California, and suction dredging activities conducted consistent with those amendments. This proposed project is referred to as the "Proposed Program" or simply the "Program" throughout this document. The environmental assessment of the Program was developed in parallel with amendments to the previous regulations governing suction dredge mining throughout California. To most accurately reflect the environmental effects of the Program, the DSEIR includes an assessment of the suction dredge activities as well as the proposed amendments to the previous regulations.

This DSEIR was prepared to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of implementation of the Proposed Program. CDFG has prepared this DSEIR in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (Cal. Code Regs., tit. 14 §15000 et seq.). CDFG is the lead agency on this Program.

Program Overview

Program Area

The scope of the Program is statewide. Suction dredging occurs in rivers, streams and lakes throughout the state where gold is present and CDFG's draft suction dredge regulations identify areas throughout the state that would be open or closed to suction dredging. Most dredging takes place in streams draining the Sierra Nevada, Klamath Mountains, and the San Gabriel Mountains (see Figure ES-1, as well as Figures 3-4, 3-5 and 3-6 in Chapter 3 of this document).

Program Background

Small-scale suction dredge mining activity in California began in the 1960's and peaked in the late 1970's and early 1980's, when gold prices were high. Currently, suction dredge mining is prohibited by state law. The following discussion pertains to suction dredging activities prior to the existing moratorium, and what will occur when new regulations are adopted.

CDFG administers a permitting program governing the use of vacuum and suction dredge equipment pursuant to Fish and Game Code section 5653 et seq. (Appendix A). The previous regulations promulgated by CDFG governing suction dredge mining are found in title 14 of the California Code of Regulations, commencing with section 228. Under the statute and regulations, any California resident or non-resident could obtain a suction dredge mining permit from CDFG upon payment of a fee specified by statute. The permits issued by CDFG authorize suction dredge mining throughout California subject to the terms and conditions set forth in the regulations. On average, CDFG issued approximately 3,200 suction dredge mining permits to California residents annually for the 15 years prior to the current moratorium established in July 2009. The comparable average number of non-resident suction dredge mining permits issued annually by CDFG was approximately 450.

CDFG promulgated the previous regulations governing suction dredge mining in 1994 after preparing and certifying an EIR (State Clearinghouse Number 93102046) under CEQA (hereafter, 1994 EIR). CDFG considered proposed amendments to the regulations governing suction dredge mining in 1997, releasing a draft subsequent EIR for public review that same year (hereafter, 1997 Draft SEIR). However, the 1997 Draft SEIR was never completed or certified, and the proposed amendments were not adopted.

CDFG's current effort under CEQA stems from a legal challenge to the permitting program initiated in Alameda County Superior Court in May 2005 (*Karuk Tribe of California et al. v. California Department of Fish and Game* [Super. Ct. of Alameda County, 2005, No. RG05211597]). The *Karuk* lawsuit focused on the Klamath, Scott and Salmon River watersheds in northern California, and included allegations regarding impacts to various fish species, such as coho salmon (*Oncorhynchus kisutch*), and contended that CDFG's administration of the suction dredging program violated CEQA and various provisions of the Fish and Game Code. In February 2006, various mining interests and a number of individuals joined the lawsuit by court order as party interveners. In December 2006, the Alameda County Superior Court issued an order with the consent of all parties, directing CDFG to "conduct further environmental review pursuant to CEQA of its suction dredge mining regulations and to implement, if necessary, via rulemaking, mitigation measures to protect coho salmon and/or other special status fish species in the watershed of the Klamath, Scott, and Salmon rivers, listed as threatened or endangered after the 1994 EIR" (hereafter, December 2006 Court Order). For purposes of CEQA, the December 2006 Court Order describes CDFG's legal obligations in terms of Public Resources Code section 21166 and related provisions in the CEQA Guidelines found in sections 15162 through 15164.[1]

On February 26, 2008, after conducting public outreach and reviewing the comments received, CDFG informed the Alameda County Superior Court that it intended to prepare a subsequent environmental impact report (SEIR) that would be statewide in scope and comply with the December 2006 Court Order.

This SEIR and related review under CEQA analyzes the new significant and substantially more severe environmental impacts that may be occurring under the 1994 permitting program that were not previously addressed by CDFG in the 1994 EIR. For the purposes of

[1] The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Horizon WATER and ENVIRONMENT

Figure ES-1
Program Area

this SEIR, the proposed project consists of proposed amendments to CDFG's previous regulations governing suction dredge mining throughout California and the related suction dredging that would occur consistent with those amendments (see summary below and generally Cal. Code Regs., tit. 14, § 228 et seq.).

With respect to proposed amendments to the previous regulations, CDFG is charged by the Fish and Game Code to issue suction dredge permits where CDFG determines, consistent with the regulations, that the operation will not be deleterious to fish (Fish & G. Code, § 5653, subd. (b).) Any proposed amendments to CDFG's previous regulations governing suction dredge mining must be promulgated in compliance with the Administrative Procedure Act (APA) (Gov. Code, § 11340 et seq.). CDFG is conducting "formal rulemaking" under the APA to promulgate the proposed amendments to the previous suction dredge mining regulations concurrently with the environmental review of the Program required by CEQA.

The use of vacuum or suction dredge equipment for instream mining is currently prohibited in California by state law (Fish & G. Code, § 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins)). As signed into law by Governor Schwarzenegger and effective August 6, 2009, SB 670 (Wiggins) established a temporary moratorium on instream suction dredge mining in California, even with an existing permit issued by CDFG. The new law also prohibits CDFG from issuing any new permits under the previous regulations. The statewide moratorium on instream suction dredge mining and the related prohibition on the issuance of new permits will remain in place until CDFG completes the environmental review required by the December 2006 Court Order; CDFG adopts, as necessary, the proposed updates to the previous regulations; and any such updates become effective. (Fish & G. Code § 5653.1, subd. (b).)

CDFG is also subject to a separate court order prohibiting the issuance of any new suction dredge permits under the previous regulations. Issued by the Alameda County Superior Court as a preliminary injunction on July 9, 2009, the order specifically prohibits CDFG from expending any money from the California General Fund in connection with the suction dredge permitting program. The court clarified on July 27, 2009, that the order and preliminary injunction prohibits CDFG from issuing any new permits under the previous regulations. The order and preliminary injunction will remain in place pending further court order or other direction from the Alameda County Superior Court. (*Hillman et al. v. California Dept. of Fish and Game*, Super. Ct. Alameda County, 2009, No. RG09434444, order filed July 10, 2009.).

Program Description

Program Purpose

The purpose of the Program is to implement a permitting program for suction dredging activities which complies with the requirements of Fish and Game Code section 5653 et seq. and the December 2006 Court Order.

Program Objectives and Need

The objectives of the Program are as follows:

- Comply with the December 2006 Court Order;
- Promulgate amendments to CDFG's previous regulations as necessary to effectively implement Fish and Game Code section 5653 through 5653.9 and other applicable legal authorities to ensure that suction dredge mining will not be deleterious to fish;
- Develop a program that is implementable within the existing fee structure established by statute for the CDFG's suction dredge permitting program, as well as the existing fee structure established by the CDFG pursuant to Fish and Game Code section 1600 et seq.;
- Fulfill CDFG's mission of managing California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public;
- Ensure that the development of the regulations considers economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation; and
- Fulfill the CDFG's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

Applicability

For purposes of this SEIR and the proposed regulations, a person is using suction dredge equipment when all of the following components are operating together for the purpose of vacuuming aggregate from a river, stream or lake:

(1) a vacuum hose operating through the Venturi effect which vacuums sediment from the river, stream or lake; and

(2) A motorized pump; and

(3) A sluice box.

Please refer to Chapter 3, *Activity Description,* for a full description of suction dredging activities.

Non-Covered Activities

The following is a list of activities that are not considered suction dredging subject to CDFG's permitting authority under Fish and Game Code section 5653, subdivision (b). However, other permits or authorizations from CDFG or other agencies may be required, including in some instances a Lake or Streambed Alteration Agreement pursuant to Fish and Game Code section 1600 et seq.

- Use of a high banker outside of the current water level, when aggregate is delivered to the high banker by hand, shovel, bucket or equipment such as a front-end loader;

- Use of a high banker or sluice box above the ordinary high water line and above the current water level, where aggregate is vacuumed into the highbanker or sluice box from a gravel deposit outside the current water level of a river, lake or stream but which may be wetted by a water pump. This method is often referred to as booming;
- Processing of materials collected using a suction dredge, in upland areas outside of the current water level of a river, stream or lake;
- Panning for gold;
- Use of suction dredge equipment (e.g. pontoons, water pump or sluice box) on a river, stream or lake where the vacuum hose and nozzle have been removed;
- Sluicing or power sluicing for gold when no vacuum hose or nozzle is used to remove aggregate from the river, stream or lake; and
- Use of vacuums (e.g. shop-vacs) and hand tools above the current water level.

There may be other methods of placer mining, or other activities related to suction dredging that are not captured by the above list, but are nevertheless not considered suction dredging by CDFG. In addition, the use of a suction dredge (e.g., cutterhead dredge) for the purposes of infrastructure maintenance, flood control, or navigational purposes is not considered suction dredging for the purposes of this program, since it is not used for mineral extraction.

Activities Requiring Additional Notification under Fish and Game Code Section 1602

Some methods of suction dredging, or activities performed to facilitate suction dredging, require notification to CDFG as specified in Fish and Game Code section 1602, subdivision (a) as a conditional requirement for a valid suction dredging permit. Note that in these cases, both a valid suction dredge permit and notification and compliance with Fish and Game Code section 1602, subdivision (a) are required. These activities include any of the following:

- Use of motorized winches other motorized equipment for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes or reservoirs; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

Description of Draft Proposed Regulations

The following provisions of the current regulations will not be modified.

- Every person operating a suction dredge in the state of California for instream mining must be in possession of a suction dredge permit issued by CDFG. (Cal. Code Regs., tit. 14, § 228, subd. (b))

- Any person with a qualifying disability under the American with Disabilities Act who requires assistance in operating a suction dredge may also apply for an assistant suction dredge permit. (Cal. Code Regs., tit. 14, § 228, subd. (b))
- Permits can be revoked or suspended by CDFG regional manager or his/her designee for any violation of the laws or regulations pertaining to suction dredging. (Cal. Code Regs., tit. 14, § 228, subd. (h))
- Permits do not authorize trespass on any land or property or relief of the responsibility of complying with applicable federal, State, or local laws or ordinances. (Cal. Code Regs., tit. 14, § 228, subd. (m))
- Any water may be closed to suction dredging under emergency regulatory action by CDFG pursuant to Government Code section 11346.1. (Cal. Code Regs., tit. 14, § 228, subd. (n)

The draft proposed regulations include updated application requirements, limitations on the number of permits issued annually, equipment restrictions, methods of operation, and location of activities. These updates are summarized below and a comparison of the proposed draft regulations to the existing 1994 regulations is shown in Table ES-1, at the end of this chapter.

Application Requirements

At a minimum, suction dredge permit applications shall include valid identification and contact information for the permittee or assistant permittee, a list of up to six locations where the permittee plans to suction dredge providing either the county, stream name, township, range, quarter section, base, and meridian, or approximate centerpoint using latitude/longitude, as well as the approximate dates of dredging for each identified location and a list of all suction dredge equipment to be used under the permit.

Number of permits

CDFG will issue up to 4,000 permits annually, on a first-come, first-served basis.

Equipment Restrictions

The draft proposed regulations restrict nozzle size, hose size, and pump intake screens. Only the equipment listed in the application form may be operated under the permit.

Intake nozzles with an inside diameter larger than 4 inches are not allowed except under the following conditions:

- CDFG has conducted an on-site inspection and provided written approval of the proposed nozzle size, and the provisions of Fish and Game Code section 1602, subdivision(a) have been completed; and
- The maximum inside diameter of the intake nozzle is no larger than six inches (except in certain locations where an eight-inch intake nozzle is allowed), or a constricting ring with an inside diameter no larger than four inches has been permanently attached to the intake nozzle.

The inside diameter of the intake hose may not be more than two inches larger than the permitted intake nozzle size. For example, if the nozzle size is four inches, the inside diameter of the intake hose must not be greater than six inches.

Water pump intakes shall be covered with screening mesh with openings less than 3/32 inch (2.38 millimeter [mm]) for woven wire or perforated plate screens, or 0.0689 inch (1.75mm) for profile wire screens, with a minimum 27% open area.

Method of Operation

Under the proposed regulations, a permittee operating with a suction dredge permit would be required to comply with the following conditions:

- Dredging within three feet of the lateral edge of the current water level, including the edge of instream gravel bars or under any overhanging banks, is prohibited;
- Movement of boulders, logs, or other objects outside the current water level is prohibited;
- Use of motorized winches or other motorized equipment to move boulders, logs, or other objects is prohibited unless an on-site inspection is conducted and written approval provided by CDFG, and compliance with Fish and Game Code section 1602 subdivision (a) is demonstrated;
- Hand-powered winching is permitted within the current water level only. No woody streamside vegetation can be removed or damaged. Trees may be used as winch and pulley anchor points if trunk surfaces are protected from cuts or abrasions;
- Movement of any material embedded on the banks of river or streams is prohibited;
- Reasonable care shall be used to avoid dredging in silt and clay materials, the disturbance of which would significantly increase turbidity;
- Tailings piles shall be leveled prior to leaving the site;
- Damage or removal of streamside vegetation during dredging operations is prohibited;
- Cutting, movement, or destabilization of instream woody debris, such as root wads, stumps or logs, is prohibited;
- Construction of a dam or weir which concentrates flow in a way that reduced the total wetted area of a river or stream, or obstructs fish passage is prohibited unless an on-site inspection is conducted and written approval provided by CDFG and compliance with Fish and Game Code section 1602 subdivision (a) is demonstrated;
- Disturbing actively spawning fish, redds, live mussel beds, or tadpoles is prohibited;
- No import of earthen or fill material into a stream, river, or lake is allowed;

- Use of wheeled or tracked equipment instream as part of suction dredging is prohibited;
- All fueling and servicing of dredging equipment must not result in leaks, spills or otherwise release products into a watercourse or where the product may enter waters of the state.
- No fuel, lubricants, or chemicals may be stored within 100 feet of the current water level at the time of dredging, otherwise a containment system must be used;
- All equipment shall be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in stream or lakes (also see Appendix M for Invasive Aquatic Species concerns);
- The suction dredge operator permit number must be affixed to all permitted dredges at all times and in a manner that is clearly visible from the streambank or shoreline.

Area Restrictions

Seasonal and year-round closures for various waterbodies throughout the state have been identified in the draft regulations, based on potential for impacts to sensitive aquatic species. The reader is referred to Chapter 2 and Appendix L for a description of these closures.

In addition, permits issued pursuant to CDFG's proposed regulations do not allow suction dredging in lakes or reservoirs unless CDFG has conducted an on-site inspection and the requirements of Fish and Game Code section 1602, subdivision (a) have been completed. Suction dredging is not permitted in State Wildlife Areas or Ecological Reserves, and may also be restricted in waters designated under the state and federal Wild and Scenic Rivers Acts.

Best Management Practices Information

CDFG will develop and distribute a "Best Management Practices" pamphlet which will be issued to each permittee under the Proposed Program. Though some of the guidance contained in this pamphlet would not be legally enforceable by the CDFG, some requirements would be enforceable by other agencies, and the pamphlet will be designed to support the proposed amendments to the regulations by offering suggestions to further reduce or avoid potential environmental effects and inconveniences to others. Many of the "Best Management Practices" are derived from other agency's laws or regulations, suggested measures received during public comment, the Public Advisory Committee convened for the Program, and review of the regulatory practices of other states which would minimize environmental effects, but are either not applicable or enforceable under CDFG's legal mandates. Examples of guidance include ways to identify and avoid important cultural and historic resources, recommendations to keep encampment sites clean, and advice on the proper treatment of wastes. More information on the guidance that will be included is described in the individual resource discussions of Chapter 4.

Public Involvement Process

Scoping Comment Period

In accordance with State CEQA Guidelines (Cal. Code Regs., tit. 14, §§ 15082, subdiv. [a], 15103, 15375), CDFG circulated a Notice of Preparation (NOP) of an EIR for the Proposed Program on October 26, 2009 (see Appendix B). The NOP, in which CDFG was identified as lead agency for the Proposed Program, was circulated to the public, local, state, and federal agencies, and other interested parties. The purpose of the NOP was to inform responsible agencies and the public that the Proposed Program could have significant effects on the environment and to solicit their comments.

To provide the public and regulatory agencies an opportunity to ask questions and submit comments on the scope of the SEIR and regulation amendments, public scoping meetings were held during the NOP review period. Because the suction dredge permitting program is a "project of statewide, regional, or area wide significance," the scoping meetings were conducted on consecutive days in three different locations throughout the state. The scoping meetings were held in Fresno on November 16, 2009; Sacramento on November 17, 2009; and Redding on November 18, 2009.

During the scoping period, 284 comment letters were received. These comments were summarized and included in their entirety in the Scoping Report prepared for this SEIR (Appendix C).

Public Advisory Committee

Based on suggestions received during the public scoping process, CDFG convened a Public Advisory Committee (PAC) for the Program. The overall goal of the PAC was to assist CDFG in exploring potential regulatory approaches to help with development of proposed regulations for suction dredging. By establishing a collaborative environment, CDFG intended that the PAC would provide input on technical issues relevant to the regulatory development effort. While CDFG considered recommendations of all PAC participants, ultimately, the responsibility to develop new regulations belongs to CDFG.

The PAC had a diverse membership, including 25 individuals representing federal agencies, county governments, environmental/conservation and mining interests, private industry, the Karuk Tribe, and scientists. The group met on February 11th and 25th, and on March 11th, 2010. All three meetings included presentations on a variety of topics including geomorphology, water quality, mercury, mining techniques, and environmental changes since the 1994 regulations were adopted, CDFG enforcement history and capabilities, and Tribal fish allocations and harvesting techniques. All the presentations were intended to help increase the PAC's collective understanding of issues pertinent to suction dredging.

This effort created a forum for sharing information and knowledge on a wide range of topics that collectively offered helpful insights for CDFG's consideration. In particular, the PAC provided valuable input and suggestions on which components of the 1994 regulations should be considered for inclusion in a future regulatory program.

A summary of the PAC process and outcomes is provided in Appendix G.

Public and Agency Review of SEIR

This document will be circulated to local, state, and federal agencies and to interested organizations and individuals, including the general public, who may wish to review and comment on the report. Its publication marks the beginning of a 60-day public review period, which concludes on April 29, 2011. Written comments concerning this DSEIR should be directed to the name and address listed below.

Submittal of written comments via e-mail (in Microsoft Word format) would be greatly appreciated.

California Department of Fish and Game
Attn: Mark Stopher
Suction Dredge Program Draft SEIR Comments
601 Locust Street
Redding, CA 96001

e-mail: dfgsuctiondredge@dfg.ca.gov

All documents mentioned herein or related to this Program can be reviewed online at the Program Website (http://www.dfg.ca.gov/suctiondredge).

Preparation of Final SEIR

Written and oral comments received in response to the Draft SEIR will be addressed in a Response to Comments document which, together with the Draft SEIR, will constitute the Final SEIR. In addition, CDFG will consider the comments received to refine, as necessary, the proposed updates to the previous regulations. Once completed, the Final SEIR will inform CDFG's exercise of discretion as a lead agency under CEQA in deciding whether or how to approve the Proposed Program as prescribed by the Fish and Game Code.

Areas of Known Controversy

Based on input during the scoping period (see *Public Involvement Process,* above), several areas of public concern have been identified regarding the Program. These issues are listed below. The intent is not to provide a comprehensive discussion of issues and concerns, rather, to highlight the issues of apparent greatest concern raised in comments to date. The following areas of public concern have been identified regarding the Program:

- Mining rights
- Suction dredge mining location restrictions
- Environmental effects of mining, particularly related to fisheries and water quality (e.g., remobilization of mercury and mercury enriched sediment)
- Cultural resources and tribal practices
- Use of hazardous materials other than fuels at suction dredger campsites

Key Issues and Significant Impacts

This section discusses key issues of concern relative to the Proposed Program and the conclusions of this document regarding those issues, as well as any significant impacts that were identified. This is not a comprehensive discussion of impacts of the Proposed Program, for which the reader is directed to Table ES-2, Summary of Impacts and Mitigation Measures, at the end of this chapter.

Environmental factors potentially affected by the Program include:

- Hydrology and Geomorphology
- Water Quality and Toxicology
- Biological Resources
- Hazards and Hazardous Materials
- Cultural Resources
- Aesthetics
- Noise
- Recreation
- Transportation and Traffic, and
- Mineral Resources.

Chapters 4 and 5 of this EIR document address each of these environmental topics and the impacts of the Program.

Specific issues that were determined in this SEIR to have significant and unavoidable impacts related to water quality, cultural, noise, and cumulative water quality impacts. See Chapters 4.2 *Water Quality and Toxicology*, 4.5 *Cultural Resources,* 4.7 *Noise,* and Chapter 5 *Other Statutory Considerations* (which discusses cumulative water quality impacts) for a detailed discussion of these impacts.

Significant and Unavoidable Impacts

Water Quality Impacts Associated with Suction Dredge Discharges

Mercury Resuspension and Discharge

Suction dredging has the potential to contribute to: (1) watershed mercury loading to downstream reaches within the same water body and to downstream water bodies, (2) methylmercury formation in the downstream reaches/water bodies, and (3) bioaccumulation in aquatic organisms in these downstream reaches/water bodies. The associated increase in health risks to wildlife (including fish) or humans consuming these organisms is considered a potentially significant impact.

Potential mitigation measures to reduce the impact would necessarily involve actions to avoid or reduce total mercury discharge from areas containing elevated sediment mercury and/or elemental mercury from suction dredging activities under the Program. However, a comprehensive set of actions to mitigate the potential impact through avoidance or minimization of mercury discharges has not been determined at this time, nor is its likely effectiveness known. This impact would remain potentially significant until such time that a sufficient and feasible mitigation program is developed, but there is no guarantee that this type of mitigation is practicable. As such, this impact is considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact WQ-4 (Chapter 4.2 *Water Quality and Toxicology*).

Resuspension and Discharge of Other Trace Metals

Generally, discharge of trace metals at typical sites should have less than significant impacts. However, suction dredging at known trace metal hot-spots resulting from acid mine drainage and characterized by contaminated sediment (e.g., low pH levels and high metal concentrations in the pore water) would remobilize potentially bioavailable forms of metals and has the potential to increase levels of one or more trace metals in water body reaches such that the water body reach would exceed California Toxics Rule metals criteria by frequency, magnitude, and geographic extent that could result in adverse effects to one or more beneficial uses, relative to baseline conditions. This impact is considered to be potentially significant.

Potential mitigation measures to reduce the impact would necessarily involve identifying known trace metal hot-spots associated with past mining operations (e.g., problematic sites with acid mine drainage) and stating in the Regulations Program that these identified sites are closed to suction dredging. However, because not all locations of such contamination are known, the feasibility with which contaminated sites could be identified at a level of certainty that is sufficient to develop appropriate closure areas or other restrictions for allowable dredging activities is uncertain at this time. As such, this impact is considered significant and unavoidable until such time that a sufficient and feasible mitigation program is developed. For a more complete discussion of this impact, please refer to the discussion under Impact WQ-5 (Chapter 4.2 *Water Quality and Toxicology*).

Effects on Special-Status Passerines Associated with Program Activity

Specific disturbance mechanisms include noise associated with dredge rigs, dredgers accessing streams, direct disturbance of riparian habitat, alteration of prey resource base, and suction dredging encampment activities at night (e.g., lights and noise). Suction dredging activities that occur during the passerine breeding season may alter behavioral patterns of special-status passerine species.

Potential for impacts to special-status passerine species would largely be minimized with incorporation of the proposed regulations, but not completely avoided. The potential for direct disturbance of nests or adverse behavior modifications due to human activity would remain. For several of these species, even a small disturbance could be substantial considering the restricted population and/or range of the species in question. Mitigation measures are available to reduce impacts to a less-than-significant level for passerines that may be affected (including avoidance as a Best Management Practice), however, CDFG does not have the jurisdictional authority under this Program to adopt or enforce mitigation for impacts to species not defined as “fish” in the Fish and Game Code. Therefore, impacts to these passerine species are considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact BIO-WILD-2 (Chapter 4.3 *Biological Resources*).

Cultural Resource Impacts Associated with Program Activity

Effects on Historical Resources

Program activities have the potential to result in a substantial adverse change in the significance of a historical resource due to possible demolition, relocation, or alteration. Similarly, the introduction of increased human activity in around the state's waterways could cause a substantial adverse change to traditional cultural properties. For these reasons, impacts to historical resources and traditional cultural properties resulting from suction dredge mining activities are considered potentially significant. However, as CDFG does not have the jurisdictional authority to mitigate impacts to these resources, impacts to historical resources and traditional cultural properties are therefore considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact CUL-1 (Chapter 4.5 *Cultural Resources*).

Effects on Unique Archaeological Resources

Riverine settings are considered highly sensitive for the existence of significant archaeological resources. Suction dredge mining activities could cause a substantial adverse change to a unique archaeological resource through riverbed suctioning and screening activities that could disturb or destroy cultural materials which may be located just below the surface of the riverbed or along its banks. Impacts to unique archaeological resources resulting from suction dredge mining could also occur through increased human activity in the vicinity of the state's waterways. Such impacts to unique archaeological resources are considered potentially significant. However, CDFG does not have the jurisdictional authority to mitigate impacts to unique archaeological resources. As such, impacts to such resources are therefore considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact CUL-2 (Chapter 4.5 *Cultural Resources*).

Temporary Noise Impacts Associated with Program Activity

Suction dredging activities have potential to generate noise in excess of local noise standards, which would be a significant impact. Although all recreationists using noise-generating equipment, including suction dredge miners, are equally required to abide by local noise ordinances, violations can still occur. Violations can be reported at any time to the local authorities who have the jurisdiction to enforce applicable regulations as appropriate. However, because local noise standards are outside of the scope of the Program to enforce, the impact cannot be discounted. As such, this impact was identified as significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact NZ-1 (Chapter 4.7 *Noise*).

Cumulative Effects on Wildlife Species and their Habitats

Suction dredging and ancillary activities are likely to co-occur with several bird species. Of greatest concern are the incremental effects of the Proposed Program on species that are very rare and are likely to occur in close proximity to suction dredging activities. As described in Chapter 4.3, *Biological Resources*, suction dredging activities may lead to significant impacts on several of these species at the individual (Proposed Program) level. The incremental contribution of these impacts is also considered considerable at the cumulative level. This impact is considered significant; no feasible mitigation is available, and as such, the impact is considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact CUM-2 (Chapter 5, *Other Statutory Considerations*).

Cumulative Water Quality Effects of Suction Dredge Discharges

Turbidity/TSS Discharges from Suction Dredging

Although the regulations under the Proposed Program would reduce the potential incremental contribution of the suction dredge discharges to a cumulative impact in impaired waters, sediment discharges would not be entirely avoided. Where such discharges are occurring in water bodies with existing turbidity/TSS impairments, the incremental contribution from suction dredging would be cumulatively considerable. To reduce these effects, potential mitigation could include closures or restrictions on suction dredging in waterbodies impaired for sediment. However, such closures are infeasible as they are not within CDFG's jurisdiction to implement. No other feasible mitigation has been identified within CDFG's jurisdictional authority. As such, this cumulative impact is considered significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact CUM-6 (Chapter 5, *Other Statutory Considerations*).

Mercury Resuspension and Discharge from Suction Dredging

Although the regulations under the Proposed Program would reduce the potential for flouring and reduce the potential incremental contribution of the suction dredge discharges to the significant cumulative impact, mercury discharges would continue. Such discharges associated with Program activities would make a cumulatively considerable contribution to existing cumulative impacts related to watershed mercury loading, methylmercury formation in downstream areas, and bioaccumulation in aquatic organisms (and associated risks related to human or wildlife consumption). To reduce these effects, potential mitigation could include closing mercury contaminated watersheds, limiting the number of permits in areas impaired for mercury, or further restrictions on nozzle size, number of permits, and hours/days spent dredging. However, such measures are considered infeasible since they are not within CDFG's jurisdiction to implement (they are not considered necessary to avoid deleterious effects to aquatic species). Therefore, this impact would be significant and unavoidable. For a more complete discussion of this impact, please refer to the discussion under Impact CUM-7 (Chapter 5, *Other Statutory Considerations*).

Alternatives Considered

The purpose of the alternatives analysis in an EIR is to describe a range of reasonable alternatives to the Program that could feasibly attain most of the objectives of the Program. Section 15126.6 (b) of the CEQA Guidelines requires that the alternatives reduce or eliminate significant adverse environmental effects of the Proposed Program; such alternatives may be more costly or otherwise impede to some degree the attainment of the Program's objectives. The range of alternatives considered must include those that offer substantial environmental advantages over the Proposed Program and may be feasibly accomplished in a successful manner considering economic, environmental, social, technological, and legal factors. The analysis evaluates the comparative merits of the alternatives (CEQA Guidelines, § 15126.6[a]).

The following alternatives have been evaluated for their feasibility and their ability to achieve most of the Program objectives while avoiding, reducing, or minimizing significant impacts identified for the Proposed Program:

- No Program Alternative
- 1994 Regulations Alternative
- Water Quality Alternative
- Reduced Intensity Alternative

These alternatives (with the exception of the No Program Alternative) were determined to be feasible or potentially feasible and would generally meet the Program objectives.

No Program Alternative

Under the No Program Alternative, the current prohibitions on instream suction dredging operations would remain in effect and no further permit issuance by CDFG would occur. Essentially, this would entail continuance of the existing environmental conditions of the Program area. By continuing the moratorium on the use of suction dredges in California, all of the adverse environmental impacts related to the Proposed Program would be eliminated.

By having no effect at all on these resources, the No Program Alternative would avoid all the significant and unavoidable effects of the Program and would further reduce or eliminate the effects reported as being less-than-significant. This includes the avoidance of noise and air emissions, recreational conflicts between users, and geomorphic and biologic effects, among others.

1994 Regulations Alternative

Under this alternative, CDFG would resume administering the Program under the 1994 Regulations, which were in place prior to the moratorium. This includes the limits on nozzle size and operational requirements as outlined in those regulations and suction dredge use classifications for waterways unchanged from the 1994 specifications.

Three defining characteristics of this alternative were identified and considered for each environmental resource topic:

- The 1994 regulations did not establish a maximum limit on the number of permits CDFG could issue each year. Though based on historic records, CDFG issues an average of 3,650 permits annually; the actual distribution number can vary significantly. Depending on a number of factors, including the current selling price of gold, it is reasonable to assume that demands for permits under this alternative could reach, or even surpass, these peak levels.

- Similarly, the 1994 regulations were also less specific in defining operational requirements compared to the Proposed Program. This includes fewer equipment restrictions (i.e. larger permissible nozzle size) and less restrictive operational regulations (i.e. no daily hour restrictions, less detail on permissible and prohibited disturbances).
- In addition, the listing of open or closed streams would differ under this alternative than under the Proposed Program. While all of the impacts of the Proposed Program would be eliminated in certain geographic areas (areas proposed to be open under the Proposed Program, but closed under the 1994 regulations), this would be offset to varying degrees by increased impacts in other locations (areas that are proposed to be closed under the Proposed Program but would be open under the 1994 regulations). In terms of reducing impacts of the Proposed Program, this alternative would eliminate all impacts in areas closed under the 1994 regulations but proposed to be open under the Proposed Program.

For most of resource topics, the alternatives analysis reveals that this alternative would have similar or greater impacts overall. The 1994 regulations are not as comprehensive in protecting Program Area resources as those included in the Proposed Program. In particular, this alternative would substantially increase adverse effects on biological resources by not including consideration of up-to-date species listings and information regarding special status species and habitats. Cumulatively, this alternative would make a larger contribution to adverse impacts associated with mercury discharges, greenhouse gas emissions and effects on fish species. The remainder of cumulative impacts would likely be similar as described for the Proposed Program.

Water Quality Alternative

The Water Quality Alternative focuses on reducing the water quality impacts of the Program. In addition to applying the proposed regulations of the Proposed Program, this alternative would include additional considerations for water bodies listed as impaired pursuant to Clean Water Act Section 303(d) for sediment or mercury. These listed areas would be closed to suction dredging in order to avoid further degradation of the water body from dredging activities. The listing of areas closed to dredging would be updated as necessary to remain consistent with the State Water Resources Control Board's determinations, which generally occurs every 2 years.

The elimination of disturbances associated with operations at certain locations (listed water bodies) would decrease adverse effects compared to the Proposed Program for the majority of environmental resource topics. In particular, impacts associated with mercury discharges, sediment resuspension, and biological resources would be reduced under this alternative. Operational effects which are not uniquely related to the locations of areas open or closed to suction dredging (for instance, Hazards and Hazardous Materials, Cultural Resources, Traffic and Transportation, Minerals) would remain similar to the Proposed Program in areas where suction dredging is permitted.

Cumulatively, the elimination of disturbances associated with operations at certain locations would decrease the Program's incremental contribution to cumulative effects on mercury discharges and wildlife species compared to the Proposed Program.

Reduced Intensity Alternative

The Reduced Density Alternative is similar to the Proposed Program but would incorporate a combination of additional restrictions on the total number of permits issued and general methods of operation to reduce the intensity of environmental effects in the Program Area. Under this alternative, a maximum of 1,500 permits would be issued annually by CDFG instead of 4,000 under the Proposed Program. This would translate to a 59% decrease in dredging operations permitted annually compared to the recent historic average. Additional operational requirements would include density limitations, additional equipment restrictions, and restrictions on the duration of daily dredging and total number of days each individual could dredge.

The stipulations of this alternative would decrease potential site disturbances and reduce risks of accidents and competition between recreational uses. As a result, this alternative would lessen adverse effects on nearly every environmental resource area compared to the Proposed Program.

Similarly, incremental contributions to cumulative effects would be decreased compared to the Proposed Program. In particular, cumulative impacts associated with mercury discharges and effects on wildlife species would be reduced under this alternative.

Comparison of Alternatives and the Environmentally Superior Alternative

The No Program Alternative is considered the environmentally superior alternative, because it would eliminate all of the adverse effects of the Proposed Program by continuing the moratorium on suction dredging. However, CEQA requires that when the No Program Alternative is selected as the environmentally superior alternative, another environmentally superior alternative must be chosen from one of the action alternatives. Accordingly, the Reduced Intensity Alternative is considered the environmentally superior action alternative. By limiting the locations open to dredging and placing further restrictions on equipment and the number of permits issued, it would reduce the impacts associated with such operations for each resource category compared to the Proposed Program and other alternatives to the greatest extent.

The other Programmatic alternatives were not selected as the environmentally superior alternative for the following reasons:

- ***1994 Regulations Alternative.*** This alternative would eliminate all impacts in areas closed under the 1994 regulations but proposed to be open under the Proposed Program. However, this factor was overwhelmed by the substantially greater impacts that would be anticipated to result from the less restrictive operational requirements, as well as the greater disparity in the protection of biological resources. Since the 1994 regulations do not take into consideration the up-to-date special-status species and habitat information, this alternative have much greater potential for adverse impacts on special-status species.
- ***Water Quality Alternative.*** The avoidance of Program effects in areas listed as impaired for sediment or mercury were not as advantageous in reducing overall Program impacts, as compared to Reduced Intensity Alternative. Several resource areas, including hazards and hazardous materials, cultural resources,

and transportation and traffic would have no discernable reduction in impacts compared to the Proposed Program or the Reduced Intensity Alternative.

Summary of Impacts and Levels of Significance

The impacts of the Proposed Program and significance conclusions are discussed in detail in Chapters 4 and 5. Table ES-2 summarizes the impacts, mitigation measures, and levels of significance identified in this document.

Topic	1994 Provisions	Draft Updated Provisions	Comments
Permit Requirement	Every suction dredge operator or assistant operator must have a permit issued by CDFG	No change	
Permit Application	No requirements specified	Requires valid identification and contact information; list of up to six locations planned for dredging activities, including locational information and approximate dates; list of all dredge equipment which will be used under the permit	New provision
Number of Permits	No limit	Maximum of 4,000 permits issued each year	New provision
Special Suction Dredge Permits	Requires submittal of a written plan and approval by CDFG	Removed	
Special Approval for Suction Dredging in Lakes and Reservoirs	Written approval from the lake operating agency, Regional Water Quality Control Board, and CDFG required	Requires a valid permit, an on-site inspection, and compliance with the provisions of Fish and Game Code section 1602, subdivision(a)	
Equipment Requirements	Nozzle Restriction: - Inside diameter up to six inches (special areas allowed up to eight inches) Hose Restriction: - Inside diameter of the intake hose less than four inches larger than the permitted nozzle size	<u>Nozzle Restriction:</u> - Inside diameter four inches or less - If authorized in writing by CDFG and compliance with the provisions of Fish and Game Code section 1602, subdivision(a) is demonstrated, inside diameter of up to six inches would be allowed -Up to an 8 inch intake nozzle would be permitted at CDFG's discretion in the locations identified in Cal. Code Regs., tit. 14, § 228, subd. (h)(1)(c) <u>Hose Restriction:</u> - Inside diameter of intake hose not more than two inches larger than the permitted nozzle size	Reduced nozzle and hose size, unless authorized by CDFG. New requirement for pump intake screening.

TABLE ES-1: COMPARISON OF 1994 AND DRAFT UPDATED PROVISIONS

Topic	1994 Provisions	Draft Updated Provisions	Comments
		Pump Intake Screening: - woven wire or perforated plant screen openings less than 3/32 inches - profile wire screen openings less than 0.0689 inches with a minimum 27% open area	
	Not included	Only the nozzle size(s), constrictor ring(s) and engine model numbers identified in the permits may be used.	New provision
	Not included	The suction dredge operator's permit number must be affixed to all permitted dredges at all times, in a manner such that the number is clearly visible from the streambank or shoreline. The number must be maintained in such a condition as to be clearly legible.	New provision
Restrictions on Methods of Operation	Winching is permitted if: - materials are only moved within the existing water line - no embedded material from stream or river banks is winched - no deflection of water into the bank occurs as a result of winched material - no power-winch activated shovels, buckets, or rakes are used - no woody streamside vegetation is removed or damaged	Winching is permitted if: - materials are not removed from within the existing water line -no winching of embedded material on stream or river banks is conducted - winching does not cause water to deflect onto the bank -no streamside vegetation is removed or damaged Motorized winches and use of other motorized equipment to move boulders, logs, or other objects from within the stream may be authorized following an on-site inspection and compliance with Fish and Game Code section 1602.	Additional Fish and Game Code section 1602 process for motorized winching
	No dredging into the bank of any stream, lake or river	No dredging within 3 feet of the lateral edge of the current water level, including at the edge of instream gravel bars or under any overhanging banks.	Added specificity

TABLE ES-1: COMPARISON OF 1994 AND DRAFT UPDATED PROVISIONS

Topic	1994 Provisions	Draft Updated Provisions	Comments
Restrictions on Methods of Operation, cont'd	No removal or damage to woody riparian vegetation during dredging operations	No removal or damage to streamside vegetation during suction dredging operations	Expanded provision to include greater protection
	No diversion of a stream or river into the bank	No change to this provision	
	No creation of dams or structures that otherwise obstruct fish passage in a stream, river or lake	No construction of a dam or weir, or concentrating flow in a way that reduced the total wetted area of a river or stream or obstruct fish passage unless authorized following an on-site inspection and compliance with Fish and Game Code section 1602 subdivision(a).	Additional Fish and Game Code section 1602 process
	No import of any earthen material into a stream, river, or lake	No change to this provision	
	Not included	Fueling and servicing of dredging equipment must not result in leaks, spills, or release into waters of the state	New provision
	Not included	No fuel, lubricants, or chemicals may be stored within 100 feet of the current water level. If infeasible, a containment system must be used.	New provision
	Boulders and other material may only be moved within the existing water line. No boulders or other material shall be moved outside the water line.	Stream substrate, including gravel, cobble, boulders, and other materials may only be moved within the current water line.	Expanded provision
	Winching of any material embedded in banks of streams or rivers is prohibited.	Displacement of any material embedded on the banks of streams or rivers is prohibited	Expanded provision
	No person shall cut, move, or destabilize instream any anchored, exposed woody debris such as root wads, stumps or logs	Cutting, removal, or disturbance of any type of instream woody debris is prohibited	Expanded provision

TABLE ES-1: COMPARISON OF 1994 AND DRAFT UPDATED PROVISIONS

Topic	1994 Provisions	Draft Updated Provisions	Comments
Restrictions on Methods of Operation, cont'd	Not included	Reasonable care shall be used to avoid dredging silt and clay materials, the disturbance of which would significantly increase in turbidity.	New provision
	Not included	The tailing piles shall be leveled and returned to the pre-mining grade to the extent possible prior to finishing use of the excavation site, or leaving to work another site.	New provision
	Not included	No disturbance of mussel beds. Dredging shall not occur within 30 yards upstream of a mussel bed or within 10 yards laterally or downstream.	New provision
	Not included	No disturbance of actively spawning fish, fish redds, amphibian egg masses, or tadpoles. If these are encountered, dredging operations must cease and relocate	New provision
	Not included	Willful entrainment of finfish, mollusks, or amphibians is prohibited	New provision
	Not included	Use of wheeled or tracked equipment instream for suction dredging is prohibited	New provision
	Not included	All equipment shall be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in streams or lakes. See Appendix M on Invasive Species. (Zebra, Quagga, and NZ Mud-Snails).	New provision
State Wildlife Areas and Ecological Reserves	Not included	Dredging not permitted in State Wildlife Areas and Ecological Reserves	New provision

TABLE ES-1: COMPARISON OF 1994 AND DRAFT UPDATED PROVISIONS

Topic	1994 Provisions	Draft Updated Provisions	Comments
Compliance with Other Laws	Nothing in any permit issued pursuant to these regulations authorizes the permittee to trespass on any land or property, or relieves the permittee of the responsibility of complying with applicable federal, State, or local laws or ordinances	No change to this provision	
Emergency Closure	CDFG may initiate emergency regulatory action pursuant to Government Code Section 13346.1 to closer any water to suction dredging	No change to this provision	
Location of Activity	See Suction Dredge Use Classifications and Special Regulations (Cal. Code Regs., tit. 14, § 228.5)	See draft regulations (Chapter 2 and Appendix L).	Updated provisions
Timing of Activity	Not included	Active dredging to be conducted only between one half hour after sunrise to sunset.	New provision

TABLE ES-2. SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential Impact	Level of Significance	Mitigation Measures
4.1 Hydrology and Geomorphology		
GEO-1: Erosion, Transport, and Deposition of Alluvial Material in Rivers and Streams Resulting in Dredge Potholes, Tailings Piles, and Other Suspension/Depositional Features	LTS	n/a
GEO-2: Destabilization of the Streambanks	LTS	n/a
GEO-3: Destabilization of Channel Bed Forms Such as Riffle and Bars	LTS	n/a
GEO-4: Destabilization of Channel Profile	LTS	n/a
GEO-5: Streamflow Channelization, Diversion, or Obstruction	LTS	n/a
GEO-6: Alteration or Destabilization of Lake Bed or Shoreline	LTS	n/a
4.2 Water Quality and Toxicology		
WQ-1: Effects of Contaminant Discharges from Dredge Site Development and Use	LTS	n/a
WQ-2: Effects of Contaminant Discharges of Oil or Gasoline Used in Suction Dredges	LTS	n/a
WQ-3: Effects of Turbidity/TSS Discharges from Suction Dredging	LTS	n/a
WQ-4: Effects of Mercury Resuspension and Discharge from Suction Dredging	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
WQ-5: Effects of Resuspension and Discharge of Other Trace Metals from Suction Dredging	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
WQ-6: Effects of Trace Organic Compounds Discharged from Suction Dredging	LTS	n/a
4.3 Biological Resources		
BIO-FISH-1: Direct Effects on Spawning Fish and their Habitat	LTS	n/a
BIO-FISH-2: Direct Entrainment, Displacement or Burial of Eggs, Larvae and Mollusks	LTS	n/a

TABLE ES-2. SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential Impact	Level of Significance	Mitigation Measures
BIO-FISH-3: Effects on Early Life Stage Development	LTS	n/a
BIO-FISH-4: Direct Entrainment of Juvenile or Adult Fish in a Suction Dredge	LTS	n/a
BIO-FISH-5: Behavioral Effects on Juvenile or Adults	LTS	n/a
BIO-FISH-6: Effects on Movement/Migration	LTS	n/a
BIO-FISH-7: Effects on the Benthic Community/Prey Base	LTS	n/a
BIO-FISH-8: Creation and Alteration of Pools and Other Thermal Refugia	LTS	n/a
BIO-FISH-9: Destabilization/Removal of Instream Habitat Elements (e.g., Coarse Woody Debris, Boulders, Riffles)	LTS	n/a
BIO-FISH-10: Destabilization of the Streambank	LTS	n/a
BIO-FISH-11: Effects on Habitat and Flow Rates Through Dewatering, Damming, or Diversions	LTS	n/a
BIO-WILD-1: Effects on Special-Status Terrestrial and Non-Riverine Aquatic Invertebrates (e.g., Fairy Shrimp)	LTS	n/a
BIO-WILD-2: Effects on Special-Status Passerines Associated with Riparian Habitat	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
BIO-WILD-3: Effects on Special-Status Raptors Associated with Riparian Habitat	LTS	n/a
BIO-WILD-4: Effects on other Special-Status and Non-Listed Terrestrial Wildlife Species	LTS	n/a
BIO-PLANT-1: Effects on Aquatic and Wetland-Associated Special-Status Plant Species and their Habitat	LTS	n/a
BIO-PLANT-2: Effects on Upland Special-Status Plant Species and their Habitat	LTS	n/a
BIO-HAB-1: Effects on Federal and State Protected Wetlands	LTS	n/a

TABLE ES-2. SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential Impact	Level of Significance	Mitigation Measures
BIO-HAB-2: A Fundamental Change to the Structure of a Community or Stream Ecosystem, Including Substantial Reductions in Biodiversity or Resiliency to Disturbance	LTS	n/a
BIO-HAB-3: Direct Disturbance to Riparian and Aquatic Habitats, and Other Sensitive Natural Communities	LTS	n/a
BIO-HAB-4: Introduction and/or Dispersal of Aquatic Invasive Species and Pathogens	LTS	n/a
BIO-HAB-5: Introduction and/or Dispersal of Non-Native Invasive (Terrestrial) Plant Species	LTS	n/a
BIO-HAB-6: Effects of Encampments and Other Activities Associated with Suction Dredging	LTS	n/a
4.4 Hazardous Materials		
HAZ-1: Use, Handling, Storage, Transport, Disposal and/or Accidental Release of Oil or Gasoline Used in Suction Dredges	LTS	n/a
HAZ-2: Handling, Storage, Transport and/or Disposal of Toxic Materials Collected by Suction Dredges	LTS	n/a
HAZ-3: Use, Handling, Storage, Transport, Disposal and/or Accidental Release of Materials Used to Process Suction Dredge Concentrates	LTS	n/a
HAZ-4: Human Wastes From Dredge Encampments	LTS	n/a
HAZ-5: Safety Hazards to Dredgers and Others From Suction Dredge Operations, Equipment, and/or Geomorphic Changes	LTS	n/a
HAZ-6: Exacerbation of Wildland Fires	LTS	n/a
HAZ-7: Create Safety Hazards or Releases of Hazardous Materials in Proximity to a School	LTS	n/a
HAZ-8: Exposure to Mercury or Acid Vapor	LTS	n/a

TABLE ES-2. SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential Impact	Level of Significance	Mitigation Measures
4.5 Cultural Resources		
CUL-1: Substantial Adverse Changes, When Considered Statewide, in the Significance of Historical Resources	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
CUL-2: Substantial Adverse Changes, When Considered Statewide, in the Significance of Unique Archaeological Resources	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
CUL-3: Disturbance of Human Remains	LTS	n/a
4.6 Aesthetics		
AES-1: Viewer Response to Suction Dredging Activities at the Suction Dredge Site	LTS	n/a
AES-2: Temporary Degradation of Visual Character from Turbidity Plumes Generated by Suction Dredging	LTS	n/a
AES-3: Alteration of Visual Character or Quality, or Scenic Resources, Following Completion of Suction Dredging Activities	LTS	n/a
AES-4: Alteration of Visual Character or Quality from Upland Activities Related to Suction Dredging	LTS	n/a
4.7 Noise		
NZ-1: Exposure of The Public to Noise Levels in Excess of City or County Standards	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
NZ-2: Result in a Temporary Increase in Noise Above Ambient Levels	LTS	n/a
4.8 Recreation		
REC-1: Effects on the Quality of Recreational Resources or Experience	LTS	n/a
REC-2: Changes in Recreational Facility Use or Availability	LTS	n/a

TABLE ES-2. SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Potential Impact	Level of Significance	Mitigation Measures
4.9 Transportation and Traffic		
TR-1: Traffic Hazards Caused by Suction Dredging	LTS	n/a
TR-2: Inadequate Parking Capacity	LTS	n/a
4.10 Mineral Resources		
MIN-1: Availability of, or Access to, Placer Gold Deposits	B	n/a
MIN-2: Compliance with Applicable Federal and State Mining Regulations	NI	n/a
5. Cumulative Impacts		
CUM-1: Effects on Fish Species and Their Habitats	LTS	n/a
CUM-2: Effects on Wildlife Species and Their Habitats	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
CUM-3: Effects on Special-Status Plant Species	LTS	n/a
CUM-4: Contributions to Non-Attainment Status	LTS	n/a
CUM-5: Greenhouse Gas Emissions	LTS	n/a
CUM-6: Turbidity/TSS Discharges from Suction Dredging	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
CUM-7: Cumulative Impacts of Mercury Resuspension and Discharge from Suction Dredging	SU	CDFG does not have the jurisdictional authority to mitigate these impacts under this Program.
CUM-8: Cumulative Impacts of Resupsension and Discharge of Other Trace Metals From Suction Dredging	LTS	n/a
CUM-9: Cumulative Impacts on Ambient Noise Levels in Suction Dredge Locations	LTS	n/a
CUM-10: Cumulative Impacts on Recreational Facility Use or Availability	LTS	n/a

Definitions

B=Beneficial, LTS=Less-than-Significant, NI=No Impact, SU =Significant and Unavoidable

Chapter 1
INTRODUCTION

The California Department of Fish and Game (CDFG) has prepared this Draft Subsequent Environmental Impact Report (DSEIR) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Suction Dredge Permitting Program (Program or Proposed Program). This DSEIR was prepared in compliance with the California Environmental Quality Act (CEQA) of 1970 (as amended), the State CEQA Guidelines (California Code of Regulations [Cal. Code Regs.] title 14, section (§) 15000 et seq.), and pursuant to the December 2006 Court Order issued by the Alameda Superior Court which stemmed from the May 2005 legal challenge to the existing permitting program (*Karuk Tribe of California et al. v. California Department of Fish and Game* [Super. Ct. of Alameda County, 2005, No. RG05211597]).

1.1 Program Background

The use of vacuum or suction dredge equipment for instream mining is currently prohibited in California by state law (Fish and Game Code [Fish & G. Code] § 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 [Wiggins]). The following is a history of suction dredge mining and CDFG's roles and authority. The current moratorium on suction dredging is discussed in more detail toward the end of this section.

Small-scale suction dredge mining activity in California began in the 1960's and peaked in the late 1970's and early 1980's, when gold prices were high. The CDFG administers a permitting program governing the use of vacuum and suction dredge equipment pursuant to Fish and Game Code section 5653 et seq. (Appendix A). The previous regulations promulgated by CDFG governing suction dredge mining are found in Title 14 of the California Code of Regulations, commencing with section 228. The existing regulatory regime governing the activity as administered by CDFG is rooted in statutory amendments to the Fish and Game Code that took effect in the late 1980's. CDFG promulgated the previous regulations governing suction dredge mining in California consistent with this statutory authority in 1994. Under the statute and regulations, any California resident or non-resident could obtain a suction dredge mining permit from CDFG upon payment of a fee specified by statute. The permits issued by CDFG authorize suction dredge mining throughout California subject to the terms and conditions set forth in the regulations. On average, CDFG has issued approximately 3,200 suction dredge mining permits to California residents annually for the last 15 years prior to the current moratorium established in July 2009. The comparable figure for non-resident suction dredge mining permits issued by CDFG was 450.

CDFG promulgated the previous regulations governing suction dredge mining in 1994 after preparing and certifying an environmental impact report (EIR) (State Clearinghouse Number 93102046) under CEQA (hereafter, 1994 EIR). CDFG considered proposed amendments to the regulations governing suction dredge mining in 1997, releasing a draft subsequent EIR for public review that same year (hereafter, 1997 Draft SEIR). However, the

1997 Draft SEIR was never completed or certified, and the proposed amendments were not adopted.

CDFG's current effort under CEQA stems from a legal challenge to the existing permitting program initiated in Alameda County Superior Court in May 2005 (*Karuk Tribe of California et al. v. California Department of Fish and Game* [Super. Ct. of Alameda County, 2005, No. RG05211597]). The *Karuk* lawsuit focused on the Klamath, Scott and Salmon River watersheds in northern California, and included allegations regarding impacts to various fish species, such as coho salmon (*Oncorhynchus kisutch*), and contended that CDFG's administration of the suction dredging program violated CEQA and various provisions of the Fish and Game Code. In February 2006, various mining interests and a number of individuals joined the lawsuit by court order as party interveners. In December 2006, the Alameda County Superior Court issued an order with the consent of all parties, directing CDFG to "conduct further environmental review pursuant to CEQA of its suction dredge mining regulations and to implement, if necessary, via rulemaking, mitigation measures to protect coho salmon and/or other special status fish species in the watershed of the Klamath, Scott, and Salmon rivers, listed as threatened or endangered after the 1994 EIR" (hereafter, December 2006 Court Order). For purposes of CEQA, the December 2006 Court Order describes CDFG's legal obligations in terms of Public Resources Code Section 21166 and related provisions in the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15162 - 15164). The December 2006 Court Order left it to CDFG's discretion to determine the scope and nature of the environmental review to be completed under CEQA.

As part of its effort to comply with the December 2006 Court Order, CDFG issued a public notice in October 2007, soliciting information regarding the environmental impacts that may occur in California as a result of suction dredge mining under CDFG's existing permitting program (Cal. Reg. Notice Register 2007, No. 42-Z, p. 1783, October 19, 2007) (hereafter, October 2007 Public Notice). In so doing, CDFG sought information from interested members of the public and various public agencies relevant to the following issues:

- Whether suction dredge mining results in adverse impacts to the environment;
- Whether suction dredge mining under CDFG's previous regulations governing such activities results in deleterious effects to fish;
- Whether there are changed circumstances or new information available since 1994 regarding suction dredge mining and the environment generally; and
- Whether changed circumstances or new information available since 1994 indicates that suction dredge mining under CDFG's previous regulations results in new significant or substantially more severe environmental impacts than previously considered by CDFG in the 1994 EIR.

In response to the October 2007 Public Notice, CDFG received comments from approximately 70 federal, state, and local agencies; various tribal, environmental, and mining interests; representatives of the academic and consulting community; and members of the public. Based on this information, CDFG informed the Alameda County Superior Court on January 7, 2008, that it had determined it could not proceed with the court-ordered environmental review in reliance on an addendum prepared pursuant to CEQA (see generally Cal. Code Regs., tit. 14, § 15164). CDFG indicated to the court at the same time that more than minor additions or changes to the 1994 EIR would be necessary and that statewide issues would need to be addressed in a subsequent environmental document in order to fulfill CDFG's obligations under CEQA. On February 26, 2008, CDFG informed the Alameda County Superior Court that it intended to prepare a subsequent environmental impact report (SEIR) that would be statewide in scope in order to comply with the December 2006 Court Order.

This SEIR and related review under CEQA analyzes new significant and substantially more severe environmental impacts that may be occurring under the existing permitting program that were not addressed by CDFG during prior environmental review completed in 1994. The proposed project, for the purposes of this SEIR, consists of the proposed amendments to CDFG's previous regulations governing suction dredge mining throughout California, and suction dredging activities conducted consistent with those amendments (see Chapter 2). (See generally Cal. Code Regs., tit. 14, § 228 et seq.) This proposed project is referred to as the "Proposed Program" or simply the "Program" throughout this document. Given the existing court order prohibiting CDFG from issuing new permits, along with the temporary moratorium on new permits and instream suction dredge mining in California established by statute, this SEIR analyzes the potentially significant environmental effects that may occur with the Proposed Program relative to a "no dredging" environmental baseline.

With respect to proposed amendments to the existing regulations, CDFG is charged by the Fish and Game Code to issue suction dredge permits where CDFG determines, consistent with the regulations, that the operation will not be deleterious to fish (Fish & G. Code, § 5653, subd. (b).). Any proposed amendments to CDFG's previous regulations governing suction dredge mining must be promulgated in compliance with the Administrative Procedures Act (APA) (Gov. Code, § 11340 et seq.). CDFG is conducting "formal rulemaking" under the APA to promulgate the proposed amendments to the previous suction dredge mining regulations concurrently with the related environmental review of the Program as required by CEQA. The scope of the proposed amendments to the previous regulations is discussed below in more detail.

As mentioned above, the use of vacuum or suction dredge equipment for instream mining is currently prohibited in California by state law (Fish & G. Code, § 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins)). As signed into law by Governor Schwarzenegger and effective August 6, 2009, SB 670 (Wiggins) established a temporary moratorium on instream suction dredge mining in California, even with an existing permit issued by CDFG. The new law also prohibits CDFG from issuing any new permits under the previous regulations. The statewide moratorium on instream suction dredge mining and the related prohibition on the issuance of new permits will remain in place until CDFG completes the environmental review required by the December 2006 Court Order; CDFG adopts, as necessary, updates to the previous regulations; and any such updates become effective. (Fish & G. Code, § 5653.1, subd. (b).)

CDFG is also subject to a separate court order prohibiting the issuance of any new suction dredge permits under the previous regulations. Issued by the Alameda County Superior Court as a preliminary injunction on July 9, 2009, the order specifically prohibits CDFG from expending any money from the California General Fund in connection with the suction dredge permitting program. The court clarified on July 27, 2009, that the order and preliminary injunction prohibits CDFG from issuing any new permits under the previous regulations. The order and preliminary injunction will remain in place pending further court order or other direction from the Alameda County Superior Court. (*Hillman et al. v. California Dept. of Fish and Game*, Super. Ct. Alameda County, 2009, No. RG09434444, order filed July 10, 2009.)

1.2 Overview of CEQA Requirements

CEQA is the cornerstone of environmental law and policy in California. CEQA's primary objectives are to:

- ensure that the significant environmental effects of proposed activities are disclosed to decision makers and the public;
- identify ways to avoid or reduce environmental damage; prevent environmental damage by requiring implementation of feasible alternatives and/or mitigation measures;
- make public the reasons for agency approval of projects with significant environmental effects;
- foster multidisciplinary interagency coordination in the review of projects; and
- enhance public participation in the planning process.

With certain strictly limited exceptions, CEQA requires all state and local government agencies to consider the environmental consequences of projects over which they have discretionary authority before taking action on those projects. It establishes both procedural and substantive requirements that agencies must satisfy to meet CEQA's objectives. For example, the agency with decision-making authority (the lead agency) must first assess whether a proposed project would result in significant environmental impacts. If the project could result in significant environmental impacts, CEQA requires that the agency prepare an EIR, analyzing both the proposed project and a reasonable range of potentially feasible alternatives.

As described in the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15121 subdiv. (a)), an EIR is a public information document that assesses potential environmental effects of a proposed project as well as identifies mitigation measures and alternatives to the project that could reduce or avoid potentially significant environmental impacts (Cal. Code Regs., tit. 14, § 15121 subdiv. (a).) Other key requirements include developing a plan for implementing and monitoring the success of the identified mitigation measures, and carrying out specific noticing and distribution steps to facilitate public involvement in the environmental review process.

The EIR is an informational document used in the planning and decision-making process. It is not the purpose of an EIR to recommend either approval or denial of a project. Consistent with CEQA requirements, CDFG has engaged in a good faith, reasonable effort towards full public disclosure of potential project effects. Note that an EIR does not expand or otherwise provide independent authority of the lead agency to impose or address project-related significant environmental impacts beyond that authority that is already within the lead agency's jurisdiction.

1.3 Scope and Intent of this Document

This DSEIR has been prepared in accordance with CEQA, under which the Proposed Program constitutes a "project." That is, in proposing to amend the previous regulations and issue suction dredge permits consistent with the proposed regulations, CDFG is proposing to carry out and approve a discretionary project subject to CEQA. CDFG will use the analyses presented in this DSEIR, and the public response to them, to evaluate the Proposed Program's environmental impacts and to further modify, approve, or deny approval of the Proposed Program based on the analyses provided herein.

1.3.1 Type of EIR: Subsequent EIR

A state or local lead agency prepares an SEIR when, after having prepared and certified an earlier EIR for the same project, new information, changed circumstances, or project changes are proposed that involve new significant or substantially more severe environmental effects not previously addressed in the earlier EIR. (*Id.*, § 15162, subd. (a); Pub. Resources Code, § 21166.) An SEIR is also appropriate where the prospect of such new or more severe environmental effects exist and more than minor additions or changes to the earlier EIR are necessary to provide meaningful, updated environmental review. (See Cal. Code Regs., tit. 14, § 15163, subd. (a).)

CDFG has determined that preparation of the SEIR is necessary for its existing suction dredge mining permitting program in order to comply with the December 2006 Court Order in the *Karuk* litigation. (See Fish & G. Code, § 5653.1, subd. (b)(1).) The SEIR is also necessary for CDFG to meet its broader obligations with respect to the suction dredge permitting program under CEQA. (Pub. Resources Code, § 21166; Cal. Code Regs., tit. 14, § 15162.) For purposes of CEQA, CDFG has determined that the continued issuance of suction dredge mining permits under the existing permitting program could result in new significant or substantially more severe environmental impacts than previously disclosed in the 1994 EIR. Because the 1994 EIR was statewide in scope, and because CDFG believes that new significant or substantially more severe environmental impacts could occur throughout the state (rather than limited to the watersheds of the Klamath, Scott and Salmon rivers, the geographic area at issue in the *Karuk* litigation), this SEIR is most appropriately statewide in scope. Similarly, CDFG believes the SEIR is necessary because more than minor revisions or changes to the 1994 EIR will be required, particularly with the recent enactment of SB 670 (Wiggins) and the issuance of the preliminary injunction in the *Hillman* litigation. It is the intent of this SEIR to analyze the potentially significant environmental impacts associated with the Proposed Program on a statewide basis.

Importantly, CDFG is preparing the SEIR under CEQA pursuant to Public Resources Code section 21166. The SEIR is being prepared, in particular, in connection with CDFG's permitting program for suction dredge mining in California. (See generally Fish & G. Code, §§ 5653, subd. (b), 5653.9.) For purposes of CEQA, the SEIR focuses on suction dredging activities associated with the overall permitting program, including proposed amendments to the previous regulations, issuance of permits consistent with the regulations, and related suction dredging activities. The issuance of individual suction dredge mining permits consistent with any regulations adopted by CDFG is a key component of the proposed project for purposes of CEQA in the present case. In other words, the subsequent issuance of individual suction dredge mining permits consistent with regulations adopted by CDFG under Fish and Game Code section 5653.9 is an important aspect of the discretionary project being analyzed in the SEIR that CDFG proposes to carry out and approve for purposes of CEQA.

That said, certain suction dredging activities under the proposed regulations would require notification under Fish and Game Code section 1602 (see discussion in Section 1.4.6, below, for greater details on these requirements). Individuals intending to engage in suction dredging subject to the section 1602 notification requirement must still obtain a suction dredge mining permit from CDFG pursuant to Fish and Game Code section 5653. Additional independent review and related final action by CDFG under Fish and Game Code section 1602 et seq. will also be required before the dredging activity subject to the required notification occurs, including appropriate environmental review by CDFG under CEQA of the specific proposal at issue. The environmental effects expected with the suction dredging operations subject to the section 1602 notification are addressed in detail in the SEIR to the extent feasible at this juncture based on the statewide scope of the proposed Project. The related analysis in the SEIR reflects CDFG's reasonable, good faith effort in the present context to identify and analyze the expected environmental effects that may occur with individual suction dredging activities subject to the section 1602 notice requirement and additional independent review by CDFG.

Because the Proposed Program involves the adoption of regulations, the SEIR will serve as the functional equivalent environmental analysis under CDFG's related "certified regulatory program" (CRP). (See generally Pub. Resources Code, § 21080.5; Cal. Code Regs., tit. 14, § 15251, subd. (n); Cal. Code Regs., tit. 14, § 777.5 et seq.) In general, CRPs as approved by the Secretary for Natural Resources provide a functional equivalent process for state agencies to prepare analysis and conduct related environmental review under CEQA for certain types of projects that fall within the CRP. In general, environmental documents and related review conducted pursuant to an approved CRP are exempt from Chapter 3 and a limited number of other provisions in CEQA. However, all other CEQA provisions and policies apply. (Pub. Resources Code, § 21080.5, subd. (c).) In the present case, CDFG is preparing the SEIR pursuant to Public Resources Code Section 21166, a section of CEQA that does not fall within the limited exemptions for CRPs provided by section 21080.5. For this and other important reasons, CDFG has prepared the SEIR and conducted related environmental review of the Proposed Program in accordance with CEQA generally, also following the rulemaking process for regulations under the Proposed Program as set forth in CDFG's related CRP and APA (Gov. Code, § 11340 et seq.).

Finally, it bears noting that this SEIR extends beyond the scope of a typical SEIR, in that it presents a comprehensive evaluation of the full range of potential environmental impacts, including topics which were previously addressed in the 1994 EIR. The 1994 EIR, in general, utilized a fairly broad and qualitative approach in evaluating impacts. To bring additional specificity and clarity to the impact discussion and conclusions, this SEIR revisits many of these topics, even where there is not information to suggest that there may be new significant or substantially more severe environmental effects than were evaluated in the 1994 EIR. In large part, the change in existing environmental conditions at the time of preparation of these planning documents lends to the increased scope of this report compared to a typical SEIR. As explained in more detail below, the *Hillman* injunction and the passage of SB 670 prohibiting CDFG from issuing new suction dredge permits necessitate a change in baseline conditions from which to assess potential effects, as compared to an environmental baseline that includes ongoing suction dredging activities consistent with the existing regulations in Title 14 as analyzed in the 1994 EIR.

1.3.2 Baseline Conditions

Under CEQA, the environmental setting or "baseline" serves as a gauge to assess changes to existing physical conditions that will occur as a result of a proposed project. Per CEQA Guidelines (Cal. Code Regs., tit. 14, §15125), for purposes of an EIR, the environmental setting is normally the existing physical conditions in and around the vicinity of the proposed project as those conditions exist at the time the Notice of Preparation (NOP) is published. As underscored by appellate case law, however, the appropriate environmental baseline for a given project may be different in certain circumstances in order to provide meaningful review and disclosure of the environmental impacts that will actually occur with the proposed project.

In the present case, CDFG has determined that a conservative approach to identifying the environmental baseline is appropriate. As described above, instream suction dredge mining is currently prohibited in California pursuant to a state law enacted shortly before the publication of the NOP for this SEIR. (Fish & G. Code, 5653.1, added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins).) The same law and a related court order also prohibit CDFG from issuing new suction dredge permits. CDFG has determined that the appropriate environmental baseline for purposes of CEQA and the analysis set forth below is one that assumes no suction dredging in California, because that was (and remains) the state of the regulatory and physical environment at the time the NOP was published. The SEIR provides a "fresh look" at the impacts of suction dredge mining on the environment generally.

1.4 CEQA and Rulemaking Process

Proposed amendments to CDFG's previous regulations governing suction dredge mining must be promulgated in compliance with the APA (Gov. Code, § 11340 et seq.). The "formal rulemaking" under the APA to promulgate amendments to the existing suction dredge mining regulations is running concurrently with the related environmental review of the SEIR required by CEQA, as they are both considered the Program. Figure 1-1 illustrates the relationship between these dual processes. The following discussion explains the steps in the CEQA and rulemaking process.

1.4.1 Initial Study/Notice of Preparation

An NOP for the Proposed Program was prepared pursuant to CEQA Guidelines (Cal. Code Regs., tit. 14, § 15082) and circulated on October 26, 2009. The NOP presented general background information on suction dredging, the scoping process, the environmental issues to be addressed in the SEIR, and the anticipated uses of the SEIR. The NOP also included the Initial Study which provided a preliminary, relatively brief environmental impact analysis for the Proposed Program. The Initial Study identified the less-than-significant effects expected to result from the Program, thus enabling the SEIR to address in more substantive detail the environmental topics with potentially significant effects. The Initial Study also described the Program as envisioned by CDFG at that time. Information contained in the NOP (activity descriptions, program description, range of topics, etc.) was further refined based on the input received in public comments on the NOP and is reflected in the text of this SEIR. The NOP and Initial Study are included in this SEIR in Appendix B.

1.4.2 Scoping Comments and Meetings

In order to provide the public and regulatory agencies an opportunity to ask questions and submit comments on the scope of the SEIR and regulation amendments, public scoping meetings were held during the NOP review period. The CDFG conducted scoping meetings on consecutive days in three different locations throughout the state given the Program's standing as a "project of statewide, regional, or area wide significance." These scoping meetings were held in Fresno, Sacramento and Redding to solicit input from the public and interested public agencies regarding the nature and scope of environmental impacts to be addressed in the draft SEIR and regulation amendments.

The Scoping Meetings were held at the following locations:

- Fresno, CA - November 16, 2009, 5:00 to 8:00 pm. Held at the California Retired Teachers Association building (3930 E. Saginaw Way, Fresno, 93726);
- Sacramento, CA - November 17, 2009, 5:00 to 8:00 pm. Held at the West Sacramento City Hall Galleria (1110 West Capitol Avenue, West Sacramento, 95691);
- Redding, CA - November 18, 2009, 5:00 to 8:00 pm. Held at the Shasta Senior Nutrition Programs Main Facility (100 Mercy Oaks Drive, Redding, 96003).

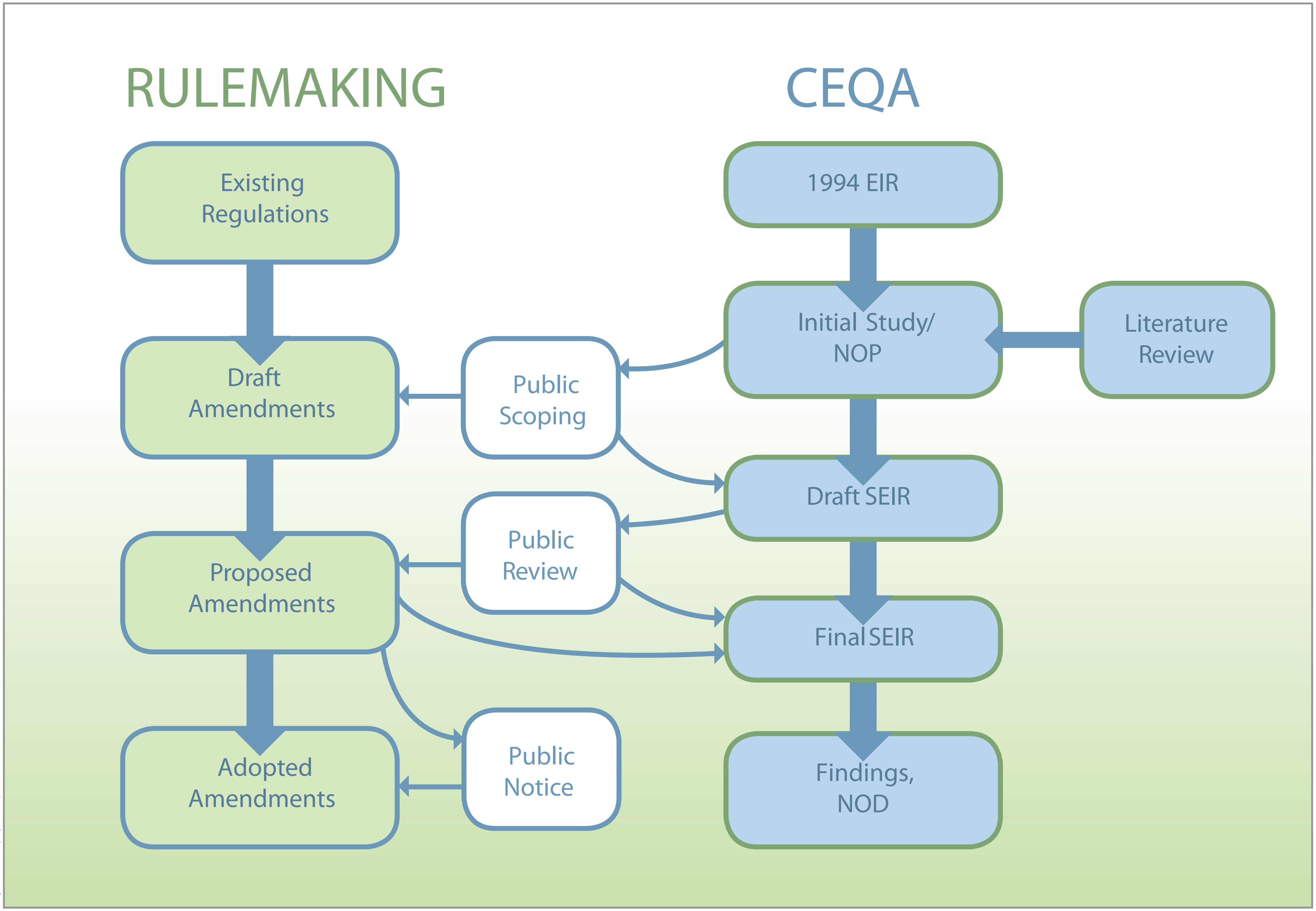
All three meetings used the same format, and interested parties were invited to attend one or all meetings. At the beginning of each meeting, CDFG made a brief presentation in order to provide an overview of the existing program, the legal background leading to this SEIR, the objectives and range of information to be included in the Program, and the CEQA process generally. Afterwards, an interactive session followed, where CDFG staff was available to answer questions and provide information about the Program. CDFG accepted prepared written comments during the meetings, as well as during the 30-day scoping period which concluded on December 3, 2009. Comment forms were also distributed at the scoping meetings for submission of written comments during or after the meeting.

In addition to notices mailed to interested parties, scoping meeting information was published in local newspapers and CDFG's website (www.dfg.ca.gov) prior to the events to solicit attendance.

During the scoping period, 284 comment letters were received. These comments have been summarized, as well as included in their entirety, in a Scoping Report, which is included in this SEIR as Appendix C.

1.4.3 Draft SEIR and Draft Regulations

The primary purpose of the SEIR is to analyze and disclose the direct and reasonably foreseeable indirect physical environmental impacts that may occur as a result of the Proposed Program. As stated earlier, for the purposes of the SEIR, the Proposed Program consists of the draft regulations contained in Chapter 2 and the suction dredging activities expected to occur consistent with those regulations. The Initial Study served to identify the related, potentially significant environmental impacts to be addressed in detail in the DSEIR. The Initial Study also served to inform CDFG's development of the specific proposed amendments to the previous regulations consistent with CDFG's statutory mandate to issue suction dredge permits, but only where the underlying operation will not result in



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Horizon WATER and ENVIRONMENT

Figure 1-1
CEQA and Rulemaking Process

deleterious effects to fish. The DSEIR, as informed by the Initial Study and related public and agency input, provides analysis and disclosure of the potentially significant environmental impacts associated with suction dredge mining under CDFG's permitting program and, where any such impacts are significant, potentially feasible mitigation measures and alternatives that substantially lessen or avoid such effects are identified and discussed.

1.4.4 Public Review and Meetings

The DSEIR and draft regulations are currently undergoing public review for a minimum of 60 days. During this period, CDFG will hold a total of five public meetings in different locations throughout the state. One meeting will be held in each of the following locations: Santa Clarita, Fresno, Sacramento, Redding and Yreka. The meetings will begin with a brief overview of the analysis and conclusions set forth in the DSEIR, as well as a brief overview of the proposed amendments to the previous regulations. This introductory presentation will then be followed by the opportunity for interested members of the public to provide oral comments to CDFG regarding the Proposed Program and the SEIR under CEQA and the APA. Commenters may provide oral or written comments, or both.

The dates, times, and exact locations of the public meetings will be published in local newspapers prior to the events and are included in the Notice of Availability of this SEIR.

1.4.5 Final SEIR and Proposed Regulations

Written and oral comments received in response to the DSEIR will be addressed in a Response to Comments document which, together with the DSEIR and any related changes to the substantive discussion in the DSEIR, will constitute the Final SEIR. In addition, CDFG will consider the comments received to refine, as necessary, the proposed amendments to the previous regulations. The Final SEIR, in turn, will inform CDFG's exercise of its discretion as a lead agency under CEQA in deciding whether or how to approve the Proposed Program as prescribed by the Fish and Game Code.

1.4.6 Further Notification Requirements

As previously indicated, the Proposed Program as analyzed in this SEIR, is the issuance of permits by CDFG pursuant to the draft proposed regulations (detailed in Chapter 2). Any person that intends to engage in suction dredge mining as defined must obtain a suction dredge permit from the California Department of Fish and Game pursuant to Fish and Game Code section 5653 et seq., though certain circumstances also require notification under Fish and Game Code section 1602 (notification of Lake or Streambed Alteration). In general, Fish and Game Code section 1602 requires an entity to notify the CDFG of any proposed activity that may substantially modify a river, stream, or lake. Certain methods of suction dredging, or activities performed to facilitate suction dredging, require notification to the CDFG pursuant to Fish and Game Code section 1602 subdivision (a), in addition to obtaining a valid suction dredging permit. These activities include:

- Use of motorized winches or other motorized equipment for the movement of instream boulders or wood to facilitate suction dredge activities;

- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes or reservoirs; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

Where a notification pursuant to Fish and Game Code section 1602 subdivision (a) is made, an on-site inspection and approval by the CDFG is required. Approval of such operations may require individual CEQA analysis at a project-specific level of detail. In these cases, information contained within this SEIR may be used to support such site-specific tiered evaluations.

1.5 Other Related Activities

As part of preparing this SEIR, CDFG has engaged in several activities which, while not strictly a part of the CEQA or rulemaking process, have supported the development of and analysis contained within the SEIR.

1.5.1 Literature Review

Though not a CEQA requirement, a review of the scientific literature was conducted to develop a better understanding of the existing information associated with suction dredging and its effects (both beneficial and adverse) on the environment. In particular, the literature review focused on information that has become available since the previous environmental analysis completed in 1994. During this step, all relevant information was gathered, reviewed, and assessed, with the resulting body of data used for the Initial Study assessment. The Literature Review is included in this SEIR as Appendix D.

As part of the Literature Review, a review of the existing regulations applicable to suction dredging in other states was conducted. A tabular comparison showing each state's regulatory requirements for suction dredge mining is included in Appendix E of this SEIR.

1.5.2 Suction Dredger Surveys

CDFG conducted a survey of suction dredge permit holders. This survey was an update of a similar survey conducted in 1994. The voluntary survey was designed to gather current information regarding the general characteristics of suction dredging, and the expenditures made by suction dredgers as part of the activity. The information generated by the survey has been used to support the CEQA and rulemaking processes for the Program.

The survey was sent to a random selection of 1,100 California residents, and 500 non-residents, who purchased suction dredge permits in 2008. 734 residents and 337 non-residents returned the survey. The survey and a summary of results are provided in Appendix F.

1.5.3 Public Advisory Committee

Based on suggestions received during the public scoping process, CDFG convened a Public Advisory Committee (PAC) for the Program. The overall goal of the PAC was to assist CDFG in exploring potential regulatory approaches to help with development of proposed regulations for suction dredging. By establishing a collaborative environment, CDFG intended that the PAC would provide input on technical issues relevant to the regulatory development effort. CDFG considered recommendations of all stakeholders. Ultimately, the responsibility to develop new regulations belongs to CDFG.

The PAC was comprised of individuals who are knowledgeable regarding suction dredging, the environmental processes found in streams where dredging activities occur, and/or regulatory issues associated with suction dredging and streams. The members provided a local perspective – as well as topical and on-the-ground knowledge – and had the ability to work collaboratively with people with views different from their own.

The PAC had a diverse membership, including 25 individuals representing federal agencies, county governments, environmental/conservation and mining interests, private industry, the Karuk Tribe, and scientists. The group met on February 11th and 25th, and on March 11, 2010. All three meetings included presentations on a variety of topics. Topics included existing regulations, geomorphology, water quality, mercury, an overview of dredge mining, mining techniques known as power sluicing and high banking, what's changed since the 1994 regulations were adopted, CDFG enforcement history and capabilities, and Tribal fish allocations and harvesting techniques. All the presentations were provided to help increase the PAC's collective understanding of issues pertinent to suction dredging. The discussions and questions that followed each of the presentations have been very informative for CDFG.

The PAC provided valuable input for CDFG's consideration. Specifically, the PAC provided specific suggestions on which components of the 1994 regulations should be considered for inclusion in a future regulatory program. In addition, a few PAC members provided ideas as to how to evaluate potential impacts to fish and the environment. The PAC provided a forum for sharing information and knowledge on a wide range of topics that collectively offered particularly helpful insights for CDFG's consideration.

A summary of the PAC process and outcomes is provided in Appendix G.

1.5.4 Socioeconomic Report

A Socioeconomic Report (Appendix H) has been prepared that provides socioeconomic information to support the conclusions presented in the Economic and Fiscal Impact Statement (Standard Form 399), as part of the APA process. The information in that report focuses on the economic contribution that suction dredging activities makes to regional and local economies in California. In addition, the report addresses the socioeconomic implications of existing and potential conflicts between suction dredging activities and other beneficial uses. The report also includes information on the amount of gold collected by dredgers.

The Socioeconomic Report first describes economic conditions pertaining to suction dredging activity in California in 2008, which was the most recent full year that suction dredging was permitted in California. This information provides a foundation for assessing the effects of the proposed program and other program alternatives on the impacts of suction dredging activities on regional and local economies, and of potential changes in beneficial use conflicts.

The socioeconomic report relies upon responses from holders of suction dredge permits in 2008 and there is no independent analysis available to corroborate estimates of suction dredging effort or expenditures. This type of survey is subject to two forms of bias. The first is “recall bias” and is caused by the lapse of time from the conduct of an activity to the later point in time when the activity is documented. Although the exact nature and magnitude of error introduced by “recall bias” is uncertain, similar studies on hunting and fishing activities suggest that longer recall periods tend to produce larger estimates of the activity. The second type of bias is “strategic bias”. This occurs when a respondent provides a response with the intent to influence an outcome from the use of that data. This is more of a concern in studies where theoretical questions are posed, than it was in this survey. However, it is possible that some respondents chose to increase their estimate of time spent suction dredging or their economic investment in the activity.

The SEIR made use of the survey data primarily to estimate the location and amount of suction dredge activity throughout the State. In the event that either “recall bias” or “strategic bias” occurred in association with this survey, these errors are believed to increase the possibility that a particular impact would be considered significant. In that context, determinations made in this Draft SEIR that a particular impact is less than significant tend to be conservative. Said another way, the likelihood of making a mistake in concluding that an impact is not significant, is reduced.

Note that socioeconomic effects are not considered environmental impacts under CEQA, unless they have relevance to a significant physical impact. The impact analysis therefore makes use of the socioeconomic information as appropriate where such a nexus exists.

1.6 Organization of this DSEIR

This DSEIR contains the following components.

Executive Summary. A summary of the Program, a description of the issues of concern, Program alternatives, and a summary of environmental impacts are provided in this chapter.

Chapter 1, *Introduction*. This chapter describes the purpose and organization of the SEIR and its preparation, review and certification process.

Chapter 2, *Program Description*. This section summarizes the Program, including: a description of the Program purpose and objectives; a brief description of the Program area and areas where the suction dredge mining historically occurs; the Program applicability; proposed updates to the regulations; and related permits and approvals associated with the activity.

Chapter 3, *Activity Description*. This section describes the activities associated with suction dredge mining, including: a summary of the existing regulations; a brief history of gold mining operations in California leading up to, and including, suction dredge mining; and a description of the equipment and methods associated with operation of the activity.

Chapter 4, *Environmental Setting and Impact Analysis*. This chapter begins with an introductory section which identifies resource areas determined not to be affected by the Program. Chapter 4 includes ten subchapters which describe existing environmental conditions and the Proposed Program's anticipated potentially significant environmental impacts. The following resource topics are addressed in Chapter 4:

4.1 Hydrology and Geomorphology,

4.2 Water Quality and Toxicology,

4.3 Biological Resources,

4.4 Hazards and Hazardous Materials,

4.5 Cultural Resources,

4.6 Aesthetics,

4.7 Noise,

4.8 Recreation,

4.9 Transportation and Traffic, and

4.10 Mineral Resources.

Chapter 5, *Other Statutory Considerations*, addresses the Proposed Program's potential to contribute to cumulative impacts. Chapter 5 outlines the Proposed Program's potential to induce growth; and identifies significant, irreversible environmental changes resulting from the Program.

Chapter 6, *Alternatives Analysis*, describes the process through which alternatives to the Proposed Program were developed and screened; evaluates their likely environmental impacts; and identifies the environmentally superior alternative.

Chapter 7, *Report Preparation*, lists the individuals involved in preparing this SEIR.

Chapter 8, *References*, provides a bibliography of printed references, web sites, and personal communications used in preparing this Draft SEIR.

Appendix A contains Fish and Game Code section 5653 et seq.

Appendix B contains the Initial Study and NOP issued by CDFG.

Appendix C contains the Scoping Report and comments received on the NOP.

Appendix D presents the literature review that was prepared for the SEIR.

Appendix E presents the review of existing regulations applicable to suction dredging in other states that was conducted as part of the literature review.

Appendix F contains the suction dredger survey and an overview of the results.

Appendix G contains the summary of the PAC meetings.

Appendix H contains the socioeconomic report on the regulatory amendments.

Appendix I describes habitat types likely to occur in or adjacent to Proposed Program activities.

Appendix J contains species lists generated from the California Natural Diversity Database.

Appendix K describes the life histories of *Fish* action species

Appendix L describes species-based restrictions on Proposed Program activities.

Appendix M contains information regarding the management of invasive species.

1.7 Impact Terminology

This Draft SEIR uses the following terminology to describe environmental effects of the Proposed Program.

- A finding of *no impact* is made when the analysis concludes that the Program would not affect the particular environmental resource or issue.
- An impact is considered *less than significant* if the analysis concludes that there would be no substantial adverse change in the environment and that no mitigation is needed.
- An impact is considered *significant* or *potentially significant* if the analysis concludes that there could be a substantial adverse effect on the environment.
- An impact is considered *significant and unavoidable* if the analysis concludes that there could be a substantial adverse effect on the environment and no feasible mitigation measures are available to reduce the impact to a less-than-significant level.
- An impact is considered *beneficial* if the analysis concludes that there would be a positive change in the environment.
- *Mitigation* refers to specific measures or activities adopted to avoid an impact, reduce its severity, or compensate for it.
- A *cumulative impact* can result when a change in the environment results from the incremental impact of a project when added to other related past, present, or reasonably foreseeable future projects. Significant cumulative impacts may result from individually minor but collectively significant projects. The cumulative impacts analysis in this SEIR focuses on whether the Proposed Program's incremental contribution to other impacts caused by past, present, or probable future projects is cumulatively considerable (i.e., significant).

1.8 Units of Measurement

Both the metric and English systems of measurement are used throughout this document. In general, quantitative values are reported in units that allow for the simplest interpretation of the data. For example, water quality parameters are generally reported in metric units such as milligrams per kilogram (mg/kg), whereas description of dredge equipment (e.g., nozzle size) is reported in standard units.

1.9 Submittal of Comments

CDFG is now circulating this DSEIR for a 60-day public review and comment period which will end on April 29, 2011. CDFG will host five public meetings during this period. The purpose of public circulation and the public meetings is to provide agencies and interested individuals with opportunities to comment on or express concerns regarding the contents of the DSEIR. Specific dates, times and locations for these meetings will be provided in the Notice of Availability, on CDFG's website, and through several other methods.

For those interested, written comments or questions concerning this Draft SEIR should be submitted within this review period and directed to the name and address listed below.

Submittal of written comments via e-mail (Microsoft Word format) would be greatly appreciated.

California Department of Fish and Game
Attn: Mark Stopher
Suction Dredge Program Draft SEIR Comments
601 Locust Street
Redding, CA 96001

e-mail: dfgsuctiondredge@dfg.ca.gov

All documents mentioned herein or related to this Program can be reviewed online at the Program Website (http://www.dfg.ca.gov/suctiondredge).

Written comments received in response to the Draft SEIR during the public review period will be addressed in a new Response to Comments chapter of the Final SEIR.

Chapter 2
PROGRAM DESCRIPTION

2.1 Introduction

2.1.1 Program Purpose

The purpose of the Proposed Program is to establish and implement a permitting program for suction dredging activities consistent with the requirements of Fish and Game Code section 5653 et seq. and the December 2006 Court Order.

2.1.2 Program Objectives

The objectives of the Proposed Program are as follows:

- Comply with the December 2006 Court Order;
- Promulgate amendments to CDFG's previous regulations as necessary to effectively implement Fish and Game Code sections 5653 and 5653.9 and other applicable legal authorities to ensure that suction dredge mining will not be deleterious to fish;
- Develop a program that is implementable within the existing fee structure established by statute for the CDFG's suction dredge permitting program, as well as the existing fee structure established by the CDFG pursuant to Fish and Game Code section 1600 et seq.;
- Fulfill CDFG's mission to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public;
- Ensure that the development of the regulations considers economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation; and
- Fulfill the CDFG's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

2.1.3 Program Area

The scope of the Proposed Program is statewide. Suction dredging occurs in rivers, streams, and lakes throughout the state where gold is present, and CDFG's draft suction dredge regulations identify areas throughout the state that would be open or closed to suction dredging. Most dredging takes place in streams draining the Sierra Nevada, Klamath Mountains, and within the San Gabriel Mountains (see Figure 2-1). Suction dredging may also occur to a lesser extent within the Peninsular Ranges, Transverse Ranges, northern Great Valley, and Coast Ranges.

2.2 Program Description

The Proposed Program, as analyzed in this SEIR, is the issuance of permits and suction dredge activities conducted in compliance with these permits consistent with CDFG's proposed amendments to the existing regulations governing suction dredge mining in California. Note that in all cases, any person that intends to engage in suction dredging mining as defined below must obtain a suction dredge permit from CDFG pursuant to Fish and Game Code section 5653. In certain circumstances, in addition to obtaining a suction dredge permit, suction dredge mining activities also require notification under Fish and Game Code section 1602. The activities associated with the issuance of a Streambed Alteration Agreement pursuant to Fish and Game Code section 1602 would be subject to individualized CEQA review on a permit-by-permit or project-specific basis. In these cases, the analysis in this SEIR is anticipated to serve as a starting point for such a CEQA analysis.

Note that the purpose of promulgating the draft proposed regulations is to ensure that suction dredge mining consistent with the Proposed Program is not "deleterious to fish" (Fish & G. Code § 5653). In other words, with the exception of suction dredging activities subject to Fish and Game Code section 1602, CDFG has determined that issuance of individual suction dredge permits consistent with CDFG's proposed amendments to the existing regulations will not be deleterious to fish.

2.2.1 Applicability

CDFG's regulatory authority governing suction dredge mining is based specifically on Fish and Game Code section 5653 et seq. In general, these provisions of the Fish and Game Code prohibit the use of any vacuum or suction dredge equipment by any person in any river, stream, or lake in California, except as authorized by a permit issued by CDFG in compliance with regulations adopted pursuant to Fish and Game Code section 5653.9 (See Appendix A). CDFG's previous regulations governing the issuance of vacuum and suction dredge permits are found in Title 14 of the California Code of Regulations in sections 228 and 228.5.

For purposes of CDFG's previous regulations, "suction dredging (also called vacuum dredging) is defined as the use of a suction system to remove and return materials at the bottom of a river, stream, or lake for the extraction of minerals." (Cal. Code Regs., tit. 14, § 228.) CDFG's regulatory authority pursuant to Fish and Game Code section 5653 et seq. pertains, in this respect, to the use of vacuum and suction dredge equipment in California for instream mining. Related provisions of the Fish and Game Code underscore the same point. Recently enacted Fish and Game Code Section 5653.1 refers to the use of vacuum and suction dredge equipment for instream mining, prohibiting the use of the equipment for this purpose pending, among other things, completion of the environmental review that includes this SEIR. (Fish & G. Code, § 5653.1, subds. (a)-(b), added by Stats. 2009, ch. 62, § 1 (SB 670 (Wiggins); see also *id.*, § 2 (referring to "suction or vacuum dredge mining").) The same provision of the Fish and Game Code also clarifies that the related temporary moratorium on the use of vacuum and suction dredge equipment is limited to instream mining, and that the section does not expand or provide new authority for CDFG to regulate

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Horizon WATER and ENVIRONMENT

Figure 2-1
Program Area

suction dredging for other purposes governed by other state or federal law. (Fish & G. Code, § 5653.1, subd. (c).)

That CDFG's regulatory authority under Fish and Game Code Section 5653 et seq. is limited to instream suction dredge mining is also underscored by legislative history. Fish and Game Code Section 5653, for example, derives from former Fish and Game Code Section 5653. (See former Fish & G. Code, § 5653, added by Stats. 1961, ch. 1816, § 1 (SB 1459 (Arnold).) Legislative history materials related to this former section specifically casts CDFG's related regulatory authority in terms of instream mining. (See, e.g., Analysis of Senate Bill No. 1459 (Arnold), as amended in the Senate May 26, 1961, Legislative Analyst (referring to the use of "vacuum or suction devices … to carry out gold dredging operations … in rivers and streams"); Letter to Honorable Edmund G. Brown, Governor, from Senator Stanley Arnold (June 16, 1961) (urging the Governor's favorable consideration of the SB 1459 as passed unanimously by the Legislature; "intent of this bill" is to regulate and control the use of "small portable dredging equipment used for gold recovery by skin divers in streams"); State of California Interdepartmental Communication to the Honorable Edmund G. Brown, Governor, from the Director, Department of Fish and Game, Subject: Senate Bill No. 1459 (June 28, 1961) (recommending approval of the bill, indicating it is "designed to control the activities of the 'weekend gold miners' who are using portable suction dredges … in the stream beds of northern and central part of the state").

Against this backdrop, for purposes of this SEIR and the proposed regulations, a person is using suction dredge equipment when all of the following components are operating together for the purpose of vacuuming aggregate from a river, stream or lake:

(1) a vacuum hose operating through the Venturi effect which vacuums sediment from the river, stream or lake; and

(2) An motorized pump; and

(3) A sluice box.

Non-Covered Activities

The following, in turn, is a list of activities that are not considered suction dredging for purposes of the Proposed Program, as they are not subject to CDFG's permitting authority under Fish and Game Code section 5653, subdivision (b). However, other permits or authorizations from CDFG may be required, including in some instances a Lake or Streambed Alteration Agreement pursuant to Fish and Game Code section 1600 et seq.

- Use of a high banker outside of the current water level, when aggregate is delivered to the high banker by hand, shovel, bucket or equipment such as a front-end loader;
- Use of a high banker or sluice box, above the ordinary high water line and above the current water level, where aggregate is vacuumed into the high banker or sluice box from a gravel deposit outside the current water level of a river, lake or stream but which may be wetted by a water pump. This method is often referred to as booming;

- Processing of materials collected using a suction dredge, in upland areas outside the current water level of a river, stream or lake;
- Panning for gold;
- Use of a suction dredge equipment (e.g. pontoons, water pump or sluice box) on a river, stream, or lake where the vacuum hose and nozzle have been removed;
- Sluicing or power sluicing for gold when no vacuum hose or nozzle is used to remove aggregate from the river, stream or lake; and
- Use of vacuums (i.e. shop vacs) and hand tools above the current water level.

There may be other methods of placer mining, or other activities related to suction dredging that are not captured by the above list, but are nevertheless not considered suction dredging by CDFG. In addition, the use of a suction dredge for the purposes of infrastructure maintenance, flood control, or navigational purposes (e.g., a cutterhead dredge) is not considered suction dredging for the purposes of this Program, since it is not used for mineral extraction.

Activities Requiring Additional Notification under Fish and Game Code Section 1602

Some methods of suction dredging, or activities performed to facilitate suction dredging, require notification to CDFG as specified in Fish and Game Code section 1602, subdivision (a)(1). Note that in these cases, both a valid suction dredge permit and notification and compliance with Fish and Game Code section 1602, subdivision (a) are required. These activities include any of the following:

- Use of motorized winches or other motorized equipment for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes or reservoirs; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

2.2.2 Definition of "Deleterious to Fish"

In developing the proposed amendments to the previous regulations CDFG considered what types and under what circumstances suction dredging activities may be deleterious to fish, as that term is used in the authorizing statute. This is guided by, among other things, the definition of "fish" set forth in the Fish and Game Code. Section 45 of the Code defines fish to mean wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn, or ova thereof. For the purposes of this chapter, the word "fish" when written as *Fish* refers to the definition set forth in the Fish and Game Code. References to fin fish are written without italics and in appropriate grammatical context.

Against this backdrop and as highlighted below, CDFG believes section 5653 is intended to assure that the individual and cumulative impacts of permitted suction dredge operations do not substantially affect any species of fish as defined by Fish and Game Code section 45.

This approach is consistent with existing State policy to maintain sustainable populations of fish and wildlife resources. (See, e.g., Fish & G. Code, §§ 1700, subd. (a), 1801, subd. (a).) Generally, CDFG concludes that an effect which is deleterious to *Fish*, for purposes of section 5653, is one which manifests at the community or population level and persists for longer than one reproductive or migration cycle. The approach is also consistent with the legislative history of section 5653. The history establishes that, in enacting section 5653, the Legislature was focused principally on protecting specific fish species from suction dredging during particularly vulnerable times of those species' spawning life cycle.

2.2.3 Development of Regulations

CDFG developed the draft proposed amendments to the existing regulations to ensure that suction dredging would not result in deleterious effects to *Fish*. The development of the draft proposed amendments included analysis of life history, habitat requirements and distribution of the all *Fish* species in the state. Temporal and spatial restrictions on suction dredging were developed to protect select *Fish* species. These species are hereafter are referred to as *Fish* "action" species, and are listed in Chapter 4.3, Table 4.3-1. Other *Fish* species were determined to be adequately protected by the general (non-spatial or temporal) suction dredging requirements, or to receive adequate surrogate protection as a result of temporal and spatial restrictions developed for *Fish* action species.

CDFG developed a series of "use classifications" that were assigned to each *Fish* action species based on the species population viability, abundance and/or reproductive biology. Each use classification stipulates the period of time in the year that streams are proposed to be open to dredging. The use classifications are as shown on Table 2-1.

TABLE 2-1. SUCTION DREDGE USE CLASSIFICATIONS ASSIGNED TO *FISH* ACTION SPECIES

Use Classification	Open Dates
A	No dredging permitted at any time
B	Open to dredging from July 1 through August 31
C	Open to dredging from June 1 through September 30
D	Open to dredging from July 1 through January 31
E	Open to dredging from September 1 through January 31

In general, use classifications were assigned to each species to protect critical life stages (e.g., spawning, incubation, early emergence/development) (See Chapter 4.3, Table 4.3-1). For certain species, CDFG determined that any level of dredging activity in suitable or occupied habitat would have the potential to result in a deleterious effect to the species. For these species, occupied or suitable habitat is proposed to be closed to dredging (i.e., Class A).

The use classes assigned to each of the *Fish* action species were then applied to streams within the species range or known distribution. There is a broad range of data that provide information on species distribution in the state. The quality and accuracy of these data resources vary. In all cases, CDFG has attempted to use the best available data on species distribution. However, because of the broad spatial extent of the Proposed Program, it was not feasible to incorporate all data resources specific to each action species. Thus, the draft proposed amendments to the existing regulations often reflect broad understanding of a species distribution within the state. In many cases, modifications to the species' use classification or known distributions were applied based on regional knowledge of the species status and life history characteristic. In all cases these modifications were based on the potential for suction dredging activities to be deleterious to *Fish* species. Modifications to the generic use classifications or spatial data used for each species are described in Chapter 4.3, Table 4.3-1 or Appendix L.

In many cases, the use classifications for action species overlap, which required the development of additional uses classifications which would provide protection for all action species which may occur in a given stream. Table 2-2 provides a matrix that demonstrates the resulting stream restrictions for all scenarios of overlapping uses classifications. New use classifications were developed as necessary to address certain overlaps.

TABLE 2-2. SELECTION MATRIX FOR OVERLAP OF *FISH* ACTION SPECIES USE CLASSIFICATIONS

		Class							
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Class	**A**	A	A	A	A	A	A	A	A
	B	-	B	B	B	A	B	A	B
	C	-	-	C	F	G	F	G	C
	D	-	-	-	D	E	F	G	D
	E	-	-	-	-	E	G	G	E
	F	-	-	-	-	-	F	G	F
	G	-	-	-	-	-	-	G	G
	H	-	-	-	-	-	-	-	H

The resulting use classes are provided in Table 2-3.

TABLE 2-3. SUCTION DREDGE USE CLASSIFICATIONS ASSIGNED TO STREAMS WITHIN THE STATE

Class	Open Dates
A	No dredging permitted at any time
B	Open to dredging from July 1 through August 31
C	Open to dredging from June 1 through September 30
D	Open to dredging from July 1 through January 31
E	Open to dredging from September 1 through January 31
F	Open to dredging from July 1 through September 30
G	Open to dredging from September 1 through September 30
H	Open to dredging throughout the year

The use classifications have been applied to all rivers and streams in the state. Note that in some cases, the spatial extent of the use classifications have been modified from the actual boundaries of the species' occupied habitat or range for ease of interpretation and enforcement. Lakes and reservoirs are assigned to Class H, that is, open year round to dredging. However, as specified in the draft regulations, any person proposing suction dredging in a lake must notify the Department pursuant to Fish and Game Code section 1602.

2.2.4 Draft Proposed Regulations

CDFG has developed amendments to the previous regulations with the fundamental purpose of ensuring that suction dredge mining will not be deleterious to fish. To illustrate the proposed regulatory amendments, the previous regulations are included below with revised text; text that has been deleted is shown in ~~strikethrough~~, and text that has been inserted is shown in underline**:**

TITLE 14. NATURAL RESOURCES

Division 1. Fish and Game Commission-Department of Fish and Game

Subdivision 1. Fish, Amphibians and Reptiles

Chapter 8. Miscellaneous

Section 228 and 228.5. Suction Dredging.

PROPOSED AMENDMENTS TO REGULATIONS

[February 25, 2011]

§ 228. Suction Dredging.

The Department has adopted this Section and Section 228.5 pursuant to Fish and Game Code Section 5653.9, and to make specific and otherwise implement Fish and Game Code Section 5653, specifically. Pursuant to that authority, the Department finds that suction dredging subject to and consistent with the requirements of Sections 228 and 228.5 will not be deleterious to fish.

~~For purposes of these regulations, suction dredging (also called vacuum dredging) is defined as the use of a suction system to remove and return material at the bottom of a stream, river, or lake for the extraction of minerals. Suction dredges may only be used pursuant to the following provisions:~~

(a) Definitions.

(1) Suction dredging. For purposes of Section 228 and 228.5, the use of vacuum or suction dredge equipment (i.e. suction dredging) is defined as the use of a motorized suction system to vacuum material from the bottom of a river, stream or lake and to return all or some portion of that material to the same river, stream or lake for the extraction of minerals. A person is suction dredging as defined when all of the following components are operating together:

(A) A vacuum hose operating through the Venturi effect which vacuums sediment from the river, stream or lake; and

(B) A motorized pump; and

(C) A sluice box.

(2) Motorized. For purposes of these regulations, "motorized" means a mechanical device powered by electricity or an internal combustion engine.

~~(a)~~ (b) Permit requirement. Every person who operates the intake nozzle of any suction dredge shall have a suction dredge permit in his/her immediate possession. Any amended permit shall also be in his/her immediate possession. Suction dredge permits sold in 2011 or 2012 shall be valid through December 31, 2012. Beginning on January 1, 2013, suction dredge permits shall be valid from the first of the year for one calendar year or if issued after the first of the year, for the remainder of that year. The ~~department~~ Department will charge a fee for each suction dredge permit pursuant to Section 5653(c)~~,~~ of the Fish and Game Code. Permits may be obtained at any Department license sales office. ~~Regional office or at the License and Revenue Branch office.~~

Any person with a qualifying disability under the Americans with Disabilities Act, who presents a Disabled Person DMV registration or other State, or Federal approved documentation of disability, and who requires assistance in operating a suction dredge may also apply for an assistant suction dredge permit. Any assistant suction dredge permit issued by the ~~department~~ Department to such disabled person shall be in the disabled applicant's name and shall be issued at no charge. The disabled permittee must be present at the dredge site while the assistant is operating the suction dredge. The assistant shall have the assistant suction dredge permit in his/her immediate possession while assisting the disabled permittee in suction dredging activities. Any assistant may be prosecuted for a violation of the laws or regulations pertaining to suction dredging. The disabled permittee may be prosecuted for a violation of the laws or regulations pertaining to suction dredging committed by his/her assistant.

~~(b) Special Suction Dredge Permits.~~

~~(1) Submission of Written Plan. Any person may apply for a special suction dredge permit to operate a suction dredge with a nozzle larger than prescribed in subsections 228(c)(1), 228.5(c) or 228.5(d) by submitting a written plan detailing the proposed operation. If the department determines that no deleterious effect to fish may occur, the special permit shall be issued with conditions prescribed by the department to protect fish resources. A special permit will be issued or denied within 30 days upon receipt of a complete written plan detailing the proposed operation unless the time is intended by mutual agreement. If the special permit is denied, the justification for denial will be provided.~~

~~(2) Appeal of Denial. The denial of a special suction dredge permit may be appealed in writing to the director or his/her designee (hereinafter referred to as director). If the director determines that no deleterious impacts to fish may occur, the director shall authorize the issuance of the permit. The director shall respond to an appeal within 45 days from receipt of notice of request to appeal.~~

(c) Permit application. Suction dredge permit applications shall be made available at any Department license sales office using the Department’s Automated License Data system. No suction dredge permit shall be issued by the Department unless an application has been completed by the permit applicant. At a minimum, a completed application shall contain all of the following information:

(1) Identification and contact information for the permit applicant based on any of the following:

(A) Any license document or identification number previously issued via the Department’s Automated License Data System

(B) A valid driver's license or identification card issued to him or her by the Department of Motor Vehicles or by the entity issuing driver's licenses from the licensee's state of domicile

(C) U.S. Birth Certificate

(D) U.S. Certificate or Report of Birth Abroad

(E) Immigration and Naturalization Service American Indian Card

(F) Birth Certificate or passport issued from a US Territory

(G) U.S. Passport

(H) U.S. Military Identification Cards (Active or reserve duty, dependent, retired member, discharged from service, medical/religious personnel)

(I) Certificate of Naturalization or Citizenship.

(2) A list of up to six locations where the permit applicant plans to suction dredge. Location information shall include either:

(A) County, river or stream or lake name, township, range, section, quarter section, base, and meridian; or

(B) Approximate centerpoint of the location using latitude and longitude.

For each location the California Active Mining Claim number, if applicable, and approximate dates of proposed dredging shall be listed.

(3) A list of all suction dredge equipment that will be used under the permit, including nozzle size, constrictor ring size (if needed), engine manufacturer and model number, and horsepower.

(d) Permit Amendment. Applicants may amend suction dredge permits at a Department license sales office, at no additional cost, by submitting an amendment form providing the Department with their permit number and modifications or additions to the information specified in the original application.

(e) Permits Requiring an On-site Inspection. Where an on-site inspection is required, a permit, or amended permit, is not valid until the permittee has contacted the appropriate Department Regional Office to arrange an inspection, the inspection has been completed and the Department has provided written approval of the proposed suction dredging.

(f) Permits Requiring Notification Pursuant to Section 1602 of the Fish and Game Code. Where a notification is required pursuant to these regulations, a permit, or amended permit, is not valid until the permittee has in their possession documentation of compliance with Fish and Game Code section 1602, subdivision (a), for the proposed suction dredging, including a copy of their notification to the Department; any response to the notification by the Department pursuant to Fish and Game Code Section 1602, subdivision(a)(4)(A)(i); and a Streambed Alteration Agreement if required.

(g) Number of Permits. The Department shall issue a maximum of 4,000 permits annually, on a first-come, first-serve basis. Any permits issued in 2011 will apply toward the limitation of 4,000 permits for 2012.

~~(e)~~ (h) Permit Revocation or Suspension. Any suction dredge permit, or assistant suction dredge permit~~, or special suction dredge permit~~ may be revoked or suspended by the ~~regional manager~~ assistant chief of enforcement ~~or his/her designee (hereinafter referred to as regional manager)~~ for any violation of the laws or regulations pertaining to suction dredging. The ~~regional manager~~ assistant chief of enforcement may, in his/her discretion, revoke or suspend the permit ~~or permit renewal or permanently revoke the renewal of a permit~~ based on past citations or convictions of such laws or regulations. Once a permit has been revoked, no new suction dredge permit may be obtained by that person in the current year or for the calendar year subsequent to the revocation. An assistant chief of enforcement’s ~~regional manager's~~ decision to revoke or suspend a permit ~~or permit renewal~~ may be appealed to the director. Any revocation or suspension of a permit ~~or permit renewal~~ shall be in accordance with the following provisions:

(1) Hearing When Permittee Convicted of Violation. In the case where the permittee has already been convicted of a violation of Section 5653 or 5653.3 of the Fish and Game Code or any regulation pertaining thereto permitted by said code, the ~~regional manager~~ assistant chief of enforcement shall schedule a hearing to consider the revocation or suspension of his/her permit~~ or permit renewal~~:

(A) Notification. The ~~regional manager~~ assistant chief of enforcement shall notify the permittee, by certified letter, of the intent to consider the revocation or suspension of his/her permit ~~or permit renewal~~ at the hearing. The certified letter shall include the following information:

1. Name of permittee and last known address.
2. Date, time and place of scheduled hearing,
3. Reason for impending action, including a statement as to date and fact of conviction(s).
4. A copy of Section 228, Title 14, California Code of Regulations.
5. A statement that the permittee has the right to appear and to be represented by legal counsel.

(B) Recording. The proceedings of the hearing shall be recorded by an electronic tape recording system.

(C) Reading of Documents. At the hearing, the ~~regional manager~~ assistant chief of enforcement shall read the conviction documents. The ~~department~~ Department shall provide the ~~regional manager~~ assistant chief of enforcement with the background information regarding the violation(s) and conviction(s) and shall submit into the record a copy of the document(s) which include(s) the facts of the conviction(s) of a violation of the regulation(s) or statute.

(D) Statement by Permittee. The permittee shall make his/her statement regarding the violation (s) and conviction(s), and may argue that extenuating circumstances were such as to not warrant the loss of his/her permit. ~~or permit renewal.~~

(E) Questioning. The permittee or the ~~department~~ Department personnel may be questioned by the ~~regional manager~~ assistant chief of enforcement.

(F) Findings. At the conclusion of the hearing, the ~~regional manager~~ assistant chief of enforcement shall make a decision which contains findings or reasons for the proposed action.

(G) Notification by Certified Mail. After the hearing, the ~~regional manager~~ assistant chief of enforcement shall provide the permittee, by certified mail, a copy of the final decision.

(H) Appeal. The permittee may request an appeal in writing to the director within 30 days of the date of receipt of the ~~regional manager's~~ assistant chief of enforcement’s decision. The director shall respond to an appeal in writing within 45 days from receipt of notice of request to appeal.

(I) Judicial Review. The permittee may request judicial review by filing a petition for writ of mandate in accordance with provisions of the Code of Civil Procedure within 30 days from the date of the decision. The record of the proceedings shall be prepared by the ~~department~~ Department and delivered to the petitioner within 30 days after receipt of petitioner's request and upon payment of the fee specified in Section 69950 of the Government Code.

(2) Hearing When Permittee Cited but Not Convicted. In the case where the permittee has not been convicted of a violation of Section 5653 of the Fish and Game Code or any regulation pertaining to suction dredging permitted by said code, but has been cited by the ~~department~~ Department, the ~~regional manager~~ assistant chief of enforcement shall schedule a hearing to consider the revocation or suspension of his/her permit. ~~or permit renewal:~~

(A) Notification. The ~~regional manager~~ assistant chief of enforcement shall notify the permittee, by certified letter, of the ~~regional manager's~~ intent to consider the revocation or suspension of his/her permit ~~or permit renewal~~ at the hearing. The certified letter shall include the following information:

1. Name of permittee and last known address.

2. Date, time and place of scheduled hearing.

3. Reason for impending ~~regional manager's~~ assistant chief of enforcement’s action, including a concise statement of the acts or nonactions of the permittee which constitutes a violation of Section 5653 or 5653.3, of the Fish and Game Code or regulations made pursuant thereto.

4. A copy of Section 228, Title 14, California Code of Regulations.

5. A statement that the permittee has the right to appear and to be represented by legal counsel.

(B) Recording. The proceedings of the hearing shall be recorded by an electronic type recording system.

(C) Presentation of Evidence. The permittee and the ~~department~~ Department have the right to present evidence at the scheduled hearing as follows:

1. Oral evidence shall be taken on oath or affirmation.

2. Each party may call and examine witnesses, cross-examine opposing witnesses on any relevant matter, may rebut evidence against him/her, and may orally argue the matter.

3. The hearing need not be conducted according to the technical rules relating to evidence and witnesses. Any relevant evidence shall be admitted if it is the sort of evidence on which responsible persons would rely in the conduct of serious affairs.

4. The permittee or the ~~department~~ Department may be questioned by the ~~regional manager~~ assistant chief of enforcement.

(D) Findings. At the conclusion of the hearing, the ~~regional manager~~ assistant chief of enforcement shall make a decision based on the evidence presented at the hearing and shall issue written findings containing reasons for the decision and the evidence relied upon.

(E) Notification by Certified Mail. After the hearing the ~~regional manager~~ assistant chief of enforcement shall provide the permittee, by certified mail, a copy of the final decision.

(F) Appeal. The permittee may request an appeal in writing to the director within 30 days of the date of receipt of the ~~regional manager's~~ assistant chief of enforcement's decision. The director shall respond to an appeal in writing within 45 days from receipt of notice of request to appeal.

(G) Judicial Review. The permittee may request judicial review by filing a petition of writ of mandate in accordance with provisions of the Code of Civil Procedure within 30 days from the date of the director's decision. The record of the administrative proceedings shall be prepared by the ~~department~~ Department and delivered to the petitioner within 30 days after receipt of petitioner's request and upon payment of the fee specified in Section 69950 of the Government Code.

~~(d)~~ (i)~~Special Approval for~~ Use of Suction Dredges in Lakes and Reservoirs. No suction dredging is permitted within the current water level in any lake or reservoir unless: ~~without written approval from the lake operating agency, the Regional Water Quality Control Board, and an on-site inspection and approval by the Department.~~

(1) The Department has conducted an on-site inspection and approved the proposed suction dredging operation in writing;
(2) The permittee has a valid suction dredge permit; and
(3) The permittee has in their possession documentation of compliance with Fish and Game Code section 1602(a) for the proposed suction dredging operation, including a copy of the

permittees notification to the Department; any response by the Department pursuant to Fish and Game Code Section 1602(a)(4)(A)(i) and, in the event a Streambed Alteration Agreement is required authorization from the Department for the proposed suction dredging operations at the location specified in the permit application pursuant to subdivision (c).

For purposes of this subdivision, suction dredging in any tributary river or stream in the exposed bed of any partially empty lake or reservoir shall be governed by the requirements in Section 228.5 for that tributary river or stream.

~~(c)~~ (j) Equipment Requirements.

(1) Nozzle Restriction. No suction dredge having an intake nozzle with an inside diameter larger than ~~six~~ four inches may be used unless:

~~(A) Otherwise provided under special regulations of Section 228.5, Title 14, California Code of Regulations~~

(A) The Department has conducted an on-site inspection and approved a larger nozzle size in writing; the maximum inside diameter of the intake nozzle is no larger than six inches, or eight inches where allowable under Section 228, subdivision(j)(1)(E); and

(B) The permittee has a valid suction dredge permit; and

(C) The permittee has in their possession documentation of compliance with Fish and Game Code section 1602, subdivision(a), for the proposed suction dredging operation, including a copy of his/her notification to the Department; any response to the notification by the Department pursuant to Fish and Game Code Section 1602, subdivision(a)(4)(A)(i); and specific authorization from the Department for a vacuum nozzle greater than 4" in diameter if a Streambed Alteration Agreement is required; or

(D) A constricting ring with an inside diameter not larger than ~~six~~ four inches has been attached to the intake nozzle. This constricting ring must be of solid, one-piece construction with no openings other than the intake and openings not greater than one inch between the constricting ring and nozzle. It must be welded or otherwise permanently attached over the end of the intake nozzle. No quick-release devices are permitted.

(E)Suction dredge intake nozzles up to eight inches in diameter may be permitted at the Department's discretion in accordance with Section 228 subdivision(j)(1)(A) only on the following rivers:

(1) American (Placer, Nevada, and EI Dorado counties)
(2) Cosumnes (Sacramento, Amador and EI Dorado counties)
(3) Feather (Butte, Plumas, and Yuba counties)
(4) Klamath (Del Norte, Humboldt and Siskiyou counties)
(5) Merced (Mariposa and Merced counties)
(6) Mokelumne (Amador, Calaveras and San Joaquin counties)
(7) Scott (Siskiyou County)
(8) Trinity (Trinity and Humboldt counties); and
(9) Yuba (Sierra and Yuba counties)

(2) Hose Restriction. The inside diameter of the intake hose may not be more than ~~four~~ two inches larger than the permitted intake nozzle size.

(3) Pump Intake Screening. The intake for the suction dredge pump shall be covered with screening mesh. Screen mesh openings shall not exceed 3/32 inch (2.38 mm) for woven wire or perforated plate screens, or 0.0689 inch (1.75 mm) for profile wire screens, with a minimum 27% open area.

(4) Only the nozzle size(s), constrictor ring(s) and engine model numbers identified in the permit may be used.

(5) The suction dredge permit number must be affixed to all permitted dredges at all times, in a manner such that it is clearly visible from the streambank or shoreline. The number must be displayed in lettering at least three inches in height and maintained in such a condition as to be clearly visible and legible.

~~(f)~~ (k) Restrictions on Methods of Operation.

~~(1) Winching is permitted under the following provisions:~~

(1) Motorized winching or the use of other motorized equipment to move boulders, logs, or other objects is prohibited, unless:

(A) The Department has conducted an on-site inspection and approved the proposed suction dredging operations in writing; and

(B) The permittee has a valid suction dredge permit; and

(C) The permittee has in their possession documentation of compliance with Fish and Game Code section 1602, subdivision (a), for the proposed suction dredging operations, including a copy of their notification to the Department; any response to the notification by the Department pursuant to Fish and Game Code Section 1602, subdivision(a)(4)(A)(i); and specific authorization from the Department for motorized winching if a Streambed Alteration Agreement is required.

(2) Winching, whether motorized or hand powered, must be conducted under the following provisions:

(A) Boulders and other material may only be moved within the ~~existing~~ current water ~~line~~ level. No boulders or other material shall be moved outside the current water ~~line~~ level.

(B) Winching of any material embedded on banks of streams or rivers is prohibited.

(C) Winching of any material into a location which deflects water into the bank is prohibited.

(D)~~ No power-winch activated shovels, buckets or rakes may be used to excavate materials in the stream course~~. Nets and other devices may be used to collect cobbles and boulders by hand for removal from dredge holes providing the materials are not removed from within the current water level. ~~line.~~

(E) No woody streamside vegetation shall be removed or damaged. Trees of sufficient size and condition may be used as winch and pulley anchor points provided that precautions are taken to ensure that trunk surfaces are protected from cutting or abrasions and the tree is not uprooted.

~~(2) No person may suction dredge into the bank of any stream, lake or river.~~

(3) No person may suction dredge within three feet of the lateral edge of the current water level, including at the edge of instream gravel bars or under any overhanging banks.

~~(3)~~(4) No person shall remove or damage ~~woody riparian~~ streamside vegetation during suction dredge operations.

~~(4)~~(5) No person shall cut, move or destabilize instream ~~any anchored, exposed~~ woody debris such as root wads, stumps or logs.

~~(5)~~(6) No person shall divert the flow of river or stream ~~a stream or river~~ into the bank.

~~(6) No person shall dam or otherwise obstruct a stream, river or lake in such a manner that fish passage is impeded.~~

(7)For the purpose of suction dredge mining subject to this section, no person shall construct a dam or weir, concentrate flow in a way that reduces the total wetted area of a river or stream, or obstruct fish passage; unless:

(A) The Department has conducted an on-site inspection and approved the proposed suction dredging operations in writing; and

(B) The permittee has a valid suction dredge permit; and

(C) The permittee has in their possession, documentation of compliance with Fish and Game Code section 1602, subdivision (a), for the proposed suction dredging operations, including a copy of their notification to the Department; any response by the Department to the notification pursuant to Fish and Game Code Section 1602, subdivision (a)(4)(A)(i); and specific authorization for the proposed activity if a Streambed Alteration Agreement is required.

~~(7)~~ (8) No person shall import any earthen material into a stream, river or lake.

(9) All fueling and servicing of dredging equipment must be done in a manner such that petroleum products and other substances are not leaked, spilled or placed where they may pass into the waters of the state.

(10) No fuel, lubricants or chemicals may be stored within 100 feet of the current water level. Where this is not feasible, a containment system must be in place beneath the fuel, lubricants or chemicals.

(11) Stream substrate, including gravel, cobble, boulders and other material may only be moved within the current water level.

(12) No person shall displace any material embedded on banks of rivers or streams.

(13) No person shall disturb any mussel beds. A mussel bed is defined as an area of any size where the density of mussels is 40 or more/square yard. Suction dredging activities, including deposition of tailings, shall not occur within 30 yards upstream of a mussel bed, nor within 10 yards laterally or downstream.

(14) Reasonable care shall be used to avoid dredging silt and clay materials that would result in a significant increase in turbidity.

(15) The permittee shall level all tailing piles, returning the site to the pre-mining grade to the greatest extent possible, prior to finishing use of the excavation site for the suction dredging season, or working another excavation site.

(16) No person shall disturb any redds, actively spawning fish, amphibian egg masses or tadpoles. If encountered while operating a suction dredge, the permittee must cease operations and relocate dredging activities.

(17) The willful entrainment of finfish, mollusks or amphibians is prohibited.

(18) No person shall use wheeled or tracked equipment instream as part of suction dredging.

(19) All suction dredge equipment shall be cleaned of mud, oil, grease, debris, and plant and animal material before use in a river, stream or lake.

~~Operating outside these Restrictions on Methods of Operation may require compliance with Fish and Game Code sections 1600-1607,which governs lake and streambed alterations~~.

(l) State Wildlife Areas and Ecological Reserves. Consistent with Title 14, Sections 550, subdivision (b)(10), and 630, subdivision (a)(1), of the California Code of Regulations, suction dredging is prohibited in State Wildlife Areas and Ecological Reserves.

(~~g~~m) Compliance with Other Laws. Nothing in any permit issued pursuant to these regulations authorizes the permittee to trespass on any land or property, or relieves the permittee of the responsibility of complying with applicable federal, State, or local laws or ordinances.

(~~h~~n) Emergency Closure. The Department may initiate emergency regulatory action pursuant to Government Code Section 11346.1 to close any water to suction dredging.

(o) Location of Suction Dredge Operations. No person shall suction dredge in locations other than those identified in the permit application pursuant to subdivision (c).

(p) Timing of Activity. Active suction dredging operations may only be conducted between one half hour after sunrise to sunset.

§ 228.5. Suction Dredge Use Classifications and Special Regulations.

(a) Suction Dredge Use Classifications. For purposes of these regulations, the following classes of suction dredge use restrictions apply in California's lakes, reservoirs, streams and rivers as specified:

(1) Class A: No dredging permitted at anytime.
(2) Class B: Open to dredging from July 1 through August 31.
(3) Class C: Open to dredging from June 1 ~~the fourth Saturday in May~~ through September 30 ~~October 15~~.
(4) Class D: Open to dredging from July 1 through January 31 ~~September 15~~.
(5) Class E: Open to dredging from September 1 ~~July 1~~ through January 31 ~~September 30~~.
(6) Class F: Open to dredging from July 1 ~~December 1~~ through September 30 ~~June 30~~.
(7) Class G: Open to dredging from September 1 ~~the fourth Saturday in May~~ through September 30.
(8) Class H: Open to dredging throughout the year.

(b) Suction Dredge Special Regulations. The Suction Dredge Use Classifications (Section (a), above) apply for each of the rivers or streams in each of the counties listed below. Lakes and reservoirs statewide are Class H.

(1) Alameda

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All rivers and streams from Alameda Creek south to the Alameda-Santa Clara County line, unless otherwise noted below	C
Multiple Waters	All rivers and streams east of I-680 and south of I-580, and above 1,000 ft elevation, unless otherwise noted below	D
Alameda Creek	Mainstem and all tributaries below 300 ft. elevation	A
Alameda Creek	Mainstem and all tributaries above 300 ft. elevation	F
Arroyo Viejo	Mainstem and all tributaries	A
Codornices Creek	Mainstem	A
Peralta Creek	Mainstem	A
San Leandro Creek	Mainstem from San Francisco Bay upstream to Lake Chabot	A
San Lorenzo Creek	Mainstem and all tributaries	A
Sausal Creek	Mainstem and all tributaries	A
Ward Creek	Mainstem	A

(2) Alpine

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Arnot Creek	Mainstem and all tributaries	A
Caples Lake (Tributaries)	All waters draining to Caples Lake	A
Carson River, East Fork	Mainstem and all tributaries from California-Nevada State Line to Carson Falls, unless otherwise noted	G
Carson River, East Fork	Mainstem and all tributaries upstream from Carson Falls	A
Carson River, West Fork	Mainstem and all tributaries, unless otherwise noted below	G
Disaster Creek	Mainstem and all tributaries	A

Heenan Lake (Tributaries)	All waters draining to Heenan Lake	A
Mokelumne River, North Fork	Mainstem and all tributaries	A
Murray Canyon Creek	Mainstem and all tributaries	A
Pleasant Valley Creek	Mainstem and all tributaries	A
Poison Flat Creek	Mainstem and all tributaries	A
Silver Creek	Mainstem and all tributaries upstream from Pennsylvania Creek	A
Silver Fork American River	Mainstem and all tributaries	A
Silver King Creek	Mainstem and all tributaries upstream from Snodgrass Creek	A
Silver Lake (Tributaries)	All waters draining to Silver Lake	A
Stanislaus River, North Fork	Mainstem and all tributaries upstream from Union Reservoir	A
Truckee River, Upper	Mainstem and all tributaries	A

(3) Amador

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Streams	All rivers and streams in the County west of Highway 49, unless otherwise noted below	C
Cole Creek	Mainstem and all tributaries upstream from North Fork Mokelumne River	A
Cosumnes River, South Fork	Mainstem and all tributaries	C
Mokelumne River	Mainstem from Pardee Dam upstream to Highway 49	D
Mokelumne River, North Fork	Mainstem and all tributaries from Tiger Creek to Salt Springs Reservoir, except Cole Creek	E
Mokelumne River, North Fork	Mainstem and all tributaries from Salt Springs Reservoir upstream to Amador-Alpine County Line	A
Silver Fork American River	Mainstem and all tributaries	A
Silver Lake (Tributaries)	All waters draining to Silver Lake	A
Tragedy Creek	Mainstem and all tributaries	A

(4) Butte

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	C
Butte Creek	Mainstem and all tributaries from County Line upstream to Centerville Head Dam, unless otherwise noted	A
Butte Creek	Mainstem and all tributaries from Centerville Head Dam upstream to De Sabla Powerhouse, unless otherwise noted	E
Butte Creek	Mainstem and all tributaries from De Sabla Powerhouse upstream to Bolt Creek, unless otherwise noted	F
Butte Creek	Mainstem and all tributaries upstream of Bolt Creek, unless otherwise noted	A
Fall River	Mainstem	A
Feather River	Mainstem to Lake Oroville	A
Feather River, Middle Fork (Mainstem)	Mainstem upstream of Lake Oroville	D
Feather River, Middle Fork (Tributaries)	All tributaries to Middle Fork Feather River upstream of Lake Oroville, unless otherwise noted	E
Feather River, North Fork (Mainstem)	Mainstem upstream of Lake Oroville	D
Feather River, North Fork (Tributaries)	All tributaries to North Fork Feather River upstream of Lake Oroville, unless otherwise noted	E
Feather River, South Fork (Mainstem)	Mainstem upstream of Lake Oroville	D
Feather River, South Fork (Tributaries)	All tributaries to South Fork Feather River upstream of Lake Oroville, unless otherwise noted	E
Mill Creek	Mainstem and tributaries	A
Pinkard Creek	Mainstem upstream of Lost Creek Reservoir	A
Sacramento River	Mainstem	F

(5) Calaveras

Water	Description	Class
Multiple Waterss	All rivers and streams in the County, unless otherwise noted below	H

Multiple Waters	All rivers and streams in the County west of Highway 49, unless otherwise noted below	C
Calaveras River, North Fork	Mainstem and all tributaries, except Jesus Maria Creek	D
Calaveras River, South Fork	Mainstem and all tributaries	D
Forest Creek	Mainstem and all tributaries	E
Jesus Maria Creek	Mainstem and all tributaries	E
Mokelumne River	Mainstem from Pardee Dam upstream to Highway 49	D
Mokelumne River, Middle Fork	Mainstem and all tributaries, except Forest Creek	D
Mokelumne River, North Fork	Mainstem and all tributaries from Tiger Creek upstream to Salt Springs Reservoir	E
Mokelumne River, North Fork	Mainstem and all tributaries upstream from Salt Springs Reservoir	A
Mokelumne River, South Fork	Mainstem and all tributaries	D
Stanislaus River, North Fork	Mainstem and all tributaries	D

(6) Colusa

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County west of I-5, unless otherwise noted below	D
Multiple Waters	All rivers and streams in the County east of I-5, unless otherwise noted below	F
Butte Creek	Mainstem	A

(7) Contra Costa

Water	**Description**	**Class**
Multiple Waters	All rivers and streams west of I-680, unless otherwise noted below	H
Multiple Waters	All rivers and streams east of I-680, unless otherwise noted below	F
Alhambra Creek	Mainstem and all tributaries	A
Garrity Creek	Mainstem and all tributaries	A
Mount Diablo Creek	Mainstem and all tributaries	A
Pacheco Creek	Mainstem and all tributaries	A
Pinole Creek	Mainstem and all tributaries	A
Refugio Creek	Mainstem and all tributaries	A

Rodeo Creek	Mainstem and all tributaries	A
San Pablo Creek	Mainstem and all tributaries	A
Walnut Creek	Mainstem and all tributaries	A
Wildcat Creek	Mainstem and all tributaries	A

(8) Del Norte

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	F
Blue Creek	Mainstem and all tributaries	A
Klamath River	Mainstem	D
Smith River, Middle Fork	Mainstem and all tributaries from Smith River upstream to Knopti Creek	B
Smith River, North Fork	Mainstem and all tributaries	B
Smith River, South Fork	Mainstem and all tributaries from Smith River upstream to Quartz Creek	B

Special Closures for Thermal Refugia in Klamath River Watershed A 200-foot radius* at the confluence of each of the following waters with the Klamath River is Class A:
Water
Hunter Creek
McGarvey Creek
Salt Creek
*Pursuant to Fish and Game Code 5653(d) It is unlawful to possess a vacuum or suction dredge in areas, or in or within 100 yards of waters, that are closed to the use of vacuum or suction dredges. Therefore, the effective closure at thermal refugia locations is a 500-foot radius from the center-line of the confluence of the tributary stream with the mainstem river.

(9) El Dorado

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
American River, Middle Fork (Mainstem)	Mainstem from North Fork American River upstream to Oxbow Dam, unless otherwise noted	D
American River, Middle Fork (Tributaries)	All tributaries from North Fork American River upstream to Oxbow Dam, unless otherwise noted	E
American River, North Fork	Mainstem and all tributaries from Folsom Lake upstream to confluence	C

	with the Middle Fork American River, unless otherwise noted	
American River, South Fork	Mainstem and all tributaries from Folsom Lake upstream to Slab Creek Reservoir, unless otherwise noted	C
American River, South Fork	Mainstem and all tributaries from Slab Creek Reservoir upstream to Highway 50 Bridge at Riverton, unless otherwise noted	E
American River, South Fork	Mainstem and all tributaries upstream from Highway 50 Bridge at Riverton, unless otherwise noted	C
Camp Creek	Mainstem and all tributaries from North Fork Cosumnes River upstream to Dennis Canyon	E
Camp Creek	Mainstem and all tributaries upstream of Dennis Canyon	A
Cosumnes River, Middle Fork	Mainstem and all tributaries	E
Cosumnes River, North Fork	Mainstem and all tributaries except Camp Creek	D
Cosumnes River, South Fork	Mainstem and all tributaries	C
Glen Alpine Creek	Mainstem and all tributaries from Fallen Leaf Lake	A
Ice House Reservoir (Tributaries)	All waters draining to Ice House Reservoir	A
Lake Tahoe (Tributaries)	All waters draining to Lake Tahoe, unless otherwise noted	G
Middle Creek	Mainstem from Silver Fork American River	A
Pyramid Creek	Mainstem and all tributaries	A
Rock Creek	Mainstem and all tributaries	A
Rubicon River	Mainstem and all tributaries upstream from the Placer-El Dorado County Line	A
Taylor Creek	Mainstem from Lake Tahoe to Fallen Leaf Lake	A
Trout Creek	Mainstem and all tributaries upstream from Saxon Creek	A
Truckee River, Upper	Mainstem and all tributaries from Lake Tahoe upstream to El Dorado-Alpine County Line	A
Webber Creek	Mainstem and all tributaries	A

(10) Fresno

Water	Description	Class
Multiple Waters	All rivers and streams in the County above 4,000 feet elevation	A
Multiple Waters	All rivers and streams east of I-5 between 1,000 to 4,000 feet, unless otherwise noted below	F
Multiple Waters	All rivers and streams east of I-5 less than 1,000 feet elevation, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the County west of I-5	D
San Joaquin River	Mainstem between Redinger and Kerckhoff Reservoirs	C

(11) Glenn

Water	Description	Class
Multiple Waters	All rivers and streams in the County west of I-5, unless otherwise noted below	F
Multiple Waters	All rivers and streams in the County east of I-5, unless otherwise noted below	C
Butte Creek	Mainstem	A
Sacramento River	Mainstem	F

(12) Humboldt

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	F
Blue Creek	Mainstem and all tributaries	A
Boise Creek	Mainstem	A
Camp Creek	Mainstem	A
Beaver Creek	Mainstem	A
Special Closures for Thermal Refugia in Klamath River Watershed		
A 200-foot radius* at the confluence of each of the following waters with the Klamath River is Class A:		
Water	**Water (continued)**	
Aikens Creek	Pearch Creek	
Blue Creek	Pecwan Creek	
Bluff Creek	Pine Creek	
Boise Creek	Red Cap Creek	

Camp Creek	Roach Creek
Cappell Creek	Roselano Creek
Cheenitch Creek	Roselano Creek
Coon Creek	Slate Creek
Crawford Creek	Trinity River
Donahue Flat Creek	Tully Creek
Hopkins Creek	Ullathorne Creek
Ikes Creek	Whitmore Creek
Ikes Creek	Wilson Creek
Miners Creek	
*Pursuant to Fish and Game Code 5653(d) It is unlawful to possess a vacuum or suction dredge in areas, or in or within 100 yards of waters, that are closed to the use of vacuum or suction dredges. Therefore, the effective closure at thermal refugia locations is a 500-foot radius from the center-line of the confluence of the tributary stream with the mainstem river.	

(13) Imperial

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waterbodies	All shoreline pools and irrigation drains within one mile of the Salton Sea	A
Colorado River	Mainstem	A
San Felipe Creek	Mainstem and all tributaries	A

(14) Inyo

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Amargosa River	Mainstem upstream of Death Valley Road (CA 127)	A
Antelope Spring Creek	Mainstem	A
Baker Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Big Pine Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Birch Creek (Drains to Deep Springs Valley)	Mainstem and associated springs within Inyo National Forest Boundary	A

Birch Creek (Bishop Creek tributary)	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Bishop Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Bishop Creek Canal	All canal	E
Bishop Creek, North Fork (east of Bishop)	Mainstem from Owens River upstream to Highway 6	E
Cabin Creek	Mainstem	A
China Ranch Wash	Mainstem	A
Cottonwood Creek (Drains to Owens Lake)	Mainstem and tributaries upstream of Little Cottonwood Creek	A
Cottonwood Creek (East of Highway 168)	Mainstem	A
Diaz Creek	Mainstem and tributaries upstream of John Muir Wilderness Boundary	A
Division Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Fish Slough	Mainstem, all tributaries, pools and springs	A
Goodale Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Haiwee Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Hogback Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Horton Creek	Mainstem from Owens River upstream to Highway 395	E
Horton Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Independence Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Leidy Creek	Mainstem	A
Lone Pine Creek	Mainstem and tributaries upstream of Whitney Portal Campground	A
McGee Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
McNally Canal	1000 ft above and below Silver Canyon Road	E
Mule Springs	Upper and Lower Ponds, and spring channels	A
Oak Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Owens River	Mainstem above 3,500 ft elevation upstream to Inyo-Mono Counity Line	E

Pine Creek	Mainstem downstream of Inyo National Forest Boundary	E
Pine Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Rawson Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Red Mountain Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Rock Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Rock Creek, Lower	Mainstem and tributaries between Owens River and Inyo-Mono County Line	E
Sawmill Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Shannon Canyon Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Summit Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Taboose Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Thibaut Creek	Mainstem and tributaries above Inyo National Forest Boundary	A
Tinemaha Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Tuttle Creek	Mainstem and tributaries in John Muir Wilderness	A
Warm Springs	Upper Pond, Lower Pond, Outflow Ditch and North Ditch	A

(15) Kern

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All rivers, streams, and lakes in the County east of Hwy 99 and north of Hwy 58, unless otherwise noted below	F
Multiple Waters	All rivers and streams in the County east of Hwy 99, north of Hwy 58, south of Hwy 178, and east of Hwy 14 above 4,000 feet elevation	A
Multiple Waters	All rivers and streams in the County east of Hwy 99 and north of Hwy 178 above 4,000 feet elevation	A
Kern River, South Fork (Tributaries)	All tributaries to the South Fork Kern River upstream of Lake Isabella and north of SR 178	A

(16) Kings

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Garza Creek	Mainstem and all tributaries	D
Avenal Creek	Mainstem and all tributaries	D
Baby King Creek	Mainstem and all tributaries	D
Big Tar Creek	Mainstem and all tributaries	D

(17) Lake

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Bucknell Creek	Mainstem	F
Butts Creek	Mainstem and all tributaries	F
Cache Creek	Mainstem and all tributaries	F
Clear Lake (Tributaries)	All waters draining to Clear Lake	E
Eel River	Mainstem and all tributaries upstream from the Lake-Mendocino County Line to Lake Pillsbury.	F

(18) Lassen

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Ash Creek	Mainstem	A
Beaver Creek	Mainstem and all tributaries	C
Cedar Creek	Mainstem and all tributaries	E
Cottonwood Creek	Mainstem	A
Hamilton Branch	Mainstem from Lassen-Plumas County Line upstream to Highway 147	D
Horse Creek	Mainstem and all tributaries from Pit River upstream to Little Valley	C
Pine Creek	Mainstem and all tributaries	A
Pit River	Mainstem and all tributaries from Horse Creek upstream to Lassen-Modoc County Line	C
Pit River, South Fork	Mainstem and all tributaries	E
Secret Creek	Mainstem and all tributaries	E
Susan River	Mainstem and all tributaries	E

(19) Los Angeles

Water	Description	Class
Multiple Waters	All rivers, streams, lakes in the County, unless otherwise noted below	H
Multiple Waters	All rivers, streams, lakes in San Gabriel Mountains south of SR-2, unless otherwise noted below	E
Multiple Waters	All rivers, streams, lakes in the Los Angeles River watershed, unless otherwise noted below	E
Multiple Waters	All rivers, streams, lakes in the San Gabriel River watershed, unless otherwise noted below	E
Alder Creek	Mainstem from Big Tujunga Creek upstream to Mule Fork	A
Aliso Canyon	Mainstem within Angeles National Forest	A
Arrastre Canyon	Mainstem	A
Arroyo Sequit	Mainstem and all tributaries	A
Bear Canyon Creek	Mainstem and all tributaries	A
Bear Gulch	Mainstem	A
Big Mermaids Creek	Mainstem	A
Big Rock Creek, South Fork	Mainstem and all tributaries upstream of Big Rock Creek	A
Big Tujunga Creek	Mainstem and all tributaries from Hansen Flood Control Basin upstream to Big Tujunga Reservoir	E
Big Tujunga Creek	Mainstem from Big Tujunga Reservoir upstream to Alder Creek	A
Boquet Creek	Mainstem from Santa Clara River upstream to Boquet Reservoir	A
Castaic Creek	Mainstem from Santa Clara River upstream to I-5 crossing	A
Castaic Creek	Mainstem from Castaic Lake upstream to Bear Canyon	A
Cattle Canyon Creek	Mainstem	A
Cow Canyon Creek	Mainstem	A
Devil's Canyon	Mainstem	A
Fish Creek	Mainstem from Castaic Creek upstream to Cienega Spring	A
Fish Canyon Creek	Mainstem	A
Little Rock Creek	Mainstem and all tributaries, from Little Rock Reservoir	A
Malibu Creek	Mainstem and all tributaries, unless otherwise noted	E

Malibu Creek	Mainstem from Pacific Ocean upstream to Rindge Dam	A
Mill Creek	Mainstem from Big Tujunga Creek upstream to Monte Cristo Creek	A
Pacoima Canyon Creek	Mainstem above dam	E
Piru Creek	Mainstem from Pyramid Reservoir upstream to Lockwood Creek	A
Piru Creek	Mainstem from Lake Piru upstream to Fish Creek	A
San Dimas Canyon Creek	below dam	E
San Francisquito Canyon	Mainstem	A
San Gabriel River, East Fork	Mainstem and all tributaries from San Gabriel Reservoir upstream to Cattle Canyon Creek	E
San Gabriel River, East Fork	Mainstem and all tributaries upstream of Cattle Canyon Creek	A
San Gabriel River, West Fork	Mainstem upstream from San Gabriel Reservoir	A
Santa Clara River	Mainstem upstream of Los Angeles-Ventura County line	A
Topanga Creek	Mainstem from Pacific Ocean to Topanga Canyon Blvd crossing near Cuesta Cala Rd	A
Vincent Gulch	Mainstem and tributaries	A

(20) Madera

Water	**Description**	**Class**
Multiple Waters	All rivers, streams, lakes in the County above 4,000 feet elevation	A
Multiple Waters	All rivers, streams, lakes in the County from 1,000 to 4,000 feet elevation	F
Multiple Waters	All rivers, streams, lakes in the County below 1,000 feet elevation	H

(21) Marin

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Corte Madera Creek	Mainstem and all tributaries	A
Coyote Creek	All mainstem from San Pablo Bay upstream to Flamingo Rd crossing	A

Creamery Bay Creek	Mainstem	A
Easkoot Creek	Mainstem	A
East Schooner Creek	Mainstem	A
Estero Americano	Mainstem and all tributaries	A
Estero San Antonio	Mainstem	A
Gallinas Creek	Mainstem and all tributaries	D
Home Ranch Creek	Mainstem	A
Laguna Creek	Mainstem	A
Lagunitas Creek	Mainstem and all tributaries	A
McKinnon Gulch	Mainstem	A
Miller Creek	Mainstem	A
Millerton Gulch	Mainstem and all tributaries	A
Morse Gulch	Mainstem	A
Muddy Hollow Creek	Mainstem	A
Novato Creek	Mainstem and all tributaries	A
Petaluma River	Mainstem and all tributaries	A
Pine Gulch Creek	Mainstem and all tributaries	A
Redwood Creek	Mainstem and all tributaries	A
San Clemente Creek	Mainstem	D
San Rafael Creek	Mainstem	D
Stemple Creek	Mainstem and all tributaries	A
Stinson Gulch	Mainstem	A
Walker Creek	Mainstem and all tributaries	A
Wilkins	Mainstem	A

(22) Mariposa

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County above 5,000 feet elevation	A
Multiple Waters	All rivers and streams in the County from 2,000 to 5,000 feet elevation	D
Multiple Waters	All rivers and streams in the County below 2,000 feet elevation	F

(23) Mendocino

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	F
Albion River	Mainstem and all tributaries	A
Big River	Mainstem and all tributaries	A
Big Salmon Creek	Mainstem and all tributaries	A

Caspar Creek	Mainstem and all tributaries	A
Cottaneva Creek	Mainstem and all tributaries	A
Dehaven Creek	Mainstem and all tributaries	A
Doyle Creek	Mainstem from Pacific Ocean	A
Elk Creek	Mainstem and all tributaries	A
Garcia River	Mainstem and all tributaries	A
Gualala River	Mainstem and all tributaries	A
Hardy Creek	Mainstem and all tributaries	A
Hare Creek	Mainstem and all tributaries	A
Howard Creek	Mainstem and all tributaries	A
Juan Creek	Mainstem and all tributaries	A
Little River	Mainstem and all tributaries	A
Little Salmon Creek	Mainstem and all tributaries	A
Navarro River	Mainstem and all tributaries	A
Noyo River	Mainstem and all tributaries	A
Pudding Creek	Mainstem and all tributaries	A
Russian Gulch	Mainstem and all tributaries	A
Russian River	Mainstem and all tributaries, excluding East Fork Russian River above Coyote Dam.	A
Ten Mile River	Mainstem and all tributaries from Pacific Ocean	A
Usal Creek	Mainstem and all tributaries from Pacific Ocean	A
Wages Creek	Mainstem and all tributaries from Pacific Ocean	A

(24) Merced

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the County west of I-5, unless otherwise noted below	D
Multiple Waters	All rivers and streams in the County east of Highway 99, unless otherwise noted below	C
Merced River	Mainstem	C
San Joaquin River	Mainstem and all tributaries	C

(25) Modoc

Stream	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Ash Creek	Mainstem and all tributaries	A
Boles Creek	Mainstem	A
Willow Creek	Mainstem	A
Lost River (Mainstem)	Mainstem from Clear Lake Reservoir upstream to California-Oregon State Line	A
Lost River (Tributaries)	All tributaries	D
Pit River	Mainstem and all tributaries, unless otherwise noted	F
Turner Creek	Mainstem and all tributaries	A
Willow Creek	Mainstem from Goose Lake	A
Lassen Creek	Mainstem from Goose Lake	A
Davis Creek	Mainstem from Goose Lake	A
Pine Creek	Mainstem from Goose Lake	A
Cottonwood Creek	Mainstem from Goose Lake	A

(26) Mono

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Unnamed Creeks	Mainstem of unnamed creeks between Dechambeau Creek and Beartrack Creek	A
Unnamed Creeks (Owens River/Lake Crowley Drainage)	Mainstem and tributaries of all Unnamed Creeks within Inyo National Forest, from Willfred Creek west to Deadman Creek	A
Unnamed Creeks (Owens River/Lake Crowley Drainage)	Mainstem and tributaries of all Unnamed Creeks within Inyo National Forest, from Dry Creek south to Little Hot Creek	A
Unnamed Creek (Drains to Mono Lake)	Mainstem and tributaries of Unnamed Creek west of Dry Creek	A
Unnamed Creeks	Mainstem and tributaries, Unnamed Creeks east of Lower Rock Creek, from Witcher Creek south to Mono - Inyo County Line	A
Adobe Creek	Mainstem and tributaries upstream from Inyo National Forest Boundary	A
Birch Creek	Mainstem and tributaries	A

Buckeye Creek	Mainstem and tributaries upstream of Buckeye Hot Spring	A
Buckeye Creek	Mainstem and tributaries downstream of Buckeye Hot Spring	G
ByDay Creek	Mainstem	A
Convict Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Cowcamp Creek	Mainstem and tributaries	A
Crooked Creek	Mainstem and tributaries upstream of Lake Crowley	A
Dechambeau Creek	Mainstem and tributaries upstream of Highway 395	A
Desert Creek (Drains to Fourmile Hill Creek - Nevada)	Mainstem and tributaries	G
Dexter Creek	Mainstem and tributaries south of Highway 120	A
Driveway Creek	Mainstem and tributaries upstream of Highway 395	A
Dry Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Dunderberg Creek	Mainstem and tributaries	A
East Walker River	Mainstem and tributaries, unless otherwise noted	G
Fish Slough	Mainstem, all tributaries, pools and springs	A
Green Creek	Mainstem and tributaries above Dynamo Pond	A
Grouse Creek	Mainstem and tributaries above Highway 395	A
Hilton Creek	Mainstem and tributaries upstream from Inyo National Forest Boundary	A
Hot Creek (Little Walker River tributary north of Bridgeport)	Mainstem and tributaries above Little Walker River	G
Hot Creek (Owens River tributary)	Mainstem and tributaries downstream of Forest Service Road 3S07	E
Hot Creek (Owens River tributary)	Mainstem and tributaries upstream of downstream of Forest Service Road 3S07	A
Junction Creek	Mainstem and tributaries	A
Labrosse Creek	Mainstem and tributaries	A
Laurel Creek	Mainstem and tributaries	A
Leidy Creek	Mainstem and tributaries	A
Lee Vining Creek	Mainstem and tributaries upstream of Highway 395	A

Little Hot Creek	Mainstem from Owens River upstream to Inyo National Forest Boundary	E
Little Hot Creek	Mainstem and tributaries upstream to Inyo National Forest Boundary	A
Little Walker River	Mainstem and tributaries upstream of Willow Flat	A
Mammoth Creek	Mainstem and tributaries upstream of Hot Creek	A
McGee Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
McLaughlin Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Mill Creek (Drains to West Walker River)	Mainstem and tributaries	A
Mill Creek (Drains to Mono Lake)	Mainstem and tributaries upstream of Highway 395	A
Molybdnite Creek	Mainstem and tributaries upstream of Dry Creek	A
Murphy Creek	Mainstem	A
North Canyon Creek	Mainstem and tributaries	A
O'Harrel Canyon Creek	Mainstem and tributaries	A
Owens River	Mainstem from Inyo-Mono County Line to Dry Creek confluence	E
Owens River	Mainstem and tributaries upstream of Dry Creek	A
Poison Creek	Mainstem and tributaries	A
River Spring Lakes	All ponds in Sections 19, 24 and 30 , T01N, R31E	A
Robinson Creek	Mainstem and tributaries upstream of Twin Lakes	A
Robinson Creek	Mainstem and tributaries downstream of Twin Lakes	G
Rock Creek	Mainstem and tributaries upstream of Highway 395	A
Rush Creek	Mainstem and tributaries upstream of Highway 395	A
Sawmill Creek	Mainstem and tributaries within Inyo National Forest	A
Silver Creek	Mainstem	A
Slinkard Creek	Mainstem and tributaries	A
Virginia Creek	Mainstem and tributaries above Toiyabe National Forest Boundary	A
Walker Creek	Mainstem and tributaries upstream of Highway 395	A

West Walker River and Tributaries	All Mainstem and tributaries, unless otherwiswe noted	G
West Walker River (Tributaries)	All tributaries above 7,000 feet, unless otherwise noted	A
Wilfred Creek	Mainstem and tributaries upstream of Inyo National Forest Boundary	A
Wolf Creek	Mainstem	A

(27) Monterey

Water	**Description**	**Class**
Multiple Waters	All rivers and streams west of Hwy 101	A
Multiple waters	All rivers and streams east of Hwy 101, unless otherwise noted below	D
Salinas River	Mainstem	A

(28) Napa

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Napa River	Mainstem and all tributaries	A

(29) Nevada

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Bear River	Mainstem and all tributaries from Camp Far West upstream to Lake Combie	C
Deer Creek	Mainstem and all tributaries from Nevada-Yuba County Line upstream to Lake Wildwood	A
Dry Creek	Mainstem and all tributaries	C
East Fork Creek	Mainstem and all tributaries	A
Faucherie Lake (Tributaries)	All waters draining to Faucherie Lake	A
Fordyce Lake (Tributaries)	All waters draining to Fordyce Lake	A
Independence Lake (Tributaries)	All waters draining to Independence Lake	A
Macklin Creek	Mainstem and all tributaries	A
Rattlesnake Creek	Mainstem and all tributaries	A
Truckee River	Mainstem	G

Truckee River (Tributaries)	All tributaries, unless otherwise noted	G
Yuba River	Mainstem downstream of Englebright Reservoir	A
Yuba River	Mainstem and all tributaries from Englebright Reservoir upstream to South Yuba River	C
Yuba River, Middle	Mainstem and all tributaries from Nevada-Yuba County Line upstream to Milton Reservoir, unless otherwise noted	E
Yuba River, South Fork (Mainstem)	Mainstem from Yuba River upstream to Lake Spaulding	D
Yuba River, South Fork (Tributaries)	All tributaries from Yuba River upstream to Lake Spaulding	E

(30) Orange

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	E
Cristianitos Creek	Mainstem and all tributaries upstream of San Diego County line	A
San Juan Creek	Mainstem and all tributaries	A
Santiago Creek	Mainstem and all tributaries upstream of Irvine Lake	A
Talega Creek	Mainstem	A

(31) Placer

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All streams in County further west than the intersection of I-80 and Placer Hills Road, unless otherwise noted below	C
American River, Middle Fork (Mainstem)	Mainstem upstream of Oxbow Dam	D
American River, Middle Fork (Tributaries)	All tributaries upstream of Oxbow Dam	E
American River, North Fork	Mainstem and all tributaries from Lake Clementine Dam to Big Valley Canyon	G
Lake Tahoe (Tributaries)	All waters draining to Lake Tahoe	G

Pole Creek	Mainstem and all tributaries	A
Rubicon River	Mainstem and all tributaries upstream of Oxbow Dam to the Placer-El Dorado County Line	E
Truckee River	Mainstem and all tributaries	G

(32) Plumas

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted	H
Antelope Lake (Tributaries)	All waters draining to Antelope Lake	A
Big Ravine	Mainstem and all tributaries	A
Boulder Creek (Little North Fork of Middle Fork Feather River tributary)	Mainstem and all tributaries	A
Cooks Creek	Mainstem and all tributaries	A
Dark Ravine	Mainstem and all tributaries	A
Fall River	Mainstem and all tributaries	A
Feather River, Middle Fork (Mainstem)	Mainstem	D
Feather River, Middle Fork (Tributaries)	All tributaries, unless otherwise noted	E
Feather River, North Fork (Mainstem)	Mainstem from Plumas-Butte County Line to East Branch of North Fork Feather River	D
Feather River, North Fork (Tributaries)	All tributaries, unless otherwise noted	E
Feather River, South Fork	Mainstem	D
Feather River, South Fork	All tributaries, unless otherwise noted	E
Frazier Creek	Mainstem and all tributaries	A
Gray Eagle Creek	Mainstem and all tributaries	A
Grizzly Creek	Mainstem and all tributaries	A
Last Chance Creek	Mainstem and all tributaries	A
Lights Creek, West Branch	Mainstem and all tributaries	A
Mill Creek	Mainstem and all tributaries	A
Rock Creek, South Fork	Mainstem and all tributaries	A

Rowland Creek	Mainstem and all tributaries	A
Silver Creek	Mainstem and all tributaries	A
Slate Creek	Mainstem and all tributaries	A
Sulphur Creek	Mainstem and all tributaries	A
Warner Creek	Mainstem and all tributaries	A
Wolf Creek	Mainstem and all tributaries	A

(33) Riverside

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the Aliso-San Onofre watershed, unless otherwise noted below	E
Multiple Waters	All rivers and streams in the Santa Ana River watershed, unless otherwise noted	E
Multiple Waters	All rivers and streams in the Santa Margarita River watershed, unless otherwise noted	E
Multiple Waterbodies	All shoreline pools and irrigation drains within one mile of the Salton Sea	A
Andreas Creek	Mainstem above 4,000 feet elevation	A
Arroyo Seco Creek	Mainstem upstream of Vail Lake	A
Bautista Creek	Mainstem, upstream from Fairview Ave crossing	A
Colorado River	Mainstem	A
Indian Creek	Mainstem upstream of Lake Fulmor	A
Rialto Drain	Mainstem	E
Salt Creek	Mainstem and all tributaries	A
San Jacinto River	Mainstem from Sand Canyon upstream to Soboba Indian Reservation boundary	A
San Jacinto River, North Fork	Mainstem and all tributaries above 4,000 ft elevation	A
San Juan Creek	Mainstem and all tributaries	A
Santa Ana River	Mainstem upstream of N Lakeview Ave. crossing	E
Santa Ana River	Mainstem upstream of Prado Flood Control Basin	E
Tahquitz Creek	Mainstem upstream from Willow Creek	A
Temecula Creek	Mainstem upstream from Vail Lake	A
Whitewater River	Mainstem upstream from Colorado River Aqueduct	A
Willow Creek	Mainstem	A

Wilson Creek	Mainstem from Vail Lake upstream to Cahuilla Creek	A

(34) Sacramento

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	C
Sacramento River	Mainstem	F
American River	Mainstem from Sacramento River upstream to Nimbus Dam	A

(35) San Benito

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Pacheco Creek	Mainstem and all tributaries	A
Pajaro River	Mainstem	A

(36) San Bernardino

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the Santa Ana watershed, unless otherwise noted below	E
Amargosa River	Mainstem from SR-127 crossing upstream to Old Spanish Trail crossing in Tecopa (Inyo Co)	A
Amargosa River	Mainstem from San Bernadino-Inyo County line upstream to Saratoga Springs	A
Barton Creek, East Fork	Mainstem	A
Cajon Wash	Mainstem upstream from San Bernadino National forest boundary	E
City Creek	Mainstem and all tributaries upstream from Highland Ave crossing	A
Colorado River	Mainstem	A
Day Canyon	Mainstem and all tributaries	A
Deep Creek	Mainstem from West Fork Mojave upstream to Holcomb Creek	A
Grass Valley Creek	Mainstem	A
Horsethief Creek	Mainstem	A

Juniper Springs	All	A
Kinley Creek	Mainstem	A
Little Horsethief Creek	Mainstem	A
Lytle Creek	Mainstem upstream to Miller Narrows	E
Mojave River	Mainstem from Rock Springs Rd crossing to Mojave River Forks Dam	A
Mojave River, West Fork	Mainstem and all tributaries, upstream from Silverwood Lake	A
Mojave River, West Fork	Mainstem from Mojave River Forks Dam to SR-173 crossing	A
Shay Creek and Vicinity	Mainstem upstream from Baldwin Lake. Vicinity includes Shay Pond, Sugarloaf Pond, Wiebe Pond, Motorcycle Pond, and Baldwin Lake.	A
Whitewater River, North Fork	Mainstem	A

(37) San Diego

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All coastal drainages and their tributaries from San Mateo Creek south to the Santa Margarita River	E
Agua Caliente Creek	Mainstem	A
Arroyo Seco Creek	Mainstem	A
Boden Canyon	Mainstem	A
Borrego Palm Canyon	Mainstem	A
Campo Creek	Mainstem upstream of Campo Lake	A
Canebrake Wash	Mainstem	A
Christianitos Creek	Mainstem from Gabino Creek to Camp Pendleton Boundary	A
Cottonwood Creek	Mainstem from Morena Reservoir upstream to I-8 crossing at Buckman Springs	A
Cottonwood Creek	Mainstem from U.S.-Mexico border upstream to Barret Lake	A
De Luz Creek	Mainstem from Camp De Luz Rd crossing upstream to Camp Pendleton Boundary	A
Gabino Creek	Mainstem and all tributaries	A
Guejito Creek	Mainstem	A

Horsethief Canyon	Mainstem	A
Keys Creek	Mainstem	A
Kitchen Creek	Mainstem	A
La Posta Creek	Mainstem upstream of Morena Reservoir	A
Morena Creek	Mainstem and all tributaries	A
Palla Creek	Mainstem	A
Peterson Canyon	Mainstem and all tributaries	A
Pine Valley Creek	Mainstem and all tributaries upstream of Barret Reservoir	A
San Diego River	Mainstem from SR-67 crossing upstream to El Capitan Lake	A
San Diego River	Mainstem from El Capitan Lake to Temescal Creek (includes Cedar Creek)	A
San Dieguito River	Mainstem and all tributaries upstream of I-15 crossing	A
San Felipe Creek	Mainstem from downstream end of Sentenac Canyon upstream to SR-78 crossing	A
San Luis Rey River	Mainstem from Pacific Ocean upstream to La Jolla Indian Reservation boundary	A
San Luis Rey River	Mainstem upstream of Lake Henshaw	A
San Luis Rey River, West Fork	Mainstem from Lake Henshaw upstream to Barker Valley	A
San Mateo Creek	Mainstem upstream of Camp Pendleton boundary	A
San Vicente Creek	Mainstem from San Vicente Reservoir upstream to Vista Vicente Rd crossing	A
Santa Margarita River	Mainstem upstream of De Luz Rd crossing	A
Santa Ysabel Creek	Mainstem from Santa Maria Creek upstream to Temescal Creek	A
Santa Ysabel Creek	Mainstem upstream from Lake Sutherland	A
Sweetwater River	Mainstem from Sycuan Resort upstream to Loveland Reservoir	A
Sweetwater River	Mainstem upstream from Loveland Reservoir	A
Talega Creek	Mainstem	A
Taylor Creek	Mainstem and all tributaries	A
Temecula Creek	Mainstem	A
Temescal Creek	Mainstem	A
Tijuana River	Mainstem	A
Viejas Creek	Mainstem from Sweetwater River upstream to Viejas Indian Reservation	A

(38) San Francisco

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H

(39) San Joaquin

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	C
Multiple Waters	All waters south of I-580	D
San Joaquin River	Mainstem	F
Mokelumne River	Mainstem from Burella Road upstream to Camache Dam	A

(40) San Luis Obispo

Water	**Description**	**Class**
Multiple Waters	All rivers and streams west of Hwy 101	A
Multiple Waters	All rivers and streams east of Hwy 101 and south of Atascadero, unless otherwise noted below	D
Multiple Waters	All rivers and streams east of Hwy 101 and north of Atascadero, unless otherwise noted below	H
Arroyo Grande Creek	Mainstem and all tributaries	A
Pismo Creek	Mainstem and all tributaries	A
Salinas River	Mainstem and all tributaries upstream of confluence with the Estrella River (not including Estrella River)	A
San Luis Obispo Creek	Mainstem and all tributaries	A
Santa Maria River	Mainstem	A

(41) San Mateo

Water	**Description**	**Class**
Multiple Waters	All rivers and streams west of I-280, unless otherwise noted below	D
Multiple Waters	All rivers and streams east of I-280, unless otherwise noted below	H

Multiple Waters	All rivers and streams east of I-280 above 200 ft elevation, unless otherwise noted below	D
Ano Nuevo Creek	Mainstem and all tributaries	A
Arroyo Canada Verde	Mainstem and all tributaries	A
Arroyo De En Medio	Mainstem and all tributaries	A
Arroyo De Los Frijoles	Mainstem and all tributaries	A
Arroyo Ojo	Mainstem and all tributaries	A
Belmont Creek	Mainstem and all tributaries	A
Calera Creek	Mainstem and all tributaries	A
Cascade Creek	Mainstem and all tributaries	A
Colma Creek	Mainstem and all tributaries	A
Cordilleras Creek	Mainstem and all tributaries	A
Easton Creek	Mainstem and all tributaries	A
Frenchmans Creek	Mainstem and all tributaries	A
Gazos Creek	Mainstem and all tributaries	A
Green Oaks Creek	Mainstem and all tributaries	A
Laurel Creek	Mainstem and all tributaries	A
Lobitos Creek	Mainstem and all tributaries	A
Martini Creek	Mainstem and all tributaries	A
Milagra Creek	Mainstem and all tributaries	A
Mills Creek	Mainstem and all tributaries	A
Montara Beach	Mainstem and all tributaries	A
Pescadero Creek	Mainstem and all tributaries	A
Pilarcitos Creek	Mainstem and all tributaries	A
Point Montara	Mainstem and all tributaries	A
Pomponio Creek	Mainstem and all tributaries	A
Purisima Creek	Mainstem and all tributaries	A
San Francisquito Creek	Mainstem and all tributaries	A
San Gregorio Creek	Mainstem and all tributaries	A
San Mateo Creek	Mainstem and all tributaries	A
San Pedro Creek	Mainstem and all tributaries	A
San Vicente Creek	Mainstem and all tributaries	A
Sanchez Creek	Mainstem and all tributaries	A
Tunitas Creek	Mainstem and all tributaries	A
Whitehouse Creek	Mainstem and all tributaries	A
Yankee Jim Gulch	Mainstem and all tributaries	A

(42) Santa Barbara

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Multiple Waters	All coastal drainages from Jalama Creek in the north to Rincon Lagoon in the south, unless otherwise noted below	A
Abel Canyon	Mainstem and all tributaries	A
Alisal Creek	Mainstem and all tributaries	A
El Jaro Creek	Mainstem and all tributaries	A
Foresters Leap	Mainstem and all tributaries	A
Hilton Creek	Mainstem and all tributaries	A
Indian Creek	Mainstem	A
Judell Creek	Mainstem and all tributaries	A
Mono Creek	Mainstem and all tributaries	A
Quiota Creek	Mainstem and all tributaries	A
San Antonio Creek	Mainstem, from mouth up to and including Barka Slough	A
San Lucas Creek	Mainstem and all tributaries	A
Santa Maria River	Mainstem and all tributaries	A
Santa Ynez River	Mainstem, from the mouth to Lake Cachuma	A
Santa Ynez River	Mainstem upstream of Gibraltar Reservoir	A
Siquoc River	Mainstem and all tributaries	D
Water Canyon (Sisquoc River tributary)	Mainstem and all tributaries	A

(43) Santa Clara

Water	Description	Class
Multiple Waters	All rivers and streams below 1,000 ft elevation, unless otherwise noted below	C
Multiple Waters	All rivers and streams above 1,000 ft elevation, unless otherwise noted below	D
Adobe Creek	Mainstem and all tributaries	A
Alamitos Creek	Mainstem and all tributaries	A
Arroyo Honda	Mainstem and all tributaries	A
Berryessa Creek	Mainstem and all tributaries	A
Calabazas Creek	Mainstem and all tributaries	A

Caleros Creek	Mainstem and all tributaries	A
Carnadero Creek	Mainstem and all tributaries	A
Coyote Creek	Mainstem	A
Guadalupe Creek	Mainstem and all tributaries	A
Guadalupe River	Mainstem	A
Llagas Creek	Mainstem and all tributaries	A
Los Gatos Creek	Mainstem and all tributaries	A
Silver Creek	Mainstem and all tributaries	A
Matadero Creek	Mainstem and all tributaries	A
Pacheco Creek	Mainstem and all tributaries	A
Permanente Creek	Mainstem and all tributaries	A
Pescadero Creek	Mainstem and all tributaries	A
San Francisquito Creek	Mainstem and all tributaries	A
Sargeant Creek	Mainstem and all tributaries	A
Stevens Creek	Mainstem and all tributaries	A
Penetencia Creek	Mainstem and all tributaries	A
Uvas Creek	Mainstem and all tributaries	A

(44) Santa Cruz

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Aptos Creek	Mainstem and all tributaries	A
Arana Gulch Creek	Mainstem and all tributaries	A
Baldwin Creek	Mainstem and all tributaries	A
Corralitos Creek	Mainstem and all tributaries	A
Coward Creek	Mainstem and all tributaries	A
Davenport Landing Creek	Mainstem and all tributaries	A
Green Valley Creek	Mainstem and all tributaries	A
Laguna Creek	Mainstem and all tributaries	A
Liddell Creek	Mainstem and all tributaries	A
Majors Creek	Mainstem upstream of SR-1 crossing	A
Mattos Creek	Mainstem and all tributaries	A
Molino Creek	Mainstem and all tributaries	A
Pajaro River	Mainstem	A
Pescadero Creek	Mainstem and all tributaries	A
Salsipuedes Creek	Mainstem and all tributaries	A
San Lorenzo River	Mainstem and all tributaries	A
San Vicente Creek	Mainstem and all tributaries	A
Scott Creek	Mainstem and all tributaries	A
Soquel Creek	Mainstem and all tributaries	A

Waddell Creek	Mainstem and all tributaries	A
Wilder Creek	Mainstem and all tributaries	A
Yellow Bank Creek	Mainstem and all tributaries	A

(45) Shasta

Water	Description	Class
Multiple Waters	All rivers and streams in the County above 5,000 feet, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the County below 5,000 feet, unless otherwise noted below	D
Clear Creek	Mainstem from Sacramento River upstream to Whiskeytown Dam	A
Fall River	Mainstem and all tributaries	A
Hat Creek	Mainstem and all tributaries	A
McCloud River	Mainstem from the southern boundary of Section 16, T38N, R3W upstream to Lake McCloud Dam	A
Pit River	Mainstem from Shasta Lake upstream to Fall River Mills	C
Pit River	Mainstem from Fall River Mills to Shasta-Lassen County Line	A
Sacramento River (Mainstem)	Mainstem from Shasta-Tehama County Line upstream to Keswick Dam	A
Sacramento River (Tributaries)	All tributaries to the Sacramento River from the Shasta-Tehama County Line to Keswick Dam, unless otherwise noted	C
Sucker Springs Creek	Mainstem	A

(46) Sierra

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Sulphur Creek	Mainstem and all tributaries	A
Slate Creek	Mainstem and all tributaries	A
Frazier Creek	Mainstem and all tributaries	A
Yuba River, Middle	Mainstem and all tributaries from Sierra-Yuba County Line upstream to Milton Reservoir	E
Yuba River, North Fork (Mainstem)	Mainstem from Sierra-Yuba County Line upstream to Ladies Canyon Creek	D

Yuba River, North Fork (Tributaries)	All tributaries from Sierra-Yuba County Line upstream to Ladies Canyon Creek	E
Independence Lake (Tributaries)	All waters draining to Independence Lake	A
Truckee River	Mainstem and all tributaries	G
Long Valley Creek	Mainstem and all tributaries	E

(47) Siskiyou

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County above 4,000 feet, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the County below 4,000 feet, unless otherwise noted below	F
Salmon River, South Fork	Mainstem from French Creek upstream to St. Claire Creek	A
Applegate River	Mainstem and all tributaries	C
Bogus Creek	Mainstem	A
Camp Creek	Mainstem	A
Canyon Creek	Mainstem	A
Clear Creek	Mainstem	A
Cottonwood Creek (Tributary to Klamath River)	Mainstem	A
Elk Creek (Tributary to Klamath River)	Mainstem	A
French Creek	Mainstem	A
Grider Creek	Mainstem	A
Horse Creek	Mainstem	A
Humbug Creek	Mainstem	A
Independence Creek	Mainstem	A
Indian Creek (Tributary to Klamath River)	Mainstem	A
Jenny Creek	Mainstem from Iron Gate Reservoir upstream to California-Oregon State Line	A
Klamath River	Mainstem from Iron Gate Reservoir upstream to California-Oregon State Line	A
Seiad Creek	Mainstem	A
Shackleford Creek	Mainstem	A

Shasta River	Mainstem and all tributaries upstream of County Road A12	A
Sugar Creek	Mainstem	A
Thompson Creek	Mainstem	A
Wooley Creek	Mainstem	A
Special Closures for Thermal Refugia in the Salmon River Watershed		
A 200-foot radius* at the confluence of each of the following waters with the Salmon River (or its tributaries) is designated Class A:		
Water Name	**Location in Salmon River Watershed**	
Big Creek	Confluence with North Fork of Salmon River	
Butler Creek	Confluence with mainstem of Salmon River	
Eddy Gulch	Confluence with North Fork of Salmon River	
Horn Creek	Confluence with mainstem of Salmon River	
Jackass Gulch	Confluence with North Fork of Salmon River	
Jessups Gulch	Confluence with North Fork of Salmon River	
Jones Gulch	Confluence with North Fork of Salmon River	
Little North Fork Salmon River	Confluence with North Fork of Salmon River	
Matthews Creek	Confluence with South Fork of Salmon River	
McNeal Creek	Confluence with South Fork of Salmon River	
Merrill Creek	Confluence with mainstem of Salmon River	
Methodist Creek	Confluence with South Fork of Salmon River	
Monte Creek	Confluence with mainstem of Salmon River	
Nordheimer Creek	Confluence with mainstem of Salmon River	
Plummer Creek	Confluence with South Fork of Salmon River	
Sainte Claire Creek	Confluence with South Fork of Salmon River	
Shiltos Creek	Confluence with North Fork of Salmon River	
Somes Creek	Confluence with mainstem of Salmon River	
Special Closures for Thermal Refugia in Klamath River Watershed		
A 200-foot radius* at the confluence of each of the following waters and the Klamath River is designated Class A:		
Water Name	**Water Name (continued)**	
Aubrey Creek	Lumgrey Creek	
Barkhouse Creek	McKinney Creek	
Beaver Creek	Mill Creek	
Bogus Creek	Natuket Creek	
Cade Creek	Natuket Creek	

China Creek	Negro Creek
Clear Creek	O'Neil Creek
Coon Creek	Oak Flat Creek
Crawford Creek	Portuguese Creek
Dillon Creek	Reynolds Creek
Doggett Creek	Rock Creek
Dona Creek	Rogers Creek
Elk Creek	Salmon River
Elliott Creek	Sandy Bar Creek
Empire Creek	Scott River
Empire Creek	Seiad Creek
Fort Goff Creek	Shasta River
Grider Creek	Stanshaw Creek
Halverson Creek	Swillup Creek
Horse Creek	Teneyck Creek
Humbug Creek	Teneyck Creek
Independence Creek	Thomas Creek
Indian Creek	Thompson Creek
Irving Creek	Ti Creek
King Creek	Titus Creek
Kohl Creek	Tom Martin Creek
Kuntz Creek	Ukonom Creek
Ladds Creek	Walker Creek
Little Grider Creek	Wilson Creek
Little Humbug Creek	
*Pursuant to Fish and Game Code 5653(d) It is unlawful to possess a vacuum or suction dredge in areas, or in or within 100 yards of waters, that are closed to the use of vacuum or suction dredges. Therefore, the effective closure at thermal refugia locations is a 500-foot radius from the center-line of the confluence of the tributary stream with the mainstem river.	

(48) Solano

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County below 100 ft elevation, unless otherwise noted below	H
Multiple Waters	All rivers and streams in the County above 100 ft. elevation, unless otherwise noted below	D
Cordelia Slough	Mainstem and all tributaries	A

Frank Horan Slough	Mainstem and all tributaries	A
Green Valley Creek	Mainstem and all tributaries	A
Napa River	Mainstem and all tributaries	A
Suisun Creek	Mainstem and all tributaries	A

(49) Sonoma

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	D
Estero Americano	Mainstem and all tributaries	A
Fort Ross Creek	Mainstem and all tributaries	A
Gualala River	Mainstem and all tributaries	A
Kolmer Gulch	Mainstem and all tributaries	A
Petaluma River	Mainstem and all tributaries	A
Russian River	Mainstem and all tributaries, excluding Dry Creek above Warm Springs Dam	A
Russian Gulch Creek	Mainstem and all tributaries	A
Salmon Creek	Mainstem and all tributaries	A
Schell Creek	Mainstem and all tributaries	A
Sonoma Creek	Mainstem and all tributaries	A
Tolay Creek	Mainstem and all tributaries	A

(50) Stanislaus

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County west of I-5	D
Multiple Waters	All rivers and streams in the County east of I-5, unless otherwise noted	H
San Joaquin River	Mainstem	C
Stanislaus River	Mainstem	C
Tuolumne River	Mainstem	C

(51) Sutter

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	C
Butte Creek	Mainstem	A
Feather River	Mainstem	A
Sacramento River	Mainstem	F

(52) Tehama

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	F
Multiple Waters	All rivers and streams in the County east of State Hwy 32	A
Butte Creek	Mainstem and all tributaries from Tehama-Butte County Line	A
Carter Creek	Mainstem from Deer Creek	A
Colby Creek	Mainstem from Tehama-Butte County Line	A
Deer Creek	Mainstem from Sacramento River to Deer Creek Falls	A
Mill Creek	Mainstem from Sacramento River to Lassen National Park Boundary	A
Sacramento River	Mainstem from Tehama-Butte County Line to Tehama-Shasta County Line	A
Willow Creek	Mainstem from Tehama-Butte County Line	A

(53) Trinity

Water	Description	Class
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	F
Big French Creek	Mainstem	A
Canadian Creek	Mainstem	A
Dutch Creek	Mainstem	A
Grass Valley Creek	Mainstem	A
New River	Mainstem and all tributaries upstream from East Fork New River	A
New River, East Fork	Mainstem and all tributaries	A
Reading Creek	Mainstem	A
Rush Creek	Mainstem	A
Soldier Creek	Mainstem	A
Trinity River	Mainstem from Humboldt-Trinity County Line upstream to North Fork Trinity River	D
Trinity River	Mainstem from North Fork Trinity River upstream to Grass Valley Creek	C
Trinity River	Mainstem from Grass Valley Creek upstream to Lewiston Dam	A
Trinity River	Mainstem and all tributaries upstream of Lewiston Dam	D
Trinity River, East Fork of North Fork	Mainstem from North Fork Trinity River	A

Trinity River, North Fork	Mainstem	A
Trinity, South Fork	Mainstem	B
Weaver Creek	Mainstem	A

(54) Tulare

Water	Description	Class
Multiple Waters	All rivers and streams in the County above 4,000 feet elevation	A
Multiple Waters	All rivers and streams in the County between 1,000 and 4,000 feet elevation	F
Multiple Waters	All rivers and streams in the County below 1,000 feet elevation	H

(55) Tuolumne

Water	Description	Class
Multiple Waters	All rivers and streams in the County above 5,500 feet elevation	A
Multiple Waters	All rivers and streams in the County from 2,000 feet to 5,500 feet elevation, unless otherwise noted below	D
Multiple Waters	All rivers and streams in the County below 2,000 feet elevation, unless otherwise noted below	F
Amber Creek (Six Bit Gulch Tributary)	Mainstem	E
Delaney Creek (Tuolumne River tributary)	Mainstem	A
Horton Creek (Six Bit Gulch Tributary)	If the stream is not flowing in the proposed location of dredging, dredging is limited to no more that 1 pool out of every 4 contiguous pools or submit notification to CDFG under Section 1602.	B
Roach Creek (Six Bit Gulch Tributary)	If the stream is not flowing in the proposed location of dredging, dredging is limited to no more that 1 pool out of every 4 contiguous pools or submit notification to CDFG under Section 1602.	B

(56) Ventura

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County, unless otherwise noted below	H
Agua Blanca Creek	Mainstem	A
Hopper Creek	Mainstem and all tributaries	A
Hopper Creek	Mainstem	A
Las Virgenes Creek	Mainstem	A
Magu Lagoon	Mainstem from Pacific Ocean to SR-1 crossing	A
Malibu Creek	Mainstem and all tributaries, unless otherwise noted	E
Piru Creek	Mainstem from Pyramid Reservoir to Lockwood Creek	A
Santa Clara River	Mainstem from Pacific Ocean to Piru Creek	A
Santa Paula Creek	Mainstem	A
Sespe Creek	Mainstem and all tributaries	A
Sisar Creek	Mainstem	A
Ventura River	Mainstem and all tributaries	A

(57) Yolo

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County east of I-5 or I-505 (whichever is further west), unless otherwise noted below	C
Multiple Waters	All rivers and streams in the County west of I-5 or I-505 (whichever is further west), unless otherwise noted below	F
Sacramento River	Mainstem	F

(58) Yuba

Water	**Description**	**Class**
Multiple Waters	All rivers and streams in the County west of Bullards Bar Reservoir, unless otherwise noted below	C
Dry Creek	Mainstem upstream to Merle Collins Reservoir	A
Sacramento River	Mainstem	F
Slate Creek	Mainstem and all tributaries from Buckeye Creek upstream to Yuba-Plumas County Line	A

Yuba River	Mainstem from Feather River to Englebright Reservoir	A
Yuba River, Middle	Mainstem from Yuba River upstream to Yuba-Sierra County Line	E
Yuba River, North Fork (Mainstem)	Mainstem from New Bullards Bar Reservoir upstream to Yuba-Sierra County Line	D
Yuba River, North Fork (Tributaries)	All tributaries from New Bullards Bar Reservoir upstream to Yuba-Sierra County Line	E

~~(b) Special Closures by County. Except as specified in subsections (c) and (d) below, the suction dredge class restrictions for each county are as follows:~~

~~(1) Alameda Class H.~~

~~(2) Alpine Class C.~~

~~(3) Amador East of Highway 49 is Class C, the remainder is Class H.~~

~~(4) Butte Class C.~~

~~(5) Calaveras East of Highway 49 is Class C, the remainder is Class H.~~

~~(6) Colusa Class H.~~

~~(7) Contra Costa Class H.~~

~~(8) Del Norte Class E.~~

~~(9) El Dorado East of Highway 49 is Class C, the remainder is Class H.~~

~~(10) Fresno Within the external boundaries of the National Forests is Class C, the remainder is Class H. (Kings River Special Management Area has been closed to suction dredging by the U.S. Forest Service. Contact Sequoia National Forest for details.)~~

~~(11) Glenn Class H.~~

~~(12) Humboldt Class E.~~

~~(13) Imperial Class H.~~

~~(14) Inyo Class A.~~

~~(15) Kern Class H.~~

~~(16) Kings Class H.~~

~~(17) Lake Class H.~~

~~(18) Lassen Class C.~~

~~(19) Los Angeles Class H. (Portions of the San Gabriel Mountains may be closed to suction dredging by the U.S. Forest Service. Contact the Angeles National Forest for details.)~~

~~(20) Madera Within the external boundaries of the National Forests is Class C, the remainder is Class H.~~

~~(21) Marin Class A.~~

~~(22) Mariposa Within the external boundaries of the National Forests is Class C, the remainder is Class H.~~

~~(23) Mendocino Class A.~~

~~(24) Merced Class H.~~

~~(25) Modoc Class C.~~

~~(26) Mono Class A.~~

~~(27) Monterey Class A.~~

~~(28) Napa Class A.~~

~~(29) Nevada East of Highway 49 is Class C, the remainder is Class H.~~

~~(30) Orange Class H.~~

~~(31) Placer East of Highway 49 is Class C, the remainder is Class H.~~

~~(32) Plumas Class C.~~

~~(33) Riverside Class H.~~

~~(34) Sacramento Class H.~~

~~(35) San Benito Class A.~~

~~(36) San Bernardino Class H. (Portions of the San Gabriel Mountains may be closed to suction dredging by the U.S. Forest Service. Contact the Angeles National Forest for details.)~~

~~(37) San Diego Class H.~~

~~(38) San Francisco Class H.~~

~~(39) San Joaquin Class H.~~

~~(40) San Luis Obispo Class A.~~

~~(41) San Mateo Class A.~~

~~(42) Santa Barbara Class H.~~

~~(43) Santa Clara Class H.~~

~~(44) Santa Cruz Class A.~~

~~(45) Shasta Class C.~~

~~(46) Sierra Class C.~~

~~(47) Siskiyou Class E.~~

~~(48) Solano Class H.~~

~~(49) Sonoma Class A.~~

~~(50) Stanislaus Class H.~~

~~(51) Sutter Class H.~~

~~(52) Tehama Class D.~~

~~(53) Trinity Class E.~~

~~(54) Tulare Within the external boundaries of the National Forests is Class C, the remainder is Class H.~~

~~(55) Tuolumne East of Highway 49 is Class C, the remainder is Class H.~~

~~(56) Ventura Class H.~~

~~(57) Yolo Class H.~~

~~(58) Yuba Class H.~~

~~(c) Eight-Inch Nozzle Size. An eight-inch diameter intake nozzle size is permitted on the following rivers unless otherwise specified in Section 228.5(d):~~

~~(1) American (Placer, Nevada, and El Dorado counties)~~

~~(2) Cosumnes (Sacramento, Amador and El Dorado counties)~~

~~(3) Feather (Butte, Plumas, and Yuba counties)~~

~~(4) Klamath (Del Norte, Humboldt and Siskiyou counties)~~

~~(5) Merced (Mariposa and Merced counties~~

~~(6) Mokelumne (Amador, Calaveras and San Joaquin counties)~~

~~(7) New (Trinity County)~~

~~(8) Scott (Siskiyou County)~~

~~(9) Trinity (Trinity and Humboldt counties)~~

~~(10) Yuba (Sierra and Yuba counties)~~

~~(d) Special Regulations by Water. In addition to the classifications listed in Section 228.5(b) and (c), the special regulations below apply to the following waters:~~

~~(1) American River (Sacramento County). The main stem American River from the Sacramento River upstream to Nimbus Dam is Class A.~~

~~(2) American River, Middle Fork (El Dorado and Placer counties). The main stem American River Middle Fork from its junction with the North Fork of the American River upstream to the confluence with the Rubicon River is Class C. (Note: Recreational dredging is allowed in the Auburn State Recreation Area on an interim management basis. Contact the Auburn State Recreation Area for instructions.)~~

~~(3) American River, North Fork (Placer County). The main stem North Fork American River from Folsom Reservoir to the Colfax-Iowa Hill Road Bridge is Class C. From the Colfax-Iowa Hill Road Bridge upstream to Heath Springs (T16N R14E S26) is Class A. (Note: Recreational dredging is allowed in the Auburn State Recreation Area on an interim management basis. Contact the Auburn State Recreation Area for instructions.)~~

~~(4) American River, South Fork (El Dorado County). The main stem South Fork American River from Folsom Reservoir upstream to the Highway 49 bridge at Coloma is Class C.~~

~~(5) American River, South Fork Tributaries (El Dorado County). All tributaries to the South Fork American River from Folsom Reservoir upstream are Class C.~~

~~(6) Antelope Creek and Tributaries (Placer County). Antelope Creek and its tributaries are Class B.~~

~~(7) Auburn Ravine and Tributaries (Placer County). Auburn Ravine and its tributaries are Class B.~~

~~(8) Bear River (Placer County). The main stem Bear River from Forty Mile Road to the South Sutter Irrigation District's diversion dam is Class D.~~

~~(9) Big Chico Creek (Butte County). The main stem Big Chico Creek from Manzanita Avenue in Chico to the head of Higgins Hole (T24N R3E S31) is Class A.~~

~~(10) Big Creek and Tributaries (Fresno County). Big Creek, tributary to the Kings River, and its tributaries are Class A.~~

~~(11) Big Creek (Trinity County). The main stem Big Creek is Class A.~~

~~(12) Blue Creek and Tributaries (Del Norte and Humboldt counties). Blue Creek and its tributaries are Class A.~~

~~(13) Butte Creek (Butte County). The main stem Butte Creek from the Sutter County line upstream to the Durham-Oroville Highway Bridge is Class H, and from the Durham-Oroville Highway Bridge upstream to the intake of Centerville Ditch (T23N R3E S10) is Class A.~~

~~(14) Calaveras River and Tributaries (Calaveras and San Joaquin counties). The Calaveras River and its tributaries below New Hogan Reservoir are Class B.~~

~~(15) Canyon Creek (Yuba County). The main stem Canyon Creek from its mouth upstream to the Sierra-Yuba County line (T20N R8E S25) is Class C.~~

~~(16) Cherry Creek (Tuolumne County). The main stem of Cherry Creek is Class B.~~

~~(17) Chowchilla River (Madera and Mariposa counties). The main stem Chowchilla River from Eastman Lake upstream to the West and East forks of the Chowchilla River is Class A.~~

~~(18) Chowchilla River West Fork (Madera and Mariposa counties). The main stem West Fork Chowchilla River from its mouth upstream to the Highway 49 bridge is Class A.~~

~~(19) Clavey River (Tuolumne County). The main stem Clavey River is Class A.~~

~~(20) Clear Creek and Tributaries (Siskiyou County). Clear Creek and its tributaries are Class A.~~

~~(21) Colorado River and Tributaries (Imperial, Riverside and San Bernardino counties). The main channel and all side sloughs and tributaries of the Colorado River are Class A.~~

~~(22) Cosumnes River (Sacramento, Amador and El Dorado counties). The main stem Cosumnes River from the Western Pacific Railroad Bridge about 1/4 mile above the mouth upstream to the Latrobe Highway Bridge is Class D, and from the Latrobe Highway Bridge upstream to the confluence with the North and Middle forks of the Cosumnes River is Class H.~~

~~(23) Cosumnes River, North Fork (El Dorado County). The main stem North Fork Cosumnes River from the Middle Fork of the Cosumnes River upstream to the Somerset-Pleasant Valley Road Bridge is Class H.~~

~~(24) Cosumnes River, Middle Fork (El Dorado County). The main stem Middle Fork Cosumnes River from the North Fork Cosumnes River upstream to Bakers Ford on the Aukum-Somerset Road is Class H.~~

~~(25) Cosumnes River, South Fork (Amador and El Dorado counties). The main stem South Fork Cosumnes from Middle Fork Cosumnes River upstream to the County Road Bridge at River Pines is Class H.~~

~~(26) Cow Creek and Tributaries (Fresno County). Cow Creek and its tributaries are Class A.~~

~~(27) Curtis Creek (Tuolumne County). The main stem Curtis Creek is Class C.~~

~~(28) Deep Creek (San Bernardino County). The main stem Deep Creek is Class A.~~

~~(29) Deer Creek (Nevada County). The main stem Deer Creek from Ponderosa Way below Rough and Ready Falls (T16N R7E S13) upstream to Highway 49 is Class C.~~

~~(30) Dillon Creek and Tributaries (Siskiyou County). Dillon Creek and its tributaries are Class A.~~

~~(31) Dinkey Creek and Tributaries (Fresno County). Dinkey Creek and its tributaries are Class A.~~

~~(32) Eagle Creek (Tuolumne County). The main stem Eagle Creek is Class C.~~

~~(33) Eastman Lake (Madera and Mariposa counties). Eastman Lake is Class A.~~

~~(34) Eel River, All Forks and Tributaries (Mendocino County). The Eel River, all forks and its tributaries upstream of the Humboldt/Mendocino and Trinity/Mendocino County lines are Class A.~~

~~(35) Eel River, Middle Fork and Tributaries (Mendocino and Trinity counties). The Middle Fork Eel River and its tributaries are Class A.~~

~~(36) Feather River (Butte County). The main stem Feather River from Honcut Creek (T17N R3E S27) upstream to the Highway 70 Bridge is Class B, and from the Highway 70 Bridge upstream to Oroville Dam is Class A.~~

~~(37) Feather River, South Fork (Butte and Plumas counties). The main stem South Fork Feather River from Oroville Reservoir upstream to Little Grass Valley Dam (T22N R9E S31) is Class C.~~

~~(38) Flat Creek and Tributaries (Shasta County). Flat Creek and its tributaries are Class H.~~

~~(39) French Creek (Trinity County). The main stem French Creek is Class A.~~

~~(40) Grapevine Creek (Tuolumne County). The main stem Grapevine Creek is Class B.~~

~~(41) Horton Creek (Tuolumne County). The main stem Horton Creek is Class A.~~

~~(42) Hunter Creek (Tuolumne County). The main stem Hunter Creek is Class B.~~

~~(43) Independence Creek and Tributaries (Nevada and Sierra counties). Independence Creek and its tributaries from Independence Lake upstream are Class A.~~

~~(44) Jawbone Creek (Tuolumne County). The main stem Jawbone Creek is Class B.~~

~~(45) Kaweah River (Tulare County). The main stem Kaweah River upstream of Kaweah Reservoir is Class A.~~

~~(46) Kern River and Tributaries (Kern and Tulare counties). The Kern River and its tributaries from Isabella Dam upstream are Class A.~~

~~(47) Kern River, South Fork and Tributaries (Kern and Tulare counties). The South Fork Kern River and its tributaries are Class A.~~

~~(48) Kings River and Tributaries (Fresno and Kings counties). The Kings River and its tributaries from Tulare Lake upstream to Pine Flat Dam are Class A.~~

~~(49) Klamath River, Main Stem (Del Norte, Humboldt and Siskiyou counties). The main stem Klamath River from the mouth upstream to the Salmon River is Class G, from the Salmon River upstream to 500 feet downstream of the Scott River is Class H, from 500 feet downstream of the Scott River upstream to Iron Gate Dam is Class G, and from Iron Gate Dam to the Oregon border is Class A.~~

~~(50) Knights Creek (Tuolumne County). The main stem Knights Creek is Class C.~~

~~(51) Lavezzola Creek (Sierra County). The main stem Lavezzola Creek is Class C.~~

~~(52) Little Rock Creek and Tributaries (Los Angeles County). The main stem Little Rock Creek and its tributaries from the Sycamore Campground in the Angeles National Forest upstream are Class A.~~

~~(53) Little Swede Creek (Trinity County). The main stem Little Swede Creek is Class A.~~

~~(54) Macklin Creek (Nevada County). The main stem Macklin Creek from its confluence with the Middle Fork Yuba River (T19N R12E S16) upstream is Class A.~~

~~(55) Malibu Creek and Tributaries (Los Angeles County). Malibu Creek and its tributaries are Class A.~~

~~(56) McCloud River (Shasta County). The main stem McCloud River from the southern boundary of Section 16, T38N, R3W, upstream to Lake McCloud Dam is Class A.~~

~~(57) Merced River (Merced County). The main stem Merced River from the San Joaquin River upstream to the Crocker-Huffman Dam (upstream from Snelling) is Class A.~~

~~(58) Merced River (Mariposa County). The main stem Merced River is Class C.~~

~~(59) Merced River, North Fork (Mariposa County). The main stem North Fork Merced River is Class C.~~

~~(60) Miner's Ravine and Tributaries (Placer County). Miner's Ravine and its tributaries are Class B.~~

~~(61) Minnow Creek (Tuolumne County). The main stem Minnow Creek is Class A.~~

~~(62) Mokelumne River (Amador, Calaveras and San Joaquin counties). The main stem Mokelumne River from Burella Road upstream to Camanche Dam is Class A, from Camanche Dam upstream to Pardee Dam is Class H, and from Pardee Dam upstream is Class C.~~

~~(63) Mud Creek (Butte County). The main stem Mud Creek from Big Chico Creek upstream is Class C.~~

~~(64) Nelson Creek (Plumas County). The main stem Nelson Creek is Class C.~~

~~(65) New River and Tributaries (Trinity County). New River and its tributaries upstream from the East Fork New River, are Class A.~~

~~(66) New River East Fork and Tributaries (Trinity County). The East Fork New River and its tributaries from the New River upstream are Class A.~~

~~(67) Piru Creek and Tributaries (Ventura and Los Angeles counties). Piru Creek and its tributaries are Class A.~~

~~(68) Pit River and Tributaries (Lassen and Modoc counties). The Pit River and its tributaries are Class A.~~

~~(69) Poor Man Creek and Tributaries (Tuolumne County). Poor Man Creek and its tributaries are Class A.~~

~~(70) Portuguese Creek and Tributaries (Madera County). Portuguese Creek and its tributaries are Class A.~~

~~(71) Rock Creek (Butte County). The main stem Rock Creek from Big Chico Creek upstream to the Butte/Tehama County Line is Class C.~~

~~(72) Rock Creek and Tributaries (Shasta County). Rock Creek and its tributaries are Class H.~~

~~(73) Rose Creek (Tuolumne County). The main stem Rose Creek is Class C.~~

~~(74) Rubicon River and Tributaries (El Dorado and Placer counties). The Rubicon River and its tributaries are Class C. No dredge with an intake larger than four inches may be used.~~

~~(75) Sacramento River and Tributaries (several counties). The main stem Sacramento River from the San Francisco Bay upstream to Shasta Dam is Class A. The Sacramento River and its tributaries from Shasta Lake upstream to Box Canyon Dam are Class A.~~

~~(76) Salmon River (Siskiyou County). The main stem Salmon River is Class D.~~

~~(77) Salmon River, North Fork (Siskiyou County). The main stem North Fork Salmon River from the South Fork Salmon River upstream to the Marble Mountain Wilderness boundary is Class D.~~

~~(78) Salmon River, South Fork (Siskiyou County). The main stem South Fork Salmon River from the North Fork Salmon River upstream to the Trinity Alps Wilderness boundary is Class D.~~

~~(79) Salt Creek and its Tributaries (Riverside County). Salt Creek and its tributaries are Class A.~~

~~(80) San Felipe Creek and its Tributaries (Imperial and San Diego Counties), San Felipe Creek and its tributaries are Class A.~~

~~(81) San Gabriel, East Fork and Tributaries (Los Angeles County). The East Fork San Gabriel River and its tributaries from Cattle Canyon upstream are Class A.~~

~~(82) San Gabriel River, West Fork and Tributaries (Los Angeles County). The West Fork San Gabriel River and its tributaries from the Rincon Guard Station upstream are Class A.~~

~~(83) San Joaquin River (several counties). San Joaquin River from the Delta upstream to Friant Dam (Millerton Lake) is Class A.~~

~~(84) San Juan Creek and Tributaries (Orange and Riverside counties). San Juan Creek and its tributaries from its mouth upstream are Class A.~~

~~(85) San Mateo Creek and Tributaries (San Diego, Orange and Riverside counties). San Mateo Creek and its tributaries from its mouth upstream are Class A.~~

~~(86) Santa Ana River and its Tributaries (San Bernardino County). The Santa Ana River and its tributaries from the mouth of Bear Creek upstream are Class A.~~

~~(87) Santa Clara River and Tributaries (Los Angeles and Ventura counties). The Santa Clara River and its tributaries from the Los Angeles/Ventura County line upstream are Class A, except that Texas Canyon Creek is Class H.~~

~~(88) Santiago Creek and Tributaries (Orange County). Santiago Creek and its tributaries within the Cleveland National Forest are Class A.~~

~~(89) Saxon Creek (Mariposa County). The main stem Saxon Creek is Class A.~~

~~(90) Scott River and Tributaries (Siskiyou County). The Scott River and its tributaries are Class C.~~

~~(91) Secret Ravine and Tributaries (Placer County). Secret Ravine and its tributaries are Class B.~~

~~(92) Sespe Creek (Ventura County). The main stem Sespe Creek from the Los Padres National Forest boundary upstream to its confluence with Tule Creek is Class A.~~

~~(93) Shay Creek and Tributaries (San Bernardino County). Shay Creek and its tributaries are Class A.~~

~~(94) Shasta River and Tributaries (Siskiyou County). The Shasta River and its tributaries are Class A.~~

~~(95) Sherlock Creek (Mariposa County) The main stem Sherlock Creek is Class A.~~

~~(96) Silver King Creek and Tributaries (Alpine County). Silver King Creek and its tributaries are Class A.~~

~~(97) Six-Bit Creek and Tributaries (Tuolumne County). Six-Bit Creek and its tributaries are Class A.~~

~~(98) Smith River Middle Fork (Del Norte County). The main stem Middle Fork Smith River is Class D.~~

~~(99) Stanislaus River (Calaveras, San Joaquin, Stanislaus and Tuolumne counties). The main stem Stanilaus River from the San Joaquin River upstream to Goodwin Dam is Class A, and from New Melones Dam upstream, excluding New Melones Reservoir, is Class C.~~

~~(100) Sullivan Creek (Tuolumne County). The main stem Sullivan Creek is Class C.~~

~~(101) Sutter Creek (Amador County). The main stem Sutter Creek from Highway 49 upstream to Pine Gulch Road is Class H.~~

~~(102) Sycamore Creek and Tributaries (Fresno County). Sycamore Creek, tributary to the Kings River, and its tributaries are Class A.~~

~~(103) Texas Canyon Creek (Los Angeles County). The main stem Texas Canyon Creek is Class H.~~

~~(104) Trinity River, Main Stem below Lewiston Dam (Humboldt and Trinity counties). The main stem Trinity River from the Klamath River upstream to the South Fork Trinity River is Class A, from the South Fork Trinity River upstream to the North Fork Trinity River is Class H, from the North Fork Trinity River upstream to Grass Valley Creek is Class D, and from Grass Valley Creek upstream to Lewiston Dam is Class A.~~

~~(105) Trinity River, Main Stem and Tributaries above Lewiston Dam (Trinity County). The Trinity River and its tributaries above Lewiston Dam are open to dredging from July 1 through October 15.~~

~~(106) Trinity River, North Fork and Tributaries (Trinity County) The North Fork Trinity River and its tributaries upstream from Hobo Gulch Campground are Class A.~~

~~(107) Tuolumne River (Stanislaus County). The main stem Tuolumne River from the Waterford Bridge upstream to La Grange Dam is Class A.~~

~~(108) Tuolumne River, North Fork, and Tributaries (Tuolumne County). The North Fork Tuolumne River and its tributaries are Class B.~~

~~(109) Turnback Creek and Tributaries (Tuolumne County). Turnback Creek and its tributaries are Class A.~~

~~(110) Wolf Creek (Nevada County). The main stem Wolf Creek from the Tarr Ditch Diversion (T15N R8E S10) upstream is Class C.~~

~~(111) Woods Creek and Tributaries (Tuolumne County). Woods Creek and its tributaries from Harvard Mine Road (Jamestown) downstream are Class C, from Harvard Mine Road upstream are Class A.~~

~~(112) Wooley Creek and Tributaries (Siskiyou County). Wooley Creek and its tributaries are Class A.~~

~~(113) Yuba River (Yuba County). The main stem Yuba River from its mouth at Marysville upstream to Highway 20 is Class B, and from Highway 20 upstream to Englebright Dam is Class A.~~

~~(114) Yuba River, North Fork (Sierra and Yuba counties). The main stem North Fork Yuba River from the Middle Fork of the Yuba River upstream to Fiddle Creek is Class H.~~

2.2.5 "Best Management Practices" Information

As part of development of the proposed amendments to the regulations, CDFG conducted a review of the policies from the 8 other states which currently regulate similar suction dredge activities. A tabular comparison showing each state's regulatory requirements for suction dredge mining is included in Appendix E of this SEIR. Many of the regulatory practices of other states include policies which are designed to minimize environmental effects, but are either not applicable or not enforceable under CDFG's legal mandates. Instead, CDFG will use this information to inform the development of a "Best Management Practices" pamphlet which will be given to each permittee under the Proposed Program. Though some of the guidance contained in this pamphlet would not be legally enforceable by the CDFG, it is designed to support the proposed amendments to the regulations by offering suggestions to further reduce or avoid potential environmental effects and inconveniences to others. For instance, some of the "Best Management Practices" guidelines that will be developed include ways to identify and avoid important cultural and historic resources, recommendations to keep encampment sites clean, and advice on the proper treatment of wastes. More information on the guidance that will be included is described in the individual resource discussions of Chapter 4.

2.3 Uses of this SEIR

CDFG will use the SEIR to: (1) inform its decision whether to adopt and implement the Proposed Program, including the issuance of individual permits for activities in compliance with the proposed amendments to the regulations; and (2) inform, in part, the decision of whether a Streambed Alteration Agreement is necessary and whether to execute such an agreement under Fish and Game Code Section 1602 for dredging operations that intend to deviate from the specific restrictions enumerated in the proposed amendments to the regulations. In addition, this SEIR may be used by other agencies to support their issuance of permits or approvals in relationship to suction dredging. These are anticipated to include the U.S. Forest Service (USFS) and U.S. Bureau of Land Management (BLM), who oversee suction dredging on lands within their respective jurisdictions. While no other local, state or federal agencies are known to currently issue permits or authorizations related to suction dredging, it is possible that certain agencies may choose to regulate the activity in the future. If this is the case, it is possible that such agencies may choose to rely on this SEIR as a source of information or to support their discretionary decisions related to suction dredging. These agencies may include, but are not limited to, the following:

- United States Fish and Wildlife Service
- National Marine Fisheries Service
- California State Water Resources Control Board
- Regional Water Quality Control Boards (all regions)
- United States Army Corps of Engineers
- California State Historic Preservation Office
- California State Air Resources Board
- California Department of Parks and Recreation
- California State Lands Commission
- California Department of Conservation
- California Environmental Protection Agency

Note that the purpose of this SEIR is to address environmental impacts of the Proposed Program, not to provide a dispositive legal treatise on a variety of legal issues which may or may not be within the jurisdiction of CDFG. As such, the SEIR does not attempt to define the jurisdictions and related permitting or regulatory approval authority of other agencies which may have oversight over suction dredging activities.

Chapter 3
ACTIVITY DESCRIPTION

3.1 History

Although gold had been discovered in California as early as 1775, California's famous Gold Rush began with the discovery of gold at Sutter's Mill on January 24, 1848. At first, individual dredgers could "strike it rich" by panning, and using simple equipment such as rocker boxes and sluices. However, by the mid-1850's, the easily recoverable gold had been mined out and gold mining began to be dominated by well capitalized companies (California Divisions of Mines and Geology, 1970).

Hydraulic mining emerged in several locations simultaneously in the early 1850's. After extensive water conveyance systems were completed, it became an important segment of the gold mining industry and thrived from about 1860 to 1884 when the Sawyer Decision (which addressed environmental and commerce damage caused by hydraulic mining debris) led to the decline of hydraulic mining in California.

Underground "hardrock" gold became a major gold producing industry as milling technology improved after hydraulic mining began to wane. However, hardrock mining for gold was suspended during World War Two and never fully recovered after the war.

In the late 1890's, large, mechanical dredges (e.g., bucket and dragline dredges) were developed to mine low grade gold deposits in rivers or on their outwash fans. These dredges floated in rivers or in their own ponds and mined ahead by scooping up gold-bearing gravel in huge steel buckets, extracting the gold, and dumping the waste cobbles into great mounds behind them. The gold dredging industry grew steadily and reached its peak during the Great Depression. However, because of low gold prices and increased operating expenses, the business declined. By the 1950's very few large gold operations remained.

In the early 1960's, a new inexpensive and portable dredge emerged – the suction dredge. Self Contained Underwater Breathing Apparatus (SCUBA) and Hookah Air systems allowed individuals to use suction dredges underwater like vacuum cleaners to excavate sediment from a river or stream. Anecdotal reports hold that the individuals first using these new machines in northern rivers recovered impressive amounts of gold. Although suction dredges began as self-crafted devices, a number of manufacturers produce suction dredges of various sizes and prices, including companies such as Keene and Proline.

3.2 Number of Suction Dredgers

The number of general suction dredge permits issued annually by CDFG increased dramatically from 3,981 in 1976 to a peak of 12,763 in 1980, echoing the steep rise in gold prices in the late 1970s. On average, CDFG issued approximately 3,200 suction dredge mining permits to California residents annually for the 15 years prior to the current moratorium established in July 2009. The comparable average number of non-resident suction dredge mining permits issued annually by CDFG was approximately 450 (Figure 3-1).

3.3 Equipment

3.3.1 General

Although suction dredges vary in size and power, their basic configuration is comprised of a floating gold recovery system (known as a sluice box) attached to a suction hose (see Figure 3-2). These machines are operated by one or two individuals who control the hose underwater using a supplied air system as necessary.

Suction dredges are generally driven by either a gasoline or diesel engine that runs a centrifugal pump. The pump draws in river water and forces it through a series of hoses and tubes to create a Venturi effect, or a strong suction. Sediment from a river or stream is drawn up the suction hose and discharged into one or more sluice boxes. Material which is not trapped by the sluice filters passes back into the waterway. The heavier, gravel-like materials are deposited just off the tail (end) of the sluice back into the stream while finer sediments (clay and silt sized particles) are carried downstream by the water current (USFS, 2010). In general, dredge performance or capacity (reported as cubic yards per hour by manufacturers) is primarily a function of the diameter of the intake nozzle and the size and characteristics of the substrate, as well as engine horsepower (HP). Further description of the range in dredge performance is provided below in Section 3.3.3.

Sluice boxes are usually metal boxes equipped with steel riffles and are used to recover gold and other high density solids (e.g., black sand, lead weights and shot, mercury amalgam, mercury) from bulk sediment. Gold-bearing sediment is washed through a sluice box and gold and other high density solids settle behind the riffles. Materials discharged from the sluice (e.g., low density sediment, small gold particles, etc.) are called tailings. Gold and other dense solids are collected when the sluice is cleaned. Sluice boxes have become increasingly complex as manufacturers attempt to increase their gold-trapping efficiency (e.g., systems employing several sluice boxes, sediment classifiers, and jet flare technology). However, because manufacturers do not provide test data for different designs, it is not possible to state how much better or worse different designs fare at trapping gold.

Almost all dredges are supported in the water by floats made of plastic, foam, or tire tubes. Some dredges are designed with twin pressure systems—they have two engines, two pumps, and two pressure hoses which attach to a special jet. The main advantage of this type of system is that it allows a dredge operator to move material faster by combining portability with capacity.

Larger dredges—those with a nozzle size larger than 6 inches—generally require at least two operators. In addition, the larger dredge systems are almost always equipped with Hookah air compressors, which can supply air to one or more divers.

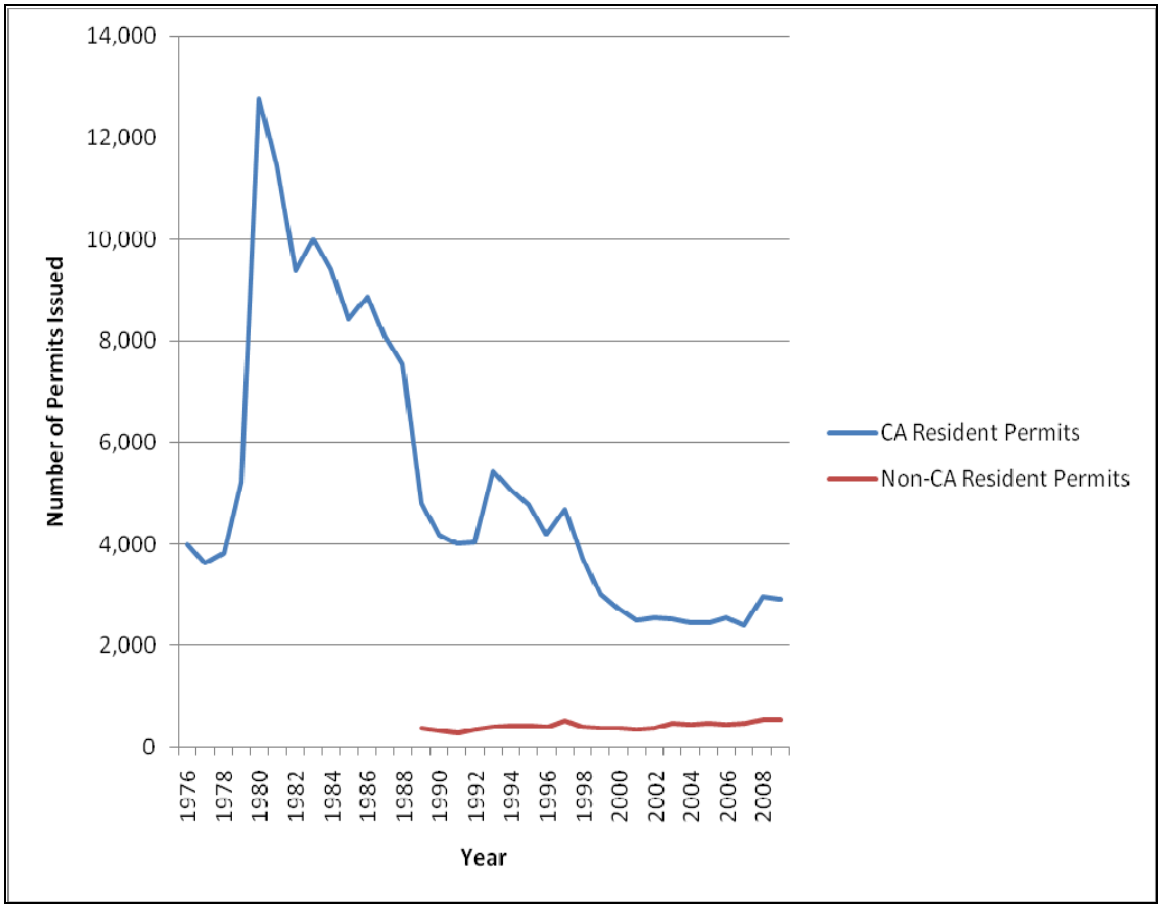


FIGURE 3-1. HISTORICAL TRENDS IN SUCTION DREDGE PERMIT ISSUANCE BETWEEN 1976 AND 2009

Source: California Department of Fish and Game Historical Licensing Statistics – Special Licenses and Permits

3.3.2 Types of Dredges

Surface Dredge

Surface dredges are dredges that have their engines and sluice boxes mounted above the water's surface (see Figure 3-2). It is by far the most common type of suction dredge. They are most effective in shallow water and thus, are easily operated without diving equipment. Surface dredges range in size from small backpack models to large models up to ten meters in length.

Subsurface Dredge

Subsurface dredges differ from surface dredges in that their gold recovery systems are suspended underwater beneath the dredge's floats. Since the sluice box can be raised or lowered, it can be maintained close to the stream bottom. Therefore, the sand and gravel need not be pumped all the way to the water's surface. This minimizes the amount of power required to operate the dredge and decreases the overall weight of the device. For example, a 5-inch subsurface pump can use the same pump from a 3-inch surface dredge yet move 2-3 times more material than the surface unit (Herschbach, 1999). However, the recovery rate of gold for the subsurface dredge is less effective. The recovery system utilizes a long, enclosed chamber with removable riffle trays that are attached along the bottom. And since the riffle trays are relatively small and provide less surface area in which gold may be trapped, it is less efficient at fine gold recovery than the surface dredge. Despite lower recovery rates, the benefit of decreased weight makes these types of dredges popular with suction dredgers who favor portability.

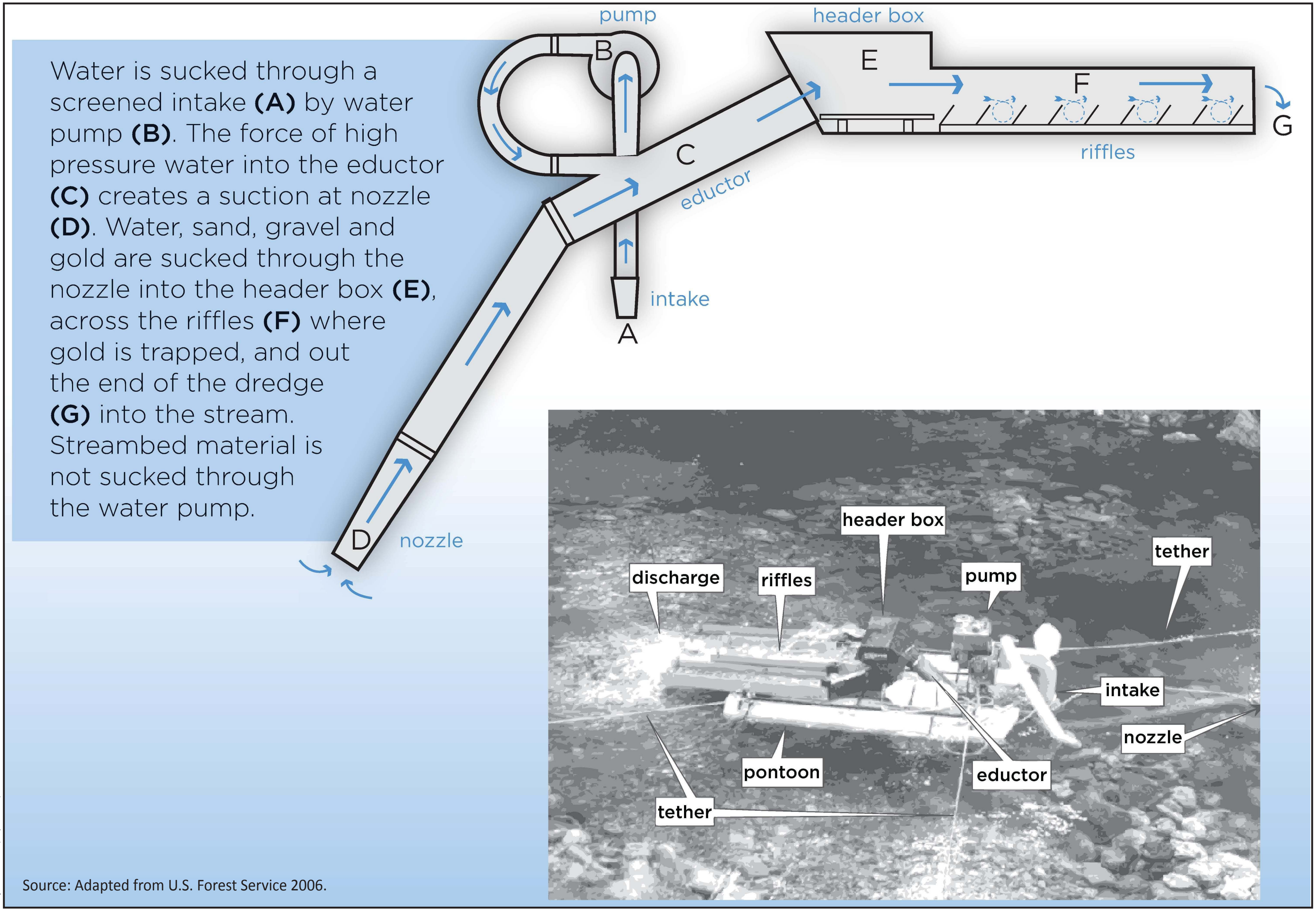
Underwater Dredge

Underwater dredges employ an enclosed gold recovery system that rests on the river or stream bottom underneath the float-supported engine(s). Like the subsurface dredge, the underwater dredge is an enclosed chamber with riffle trays that are suspended under water. However, unlike the subsurface systems, there are no chains attaching the underwater sluice to the floats. Instead, the sluice box rests on the bottom, supported in an upright position by the diver; the pressure hose is its only link with the water surface. The underwater dredge has no suction hose; the intake nozzle and jet are built as one recovery system, generally a metal or plastic tube with an attached metal elbow. Instead of manipulating just a flexible suction hose, as with the subsurface dredge, a diver using an underwater dredge must maneuver the whole unit around the bottom, keeping it always in an upright position and completely submerged. If it falls over, any gold in the small riffle tray may be lost. The reported main advantage of underwater dredges is portability. The components of an underwater dredge, for instance, are approximately half the weight of a subsurface dredge, and they are more compact and easier to carry. As a result, these underwater dredges are primarily used for reconnaissance of sites; when a gold streak is found a more efficient dredge type is employed.

3.3.3 Size of Dredges

Dredge size varies greatly according to dredge type, make, and model. Table 3-1 summarizes characteristics of common dredge types and sizes. In general, suction dredges equipped with nozzle sizes 6 inches and smaller are considered to be recreational, while larger nozzle sizes are employed for more commercial endeavors. Respondents to the Suction Dredger Survey (Appendix F) reported using nozzle sizes between 2 and 8 inches in diameter. This SEIR considers the effects of nozzles ranging from 2 to 10 inches in diameter.

The volume of sediment moved based on varying nozzle size is presented in Table 3-2 and Figure 3-3. In general, dredges equipped with small-diameter nozzles have less sediment excavating capacity compared to those with larger diameter nozzles. Although scientific data is lacking, experienced suction dredgers have noted that excavating capacity is more directly limited by the nozzle diameter rather than engine HP size (McCracken, 2005). Doubling the engine power beyond what is most commonly used for a given nozzle diameter would not necessarily double the sediment excavating capacity. For instance, on a 3 inch diameter nozzle, using a 10 HP engine rather than a standard 4 HP engine would not significantly increase the dredge capacity, as the unit remains constrained by the volume and size of sediment that can be passed through the nozzle. In addition, technological advances have lead to improvements on engine efficiencies such that older engines, though labeled with a similar HP rating, may be less efficient than newer ones.



Source: Adapted from U.S. Forest Service 2006.

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Horizon WATER and ENVIRONMENT

Figure 3-2
Typical Small-Scale Suction Dredge

Based on the survey results, the median nozzle size used by dredgers is 4 inches, and the median engine power is 5.5 HP and 6.5 HP for California resident and non-resident permit holders, respectively.

It is important to note that presently, only very limited data sources are available which detail suction dredge capacity, and the reported production rates exhibit a great degree of variability. During the Initial Study, data from Keene Engineering's 2008 product catalogue were used to illustrate the dredging capacity for the Program. However, several sources have indicated that the manufacturer's specifications for production rate were not realistic because they represented the maximum volume of substrate that the dredge can processes under ideal conditions. It is unlikely that these production rates are achieved under actual circumstances.

Generally speaking, the sediment movement power of suction dredges can vary greatly depending on a number of factors including size of the substrate, bed compactness, water depth, water velocity, visibility, and user experience. Typical situations which slow production rates include dredging in areas with abundant cobbles or boulders larger than the nozzle size (which require significant time to physically move), dredging in crevices or joints, and in shallow or fast moving water (USFS, 2010). Given the magnitude of these influences on dredging volumes, the USFS estimates that actual production capacities are 50-90% less than the maximum capacity cited by manufacturers (USFS, 2010).

During public review of the Initial Study, several individuals submitted personal accounts of their own production rates, generally calculated using dredge hole volume and time spent dredging. Similar information was also submitted as part of the suction dredge survey. While of interest, these production rates are not incorporated into this document due to their specificity towards a single nozzle size and the inherent difficulty of verifying their calculation methodology. However, Keene Engineering provided a secondary data set which provides detailed information documenting a range of equipment sizes under two different substrate environments in California Rivers. These more conservative production rates are illustrated in Table 3-2 along with the original manufacturer specifications to provide a broad overview of the expected range for dredging volumes based on nozzle size.

3.4 Suction Dredging Activities

This section briefly describes the basic steps involved in suction dredge mining activities. Information was derived from the Suction Dredger Survey conducted as part of this SEIR (Appendix F), the Modern Gold Dredging booklet (Heavy Metal Mining Company, 1992), website advice from miner Dave McCracken (2008), the New 49ers Club Rules (Koons, 2004), USFS technical memo on suction dredging (2010), and dredge manufacturer Keene Engineering, Inc. (2008b). The information provided by these sources appears to be based on personal experience and has not been verified or described in peer reviewed, scientific publications. These references were instructive in providing an intimate and knowledgeable perspective on suction dredging, but they are not necessarily definitive or complete. Further, CDFG was unable to validate this information in the field due to the legislative moratorium.

TABLE 3-1. CHARACTERISTICS OF VARIOUS SUCTION DREDGES

Dredge Size & Type	Nozzle Size (inches)	Engine Size (horsepower)	Dredge Pros	Dredge Cons
Backpack dredge	2-2.5	2.5-3	Light and easy to pack in and out of the location. Good for prospecting and sampling. With suction nozzle it can be used in very shallow water.	Small capacity, very low production capability.
Sampling dredge	3	4	Still lighter and smaller than a 4-inch and can move much more material than the 2 inch. High portability. This sized unit is fairly good for use in remote places	Low production rate.
Sampling/small scale production dredge	4	6	The smallest of the production dredges but still good at sampling for pay streaks. Still fairly mobile, and good for semi-remote sites.	Heavier and more work to put together and take apart.
Larger scale sampling/production dredge	5	9	Good for larger operations. Still good for sampling, but on a larger scale. Hose is flexible and can be operated by a single dredger.	Heavier to disassemble and move around than smaller dredges. May have multiple or larger engines.
Recreational or smaller commercial production dredge	6	14	A useful size dredge for someone who has found a sizable pay stream and wants maximize production. Useful in larger rivers to locate gold in bigger areas. Can move rocks and gravel, and sand up to about 5 inches in diameter without plug-up of the hose or jet.	Heavier Unit. Larger nozzle makes it harder to sample with. The larger hose isn't as flexible as a smaller one. Although one person can operate it, two person teams are better. Rocks are uncovered so quickly by this size unit that a single operator can be overwhelmed with the work of clearing large cobbles and small

Dredge Size & Type	Nozzle Size (inches)	Engine Size (horsepower)	Dredge Pros	Dredge Cons
				boulders that don't fit in the suction nozzle.
Commercial dredge	8	46	Good size for commercial operations.	Heavy Unit. Manning the hose and moving the rocks require at least two persons to make productive use. Dredges this size are legally limited in which waters they can be used.
Larger commercial dredge	10	95	Good for larger commercial operations.	Heavy unit. Needs a team of underwater workers to operate. Not legal under previous or proposed regulations.

Source: Dorado Vista, Inc. N.D.; Keene 2009

TABLE 3-2. VOLUME OF SEDIMENT MOVED BASED ON NOZZLE SIZE

Dredge Nozzle Diameter (inches)	Manufacturer Specifications (maximum reported)		2009 Manufacturer Field Testing Results			
			Gravel Bars (Klamath River)		Rocky Substrate (Yuba River)	
	cy/hour	cy/day (6 hours*)	cy/hour	cy/day (6 hours*)	cy/hour	cy/day (6 hours*)
2	1.4	8.4	0.18	1.08	0.12	0.72
2.5	2.4	14.4	0.23	1.38	0.15	0.9
3	3	18	0.46	2.76	0.3	1.8
4	5.2	31.2	0.69	4.14	0.46	2.76
5	10.5	63	1.37	8.22	0.91	5.46
6	17	102	1.6	9.6	1.07	6.42
8	27.5	165	3.43	20.58	2.28	13.68
10	Not reported	Not reported	7.31	43.86	4.87	29.22

** 6 hours was selected based on the Suction Dredger Survey results (Appendix F), which resulted in an average between five and six hours. The average duration was rounded up to provide a conservative estimate.*

Source: Keene 2008a and 2009.

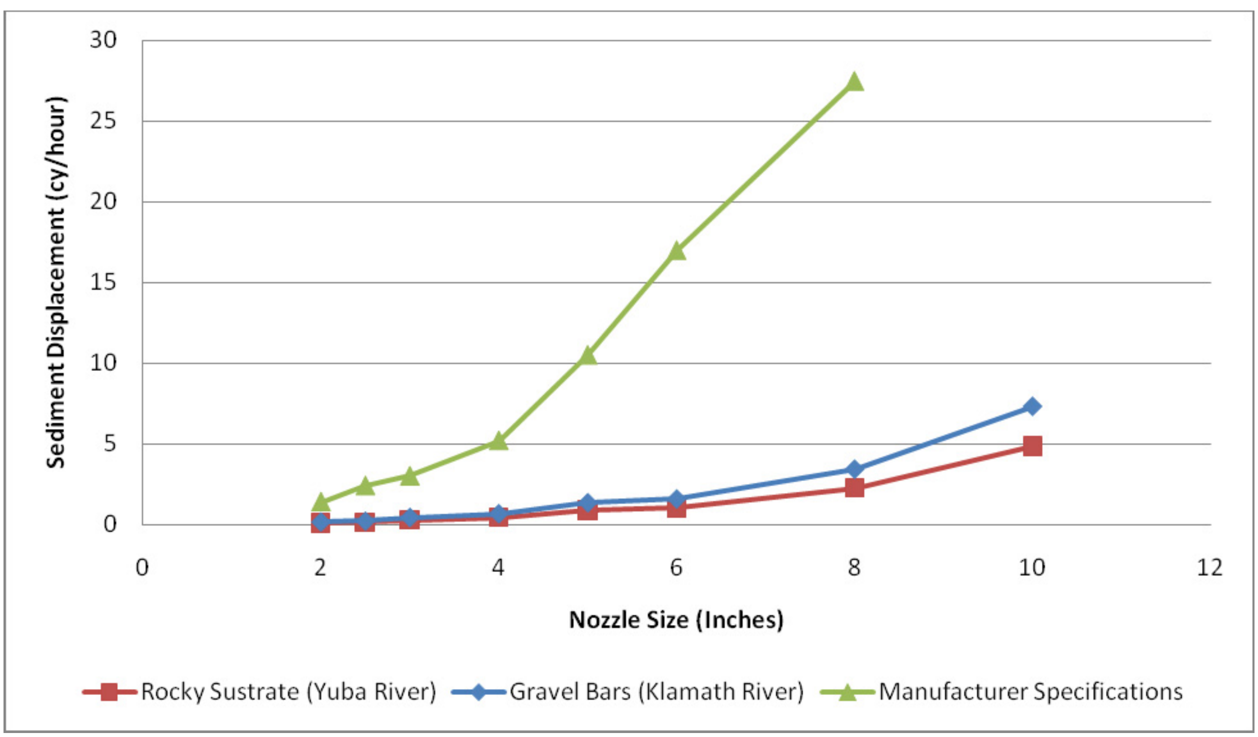

FIGURE 3-3. VOLUME OF SEDIMENT MOVED BASED ON NOZZLE SIZE AND SUBSTRATE TYPE

Source: Keene 2008a and 2009

3.4.1 Selecting a Site

In seeking a good site with potential for gold, suction dredge miners consider river processes and river form in prioritizing their locations, as well as past history with sites producing gold. In California, gold found in streams, floodplains, and terraces is generally alluvial, having been previously transported and deposited by streams. A placer deposit is the collection of valuable minerals (in this case gold) concentrated in a dense depositional site. In California, placer deposits are typically comprised of alluvial sand and gravel. While placer deposits are generally thought of as occurring in the active stream channels, placer gold deposits are often commonly held in the stored alluvium in the floodplains and relict terraces adjacent to stream courses. Within streams, placer gold deposits will generally be found in zones where sediments are deposited or are collected. Because the gold is typically very fine (less than .0015 inches in diameter) it will more likely deposit (or settle out) in slower water environments, such as in deeper pools or along point bars on the inside bend of river turns. Gold may also be found in the stillwater deposits downstream of obstructions, such as rocks, vegetation, logs, or bedrock outcrops. Backwater eddies along the stream banks or around coarse woody debris (CWD) may also help settle gold. As one of the denser materials transported by any stream, gold is among the first to drop out when a stream slows and energy diminishes. Unless the gold is re-initiated into transport, it often sifts down through coarser sediments (sand and gravel) ultimately settling on a hardpan layer or local bedrock. Deep narrow crevices and cracks, especially occurring in steeply dipping rocks whose strike or trend is perpendicular to the stream flow, are particularly favorable for the occurrence of gold. A series of parallel, deep, narrow cracks or crevices at right angles to streamflow are productive because they form natural riffles and pockets to trap gold.

Dredging is generally conducted in waters with 10 feet of depth or less. However, larger dredges equipped with Hookah Systems and hose lengths can allow for excavations in deeper waters (such as the Klamath, American, and Yuba rivers).

3.4.2 Accessing the Site

Suction dredge operators usually rely on personal transportation to access sites. These mining areas can be accessed via vehicle or boat depending on the location. According to the Suction Dredger Survey, one way travel distances for in-state dredgers averaged 132 miles while for out-of-state dredgers, this distance averaged 851 miles. Miners generally use existing trails and pathways for ease of travel, though such pathways and trails are not always available. Approximately 72% of California-resident permit holders reported that they typically drove off paved roads to access dredging sites, of which 87% indicated that they used a car or truck in doing so. Fewer non-Californian permit holders reported driving off of paved roads (68%); though of those who did, the majority used a car or truck. It should be noted that miners are required by law to obtain permission to enter private lands, as CDFG's proposed permit regulations do not authorize trespassing.

3.4.3 Delivering Equipment

Suction dredge mining equipment, including the dredge engine, pump oil, fuel, cables or ropes to hold the dredge in place, winches to move boulders, hand tools to loosen gravel and process materials, and other components, are usually driven into an area where the miner will stay. The equipment may require additional secondary transport if the mining location is remote and not accessible by roads from the campsite. If the ultimate site is inaccessible by vehicle, miners will generally carry the equipment, fuel, and supplies to the desired location and assemble the suction dredge on the bank. It is a standard practice to drain oil and fuel from motors during transportation or carrying. The amount of fuel brought for the rigs to the mining location is generally limited to the day's estimated needs.

Dredges are normally disassembled during transport over dry ground and reassembled on-site. Assembly time can range anywhere from 30 minutes to 1 hour depending on the dredge size and accessory equipment.

3.4.4 Securing Equipment

Any equipment not used during the dredging operation is generally secured at a campsite or along the banks of the area to be dredged.

During operation, dredges are usually secured in the waterway using rope or cable to prevent drift while the dredge is in use. This is generally done using ropes with two separate knots and a heavy or stationary object near the stream bank.

3.4.5 Conducting Dredging

Once the components have been assembled and placed at the mining site, the pump must be fully primed – full of water with all air removed – before starting the engine.

Dredging operations are generally divided into "sampling" and "production" phases. The first phase, "sampling," is the testing of areas to determine the presence or absence of gold laden areas, or "pay streaks." Pay streaks are referred to as such because of the notion that gold deposits settle out in areas with definite left and right boundaries and less definitive upstream and downstream margins. Sampling can involve several test holes and can be conducted with smaller suction dredges until a suitable production area is located. A dredge hole is the general term for the area in which the miner is dredging. These dredge holes are commonly cleared of large cobbles and rocks to allow the dredge to suck up smaller, gravel-sized sediments from the stream bed.

Experienced dredge miners recommend that one find the tail end of a streak and move upstream when in a production phase, so that the tailings fall in areas already worked. In order to fully take advantage of the suction dredger's production rate, the operator frees and moves over-sized rocks (too large to be sucked into the nozzle) from the stream bed work area. The basic movement for a suction hose is placement into the streambed at a slightly upstream angle, and then moving upstream. Cobbles are generally tossed downstream rather than to the side to prevent the need to re-excavate if the diver chooses to move laterally to locate a more promising area. Suction dredgers will often perform multiple passes over a streak, until they have reached the bottom of the gold deposit.

On occasion, to reach gold that has deposited below or around large boulders, winching or prying is performed. Crowbars, winches, or pull cables/chains are used to move the boulders out of place during dredging.

During dredging, a solids-to-water balance must be maintained to ensure suction. The solids content being dredged should generally never exceed 10%. Therefore, care is exercised to prevent dredging excess amounts of sand.

3.4.6 Refueling

Most engines will require refueling during the day, and can be replenished with the fuel that has been brought to the site. Dredgers often refuel their equipment where they are operating. Oil changes may also be required periodically.

3.4.7 Processing of Material

Clean-up consists of daily removal of coarse pieces of gold from the sluice using tweezers. Normal conditions require that the sluice box be washed out on a daily or weekly basis to remove accumulated materials. Generally, the sluice box does not need to be cleaned until gold is beginning to be deposited below the upper third of the box. When the sluice box is ready to be cleaned, the carpet underlay is removed and all materials captured in the box are washed into a large bucket or washtub. The contents of the washtub become known as concentrates. In addition to containing gold, concentrates can also contain mercury or other materials (e.g., lead fishing weights) that have settled to the bottom of the river alongside the gold deposits. The concentrates are filtered through a series of screens and/or panned to work the concentrates down to small batches containing gold, which then can be processed through a final dry process.

The final process is sometimes done at camp where there is a flat work surface and shelter from wind. Alternatively, miners will take the concentrates home or deliver them to a service for processing. This final procedure involves the drying of concentrates, filtering, and physical separation using magnets and small hand tools. In addition, chemical separation, by means of mercury and acids, may be used for the amalgamation process. Amalgamation is a method of separating finer gold particles from other materials. In this process, clean mercury is brought into contact with clean gold, and the gold becomes wetted and "drawn into" the mercury. This results in a solution of gold in mercury, or an alloy of gold and mercury called amalgam. After the mercury has gathered in the gold, it is removed by dissolving it in nitric acid or by driving it off as a vapor by heat, leaving the gold behind. While mercury should be treated as a hazardous waste, some miners collect and store it, while others may dispose of it by vaporizing it in a cooking pan on a camp stove. The spent nitric acid contains mercuric nitrate which is extremely toxic (Environmental Health and Safety, 2009). That said, 98% of both in-state and out-of-state suction dredgers reported that they did not use mercury and/or nitric acid to process concentrates.

Hydrochloric or sulfuric acid may also be used to clean stained gold but neither acid will dissolve mercury amalgamated with gold. Nitric, hydrochloric, or sulfuric acids present similar concerns as mercury regarding handling, storage, and disposal.

3.4.8 Location

Suction dredging can take place throughout California, though much of the suction dredging occurs on private lands or unpatented claims owned or leased by individuals and mining clubs. In some cases, individual club members pay a fee to use the club's claim, such as with the New 49ers (New 49ers, 2009). Clubs cannot prohibit the public from accessing unpatented claims for purposes other than mining. These clubs may provide facilities, infrastructure, supplies, and also have their own rules and guidelines for suction dredging and associated activities. Many miners also own their own unpatented claims to which they have an exclusive right only to the locatable minerals under claim. Table 3-3 below highlights the counties most frequented by suction dredgers in 2008, as reported in the Suction Dredger Survey:

TABLE 3-3. COUNTIES VISITED FOR SUCTION DREDGING IN 2008

California Resident Permit Holders		**Non-California Resident Permit Holders**	
Counties	**Frequency Mentioned**	**County Name**	**Frequency Mentioned**
Sierra	115	Siskiyou	172
Plumas	112	Sierra	45
Siskiyou	110	Plumas	43
Placer	94	Placer	20
El Dorado	68	Trinity	15
Trinity	65	Tuolumne	14
Mariposa	64	Yuba	10
Tuolumne	62	Calaveras	7
Nevada	55	Humboldt	6
Yuba	41	Nevada	6
Butte	35	El Dorado	5
Los Angeles	34	Mariposa	5
Amador	29	Butte	4
Shasta	29	Kern	4
Calaveras	22	Lassen	2
Madera	20	Los Angeles	2
Kern	18	Shasta	2
Stanislaus	16	Stanislaus	2
Merced	10	Amador	1
Fresno	8	Del Norte	1
Humboldt	6	Madera	1
San Bernardino	5	***Total responses***	***367****
Del Norte	4		
Lassen	4		
Sacramento	3		
Sutter	2		
Contra Costa	1		
Modoc	1		
San Benito	1		
Solano	1		
Tehama	1		
Yolo	1		
Total responses	***1,037****		

**=total may be greater than the number of surveys returned, as some respondents reported visiting multiple counties*

As shown, Sierra, Plumas, Siskiyou, and Placer counties were among the most visited areas for California resident permit holders, while dredgers residing out of state favored Siskiyou County. Figure 3-4 depicts the subwatersheds in California where dredging was reported to have occurred in 2008. As shown, most of the subwatersheds where dredging occured are located in the Sierra Nevada Range and in tributaries to the Klamath River. Figure 3-5 illustrates the estimated dredging intensities for California resident permit holders by river basin, based on an analysis of survey data. Figure 3-6 shows the same information for non-California resident permit holders. Figures 3-5 and 3-6 show that the highest estimated dredging intensity for both California resident permit holders and non-California resident permit holders occurs in the northern Sierra Nevada Range and in the Klamath basin and its tributaries.

3.4.9 Timing

Seasonality

Most suction dredging occurs in the summer, when flows are lower, water temperatures are higher, and water clarity is greatest. In addition to seasonal restrictions imposed by the permits, underwater visibility is a key aspect for suction dredge mining when excavating an existing dredge hole, and when working with more than one diver. Therefore, wet or rainy conditions are not favorable. (McCracken, 2008)

Duration

California-resident permit holders spent, on average, 30 days per year operating a suction dredge, whereas out-of-state permit holders averaged just over 33. Per day, the average number of hours spent dredging was reported to be 5.2 hours for California residents and 5.4 hours for non-California residents. A substantial portion of this time involves moving larger materials out of the path of the suction dredge, rather than dredging itself. The remaining time is spent out of the water, working on equipment and processing dredged material. According to experienced dredgers, processing materials from concentrates typically takes less than an hour (McCracken, 2008).

3.4.10 Encampments

The majority of California-resident dredgers (72%) and nearly all dredgers residing out of state (98%) camp near the locations they are mining for short to extended periods of time. California residents had a larger number of shorter trips to conduct suction dredging than non-California residents, who typically had a fewer number of longer trips (15 trips averaging 2 days per trip, vs. 4.5 trips averaging 7 days per trip, respectively).

Overall, suction dredgers reported staying in undeveloped federal campsites more frequently than in other types of campsites in 2008. Generally speaking, gold dredging encampments are not believed to be substantially different than the encampments of other park and waterway users except that they may have hazardous materials onsite (e.g., mercury, nitric acid) not found at other users' encampments. There are, however, a few common considerations made by suction dredge miners that influence the type and components of their camps.

The nature of the encampment depends on the presence of nearby facilities (e.g., restrooms, showers), how uncomfortable the environment is, personal requirements, and expected duration of stay. Larger public park areas and private mining clubs often offer campgrounds and lodging facilities. These more heavily used camping areas may also provide chemical toilets and basic shower facilities. And, in addition to RV's and campers equipped with restroom facilities, personal port-a-potties and storage tanks are commonly used by those who do not have easy access to existing facilities. It is illegal to dispose of this type of waste in areas other than approved dumping stations.

Miners generally plan ahead for supplies and food based on duration of stay. Depending on the location of the nearest town, supplies may not be available for replenishment. Shorter stays can utilize tents or tarps, while longer excursions may call for RV-type vehicles to transport and keep perishable supplies. Some mining clubs do not allow any permanent structures to be constructed on club property. Because fuel is an important component of a suction dredge operation, miners often bring their own supplies of fuels and store them near campsites and mining areas. Some mining clubs impose restrictions on the volume of fuel which can be brought to a property.

Secure locations for the storage of recovered gold and other valuable possessions at the camp, such as safes, are generally necessary. Some miners carry personal firearms; however, some mining clubs require that they not be displayed or used on camp property. Also, some clubs recommend that all garbage, supply, food, and equipment items be kept safely and in a clean manner to reduce hazards. This includes the clearing of garbage and debris prior to departure.

It seems likely that many suction dredge miners adhere to these basic rules and responsible behavior. CDFG has not systematically monitored encampments to develop a quantitative assessment. However, CDFG wardens have observed camps strewn with household garbage, industrial waste, large gas barrels, dilapidated vehicles, and human waste (CDFG, 1994; Sierra Fund, 2009).

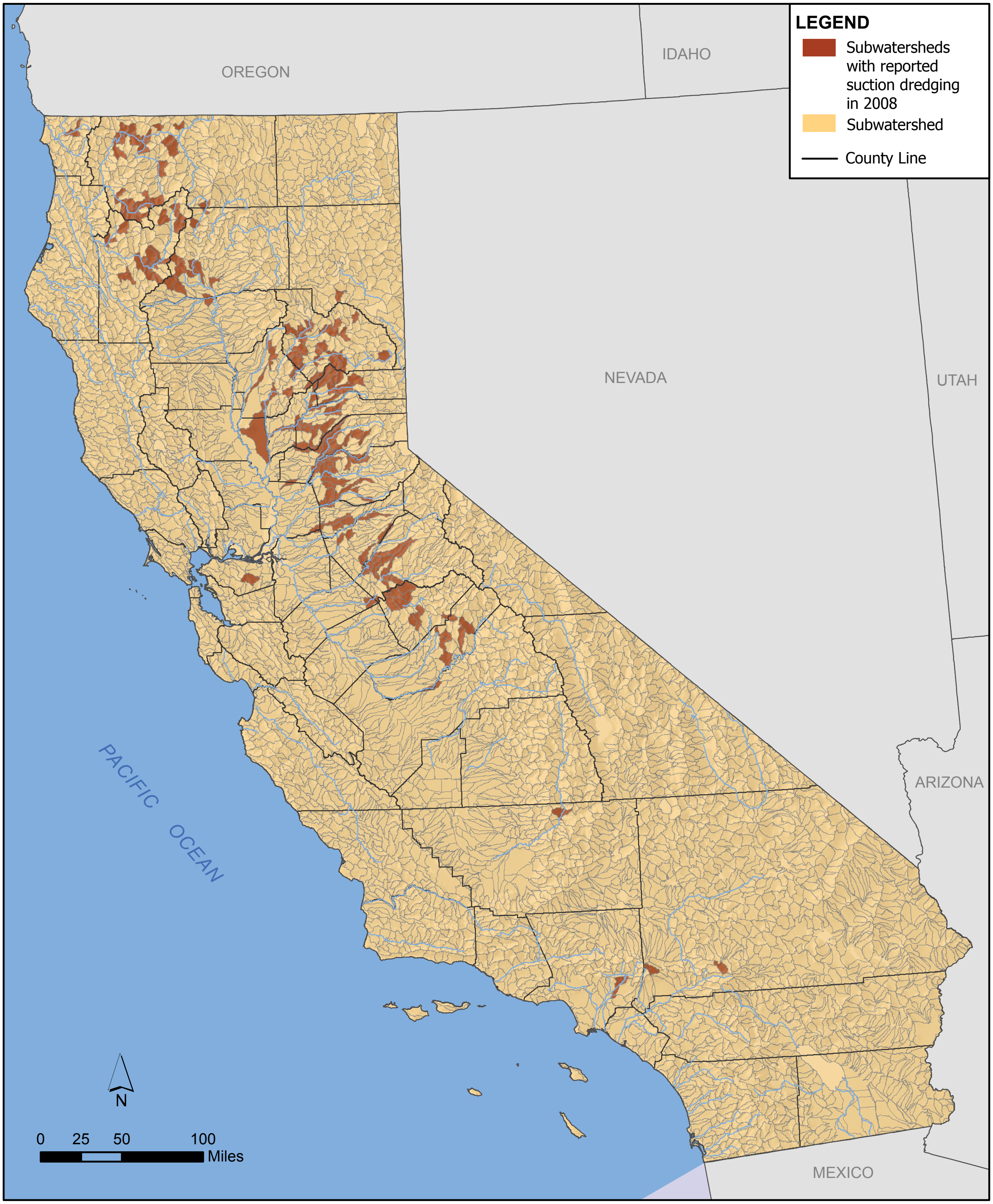

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Figure 3-4
Subwatershed Occurrences of Suction Dredging

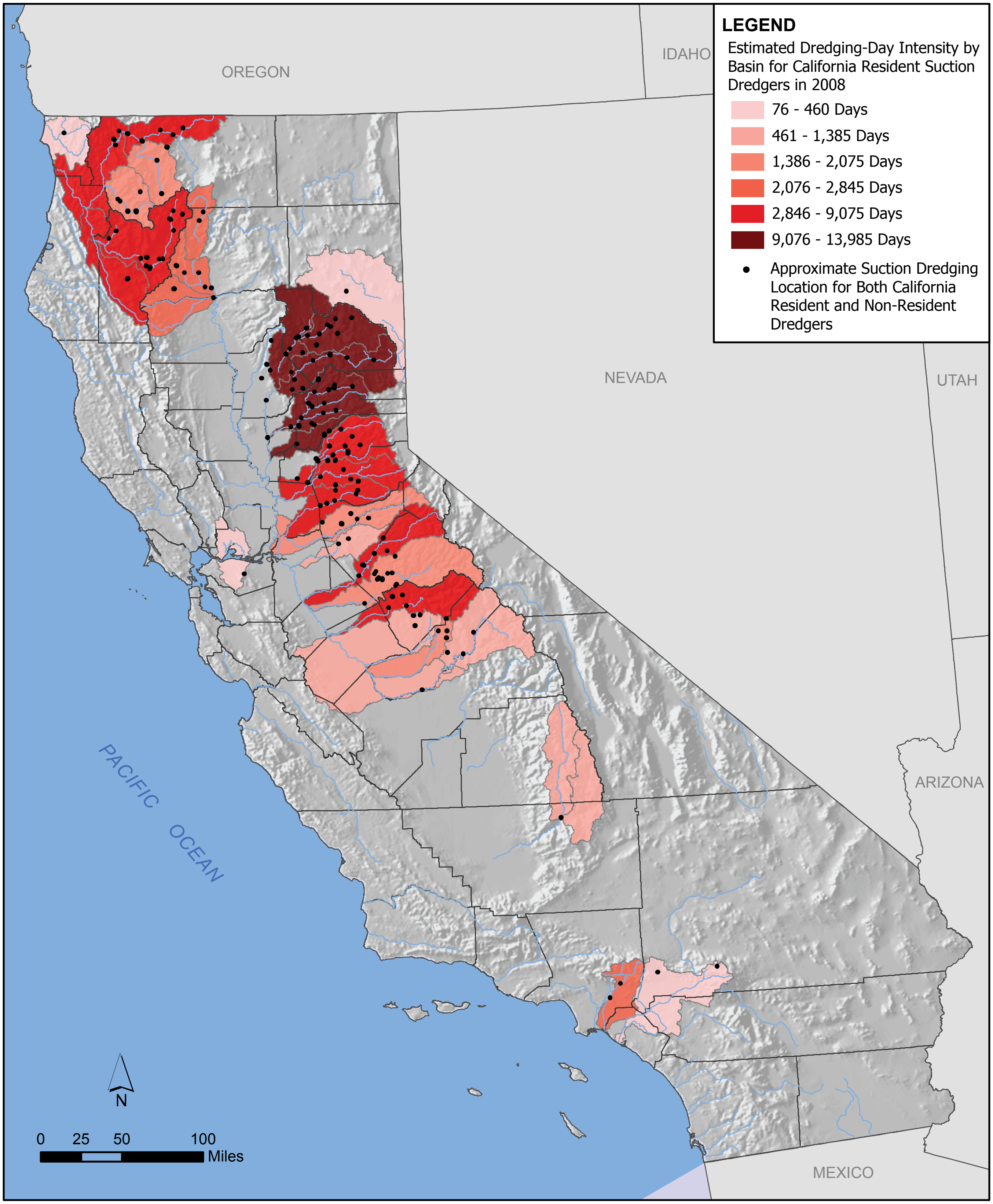

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Figure 3-5: Dredging-Day Intensity by Basin for California Resident Suction Dredgers, 2008

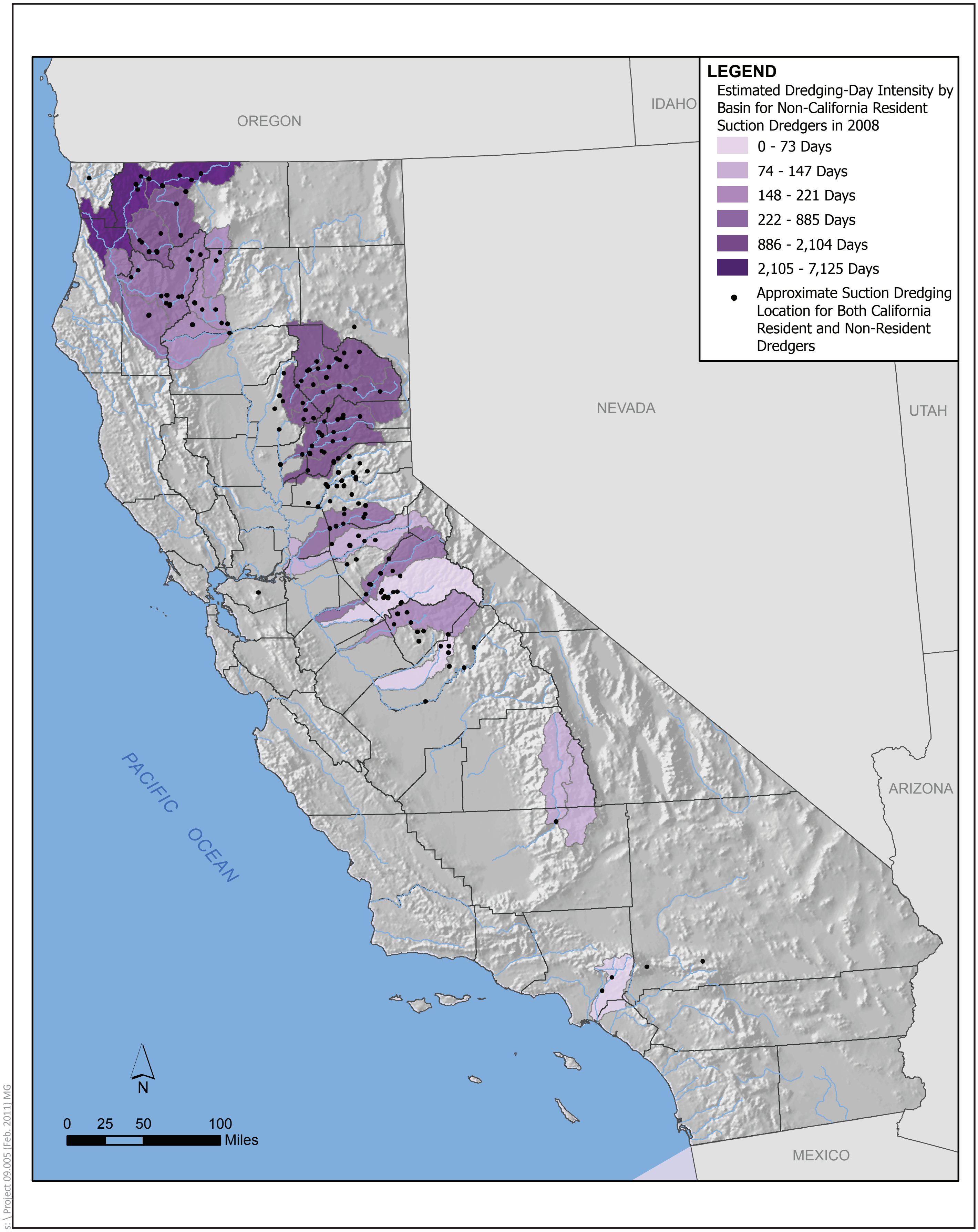

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Figure 3-6: Dredging-Day Intensity by Basin for Non-California Resident Suction Dredgers, 2008

Chapter 4
ENVIRONMENTAL IMPACTS

4.0.1 Introduction to the Analysis

Chapter 4 of this Draft Subsequent Environmental Impact Report contains individual subchapters that describe the environmental resources and potential environmental impacts of the Proposed Program. Each subchapter (4.1 through 4.10) describes the existing setting and background information for the resource to help the reader understand the conditions that could be affected by the Program. In addition, each subchapter includes a discussion of the criteria used in determining the significance levels of the Program's environmental impacts. Finally, each subchapter provides a description of environmental impacts and makes a significance conclusion relative to the significance criteria.

4.0.2 Significance of Environmental Impacts

According to CEQA, an EIR should define the threshold of significance and explain the criteria used to determine whether an impact is above or below that threshold. Significance criteria are identified for each environmental category to determine whether implementation of a project would result in a significant environmental impact when evaluated against the environmental setting/baseline conditions. The significance criteria vary depending on the environmental category. Where appropriate, CDFG has used custom significance criteria to assist in better evaluating impacts given the characteristics of the Program, and to bring as much specificity and/or clarity to the impact discussions as possible. It is within CDFG's discretion to use significance criteria which deviate from those contained in the Appendix G checklist due to its inherent authority under OPR's directive that significance determinations should be "based to the extent possible on scientific and factual data." (Cal. Code Regs., tit. 14, §15064, subd. (b).) "Such thresholds can be drawn from existing environmental standards, such as other statutes or regulations. '"[A] lead agency's use of existing environmental standards in determining the significance of a project's environmental impacts is an effective means of promoting consistency in significance determinations and integrating CEQA environmental review activities with other environmental program planning and resolution.'" (*Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1107, quoting *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 111.) "In preparing an EIR, the agency must consider and resolve every fair argument that can be made about the possible significant environmental effects of a project, irrespective of whether an established threshold of significance has been met with respect to any given effect." (*Protect the Historic Amador Waterways, supra,* 116 Cal.App.4th. at p. 1109.) Thus, under certain circumstances, such as the ones involved in the Proposed Program, CDFG has the discretion to deviate from the Appendix G checklist and develop custom thresholds that more accurately consider the relevant scientific and factual data involved in the Proposed Program.

In general, impacts are identified as either significant (above threshold) or less than significant (below threshold). In some cases, a significant impact may be identified as significant and unavoidable if no feasible mitigation measure(s) is/are available to reduce the impact to a less-than-significant level. If a project is subsequently adopted despite identified significant impacts that would result from the project, CEQA requires the lead agency to prepare and disclose a statement of overriding considerations describing the social, economic, and other reasons for adoption.

In determining significance, the analysis assumes compliance with the proposed regulations. In other words, dredging requirements that are explicitly included in the proposed regulations (e.g., restoration requirements), and therefore fall under CDFG's enforcement authority, were assumed to be complied with in the vast majority of cases because any enforcement activities would be within CDFG's jurisdiction and authority to implement. For requirements that are under the jurisdiction of another agency (e.g., handling of hazardous materials), the analysis assumed some level of non-compliance where there was evidence (including anecdotal) to suggest that such non-compliance occurs.

4.0.3 Sections Eliminated from Further Analysis

Six CEQA checklist resource areas have been eliminated from further analysis based on the nature and scope of the Proposed Program. A brief summary and description of these resource areas follows below.

Note also that socioeconomic effects are not considered environmental impacts under CEQA, unless they have relevance to a physical impact. The impact discussion under each individual resource topic cites socioeconomic information/effects as appropriate where such a nexus exists.

Agricultural Resources

The Program Area covers the entire state of California. Farmland and agricultural uses may be located in proximity to the rivers or waterways where suction dredge mining would occur; however, all suction dredge mining activities take place within water channels. As such, areas where suction dredge mining would occur do not contain lands designated or used for agriculture. In addition, the Proposed Program would not involve the development or redevelopment of lands. Therefore, the Proposed Program would not have the potential to convert prime farmland, unique farmland, or farmland of statewide importance, or lands under a Williamson Act contract to non-agricultural uses. Therefore, these impacts are not applicable.

Air Quality

During the preliminary analysis, three potential impacts were identified for the Air Quality resource topic for this DSEIR. This included potential exposure to mercury vapor and cumulative emission contributions for areas in non-attainment and/or greenhouse gasses. While these effects are still under consideration for the Program, they have been separated for analysis under more appropriate resource topics of this SEIR. Effects regarding potential exposure to mercury vapor are discussed in Chapter 4.4, *Hazards and Hazardous Materials*, while cumulative air pollutant emission contributions are covered in Chapter 5, *Other Statutory Considerations*.

Land Use

As a permit issuance program, the Proposed Program would not result in the creation of any permanent structures or barriers that could divide an established community, nor would it result in a conflict with any land use plans, policies, or regulations adopted to avoid or mitigate an environmental effect. The regulations under the Program may specify location and seasonal restrictions on operations; however, they would not provide authorization to operate on any public or private lands where such activity is not otherwise allowed.

The suction dredging regulations resulting from the Program would have no impact on land use plans as they would not override any existing laws or policies governing land uses on public or private lands which are under the jurisdiction of another agency or protected under conservation plans. All individuals participating in suction dredging activities would be responsible for obtaining any necessary authorizations from the relevant land use authority or property owner and complying with any applicable laws or policies specific to the area.

While the Proposed Program would have no impact on these *Land Use* issues, the topic of consistency with the federal mining laws received numerous comments during the scoping period. Though the *Land Use* resource area has been eliminated from this DSEIR, the topic of federal mining law consistency is not dismissed. Rather, this discussion is located in Chapter 4.10, *Mineral Resources*.

Population and Housing

A project would have an effect on population and housing if it induces growth directly (through the construction of new housing or increasing population) or indirectly (by increasing employment opportunities or eliminating existing constraints on development).

As a permitting program, the Proposed Program does not involve new development or infrastructure installation that could directly induce population growth in the Program Area. Additionally, the Program would not involve construction of new housing, create a demand for additional housing, or displace any existing housing units or persons. Furthermore, the Proposed Program would not result in measurable increases in population growth as it would not require additional staff to implement the proposed regulations.

Therefore, the Proposed Program would have no impact on population growth or housing demand.

Public Services

A project would have an effect on public services if it would result in substantial adverse physical impacts associated with the creation of new or physically altered governmental facilities, or a need for new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives.

Suction dredge mining is primarily a recreational activity that occurs on both public and private lands. When conducted on public land, this and all recreational activities are required to abide by any applicable regulations and guidelines that generally provide for the protection of the land and its natural resources. Public land managers (including the BLM, USFS, and CDFG) provide enforcement of regulations in public recreation areas to encourage protection of natural resources. When responding to calls, these agencies often work in cooperation with the local authorities, including sheriff and police departments.

All suction dredgers are responsible for obtaining permission from the operating land-managing agency or landowner and for being aware of any applicable laws or rules prior to entering and mining. The regulations resulting from the Proposed Program would not override any existing laws or policies related to the use of suction dredges on public or private lands (or associated activities) under the jurisdiction of another agency. Violations of laws or policies, while a concern, are a common issue for all recreational activities occurring in the state.

As described in the 2009 Initial Study, violations of laws or policies by suction dredgers are not believed to comprise a significant portion of the overall enforcement effort provided by local, state, or federal authorities. And while enforcement and protection services will remain an important factor in providing for the safety of the public and land, the proposed regulations would not impose a substantially greater demand for these services beyond that which already exists for recreational users overall. As such, the Proposed Program would not result in a need for altered or new facilities to provide law enforcement or fire protection services. The impact on police and fire protection is considered to be less than significant.

Furthermore, since the Proposed Program would not increase population or housing, it would have no effect on schools or other public facilities.

The Program's potential effects on park facilities are discussed in Chapter 4.8 of this DSEIR, *Recreation*.

Utilities and Service Systems

A project would have an effect on utility systems if it would affect potable water, wastewater treatment, stormwater, or solid waste facilities either directly (new or expanded facilities planned) or indirectly (result in new generation source, and/or demand that would exceed the capacities of existing facilities).

While sewage, gray water, and trash may be produced as a result of suction dredging activities, like all recreationalists, miners are responsible for the proper containment, disposal, and treatment of any such wastewater and/or solid waste. Furthermore, given the number of permits issued by CDFG in recent years, suction dredgers are not anticipated to generate sufficient waste or wastewater that would exceed the capacity of existing systems or wastewater standards. Impacts to these facilities would be less than significant.

Similarly, potable water needs by suction dredge miners would not exceed that of any other recreational activity. During extended excursions, miners are responsible for providing their own personal water supplies when a public source is unavailable. Otherwise, water may be available from any number of sources, including the public facilities that are provided by local, state, or federal land managers at recreation and park areas. The number of individuals that would participate in the Proposed Program are not likely to increase water demand beyond existing capacity. Furthermore, the Program does not involve the construction of any new water treatment facilities. As such there would be no impact on water supply and treatment facilities.

Lastly, the Proposed Program does not involve the creation of any new impervious surfaces that would result in new sources of stormwater runoff, nor does it propose or require the creation of any new or permanent stormwater drainage facilities. Therefore, the Program would have no impact on stormwater facilities.

Chapter 4.1
HYDROLOGY AND GEOMORPHOLOGY

4.1.1 Introduction

Hydrology is the science (or study) of the different forms of water in the natural environment with a focus on the circulation and distribution of water as expressed in the hydrologic cycle or a water balance (Goudie, 1994). *Geomorphology* is the study of the earth's surface, its landforms and the processes which shape them. Within geomorphology, fluvial geomorphology is the more specific study of rivers and streams, and typically includes aspects of hydrology (the quantity and timing of watershed runoff that enters the river), hydraulics (the behavior of water flows in the river), and sediment dynamics (how sediment is variably eroded, transported, and deposited along the river continuum). This section evaluates the potential for the Proposed Program to affect the geomorphic form and function of rivers, streams, and lakes within the State. While the disciplines of fluvial geomorphology, hydrology, and hydraulics are extensive, the focus of this section is to consider how streamflow, stream and river features, and river (or fluvial) processes affect the functions and values of aquatic and riparian habitats and water quality conditions. As such, this section provides a foundation for and supports the information presented in Chapters 4.2 *Water Quality and Toxicology*) and 4.3 *Biological Resources*. Specifically, this section: (1) provides a broad overview of the existing hydrologic and geomorphic setting throughout the State, (2) discusses potential impacts to these resources associated with the Proposed Program activities, and (3) provides findings and determinations regarding the significance of these impacts.

Sources of Information

Three general types of literature were reviewed to support the findings and determinations within this section. These include:

1. Studies specific to suction dredge mining;
2. More general geomorphic investigations that describe channel processes or features that are relevant to understanding the geomorphic effects of suction dredge mining; and
3. California resource investigations that describe general geologic, mineral, or other resource conditions in the California regions where suction dredge mining primarily occurs.

The most relevant studies that specifically focused on (or included key discussion of) the geomorphic effects of suction dredge mining were generally peer-reviewed or professional publications that employed scientific methods to evaluate the effects of suction dredge mining. Many of these studies included field observation and data collection from California streams and rivers where suction dredge mining has occurred. Other studies used data collected from other Western U.S. states, including Alaska, Idaho, Montana, and Washington. Some studies, including Thomas (1985), used a more experimental approach, whereby a suction dredge rig was operated and monitored in a natural setting to observe and record its effects. Most of the studies referenced for this evaluation were developed to relate how geomorphic effects influence biological and habitat conditions. Many of these same studies are relevant to Chapters 4.2 and 4.3 for their coverage of water quality, biology, and habitat issues.

4.1.2 Environmental Setting

The Proposed Program setting includes the entire State of California. In the past, popular locations for suction dredging activities have included the perennial rivers and streams within the Klamath Basin, the Mother Lode Region of the Sierra Nevada, and to a lesser extent, coastal watersheds in southern California (e.g., San Gabriel River watershed). However, the Proposed Program does not limit the activity to these areas, therefore all freshwater streams and lakes and adjacent lands were considered in the environmental setting of this EIR. The existing baseline condition (upon which the Program impact evaluation is applied in sections 4.1.3 and 4.1.4, below) includes past and continuing impacts to aquatic and riparian resources associated with historical (or previous) suction dredge mining activities.

California Hydrology and Climate

Surface water hydrology (primarily runoff and streamflow) is largely a function of climate, land cover, soil, and water resource management (e.g., the capture, storage, release, and transfer of water throughout the state). The majority of California experiences a Mediterranean climate characterized by warm, dry summers and cool, wet winters. However, climate can vary greatly throughout the State depending on latitude, elevation, proximity to the coast, and other site-specific conditions which may create micro-climates. Mean annual precipitation ranges from less than 5 inches throughout most of the Mojave Desert, to over 100 inches in the redwood forests along the North Coast (Figure 4.1-1). Precipitation is mainly concentrated in the winter months and falls primarily as rain along the coast, inland valley and foothills. Significant snowfall occurs in the mid to higher elevations (typically >5,000 ft above mean sea level [msl]) of mountainous regions, particularly the Sierra Nevada, Cascade, Trinity, and Klamath ranges. The generally north-south (or northwest-southeast) trending mountain ranges in the State (e.g., Sierra Nevada and Coast Ranges) exert a strong orographic effect on incoming storms resulting in higher precipitation totals along the western (or windward) side of the ranges, and drier conditions on the eastern (or lee) side where a “rain shadow” effect is often observed. Weather in California is subject to high annual variability as well as longer term climatic cycles, including the Pacific-North American Oscillation, the El Nino Southern Oscillation, and the Pacific Decadal Oscillation (Andrews et al., 2004). These cycles affect temperature, precipitation, and the frequency of extreme weather events.

Rainfall, land cover, soil structure and moisture conditions, slope, watershed size, snowmelt, and releases from reservoirs and other factors all influence the magnitude and duration of streamflow (or discharge) in rivers and streams. In California, unregulated streams along the coast, in the many inland valleys, and throughout the semi-arid and arid regions of the south and east generally demonstrate a rapid runoff response to rainfall

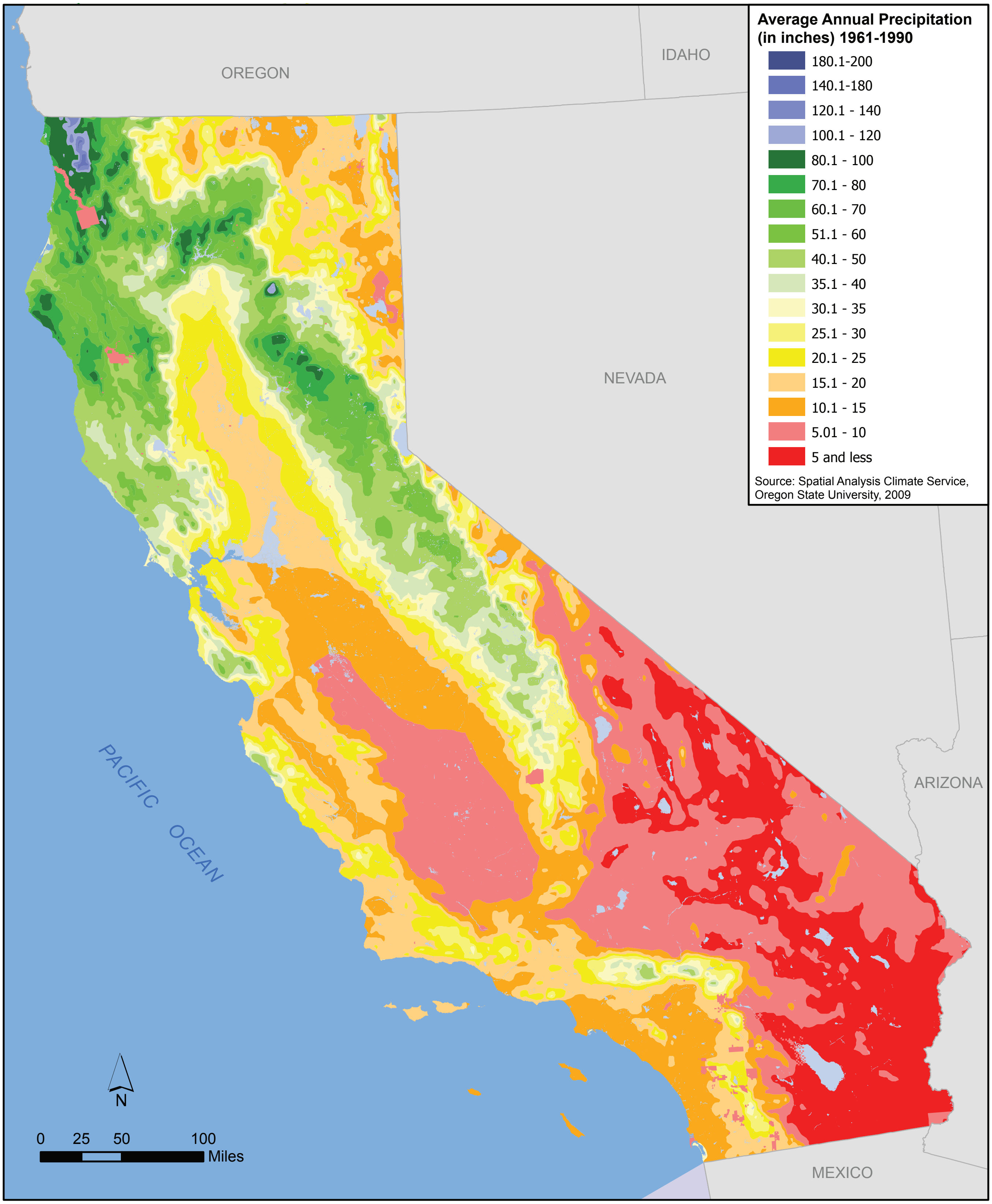

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Figure 4.1-1
Average Annual Precipitation in California

events. Such "flashy" hydrologic systems are noted for the short lag-times between rainfall and peak discharge and show very steep (needle-like) rising limbs of storm hydrographs (for example, see the hydrograph for Sespe Creek shown on Figure 4.1-2). A hydrograph is a graph or measure of streamflow over time, typically with discharge plotted along the vertical axis and time charted along the horizontal axis. Rapid and intense runoff response to rainfall is even more pronounced in the State's urban areas where a higher proportion of impervious surfaces generate more runoff and storm related discharge.

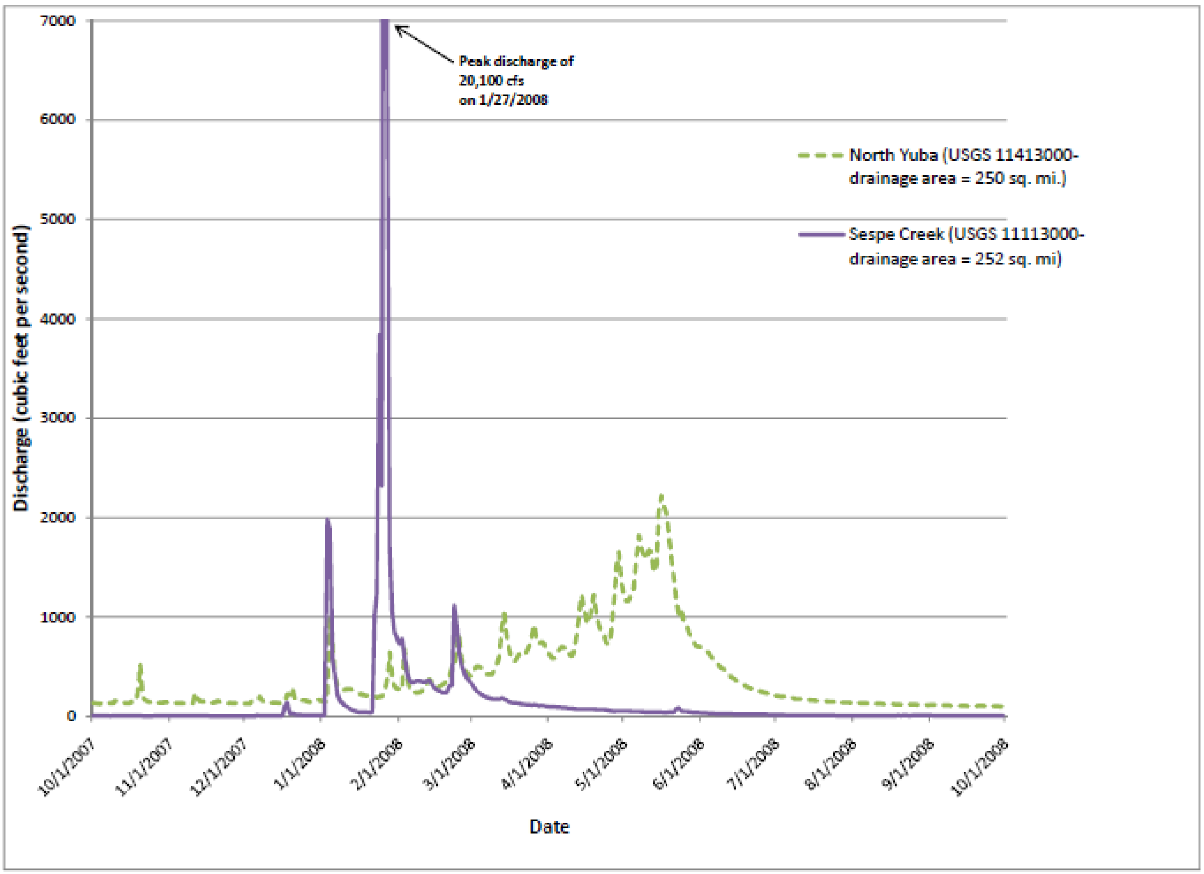


FIGURE 4.1-2: CALIFORNIA ANNUAL HYDROGRAPHS – COMPARISON OF SEMI-ARID AND SNOWMELT WATERSHEDS

(USGS, 2010)

In contrast, in California watersheds with significant snowfall, streamflow hydrographs are generally less episodic in responding to individual winter storm events and have a more seasonal discharge pattern (for example, see the hydrograph for North Yuba River shown on Figure 4.1-2)[1]. In such areas streamflow hydrology is governed by the relative abundance of the year's snowpack and the timing and extent of the snowmelt season.

[1] The North Yuba River hydrograph for the 2007-2008 Water Year is used to illustrate snowmelt-driven hydrology. However, it should be noted that the North Yuba River watershed experiences a mixed rain-snow climate, and discharge may be "flashy", particularly during warm storm events with high snow levels.

Snowmelt watersheds exhibit more uniform annual hydrographs, with peak runoff typically occurring between April and June, depending on elevation. In addition to the spring seasonal snowmelt, "rain-on-snow" events may cause even higher peak discharges. These rapid snowmelt events can occur throughout the winter season, typically associated with a southern swing of the jet stream that brings moisture laden sub-tropical air masses cyclonically against the Sierra Nevada. In these events, temperatures are warm enough and air moisture capacities high enough to maintain rainfall precipitation as high as 8,000 or 9,000 ft above msl. When this occurs a tremendous runoff event is generated that can progress downstream throughout the larger watersheds of the Sierra Nevada, Klamath, or Cascade ranges.

Typically, rain-on-snow events are of a higher magnitude and occur most frequently during the winter months, whereas the peak snowmelt-driven events are of a lower magnitude and occur in spring. This hydrologic setting creates a bimodal distribution of flood events i.e., there is a population of floods associated with snowmelt events, and a distinct population of floods generated from rain-on-snow events that occur, on average, once every 10 years.

Many of the areas used by suction dredge miners are on flow-regulated streams downstream of dams. On these systems, peak downstream discharges are reduced, flow frequency/duration relationships are more equitable (less extreme), and baseflow discharge (seasonal baseline streamflow that is not directly attributable to a precipitation event) is typically extended into the later spring, summer, and fall months. Dam operations may also generate sudden changes in discharge.

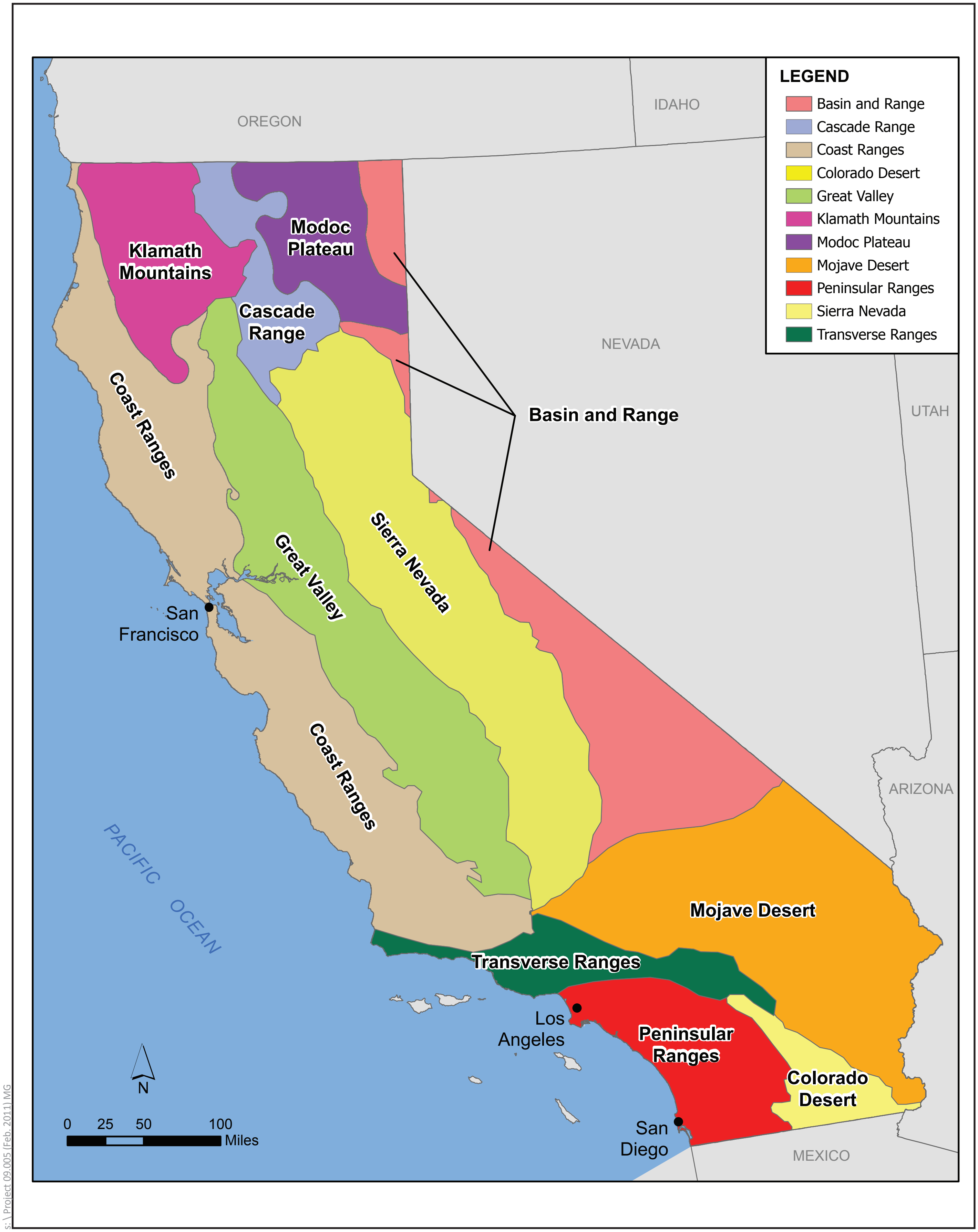
California Geomorphology

This section describes the major geomorphic provinces of California, and provides a broad overview of the geomorphology of the rivers and streams in the State.

Geomorphic Provinces

Geomorphic provinces are naturally defined geologic regions that display a distinct landscape or landform type. Eleven geomorphic provinces are identified in California (CGS, 2002) (Figure 4.1-3). Each province has its own unique, defining features based on geology (rock types, history, and structure), topography, and climate. Summaries of the eleven geomorphic provinces in California are presented below based on a 2002 report by the California Geological Survey.

The **Klamath Mountains** have rugged topography with prominent peaks and ridges reaching 6,000-8,000 feet above msl. Though a different geologic history than the Sierra Nevada, in terms of topography, the Klamath province can be considered as a northern extension of the Sierra Nevada range. The main stem Klamath River follows a circuitous course from the Cascade Range (northeast) through the Klamath Mountains to the southwest. In the western Klamath, an irregular drainage network has incised into an uplifted plateau called the Klamath peneplain. The uplift (and resulting drainage incision) has left successive benches with gold-bearing gravels deposited on the sides of the canyons. Some of this material is transported to the stream system below. Historically, the Klamath Mountains province has seen a high level of use by suction dredgers. Suction dredge activity has been particularly concentrated in the main stem Klamath, Scott and Trinity rivers.



Horizon WATER and ENVIRONMENT

Figure 4.1-3
California Geomorphic Provinces

The **Cascade Range** is a chain of volcanic cones that extends from northern California north through central Oregon and Washington. In California, the province is dominated by Mount Shasta, a glacier-mantled volcanic cone, rising 14,162 feet above msl. South of Mount Shasta and the southern termination of the Cascade Range is Mount Lassen (10,462 feet msl), which last erupted in the early 1900s. The Cascade Range is transected by deep canyons of the Pit River. In its headwaters, the Pit River exits Goose Lake and traverses the Modoc Plateau (a volcanic table land) before flowing through the lava rich and volcanic landscape between the Mount Shasta and Mount Lassen peaks. The Pit River then descends toward Lake Shasta and the confluence with the Sacramento River.

The **Modoc Plateau** is a volcanic table land (elevation 4,000- 6,000 feet above sea level) consisting of a thick accumulation of lava flows and tuff beds along with many small volcanic cones. Occasional lakes, marshes, and sluggishly flowing streams meander across the plateau. The plateau is cut by many north-south faults. The province is bordered by the Cascade Range to the west and the Basin and Range province to the east and south. Streams emanating from the Modoc Plateau may extend to these neighboring provinces, noting that discharge to the east that flows into the Basin and Range province remains as interior drainage, while flows draining to the west enter the Sacramento River system.

The **Sierra Nevada** Range is the most significant topographic and geomorphic feature in California. The range is a tilted fault block nearly 400 miles long. It is geologically complex, with a history that dates to island-arc collision in the Triassic, with subsequent subduction tectonics and the forming of the signature granitic batholith through the Jurassic and Cretaceous periods. More recently in the Tertiary period, and especially during the last 4 million years, the extensional faulting of the Basin and Range province to the east, along with a tilting of the Sierra block to the west produced a "trap door" mountain building event. As a result, the eastern face of the Sierra Nevada Range formed a rugged escarpment with a steep topographic descent to the Mono and Owens valleys to the east. In contrast, along the western Sierra Nevada a more gently sloping range (about 2%) ascends from the Central Valley and lower foothills of the range. Along its spine (axis), the range is lowest at its northern end, transitioning to the volcanic Cascade Province further north, and rises to its peak elevation at Mount Whitney (14,495 feet above msl) in its southern-central zone. Lode and some placer gold in the Sierra Nevada has its source in the metamorphic rocks formed during the Mesozoic era subduction process, whereby veins of gold solidified in the cooling magmatic intrusion. Subsequent exposure, uplift, and erosion of the range transported and deposited gold as placer deposits in the sedimentary terraces and benches along the Sierra river courses and canyons. In addition, gold-rich, Eocene-age river channels course across the western Sierra Nevada slope and have been "robbed" of their gold when eroded by today's Sierra Nevada Rivers. These Eocene-age river channels located on ridges often 1,000 feet or more above today's rivers were the primary targets of hydraulic gold mining. More recently Quaternary period glacial advance and retreat cycles resulted in high sediment loads to the main downstream large rivers. The principal rivers of the Sierra Nevada Mother Lode include the Yuba, American, Cosumnes, Mokelumne, Stanislaus, and Tuolumne rivers. These principal rivers of the Mother Lode and their tributaries have been the focus of intensive suction dredging activities in recent decades.

The **Great Valley** is a north-south oriented alluvial plain about 50 miles wide and 400 miles long in central California. Its northern section is the Sacramento Valley, drained by the Sacramento River and its southern part is the San Joaquin Valley drained by the San Joaquin

River. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic period (about 160 million years ago). Great oil fields have been found in southernmost San Joaquin Valley and along anticlinal uplifts on its southwestern margin. In the Sacramento Valley, the Sutter Buttes, the remnants of an isolated Pliocene epoch volcano, rise above the valley floor. Historically, there has been limited, if any, suction dredging in this province. The deep alluvium on the valley floor is not likely to contain concentrated gold deposits that could be effectively mined with standard suction dredging equipment.

The **Coast Ranges** are northwest-southeast trending mountain ranges with peak elevations ranging from 2,000 to 4,000 feet msl, with occasional peaks exceeding 6,000 feet above msl. The range follows the California coastline north of Point Conception running generally parallel to the San Andreas Fault system. The bulk of the Coast Ranges are comprised of thick marine and non-marine Mesozoic and Cenozoic sedimentary strata. The northern and southern ranges are separated by a structural depression containing the San Francisco Bay. The northern Coast Ranges are dominated by irregular, knobby slopes, many with active landslides developed in the surface rocks of the Franciscan Complex. The eastern transition from the Coast Ranges to the Great Valley is characterized by sequential strike-ridges and valleys that terminate along the western boundary of the Great Valley. Between the many parallel ridgelines of the Coast Ranges are alluvial valleys, again oriented with the general alignment of the San Andreas Fault system. The immediate coastline along the Coast Ranges includes embayments such as San Francisco and Monterey bays with their surrounding baylands and lowlands, as well as uplifted, terraced and wave-cut platforms and older hard rock complexes. Prominent rivers and streams of the Coast Ranges include the Eel, Russian, Napa, Putah, Alameda, Coyote, Guadalupe, San Lorenzo, Pajaro, Salinas, Santa Maria, and Santa Ynez systems. Most of these rivers travel parallel to the orientation of the surrounding ridgelines and valleys. Some rivers drain to the San Francisco and Monterey bays, while others drain directly to the coast through crossing the ranges.

The **Transverse Ranges** are an east-west trending series of extremely steep mountain ranges with interspersing valleys. The east-west structure of the Transverse Ranges is oblique to the general alignment of coastal California, hence the name "Transverse." Intense north-south compression is squeezing and uplifting the Transverse Ranges. This compression along with the rotation of the ranges has created a unique “transpressional” situation with some of the highest rates of tectonic uplift measured on Earth. The province includes the San Gabriel, Santa Susana, Santa Monica, Santa Ynez, and San Bernardino mountains, as well as the Santa Barbara Channel Islands. The highest elevation in the province is 11,503 feet, at San Gorgonio Mountain in the San Bernardino Range. While the lower elevations in the province are known for their mild Mediterranean climate, the steep ridgelines and higher elevations of the ranges generate a strong orographic effect. This effect is exacerbated when cyclonic storm tracks northerly rotation strike the face of the ranges acutely. This orographic effect greatly increases precipitation intensities and amounts. El Niño conditions (approximate decadal oscillation) further intensify rainfall amounts. High intensity episodic storm events together with a relatively high frequency fire ecology of the coastal sage and chaparral communities creates extremely high sediment yields, particularly in the post-fire scenario. Alluvial fans and large valleys and basins at the base of the mountain ranges store abundant sediment deposits. Great thicknesses (in excess of 35,000 feet) of Cenozoic petroleum-rich sedimentary rocks have been folded and faulted, making this one of the important oil producing areas in the United States. The primary rivers of the region include the Ventura, Santa Clara, Los Angeles, San Gabriel, and Santa Ana systems.

The **Peninsular Ranges** province follows the coastline of southern California in Orange, Riverside, and San Diego counties and extends inland to the watershed divide to areas that drain east to the Colorado Desert province. The Peninsular Ranges are bound to the north by the Los Angeles Basin of the Transverse Ranges and extend into Baja California (Mexico) to the south. The province includes the Santa Catalina, Santa Barbara, and the distinctly terraced San Clemente and San Nicolas islands. The Peninsular Ranges are oriented generally north-south, parallel to the coast. While their alignment is similar to the more northerly Coast Ranges, the structure and geology of the Peninsular Ranges is quite different from the sedimentary rocks of the Coast Ranges. The geology of the Peninsular Ranges is more similar to the Sierra Nevada, with granitic rock intruding older metamorphic rocks. The coastal margin includes geologically young and well developed marine and fluvial terraces (sedimentary deposits) that have been uplifted and dissected by local streams. Primary rivers and streams in the province include the San Juan, Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana systems.

The **Mojave Desert** province is a broad interior region of isolated mountain ranges separated by expanses of desert plains. It has an interior enclosed drainage and many evaporative lake beds (playas). The Mojave province occupies the wedge east of the intersection of the Garlock and San Andreas fault zones, south of the Sierra Nevada and east of the Transverse Ranges. The primary river systems of the Mojave Desert include the Mojave and Colorado Rivers, though the Colorado River drains the large Colorado Basin of the interior continent and is the eastern boundary of the province. While there have been several historic (and current) gold mines in the Mojave Desert province, most of these mines have been pit type mines. There was some placer deposit mining in the 1930s along the alluvial fan outwash plains to the Yellow Aster Mine, but this practice is not documented in the current period (Norris and Webb, 1990).

The **Basin and Range** province in California is located east of the Modoc Plateau and Sierra Nevada provinces, representing a very small portion of the western edge of the Great Basin which extends into portions of Oregon, Nevada, Idaho, and Utah. This province is characterized by interior draining streams that flow to lakes and playas with no ocean outlet. The extensional normal-faulting of the Basin and Range results in parallel fault-bounded ranges separated by down-dropped basins. Death Valley, the lowest area in the United States (280 feet below msl at Badwater), is one of these down-dropped basins (or grabens). Another basin, the Owens Valley, lies between the bold eastern escarpment of the Sierra Nevada and the Inyo Mountains. The northern Basin and Range Province includes the Honey Lake Basin. Lying east (in the rain shadow) of the Sierra Nevada and Cascade ranges the Basin and Range is an arid zone with limited runoff.

The **Colorado Desert** province of southeastern California is commonly known as the “low desert” because of its relatively low elevation compared to the higher regions of the Peninsular Ranges to the west and the Mojave Desert (“high desert”) to the north. Most of the Colorado Desert province lies below 1,000 feet msl, with extensive areas around the Salton Sea below msl. The province is extremely arid with high summer temperatures. The landscape includes extensive dunes, alluvial plains, and ancient beach forms and silt deposits associated with Pleistocene epoch Lake Cahuilla.

4.1.3 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to hydrology and geomorphology may result for suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

In the 1994 EIR, The effects of suction dredge activities were found to have potentially negative effects on stream substrate by channelizing streams, increasing embeddedness of substrates downstream, and developing dredge holes and tailings piles. However, the 1994 EIR concluded that the regulations adequately addressed these potential effects such that there would be a less-than-significant impact.

Methodology

Geomorphic Approach for SEIR

Fluvial geomorphology involves studying a stream's historic evolution, its morphology (form), and the processes that shaped the stream's form. In terms of form, a river or stream can be described according to its width dimension (cross-sectional geometry), pattern (planform alignment or sinuosity), and profile (slope or gradient). In terms of the shaping processes, a geomorphic evaluation considers many natural and anthropogenically-driven variables and the complex interactions between these variables. At the landscape-scale, the most critical independent forces that influence the morphology of California's rivers and streams are topography, geology and climate. Topography, which is largely shaped by the interaction between plate tectonics and regional geology, is responsible for the major geomorphic provinces throughout the State (described in the previous section). At the province and watershed-scale, climate and hydrology interact with topography and geology to form drainage networks. At the individual river or reach-scale, channel form and function are largely dependent on the balance (or imbalance) between the streamflow (discharge), sediment load (type and amount) and the channel's width, depth, and slope. Land use practices and riparian vegetation are also important variables affecting channel morphology at the reach scale.

This EIR considers all rivers, streams, and lakes of the State as part of the Proposed Program Area. This represents an enormously diverse set of geomorphic conditions from steep, bedrock-dominated streams in the headwaters of the San Gabriel Mountains of southern California, to low gradient meandering rivers in the Central Valley. Rivers and streams that have historically been, and are likely to be, the focus of suction dredging activities are generally located in foothill and mountainous regions, most notably in the Klamath Mountains, Sierra Nevada, and Transverse Ranges. These streams have variable morphology, but some common characteristics that make them attractive to suction dredging. They are generally moderate to high gradient streams with prominent bedrock exposures with a shallow layer of alluvium over bedrock. Regardless of the precise location or setting, general principles of fluvial geomorphology such as deposition, erosion and transport, are applicable. These general principles form the basis of the impact analysis and discussion presented in the following section.

Role of Dams and Reservoirs

A special hydrologic and geomorphic consideration for suction dredge mining in California is the role and effects of dams and reservoirs. Dams and reservoirs alter the natural hydrograph of streams by retaining and detaining flows. This typically results in reduced peak discharges downstream of dams with a seasonal (or longer) extension of higher maintained base flows. In California this may result in reduced peak and average daily discharges following winter storms and during spring snowmelt. Summer flows downstream of dams/reservoirs may be higher and involve higher stream velocities than typically expected in the summer dry season. The specific hydrologic effect of a dam/reservoir will be dependent on the conditions of the river system, as well as the designed objective and operational management of the dam and reservoir system.

Dams and reservoirs also affect sediment processes. Depending upon a dam's design and trap efficiency and the characteristics of the sediment load of the contributing streams, sediment will be variably deposited (and stored) behind the dam or transported downstream. Over time large reservoirs can trap a significant portion of a stream's overall sediment load, and particularly trap larger, non-suspended sediments (i.e., bed load). Depending upon the dam's release structure and design, discharge downstream of the dam may possess sufficient stream energy to transport sediment. However, the actual sediment load of the discharge is typically absent. This release of "clean water" has been observed to lead to a "hungry water" condition, whereby excess energy is expended on erosion of the channel bed and banks for some years following dam construction. These processes may result in channel incision (the downcutting of the bed) and a general coarsening of the bed material (Kondolf, 1997). Other downstream geomorphic and ecological adjustments related to dams include channel narrowing, fine sediment accumulation and vegetation encroachment. Dams may also result in shifts in riparian community composition due to modified hydrology, seed dispersal mechanisms and flood disturbance regimes.

Geomorphic Effects of Suction Dredging

The effects of suction dredging on rivers and streams can be likened to, or described in terms of, geomorphic processes. A suction dredge event of any scale or magnitude will instigate some degree of erosion, transport, and deposition of sediment, along with some potential modification of the channel form and streamflow hydraulic conditions. Thus, from a geomorphic perspective, the effects that a suction dredging operation has on a river or stream can be described in the following context:

1. ***Erosive processes****:* include the physical mobilization of alluvial sediment by the suction nozzle, which results in the scouring of the channel bed. Stream bed erosion can include the creation of scour potholes, the deepening of existing pools, and the removal of sediment from in-channel depositional features such as longitudinal bars and riffles.
2. ***Transport processes***: occur as sediment is passed through the suction dredge rig and discharged back to the river. Upon discharge, sediment is suspended in the water column and is available for downstream transport.
3. ***Depositional processes***: occur following transport, whereby sediment variably settles and deposits according to its particle size, density, and shape. Streamflow conditions (including flow velocity, river stage, channel roughness, channel alignment, presence of structures, etc.), also influence the rate of settling and deposition. Coarse and heavy sediment will deposit near the discharge location, while finer and lighter materials are carried further downstream in the water column before settling. Another depositional process related to suction dredge mining (though not caused by the dredge rig itself) is the hand piling and rolling of cobbles and small boulders (i.e., sediment too large to be entrained by the suction nozzle) in other locations within the channel bed by miners to access the finer sediments at depth.
4. ***Other hydraulic processes***: include the redirecting of in-channel flows as the result of miners' placement of river cobbles and boulders. Existing instream flow paths can be disrupted by such structural changes along the stream bed, with flows being channelized, or re-oriented, toward new alignments.

The impacts of these activities at a dredge site are governed by several factors that operate at a range of spatial and temporal scales. These include:

- Regional factors, including climate, geologic structure, and parent geologic materials
- Watershed factors, including basin size, the drainage network, and sediment supply
- Location of the mining site within the watershed (e.g., small tributary or mainstem channel)
- Hydrologic factors influencing flow and river stage
- Dredging location relative to dams or diversions
- Hydraulic factors influencing flow characteristics including the longitudinal profile (channel slope), channel dimensions, and roughness
- Channel substrate and sediment composition at the mining site (e.g., bedrock, alluvium, grain size)
- Existing instream features such as a pools, riffles, bars, large woody debris, etc.
- Other structural features, including road crossings, engineered banks, etc.

The interaction of these factors, along with the Proposed Program regulations, is considered in the analysis of the impacts detailed in this section. Table 4.1-1 below is used to initially identify (and qualify) potential geomorphic impacts of suction dredging according to various temporal and spatial scales. Table 4.1-1 is not summarizing the degree or significance of potential impacts, but rather is used to contextualize the range of possible impacts.

In the matrix of Table 4.1-1, the "dredging site" refers to the immediate area physically disturbed by the suction dredge equipment and operator. The "reach" includes the geomorphic functional unit that the dredger is operating in. The length of a given reach may vary significantly within and among streams, but can generally be thought of to range between 50 and 500 m. The planning watershed scale encompasses effects that would be carried downstream along the river or stream to the next planning watershed. The official California watershed system, known as CalWater has been developed by the California Interagency Watershed Mapping Committee and may be inspected at http://www.ca.nrcs.usda.gov/features/calwater/. Mapped planning watersheds range from 3,000 to 10,000 acres in size (5 to 16 square miles). The "province and state" scale considers the effects of suction dredge activities at the geomorphic province and State scales (approximately 40,000 to 400,000 km^2).

TABLE 4.1-1. SCREENING MATRIX TO EVALUATE GEOMOPHIC IMPACTS OF THE PROPOSED PROGRAM

		Spatial Scales			
		At dredging site	*Along reach (50-500 m downstream of site)*	*Downstream to next planning watershed*	*At geomorphic province and State scale*
Temporal Scales	*Impacts occuring immediately during or after dredging event*	Yes	Yes	Maybe	No
	Impacts remaining during the season following dredging	Maybe	Maybe	Maybe	No
	Impacts remaining after next bankfull dishcarge event (1.5-2.5 years) following dredging	Maybe	Maybe	No	No
	Impacts remaining 2.5-10 years after dredging event	Unlikely	Unlikely	No	No

The discussion of environmental impacts below is organized sequentially according to these spatial scales, first considering potential impacts at the immediate dredging site (or cross-section scale) and then proceeding to reach, sub-watershed/watershed, and finally state scale.

Criteria for Determining Significance

For the purposes of this environmental analysis, it was determined that the Proposed Program would result in a significant impact if it would result in:

A. Substantial modifications to the geomorphic form or function of rivers or streams which would persist following a bankfull or dominant discharge event (with an expected frequency of 1.5-2.5 years following the suction dredging activities);

B. Modifications to the geomorphic form or function of rivers or streams that are collectively considered substantial at the watershed or statewide scale; or

C. Substantial alteration to the geomorphic form of a lake bed or shoreline which would persist for more than 1 year.

Bankfull discharge is a general hydrologic concept, describing a certain discharge (and river stage) for any given channel which fills the channel capacity, whereby additional discharge would exceed the channel capacity and cause overflows to the adjacent floodplain (Dunne and Leopold, 1978). In alluvial channels that form in their own sediments, bankfull discharge may approximate the flow magnitude and recurrence (frequency) that is generally responsible for shaping the channel. This concept relates that the bankfull discharge is the flow that effectively forms the alluvial channel and has a magnitude and frequency that conducts the most geomorphic work (Wolman and Miller, 1960). Because of this, bankfull discharge is sometimes also known as the “channel forming flow” or the “effective” or “dominant” discharge (Leopold, 1994).

The concept of bankfull discharge is relevant to the environmental analysis of suction dredging because this magnitude flow fills the channel, and is believed to have sufficient hydraulic properties (velocity, shear stress, etc.), and occurs at a frequency regular enough, to ameliorate or mitigate many small scale channel bed modifications caused by suction dredging activities. However, there are caveats in using bankfull discharge as the de facto channel forming flow. First, the concept assumes an alluvial channel shaped in its own sediment. For bedrock channels, the channel forming flow may be related to higher magnitude and less frequent (i.e., more extreme) flood flows. Most suction dredge activities do occur in alluvial channels, or at least in bedrock channels with some amount of alluvium covering the bed. In these instances, suction dredging would not alter the bedrock channel per se, but may displace the overlying alluvial material that is subject to transport during flow events that approximate the bankfull discharge.

Another key consideration of bankfull discharge is the recurrence frequency of such a flow event. A common frequency given for bankfull discharge is the discharge that occurs with a 1.5-year recurrence (Dunne and Leopold, 1978). However, in semi-arid and arid climates the effective discharge frequency is likely less frequent (Wolman and Gerson, 1978). The setting of recurrence intervals to a bankfull discharge requires careful data collection (Goudie, 1994). There are many methods to relate frequency to bankfull discharge (Williams, 1978).

As shown in Table 4.1-1 above and described in the significance criteria above, this analysis assumes that a discharge with a 1.5 to 2.5-year recurrence interval approximates the bankfull discharge event, which is relatively equivalent to the effective or dominant discharge for streams that would typically be subject to suction dredging activities. These hydrologic scenarios were established as thresholds for significance because they are important indices with regard to maintenance of geomorphic form and function. In general, these scenarios also correspond to hydrologic events that will mobilize the median grain size (D_{50}) of the stream bed substrate (Saldi-Caromile et al., 2004). The mobilization of the median grain size is an important threshold for resetting streambed morphology following a suction dredging event. Dredging impacts that are not reset or mitigated by a bankfull discharge event are anticipated to have increased potential for impacts to geomorphic form and function, as well as to water quality, biological resources, aesthetics, recreation and potentially other resources.

The threshold of significance for impacts to lakes differs from that established for rivers and streams because the geomorphic processes that reset morphology in rivers and streams are either absent or occur at longer time scales in lakes. Thus, the impact threshold for lakes is lower than that for rivers and streams. A modification to the lake bed or shoreline that would persist for longer than one year would be considered a potentially significant change in morphology, due to the increased potential for impacts to water quality, biological resources, aesthetics, recreation, and potentially other resources.

4.1.4 Environmental Impacts

Impact GEO-1: Erosion, Transport, and Deposition of Alluvial Material in Rivers and Streams Resulting in Dredge Potholes, Tailings Piles, and Other Suspension/Depositional Features (Less than Significant)

Discussion

All suction dredge operations result in the redistribution of alluvial material. The redistribution of alluvial material has the potential to impact geomorphic form and function, water quality and aquatic habitat. The severity of such impacts is related to the location of the dredging operation(s), volume and particle size of the material displaced, as well as the total area dredged. Impacts associated with the volume of material displaced and the area of disturbance is addressed under *Impact Geo-1*. Other potential impacts that are related to (or derive from) the sediment issues of *Impact Geo-1,* such as turbidity and aquatic habitat degradation, are addressed in the Water Quality and Toxicology, and Biological Resources chapters (See Chapters 4.2 and 4.3, respectively).

Impacts at Dredging Sites (Scour Holes, Tailing Piles, Downstream Sediment Deposits)

Erosional-type processes at the suction dredge site (intake) include the erosion and scouring of the channel bed through the direct entrainment of bed sediments. The suction dredge process can result in the general lowering of the alluvial bed, and/or where dredging is focused, result in scour holes (conical depressions or pits). The dimensions of scour holes will vary depending on the dredging equipment (e.g., nozzle size), sediment size, channel bed structure, and the individual dredging style/approach of the operator. Table 3-2 provides volume estimates for the material displaced by a suction dredge operation for varying nozzle sizes and substrate types. The proposed regulations limit the nozzle size to 4 inches or smaller. Based on the data presented in Table 3-2, it is estimated that the volume of material moved by a suction dredge operation using a 4 inch nozzle would range from 2.1 to 3.2 cubic meters (m^3) over the course of a six hour workday. The total area impacted would depend on the depth of dredging and substrate type, but is estimated to range between 1.6 to 2.3 square meters (m^2) per six hour workday (based on a uniform, approximate average dredging depth of 1.35 meters as reported in the Suction Dredger Survey [Appendix F]). Griffith and Andrews (1981) reported that a 2.5-inch dredge consistently moved 0.043 to 0.055 m^3 of substrate per hour in two Idaho streams; this is equivalent to 0.294 m^3 per 6 hr day. The U.S. Forest Service (2009a) notes that the volume of material moved by small-scale suction dredgers using five inch nozzles on creeks in Idaho varied widely, ranging from less than a cubic meter per day up to 3.8 or 7.5 m^3 per day.

Streambed sediment that is too large to pass through the intake nozzle is typically placed in piles adjacent to scour pits or along the stream margin at the banks. Piling of stream substrate alters the grain size distribution of the bed at the dredging site to some degree, generally leaving the bed coarser. In addition to this hand-placed piling of cobbles and small boulders near the intake location, depositional processes generally occur some distance downstream of the suction dredge site (see discussion of reach-scale depositional processes below). Hassler, et al. (1986) noted that deposited dredge tailings are highly unstable and can mobilize under slight increases in stream discharge and velocity because they are unconsolidated and rest on top of the streambed. This change in bed sediment stability and mobility is a concern for spawning habitat suitability, which is discussed in Chapter 4.3 *Biological Resources*.

Geomorphic Recovery at Dredging Sites

Geomorphic recovery is the concept that, following disturbance, a landform will return to its general form or trend through moderating physical and biological processes. The notion of geomorphic recovery is predicated on an assumption that the fluvial system (in this case, streams) functions at a dynamic equilibrium with alterations or disturbances occurring around a central tendency of form (Schumm and Lichty, 1965).

The concept of geomorphic recovery has been applied to the study of suction dredge mining sites by several researchers. These researchers observed that erosive scour holes, hand piled tailings, or downstream sediment deposits caused by suction dredge mining (during the relatively low-water summer conditions of California rivers) were removed following bed-mobilizing (or recovery) flows that occurred during the following fall, winter, or spring. Harvey, et al. (1982), Thomas (1985), Hassler, et al. (1986)[2], Harvey (1986), Stern (1988), Somer and Hassler (1992), and Prussian et al. (1999) all reported that some level of geomorphic recovery occurred during the seasons that followed suction dredge mining based on visual inspections a year after dredging. Additionally, Harvey, et al. (1982) suggested that geomorphic recovery may likely be slower or less effective on streams with controlled flows compared to streams that experience uncontrolled bed-mobilizing or “flushing” flows. Findings from the literature regarding geomorphic recovery at the dredging site are summarized below:

- Stern (1988) conducted visual inspection of dredging sites one year following mining activities to observe conditions and found no evidence of scour holes or tailing piles along the mid-channel thalweg[3] that had been observed in the

[2] There is considerable overlap in sampling locations for data reported by Hassler, et al. (1986) and Stern (1988).
[3] The thalweg is the line of maximum depth in a stream.

previous year. However, visible scour holes and piles that were located outside of the stream thalweg toward the streambanks remained. This difference reflects the stronger velocity flows that occurred through the central channel and thalweg were effective at removing dredging features, while flows along the stream margin were not strong enough (in that year) to remove the dredging features. In this case, after one year, dredging features remained along the stream margin. However, monitoring two seasons after the dredging activity by Stern (1988) indicated that scour holes and tailings piles from dredging two years previously were either filled (for the holes) or removed (for the piles) during the second year's flows that followed dredging. It is noteworthy that the second year's flows included a bankfull discharge event (24 cubic meters per second with a 1.9 year recurrence interval). It appears that this magnitude flow was effective in reshaping the overall channel bed and providing some degree of geomorphic recovery to the streambed.

- Similar to Stern (1988), Hassler, et al. (1986) returned to inspect 30 dredge scour holes and tailing piles measured during the previous summer and found that only 9% of the surface area of the previously measured disturbance areas was visible during the following year. For the holes and tailing piles that remained more than one year following dredging activities, it was observed that the holes were particularly deep and the tailings piles were generally located toward the stream margins.
- Thomas (1985) found that deposited sediment piles downstream of a 2.5-inch suction dredge nozzle were barely distinguishable one year after suction dredging activities.
- Prussian, et al. (1999) observed that tailing piles generated by 8 and 10-inch suction dredge nozzles were barely visible a year following the dredging activities. The tailings which remained visible had moved from the sides of the channel towards the thalweg of the river during the winter flow events.
- Harvey (1986) observed that dredging activities on large streams, such as the main stem Feather and Yuba Rivers in California, resulted in localized disturbances, whereas dredging activities on smaller tributaries had a proportionally larger and more significant area of disturbance. For example, dredging activities conducted by a single dredge on a smaller tributary of Butte Creek resulted in flow diversions that transformed riffles into exposed gravel bars within 10 days of operation. These substrate changes were not observed in Butte Creek the following year.
- Harvey, et al. (1982) monitored conditions a year following suction dredge activities on the American River and Butte Creek in California and observed that scour holes and downstream sand deposits observed the previous years were not present the following year.

In contrast to these observations, State Water Resources Control Board staff more recently has documented dredging pits persistent for one or more years in several streams of the Mother Lode region including the South Fork of the Yuba River, North Fork of the American River, and Bear River (pers. comm., Humphreys 2010).

In summary, the displacement of alluvial material at a dredge site results in impacts to streambed morphology in the form of dredge pits and tailings piles. The literature suggests that these features generally do not persist following a moderate (annual frequency) type winter flow events, and bed morphology recovers as a result of natural geomorphic processes. Some studies (Harvey et al., 1982, Harvey and Lisle, 1998) have noted that streams with modified hydrology (through reservoirs or other structures) are less likely to provide flushing flows to facilitate channel recovery. The potential for this type of impact to occur is reduced by the proposed regulations, which require dredgers to level tailings piles to the pre-mining grade to the extent possible (see *Findings* in this impact discussion). In addition, the "Best Management Practices" guidance will contain recommendations for dredgers to backfill dredging pits and other measures to reduce effects on streambed.

Reach, Sub-basin and Watershed Scales

<u>Erosion, Transport, and/or Deposition of Channel Alluvium</u>**.** Erosional processes related to suction dredging that occur at the reach, sub-basin and watershed scales are primarily a factor of one or more dredging operations occurring within the same stream or drainage basin. Several studies and reports provide estimates of the area of streambed disturbed by suction dredging, and the volume of material displaced (Hassler et al., 1986; Stern, 1984; USFS, 2006). Hassler et al. (1986) and Stern (1988) monitored the geomorphic impacts of suction dredge mining in the Canyon Creek tributary of the Trinity River in 1984 and 1985. In 1984, Stern (1988) found the total instream surface area disturbed by 20 dredges was 1,137 square meters (m^2). In 1985 the area disturbed by 15 dredges operating in the same vicinity was 1,075 m^2. Stern (1988) reported the average area mined by an individual was 39 m^2 in 1984 and 49 m^2 in 1985. Hassler et al. (1986) monitored 24 dredges in 1984 and 18 dredges in 1985. Total streambed disturbance in the Hassler et al. study area in 1984 was 1,164 m^2, and 1,075 m^2 in 1985. This resulted in average affected areas of 48.5 m^2 (1984) and 59.7 m^2 (1985) for individual dredging rigs. These authors found average scour hole depths of 1.2m (based on 30 holes in 1984) and 1.5 m (based on 22 holes in 1985). The U.S Forest Service (USFS) (2006) reported that the anticipated average surface area of an excavation site for 18 permits in Lolo Creek, Idaho, averaged slightly more than 93 m^2.

The annual average area mined reported in the studies listed above ranges from 39 to 93 m^2 per suction dredge operation (Hassler et al., 1986; USFS 2006), with average depth ranges from 1.2 to 1.5 m (Hassler et al., 1986; Stern, 1988). This is generally consistent with the results of the Suction Dredge Survey, which found the average annual area dredged to be approximately 14 and 63 m^2 (for California resident and non-resident dredgers, respectively), with average depths on the order of 1.35 m. Assuming the average dredger mines 63 m^2 annually to an average depth of 1.35 m, then the average dredge operation would displace approximately 85 m^3 or 163 metric tons[4] of sediment annually. Between 1989 and 2009 the average number of suction dredge permits issued was 3,650. If each permit holder displaced 85 m^3 of sediment, then the total volume of sediment displaced annually would have been approximately 335,410 m^3 or approximately 644,658 metric tons when considered statewide. Note, this estimated volume/mass of material displaced due to suction dredging is not the same measure as sediment yield. Sediment yield is typically defined as the total mass of particulate material (sediment) exiting the outlet of a

[4] Assumes 1922 kilograms per cubic meter of gravel sediment including sand in a natural state (www.simetric.co.uk/si_materials).

watershed, or passing by a defined location (Goudie et. al 1994). Of the net estimate of material displaced by suction dredging described above, much of this material will be held in storage within the river or creek downstream of the suction dredge operation and would not be measured as "yield" exiting the basin.

For context, Table 4.1-2 presents a range of observed and estimated values for sediment yields reported in the literature for select watershed and regions in California. As demonstrated in Table 4.1-2, sediment yields for California watersheds and regions vary widely. Suction dredge mining in watersheds like the Middle and South Yuba has a relatively higher potential to displace an abundance of sediment compared to these system's relatively low annual sediment yields. This suggests that sediment displaced from suction dredge mining in such watersheds would likely be stored as instream sediment at some locations within the watershed. In contrast, in the Klamath Basin with higher annual sediment yields, the mass of sediment displaced due to suction dredging is relatively low compared to the overall watershed sediment yield.

TABLE 4.1-2. SEDIMENT YIELDS REPORTED FOR SELECT WATERSHEDS/REGIONS OF CALIFORNIA

Watershed/Region	Drainage area		Annual sediment yield		Reference
	(mi^2)	(km^2)	($tons/mi^2$)	(metric $tons/km^2$)	
Middle Yuba River	198	513	5	1.8	Curtis et al., 2006[1]
South Yuba River	308	798	14	4.9	Curtis et al., 2006
Klamath Basin (Iron Gate to d/s end of Seiad Valley)	6,940[2]	17,975	192 - 450	67.2 - 157.5	USBR, 2005
Sierra Nevada	varies	varies	571	200	Kondolf, 1995
Western Transverse Range	varies	varies	2,114 - 15,142	740 – 5,300	Warrick and Mertes, 2009

[1] =Data from sampling conducted between 2001 to 2003, which were low water years in the Yuba drainage.
[2] =Drainage area from USGS stream gage site #11520500 (Klamath River near Seiad Valley, CA)

In the Transverse Ranges of southern California, the relative proportion of material displaced by suction dredging compared to annual sediment yield is even smaller. Note that the relative intensity of suction dredging in these areas is described in Chapter 3 based on the Suction Dredge Survey results.

Disturbance of an Armored Boundary Layer. Another erosion-based, reach-scale effect of suction dredging is the potential to degrade an armored channel bar or other bed surface. Armoring is the process by which the surface of depositional features such as mid-channel bars is stabilized through the interlocking of coarser grained materials. Beneath this surface armoring of well sorted deposits is typically a substrate of finer and less consolidated materials. The armored surface protects the underlying finer sediments from erosion until the next streamflow event of sufficient magnitude to erode the armored bar surface (Goudie, 1994). An armored surface is indicative of a channel in equilibrium. Suction dredge mining, when targeted at mid channel bars and other surfaces that have a protective "armored" surface, can lead to the physical removal of the armored layer. This type of disturbance may result in secondary erosion of the finer sediments beneath the previously armored surface. While disruption of an armored boundary layer may not significantly alter the total sediment load within a given reach, it may result in additional fine sediment contribution to the water column with associated water quality/toxicology and biological impacts (See Chapters 4.2 and 4.3, respectively). Additionally, the removal of the armored surface can destabilize the entire bar feature and lead to downstream bar migration. In scoping comments, supporters of suction dredging have opined that removal of the armored surface may to some degree benefit aquatic organisms, such as gravel-spawning fishes, by loosening the substrate and making it more suitable for spawning. However, some studies suggest that substrate loosened by dredging may be too unstable for spawning (See Chapter 4.3, Impact BIO-FISH-1).

Depositional Processes The effects of redistribution of alluvial sediment by suction dredging largely occurs at the reach where the operator is dredging, but these effects may also extend downstream of the reach. In general, coarser sediments (small cobbles, gravel, and coarse sand) settle out of transport in proximity to the sluice box discharge. Finer sediments (transitioning from coarse to medium and finer sands) are transported further downstream. Finer silt and clay particles (generally less than 0.063 millimeters [mm]) may become part of the suspended load or wash load in the water column and be transported much farther downstream (Thomas, 1985; Harvey and Lisle, 1998).

Sedimentation rates and patterns occurring downstream of suction dredge mining operations are described from several studies are summarized below. The summary below reviews literature findings for sedimentation rates and patterns in an approximately 100 m zone immediately downstream of suction mining activities. General methods used to measure sedimentation include collecting suspended sediment samples, placing sediment markers or collection devices (discs) on the channel bed, conducting repeat surveys of the channel cross-section to compare elevations and bed form, and visual observations.

- Harvey et al. (1982); Somer and Hassler (1992); and Stern (1988) calculated sedimentation rates based on repeat measurements and observations of dredging operations in northern California streams. These studies found statistically significant increases in sediment rates within the first 4-10 m downstream of the sluice box discharge. Sedimentation rates within 12 m below the sluice box were measured as high as 2,060 grams/m^2/day above background levels (Harvey et al., 1982). Harvey et al. (1982) also found that sediment deposition rates returned to background levels within 60-120 m, while turbidity levels and settleable solids concentrations returned to background rates approximately 30 m downstream.
- Stern (1988) monitored sediment deposition downstream from suction dredge operations and observed how deposition rates decreased with distance. At 9 to 10 m below the dredge rig, the average daily deposited sediment load varied between 674 to 42,366 grams/m^2/day. Where sluice box discharge occurred in the thalweg or mid-channel locations (where velocities were greater), sediment was carried further downstream in the mid-channel location. In contrast, where sluice box discharges occurred toward the outer stream margin, where velocities are less, it resulted in deposition along the shore for a shorter distance.
- Thomas (1985) measured a 10-20 fold increase above background levels in sediment deposited immediately downstream from suction dredging. He found that the majority of sediments discharged from the sluice box settled on the

stream bottom within the first 15 m. The amount of deposited sediment decreased exponentially with distance downstream from the dredge. The study also indicated that sediment deposition varies greatly depending on the particle size distribution of the substrate being dredged and stream discharge conditions.

- Somer and Hassler (1992) recorded seasonal sedimentation rates downstream from a 4-inch suction dredge as 1,711 grams/m^2 and 698 grams/m^2 at 40 m and 113 m downstream of the dredge, respectively. These values represent an increase over baseline rates of 23 grams/m^2 recorded 50 m above the dredge. These researchers monitored how downstream deposition fined with distance. The percentage of sediment by weight, trapped at 40 m and 113 m below the dredge, was 21% and 38% of particles less than 0.1 mm in diameter, respectively.
- Hassler et al. (1986) recorded a baseline sedimentation rate upstream from a dredge as 105 grams/m^2/day. Four meters downstream from the active dredge, the sedimentation rate increased to 12,080 grams/m^2/day and 285 grams/m^2/day at 25 m downstream from the dredge.
- Prussian et al. (1999) noted substantial changes to bed morphology at a dredging site on the Fortymile River in eastern Alaskan river, but no discernable effects either laterally or downstream of the channel. However, they did observe increased fine sediment deposited on downstream gravels within the dredge-generated turbidity plume.
- Stern (1988) monitored sediment deposition, substrate particle size, substrate embeddedness (the filling of interstitial pores), and channel scour and fill along transects upstream and downstream from dredging sites. Monitoring conducted by Stern (1988) concluded that substrate embeddedness increased significantly after dredging activities at all transects monitored (up to 50 m downstream). Stern also noted that particle size decreased significantly downstream of dredging activities.
- Harvey et al. (1982) observed that areas downstream of suction dredging activities that had no deposited sand prior to dredging would become embedded with sand following dredging. Sand comprised 25-40% of the substrate composition 30 m downstream from the dredging area and was observable up to 60 m downstream in areas that did not have any sand prior to dredging. The following year, all the embedded sand had been flushed away from the cobble substrate (see recovery discussion below).
- Hassler et al. (1986) noted that deposited dredge tailings are highly unstable and can mobilize under slight increases in stream volume and velocity because they are unconsolidated and rest on top of the streambed. Downstream deposited sediments are vulnerable to resuspension and transport during subsequent stormflow events or dam releases that raise discharge and velocity.
- Thomas (1985) noted that sediment deposited downstream from suction dredge discharge is very unstable and mobilizes quickly to fill downstream pools. Harvey and Lisle (1998) also described the relatively unstable nature of downstream deposited tailings and related these mobile sediments to the timing of spawning activities and when high flows might remove the sediment.

The sedimentation effects described above have several important consequences for aquatic organisms and their habitat. Deposition of coarse material immediately downstream of dredging operations, the downstream transport and deposition of finer sediment that potentially cover and embed downstream riffles, and the filling of downstream pools through the mobilization and re-transport of dredged sediment can all potentially negatively affect aquatic species and their habitats. Streambed particle size distribution is an important variable in the determining the impacts of suction dredging. Generally, dredging in coarse bed material with few fines would have a lower potential to result in water quality impacts (e.g. turbidity plumes) that may adversely affect aquatic organisms and their habitat. These considerations are described more thoroughly in Chapter 4.3, *Biological Resources*. From a geomorphic perspective, alluvial material redistributed by dredging operations is likely to be more readily transported than materials that have not been dredged and therefore may alter local hydraulic conditions. The proposed regulations that require that suction dredge operators to restore channel grades following excavation will reduce these impacts (see Findings in this impact discussion).

Province and State Scales

The redistribution of alluvial material associated with the Proposed Program is not likely to result in substantial modification to landforms and processes that occur at the province and State scales. At the province and State scales, geomorphic form and function are largely governed by processes (e.g., plate tectonics) that operate at time scales that are not detectable or relevant to the assessment of the Proposed Program impacts.

Findings

The discussion and literature review presented above identifies impacts on geomorphic form and function associated with the redistribution (erosion, transport, and deposition) of alluvial material at multiple spatial scales. At the dredging site, reach and sub-basin scales there is likely to be a measurable departure from the baseline condition in the volume of alluvial material eroded and transported in the channel. The effects of dredging are likely to be most evident in small channels and watersheds, along the margins of channels, downstream of dams, and in areas with a high concentration of dredging activity. Small watersheds and dredging sites downstream of dams are less likely to experience substrate mobilizing flows that facilitate recovery of the natural stream bed form as described above.

The proposed regulations require that suction dredge operators level the tailings piles generated from suction dredging, and guidance to restore dredge holes will be included in the “Best Management Practices” document. Removing these irregular bed surfaces following dredging will reduce impacts to geomorphic form and function. Furthermore, in most streams and rivers throughout the state, natural sediment transport process will restore irregular bed surfaces caused by suction dredging. As such, potential sediment redistribution impacts caused by dredging (including potholes, tailings piles and other suspension/deposition events) conducted in compliance with the proposed regulations are considered to be less than significant.

Impact GEO-2: Destabilization of the Streambanks (Less than Significant)

Discussion

Dredging Site and Reach Scales

A suction dredge operation can destabilize streambanks at a dredging site through several mechanisms including: (1) direct dredging of streambanks; (2) removal of riparian vegetation; (3) dredging a pit near the channel margin which effectively increases bank height; (4) dredging across the entire channel width; and (5) dredging which results in changes in hydraulic roughness (R2 Consultants, 2006; Harvey and Lisle, 1998). Although not a permitted activity in the past, direct mining into streambanks has been documented by several studies (McCleneghan and Johnson, 1983; Hassler et al., 1986; Stern, 1988), as well as by the USFS (2009 b).

Of the 200 suction dredging operations surveyed throughout the Mother Lode region of the Sierra Nevada by McCleneghan and Johnson (1983), 14 (7%) were documented to be undercutting banks. The survey did not obtain measurements of the extent of the undercutting; it only documented visual observations. According to Hassler et al. (1986), 4% of the 68 surveyed dredging operations resulted in damaged streambanks (from research along Canyon Creek, 1982-85). The Hassler et al. (1986) study followed the same survey methods as the McCleneghan and Johnson (1983) study, and no physical measurements of the bank effects were recorded. Stern (1988) reported 34 percent of miners undercut streambanks and noted that undercutting of streambanks was the most common adverse impact of suction dredge mining from his studies on Canyon Creek in the mid-1980s.

The undercutting and eroding of streambanks can destabilize streamside vegetation, such as trees. When this happens, downed trees may divert stream flow toward the opposite bank (which can cause further erosion). The loss of streamside vegetation can also result in reduced shading and increased water temperatures. Downed trees can also generate a sediment pulse from the tree root wad that is delivered to the stream. Downed trees can also provide a source of coarse woody debris (CWD) for the channel. Coarse woody debris is recruited naturally into a stream through episodic events such as a wind storm or fire, or gradual events such as tree mortality or bank failure through channel migration (Bilby and Bisson, 1998). Downed trees may provide backwater habitats where quiet reverse flows (eddies) are found (Keller and Swanson, 1978; Lisle, 1986a; Montgomery et al., 1995). Large roughness elements such as CWD can govern the location of scour and deposition at the scale of pools and riffles (Lisle, 1986b; Montgomery et. al., 1995). While the presence of CWD in a stream is often a habitat benefit, the mechanical undercutting and erosion of streambanks (as a product of suction dredging) is not considered a preferred mechanism for generating CWD supply. Inputs of CWD under natural conditions allow for the transport of fine sediments from the bank to be dispersed together with storm flows. In contrast, streambank erosion and CWD inputs initiated by mechanical conditions such as suction dredging, could result in localized inputs of sediment affecting summer low-flow habitats, such as pools.

It has been documented that some suction dredge operators, in moving larger cobbles and small boulders around the bed to improve access to gravel below, will place large rocks along the bank or even within the concave cavity created by a naturally undercut bank.

Illustrations of this activity are included in Gunn-Morrison's (1994) *A Gold Dredger's Primer to Survival in a Shrinking World*, which encourages miners to place tailing rocks beneath undercut banks as a form of bank protection. The occurrence of an undercut bank alone is not a meaningful indicator of instability, and a priori treatment as such is an inappropriate response that can result in the loss of an important habitat type for many riparian species and enhance bank erosion up- and downstream of the hardened bank area. The proposed regulations prohibit movement of boulders outside the existing water line to prevent other impacts to channel form.

Watershed, Province and State Scales

Streambank erosion or instability caused by suction dredging operations typically occurs at the on-site or reach scales as described above. While the potential presence of multiple dredging operators throughout an entire sub-watershed or watershed could cause this effect to be observed more extensively throughout the river system, in general, this has not been observed. Hence, suction dredge activities associated with the Proposed Program are not likely to result in streambank destabilization that would manifest at the watershed, province and state scales.

Findings

Streambank erosion and destabilization has been observed as a result of suction dredging. The proposed regulations clearly state that it would be illegal under the Proposed Program to dredge in proximity to or beneath a streambank, or to divert flow into a streambank. Regulations that prohibit the removal or disturbance of riparian vegetation would also protect streambanks. Additionally, the regulations that require the permittee to notify CDFG of locations of planned mining activities would provide additional oversight and enforcement capabilities, as well as a deterrent effect on illegal activities. Even with clear regulations that prohibit suction dredge activities along streambanks, it is likely that some illegal activity will continue to occur that will cause bank erosion and instability. However, due to the limited extent of potential bank erosion and instability caused by suction dredging, this impact is considered to be less-than-significant when considered statewide.

Impact GEO-3: Destabilization of Channel Bed Forms such as Riffle and Bars (Less than Significant)

Discussion

In addition to the direct physical effects of creating scour holes and tailings piles, suction dredging may also disturb channel bed forms such as riffles and gravel bars. Riffles and gravel bars play important roles in the development and maintenance of geomorphic form and function, as well as stream ecology. In alluvial channels, riffles control channel profile and establish bed characteristics that provide important habitat functions (e.g., sediment sorting, pool formation). Gravel bars are important for geomorphic function and stream ecology as they are responsible for scour pool formation, creation and destruction of floodplain surfaces, and variation in flow fields that create velocity refugia.

Dredging Site and Reach Scales

In evaluating potential effects of suction dredging on benthic invertebrates, Somer and Hassler (1992) found that the scour holes were excavated below the armored gravel layer, exposing a finer sand and silt layer below. Bedrock and large cobbles were encountered at the bottom of the holes. Harvey and Lisle (1998) report on the erosive effects of dredging near or at riffle crests, and how suction dredging at those locations can destabilize the entire riffle complex. Similarly, Harvey et al. (1982) observed that dredging in riffles has a higher potential to influence substrate changes than dredging in pools. Harvey (1986) concluded that, in general, dredging in streams with larger proportions of fine sediments resulted in more severe erosional and depositional impacts. It is evident that multiple dredging operations within a single reach of a river or stream will compound the impacts on channel bed forms, though it is not feasible to estimate the carrying capacity of a given stream for each has its own unique set of variable that determine geomorphic form and function.

Watershed, Province and State Scales

The destabilizing of channel bed forms due to suction dredging operations typically occurs at the on-site or reach scales as described above. While the potential presence of multiple dredging operators throughout an entire sub-watershed or watershed could cause this effect to be observed more extensively throughout the river system, in general, this has not been observed. Hence, suction dredge activities associated with the Proposed Program are not likely to result in destabilizing channel bed forms that would manifest at the watershed, province and state scales.

Findings

The discussion and literature review presented above identifies mechanisms by which suction dredging may destabilize channel forms such as riffles and bars. At the dredging site and reach this may result in a measurable departure from the baseline condition. In most cases the geomorphic process for recovery would reset and reestablish these channel forms within 1 to 3 years following dredging. The effects of dredging are likely to be most evident in small channels and watersheds, downstream of dams, and in areas with a high concentration of dredging activity. The proposed regulations include several provisions intended to protect aquatic habitat that would reduce the disturbance to riffles and bar features including: (1) restrictions on nozzle size, (2) dredging being restricted to the wetted portion of the channel, (3) requirements to restore irregular bed surfaces and channel grades following excavation, (4) guidance to avoid areas of fine sediment, and (5) prohibitions on dredging in gravel bars at the tails of pools. It is likely that suction dredge mining will cause some degree of destabilizing channel riffles and bars. However, given the proposed regulations which would reduce these potential effects, and due to the limited extent of this potential impact when considered for the form and function of rivers and streams at the statewide scale, the potential effect of suction dredging on destabilizing instream channel bed forms is considered less than significant.

Impact GEO-4: Destabilization of Channel Profile (Less than Significant)

Discussion

Geology, topography and landforms interact to shape the longitudinal profile of a channel. In alluvial channels, profile is maintained through a delicate balance between water and sediment supply. Maintenance of profile stability is a key component of geomorphic function. Excessive stream bed aggradation or degradation (i.e., incision) is indicative of profile instability and disequilibrium in a channel. Streambed incision typically degrades important geomorphic and ecological conditions such as floodplain function, bank stability and off-channel wetland habitat. Channel bed aggradation can bury valuable aquatic habitat.

Suction dredging-related activities that have the potential to destabilize channel profile include: (1) movement of channel structural elements such as boulders and CWD, (2) destabilization of riffles and gravel bars, and (3) dredging of excessively deep pits. Any of these activities can lead to development of breaks in channel slopes, or knickpoints[5] in the channel profile. Such knickpoints can migrate upstream and cause further channel incision, thereby creating a self-propelling feedback that drives channel incision up the river system.

The U.S. Forest Service provided a comment letter (2009b) that described observations from Dutch Creek, a small creek in Trinity County, where multiple dredge operations resulted in several negative effects to the stream channel. Abundant mining on this small creek (average width of 8 feet, and a 2 cubic feet/second summer baseflow discharge rate) destabilized the channel resulting in the downstream transport of gravels. The creek became entrenched within and below the areas of mining activities. While situations similar to what was observed at Dutch Creek may occur in the future, this type of channel destabilization on small creeks is now less likely because of regulations prohibit dredging within 3 feet of the existing water line, which would result in dredging being prohibited in streams that are 6 feet or less across.

Scale of Effects

For any given suction dredging location there is a unique threshold for which the activities listed above may cause destabilization of the channel profile. In general, steep channels are more susceptible to being destabilized than channels with shallow or moderate gradients. Channels with non-cohesive fine sediment will be more prone to destabilization, than channels dominated by coarse material. In all instances, depth to bed rock and the distance to upstream natural or artificial grade control (e.g., bridges or culverts) would determine the extent to which the impact can manifest in the channel. In many cases dredgers are working in sections of stream with shallow bed rock, which would limit the potential for large-scale modification of the channel profile. However, knickpoints formed by destabilization actions may migrate upstream until they encounter erosional resistant material, or until the channel profile adjusts to a new equilibrium gradient. If the mainstem of the river becomes incised, tributary streams would then also likely incise as they adjustment to meet the lowered receiving stream. Hence, destabilization of the channel profile that occurs at the on-site or localized scale can manifest beyond the immediate reach and extend to the broader sub-watershed and watershed scales. However, these effects, as related to suction dredging activity, are not anticipated to be measureable at the province or State-wide scales.

Findings

The discussion presented above identifies mechanisms by which suction dredging activities could destabilize channel profile. The proposed regulations would prohibit the movement of CWD and the use of power winches to move bed material. This would limit the potential

[5] A knickpoint is a location in a river or channel where there is a sharp change in channel slope, resulting from differential rates of erosion above and below the knickpoint.

for the channel profile to be destabilized by suction dredging operations. In addition, regulations that (1) establish restriction on nozzle size, and (2) require suction dredge operators to restore channel grades and bed irregularities following excavation would further reduce the potential for development of knickpoints in the channel profile. Therefore, the extent of channel profile destabilization due to suction dredge mining is considered a less than significant impact when considered on the geomorphic form and function of rivers and streams statewide.

Impact GEO-5: Streamflow Channelization, Diversion, or Obstruction (Less than Significant)

Discussion

During low flow conditions suction dredge operators are known to move streambed material to divert and concentrate flows into one portion of the stream to assist in dredging activities (McCleneghan and Johnson, 1983; Hassler et al,. 1986). This influence of suction dredging activities on the stream channel has been documented through visual observations and channel measurements by McCleneghan and Johnson (1983), Hassler et al. (1986), and Stern (1988). Of the 200 suction dredging operations surveyed by McCleneghan and Johnson (1983), 12 operations were observed to have channelized flows in the stream. From his study of 68 dredging sites in Canyon Creek (1982-1985), Hassler et al. (1986) noted that 10% of the dredging operators he observed channelized portions of the stream, 15% caused riparian damage, 4% damaged the bank, and 36% impacted spawning gravels.

Stern (1988) observed that the risk for bank failure increased when stream bed material was relocated to divert and concentrate flows toward the banks, bank vegetation was removed, and suction dredging activities also occurred near the banks. The study also observed that re-directed flows that were channelized toward the streambanks could result in the erosion and loss of riparian vegetation, including the destabilization and recruitment of overhanging vegetation and root wads.

Findings

The discussion and literature review presented above identifies mechanisms by which flow obstructions and diversions associated with suction dredging may impact stream morphology and disrupt channel hydraulics. The effects of flow modifications are likely to be most evident in small channels. At the dredging site and reach scales this may result in a measurable departure from the baseline condition. The proposed regulations include the following prohibitions: (1) no construction of permanent or temporary dams, (2) no concentrating flow in a way that reduces the total wetted area of the stream, and (3) no diversion of a stream or lake into the bank. Additionally, the regulations would require the permittee to notify CDFG of locations of planned mining activities. This would provide additional oversight and enforcement capabilities, as well as a deterrent effect on illegal activity. Even if illegal dredging activities were to occur that led to instream channelization, diversions, or obstructions, in most cases geomorphic recovery processes would likely reset and reestablish the channel form within 1 to 3 years following dredging activities. It is therefore concluded that flow obstructions and diversions associated with suction dredging would have a less than significant impact on the geomorphic form and function of rivers and streams.

Impact GEO-6: Alteration or Destabilization of Lake Bed or Shoreline (Less than Significant)

Although suction dredging is not known to commonly occur in lakes, Fish and Game Code section 5653 does not expressly preclude the activity from lakes, and therefore potential impacts must be considered in this analysis.

Discussion

Suction dredging in lakes (i.e., lentic systems) has the potential to alter lake bed morphology and potentially destabilize the lake shoreline. A suction dredge operation would excavate and disperse sediment, leaving a dredging pit. Since lake bed sediments are typically composed of sorted fine grained material, a suction dredge operator would have difficulty backfilling the excavated pit because the fine sediment would be widely dispersed. The dredge pit would likely be persistent for a significant period of time because the geomorphic processes of recovery (i.e., erosion, transport and deposition) that occur with typical annual recurrence in river and streams are either absent or occur at spatial and temporal-scales that are not functionally relevant to the Proposed Program.

One or several dredge pits in a lake bed could impact a lake shoreline by causing slumping of the lake bed or destabilization of the shoreline slope. The magnitude and severity of the impact would be dependent on the slope of the lake bed/shoreline, the dimensions of the dredging pit, geotechnical properties of the substrate, the proximity of the pit to the shoreline, and lake level fluctuations.

Findings

The discussion above identifies mechanisms by which suction dredging could modify the lake bed or destabilize the lake shoreline. At a dredging site this may result in a measurable departure from the baseline condition. The proposed regulations require that a permittee submit notification to CDFG (pursuant to Fish & G. Code, §1602) of any suction dredging activity proposed in a lake. If CDFG determines that the proposed dredging activity would not substantially alter the lake bed or shoreline, and does not require a Lake or Streambed Alteration Agreement, then the activity would have a less than significant impact to the geomorphic form of the lake. Alternatively, if CDFG determines that the proposed dredging activity would substantially alter the lake bed or shoreline, and requires a Lake or Streambed Alteration Agreement, then the activity would be subject to CEQA review outside the scope of this SEIR. For this reason, the impacts of the Proposed Program are considered less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities which require notification under Fish and Game Code section 1602 may increase the potential for adverse effects related to hydrology and geomorphology. The increased substrate movement capacity associated with the use of larger nozzle sizes could increase alterations to the forms and functions of stream beds and/or banks, and increase effects associated with sedimentation transport. Similarly, the use of power-winching techniques may cause greater destabilization of channel profiles and disturbances of in-stream and streambank features. The damming or diverting of flows is not permitted under the proposed regulations, and therefore use of such methods would increase effects on stream morphology and channel hydraulics beyond that which has been described in this SEIR. As discussed in Impact GEO-6, suction dredging in lakes is an activity which requires notification to the CDFG (pursuant to Fish & G. Code, §1602) in order to determine whether the activity would substantially alter the lake bed or shoreline. These issues, to the extent to which they could be significant, would need to be evaluated in a CEQA document.

Chapter 4.2
WATER QUALITY AND TOXICOLOGY

4.2.1 Introduction

CDFG's suction dredging permit program is statewide. Thus the affected environment is all water-bodies in the state where dredging may occur, and the adjacent shoreline zones which dredge operators use to base their activities.

4.2.2 Regulatory Setting

Federal Laws, Regulations, and Polices

Clean Water Act and Associated Programs

There are several sections of the Federal Water Pollution Control Act (33 U.S. Government Code [U.S.C.] §1251 et seq. (1972)), a.k.a. "Clean Water Act" (CWA), which is administered primarily by the U.S. Environmental Protection Agency (EPA) that pertain to regulating discharges of waste to waters of the United States, including Sections 303, 401, 402, and 404. Each of these regulatory sections of the CWA is described below.

Congress enacted the federal CWA "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[1] Section 301 of the CWA prohibits "the discharge of any pollutant by any person" except in compliance with the CWA; i.e., without obtaining a permit.[2] The "discharge of any pollutant" means any addition of any pollutant to navigable waters from any point source. One type of permit authorized by CWA Section 402 is National Pollutant Discharge Elimination System (NPDES) permits.

Section 303

As defined by U.S. EPA, water quality standards consist of: 1) the designated beneficial uses of a water segment, 2) the water quality criteria (referred to as "objectives" by the state) necessary to support those uses, and 3) an antidegradation policy that protects existing uses, future uses, and high water quality. The State of California adopts water quality standards (see discussion of state water quality standards below) to protect beneficial uses of state waters as required by Section 303 of the CWA and the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne). Section 303(d) of the CWA requires States to develop lists of water bodies (or sections of water bodies) that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers (i.e., municipalities and industries). Section 303(d) requires States to develop a total maximum daily load (TMDL) for each of the listed pollutants and water bodies, which is intended to guide the attainment of state water quality standards. A TMDL is an estimate

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[1] 33 U.S.C. § 1251(a).

[2] 33 U.S.C. § 1311(a).

of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL allocates the permissible contaminant loading among current and future pollutant sources to the water body to ensure that water bodies maintain compliance with the established water quality standards.

Sections 401 and 404

For an applicant of a federal permit or license to conduct any activity that may result in a discharge of a pollutant to a water of the United States, Section 401 of the CWA requires the state to issue a certification that the activity is consistent with the state's water quality standards. The state may grant, grant with technical conditions imposed on the project activity, or deny the Section 401 certification.

The discharge of dredged or fill material into waters of the United States, including wetlands, as determined by the U.S. Army Corps of Engineers (USACE), is subject to permitting specified under Section 404 of the CWA (Discharges of Dredge or Fill Material), which is administered by USACE. A Section 401 water quality certification is required for all Section 404 permitted activities.

Section 402

The 1972 amendments to the Federal Water Pollution Control Act established the NPDES permit program to control discharges of pollutants from point sources (Section 402). NPDES is the primary federal program that regulates point-source discharges to waters of the United States. The 1987 amendments to the CWA created a new sub-section of the CWA devoted to stormwater permitting (Section 402[p]). Section 402 of the CWA authorizes the EPA, or a state with an approved program, to issue NPDES permits for the discharge of pollutants other than dredged or fill material.[3] Within California, the Legislature has delegated its rights and responsibilities under the CWA, including the issuance of NPDES permits, to the State Water Resources Control Board (SWRCB).

Suction dredging involves the removal of material from the streambed to a sluice box. The material is separated into recoverable gold and remaining spoil. The spoil is then discharged from the sluice box directly back into the stream. Congress defined "pollutant" to include "dredged spoil, rock, sand…"[4] The discharge of the spoil from a suction dredging sluice box has been determined by the courts to constitute a discharge that may be regulated with permits issued pursuant to Section 402 of the CWA.[5] As such, the SWRCB or the Regional Water Quality Control Boards (RWQCBs) may require suction dredge operators to obtain NPDES permits in order to ensure that they are in compliance with the CWA and with California's water quality standards. Several other western states also regulate recreational dredging activities through permit procedures associated with their wastewater discharge statutes and regulations; a summary of these other state's permit procedures is provided in Appendix E.

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[3] 33 U.S.C. § 1342.

[4] 33 U.S.C. § 1362(6).

[5] *Rybachek v. U.S. Environmental Protection Agency* (9th Cir. 1990) 904 F.2d 1276.

National Toxics Rule and California Toxics Rule

The National Toxics Rule (NTR) was issued by the EPA on December 22, 1992, and amended on May 4, 1995, and November 9, 1999, to establish numeric criteria for 42 priority toxic pollutants. As a result of a court-ordered revocation of California's statewide water quality control plan for priority pollutants in September 1994, the EPA initiated efforts to issue numeric water quality criteria for California. On May 18, 2000, the EPA promulgated the California Toxics Rule (CTR) in the Federal Register as a final rule (Federal Register, Volume 65, page 31682 [65 FR 31682]). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. For California, the criteria in the CTR supplement the criteria in the NTR (i.e., the CTR does not change or supersede any criteria previously promulgated for California in the NTR, but it does include them in the table of criteria for convenience).

Federal Anti-degradation Policy

The federal anti-degradation policy is designed to protect existing beneficial uses and the level of water quality necessary to protect existing uses, and provide protection for high quality waters and national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions (40 CFR 131.12):

> (1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> (2) Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the state finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located…
>
> (3) Where high quality waters constitute an outstanding National resource, such as waters of National and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Federal Mining and Land Use Regulations

Many of the water bodies where suction dredging may occur in California occur on federal lands under the jurisdiction of either the U.S. Bureau of Land Management (BLM) or the U.S. Forest Service (USFS) National Forest system. Other federal lands (i.e., National Park Service, National Monument, military bases), Indian reservations, and U.S. Bureau of Reclamation reservoirs are not typically open to mineral exploration. The General Mining Law of 1872 and accompanying BLM regulations (43 CFR Parts 3800-3870) provide the primary rules governing mineral prospecting activities on public lands, including the filing of claims and patents and environmental provisions (excepting activities that started prior to October 1976 and have not undergone any changes). Similarly, federal regulations applicable to the USFS contain provisions for minerals exploration (36 CFR Part 228). The environmental protection requirements for BLM (43 CFR Part 3802.3) and USFS (36 CFR

Part 228.9) are similar and generally require activities to abide by state and Federal water quality standards, solid waste disposal and removal (i.e., trash, wastes), and construction of access routes in a manner to provide adequate drainage (i.e., dips, water bars, culverts), be shaped to as near a natural contour as practicable, be stabilized, and be reclaimed and revegetated when activities are discontinued.

State Laws, Regulations, and Policies

Porter-Cologne Water Quality Control Act and California Water Code

The Porter-Cologne Water Quality Control Act, passed in 1969, implements the CWA in California. It established the SWRCB and divided the state into nine regions, each overseen by a Regional Water Quality Control Board. The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA Sections 401, 402, and 303(d). In general, the SWRCB manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions. Porter-Cologne authorizes the RWQCBs to issue waste discharge requirements (WDRs), including NPDES permits, and requires the RWQCBs to adopt water quality control plans (Basin Plans) for the protection of surface water and groundwater quality. Additionally, the SWRCB may adopt water quality control plans for waters of the state. A Basin Plan must identify beneficial uses of surface water or groundwater to be protected, establish water quality objectives to ensure the reasonable protection of beneficial uses, and establish a program for implementing and achieving the water quality objectives. Basin Plans also incorporate by reference the state's "Anti-degradation Policy," which is discussed further below.

Section 13050(f) of the Porter-Cologne Act defines "beneficial uses" as uses of waters of the state (i.e., surface water or groundwater) that must be protected against water quality degradation. Potential beneficial uses include domestic and municipal, agricultural, and industrial water supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves (Section 13050[f]). Most water bodies have multiple designated beneficial uses. SWRCB policies have provided additional guidance regarding how the SWRCB and RWQCBs must regulate discharges to waters of the state in order to protect beneficial uses.

In 1988, the SWRCB adopted Resolution 88-63, the Sources of Drinking Water Policy. This policy stated, "All surface and ground waters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards…," with a few minor exceptions. Therefore, the SWRCB and RWQCBs regulate almost all surface water and groundwater of the state as a potential drinking water source.

Basin Plans establish specific numeric and narrative water quality objectives for a number of physical parameters, chemical inorganic and organic constituents, biological factors, and toxic priority trace metal and organic compounds. Numerical objectives are typically applied to conventional parameters such as coliform bacteria, dissolved oxygen (DO), pH, pesticides, electrical conductivity (EC), total dissolved solids, temperature, or turbidity. Several of the Basin Plans also contain specific numerical objectives for some of the trace metals or organic compounds. Basin Plans also commonly contain narrative water quality objectives for parameters such as suspended sediment, taste and odor, color, biostimulatory substances, oil and grease, pesticides, and toxicity. Water quality objectives for toxic pollutants in the Basin Plan complement the federal water quality standards adopted in the CTR and NTR. State objectives may be equal to, or more restrictive than federal criteria, but cannot be less restrictive than federal criteria.

Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California

In 1994, the SWRCB and the EPA agreed to a coordinated approach for addressing priority toxic pollutants in inland surface waters, enclosed bays, and estuaries of California. In March 2000, the SWRCB adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, commonly referred to as the State Implementation Policy (or SIP). The SIP implements NTR and CTR criteria, and applicable Basin Plan objectives, for toxic pollutants. When the RWQCBs issue any permit allowing the discharge of any toxic pollutant(s) pursuant to the CWA or the Porter-Cologne, the permit's promulgation and implementation must be consistent with the SIP's substantive or procedural requirements. Any deviation from the SIP requires the concurrence of U.S. EPA if the RWQCBs are issuing any permit pursuant to the CWA.

California Anti-Degradation Policy (SWRCB Resolution No. 68-16)

The goal of SWRCB Resolution No. 68-16 ("Statement of Policy With Respect to Maintaining High Quality Waters in California") is to maintain high quality waters where they exist in the State. State Board Resolution No. 68-16 states, in part:

> "1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.
>
> 2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

The SWRCB has interpreted Resolution No. 68-16 to incorporate the federal anti-degradation policy, which is applicable if a discharge that began after November 28, 1975, will lower existing surface water quality.

California Fish and Game Code Sections 5650-5652 and 5655

The California Fish and Game Code section 5650 prohibits the discharge of petroleum products and other miscellaneous materials, or any substance deleterious to fish, plant life, mammals, or bird life into waters of the state. For conditions where CDFG finds that a continuing and chronic condition of pollution exists, section 5651 requires CDFG to coordinate with the RWQCBs in obtaining correction and abatement of the problem. Section 5652 prohibits discharge of refuse to waters of the state or within 150 feet of the high water mark of waters of the state. Section 5655 allows CDFG to collect funds and conduct cleanup and abatement actions for spills of petroleum or petroleum products by a discharger, or require the discharger who caused the spill to conduct the cleanup.

Local Laws and Regulations

Because suction dredging typically occurs as temporary activities, involves access and setup of small and dispersed sites in remote locations, and often access through Federal public lands, the activities are unlikely to require application or approval under local land use regulations that may involve water quality protection either directly or indirectly (e.g., grading and erosion control ordinances, building permits, stormwater management regulations).

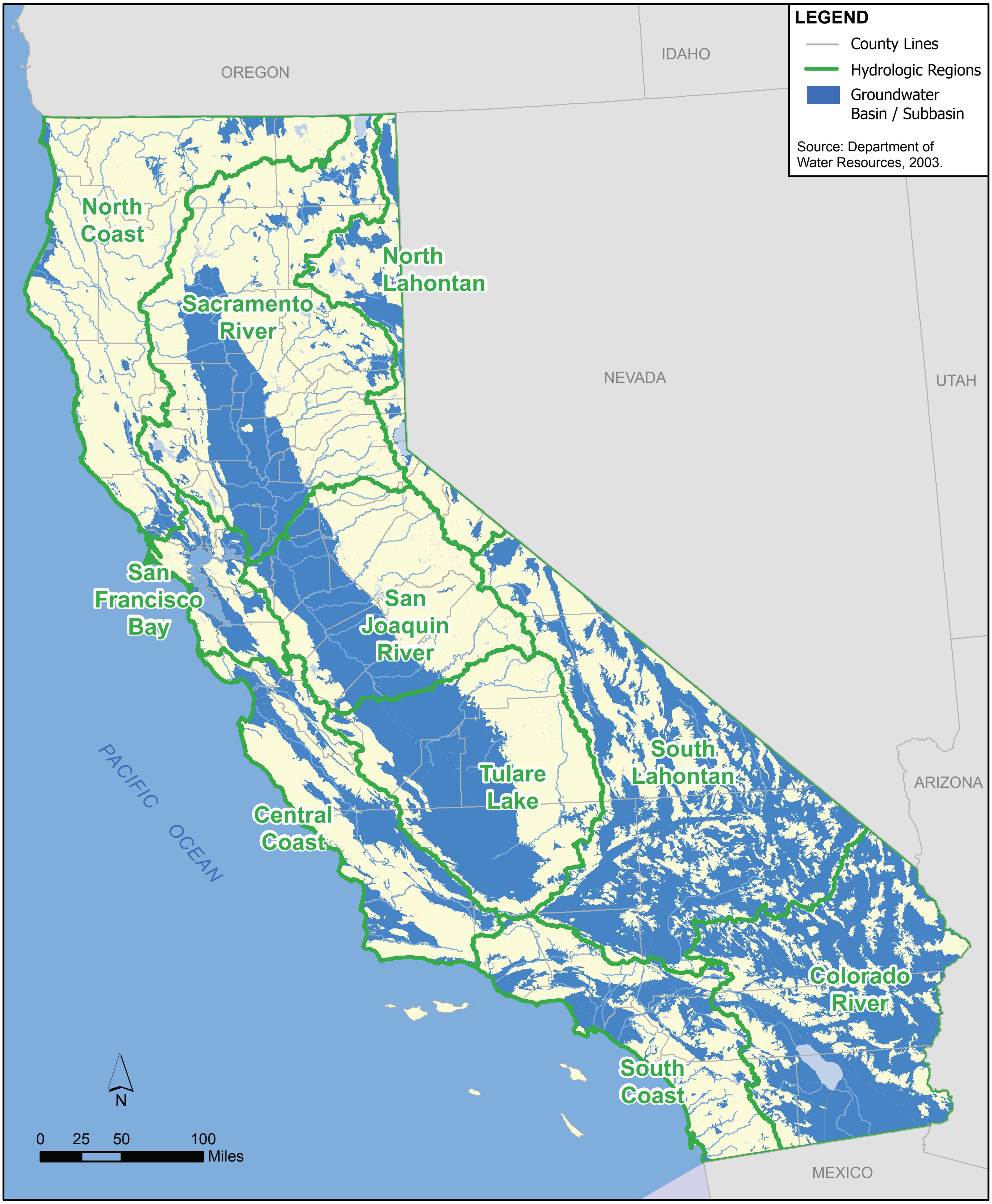
4.2.3 Environmental Setting

A Literature Review (Appendix D) was conducted in preparing this EIR section to identify and evaluate available information that exists regarding the potential environmental effects to water resources that suction dredging activity may cause. Based on the Literature Review, and the results of the agency and public issues-scoping process conducted for this EIR, it was determined that the major water quality issues of potential concern associated with suction dredging activity under the Proposed Program were waste discharges of dispersed encampments, instream waste discharges from dredging equipment, and instream resuspension of sediments and related sediment-derived contaminants. As proposed, the Program will apply statewide, thus the setting below addresses existing conditions at an appropriate regional scale. The following sections describe relevant regional climate, hydrology, water quality, and environmental toxicology conditions in California that may be affected by suction dredging activity, or may influence the environmental effects of suction dredging activity.

Regional Climate and Hydrology

The Department of Water Resources (DWR) divides the state into ten hydrologic regions which are designated in Water Code Section 13200, and based on boundaries of major river system watersheds. The boundaries of the nine RWQCBs also are defined (for the most part) by these boundaries. These hydrologic region boundaries are shown in Figure 4.2-1, along with major defined groundwater basins of the state (DWR, 2003). The location of groundwater basins are only partially related to the boundaries of major surface watersheds.

Most of California experiences a Mediterranean climate with cool, wet winters and warm, dry summers. However, the state also contains deserts that experience arid climatic conditions and mountains with subarctic climate patterns. In California, most precipitation (i.e., rain and snow) and peak stream runoff events occur primarily during the months of October–April, and are usually most extreme between November and March. Precipitation rates vary greatly across the state from the northern to southern regions, and the state contains many desert regions where annual total precipitation averages less than about 7 inches. In general, the April to July period is characterized by moderately high runoff from



Horizon WATER and ENVIRONMENT

Figure 4.2-1
Hydrologic Regions and Groundwater Basins in California

snowmelt in watersheds that receive a substantial snowpack, much of which is captured in reservoirs. Mountain snowmelt and seasonal release of stored water from the reservoirs generally provides surface water flows into or throughout the summer months in the major streams and rivers located downstream in the Sacramento Valley, San Joaquin Valley, and northern California.

Many rivers are controlled by dams and levees for a variety of purposes, including but not limited to, flood control, water storage and transport, and recreation. Rivers and streams in the Klamath/North Coast region are largely uncontrolled, with the exception of the Trinity River where Lewiston Reservoir provides substantial storage and flows are diverted into the Sacramento River basin, and the Klamath River. Most of the rivers on the west side of the Sierra Nevada Mountains are controlled, to some degree, by dams and diversions. The climate and hydrology of each hydrologic region are described in detail below.

North Coast Hydrologic Region

The North Coast hydrologic region covers approximately 12.46 million acres (19,470 square miles) and encompasses Siskiyou, Del Norte, Trinity, Humboldt, Mendocino, Sonoma, and small areas of Marin Counties. The region extends from the Oregon border south to Tomales Bay and includes portions of the northern Coast Ranges, the Mad River drainage, the Klamath Mountains, and the coastal mountains. The majority of the population is located along the Pacific Coast and in the inland valleys north of the San Francisco Bay Area. The northern mountainous portion of the region is rural and sparsely populated, and most of the area is heavily forested. Average annual precipitation in this hydrologic region ranges from 100 inches in the Smith River drainage to 29 inches in the Santa Rosa area.

The climate in inland areas is characterized by distinct rainy, cool winters and hot, dry summers, while coastal areas experience cool and wet conditions year-round with little temperature variation. Precipitation is predominantly rainfall, and average annual precipitation in the region is 53 inches. Runoff characteristics include the highest peak discharges recorded and highest total sediment yields in the state.

San Francisco Bay Hydrologic Region

The San Francisco Bay hydrologic region covers approximately 2.88 million acres (4,500 square miles) and encompasses San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda Counties. The San Francisco Bay hydrologic region is dominated by the Coast Ranges. Significant geographic features include the Marin and San Francisco peninsulas; San Francisco, Suisun, and San Pablo bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Ranges. Although this is the smallest hydrologic region in the state, it contains the second largest human population.

The climate in coastal areas is characterized by cool and foggy conditions year-round, with rain in the winter and small seasonal temperature variations, while inland areas experience warmer, dry summers with cooler, rainy winters. Precipitation is mostly rainfall, with insignificant snowfall. Average annual precipitation is 31 inches, with greater than 50 inches in some parts. Runoff characteristics include high peak discharges due to small, steep watersheds. Local rivers are susceptible to severe flooding during high rainfall events. Some watersheds produce high sediment yields due to unstable rock types/soils.

Central Coast Hydrologic Region

The Central Coast hydrologic region covers approximately 7.22 million acres (11,300 square miles) in central California and includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura Counties. The climate and runoff experienced is similar to that described above for the San Francisco Bay Hydrologic Region. Annual average precipitation is 20 inches.

South Coast Hydrologic Region

The South Coast hydrologic region includes all of Orange County; most of San Diego and Los Angeles Counties; parts of Riverside, San Bernardino, and Ventura Counties; and a small portion of Kern and Santa Barbara Counties. Approximately half of California's population, or about 17 million people, live within the boundaries of the South Coast hydrologic region. This, combined with its comparatively small surface area of approximately 6.78 million acres (10,600 square miles) gives it the highest population density of any hydrologic region in California.

The region has a Mediterranean climate with mostly dry years interrupted by infrequent high precipitation years. It is generally characterized by warm, dry summers and mild, wet winters, though it also can experience intense subtropical storms. Precipitation is generally rainfall, with insignificant snowfall contribution. Average annual precipitation is 18.5 inches. Locally heavy storms have the highest 24-hour rainfall totals in the state. Rivers and streams are largely ephemeral and fed by rainfall. Rivers are susceptible to frequent flooding due to high peak discharge events. Sediment yields are locally high due to intense urbanization, low vegetation cover and unstable soils. Debris flows and mudflows are frequent in some drainages.

Central Valley Hydrologic Region

At over 38 million acres (59,450 square miles), the Central Valley hydrologic region is the largest in California, and encompasses the three subregions described below. The climate in the Central Valley is characterized by hot, dry summers and cool, wet winters, while mountainous areas experience mild summers with intermittent thundershowers and heavy winter snowfalls above 5,000 feet. Lowland areas receive winter rainfall, and mountains receive moderate to heavy snowfall. Total average annual precipitation ranges from 36 inches in the Sacramento River region to 13-14 inches for the San Joaquin Valley and Tulare Lake regions. Runoff is characterized by prolonged spring runoff fed by Sierra Nevada snowpack. The region experiences generally low sediment yields due to widespread vegetation and stable rock types/soils, though high sediment yields are experienced locally due to land uses (e.g., logging, grazing, and urbanization). The natural hydrology has been highly modified by the introduction of dams, timing and location of water uses, and conveyance systems.

Sacramento River Hydrologic Subregion

The Sacramento River hydrologic subregion covers 27,250 square miles and includes all or a portion of 20 predominantly rural northern California counties. The city of Sacramento is the most densely populated portion of this region. The region extends from the crest of the Sierra Nevada in the east to the summit of the Coast Ranges in the west, and from the

Oregon border north downstream to the Sacramento–San Joaquin Delta. It includes the entire drainage area of the Sacramento River, the largest river in California, and its tributaries.

San Joaquin River Hydrologic Subregion

The San Joaquin River hydrologic subregion is bordered on the east by the crest of the Sierra Nevada Mountains and on the west by the crest of the coastal mountains of the Diablo Range. It extends from the southern boundary of the Sacramento–San Joaquin Delta to the southern extent of the San Joaquin River drainage in Madera County. It consists of the drainage area of the San Joaquin River, which at approximately 300 miles long is one of California's longest rivers, although substantial portions have only intermittent flow, and also encompasses approximately half of the Sacramento–San Joaquin Delta. The San Joaquin River hydrologic region covers approximately 9.7 million acres (15,200 square miles).

Tulare Lake Hydrologic Subregion

The Tulare Lake hydrologic subregion is located in the southern end of the San Joaquin Valley and includes all of Tulare and Kings Counties and most of Fresno and Kern Counties. Major cities include Fresno, Bakersfield, and Visalia. The region covers approximately 10.9 million acres (17,000 square miles). The surface water hydrology of this region has been greatly modified and there is generally no discharge of river flow out of the region, with the exception of infrequent high flow events when there may be some flow into the San Joaquin basin to the north. The ancestral Tulare Lake is now completely under agriculture.

Lahontan Hydrologic Region

The Lahontan hydrologic region encompasses the North and South Lahontan subregions covering approximately 25.1 million acres (39, 200 square miles). Valleys are semi-arid high desert with hot, dry summers, mild, dry winters, and locally intense thunderstorms. Mountainous areas experience cool to mild summers and cold winters. Precipitation is low to moderate in valleys due to the rain-shadow effects of the Sierra Nevada and Cascade Mountains. The mountains experience regionally heavy winter snowfall and intense summer thunderstorms. Average annual precipitation ranges from 8 inches in the south to 32 inches in the north.

North Lahontan Hydrologic Subregion

The North Lahontan hydrologic subregion extends south from the Oregon border approximately 270 miles to the South Lahontan region. Extending east to the Nevada border, it consists of the western edge of the Great Basin, and water in the region drains eastward toward Nevada. The subregion, corresponding to approximately the northern half of the Lahontan RWQCB, covers approximately 3.91 million acres (6,110 square miles) and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Tuolumne Counties.

South Lahontan Hydrologic Subregion

The South Lahontan hydrologic subregion in eastern California, which includes approximately 21% of the state, covers approximately 21.2 million acres (33,100 square miles). This region contains both the highest (Mount Whitney) and lowest (Death Valley) surface elevations of the contiguous United States. It is bounded on the west by the crest of the Sierra Nevada and on the north by the watershed divide between Mono Lake and East Walker River drainages; on the east by Nevada and the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward. The subregion includes all of Inyo County and parts of Mono, San Bernardino, Kern, and Los Angeles Counties.

Colorado River Hydrologic Region

The southeast portion of California comprises the Colorado River hydrologic region, which contains 12% of the state's land area at approximately 12.8 million acres (20,000 square miles). The Colorado River forms most of the region's eastern boundary except for a portion of Nevada at the northeast, and extends south to the Mexican border. The region includes all of Imperial County, approximately the eastern one-fourth of San Diego County, the eastern two-thirds of Riverside County, and the southeastern one-third of San Bernardino County. It includes a large portion of the Mojave Desert and has variable, arid desert terrain that includes many bowl-shaped valleys, broad alluvial fans, sandy washes, and hills and mountains.

This is an arid desert region with hot, dry summers, locally intense thunderstorms, and mild winters. Rainfall is limited to a few storms per year. All precipitation falls in the form of rain. This region has the lowest annual precipitation totals in the state, with some areas receiving less than 2 inches. Average annual regional rainfall region-wide rainfall is 5.5 inches. Runoff is low due to limited rainfall, but locally heavy during infrequent storm events. Overall sediment yields are low, but produce debris flows during storms.

Water Quality

As determined in the Literature Review (Appendix D), and further detailed below under the "Impact Analysis – Methodology" section, research studies, surveys, and other resource agency information have been compiled that have evaluated the water quality effects of suction dredging activities that have been conducted in the past in California and in other states. Based on the Literature Review, the major water quality constituents of potential concern associated with suction dredging activity are expected to be associated with waste discharges that occur in relation to instream resuspension of sediments and related sediment-derived contaminants. Therefore, the following section describes available and relevant information on existing regional water quality conditions that may be affected by suction dredging activity.

The water quality of surface waters and groundwater varies throughout California. Potential sources of water quality impairments include point sources (direct discharges to water bodies) and non-point sources. Pollutants from non-point sources are transported primarily via surface water runoff, but in some cases by groundwater discharge. In urban areas, typical non-point pollutant sources include city streets, parking lots, lawns, gardens, and industrial areas. Runoff from roads and parking lots carry oil and other gasoline-related contaminants, as well as trace metals such as copper and zinc. Typical pollutants in stormwater runoff from lawns and agricultural areas include pesticides, herbicides, and nutrients from fertilizers. Other non-point pollutants include trash, sediments, and pathogens. Surface waters such as rivers and streams may be affected by a large variety of pollutants, including sediments, pathogens, pesticides, trace metals, and legacy contaminants (pollutants that have been banned or replaced and are no longer supplied to the environment in large quantities, but that remain in the environment for an extended period after deposition with little degradation) such as dichlorodiphenyltrichloroethane (DDT) and other chlorinated hydrocarbon pesticides, and polychlorinated biphenyl compounds (PCBs).

Primary water quality issues vary around the state depending on the location and type of water resources present in an area, the size and extent of the watershed and regional water resources, the location of the water body with respect to potential pollutant sources, seasonal and climatic factors, and many other interacting physical, chemical, and biological processes.

Water Quality Monitoring and Section 303(d) Listed Water Bodies

Monitoring for water quality protection purposes is conducted through a variety of federal, state, and local programs. The SWRCB conducts monitoring of surface waters through the Surface Water Ambient Monitoring Program (SWAMP). Water quality monitoring is conducted for the State Water Project (SWP) administered by the Department of Water Resources, and Central Valley Project (CVP) administered by the U.S. Bureau of Reclamation. In particular, extensive monitoring and special studies have been conducted in the Sacramento River-San Joaquin River Delta (Delta), San Francisco Bay, and surrounding tributaries over the past 30 years to manage the SWP/CVP operations and understand chemical fate and transport processes affecting these water bodies. Additionally, the U.S. Geological Survey (USGS) has conducted assessments through the National Water-Quality Assessment Program (NAWQA) of the Sacramento River, San Joaquin-Tulare, and Santa Ana Basins to understand the status of water quality trends and how natural and anthropogenic factors affect water quality.

The state evaluates current water quality conditions and prioritizes funding efforts for protection, cleanup, and monitoring programs through individual water quality assessments that are compiled into the Section 305(b) reporting process, which is mandated under the federal CWA. The most recent Section 305(b) report was prepared in 2002 and reported that of 32,536 miles of rivers/streams assessed, 27,449 miles were impaired for one or more beneficial uses. Out of 576,013 acres of lakes/reservoirs assessed, 361,128 acres were impaired for one or more beneficial uses (SWRCB, 2003).

CWA Section 303(d) lists identify water bodies that do not meet applicable water quality standards or designated beneficial uses that are subject to technology-based controls for waste discharges. Table 4.2-1 shows the number of water bodies on the 2006 statewide 303(d) list by region and pollutant type. Of the total number of listings, 2,238 require preparation of TMDLs, reflecting either a new listing since the prior 2004 list or an existing listed water body awaiting development of the TMDL. The number of TMDLs that have been prepared to date is substantially less than the actual number of 303(d) listings. The state has completed compilation of the recommended 2010 update of the Section 303(d) list of impaired water bodies in an Integrated Report (SWRCB, 2010), and EPA approval of the list is pending, at which point the state will have a fully adopted 2010 Section 303(d) list. The 2010 Integrated Report identifies that there are an additional 1,464 listings that will require TMDL development, and 195 recommended delistings. Because the 303(d) listing process is data driven, and as evidenced by the large number of new listings for 2010, it should be noted that the 303(d) listing process does not necessarily completely represent the actual number of impaired water bodies. In particular, water bodies in rural or remote areas where there is not an active data collection program may not be represented in the listing process.

Constituents of Concern for the Proposed Program

As noted above, the Literature Review (see Appendix D) was conducted to identify potential water quality effects that suction dredging may have, to identify information gaps on water quality topics important to the assessment, and to direct the development of the assessment methodology. The following sections summarize information from the Literature Review regarding the characteristics of suction dredging activity that can lead to waste discharges from: (a) encampment activities; (b) sediment resuspension; (c) dredging discharges of sediment-associated and elemental Hg; and, (d) dredging discharges of other metals or organic compounds. A final section summarizes the key findings of the Literature Review regarding the water quality concerns of chemical constituents that may be discharged, the routes of exposure to sensitive beneficial uses of the water bodies affected, and the status of the available data (or data gaps) and level of understanding of suction dredging effects.

Contaminant Discharges from Onshore Dredge Site Encampments

Many areas where suction dredging is conducted are remote and distant from developed facilities. As such, activities associated with suction dredging may include gaining access to stream sites with motorized transportation (e.g., boats, automobiles, off-highway vehicles), establishment and occupation of temporary encampments for extended stay periods, use of fuels for suction dredges and other hazardous substances (e.g., oil for equipment maintenance, and use of chemicals for dredge material processing including primarily nitric acid and/or mercury), creation of wastewater if encampments are remotely located from campground or overnight facilities, or incidental discharges of trash or other debris. Suction dredges operate using internal combustion engines while floating on the surface of the water. Therefore, the potential exists for oil and gas leaks or spills to occur, resulting in direct discharges of these contaminants to water bodies and possible adverse water quality affects. There have been no specific technical studies that have evaluated the effects of suction dredging encampments on water quality.

TABLE 4.2-1. NUMBER OF WATER-BODIES WITH 303(d) LISTINGS (I.E., IMPAIRED WATER BODIES) FOR WATER QUALITY CONSTITUENTS, BY REGION

	REGION NUMBER									
Pollutant Type	1	2	3	4	5	6	7	8	9	**Total**
Hydromodification				10						10
Mercury	10	100	2	8	51	3	1	2	1	178
Other Metals		55	15	115	77	75	6	18	46	407
Miscellaneous [1]	201	13	1	28	16			2	22	283
Nuisance [2]				14					11	25
Nutrients	110	27	114	104	21	254	10	20	81	741
Other Inorganics [3]		4		19		5			10	38
Other Organics [4]	2	69	12	89	10	2	17	10	12	223
Pathogens	10	48	141	122	33	45	7	30	55	491
Pesticides		99	69	177	145		18	16	18	542
Salinity	1	3	20	30	16	42	3	2	52	169

	REGION NUMBER									
Pollutant Type	1	2	3	4	5	6	7	8	9	**Total**
Sediment	410	20	150	23	5	85	3	15	17	728
Toxicity		3	4	32	30	1	1	7	18	96
Trash		1		37			1		3	42
Grand Total	*744*	*442*	*528*	*808*	*404*	*512*	*67*	*122*	*346*	*3,973*

[1] = Includes 303d-listed temperature, pH, and exotic species.
[2] = Includes odor and scum formation.
[3] = Includes hydrogen sulfide, sulfates, and cyanide.
[4] = Includes PCBs, dioxin/furan compounds, and polycyclic aromatic hydrocarbons (PAHs).

Turbidity and Total Suspended Solids

Turbidity is the optical property of a suspension that causes light to be scattered and absorbed rather than transmitted through the water column. The scattering and absorption of light is caused by: 1) water; 2) suspended particulate matter ranging in size from colloidal to coarse dispersions; and 3) dissolved chemicals. Suspended materials may include suspended sediments, finely divided organic and inorganic compounds, plankton, and other microscopic organisms. Because turbidity is primarily caused by suspended solids, these two parameters are often discussed together. Suspended solids concentration in water is quantified by filtering a known volume of water through a weighed standard glass-fiber filter, and drying the residue retained on the filter to a constant weight at 103-105°C. The total suspended solids (TSS) concentration within the sample is then reported as milligrams of dried residue per liter of water filtered (mg/L). Although the terms "suspended solids" and "turbidity" are sometimes used synonymously, the degree of turbidity is not equal to the suspended solids concentration; rather, turbidity is an expression of only one effect of suspended solids upon the character of water (i.e., the ability of light to penetrate through the water column). Because the particle size and nature (e.g., organic vs. inorganic) of the suspended solids affect the light scattering, different turbidities can be measured for waters having the same TSS concentration (McKee and Wolf, 1963).

All surface water bodies have quantifiable levels of suspended solids and turbidity. Turbidity levels of fresh waters vary greatly with location and season, with headwaters of streams and rivers generally having low turbidities (e.g., often below 5 Nephelometric Turbidity Units [NTUs]) throughout the year. Larger rivers, located at lower elevations, typically have higher turbidities (e.g., <10 to over 100 NTUs). The turbidity of water bodies increases during and following precipitation events that result in highly turbid runoff. TSS levels in natural waters seldom exceed 20,000 mg/L for more than a few days (Boyd, 1990).

Both turbidity and TSS are regulated water quality parameters in all of the state's RWQCBs' Basin Plans. Beneficial uses considered most sensitive to ambient levels of turbidity and TSS and/or the degree of changes in turbidity/TSS levels which may be caused by natural runoff events or manmade discharges are aquatic life and their habitats, municipal and domestic water supply, industrial water supply, and recreational/aesthetic uses. However there are no set absolute numerical turbidity or TSS objectives applicable to ambient water quality. Rather, all of the Basin Plans contain a narrative objective for TSS, generally requiring the suspended sediment load and suspended sediment discharge rate of surface waters to not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. All of the state's Basin Plans contain similar numerical turbidity objectives that limit the allowable increase over background levels. The Basin Plan for the Central Valley Region (which includes most of the Sierra Nevada gold mining region) contains the most specific turbidity objectives in the State, as follows:

- Where natural turbidity is less than 1 NTU, controllable factors shall not cause downstream turbidity to exceed 2 NTUs;
- Where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU;
- Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%;
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs; and
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.

Additionally, the Central Valley Region Basin Plan states: "In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected." Moreover, the Basin Plan provides for exceptions to the above limits for dredging operations that cause an increase in turbidity stating, "In those cases, an allowable zone of dilution within which turbidity in excess of the limits may be tolerated will be defined for the operation and prescribed in a discharge permit." The North Coast Region (which includes the Klamath-Trinity gold country) limits turbidity to no more than 20 percent above naturally occurring background levels and allows zones of dilution within which higher percentages can be tolerated for specific discharges. The turbidity objectives vary among the other Basin Plans, and not all regions include considerations for mixing zones and averaging periods.

Environmental Toxicology of Metals and Organic Compounds

Environmental toxicology is the study of environmental contaminants and the health risks to humans and wildlife (including fish and aquatic organisms) associated with various routes of exposure (e.g., ingestion, drinking water, and air). Several constituent groups are of known concern for toxicological risk to fisheries and human health in water bodies in California. These include mercury, other trace metals, and synthetic organic compounds. Mercury (Hg) is the constituent that poses the greatest toxicological risk to humans and fish and wildlife in areas where suction dredging activity might occur. Potential impacts of Hg and other heavy metals on fish and aquatic organisms are also discussed in Chapter 4.3 *Biological Resources*.

As noted in the Literature Review (Appendix D), suction dredging activities typically target the known gold-bearing streams and rivers of California where much of the historic mining activity took place after the California gold rush of 1849. Elemental (i.e., liquid) mercury was used extensively in gold mining processes and much of the mercury was discharged or wasted directly to streams and river channels, resulting in extensive areas of mercury enriched channel sediments and watershed-wide contamination with elemental mercury. Based on the Literature Review, mercury is the primary constituent of concern that occurs in aquatic sediments where suction dredging might occur under the Program. Mercury is a toxic constituent that bioaccumulates in the foodchain of aquatic organisms and terrestrial wildlife, and is ultimately a human health concern primarily through the consumption of Hg-contaminated fish. Methylmercury (MeHg) is a more bioavailable form of Hg that is produced from inorganic Hg by specific types of aquatic bacteria in rivers and reservoirs. This section briefly discusses available information regarding the extent of mercury contamination and related concerns pertaining to bioaccumulation in the food chain, which is the primary concern for Hg contamination in water bodies.

The major pathway for human and wildlife exposure to methylmercury (MeHg) is consumption of Hg-contaminated fish. Dietary MeHg is almost completely absorbed into the blood and is distributed to all tissues including the brain. In pregnant women, it also readily passes through the placenta to the fetus and fetal brain. MeHg is a highly toxic substance with a number of adverse health effects associated with its exposure in humans and animals. High-dose human exposure results in mental retardation, cerebral palsy, deafness, blindness, and dysarthria in utero and in sensory and motor impairment in adults. Although developmental neurotoxicity is currently considered the most sensitive health endpoint, data on cardiovascular and immunological effects are beginning to be reported and provide more evidence for toxicity from low-dose MeHg exposure (U.S. EPA, 2001). In birds and mammalian wildlife, high levels of MeHg can result in death, reduced reproduction, slower growth and development, and abnormal behavior (U.S. EPA, 2010).

Criteria and screening values have been developed for the protection of human health and fish-eating wildlife for Hg in fish tissue and unfiltered water-column 30-day Hg concentrations. A selection of the most relevant criteria is shown in Table 4.2-2.

Table 4.2-3 shows those water bodies in California for which the state Office of Environmental Health Hazard Assessment (OEHHA) fish tissue advisories have been issued for Hg in areas where the Hg contamination is associated with historic gold mining. Also shown are the species with the highest mean tissue concentration, what that concentration is, and the number of samples used to calculate the mean. Water bodies with Hg levels that are primarily a result of historic Hg mines or industrial sources (such as Clear Lake and San Francisco Bay area reservoirs) are not shown. All water bodies shown in the table are within the Central Valley Hydrologic Region (Region 5) or the North Coast Hydrologic Region (Region 1). However, some water bodies in the San Gabriel Mountains exhibit sufficient recent fish tissue Hg data to qualify for advisories, for example, Pyramid Lake, Lake Piru, Castaic Lake, and Lake Hansen within the South Coast Hydrologic Region (Davis et al., 2009).

Other Trace Metals and Organic Compounds

Other natural or human-generated contaminants such as trace metals or synthetic organic compounds (e.g., pesticides) may be present in the sediments where suction dredging activities typically occur. Other trace metals that may be present in California water bodies include, but are not limited to, arsenic, copper, silver, zinc, lead, chromium, nickel, antimony, cadmium, and selenium. Release of these metals is dependent on many factors, including levels present in sediment, which are variable from stream to stream and between reaches of a single stream. Little data is available to comprehensively characterize concentrations of these constituents in California rivers and streams.

TABLE 4.2-2. MERCURY CRITERIA IN FISH TISSUE AND WATER FOR PROTECTION OF HUMAN HEALTH AND WILDLIFE

Medium	Basis	Target Population	Criterion (mg/kg)	Reference Dose, µg/kg/d	Body Wt, kg	Consumption Rate, kg/day	Reference
Fish-tissue	Human Health	US General Population mean	0.3	0.1	70	0.0175	U.S. EPA, 2001
		California General Population mean	0.17	0.1	70	0.0305	U.S. EPA, 2001; Office of Environmental Health Hazard Assessment (OEHHA), 2001
		California 95th percentile	0.06	0.1	70	0.0852	USEPA, 2001; OEHHA, 2001
		California Sensitive Populations [Fish Contaminant Goal]	0.22	0.1	70	0.032	OEHHA, 2008
	Wildlife	Mammalian	0.1	18	*	*	U.S. EPA, 1995; Yeardley, 1998
		Avian	0.02	21	*	*	USEPA, 1995; Yeardley, 1998
Water (unfiltered)		Human	1.8 nanograms per liter (ng/L)				U.S. EPA, 1995
		Fish-eating Wildlife	1.3 ng/L				U.S. EPA, 1995

**=Mammalian criterion based on geometric mean of criteria for mink and river otter, whose body weights are 0.6 and 6.7 kilograms (kg), respectively, and consumption rates are 0.14 and 1.124 kg/day, respectively. Avian criterion based on geometric mean of criteria for Bald Eagle, Osprey, and Belted Kingfisher, whose body weights are 5.25, 1.75, and 0.15 kg, respectively, and whose consumption rates are 0.566, 0.350, and 0.068 kg, respectively.*

TABLE 4.2-3. WATER BODIES IN CALIFORNIA WHERE OEHHA CONSUMPTION ADVISORIES HAVE BEEN ISSUED FOR MERCURY IN ASSOCIATION WITH HISTORIC GOLD MINING

Water Body	Species with Highest Mean Tissue Concentration (n >= 6)	Highest Species Mean Tissue Concentration (mg/kg, wet weight)[1]	N [2]	Region
Lower Feather River	Striped Bass	1.27	6	5
Englebright Lake	Bass	0.45	56	5
Camp Far West Reservoir	Largemouth and Spotted Bass	0.85	38	5
Lake Combie	Largemouth Bass	0.9	19	5
Rollins Reservoir	Channel Catfish	0.36	13	5
Lower American River	Largemouth Bass	0.81	48	5
Lake Natoma	Channel Catfish	1.474	11	5
Lake Folsom	Spotted Bass	0.71	16	5
Cosumnes River	Crappie	1.38	11	5
Lower Mokelumne River	Pikeminnow	0.82	11	5
Lower Sacramento River and North Delta	Smallmouth Bass	0.86	13	5
Central and South Delta	Largemouth Bass	0.3	369	5
Trinity River Watershed	Largemouth Bass	0.55	24	1

[1] OEHHA fish tissue concentration thresholds for establishing fish consumption advisories vary from 0.06-0.22 milligrams per kilogram (mg/kg) depending on exposure routes and affected population of concern.

[2] N = number of samples of all fish species monitored and assessed.

Legacy chlorinated hydrocarbon pesticides (e.g., dieldrin, DDT, and chlordane) and PCBs can be transported to remote or high altitude waterways by atmospheric deposition. Legacy pesticides are rarely above public health thresholds in fish in upper watershed streams and lakes. PCBs have been found above threshold values in fish from lakes primarily in lowland areas of the state (Davis et al., 2009). PCB concentrations were uniformly below threshold values in fish from high elevation lakes of the Sierra Nevada and northern California mountains (Davis et al., 2009).

4.2.4 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to water quality may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;

- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

The water quality impacts analyzed in the 1994 EIR analyzed included impacts resulting from accidental spills, turbidity, and heavy metals. Findings for each of these issues were as follows:

Accidental Spills

The 1994 EIR found that effects on water quality as a result of accidental oil or gas spills from the engine component of the dredges are less-than-significant. Although the regulations do not specifically address water quality issues except as they relate to fish, the 1994 EIR notes that suction dredgers are required to comply with Fish and Game Code 5650 which prohibits the deposition of petroleum or other materials deleterious to fish and wildlife into state waters.

Turbidity

The 1994 EIR found that suction dredge mining would have a less-than-significant impact on water quality related to temporary increased turbidity levels caused by the resuspension of stream bed sediments.

Heavy Metals

The 1994 EIR found that suction dredge mining would have a less-than-significant impact on water quality as it relates to mercury present in streams. At the time of the 1994 Report, adverse effects related to mercury were cited as being those associated with re-release of mercury after capture in the dredging equipment. The report noted that Fish and Game Code 5650 addresses pollution of this nature.

In addition, the 1994 Report found that suction dredging would have a beneficial impact related to the capture and removal of lead from waterways, which would help to keep lead from entering the foodchain (i.e., primarily waterfowl).

Methodology

The following sections describe: (a) a summary of the Literature Review (see Appendix D) that provided the focus for this Water Quality and Toxicology assessment; (b) screening of potential constituents of concern to be assessed in detail; and, (c) the methodologies used to assess the effects of suction dredging activity that might occur through implementation of the Program.

Literature Review of Water Quality Effects of Suction Dredging

The major findings of the Literature Review (Appendix D) related to water quality and toxicology that were used, in part, to inform and direct the focus of the water quality impact assessments are as follows.

- There is little information available regarding the environmental effects of dredge site development such as site access, land-side encampments, and fuel/chemical spills. There remains a lack of any rigorous studies on this subject.
- All scientific studies to date suggest that the effects of suction dredging on turbidity and suspended sediment concentrations as it relates to water clarity are limited to the area immediately downstream of the dredging for the duration of active dredging.
- The effects of Hg contamination from historic activities in California are being extensively studied and there is substantial literature regarding Hg fate and transport. However, there are very few published studies specifically addressing the effects of suction dredging on Hg fate and transport processes. Since the time the Literature Review (Appendix D) was prepared, USGS scientists and Hg experts provided CDFG with preliminary results of their recent research in the Yuba River which is specifically focused on assessing the potential discharge of elemental Hg and Hg enriched suspended sediment from suction dredging activities. This new information and data from USGS was used in formulating the approach to this assessment of the Program. Ongoing studies are evaluating the relative magnitude of dredging-related effects on Hg discharges compared to other causes.
- The human and aquatic toxicity of Hg discharged from suction dredging operations has not been studied. Studies have shown that remobilized Hg can be converted to MeHg, which can bioaccumulate up the food chain, and is therefore of concern to biota and human health through fish and shellfish consumption. Mercury hotspots (i.e., places where large amounts of Hg are concentrated) are known to exist but there has been no concerted effort to locate them. Fine particles (<63 μm) in sediment in historic gold mining regions have been shown to contain at least an order of magnitude higher concentration of Hg than larger size fractions. The suspended particle size fractions that are enriched in Hg and discharged from suction dredges is under investigation by USGS in the Yuba River system described above. The reactivity and speciation of mercury-enriched sediment resuspended by dredging operations is also under investigation. The transport, reactivity, and speciation of "floured" Hg (i.e., microscopic-size particles of elemental Hg created by the physical agitation and fractionation of larger particles) has not been studied. Dissolved Hg, elemental Hg, and fine particle/colloid bound Hg may be of concern for methylation (i.e., conversion to methyl mercury, which is a bioavailable form that can result in toxic effects and bioaccumulation up the food chain) in the vicinity of dredge sites if conditions are favorable or transported long distances to downstream environments (e.g., reservoirs, wetlands) favorable to methylation. Therefore, potential impacts may occur both near and away from the actual dredging locations.

- There is very little information available on the potential operations-related effects of dredging to discharges of other constituents that might reasonably be present in sediment and discharged to the water when disturbed by suction dredging activity (e.g., trace metals, organic compounds, and nutrients) or otherwise be affected by physical changes in the environment (e.g., water temperature and dissolved oxygen concentrations). Other metals that may be discharged during suction dredging include arsenic, copper, silver, zinc, lead, chromium, nickel, antimony, cadmium, and selenium, but the distribution of metals on different particle sizes, transport of released metals, biotic uptake, etc., have not been studied. Similarly, there have been no studies undertaken to determine whether suction dredging releases legacy pesticides and, if so, what the fate, transport, and effects of the chemicals are downstream.

Screening of Constituents for Assessment Purposes

Results of the Literature Review as summarized above, and in detail in Appendix D, were used to determine constituents requiring further detailed assessment and whether the impact assessment for a given water quality constituent would be qualitative (e.g., contaminants from dredge site development and use, due to the lack of quantitative information available), semi-quantitative (e.g., Hg, due to the availability of some quantitative information), or fully quantitative. Furthermore, results of the Literature Review showed that Hg was the constituent for which the assessment would be most complex.

Constituents of Concern Raised in Public Review Comments

Comments were received that indicated a concern for the effects of suction dredging on water temperature and effects of blue-green algae on suction dredgers themselves. As previously noted, the literature review provided a primary basis of information for identifying constituents of concern to be addressed by the water quality impact assessment. However, no scientific literature was identified that indicated temperature or nuisance blue-green algae were constituents of concern for suction dredging activity. Because data are lacking with respect to the effects of dredging-related turbidity and suspended sediment on water temperature, the assessment relies on scientific principles, facts, assumptions based on facts, and professional judgment.

With respect to the effects of blue-green algae (i.e., cyanobacteria) on suction dredgers, the exposure of dredging operators to nuisance blue-green algae blooms would be a risk incurred by the operators. Many blue-green algal species, when present at high enough population levels (i.e., known as blooms) and in concert with other factors (e.g., warm weather and water temperatures, sufficient light and algal nutrients), have the potential to produce specific intercellular toxins which can cause a variety of health effects to humans and animals (SWRCB, 2008). The potential health effects can be associated with skin contact (e.g., rashes, eye irritation), ingestion (e.g., gastrointestinal illness, liver damage), or inhalation exposure routes. Blue-green blooms that reach levels where presence of cyanotoxin production could produce health effects are typically associated with calm or stagnant water conditions (e.g., lakes, ponds) and do not usually attain high population densities in highly flushed environments with retention times (i.e. the time it takes for the water volume to be exchanged once) of less than 5-10 days, or in the open channels of flowing rivers (SWRCB, 2008). The risks to dredging operators from potential exposure to blue-green algae blooms and cyanotoxins, which are a background condition that might occur where dredging is conducted, is not a responsibility of the state. Moreover, CDFG's adoption of dredging regulations under the Program would not in itself affect the allowable dredging activity such that exposure of operators to cyanotoxins would be higher than without the Program. In fact, the Program generally prohibits dredging activity in lakes and reservoirs without specific approval from CDFG and applicable RWQCB, and thus would limit potential exposure in these quiescent water bodies where blue-green algae blooms are more likely to occur. Therefore, because the Program would not adversely affect the exposure of operators to existing or potential future blue-green algae cyanotoxins, this issue is not addressed further in this assessment.

Assessment Methods for Effects of Dredge Site Development and Use

As noted in the Literature Review, there is very little new data available since the preparation of the 1994 EIR, and no substantial changes in the scientific understanding of the effects from development and operations of encampments used for suction dredging operations. Previous suction dredging activity in California permitted through CDFG's former permit system did not include formal record keeping, monitoring, or inspection protocols. Therefore, there is no specific information available regarding the distribution or location of dredging activities associated with the permits that were issued in previous years. There also is no available information maintained on any enforcement actions under the previous permit system. The Suction Dredger Survey conducted by CDFG as part of this EIR provides some level of information on the level of suction dredging activity, locations, frequency, and methods used in 2008. The representativeness of survey information used in the impact assessment was considered, as it is likely that there is no consistent and comprehensive information available. Due to the lack of specific and quantitative information, the assessment of effects from encampments on water quality is necessarily qualitative. The assessment of potential effects associated with encampment activities is qualitative and based on the Literature Review and knowledge of potential waste discharges, applicable existing regulations and terms and conditions of the Program that would serve to limit pollutant discharges, and considers dredging equipment features and practices that would be expected to influence the magnitude of potential adverse effects on water quality.

Assessment Methods for Effects of Dredging-Related Increases in Turbidity/TSS

As noted in the Literature Review, there is very little new dredging-specific data available since the preparation of the 1994 EIR, and no substantial changes in the scientific understanding of the effects of increased turbidity/TSS from suction dredging operations with respect to water clarity. The impact assessment is based on the location, frequency, duration, and size of discharge plumes, and characterization of turbidity/TSS levels within suction dredger plumes, that are anticipated to occur downstream of the dredging site based on the available literature. Prior literature studies regarding the effects of dredging activity on sediment disturbance and related effects to turbidity/TSS discharges have addressed a relatively wide range of environmental conditions. However, as the scope of any individual such study was typically project-specific, or addressed a limited set of variables (e.g., location, equipment, monitoring parameters), the available data likely does not address every possible combination of variables in which turbidity/TSS discharges may occur. Consequently, the assessment of effects of turbidity/TSS on beneficial uses necessarily involves qualitative analysis based on best professional judgment of the scientific evidence. The turbidity/TSS levels created by suction dredging activities were compared to regulatory objectives and to tolerances of fish and aquatic organisms, and other applicable thresholds considered protective of beneficial uses. Recreational activity (e.g., swimming, boating) and visual resources may be affected by water clarity and specific turbidity/TSS discharge conditions associated with suction dredging. The "Aesthetics" and "Recreation" chapters have additional information regarding the potential effects that suction dredging activity may have on these resources. In assessing the potential effects and magnitude of turbidity/TSS caused by dredging activities, the dispersion and attenuation of the dredging plume that occurs downstream of dredging was considered.

Assessment Methods for Effects of Dredging-Related Mercury Discharges

A methodology was developed to address whether suction dredging causes water quality conditions that would exceed thresholds of significance. A conceptual model, described below, was developed to examine the discharge, transport, transformation and bioaccumulation of Hg in aquatic organisms from suction dredging and background watershed sources and the potential for environmental effects of Hg resuspension and discharge from suction dredging operations. Potential toxicological risks of Hg to higher trophic levels in the wildlife food chain are also discussed in Chapter 4.3 *Biological Resources*.

Geographic Assessment

Where high sediment Hg levels and suction dredging occur in the same areas, the resuspension of sediment-associated Hg may have the potential to increase the bioaccumulation of Hg in wildlife (including fish and aquatic organisms), and thereby result in increased human health risks to people and wildlife that eat these organisms. Suction dredgers were not required to report their dredging locations under CDFG's previous suction dredging permit system, so it is not possible to document exactly where in the state suction dredging occurred and how frequently it occurred at various locations. CDFG's Suction Dredger Survey of 2008 permit holders indicates that most dredging activity occurred in the central Sierra Nevada Mountain counties, with lesser amounts in the known gold-bearing areas of Shasta and Trinity counties and several southern California counties. Given that gold still occurs in watersheds in historic gold mining areas, the spatial distribution of historic gold mining districts and mines themselves can be used to identify watersheds where suction dredging would resume upon implementation of the Program. Moreover, Hg was used in large quantities at historic gold mines and was discharged with mine waste (hydraulic mining debris, mill tailings, and dredge spoils from dragline and bucket-line dredging) into nearby watersheds. Consequently, suspended sediment enriched in Hg and elemental Hg can be found in these watersheds. A number of TMDLs have been developed or are being developed in California for mercury. Of most relevance to suction dredging are the American River Mercury TMDL (in development), Sacramento-San Joaquin Delta Methylmercury TMDL (in development), and San Francisco Bay Mercury TMDL (adopted). Because watersheds draining into these areas also contain gold and gold bound with Hg, they are targeted by suction dredgers.

Three regions where the assessment focused are based on anecdotal evidence of where suction dredging occurs and where gold has been historically located. These are the Sierra Nevada, the Klamath-Trinity Mountains, and the San Gabriel Mountains (Figure 4.2-2). Researchers from USGS have collected sediment Hg data in the Trinity River system, but at

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Horizon WATER and ENVIRONMENT

Figure 4.2-2
Locations of Past-Producing Gold and Mercury Mines in California

the time of this writing, these data were not available for analysis. Little data exists in the rest of the Klamath-Trinity and San Gabriel mountains. For the purposes of the detailed quantitative assessment, the focus will be on the Sierra Nevada, and the South Yuba River will be used as a representative of Sierra Nevada streams and rivers due to the relatively large number of studies and amount of data available for this river. Assessments were accomplished for the following locations: 1) in-stream, 2) Englebright Lake, the first reservoir downstream, and 3) the San Francisco-San Joaquin River Delta. There are several reasons why such an assessment provides a good surrogate for all Sierra Nevada streams. Most Sierra Nevada streams possess similar geology, experience similar climate and rainfall, were located near extensive gold-mining operations, have at least one reservoir before joining the Sacramento or San Joaquin Rivers (with the exception of the Cosumnes River), and eventually drain into the Delta. The South Yuba River watershed experienced the most intensive level of hydraulic mining, in which mercury-contaminated hydraulic mining debris was produced and discharged into the watershed. When normalized by watershed area, it still received the greatest volume of hydraulic mining sediment production, but was only slightly above its smaller neighbors Deer Creek, the Bear River, and the similarly sized North Fork of the American River (James, 1999). Methodology for translating results of the assessment to other water-bodies and geographical regions is discussed in the section "*Geographic Translation*."

Conceptual Model and Quantitative Assessment Approach

The assessment of suction dredging-related effects on the potential for Hg discharge, transport, and contribution to fish uptake and bioaccumulation involved conducting quantitative discharge, transport, and fate calculations based primarily on recent field sediment and special study data collected by the USGS. A conceptual model was developed to frame the assessment. The model consists of four elements: 1) discharge of Hg to the stream from suction dredging; 2) discharge of Hg from background watershed sources; 3) transport of discharged Hg; and, 4) transformation/bioaccumulation of Hg. The elements of the conceptual model are shown in Figure 4.2-3. The elements of the model do not necessarily occur sequentially or at the same time. Transformation and bioaccumulation can occur simultaneously with transport and discharge. The specific assessment approach for each element is detailed in the impact assessment discussion.

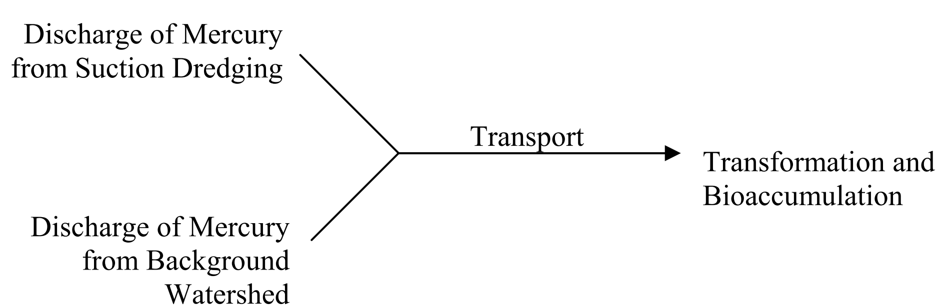


FIGURE 4.2-3. CONCEPTUAL MODEL FOR THE MERCURY IMPACT ASSESSMENT

Briefly, discharge of Hg from suction dredging was based primarily on field characterization of Hg contaminated sediments (Fleck et al., 2011). Background watershed Hg loading estimates were utilized to compare to suction dredge discharge estimates (Alpers et al., in prep). Transport of Hg associated with sediments was based on particle size distribution characterization of suspended sediments (Curtis et al., 2006) and assessment of net deposition in Englebright Lake (Alpers et al., in prep; Alpers et al., 2006). Transformation and bioaccumulation characteristics were derived from a variety of literature sources. Additional information characterizing potential impacts of elemental Hg was also used in the assessment.

Other Trace Metals

As noted in the Literature Review (Appendix D), there are very little data regarding the effects of suction dredging on trace metals mobilization. Due to the limited quantitative information, the water quality impact assessment for trace metals is largely qualitative and based on the anticipated level and nature of dredging activity that is projected to occur. Results of the Literature Review were used to characterize existing measurements of trace metals in suction dredge plumes. Measured sediment concentrations of arsenic, copper, silver, zinc, lead, chromium, nickel, and cadmium were combined with different TSS levels to characterize the potential to increase receiving water metals concentrations above aquatic life criteria. The frequency, magnitude, and size of discharge plumes were assessed relative to dilution and near field settling.

Organic Chemicals

As noted in the Literature Review (Appendix D), there is very little data regarding the effects of suction dredging on synthetic organic compounds mobilization. Moreover, there is no comprehensive information regarding presence of organic compounds in aquatic sediments in the areas of California where suction dredging is likely to occur. Unlike Hg or any other metals present as a result of natural ore, there is little reason to suspect that significant numbers of hot-spots exist containing synthetic organic compounds, or that their magnitude relative to average background levels is very great. Due to the lack of specific and quantitative information, the water quality impact assessment for organic compounds is necessarily qualitative to characterize the potential to cause receiving water concentrations to exceed applicable criteria.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would:

- Increase levels of any priority pollutant or other regulated water quality parameter in a water body such that the water body would be expected to exceed state or federal numeric or narrative water quality criteria, or other relevant effect thresholds identified for this assessment, by frequency, magnitude, and geographic extent that would result in adverse effects on one or more beneficial uses.
- Result in substantial, long-term degradation of existing water quality that would cause substantial adverse effects to one or more beneficial uses of a water body.

- Increase levels of any bioaccumulative pollutant in a water body by frequency and magnitude such that body burdens in populations of aquatic organisms would be expected to measurably increase, thereby substantially increasing the health risks to wildlife (including fish) or humans consuming these organisms.

4.2.5 Environmental Impacts

Impact WQ-1. Effects of Contaminant Discharges from Dredge Site Development and Use (Less than Significant)

Persons conducting suction dredging may develop encampments near the locations where they are mining for short to extended periods of time. Development of camps on undeveloped lands, certain camping activities, and mining activities that occur within the camps have the potential to result in the additional discharges of wastes to water bodies, relative to baseline conditions. Encampment activities considered to have the potential to cause adverse water quality effects include development of access roads/trails, campsite development, and travel to and from the site. Development of new campsites at previously undisturbed locations, or establishing undeveloped campsites each year on private or public lands, may include disturbance or clearing of native vegetation and soils that could result in additional runoff and soil erosion during rain events, thus contributing to turbidity and suspended solids levels in surface water bodies. Miscellaneous camping activities include cooking, cleaning, pets, sanitary practices, and garbage disposal that, if not properly managed or occurring too close to water, can result in direct discharges of wastes into water bodies. Contaminants associated with these miscellaneous activities include organic matter, pathogens from fecal wastes, oil and grease, or synthetic chemicals in cleaning products. Activities related to mining include ore processing with chemicals such as nitric acid and general equipment maintenance, fuel storage, and fueling operations. Accidental spills of fuel or chemicals pose the greatest risk of contaminant discharges to the soil and water bodies. The most likely contaminants that could enter water bodies from different waste discharges associated with dredger encampments include sediment from land disturbances, decomposable organic matter, trash, inorganic chemicals [e.g., salts, nitrogen, and phosphorus], or pathogens, which are all generally non-toxic and are not bioaccumulative in organisms. Wastes in accidental spills may include oils, solvents, or other household products which may contain priority pollutants regulated under CTR criteria such as trace metals (e.g., copper, zinc) or synthetic organic compounds, which are capable of causing toxic effects. In general, the beneficial uses of water most likely to be affected by the contaminants potentially discharged by camping activities are aquatic life from the potential toxicity posed by compounds, and contact recreation and drinking water from contaminants that cause adverse human health problems when ingested (e.g., pathogens).

In general, it is anticipated that the types of encampment activities used by dredgers would depend on the presence of nearby facilities (e.g., restrooms, showers), environmental conditions, personal requirements, access, and expected duration of stay. Larger public park areas and private mining clubs often offer campgrounds and lodging facilities. Mining clubs also may try to limit the quantity of fuels brought in to campsites and recommend clearing of trash prior to departure. The more heavily used camping areas typically also provide chemical toilets and basic shower facilities. And, in addition to RV's and campers equipped with restroom facilities, personal port-a-potties and storage tanks are commonly used by those who do not have easy access to existing facilities. Camping activities in developed private or public campgrounds are considered to provide sufficient features such as waste disposal and sanitary sewage systems that water resources would generally be protected from contamination by wastes.

CDFG does not monitor or record the type or amount of camping activities of those that have obtained dredging permits in the past. The results of the Suction Dredger Survey conducted by CDFG for this EIR included questions requesting information on the locations of dredging activity, types and amount of camping activities, and amount of off-road vehicle travel that occurred in the 2008 dredging season, which may provide some indication of the typical level of remote camping activity that occurs relative to the amount that occurs in developed areas or not involving camping activities. The Suction Dredger Survey results of in-state permit holders indicate that camping was the preferred option when dredging involved an overnight stay with stays at hotels/motels or with friends/family being much less frequent. Approximately 54% of the in-state permit holders reported camping in undeveloped campgrounds at least once, and 44% used developed campsites at least once. Compared to resident permit holders, a higher percentage of out-of-state permit holders stay overnight when dredging but the percentage of use for undeveloped campsites (54%) and developed campsite use (51%) is similar to resident permit holders. In general, although not fully quantified, the survey data indicate that the number of new encampments in previously undeveloped areas each year by recreational dredging activities is likely to be small. This is because suction dredgers reoccupy campsites in undeveloped area, and use developed facilities or self-contained recreational vehicles when possible. Encampments at undeveloped sites are also likely to be relatively dispersed.

No studies were found that evaluated problematic waste discharges at campsites used by suction dredgers. However, Department wardens have observed camps strewn with household garbage, industrial waste, large gas barrels, dilapidated vehicles, and human waste in the past (CDFG, 1994; Sierra Fund, 1999).

The Program itself does not address encampments, since such encampments are outside of the statutory authority granted to CDFG under Fish and Game Code Section 5653. However, existing federal land use regulations of the USFS and BLM regarding waste disposal and road construction methods exist to prevent erosion and drainage problems. Fish and Game Code sections 5650-5652 prohibit the discharge of petroleum products and (any substance or material deleterious to fish, plant life, mammals, or birds) and trash to waters of the state. Similar requirements generally apply to camping activities on other public or private lands. In addition, tips on keeping sanitary camps and guidance on proper waste control and disposal will be included in the “Best Management Practices” pamphlet, described in Chapter 2. Thus, existing federal, state and local regulations provide enforceable conditions for which CDFG and other local, state, or federal law enforcement officers can act to stop activities that may result in waste discharges from encampments.

Suction dredging encampments have the potential to result in waste discharges not occurring under the existing conditions. However, based on the limited amount of information available, suction dredging encampments are not anticipated to cause substantial erosion, runoff, or discharges of wastes and contaminants.. In particular, undeveloped encampment activities for dredging are typically dispersed and along streams in primarily rural areas of the state, and conducted on a seasonal and temporary basis.

Thus, implementation of the Program would not be anticipated to result in contaminant discharges that would be of sufficient magnitude, frequency, or geographic extent to adversely affect beneficial uses. Additionally, because of the seasonal, temporary, and intermittent character of most dredging activity, any water quality degradation that may occur is expected to be infrequent and dispersed and thus would not cause substantial or long-term degradation of water quality. Finally, development and use of encampments for suction dredging activities could result in the discharge of bioaccumulative constituents but the levels or frequencies would be too small to increase body burdens in aquatic organisms, or increase the health risks to wildlife (including fish and aquatic organisms) or humans consuming these organisms. Therefore, this impact is considered to be less than significant.

Impact WQ-2: Effects of Contaminant Discharges of Oil or Gasoline Used in Suction Dredges (Less than Significant)

Suction dredging operations subject to the Program are generally powered with a dredge-mounted gasoline engine. The size of motors used for dredging machines typically ranges from about 2 to 50 horsepower, depending on the nozzle size, which controls the rate and volume of sediment that can be moved in a period of time. Depending on the duration of dredging activity during a day, engines must be refueled and engine oil may need to be added or changed. Refueling and servicing of dredge motors, if not conducted responsibly, has the potential to result in accidental spills and discharges of fuel and oil to water or soil, where it may remain to be transported offsite by rainfall and runoff, or directly into water bodies. Additionally, engine refueling is often done with the dredge at the dredging location, and dredge engines are not generally fitted with spill-catching equipment.

In general, the beneficial uses of water most likely to be affected by discharges of petroleum-based products are aquatic life and drinking water. Petroleum-based products contain numerous hydrocarbon compounds known to be toxic to aquatic life, and in particular the class of compounds identified as polycyclic aromatic hydrocarbons (PAHs) which can be toxic at low concentrations. Oil products discharged to water also can create thin sheens on the water surface which can restrict the passage of gases between the atmosphere and water (e.g., dissolved oxygen [DO], carbon dioxide), thereby potentially resulting in lower DO levels available to aquatic organisms. Oils also can foul stream bank sediments thereby adversely affecting the habitat of aquatic insects. Petroleum-based contaminants can also impart undesirable tastes and odors in drinking water supplies, negatively affect recreational/aesthetic uses, and pose health risks to humans if present in drinking water supplies for extended periods of time.

As noted above, CDFG does not have records of inspection or enforcement activities regarding the activities of past suction dredger permit holders. While many suction dredgers likely adhere to basic rules of responsible behavior, there have been observations by Department wardens of unkempt encampments containing gas barrels and dilapidated vehicles (CDFG, 1994; Sierra Fund, 2009). This could indicate that there may be incidences of petroleum-based product discharges and runoff from campsite activities. To address the encampment issue, the proposed Program's requirements and guidance for encampments will be provided in the "Best Management Practices" pamphlet. Additionally, the amount of fuel and oil spilled each year into surface water caused by recreational dredging activities would be anticipated to be relatively small based on the size of dredging motors, total number of dredges anticipated to operate under the Program, and low probability that any individual dredger would cause substantial fuel or oil spills while refueling.

The regulations under the Proposed Program include the requirement to take appropriate precautions for fuel storage and dredge refueling operations, which are expected to limit the risk of accidental spills and discharges of contaminants to water bodies. Additionally, existing Fish and Game Section 5650 regulations restrict the allowable fuel handling procedures. CDFG will also provide guidance to permit holders related to appropriate spill control and response measures in the event of fuel or oil spills, or if leaks are detected. Such guidance will be incorporated into the "Best Management Practices" document. Thus, the Program and existing state regulations provide enforceable conditions for which CDFG and other local, state, or federal law enforcement officers can act to stop activities that may result in fuel/oil spills or discharges or that are inconsistent with the Program.

Based on this assessment, the Program would result in limited potential for substantial discharges of petroleum-based products. Based on the dispersed and temporary character of dredging activities, and restrictions under the Program included for the purpose of limiting accidental spills of petroleum products, it is anticipated that the potential for substantial quantities or frequent discharges of contaminants to water bodies would be limited. Thus, implementation of the Program would not be anticipated to result in contaminant discharges that would be of sufficient magnitude, frequency, and geographic extent to adversely affect beneficial uses. Because dredging activities are largely conducted on a seasonal, temporary, and intermittent basis in California, any near-term water quality degradation that may occur is expected to be dispersed.. Finally, while potential discharges of petroleum products in associated with dredging activities could result in the discharge of bioaccumulative constituents, the levels or frequency would be too small to measurably increase body burdens in aquatic organisms, or increase the health risks to wildlife (including fish and aquatic organisms) or humans consuming these organisms. Therefore, this impact is considered to be less than significant.

Impact WQ-3. Effects of Turbidity/TSS Discharges from Suction Dredging (Less than Significant)

Resuspension of coarse and fine sediments into the water column by suction dredging activity is a function of several factors, which primarily include: (a) sediment substrate characteristics; (b) dredge motor horsepower and capacity for intake of material, which is dictated by the diameter of the intake nozzle and hose; (c) specific methods, rate of dredging, and skill of the dredge operator; and, (d) river conditions and streamflow characteristics (i.e., depth, velocity, and hydraulic factors). Sediment resuspension from suction dredging activity can increase water turbidity and TSS levels immediately downstream of the dredging site (i.e., near-field effects) and increase the transport of fine, colloidal material extended distances downstream (i.e., far-field effects) or otherwise contribute to additional sediment transport via exposure of deposited dredge material to later transport by higher-energy streamflow events than were present at the time the dredge material was deposited.

As determined in the Literature Review (Appendix D), the available scientific studies of suction dredging suggest that the effects on turbidity and suspended sediment concentrations on aspects of water clarity and physical effects to aquatic organisms are limited to the area immediately downstream of the dredging for the duration of active dredging. It should be noted that the far-field transport of finer suspended sediment for greater distances downstream of dredging activity is generally considered to be a small fraction of the mass of material disturbed in the near-field dredging plume, and is not associated with visible water clarity or physical effects to organisms. However, it also should be noted that the finer suspended sediment transported long distances downstream may provide a disproportionally higher amount of surface area and binding sites for other water quality contaminants (e.g., mercury, organic compounds) that also are important to beneficial uses. The effects of far-field transport of other contaminants associated with suspended sediment is addressed further below in the impact assessments for mercury, metals, and organic compounds.

Generally, suction dredging causes turbidities of between 15 and 50 NTUs immediately downstream of the operation, with background levels returning between 50 and 160 meters downstream, and in some cases in as short as 11 meters (Harvey, 1986; Somer and Hassler, 1992; Thomas, 1985; Griffith and Andrews, 1981; Stern, 1988; Prussian et al., 1999). Among the available studies, the maximum reported TSS concentrations were up to 300-340 milligrams per liter (mg/L) immediately downstream of the dredge, decreasing to background levels within 160 meters (Thomas, 1985). Turbidity and suspended sediment levels were measured at 2 to 3 times higher than background levels at 50 meters downstream from dredging operations (Stern, 1988). Studies of large suction dredges (i.e., 8-10 inch) in Alaska indicated that turbidity plumes could be detected up to 320 meters downstream (Prussian, et. al., 1999). In one case, a turbidity plume was said to extend “well over a mile,” but turbidity levels from this plume were “within limits” (USFS, 1996). The extent of the turbidity plume is influenced by the composition of the streambed; dredging in streams with higher proportions of fine materials will generate a more extensive turbidity plume (Harvey et al., 1982; Harvey, 1986). Also, observations of large dredges and many dredges in a water course suggest that turbidity increases can be large.

The assessment of potential effects of dredging-related disturbance on in-water concentrations of turbidity/TSS is based on the results of previous studies described above and on the known rate and intensity of the activities that would be anticipated to occur in California under the Program. Based on historical experience under CDFG’s previous suction dredging regulations, dredging activity generally occurs only during the warmer, non-winter months. Dredging activity also is widely dispersed across the gold-bearing regions and streams in the state. CDFG’s 1993 survey of the dredger community found that in-water suction dredging effort on the part of dredge operators averaged about 5 hours per day and 225 hours per year. Based on CDFG’s recent survey of the recreational dredging community, the rates of participation and time spent conducting dredging is similar to historical survey results at approximately 5.4 hours of dredging per day, with in-state and out-of-state permit holders averaging 169 hours and 181 hours per year, respectively.

The beneficial uses considered to potentially be most sensitive to the increased water column concentrations of turbidity/TSS associated with recreational suction dredging activity are aquatic organisms, drinking water supplies, and recreational resources. Drinking water supplies can be adversely affected by turbidity/TSS levels if aesthetic appeal of the water supply is substantially reduced or additional treatment is required. However, based on the limited duration of dredging activity on an annual basis, dispersal of dredging operators over a large geographic area, limited size of the mixing zone and magnitude of turbidity/TSS levels resulting from suction dredging activity, the turbidity/TSS resuspension associated with suction dredging would not be expected to adversely affect domestic or municipal drinking water supplies, recreational uses, or other non-aquatic life uses. As noted above, while available studies of suction dredging activity may not represent every possible combination of variables that may lead to creation of substantial turbidity/TSS plume conditions, the potential for adverse conditions would be anticipated to be the exception rather than commonplace. In particular, the exposure of water supply diversions to dredging-related disturbance would be anticipated to be low in rural and remote locations (i.e., potential for turbidity plumes to directly affect diversions would be unlikely). Moreover, domestic and municipal drinking water intakes are typically designed and constructed to remove, or accommodate fluctuations in turbidity/TSS changes, and small changes caused by dredging would be unlikely to result in any measurable change in water supply operations or need for additional treatment. Recreation beneficial uses potentially could be affected by dredging-related turbidity/TSS plumes if physical interference or aesthetic qualities were to be substantial enough to cause nuisance conditions. A nuisance water quality condition, as it relates to compliance with water quality standards specified in the Basin Plans for the state, is defined for a waste discharge activity under the Porter-Cologne as an effect that meets all of the following requirements:

(1) injurious to health, or indecent or offensive to the senses, or interfering with the comfortable enjoyment of life or property;

(2) affects and entire community or neighborhood, or any considerable number of persons.

Based on the typical characteristics of dredging activity (i.e., seasonal activity, dispersed) and potential effects associated with dredging-related turbidity plumes (i.e., relatively low magnitude concentrations and limited extent of downstream plumes), a single dredge would not be expected to preclude or have significant adverse effects on recreational uses or result in community-wide or offensive changes that rise to the level of nuisance conditions. As noted above, additional information regarding the effects of turbidity/TSS plumes from recreational dredging are discussed in Chapter 4.6 *Aesthetics* (Impact AES-2), and in Chapter 4.8 *Recreation* (Impact REC-1), with both analyses supporting the conclusion herein that turbidity/TSS plumes would not substantially adversely affect aesthetic and recreational resources. Consequently, the remainder of this impact assessment is focused on the potential turbidity/TSS effects of suction dredging to fisheries and aquatic resources and beneficial uses.

Comments received on the NOP for this EIR identified a concern for the potential effects of turbidity produced by suction dredging activity on water temperatures. Available information indicates that high levels of turbidity can affect shallow water temperatures in calm water bodies (e.g., lakes, reservoirs, and ponds) (Wetzel, 1983; Reed et. al., 1983). However, the large majority of heat input to a water body is a result of absorption of infrared wavelengths in the light spectrum, which occurs in a very shallow portion of the water column (i.e., less than about 1 meter) and is not affected to a large degree by differences in particulate matter content (Wetzel, 1983). Based on the relatively small area of sediment resuspension caused by dredging, transitory nature of turbidity plumes downstream of dredging through settling, dilution and dispersion, and the fact that turbidity does not result in a major contribution to the heat input to water, it is anticipated that suction dredging activity under the Program would have negligible, if even measurable, effects on water temperature. Thus, the potential temperature effects would not exceed applicable Basin Plan temperature objectives which limit the allowable increase from controllable factors to less than 5 °F above background conditions.

Fish (and benthic macroinvertebrates) are generally not directly affected by suspended solids and turbidity, unless they reach relatively high levels. Suspended solids, particularly when at high levels, directly affect fish and macroinvertebrates through physiological effects, whereas turbidity generally has indirect effects via water clarity, primary production, food availability, and risk of predation. Numerous scientific studies conducted over the past 50–60 years indicate that there is no sharply defined concentration of turbidity or TSS above which aquatic communities are harmed. Rather, the magnitude and type of effects on aquatic life are species-specific and determined by concentration and type of suspended solids and turbidity, as well as the duration of exposure.

Numerous studies have been conducted over the years on the acute lethality of suspended solids to fish and macroinvertebrates over short (acute) exposure periods and elevated turbidity/TSS levels. Griffin (1938) stated that Pacific salmon and trout fingerlings lived for 3-4 weeks at suspended solids levels of 300-750 mg/L with short daily increases to 2,300-6,500 mg/L caused by stirring up sediments. A study published in 1951 investigated the direct short-term effects of suspended montmorillonite clay on 14 species of warmwater fishes which demonstrated that the tolerance of various fish species can differ widely, as described below (data presented in McKee and Wolf [1963]). In this study, suspended solids levels were increased for a short time each day by stirring the sediment. The lowest concentration of suspended solids for which mortality was observed was with pumpkinseed sunfish exposed to 16,500 mg/L daily for an average of 13 days. Rock bass was the species for which the lowest reported suspended solids level (38,250 mg/L) consistently caused mortality due to daily exposures of less than one week. Some level of mortality was observed for all species tested when exposed daily to 100,000 to 175,000 mg/L suspensions over a 1- to 2-week period. At suspended solids levels causing mortality, the opercular cavities of test fish were matted with clay, and the gills were covered with a layer of clay. Harmful non-lethal effects were first observed when suspended solids levels approached 20,000 mg/L. Smith, Kramer, and McLeod (1965) found that walleye experienced mortality within 72 hours of exposure to 100 mg/L of various wood pulps, but that 20,000 mg/L did not kill fathead minnows exposed for 96 hours. Lethal concentrations of suspended sediment are probably not produced by suction dredging because suction dredging activities do not produce lethal levels of TSS and because fish can usually avoid the dredging plumes (Bernell et al., 2003; Harvey, 1986). Thomas (1985) and Harvey (1986) indicate that in some streams where dredges operate at low density, suspended sediment is not a significant concern because effects are moderate, highly localized, and readily avoided by mobile organisms.

When the levels of suspended solids (and thus turbidity) become extremely high, they can adversely impact fish and macroinvertebrates by making it difficult for sight feeders to locate prey, causing abrasive injuries, clogging gills and respiratory passages, and/or by blanketing the streambed, thereby killing incubating fish eggs/larvae and benthic macroinvertebrates (McKee and Wolf, 1963; EIFAC, 1965; NAS, 1972; Alabaster and Lloyd, 1980). Decreased visibility in waters having moderately high turbidities can benefit the early life stages of fish and other prey organisms by providing visual protection from predators. Feeding by sculpin in laboratory channels was not detectably affected by suspended sediment levels of 1,250 mg/L (Brusven and Rose, 1981). Hassler et al. (1986) found that sculpin were not significantly impaired by increased turbidity from dredges, and turbidity does not appear to affect feeding abilities of many species. Moreover, fish can avoid plumes with high concentrations. Additionally, any reduction in feeding efficiency of fish may be offset by reduced risk of predation.

Based on the available scientific literature, suction dredging activities conducted by operators permitted under the Program have the potential to cause localized, temporary, and intermittent instream resuspension of sediments, resulting in plumes containing elevated levels of turbidity and TSS (e.g., up to 300-340 mg/L) that would extend relatively short distances downstream from the dredging sites. The turbidity plumes created by suction dredging likely may exceed the applicable Basin Plan objectives, particularly in streams that have low background turbidity levels. Nevertheless, the available literature indicates that turbidity and TSS concentrations within suction dredging plumes are unlikely to exceed 50 NTUs and 340 mg/L, respectively, and are, therefore, not expected to approach or exceed the levels discussed above that would cause lethal or other adverse physiological effects to fisheries or other aquatic resources. Moreover, these potential highest dredging-caused turbidity/TSS levels would be expected to rapidly return to near background levels downstream within a few hundred meters or less of the dredge operation. Thus, while potentially exceeding a Basin Plan turbidity objective within temporary plumes created during dredging operations, suction dredging activity permitted under the Program is not expected to adversely affect aquatic organisms, which is the most sensitive beneficial use that could be affected by elevated turbidity/TSS levels.

The Program includes additional prohibitions that will largely avoid and limit the potential disturbance of fine sediments that can result in higher levels of turbidity and TSS. Prohibited activities include mechanized winching, highbanking, removal of vegetation, dredging outside of the wetted channel, and diversion of flows. Additionally, the proposed regulations require dredgers to take reasonable care to avoid dredging silt and clay materials. Thus, the Program would provide enforceable conditions by which CDFG and other local, state, or federal law enforcement officers can act to stop activities that may result in turbidity/TSS conditions that are inconsistent with the Program. It should be noted that dredging related discharges of turbidity/TSS, as an activity that has the ability to exceed numerical and narrative regulatory water quality objectives established in Basin Plans, may additionally be regulated by separate permitting authority of the RWQCBs pursuant to the CWA and Porter-Cologne. While no such permitting processes have been established by the RWQCBs for the Program discharges or for CDFG's previously authorized suction dredging program, such authority, if exercised, would have the potential to provide additional assurance that sufficient regulatory controls exist to prevent adverse effects to beneficial uses. At their discretion, individual RWQCBs or the SWRCB could develop a complementary permitting program for suction dredging activity to further address compliance with water quality regulations.

Based on this assessment, suction dredging activities anticipated to be conducted under the Program are not expected to result in substantial discharges of turbidity/TSS. Thus, implementation of the Program would not be anticipated to result in turbidity/TSS discharges that would be of sufficient magnitude, frequency, and geographic extent to adversely affect beneficial uses. Requirements of the Program are designed to prohibit and/or limit specific channel disturbance activities and thus, limit the potential for excessively high turbidity/TSS levels from dredging activities. Because dredging activities are largely conducted on a seasonal, temporary, and intermittent basis in California, water quality degradation is expected to be infrequent and dispersed and thus not cause substantial, long-term degradation of water quality. Turbidity and TSS are not bioaccumulative constituents and thus are not a concern for uptake in the food chain or health risk to wildlife or humans. Therefore, this impact is considered to be less than significant.

Impact WQ-4. Effects of Mercury Resuspension and Discharge from Suction Dredging (Significant and Unavoidable)

The following sections describe the results of the assessment of Hg discharge, transport, transformation and bioaccumulation projected to occur through the implementation of the Proposed Program. The assessment follows the conceptual model elements presented previously in Figure 4.2-3, which include: (1) the discharge of Hg from suction dredging which are usually seasonally out of phase with background Hg releases; (2) discharge of Hg from background watershed sources; (3) transport; and (4) transformation and bioaccumulation.

Discharge of Mercury from Suction Dredging

Characterization of Sediment Available to Discharge from Suction Dredging

Recent field and laboratory studies were conducted by the USGS near the confluence of Humbug Creek and the South Yuba River. The objectives of the studies were to: 1) characterize Hg concentration and speciation in sediment of various size fractions (Lab), 2) characterize Hg and MeHg concentrations in local biota (field), and 3) assess the practicality and potential impacts of using suction dredging for removing Hg from an area contaminated with Hg (field). The laboratory study determined levels of total Hg (THg) and reactive mercury ($Hg(II)_R$) in sediments collected from a mid channel bar (Pit #1), and bank sediments collected near the confluence of the South Yuba River and Humbug Creek (Pit #2). The Pit #2 location was chosen by an experienced dredger as a promising location for gold. Humbug Creek was used as a conduit for hydraulic mining debris from Malakoff Diggins and hydraulic mining debris continues to slough into the river from bench deposits at the confluence. Figure 4.2-4 shows the particle size distribution of the sediment from the two sites. Figure 4.2-5 shows the concentration of THg associated with different size fractions that could be mobilized by suction dredging. Figure 4.2-6 shows total mass of THg found in bulk sediment by particle size. Particles with diameter of < 63 micrometers (μm) are classified as silt and clay, those with diameter between 63 μm and 2 millimeters (mm) are classified as sand, and those greater than 2 mm as gravel, pebble, cobble, or boulder.

The figures indicate that Pit #2 Bedrock Contact (Pit #2:BC) has a higher percentage of fine particles and higher concentrations of mercury associated with each size fraction. Fine particles contained more mercury on a per-mass basis than coarser particles. In the bulk sediment, Pit #2:BC contains 2-3 orders of magnitude more mercury mass with each size fraction. It should also be noted that Pit #2:BC contained elevated levels of $Hg(II)_R$, which will be discussed in more detail later. Levels from the bedrock contact layer of Pit #2 (Pit #2:BC) are assumed to be worst-case from a mercury release standpoint because they are from a location known to be contaminated with historic gold-mining Hg and because they are among the highest levels measured in California.

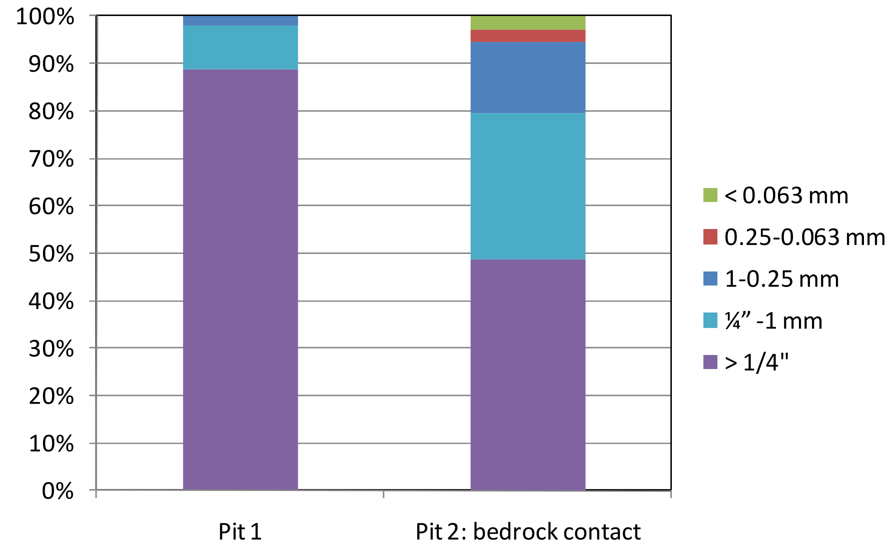


FIGURE 4.2-4. PARTICLE SIZE DISTRIBUTION OF SEDIMENTS COLLECTED IN THE SOUTH YUBA RIVER

(based on measurements in Fleck et al., 2011)

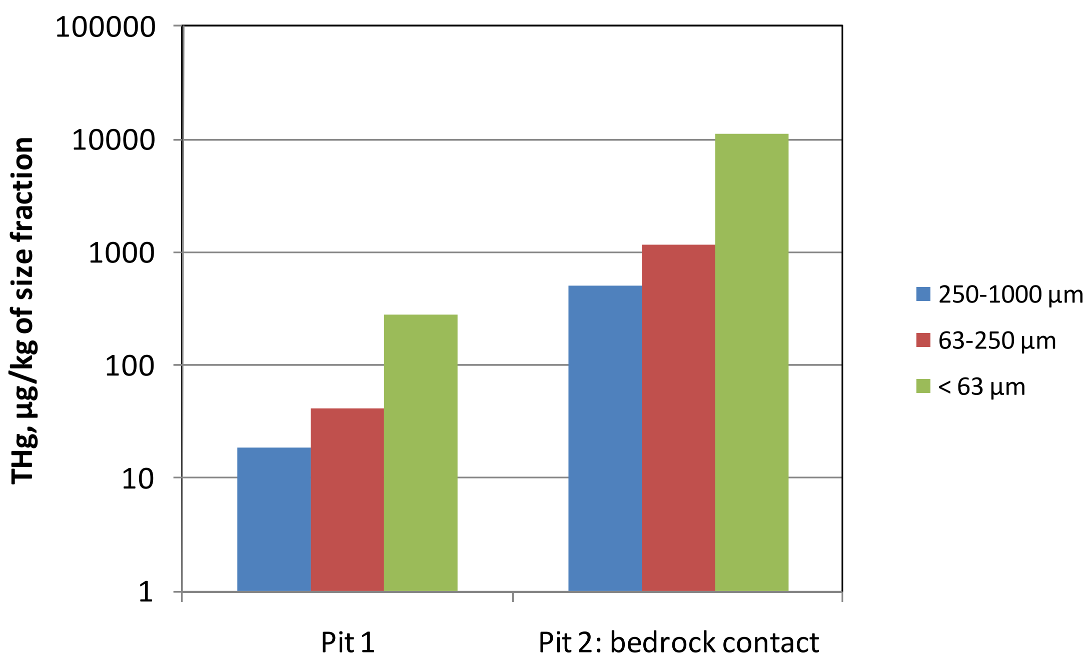


FIGURE 4.2-5. TOTAL MERCURY CONCENTRATIONS ASSOCIATED WITH DIFFERENT PARTICLE SIZES FOR SEDIMENTS COLLECTED IN THE SOUTH YUBA RIVER

(based on measurements in Fleck et al., 2011)

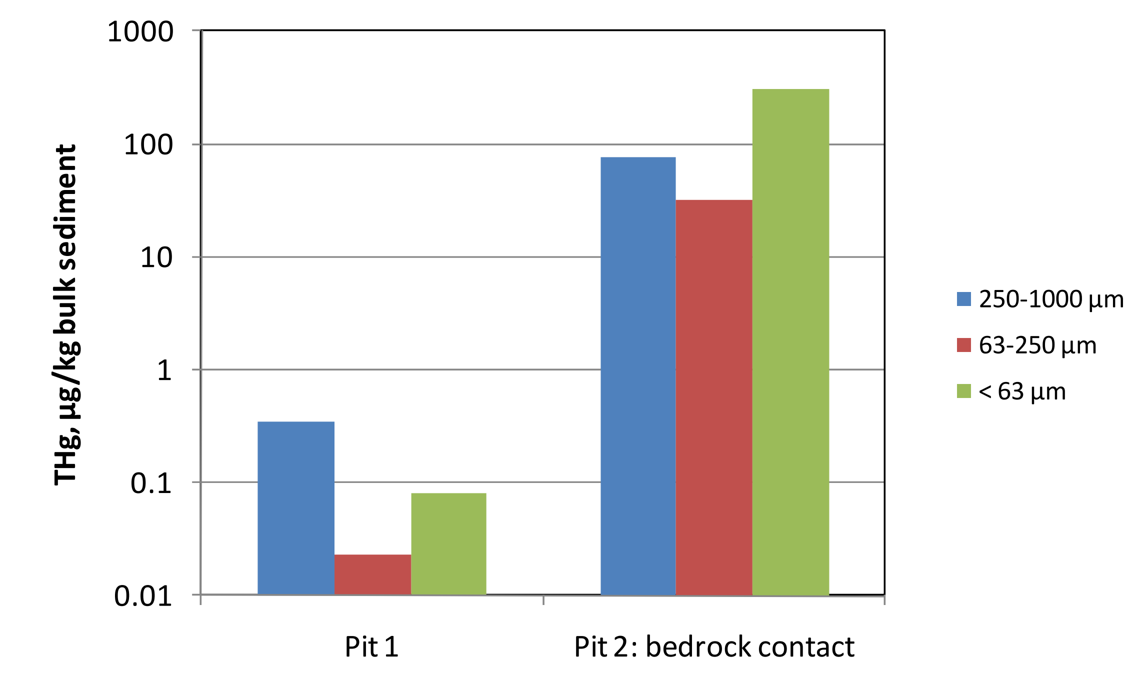


FIGURE 4.2-6. DISTRIBUTION OF MERCURY MASS IN BULK SEDIMENT COLLECTED IN THE SOUTH YUBA RIVER

(based on measurements in Fleck et al., 2011)

Characterization of Elemental Mercury Available to Discharge from Suction Dredging

However, it should be noted that few, if any, other sediments containing hydraulic mine debris in California have been characterized with respect to Hg, so it is possible that other similar sites would contain similarly high levels. Levels of Hg from Pit #1 are assumed to represent a typical site in the Sierra Nevada where mercury levels have been diluted by uncontaminated sediment from mass wasting in the watershed, because levels are comparable to those found in the Lower Yuba River and Lower Sacramento River (Domagalski, 2001), Sacramento-San Joaquin River Delta (Marvin-DiPasquale, 2003), and San Francisco Bay (San Francisco Estuary Institute, 2010; Fleck et al., 2011). Little to no publicly available sediment Hg data exist for the Klamath-Trinity or San Gabriel mountains, so it is unknown whether Pit #1 and Pit #2:BC Hg levels are representative of those locations. It is not known what the relative probability of encountering either case is for a suction dredger. However, it is expected that many dredging operations within the Sierra Foothills would occur at sites of THg levels between Pit #1 and Pit #2:BC levels characterized for this assessment. Because gold has a high grain density, it has a tendency to settle out of the water column in areas where less dense materials do not. Dredgers target these areas because concentrations of gold are expected. Because Hg also has a high density, these same areas tend to be places where Hg settles out, such as Pit #2:BC. Source assessment and sniping results suggested this location is not a unique hotspot within the South Yuba River watershed. Sniping is a method used by recreational gold miners to search for gold and other minerals of high grain density in bedrock fractures and other natural hydraulic traps on the river bottom. Since hydraulic mining was practiced throughout the watershed, it is possible that Hg contaminated sediment layers are present throughout the lower region of the watershed (Fleck et al., 2011). The deeper sediments at these sites did not appear to be available to mobilization by storms. Indeed, Pit #2:BC sediment appears to be undisturbed since hydraulic mining days, over 100 years ago, but no attempt was made to quantitatively date the sediment. Although the extent to which these deep sediments that contain high concentrations of legacy mercury are targeted by suction dredgers is unknown, because they also contain high concentrations of legacy gold, it is reasonable to assume that these areas would be attractive to and targeted by suction dredgers.

Elemental mercury (i.e., liquid Hg(0)) has been visually documented at many locations throughout the Sierra Nevada, but generally has not been quantified. On the South Fork of the American River, near Lotus, Humphreys (2005) describes a location where elemental Hg was present and whose sediment Hg concentration (particle bound plus liquid Hg) was 1,170 mg/kg. In the Greenhorn Creek watershed, tributary to the Bear River, concentrations of elemental Hg were estimated via a field panning method at 14 locations and varied from 100 mg/kg (the estimated detection limit of the test) to 45,000 mg/kg, equivalent to 4.5% (Alpers et al., 2005). It is probable that elemental Hg is present at many additional locations throughout the California gold-country, but no systematic efforts have been made to locate these so-called "hot spots."

Where elemental Hg is present, suction dredging has been observed to result in the "flouring" of Hg droplets—that is, the breaking up of larger liquid droplets into many very small droplets (Humphreys, 2005; Silva, 1986). Flouring results in increased surface area contact with water of Hg droplets, which may affect transformation as described in the transformation section below. However, some have noted that the equipment used in this study is no longer in production, and suggested that modern equipment may result in less flouring (McCracken, 2007), although this has not been scientifically evaluated. Furthermore, it is not clear from the study whether Hg droplets were floured prior to being dredged or were floured as a result of the dredging. Nevertheless, floured Hg was present in the discharge from the suction dredge. Consequently, it unlikely that suction dredges would recover either floured mercury in sediment dredged, or mercury floured by the suction and turbulence of the dredge. Transport and transformation of elemental Hg is addressed below, but due to significant data gaps in our understanding of both, it is excluded from the initial quantitative assessment.

Impact of Dredging Operations Variables on Quantity of Mercury Discharged

Sediment characteristics discussed above were combined with estimates of sediment moved per hour for various nozzle sizes provided by a suction dredge manufacturer to estimate the quantity of Hg discharged per hour (See Table 3-2 in the Activity Description chapter). A 4 inch diameter nozzle size is the most typical size used by suction dredgers, based on the results of the Suction Dredger Survey. An 8 inch nozzle was chosen as it is the largest allowable nozzle in California (although analysis for a 10 inch nozzle was also conducted). This exercise was conducted for both the more typical background average Hg level sediment (Pit #1) and the worst-case hot-spot sediment (Pit #2:BC). Figure 4.2-7 shows the rate of discharge of THg in the <63 μm portion from different size suction dredges in the two sediments. Because Pit #2:BC has both a greater percentage of <63 μm particles and a much greater concentration of mercury associated with those particles, discharge rates from Pit #2:BC are more than 3 orders of magnitude greater than for Pit #1.

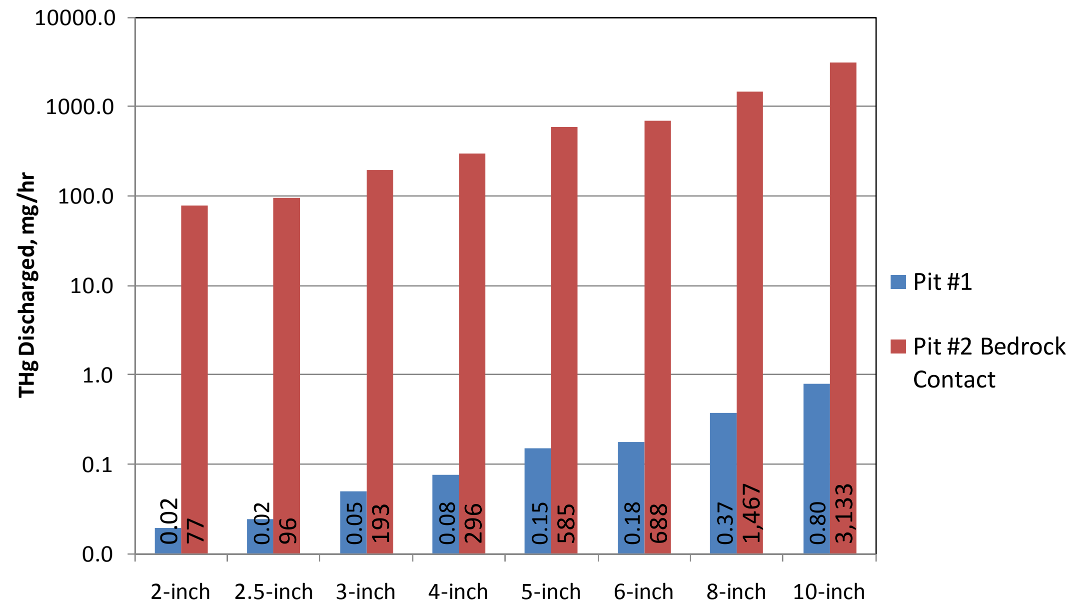


FIGURE 4.2-7. MERCURY DISCHARGE RATE FROM SUCTION DREDGING FOR DIFFERENT SUCTION DREDGE NOZZLE SIZES AND LOCATIONS WITHIN THE SOUTH YUBA RIVER

Existing Data of Total Recoverable Mercury in Suction Dredge Discharge

Very little direct data exists on the levels of THg found in suction dredge discharge. Existing data on TSS in suction dredge discharge or immediately downstream of the discharge was combined with sediment Hg levels to estimate total recoverable Hg in the discharge. Suspended sediment downstream of suction dredges has been reported as high as 340 mg/L (Thomas, 1985), but can also be as low as 1-2 mg/L (Stern, 1988). Based on the THg concentrations measured in Pit #1 and Pit #2:BC sediments, Table 4.2-4 shows estimated THg discharge that could occur from a suction dredging operation discharging suspended sediment at the 340 mg/L rate. The table shows that using a worst-case scenario of 340 mg/L TSS, total recoverable Hg is estimated to be 0.094 micrograms per liter (μg/L) with Pit #1 sediments. The same calculation at Pit #2:BC yields a total recoverable Hg concentration of 3.77 μg/L. Using a TSS of 3 mg/L, both locations yield total recoverable Hg levels below the CTR human health criterion of 0.05 μg/L. Humphreys (2005) measured suspended sediment THg concentration at 298 mg/kg but did not report the TSS concentration itself. In order for the THg concentration in this discharge to have been below 0.05 μg/L, TSS would have had to be < 1 mg/L, which is possible, but unlikely. Therefore, this discharge likely contained total recoverable Hg concentrations greater than the CTR criterion.

TABLE 4.2-4. ESTIMATED TOTAL RECOVERABLE MERCURY IN SUCTION DREDGE DISCHARGE AT PIT #1 AND PIT#2:BC SITES IN THE SOUTH YUBA RIVER

TSS (mg/L)	Pit #1 (µg/L) [a]	Pit #2:BC (µg/L) [b]
1	0.000276	0.0111
3	0.000828	0.0333
5	0.00138	**0.0555**
10	0.00276	**0.111**
50	0.0138	**0.555**
100	0.0276	**1.11**
200	**0.0552**	**2.22**
340 [c]	**0.0938**	**3.78**

Bold values indicate exceedances of CTR human health criterion of 0.05 µg/L total recoverable mercury.
[a] =Assumed only < 63 µm particles discharged from suction dredge; Pit #1 < 63 µm sediment concentration = 0.276 mg/kg.
[b] =Assumed only < 63 µm particles discharged from suction dredge; Pit #2:BC < 63 µm sediment concentration = 11.1 mg/kg.
[c] = Highest reported suction dredge discharge/plume TSS concentration found in the literature.

Discharge of Mercury from Background Watershed Sources

In contrast to Hg discharged from suction dredging, which occurs primarily during the summer, the majority of Hg from background watershed sources is discharged during the winter wet season, when runoff conditions contribute to high flows that scour sediments laden with Hg. Figure 4.2-8 shows measured Hg and discharge on the South Yuba River at Jones Bar for water years 2001-2004. This data was used to estimate annual Hg load of inflows to Englebright Lake for water years 2001-2004, which ranged from 3.4 to 7.2 kilograms per year (kg/yr) (Alpers et al., in prep). These years, overall, had below average rainfall and runoff. Water year 2001 loads were used as representative dry year loads, while water year 2003 loads were used as normal water year loads. Conditions for these years are shown in Table 4.2-5. Loads calculated for water year 2003 were based on measurements taken during the wet season only, a period when suction dredges typically are not operated. Therefore, values for water year 2003 are an estimated minimum overall load for that year. However, because the majority of background Hg transport occurs during the wet season, this is a good estimate of the true rainfall-induced watershed load for this water year. Loads calculated for water year 2001 were based on measurements during both the wet and dry season. It should be noted that these studies were not designed to detect suspended sediment pulses from operating dredges. Sampling frequency was biased towards winter when both flows and suspended sediment loads are high but variable. Less sampling was performed during the summer when flows are low and stable and ambient turbidity/TSS loads are low.

Sampling frequency for both cited studies was no more than once a month during the summer, almost always occurred on weekday mornings, and took about an hour to perform. Such sampling would not be expected to detect pulse flows from dredges that are frequently operated on weekends. However, given this, it is possible that suction dredges were contributing to the annual Hg load calculated, but Hg levels do not appear to reflect unusually high concentrations during the dry season. Given this, there are inherent uncertainties to the Hg loading estimates.

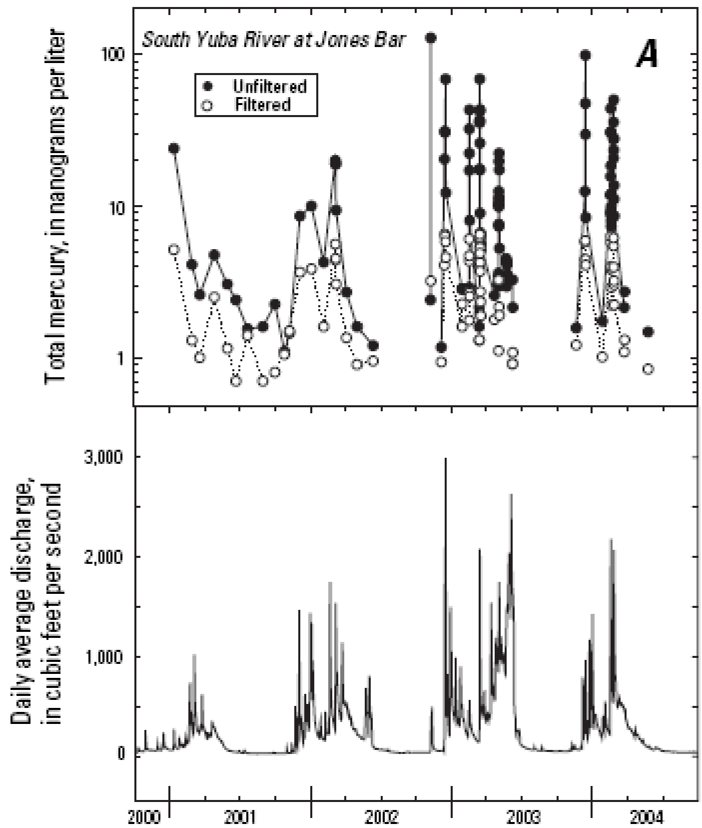


FIGURE 4.2-8. MEASURED MERCURY AND DISCHARGE IN THE SOUTH YUBA RIVER AT JONES BAR DURING WATER YEARS 2001-2004

(Alpers et al., in prep)

TABLE 4.2-5. BACKGROUND WATERSHED SEDIMENT CONTRIBUTION AND MERCURY DISCHARGE IN SOUTH YUBA RIVER AT JONES BAR

Water Year	Water Year Type	Percent of Average Precipitation	Sediment Discharge (tons)	THg Transported (kg)
2001	Dry	73%	730	0.53
2003	Normal	112%	7600	3.1

From Curtis et al., 2006; Alpers et al., in prep

Considering the background watershed loading of Hg to the Delta, the average annual input of total Hg ranges between 220 and 403 kg/yr, and the average annual input of MeHg to the Delta is approximately 5.2 kg/yr (Wood et al., 2008). Measurements of Hg and TSS that form the basis of these estimates may have been influenced by suction dredge discharge, so there is uncertainty over whether these are truly background measurements or a combination of background and suction dredge Hg loadings.

Figure 4.2-9 and Figure 4.2-10 show the total amount of Hg discharged with selected nozzle sizes as a function of hours dredged and a comparison to watershed loads.

<u>Transport of Mercury Discharged from Suction Dredging and Background Watershed Sources</u>

When sediment is discharged from suction dredging, coarser particles will settle out at a lesser distance downstream than fine particles (see also Chapter 4.1, *Hydrology and Geomorphology*). Flow velocity (which is correlated to discharge for a given river) affects both what size particles are carried by the current and how far the particles travel before they settle out of the water column. For the South Yuba River, data from bed and suspended sediments under different flow regimes indicate that fine particles <63 µm remain mostly suspended, and thus are transported at least as far as Englebright Lake (Curtis et al., 2006). Particles >63 µm do not remain suspended during summer low flows, and are thus deposited back into the river. However, these particles may be transported downstream to Englebright Lake during higher winter flows, depending on their size, the flows, and the distance to the reservoir.

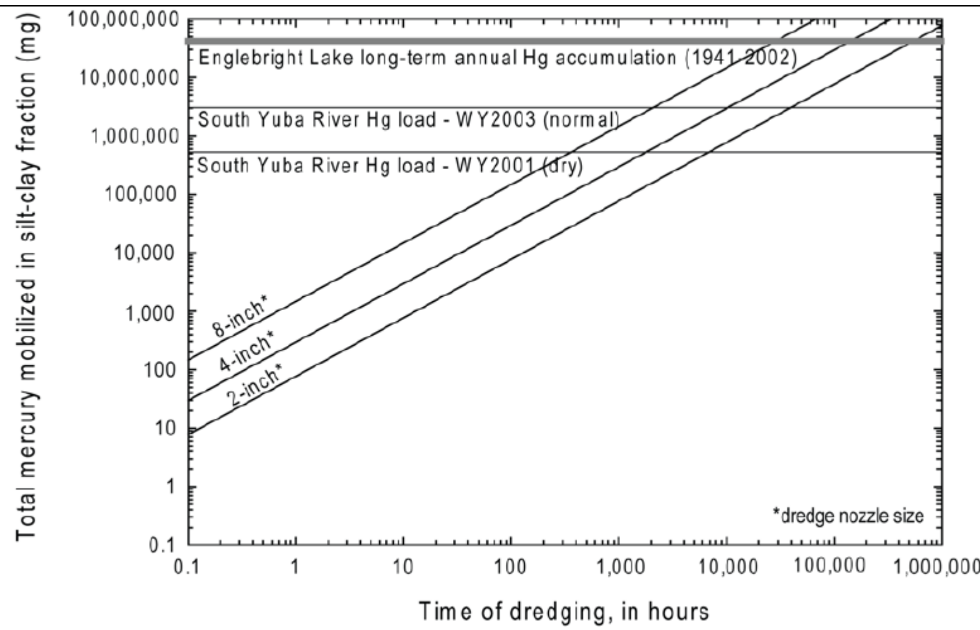


FIGURE 4.2-9. TOTAL MERCURY DISCHARGED IN <63 µM SIZE FRACTION VS. HOURS DREDGED IN PIT #2:BC SEDIMENT AND COMPARISON TO WATERSHED LOADS

(Fleck et al., 2011)

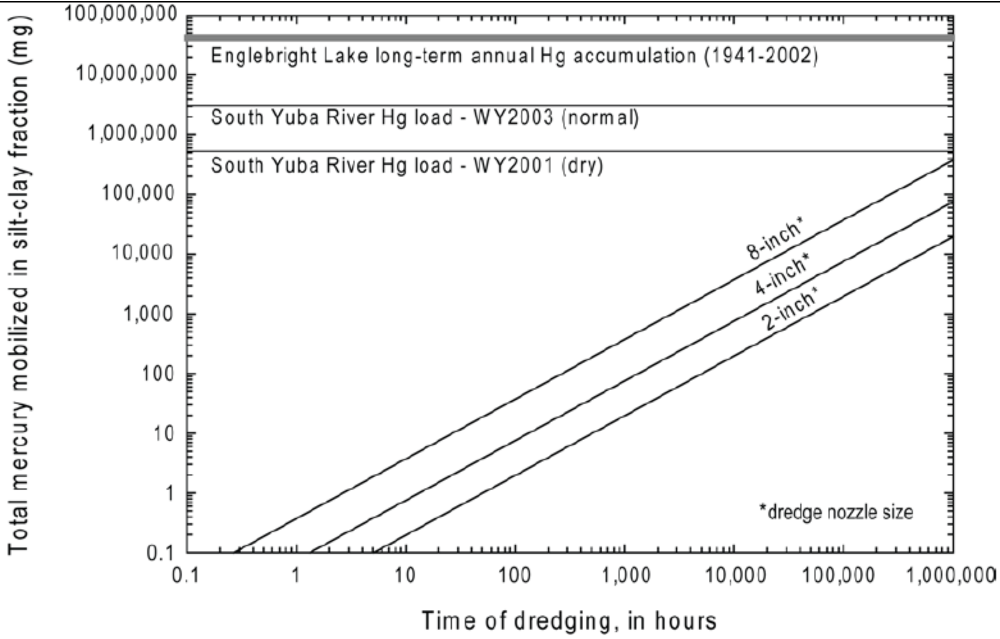


FIGURE 4.2-10. TOTAL MERCURY DISCHARGED IN <63 µM SIZE FRACTION VS. HOURS DREDGED IN PIT #1 AND COMPARISON TO WATERSHED LOADS

(Fleck et al., 2011)

For the purposes of this assessment, it is assumed that >63 µm particles are transported to other parts of the river, while <63 µm particles are delivered downstream to Englebright Lake or beyond, eventually being deposited in the Delta. During water years 2001-2004, it is estimated that only 40% of total Hg inputs to Englebright Lake were deposited, while the remaining 60% was transported downstream of Englebright Dam (Alpers et al., in prep).

Transport of elemental Hg that is floured and discharged from suction dredging is largely unknown. Floured Hg has been observed to float initially (Humphreys, 2005). Subsequently, these Hg droplets may sink (for example, after coagulating with other particles downstream), or may continue to float until they dissolve or volatilize.

The amounts of THg discharge shown in Figure 4.2-7 were used to estimate the number of dredgers required to discharge 10% of background watershed loads. The value 10% was selected based on a professional judgment of what would be a measurable increase in background loading. The analysis does not assume that this is a threshold of significance below which effects are insubstantial, but is used as a reasonable point of reference. The average number of hours dredged per year was based on the results of a survey of suction dredgers and was 160 hours (Suction Dredger Survey results, Appendix F). Results are shown in Figures 4.2-11 and 4.2-12. Due to the lower rate of Hg discharge from Pit #1 (see Figures 4.2-7 through 4.2-9), many more dredgers would be required to reach 10% of background watershed loading than for Pit #2:BC. However, experienced suction dredgers would likely not target Pit 1 type sediment because it contained little gold, or would only dredge the material as overburden—material that must be removed to get to more prospective layers below. During a dry year, a single dredger with a 4 inch dredge in Pit #2:BC or similar sediments (e.g., the layer of sediment overlying Pit #2:BC, referred to as the Compact Sediment layer in Fleck, 2011, which also had elevated THg) would contribute almost 10% of the background watershed loading. More than the entire permitted population of suction dredgers (almost 4,400, versus the permitted population of approximately 3,650) would need to be operating within sediments with concentrations similar to Pit #1 to discharge 10% of the background Hg loading in a dry year using average size (4 inch) dredges. The results of the survey indicated that approximately 260 dredgers operated in the South Yuba watershed in 2008, resulting in approximately 25,000 dredging hours (Suction Dredger Survey results, Appendix F). However, there are concerns that suction dredger self survey data have been skewed by the survey respondents.

Assuming 50% of transported sediment is deposited in a reservoir between where suction dredging is occurring and downstream reaches where particle bound Hg may reach the Delta, the same calculations were conducted to determine the number of dredgers necessary to equal 10% of the existing Hg loading to the Delta, with results shown in Figures 4.2-13 and 4.2-14. Figure 4.2-13 indicates that no practical number of dredgers in Pit #1 could approach 10% of Delta Hg loading in a year, but that a realistic number of dredgers in Pit #2:BC could reach this level.

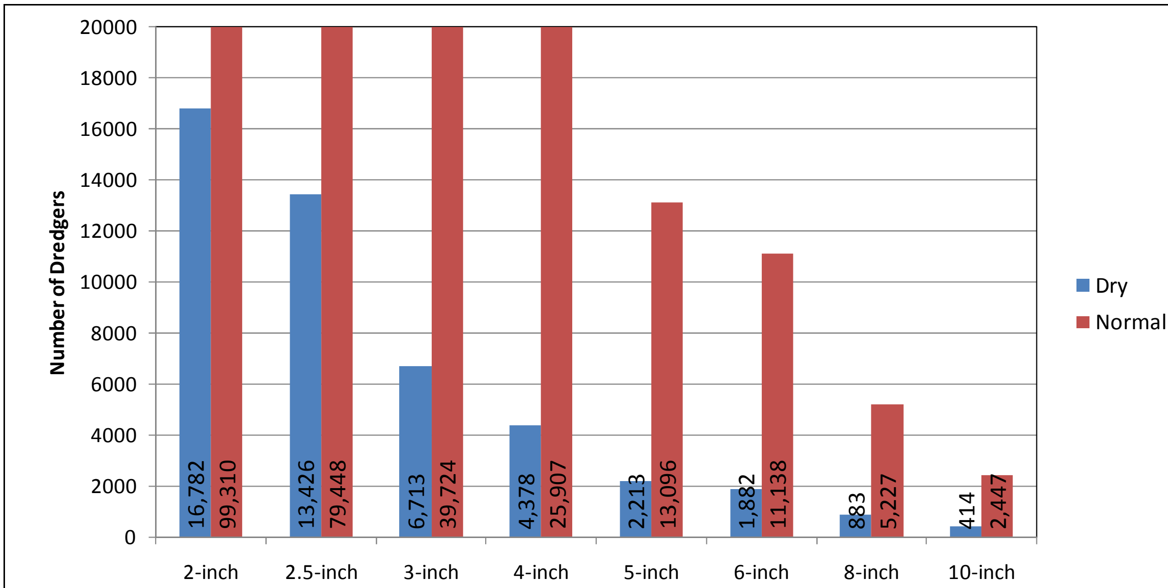


FIGURE 4.2-11. NUMBER OF DREDGERS REQUIRED TO DISCHARGE 10% OF ANNUAL BACKGROUND WATERSHED THg LOAD DURING DRY AND NORMAL WATER YEARS BASED ON PIT #1 SEDIMENT IN THE SOUTH YUBA RIVER.

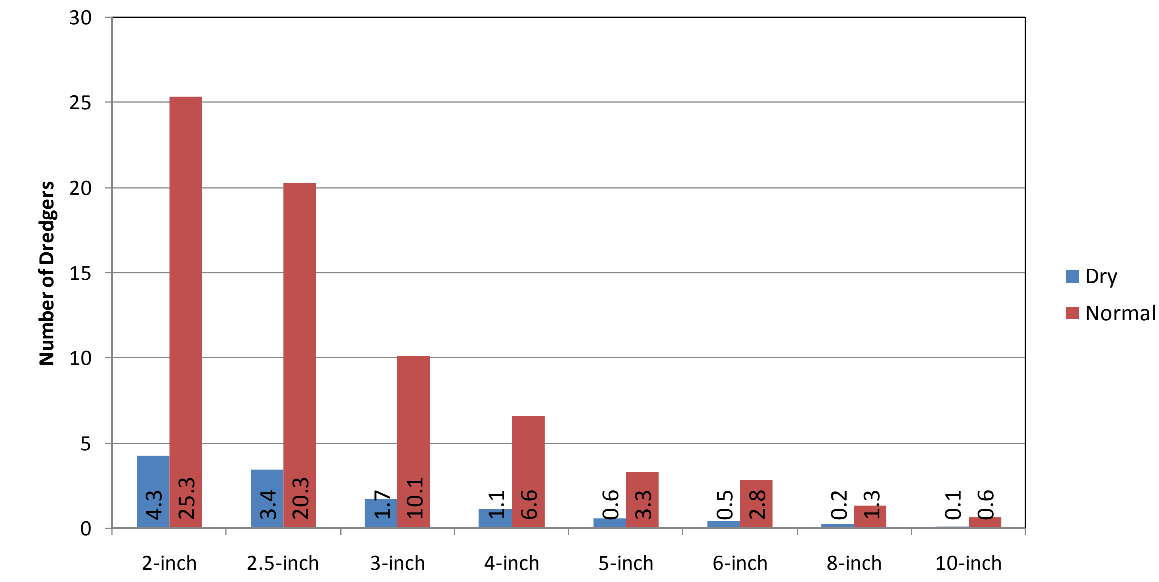


FIGURE 4.2-12. NUMBER OF DREDGERS REQUIRED TO DISCHARGE 10% OF ANNUAL BACKGROUND WATERSHED THg LOAD DURING DRY AND NORMAL WATER YEARS BASED ON PIT #2 BEDROCK CONTACT SEDIMENT IN THE SOUTH YUBA RIVER

1

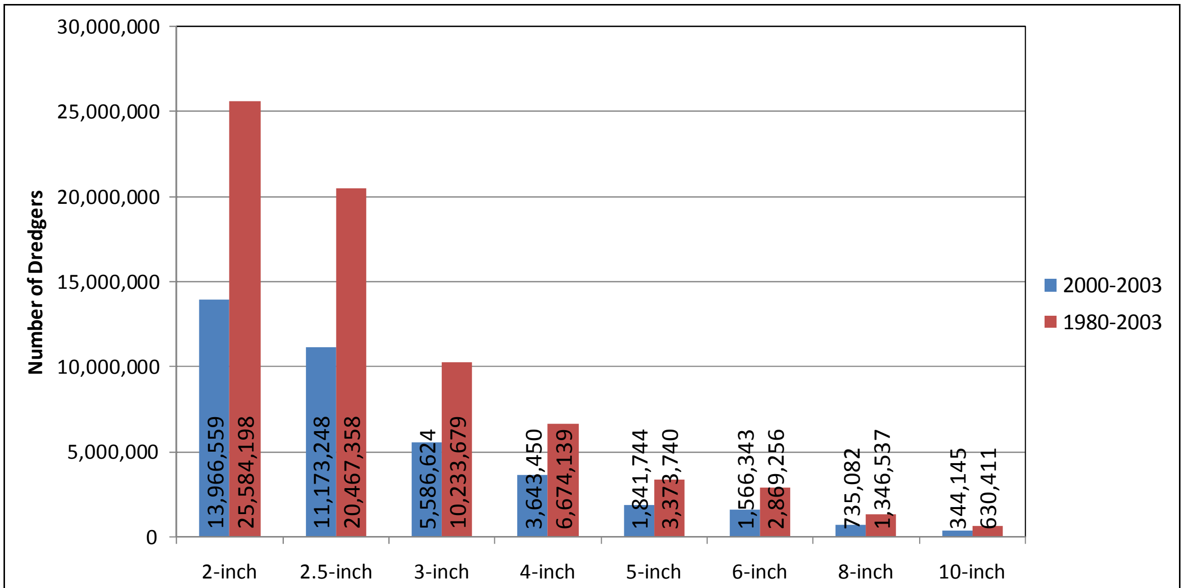


FIGURE 4.2-13. NUMBER OF DREDGERS REQUIRED TO DISCHARGE 10% OF ANNUAL DELTA THg LOAD BASED ON ESTIMATES FOR 2000-2003 AND FOR 1980-2003 DREDGING PIT #1 SEDIMENT MERCURY LEVELS *(Wood et al., 2008)*

It is assumed that 50% of the Hg is deposited in a rim reservoir (e.g., Englebright Lake) and 50% is transported to the Delta.

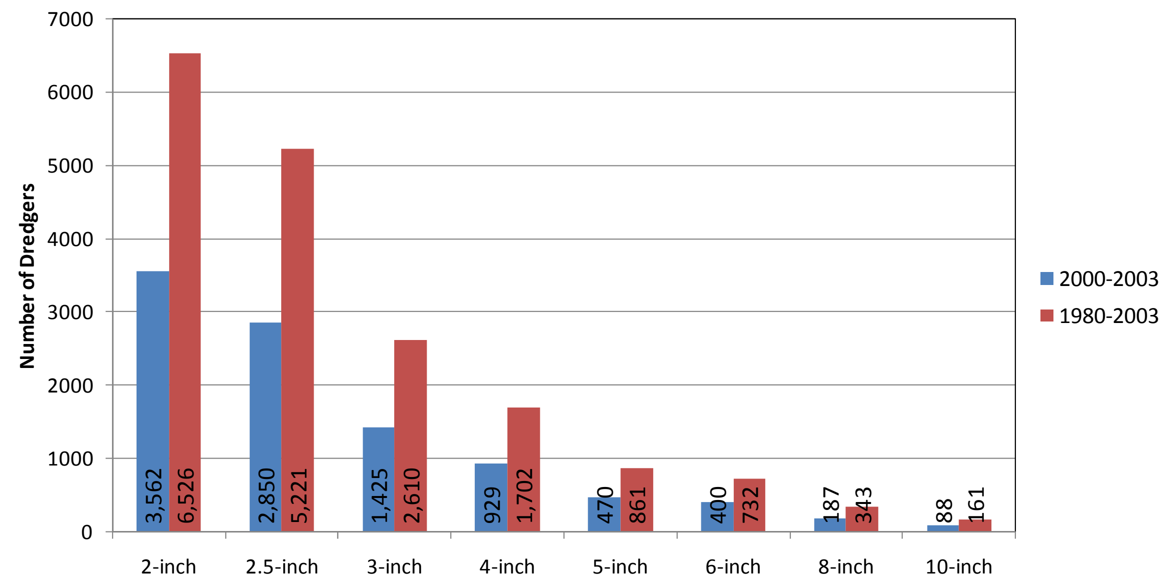


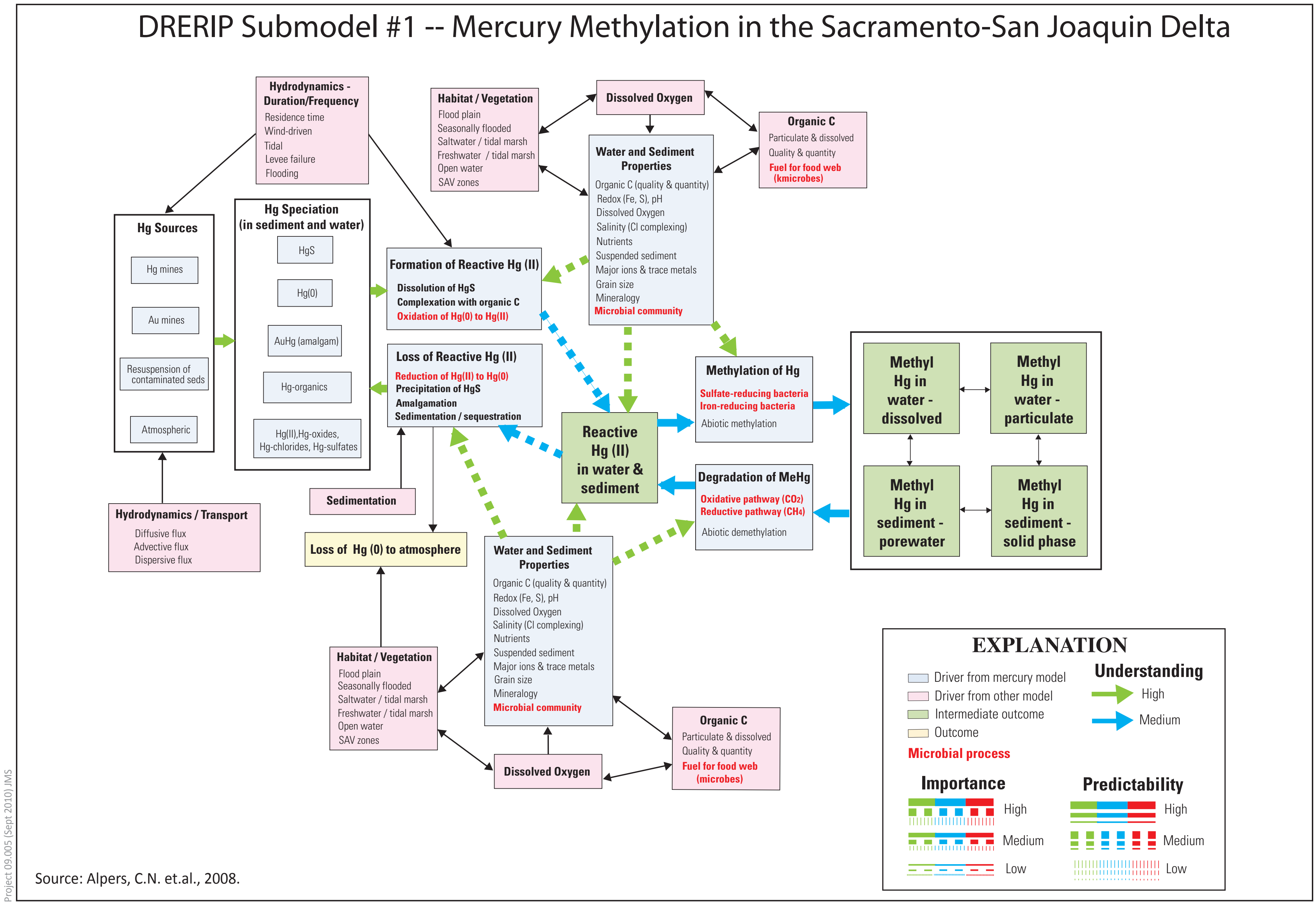
FIGURE 4.2-14. NUMBER OF DREDGERS REQUIRED TO DISCHARGE 10% OF ANNUAL DELTA THg LOAD BASED ON ESTIMATES FOR 2000-2003 AND FOR 1980-2003 DREDGING PIT #2:BC SEDIMENT MERCURY LEVELS *(Wood et al., 2008)*

It is assumed that 50% of the Hg is deposited in a rim reservoir (e.g., Englebright Lake) and 50% is transported to the Delta.

Transformation and Bioaccumulation of Mercury Discharged from Suction Dredging and Background Watershed Sources

Elemental Hg (i.e., liquid Hg(0)) was used for gold recovery in placer and hard-rock mines. Experiments with Hg droplets in water have shown that they can either dissolve, forming dissolved Hg(0), or oxidize directly to Hg(II) (Afonso de Magalhaes and Tubino, 1995; Amyot et al., 2005). The latter is enhanced in the presence of chloride, oxygen, and light; however, dissolved Hg(0) would also be subsequently available to oxidation to Hg(II). Studies have shown that Hg(II) is the form most readily converted to MeHg by microbes (Keiu, 2004; Marvin-DiPasquale et al., 2009; Marvin-DiPasquale and Cox 2007). Reactive Hg(II) (i.e., $Hg(II)_R$) is "an operationally defined fraction that represents the result of a 15-minute digestion with $SnCl_2$, a strong reducing agent that converts Hg(II) to elemental Hg(0) so that the readily available Hg(II) fraction can be measured (Marvin-DiPasquale et al., 2009; Marvin-DiPasquale and Cox, 2007). Experiments with mercury in a variety of model compounds representing a wide range of mercury species indicate that solid phase $Hg(II)_R$ appears to be a good predictor of microbial MeHg production (Alpers et al., 2008).

Figure 4.2-15 shows a conceptual model for Hg transformation and bioaccumulation. Transformation refers to the conversion of various Hg species, including elemental Hg, into $Hg(II)_R$ and subsequently to MeHg, and the corresponding backwards transformations. MeHg is transferred between the water-column and bed sediment hydrodynamically and between dissolved and particle-bound phases via physical-chemical partitioning. Some fraction of MeHg is taken up into the base of the food web and is then biomagnified up the food web, resulting in the highest concentrations at the top of the food web, generally in piscivorous fish, reptiles, mammals, or birds (Scudder et al., 2009). Most studies indicate



Horizon WATER and ENVIRONMENT

Figure 4.2-15
Conceptual Model for Transformation and Bioaccumulation of Mercury

that a majority of the Hg found in fish tissue is MeHg, in many cases the proportion is up to 95% (e.g., Bloom 1992). Numerous factors affect the multiple linkages contained within the model. Water and sediment properties that affect virtually all parts of the model include: oxidation-reduction conditions, salinity, nutrients, suspended sediment, major ions and especially levels of sulfate, trace metals, mineralogy, grain size, microbial community, organic carbon, and dissolved oxygen. Factors that affect uptake into the foodweb and subsequent bioaccumulation include: species composition, growth rate, density, food chain length, trophic transfer efficiency, exposure time, food availability and quality, predation, fecundity, habitat/vegetation, and hydrodynamics (Alpers et al., 2008).

Transformations of floured elemental Hg are essentially unknown. Increased surface area and chemical reactivity of floured Hg are likely important factors relevant to the overall environmental effects of Hg that is discharged from suction dredging activity. It is possible that floured Hg floating on the surface of water would volatilize, but if it remains a liquid droplet, either on the surface or having sunk, it would be subject to transformation. Transformation of liquid Hg(0) to dissolved Hg(II) has been shown to be proportional to surface area. The half-life of a 0.1 milliliter droplet of Hg in water subjected to dissolution alone is approximately 30 years (Amyot et al., 2005). Assuming droplets as spheres, dividing a single 0.1 mL droplet (approx. 6 mm diameter) into 10 equal smaller droplets (of approx. 2.7 mm) increases the surface area by approximately 2 times, while dividing it into 10,000 equal smaller droplets (of approx 0.27 mm) increases it by approximately 20 times. An extreme case would be the division into 10,000,000,000 equal droplets (of approx 2.7 µm), increasing the surface area by approximately 2000 times. This size droplet was observed on amalgam surfaces from the South Yuba River via a scanning electron microscope (Fleck et al., 2011). Regarding the impact of elemental mercury on uptake of MeHg, in microcosms containing sediment, zebrafish, and Hg droplets, rapid (i.e., within 7 days) increases in dissolved and fish tissue MeHg concentration have been observed after the start of the exposure (Dominique et al., 2007).

While fish tissue levels represent Hg accumulated over time, concentrations of Hg in water are variable and affected by season and hydrologic conditions, and are, therefore, an uncertain predictor of fish tissue levels (Brigham et al., 2009). However, several studies have found significant correlations between THg and MeHg in the water column (both filtered and unfiltered) and fish tissue levels (Chasar et al., 2009; Scudder et al., 2009). Scudder et al. (2009) found significant correlations between sediment MeHg levels normalized by loss on ignition (a measure of organic matter content) and fish tissue levels. The logarithm of the bioaccumulation factor (BAF) of filtered MeHg from fish to water is approximately 6.33, while the BAF of sediment MeHg to fish is approximately 3.42 (Scudder et al., 2009). This means that at equilibrium, there is > 2,000,000 times more MeHg in fish than in the surrounding water, and > 2,000 times more MeHg in fish than in the sediment in their vicinity.

Because Pit #2:BC sediments were relatively more elevated in $Hg(II)_R$ than THg compared to surface sediment layers, the potential environmental impact caused by mobilization of $Hg(II)_R$ may be even greater than is suggested by THg (Fleck et al., 2011). Additionally, resuspension of Pit #1 and Pit#2:BC sediments has been demonstrated to affect Hg speciation in the sediments. After resuspension for 7 days in oxygenated water under laboratory conditions, THg concentrations exhibited an apparent decrease, while $Hg(II)_R$ concentrations increased in both Pit #1 and Pit #2:BC sediments (Marvin-Dipasquale et al., 2011). The authors of the study attributed decreasing THg concentrations to loss of fine particles in the supernatant following centrifugation. Because this is an artifact of the laboratory methodology, THg would not be expected to decrease after resuspension in the environment. Also possible, but deemed unlikely by the authors, was loss to volatilization and issues related to sampling bias.

Experiments at Camp Far West Reservoir, found that upstream sources of MeHg may be more significant under high-flow conditions, while sources internal to the reservoir may be more important during low-flow conditions (Kuwabara et al., 2003). Benthic fluxes of dissolved MeHg were generally negligible or positive, that is, from the sediment to the water-column, and were greater during April (when water was oxic) than November (when water was suboxic).

A fundamental difference between Hg discharged by suction dredging and that discharged from background watershed sources is that the majority of suction dredging discharge and transport occurs during the summer, while the majority of background Hg transport occurs during high winter flows. The impact of this difference is not obvious, and will likely vary from watershed to watershed. One important distinction is that higher temperatures in the summer contribute to higher methylation rates, assuming that the mercury is transported to a region where methylation could occur. However, California's water system is highly managed—factors such as increased reservoir storage during the winter have been correlated with increased food-web MeHg levels in Camp Far West Reservoir, (Stewart et al., 2008).

In-stream: As discussed above, coarse-particle (i.e., >63 μm) bound Hg in elevated concentrations discharged from suction dredging in the South Yuba River is transported to nearby other parts of the stream where it settles out and rests on the surface. Becauase concentrations and loads of Hg within the stream are not altered, assessment of the transformation and bioaccumulation of this Hg examines the impact of resuspension and movement of Hg at depth to Hg in the top-sediment. Recent studies indicate that following resuspension of South Yuba River sediments, both from Pit #1 and Pit #2:BC, increased methylation was not observed after deposition into South Yuba River receiving sediments, which were relatively low in organic content (Marvin-DiPasquale, 2011).

Nevertheless, invertebrate Hg data from the South Yuba River indicate that suction dredging may have been contributing to elevated tissue concentrations. Suction dredging on the South Yuba was prohibited by the Bureau of Land Management during 2008, but had been allowed in all years prior. Figures 4.2-16 through 4.2-18 show invertebrate MeHg levels analyzed at one site in Humbug Creek and several sites downstream of its confluence with the South Yuba River in 2007 and 2008. All taxa collected in 2007 had higher concentrations of MeHg than the same taxa from the same sites in 2008, with few exceptions for which concentrations were similar. Overall, levels in 2008 were statistically significantly higher than levels in 2007. Documented inter-annual variation in other watersheds is typically less than differences observed in the South Yuba River. Hydrologic conditions were very similar between these water years, and were not atypical for this region, except in April through June, when conditions were drier than normal for both years (Fleck et al., 2011). Although caution should be used in interpreting these results because only year of data is available for the no dredging condition, these are likely the only data available at this time that can be used to compare tissue Hg levels with and without the influence of suction dredging. Fish tissue levels of Hg in the South Yuba River are relatively low (0.17 parts per million [ppm] average), owing in part to the fact that the figure is from rainbow trout, which tend to accumulate MeHg to a much lesser extent than piscivorous fish such as largemouth bass (the average Hg concentration in trout tissue from around the U.S. is about 0.11 ppm).

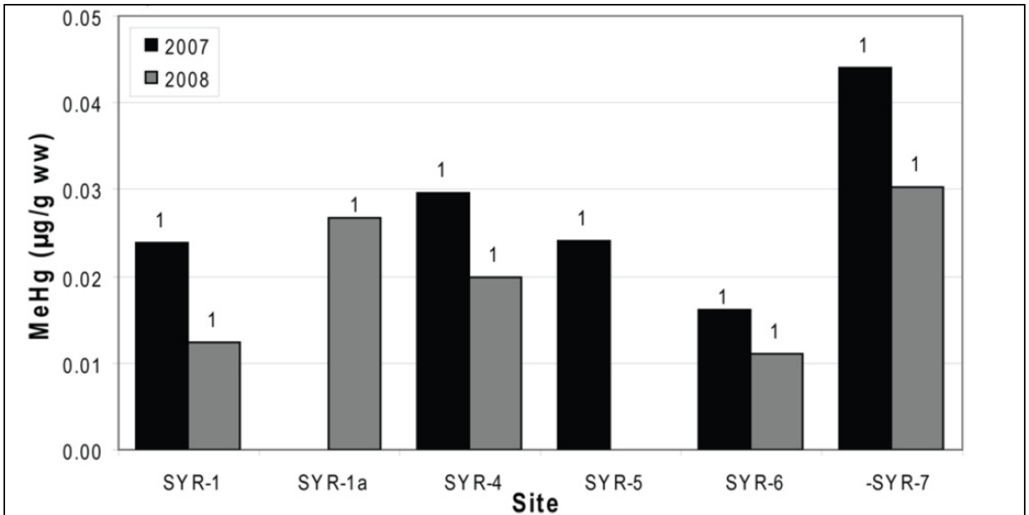


FIGURE 4.2-16. METHYLMERCURY (MeHg, µg/g, WW [WET WEIGHT]) CONCENTRATIONS IN INDIVIDUAL COMPOSITE SAMPLES OF LARVAL CADDISFLIES (ORDER TRICHOPTERA, FAMILY HYDROPSYCHIDAE) COLLECTED FROM THE HUMBUG CREEK/SOUTH YUBA STUDY AREA IN SEPTEMBER 2007 AND SEPTEMBER 2008

(Fleck et al., 2011)

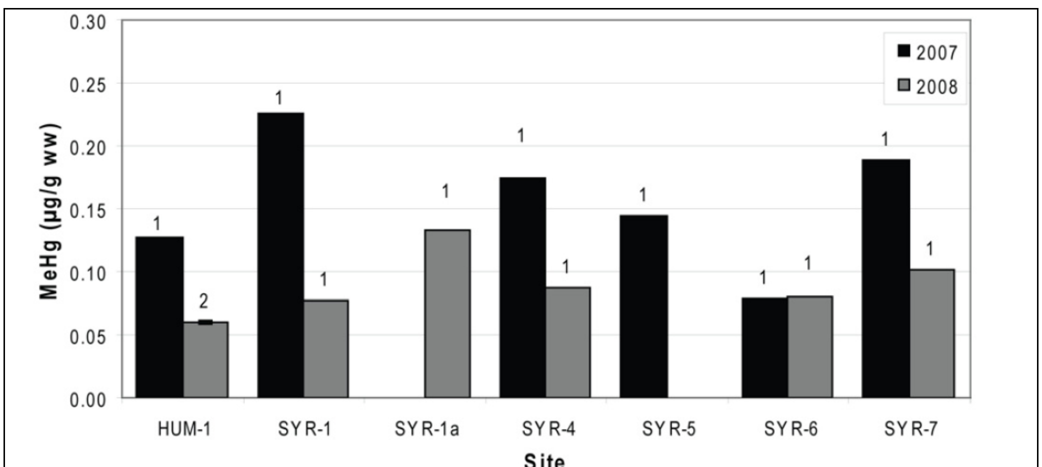


FIGURE4.2-17. METHYLMERCURY (MeHg, µg/g, WW) IN COMPOSITE SAMPLES OF WATER STRIDERS (ORDER HEMIPTERA, FAMILY GERRIDAE) (N = 1-2) COLLECTED FROM THE HUMBUG CREEK/SOUTH YUBA STUDY AREA IN SEPTEMBER 2007 AND SEPTEMBER 2008

(Fleck et al., 2011)

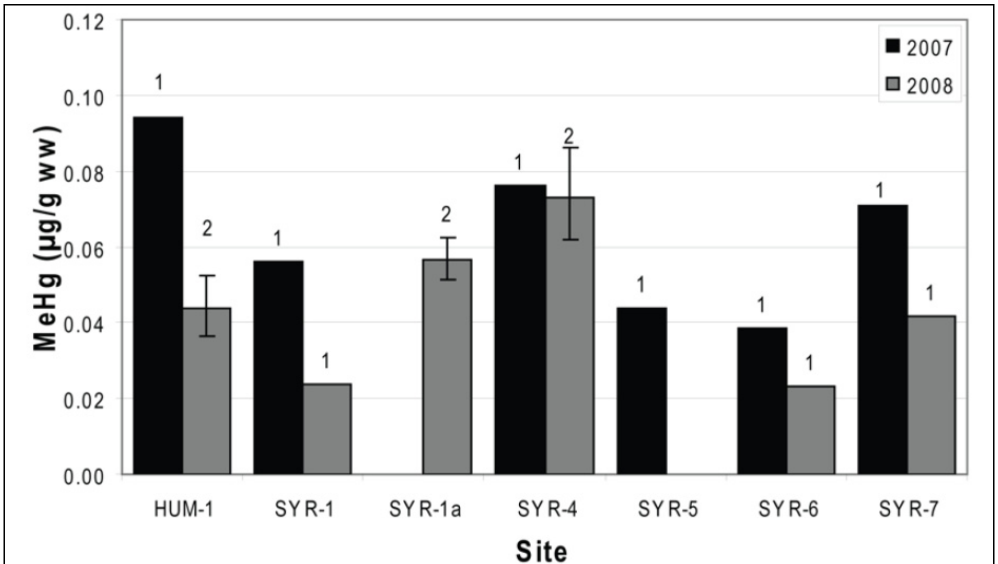


FIGURE 4.2-18. METHYLMERCURY (MeHg, µg/g, WW) IN COMPOSITE SAMPLES OF LARVAL STONEFLIES (ORDER PLECOPTERA, FAMILY PERLIDAE) (N = 1-2) COLLECTED FROM THE HUMBUG CREEK/SOUTH YUBA STUDY AREA IN SEPTEMBER 2007 AND SEPTEMBER 2008

(Fleck et al., 2011)

Englebright Lake: As discussed above, fine-particle bound Hg in elevated concentrations discharged from suction dredging in the South Yuba River may settle into bed-sediments of Englebright Lake. Mercury methylation potential is high (about 1% per day) in shallow sediments (4-12 centimeter) of Englebright Lake, and quite low (usually non-detectable) in deeper sediments (Alpers et al., 2006) and, therefore, increased concentrations of Hg in top-sediment of Englebright Lake would be expected to increase MeHg concentrations within the sediment. The sedimentation rate in Englebright Lake is quite high, on the order of 0.1 meters per year. Therefore, it is reasonable to conclude that much of the MeHg produced within the sediments of Englebright Lake is from Hg (whether from background sources or discharge from suction dredging) that has been deposited in the reservoir recently (i.e., within the previous few years). Therefore, it is expected that sediment-associated Hg discharged from suction dredging and transported downstream to Englebright Lake contributes to levels of MeHg found in surface sediments. Elevated fish tissue Hg concentrations in Englebright Lake (0.66 ppm in Smallmouth Bass) are driven by MeHg in the lake's sediment and water column, which in turn are affected by discharge and transport of Hg from suction dredging in addition to background watershed sources.

Recent experiments have shown that sediments from Pit #2:BC increased methylation relative to the control sediment when spiked into Englebright Lake receiving sediment. Being suspended for a period of 6 days, and then spiked into Englebright Lake receiving sediments at a ratio of 1:50, doubled MeHg production in the Englebright sediment when compared to the control, which was unspiked Englebright sediment (Figure 4.2-19; Marvin-DiPasquale, 2011). The same experiments using sediment from Pit #1 showed no impact on MeHg concentrations in Englebright Lake.

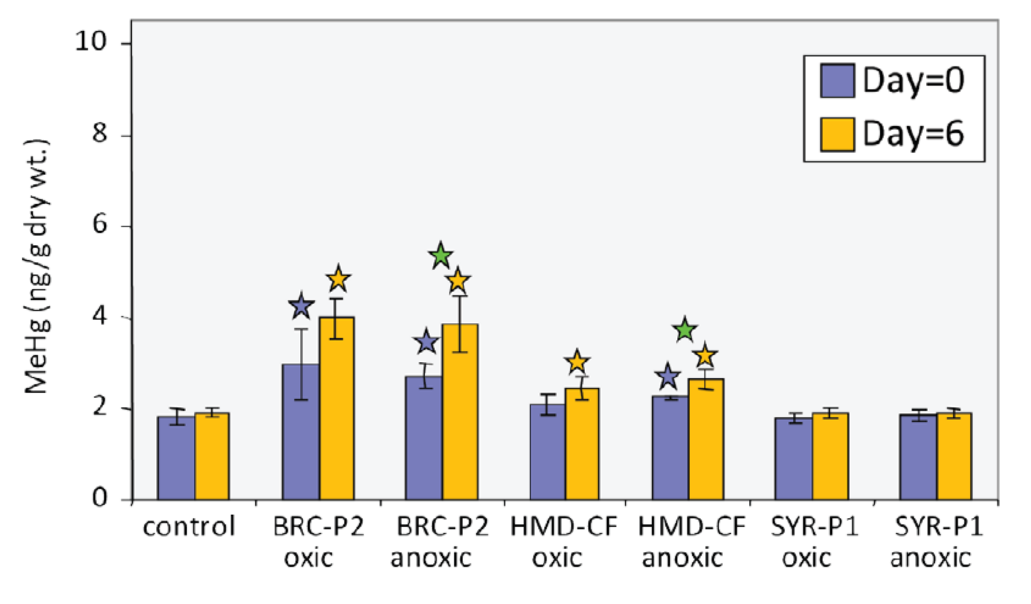


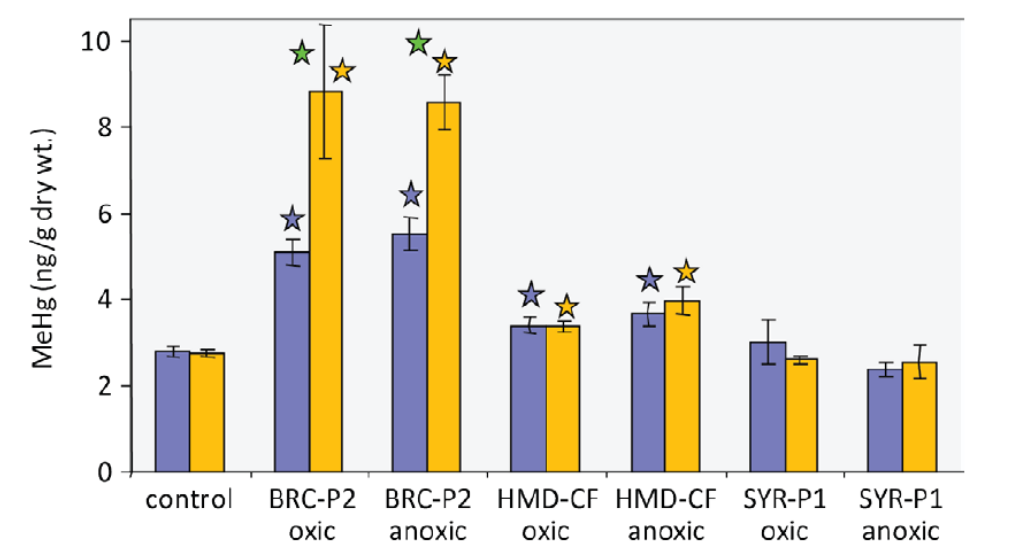
FIGURE 4.2-19. IMPACT OF PREVIOUSLY SUSPENDED SOUTH YUBA RIVER SEDIMENTS ON METHYLMERCURY PRODUCTION IN RECEIVING SEDIMENTS OF ENGLEBRIGHT LAKE

Day 0 indicates the sediment was non-suspended prior to spiking into the receiving sediment. Day 6 indicates the sediment was suspended for 6 days prior to spiking into the receiving sediment. "BRC-P2" refers to Pit #2:BC. Error bars represent ± 1 standard deviation (n=4). Significant differences (P <0.05) are indicated by the following: Day 0 treatment vs Day 0 control (★), Day 6 treatment vs Day 6 control (★), Day 0 vs Day 6 for a single grouping (★).

(Marvin-DiPasquale et al., 2011)

Delta: Several studies have documented a significant positive correlation in the Delta between THg and MeHg (Heim, 2003; Slotton, 2003). The relationships are stronger when only one type of habitat is considered. Experiments have shown that sediments from Pit #2:BC doubled methylation relative to the control sediment when spiked into Delta receiving sediments, and after being suspended for a period of 6 days and then spiked into Delta receiving sediments, tripled MeHg production within the sediment (Figure 4.2-20). It is widely known that wetlands (i.e., land with permanently saturated soil and shallow water and favorable redox conditions) are environments favorable to methylation, and the Delta was used in these experiments as a surrogate for wetland environments. The same experiments using sediment from Pit #1 showed no impact on MeHg concentrations in Delta sediments.

Of the fish tissue levels for the protection of human health shown in Table 4.2-2, values derived using the U.S. EPA 2001 methodology based on mean and 95th percentile consumption rates in California of 0.17 and 0.06 mg/kg, respectively, are the most appropriate values to use for this assessment. Consideration is also given to criteria for protection of fish-eating mammals and birds, which are 0.1 and 0.02 mg/kg, respectively.



`**FIGURE 4.2-20.** IMPACT OF PREVIOUSLY SUSPENDED SOUTH YUBA RIVER SEDIMENTS ON METHYLMERCURY PRODUCTION IN RECEIVING SEDIMENTS OF DELTA MEADOWS

Day 0 indicates the sediment was non-suspended prior to spiking into the receiving sediment. Day 6 indicates the sediment was suspended for 6 days prior to spiking into the receiving sediment. "BRC-P2" refers to Pit #2:BC. Error bars represent ± 1 standard deviation (n=4). Significant differences (P <0.05) are indicated by the following: Day 0 treatment vs Day 0 control (★), Day 6 treatment vs Day 6 control (★), Day 0 vs Day 6 for a single grouping (★).

(Marvin-DiPasquale et al., 2011)

Evidence from laboratory experiments has shown that selenium may be able to moderate the toxic effects of Hg when present at a molar ratio greater than around 1:1 (Ganther, 1972), and that most fish in the United States contain high enough levels of selenium to make this a possibility (Peterson et al., 2009). However, epidemiological support for this phenomenon is lacking, and the limited evidence gives mixed results (Watanabe, 2002). It is, therefore, unclear how experimental evidence translates into low dose, chronic risk assessments which are conducted to derive criteria. Consequently, derived criteria do not incorporate the possibility of toxicity moderation via selenium.

Fish and other aquatic life may themselves be affected by Hg. The known acute and chronic LC50s for Hg exposure (inorganic or methyl) in water are much higher than environmental concentrations. Criteria have not been developed for the protection of aquatic life in the United States. The Canadian Water Quality Guideline (CWQG) to protect freshwater life is 26 nanograms per liter (ng/L) inorganic Hg. For MeHg, the interim CWQG is 4 ng/L (Environment Canada, 2005). Effects on fish that may occur at environmentally relevant concentrations include adverse effects on feeding behavior (0.27 mg/kg in tissue as eggs) (Fjeld et al. 1998), reduced egg survival/hatching success (exposure to 100 ng/L and 1.05 mg/kg sediment THg) (USFWS 2003), male mortality (dietary source resulting in 0.5 mg/kg MeHg in tissue) (Matta et al., 2001), impaired sexual development or immune function

(0.254 mg/kg MeHg in tissue) (Friedmann et al., 1996), and changes in gene expression associated with endocrine disruption (0.87 mg/kg MeHg in diet) (Klaper et al., 2006).

From Table 4.2-3, it is evident that numerous water bodies throughout the state contain fish with tissue mercury concentrations that exceed human health criteria (> 0.06-0.3 mg/kg; see Table 4.2-2), criteria for the protection of mammalian and avian wildlife (> 0.1 and 0.02 mg/kg, respectively; see Table 4.2-2), and thresholds at which adverse impacts to fish have been documented (> 0.254 mg/kg; see above paragraph).

Hg concentrations in water to be used for potable uses are usually well below the maximum contaminant level (MCL) of 2 μg/L, which reflects the allowable concentration over a long-term (i.e., liftetime) exposure of an individual who consumes water containing Hg. The assessment of potential Hg discharges from Pit #1 and Pit #2:BC from the South Yuba River could result in a dredging plume concentration exceeding the CTR human health criteria upon leaving the dredge. There has been no work done to determine how far CTR and human health criteria exceedences would extend down stream of a dredge dredging Pit #2 type sediment.. Given that the discharge of Hg would be associated with TSS, and TSS plumes would undergo substantial attenuation due to sediment settling and dilution downstream, Hg concentrations would decrease downstream of the dredging. Exposure of drinking water sources to Hg from dredging activity would be low because dredging activity is anticipated to be largely dispersed, intermittent, and temporary. Consequently, the potential exposure of drinking water supplies diverted downstream from dredging areas to Hg levels exceeding the state drinking water MCL of 2 μg/L would be expected to be infrequent and intermittent. Thus, the Program would not cause substantial, or likely even measurable, increased risk to human health through consumption of Hg in drinking water supplies.

Geographic Translation

Although the South Yuba River, Englebright Lake, and the Sacramento-San Joaquin Delta were assessed specifically due to the availability of data at these sites, findings can be translated to other watersheds and geographic regions based on characteristics common to these areas and assessed areas.

As shown in Figure 4.2-2, historic gold mines are located throughout California, and suction dredgers target areas where gold has been located. Elemental Hg was used in both placer and hard-rock gold mining, and, therefore, is found throughout historic gold-mining regions. This causes background sediment Hg concentrations to be high throughout gold-mining regions, as well causing an increased probability of Hg hot-spots. Although hydraulic mining was most extensively practiced in the South Yuba watershed, it also was practiced in other watersheds of the Yuba, as well as watersheds of the Feather, American, Bear, Cosumnes, and Tuolumne Rivers. Additional sediment characterization from areas most likely to be targeted by suction dredgers would further clarify risk of dredging actions exacerbating existing Hg problems. Fish tissue data suggest that Hg in tissue will be high throughout historic gold-mining regions, and most sites are on the CWA Section 303(d) listed for Hg already. Fish tissue concentrations are above thresholds of concern throughout historic gold-mining regions (see Table 4.2-3). Therefore, any impact of suction dredging on Hg loading and MeHg concentrations in downstream environments might further exacerbate the existing Hg impairments.

Assessing risk on a site-specific basis across the state would be possible following site-specific characterization of: 1) sediment Hg levels, 2) estimates of watershed load, 3) impact on methylation experiments, and 4) impact on reactivity of resuspension experiments. Suction dredging will likely not pose substantial risk at every location it is practiced, but substantially increased risk from dredging discharges and associated Hg resuspension will likely be common across the state.

Summary of Findings

Suction dredging operators may target deep sediments (i.e., those too deep to be available to scour under winter flows), and thus mobilize sediment that may not be mobilized by typical winter high-flow events. Sediments in the historic gold-bearing and gold-mining areas of California that would be targeted by suction dredgers also may be elevated in Hg compared to sediments in other non-mining areas. The discharge of sediment with high THg concentrations will result in increased THg concentrations in upper sediments of downstream water bodies, particularly in lower elevation zones of natural sediment deposition (e.g., low-gradient floodplains), including reservoirs where present. A substantial fraction of the fine sediment also may pass through lower elevation reservoirs and thus be transported to lower elevation locations, such as the Sacramento-San Joaquin Delta, where Hg methylation and uptake may occur.

The fate and transport assessment conducted herein, based on recent intensive field studies of sites in the Yuba River system conducted by USGS scientists, indicates that the discharge and transport of THg loads from suction dredging of areas containing sediments highly elevated in Hg and elemental Hg is substantial relative to background watershed loadings, especially in below average runoff water years. For example, within areas of highly elevated sediment Hg concentrations, a single suction dredge operator using an average size (4 inch) dredge could discharge approximately 10% of the entire watershed Hg loading during a dry year during an average suction dredging time of 160 hours. By inference, the analysis indicates that larger capacity dredges or multiple dredges operating in similar sediments with highly elevated sediment Hg concentrations could potentially contribute a much larger proportion of the watershed load than 10%. The value 10% was selected based on a professional judgment of what would be a measurable increase in background loading. The analysis does not assume that this is a threshold of significance below which effects are insubstantial, but is used as a reasonable point of reference. The relative proportion of THg loading from suction dredging activity, compared to background watershed loading, is directly dependent on the dredge size, duration of operations during the year, and sediment characteristics and concentrations. The loading assessment indicates that dredging in areas with average sediment Hg concentrations and no elemental Hg is unlikely to result in a substantial contribution to the overall watershed loading. For example, when dredging in sediments with average Hg concentrations, more than the entire permitted population of suction dredgers would need to be operating within the watershed to discharge 10% of the background Hg loading in a dry year using average size (4 inch) dredges. Additionally, suction dredging discharge and transport of THg occurs primarily in the summer rather than the winter, when most background Hg is transported to reservoirs. While the precise implications of this are not known, it is known that methylation is generally more pronounced at higher temperatures and lower oxygen environments, both of which are more likely under summer conditions than winter conditions.

Additionally, while many unknowns surround the flouring of elemental Hg, the increased surface area and increased potential for downstream transport will likely enhance reactivity and transport to areas favorable to methylation (i.e., downstream reservoirs and wetlands). Moreover, resuspension of sediments containing Hg in oxygenated environments has been shown to increase levels of $Hg(II)_R$, which has been shown to be directly related to methylation rate. The only available data comparing tissue Hg levels under the influence of suction dredging and when no suction dredging was occurring indicate a decrease in tissue Hg concentration under the no dredging condition that may not be attributable to inter-annual variability or hydrologic conditions alone. Overall, available data show that suction dredging of sediments with elevated THg concentrations and deposits of elemental Hg can be a principal source of concern for producing higher THg concentrations in downstream deposition zone sediments than would otherwise occur from discharges only of natural watershed loading events. Moreover, such mobilized sediment containing high THg and $Hg(II)_R$ concentrations results in increased MeHg production in reservoirs or the Delta where these Hg-laden sediments are deposited. On the contrary, mobilized sediment containing average sediment Hg concentrations has been shown to have no effect on measurable effect on MeHg production in a downstream reservoir or the Delta.

Finally, the Office of Environmental Health Hazard Assessment has documented and issued consumer fish consumption advisories due to elevated levels of Hg in fish tissue for numerous areas of California that were historically affected by Hg ore mining, and in some of the areas where gold mining occurred and elemental Hg was used extensively. Concentrations of Hg in fish tissue in these areas are also above criteria developed for the protection of mammalian and avian wildlife, and occasionally exceed levels that have been found to adversely affect fish health or reproduction. Fish tissue Hg levels have been correlated to MeHg levels in sediment, which in turn have been correlated with THg levels in sediment.

Based on the information discussed above, suction dredging has the potential to contribute substantially to: (1) watershed Hg loading to downstream reaches within the same water body and to downstream water bodies, (2) MeHg formation in the downstream reaches/water bodies, and (3) bioaccumulation in aquatic organisms in these downstream reaches/water bodies. Available evidence suggests that these processes associated with suction dredging in the Sierra foothills, for example, may increase Hg levels in reaches/water bodies downstream of suction dredging areas by frequency, magnitude, and geographic extent such that MeHg body burdens in aquatic organisms may be measurably increased, thereby substantially increasing the health risks to wildlife (including fish) or humans consuming these organisms. Therefore, this impact is considered a potentially significant impact.

Potential mitigation measures to reduce the impact would necessarily involve actions to avoid or limit THg discharge from areas containing elevated sediment Hg and/or elemental Hg from suction dredging activities under the Program. Such discharge limiting actions could include the following:

- Identify river watersheds or sub-watersheds where sediment Hg levels are elevated above regional background levels or where elemental Hg deposits exist and establish closure areas to avoid suction dredging within these areas. No such data currently exist to comprehensively identify Hg “hot-spots”; however, data, especially from Sierra Nevada watersheds impacted by mining, suggest that sediment mercury levels at these sites are elevated above background levels. Hence, this action could involve a phased study to identify the presence of such areas based on intrinsic properties including proximity to mines, hydraulic and channel features, and other factors.

- Limit the allowable suction dredge nozzle size and/or allowable seasonal duration of dredging activity within water bodies known to contain sediment elevated in Hg or that contain elemental Hg deposits. Although smaller nozzle sizes would still cause mercury releases when dredging mercury enriched sediment, the amount of mercury discharged would be lower than with larger nozzle sizes.
- Implement a special individual permit system for suction dredge operators for areas where Hg "hot-spots" exist. The permit system would be designed to require assessment of the area prior to initiation of dredging activity and issuance of terms and conditions to ensure that Hg hot-spots are identified and avoided or other provisions are implemented to ensure that the dredging activity does not result in substantial discharge of Hg downstream from the site.

Implementation of such mitigation actions, implementation procedures, monitoring, and enforcement may reduce potential impacts. However, because not all locations of elemental mercury deposits are known, the feasibility with which sites containing elemental mercury could be identified at a level of certainty that is sufficient to develop appropriate closure areas or other restrictions for allowable dredging activities, is uncertain at this time. Moreover, at this time the Program allows for suction dredging activities to occur on a statewide basis within areas known to contain historic gold mining sites and sediments contaminated with elemental mercury. Thus, a comprehensive set of actions to mitigate the potential impact through avoidance or minimization of mercury discharges has not been determined at this time, nor is its likely effectiveness known. It should be noted that a program of feasible and adequate mitigation actions may be developed that includes the phased implementation of actions in combination with adaptive monitoring and evaluation measures. This impact would remain potentially significant until such time that a sufficient and feasible mitigation program is developed but there is no guarantee that this type of mitigation is practicable. This impact is considered significant and unavoidable.

Impact WQ-5. Effects of Resuspension and Discharge of Other Trace Metals from Suction Dredging (Significant and Unavoidable)

Implementation of suction dredging under the Program may result in dredging activity occurring in areas within California where the sediments could contain relatively elevated concentrations of trace metals other than Hg (e.g., copper, lead, zinc). Historic copper, lead, and silver mines are located throughout the Sierra Nevada, and copper, lead, silver, and zinc mines are located in the Klamath-Trinity Mountains. Trace metals levels in sediments in Sierra streams have not been thoroughly evaluated, with the exception that specific mining cleanup projects may have site-specific data (e.g., Iron Mountain Mine, located adjacent to Spring Creek and other tributaries to the Sacramento River near Redding). As identified in Table 4.2-1 above, the RWQCBs have identified numerous stream segments on the 303(d) list of impaired water bodies for various trace metals. Many 303(d) listed water bodies are lower elevation bays and enclosed estuaries where the historical industrial sources are the cause for listing. However, the upper Sacramento River watershed includes several 303(d) listed streams near well-known mining areas which are affected by acid mine drainage producing substantial discharges primarily of cadmium, copper, and zinc. At such sites, metals levels tend to be elevated in sediments, sediment pore water, and the water column.

Aquatic life beneficial uses are the most sensitive beneficial uses to ambient water body concentrations of most trace metals. However, as evidenced by primary or secondary drinking water MCLs, the municipal and domestic water supply beneficial use may be more sensitive to some constituents (e.g., arsenic, iron, and manganese).

As noted in the discussion above for Impact WQ-3 (Turbidity/TSS), suction dredging: (a) is intermittent in nature, (b) is generally widely dispersed geographically across the state, typically occurs in undeveloped upper watershed areas, and (c) generally produces small discharge volumes, relative to the total discharge of the water body in which dredging occurs and relative to downstream larger order streams and rivers where drinking water diversions exist. Consequently, dissolved trace metals or that fraction of the total metal mobilized that is adsorbed to sediment particles <63 µm that stay suspended for long periods of time tend to be rapidly diluted, both within the immediate water body and are further diluted in downstream waters bodies. Moreover, the remainder of the total recoverable trace metal fraction that is mobilized by suction dredging (i.e., fraction adsorbed to larger sediment particles) generally settles out within a few hundred meters of the dredging site. The result is that trace metals concentrations that may be elevated in the dredging discharge tend to return to background levels within close proximity to the dredge.

Although relatively little study of trace metal (other than mercury) mobilization and transport related to suction dredging has occurred, a few studies have been identified. Johnson and Peterschmidt (2005) identified a maximum copper concentration of 9.3 µg/L in suction dredge effluent in a study on the Similkameen River in Washington State. Zinc and lead were both significantly below their respective acute criteria. In a study of dredging in the Fortymile River of Alaska, the maximum near-field copper concentration was 20 µg/L, and the maximum zinc concentration was 43 µg/L (Royer et al., 1999). In both studies, concentrations returned to ambient background levels within a short distance from the dredging site.

Based on the above discussion and studies cited, it is not expected that suction dredging under the Program would cause more frequent exceedance of CTR criteria for the protection of the municipal and domestic water supply use or state drinking water MCLs at frequency, magnitude, or geographic extent that would result in adverse effects on the municipal and domestic supply beneficial use, or any of the other non aquatic life beneficial uses. Therefore, the remainder of this assessment will focus on determining whether suction dredging under the Program would adversely affect aquatic life beneficial uses.

The bioavailability (i.e., the ability for a metal to be taken into the body of an aquatic organism) and thus toxicity of arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc are affected by the total hardness of the water and concentrations of other water quality parameters, such as dissolved organic carbon, specific cations and anions, and pH where exposure occurs. Consequently, the CTR criteria for these metals include either includes a "water-effect ratio," that is hardness based, or both. The water-effect ratio component of the CTR criteria equations for these metals accounts for the effect of all water quality characteristics other than hardness on the metal's bioavailability and thus toxicity.

This is important to consider in this assessment because metals that are bound to sediment particles are not bioavailable to fish and benthic macroinvertebrates and thus are not in a form that can cause toxicity to aquatic life. Moreover, the dissolved fraction of metals measured is not all bioavailable for uptake by organisms. The amount of the dissolved fraction that is bioavailable depends on the water chemistry characteristics identified above.

This assessment considered the potential discharge of trace metals from suction dredging using a fate and transport methodology similar to that used for the assessment of mercury. Sediment core data from Englebright Lake in the Yuba River watershed, and from the lower Sacramento River between Redding and Freeport, were used as assumed average stream sediment concentrations and coupled with actual TSS data from suction dredge discharges to estimate total recoverable concentrations of arsenic, copper, silver, zinc, lead, chromium, nickel, and cadmium in a dredge's discharge plume. These estimates assume that 100% of the metal concentration is adsorbed to sediment for the purpose of calculating the estimated discharge concentrations. In reality, it is expected that most of the discharged metals concentration would indeed be sediment bound, but some fraction would be in the dissolved form, and a portion of the dissolved fraction would actually be bioavailable for uptake by organisms. The estimated discharge total recoverable metal concentrations were then compared to CTR acute (criteria maximum concentration [CMC]) and chronic (criteria chronic concentration [CCC]) criteria, based on moderate Sierra stream hardness of 40 mg/L as $CaCO_3$, with results shown in Table 4.2-6.

TABLE 4.2-6. SEDIMENT CONCENTRATIONS OF TRACE METALS IN SIERRA NEVADA STREAMS AND ESTIMATED TOTAL RECOVERABLE CONCENTRATIONS IN SUCTION DREDGE DISCHARGE PLUMES UNDER ASSUMED MINIMUM AND MAXIMUM TOTAL SUSPENDED SOLIDS CONCENTRATIONS

Metal	Concentration (1) (mg/kg)	TEC (2) (mg/kg)	PEC (2) (mg/kg)	Total Recoverable Metal, µg/L; 3 mg/L TSS	Total Recoverable Metal, µg/L; 340 mg/L TSS	CTR CMC, µg/L (3)	CTR CCC, µg/L (4)
Arsenic	**20.0**	9.79	33	0.06	6.80	N/A	N/A
Copper	**78.3**	31.6	149	0.24	**26.63**	5.9	4.26
Silver	N/A	N/A	N/A	N/A	N/A	0.783	N/A
Zinc	**134.5**	121	459	0.40	45.73	55.1	55.1
Lead	17.4	35.8	128	0.052	**5.93**	25.43	0.99
Chromium	**177.2**	43.4	111	0.53	**60.26**	854	34.9
Nickel	**96.1**	22.7	48.6	0.29	**32.68**	220.4	24.0
Cadmium	0.6	0.99	4.98	0.0017	**0.19**	0.84	0.14

N/A = Not applicable; TSS = Total suspended solids; values in bold represent exceedances of TECs or CTR CMCs/CCCs.

1 – Average of values measured in the Sacramento River (at Colusa, Verona, and Freeport [Alpers et al., 2000]), shallow cores in Englebright Lake (Sites 1, 4, and 7 [Alpers et al., 2006]), and fine grained sediments at Daguerre Point Dam (Alpers et al., 2006).

2 – TEC = Threshold Effect Concentration (concentration below which harmful effects are unlikely to be observed); PEC = Probable Effect Concentration (concentration above which harmful effects are likely to be observed [MacDonald 2000]).

3 – CTR CMC = California Toxics Rule Criteria Maximum Concentration; assumed hardness of 40 mg/L as $CaCO_3$.

4 – CTR CCC = California Toxics Rule Criteria Continuous Concentration; assumed hardness of 40 mg/L as $CaCO_3$.

At the maximum anticipated TSS concentrations associated with suction dredging (i.e., 340 mg/L; Thomas, 1985), a number of CTR total recoverable criteria could potentially be exceeded within the discharge plume. As stated above, settling of coarse suspended solids in combination with dilution from background streamflow would be expected to result in rapid attenuation of trace metal concentrations, which would be expected to return to background or near-background levels within a short distance downstream of the dredging site. Assuming that trace metals discharged from suction dredging are mostly associated with sediment, and that sediment levels in most areas dredged are relatively similar to areas elsewhere in the watershed (other than "hot-spot" areas), then the increased downstream loading of particulate-derived metals should not affect downstream sediment concentrations significantly.

In the scenario described above, most of the trace metal mobilized by the dredging activity, and measured as part of the total recoverable metals measurement, is expected to be bound to sediment particles. Sediment bound metal is not bioavailable to aquatic life and thus would not pose a risk of toxicity to fish or invertebrates passing through the discharge plume. In reality, one would expect some fraction of the total recoverable measurement of elevated metal concentration in the plume to be in a dissolved or ionic form that would be bioavailable to organisms. However, the concentration of metal in a bioavailable form is expected to be substantially lower than the full total recoverable concentrations shown in Table 4.2-6. At a typical dredging site (having sediment trace metal concentrations similar to those identified herein for the Yuba and Sacramento river sites and used in the Table 4.2-6 calculations), the dredging activity is not expected to increase the bioavailable concentration of any of the eight metals discussed to levels that would be toxic to aquatic life, on an acute or chronic basis. Moreover, the bioavailable fraction of metal, which could have been elevated by the dredging activity, will rapidly become diluted with increasing distance downstream from the dredging site, and is expected to rapidly return to background levels at most sites as shown in the studies cited above.

With regards to aquatic life exposure, because of the noise and activity around a site of active dredging, relatively few fish (within the river reach) would be expected to be exposed to the plume. Those invertebrates that may be disturbed and end up drifting through the plume would generally be exposed to elevated plume concentrations for only minutes before drifting beyond the plume itself. Likewise, fish feeding within the plume (on displaced and drifting invertebrates) or moving through the plume would be exposed to elevated metals levels for short periods of time, and would not be exposed to such conditions for four continuous days, which is the exposure period associated with the chronic (CCC) CTR criteria. Hence, based on the expected speciation (i.e., form) of total recoverable metal within the discharge plume and the exposure times of aquatic organisms to the plume itself, toxicity to aquatic organisms, even those temporarily feeding within or moving through the plume, is not expected to occur. This finding is consistent with the available scientific literature, which does not document toxicity to aquatic organisms associated with suction dredging.

Because there are specific sites in California where cadmium, copper, and zinc, for example, are highly elevated where historic mining activities occurred, it is reasonable to assume that localized hot-spots containing high sediment concentrations of metal ores exist. At such sites, sediment-bound metal concentrations and sediment pore water metal concentrations are likely to be substantially higher than at typical or "normal" sites assessed above. Such sites may also have problems associated with acid mine drainage. Such sites (e.g., Spring

Creek near the Iron Mountain Mine near Redding) tend to be identified on the state's 303(d) list due to their current, substantial impairments.

Consistent with the above discussion for typical (i.e., non-hot-spot) sites, suction dredging in metal hot-spot/acid mine drainage sites would tend to remobilize sediment-bound metals, which would rapidly re-settle to the creek bed within a short distance downstream of the site. However, hot-spot sites with known acid mine drainage issues (and associated low pH waters) would be expected to have very elevated levels of dissolved metals in both the water column and in the sediment pore water as well. Remobilization of highly elevated dissolved and bioavailable metal concentrations in low pH waters could have more far-reaching effects because once remobilized, the elevated concentrations of dissolved and bioavailable metals could move much farther downstream than the sediment-bound fraction. This would potentially discharge elevated concentrations of metals into downstream reaches or other downstream water bodies, thereby substantially elevating dissolved and bioavailable concentrations of various trace metals at distant downstream sites. At the example Spring Creek site, this could result in increased loading of dissolved and bioavailable trace metals to the Sacramento River, relative to the baseline condition of not dredging at this hot-spot site. Although adequate data are not available to perform a definitive, quantitative assessment of potential metal-related impacts to aquatic life and other beneficial uses within the hot-spot water body and at downstream locations due to suction dredging, this dredging scenario has the potential to adversely affect one or more beneficial uses within the hot-spot water body itself and at downstream water body locations.

Based on the information presented and discussed above, suction dredging under the Program at typical sites would not be expected to increase levels of trace metals assessed herein in any water body such that the water body would exceed state or federal water quality criteria by frequency, magnitude, or geographic extent that would result in adverse effects on one or more beneficial uses. In addition, suction dredging would not result in substantial, long-term degradation of trace metal conditions that would cause substantial adverse effects to one or more beneficial uses of a water body. Finally, because trace metals addressed in this assessment are not bioaccumulative constituents, the potential to mobilize the trace metals discussed herein would not substantially increase the health risks to wildlife (including fish) or humans consuming these organisms through bioaccumulative pathways.

Conversely, suction dredging at known trace metal hot-spots having acid mine drainage issues and associated low pH levels and high sediment and pore water metal concentrations, including high dissolved and bioavailable forms of metals, has the potential to increase levels of one or more trace metal in water body reaches such that the water body reach would exceed CTR metals criteria by frequency, magnitude, and geographic extent that could result in adverse effects to one or more beneficial uses, relative to baseline conditions. Therefore, this impact is considered to be potentially significant.

Potential mitigation measures to reduce the impact would necessarily involve identifying known trace metal hot-spots associated with past mining operations (e.g., problematic sites with acid mine drainage) and stating in the Regulations Program that these identified sites are closed to suction dredging.

Implementation of such mitigation actions may reduce potential impacts. However, because not all locations of such contamination are known, the feasibility with which contaminated sites could be identified at a level of certainty that is sufficient to develop appropriate closure areas or other restrictions for allowable dredging activities is uncertain at this time. Thus, a comprehensive set of actions to mitigate the potential impact through closures or minimization of discharges has not been determined at this time, nor is its likely effectiveness known. It should be noted that a program of feasible and adequate mitigation actions may be developed that includes the phased implementation of actions in combination with adaptive monitoring and evaluation measures. This impact would remain potentially significant until such time that a sufficient and feasible mitigation program is developed but there is no guarantee that this type of mitigation is practicable. This impact is considered significant and unavoidable.

Impact WQ-6. Effects of Trace Organic Compounds Discharged from Suction Dredging (Less than Significant)

Implementation of suction dredging under the Program may result in dredging activity occurring in sediments that could potentially contain elevated concentrations of trace organic compounds such as the now-banned and persistent legacy chlorinated hydrocarbon pesticides (e.g., DDT, dieldrin, and chlordane). Legacy pesticides can be transported to remote or high altitude waterways atmospherically. However, trace organic compounds have rarely been observed above public health thresholds in fish in upper elevation watersheds where suction dredging generally occurs (Davis et al., 2009). PCBs also are transported atmospherically, and are more commonly found above threshold values in fish (Davis et al., 2009; Ohyama et al., 2004). As noted in the Literature Review (Appendix D), characteristics of trace organic compounds in aquatic sediments have not been thoroughly evaluated throughout California. Moreover, no studies have been undertaken to determine whether suction dredging releases these chemicals, and, if so, what the fate, transport, and effects of the chemicals are downstream. The lowest applicable CTR criteria, either for aquatic life protection or human health protection, differs among the different chlorinated hydrocarbon pesticides. Regardless, where CTR criteria exist for the protection of human health via consumption of water and organisms and organisms only (i.e., municipal and domestic supply and recreation uses) and aquatic life beneficial uses, the criteria for protection of human health tend to be lower (e.g., see CTR criteria for 4,4'-DDT, Aldrin, Dieldrin, Heptachlor, PCBs). However, for some compounds (e.g., Endrin, alpha-Endosulfan, beta-Endosulfan), the CTR aquatic life criteria are lower than the human health criteria.

There are several characteristics of trace organic compounds that reduce the potential for there to be adverse effects to beneficial uses associated with their resuspension caused by suction dredging. First, legacy chlorinated hydrocarbon pesticides in particular have a high affinity for binding to sediment; thus, resuspension is unlikely to result in substantial release of bioavailable compound to the water column.

Second, these trace organic compounds were generally not widely used in the rural areas were suction dredging activity typically occurs; thus, there is unlikely to be "hot spot" areas for these compounds where dredging occurs. Based on these considerations, the vast majority of trace organic compounds mobilized by suction dredging would be adsorbed to sediments, most of which would rapidly re-settle to the stream bed within close proximity to the dredging site. Aquatic life exposed to the dredging plume would not experience toxicity because the sediment-adsorbed compounds would not be bioavailable for uptake by organisms. Trace organics adsorbed to fine sediments (e.g., <63 µm) that are transported further downstream also would remain biologically unavailable to aquatic life and would eventually settle back to the substrate in downstream water bodies. Drinking water intakes that may divert such re-suspended fine sediments would remove the vast majority of it in the filtration process.

Third, suction dredging activities target areas with relatively active stream flow conditions. Consequently, to the degree that a portion of re-suspended trace organics would be present in the water column in bioavailable forms, their concentrations would not be expected to be at levels that would cause toxicity to aquatic life at the site or immediately downstream of the site. This is due to both expected levels of bioavailable concentrations of these compounds being relatively low and the limited duration of exposure to the dredging plume areas that organisms would experience. Invertebrates displaced by dredging or fish passing through the plume would generally be exposed to the plume for a matter of minutes. This is consistent with findings from the literature review, which did not produce any scientific literature that suction dredging results in toxic conditions for fish or other aquatic organisms. Moreover, concentrations of bioavailable organics would be rapidly attenuated by dilution with increasing distance downstream. Thus, dredging discharges would not be expected to cause measurable increases in the bioconcentration or biomagnifications of these compounds in populations of organisms in downstream reaches and downstream water bodies, relative to the baseline conditions where dredging was not occurring.

Finally, because sediment mobilization associated with suction dredging is not expected to re-mobilize high concentrations of trace organics (but rather mobilize sediments having "typical" levels of these compounds adsorbed to the sediments), its re-deposition downstream should not substantially alter downstream sediment concentrations of these compounds.

Based on the information presented and discussed above, suction dredging under the Program would not be expected to increase levels of trace organics in any water body such that the water body would exceed state or federal water quality criteria by frequency, magnitude, or geographic extent that would result in adverse effects on one or more beneficial uses. In addition, suction dredging would not result in substantial, long-term degradation of trace organic conditions that would cause substantial adverse effects to one or more beneficial uses of a water body. Finally, suction dredging is not expected to mobilize trace organics in a manner or to an extent that would increase levels of any bioaccumulative trace organic in a water body by frequency and magnitude such that body burdens in populations of aquatic organisms would be expected to measurably increase, thereby substantially increasing the health risks to wildlife (including fish) or humans consuming these organisms. Therefore, this impact is considered to be less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities requiring notification under Fish and Game Code section 1602 are likely to result in additional site disturbances, increasing the potential to cause additional adverse water quality effects. Larger nozzle sizes and power winching would increase the amount of substrate movement capability, while dredging in lakes would potential affect sediment substrates with properties (e.g., percent fine-grained materials, organic matter content, chemical composition, etc.) that may substantially differ than the predominant mineral and dense riverine sediments assessed herein. Suction dredging in lakes also would potentially increase the available area and amount of dredging within the state beyond those anticipated under the proposed regulations. Diverting stream flows at suction dredging sites would have the potential to increase channel sediment disturbance and alter the dilution and assimilative capacity of discharge plumes associated with dredging-related activity.

Activities subject to Fish and Game Code section 1602 notification have the potential to increase the discharge of sediment and magnitude and duration of turbidity/TSS plumes downstream of the dredging activity than the conditions assessed for the proposed regulations. Additionally, turbidity/TSS plumes and effects to aquatic organisms in calm lake or reservoir water bodies could differ substantially compared to the conditions assessed herein. Consequently, additional environmental assessment of turbidity/TSS discharges may be necessary to determine if the activity would result in a significant impact requiring implementation of mitigation. The extent of the necessary analyses would be determined by the CDFG on a case-by-case basis, and the detailed assessment would be evaluated in a CEQA analysis.

The additional activities that would be subject to Fish and Game Code section 1602 notification would not be anticipated to result in additional or substantially changed effects associated with encampment activities (Impact WQ-1), discharges of oil and gasoline (Impact WQ-2), or discharges of organic compounds (Impact WQ-6), which were all determined to be less-than-significant impacts under the proposed regulations not requiring Fish and Game Code section 1602 notification. Additional sediment disturbance associated with increased dredging nozzle size, diversion of streamflow, and allowance of dredging in lakes/reservoirs could increase the discharge of mercury (Impact WQ-4) and other trace metals (Impact WQ-5), as assessed above. Though the impacts of discharges of mercury and other trace metals have been found to be significant and unavoidable, activities requiring notification under Fish and Game Code section 1602 may contribute to additional adverse effects; the extent of which, would be evaluated in a CEQA analysis.

Chapter 4.3
BIOLOGICAL RESOURCES

4.3.1 Introduction

This chapter discusses the potential for the Proposed Program to affect biological resources. Specifically, this section: (1) discusses state and federal regulations relevant to the biological resources affected by the Proposed Program; (2) provides an overview of the existing environmental setting throughout the state; (3) identifies wildlife and plant species potentially affected by the Proposed Program; and (4) makes findings regarding the significance of the Proposed Program's impacts on biological resources.

The following appendices support this chapter:

- Appendix I: Descriptions of habitat types likely to occur in or adjacent to Proposed Program activities;
- Appendix J: Species lists generated from California Natural Diversity Database (CNDDB) query;
- Appendix K: Detailed life history descriptions for *Fish* action species
- Appendix L: Species-based restrictions on Proposed Program activities
- Appendix M. Management of Invasive Species

For the purposes of this chapter, the word "fish" when written as *Fish* refers to all wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn, or ova thereof, per the definition promulgated in Fish and Game Code section 45. References to fin fish are written without italics and in appropriate grammatical context.

Organization of the Discussion of Existing Conditions

This chapter addresses the following aspects of the existing conditions within the context of the Proposed Program.

- "Regulatory Setting" describes state and federal regulations relevant to the assessment of existing conditions and environmental consequences of the Proposed Program;
- "Environmental Setting" describes the various eco-regions of California where suction dredging may occur; and
- "Biological Resources" lists the organisms that potentially inhabit the Program Area. This section also identifies "special-status species" within the Program Area.

Sources of Information

The descriptions and analyses presented in this chapter were prepared using a broad range of information sources, including:

- The California Natural Diversity Database (CNDDB);
- Studies specific to suction dredge mining;
- More generic reports relevant to biological communities and organisms including scientific analyses published in peer-reviewed journals and books;
- Professional experience with analysis of fisheries management programs, endangered species conservation, mining activities, and the effects of suction dredging in California;
- Other data sources as cited below; many of these resources are available online, as detailed in Chapter 8, *References Cited*.

4.3.2 Regulatory Setting

This section describes federal and state regulations, laws, permits, and policies that are relevant to protection of biological resources within the Program Area. A general description of local policies and ordinances that may be applicable to suction dredging is also provided.

Federal Laws, Regulations, and Policies

Endangered Species Act of 1973

The Endangered Species Act (ESA) (16 U.S. Code [USC] 1531–1544) provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, as well as the protection of habitats on which they depend. The U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service (NMFS) share responsibility for implementing the ESA. In general, USFWS manages land and freshwater species, while NMFS manages marine and anadromous species. As defined by the ESA, endangered refers to species that are "in danger of extinction within the foreseeable future throughout all or a significant portion of its range," while threatened refers to “those animals and plants likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges.” Refer to *Special Status Species* discussion in Section 4.3.3 below, for details on the various regulatory classifications for species covered under ESA.

Endangered Species Act Section 4(d)

Incidental take of a species listed as threatened under the federal ESA may be broadly authorized under Section 4(d) of the ESA, which authorizes incidental take of such threatened species consistent with certain conditions. Section 4(d) is not applicable to species listed as endangered under the ESA. Through a Section 4(d) rule, the USFWS or NMFS may apply take prohibitions for threatened species but exempt certain programs or activities (such as recreational fisheries) if they meet the requirements specified in the rule. The USFWS or NMFS may apply a Section 4(d) rule either at the time of listing or subsequently. A familiar example is the 4(d) rule that protects anglers if they accidentally catch a listed fish species, provided that they release it unharmed.

Endangered Species Act Section 7

Section 7 requires federal agencies to consult with USFWS or NMFS, or both, before performing any action (including actions such as funding a program or issuing a permit) that may affect listed species or designated critical habitat. Section 7 consultations are designed to assist federal agencies in fulfilling their duty to ensure federal actions do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat. Because the Proposed Program does not have a federal partner or nexus (in the form of a discretionary approval such as a Clean Water Act Section 404 permit) CDFG is not required, nor able to, undertake Section 7 consultation. Suction dredging that takes place on federal lands (e.g., National Forests), and is conducted in a manner that requires a federal agency to issue a discretionary permit, may be subject to Section 7 consultation if their activities have the potential for take of federally listed species.

Endangered Species Act Section 9

Under the ESA, it is illegal for any person, private entity, or government agency to take endangered species without federal authorization. Take of most threatened species is similarly prohibited. *Take* is defined to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct. *Harm* is defined to mean an act that actually kills or injures fish or wildlife. Take may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. The incidental take of listed species can be authorized under Section 7 or Section 10 of the ESA.

Endangered Species Act Section 10

Absent a 4(d) rule or a completed Section 7 consultation, incidental take of a listed species can only be authorized under Section 10 of the ESA. A Section 10(a)(1)(A) permit authorizes the intentional take of listed species for research or propagation that enhances the survival of the listed species in question. Incidental take by a non-federal entity also may be authorized through a Section 10(a)(1)(B) permit, including approval of a habitat conservation plan. While the Proposed Program assessed in this EIR is not seeking a Section 10(a)(1)(B) permit, it is possible this section of the ESA is applicable to individual suction dredgers if their activities have the potential for take of federally listed species.

Endangered Species Act Recovery Planning

The USFWS and NMFS are responsible for evaluating the status of species listed under the ESA, and developing recovery plans for those species. The ESA requires that recovery plans be developed that evaluate the current status of the listed population or species, assess the factors affecting the species, identify recovery (delisting) goals, identify the entire suite of actions necessary to achieve these goals, and estimate the cost and time required to carry out those actions.

Endangered Species Act Critical Habitat

When a species is proposed for listing as endangered or threatened under the ESA, USFWS or NMFS must consider whether there are areas of habitat that are essential to the species' conservation. Those areas may be proposed for designation as "critical habitat." Under Section 7, all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat. These requirements apply only to federal agency actions, and only to habitat that has been designated. Critical habitat requirements do not apply to citizens engaged in activities on private land that do not involve a federal agency.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act of 1976 is the primary act governing federal management of fisheries in federal waters, from the three nautical-mile state territorial sea limit to outer limit of the U.S. Exclusive Economic Zone. It establishes exclusive U.S. management authority over all fishing within the Exclusive Economic Zone, all anadromous fish throughout their migratory range except when in a foreign nation's waters, and all fish on the continental shelf. The Act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from U.S. fisheries in their regions. The Magnuson-Stevens Act also requires federal agencies to consult with the National Marine Fisheries Service on actions that could damage Essential Fish Habitat (EFH). EFH includes those habitats that support the different life stages of each managed species. A single species may use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions. EFH can consist of both the water column and the underlying surface (e.g. streambed) of a particular area. EFH has been designated in many locations throughout the Program Area.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (Title 16, United States Code [USC], Part 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of, or the permanent or temporary possession of, a protected species constitute violations of the MBTA. The MBTA also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum (MBPM-2) dated April 15, 2003, clarifies that destruction of most unoccupied bird nests (without eggs or nestlings) is permissible under the MBTA; exceptions include nests of federally threatened or endangered migratory birds, bald eagles (*Haliaeetus leucocephalus*), and golden eagles (*Aquila chrysaetos).* USFWS is responsible for overseeing compliance with the MBTA.

State Laws, Regulations, and Policies

California Environmental Quality Act

Title 14, section 15380, of the California Code of Regulations defines the terms species, endangered, rare, and threatened as they pertain to CEQA. Section 15380 also provides a greater level of consideration for state-listed or federally-listed species, and for any species that can be shown to meet the criteria for listing, but which has not yet been listed. The criteria for listing of a species under CEQA are as follows:

- When its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or
- Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or
- The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as that term is used in the Federal Endangered Species Act.

California Fish and Game Commission

The California Constitution establishes the California Fish and Game Commission (Commission) (CA Constitution Article 4, § 20). The Fish and Game Code delegates the power to the Commission to regulate the taking or possession of birds, mammals, fish, amphibian and reptiles (Fish & G. Code, § 200). The Commission has adopted regulations setting forth the manner and method of the take of certain fish and wildlife in the California Code of Regulations, title 14. Likewise, the Commission has exclusive statutory authority under the Fish and Game Code to designate species as endangered or threatened under the California Endangered Species Act. (Fish & G. Code, § 2070)

California Fish and Game Code—Species Protection

The Fish and Game Code establishes CDFG (Fish & G. Code, § 700) and states that the fish and wildlife resources of the state are held in trust for the people of the state by and through CDFG (Fish & G. Code, § 711.7, subdiv. (a)). Fish and Game Code section 1802 states that CDFG has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. All licenses, permits, tag reservations and other entitlements for the take of fish and game authorized by the Fish and Game Code are prepared and issued by CDFG (Fish & G. Code, § 1050, subdiv. (a)).

Provisions of the Fish and Game Code provide special protection to certain enumerated species such as:

- section 3503 protects eggs and nests of all birds.
- section 3503.5 protects birds of prey and their nests.

- section 3513 protects all birds covered under the Federal Migratory Bird Treaty Act.
- section 3511 lists fully protected birds.
- section 5515 lists fully protected fish species.
- section 3800 defines nongame birds.
- section 4700 lists fully protected mammals.
- section 5050 lists fully protected amphibians and reptiles.

California Fish and Game Code—Lake or Streambed Alteration

Fish and Game Code section 1602 states that "an entity may not substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" unless CDFG receives written notification regarding the activity and the entity pays the applicable fee. If CDFG determines that the activity may substantially adversely affect an existing fish or wildlife resource, CDFG issues an Agreement to the entity that includes reasonable measures necessary to protect the resource. Activities that typically require a Lake or Streambed Alteration Agreement include, but are not limited to, excavation or placement of fill within a stream channel, vegetation clearing, installation and operation of structures that divert the flow of water, installation of culverts and bridge supports, cofferdams for construction dewatering, and bank reinforcement.

As indicated earlier (Chapter 2), there are several circumstances under the Proposed Program (i.e., power winching, operation of a suction dredge with a nozzle larger than four inches, water diversions or impoundments, and dredging in lakes), for which a suction dredge miner would be required to submit notification to CDFG pursuant to Fish and Game Code section 1602, in addition to obtaining a suction dredge permit required pursuant to Fish and Game Code section 5653 et seq.

California Fish and Game Code—Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (Fish & G. Code, §§ 1900-1913) directs CDFG to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this state." The NPPA authorizes the Commission to designate plants as ‘endangered’ or ‘rare’ and ‘take’ of any such plants is prohibited by the Fish and Game Code, except as authorized in limited circumstances.”

California Fish and Game Code—California Endangered Species Act

The California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.) is intended to conserve, protect, restore, and enhance species designated as endangered or threatened, and their habitat (Fish & G. Code, § 2052). The Commission has exclusive statutory authority to designate species as endangered or threatened under CESA (California Constitution, article IV, § 20, subd. (b); Fish & G. Code, § 2070). Animal species designated as endangered or threatened under CESA are listed in California Code of Regulations, Title 14, section 670.5. Plant species designated as endangered or threatened under CESA, or designated as a rare plant species under the California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.), are listed in California Code of Regulations, Title 14, section 670.2.

CESA directs all state agencies, boards, and commissions to seek to conserve endangered and threatened species, and to utilize their authority in furtherance of that policy (Fish & G. Code, § 2055). For purposes of CESA, "conserve," "conserving," and "conservation" mean to use, and the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the protections provided by CESA are no longer necessary. These methods and procedures include, but are not limited to, all activities associated with scientific resources management, such as research, census, law enforcement, habitat acquisition, restoration and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking (Fish & G. Code, § 2061). CESA emphasizes that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat that would prevent jeopardy (Fish & G. Code, § 2052.1).

Species designated as endangered or threatened under CESA, and species designated as candidates for listing or delisting under CESA, are subject to what is commonly known as CESA's "take" prohibition. In general, this prohibition provides that no person shall import into the state, or export out of the state, or take, possess, purchase, or sell within the state (or attempt to do any of those acts), any species, or any part or product thereof, designated by the Commission as protected under CESA, except as otherwise provided by law (Fish & G. Code, §§ 2080, 2085; see also Cal. Code Regs., tit. 14, § 670.2, subd. (i)(1)(B)1). "Take" is defined specifically in the Fish and Game Code to mean "hunt, pursue, catch, capture, or kill," or an attempt to do any such act, and violations of CESA's take prohibition are criminal misdemeanors under state law (Fish & G. Code, §§ 86, 12000; see also *Department of Fish and Game v. Anderson-Cottonwood Irrigation District* (1992) 8 Cal.App.4th 1554). Unlike the ESA, CESA applies the take prohibitions to species under petition for listing (state candidates) in addition to listed species. Section 2081 of the Fish and Game Code expressly allows CDFG to authorize, by permit, the incidental take of endangered, threatened, and candidate species if all of the following conditions are met:

- The take is incidental to an otherwise lawful activity.
- The impacts of the authorized take are minimized and fully mitigated.
- Issuance of the permit will not jeopardize the continued existence of the species.
- The permit is consistent with any regulations adopted in accordance with sections 2112 and 2114 (legislature-funded recovery strategy pilot programs in the affected area).
- The applicant ensures that adequate funding is provided for implementing mitigation measures and monitoring compliance with these measures and their effectiveness.

Recent case law provides important guidance regarding the issuance criteria for an Incidental Take Permit under Fish and Game Code section 2081, subdivision (b). In *Environmental Protection and Information Center v. California Dept. of Forestry and Fire Protection* (2008) 44 Cal.4th 459, for example, the California Supreme Court clarified with respect to an Incidental Take Permit issued pursuant to Fish and Game Code section 2081, subdivision (b), that "'take' in this context means to catch, capture or kill" (44 Cal.4th, p. 507, citing Fish & G. Code, § 86). Similarly, in *Environmental Council of Sacramento v. City of Sacramento* (2006) 142 Cal.App.4th 1018, the Third District Court of Appeal underscored that the issuance criteria necessarily involve a complex mix of quantitative and qualitative factors that CDFG must balance and gauge in the exercise of its independent judgment. Likewise, with respect to the requirement that the permittee minimize and fully mitigate all the impacts of the authorized take, the court rejected "any insinuation that the definition of 'take' under Fish and Game Code section 2081, subdivision (b)(2), encompasses the taking of habitat alone or the impacts of the taking. As Section 86 of the Fish and Game Code makes clear, proscribed taking involves mortality (142 Cal.App.4th, p. 1040).

In short, the incidental take of listed species is authorized by CDFG on a discretionary basis. Typically, mitigation measures, including species and habitat avoidance, minimization, restoration or enhancement, acquisition, and permanent protection of compensatory habitat, along with monitoring and management and funding assurances, are necessary to demonstrate that project impacts are fully mitigated. Full mitigation for take of listed species is determined on a project-specific basis, and a variety of combinations of mitigation actions can form the basis for a conclusion that the impacts of the taking caused by any particular project are fully mitigated as required by CESA. Generally, though, full mitigation can be achieved by offsetting the project's incidental take of individuals of the covered species, along with the other spatial, temporal, direct, indirect, and cumulative impacts, including habitat loss, that constitute "impacts of the taking" as that term is used in CESA, such that the covered species continues to survive and thrive after completion of the project and required mitigation.

The CESA also provides that if a person obtains a federal incidental take statement or incidental take permit under specified provisions of the ESA for species also listed under the CESA, no further authorization is necessary under CESA if the federal permit satisfies all the requirements of CESA and the person follows specified procedures (Fish & G. Code, § 2080.1). Refer to *Special Status Species* discussion in Section 4.3.3 of this Chapter for detail on the various regulatory classifications for species covered under CESA.

Local Ordinances and Land Use Designations

There are numerous ordinances and policies enforced at the county and city levels that aim to protect fish, wildlife and their habitats. These ordinances include restrictions on activities that may be conducted in streams, riparian and wetlands areas. There are also many land use designations at the federal, state and local levels that may preclude the use of suction dredge equipment. Examples of these areas include federally designated wilderness, state Ecological Reserves, and county open space preserves. Due to the broad geographic range of the Proposed Program and limited authority of CDFG, areas that may be restricted from suction dredging due to local ordinances or land use designations are not considered specifically in this analysis. As stated in the regulations, issuance of a suction dredge permit does not relieve the permittee of the responsibility of complying with applicable federal, state, or local laws or ordinances.

4.3.3 Environmental Setting

Geographic Regions

The geographic scope of the Proposed Program encompasses the entire state. In the past, suction dredging activities have been concentrated on the rivers, streams and lakes within the Klamath Basin, the Mother Lode Region of the Sierra Nevada, and to a lesser extent streams within the San Gabriel and Los Angeles River watersheds. However, the Proposed Program does not limit the activity to these areas, therefore all perennial freshwater streams and lakes and adjacent lands are considered in the environmental setting of this EIR.

For purposes of this analysis, California is divided into eight regions according to physiographic characteristics (e.g., topography and hydrography) (Bunn et al., 2007). The descriptions of these regions, presented below, address the general physical landscape (Figure 4.3-1) and major stressors affecting wildlife and habitats within each of eight regions. The eight regions are:

- Mojave Desert Region,
- Colorado Desert Region,
- South Coast Region,
- Central Coast Region,
- North Coast–Klamath Region,
- Modoc Plateau Region,
- Sierra Nevada and Cascades Region, and
- Central Valley and Bay-Delta Region.

Full accounts for each region are provided by Bunn et al. (2007), which, except as noted otherwise, was the source for the summaries presented below.

Mojave Desert Region

The 32-million-acre Mojave Desert extends into four states: California, Nevada, Arizona, and Utah. The majority of the landscape is a moderately high plateau at elevations between 2,000 and 3,000 feet. Variations in topography, soil composition, and aspect largely account for habitat diversity. Aquatic, wetland, and riparian habitat is associated with seeps, springs, ephemeral and perennial streams. Significant perennial streams include the Amargosa and Mojave Rivers, as well as Surprise Canyon and Cottonwood Creek in the Panamint Range.

The federal government manages about 80% of the Mojave Desert Region in California. The largest land manager is the Bureau of Land Management (BLM), overseeing 8 million acres. The National Park Service (NPS) manages another 5 million acres, including the Mojave National Preserve and Death Valley and Joshua Tree National Parks, and the Department of Defense manages five military bases that cover the remaining 2.5 million acres of federal land. In contrast, the State Park System and CDFG manage only 0.32% of the region.

Major stressors affecting wildlife and habitats in the Mojave Desert Region include multiple uses conflicting with wildlife on public lands, growth and development, solar energy development, fire, groundwater overdraft, loss of riparian habitat, inappropriate off-road vehicle use, excessive livestock grazing, excessive burro and horse grazing, invasive plants, non-native fish, military lands management conflicts, illegal harvest or illegal commercialization, and mining operations.

None of the Suction Dredger Survey respondents reported dredging in the Mojave Desert Region (see Appendix F).

Colorado Desert Region

The 7 million acres of the Colorado Desert Region extend from the Mojave Desert in the north to the Mexican border in the south, and from the Colorado River in the east to the Peninsular Ranges in the west. The majority of the landscape lies below 1,000 feet elevation, but elevations range from 275 feet below sea level in the Salton Trough to nearly 10,000 feet in the Peninsular Ranges. These mountain ranges block most coastal air, resulting in an arid climate. The region experiences higher summer daytime temperatures than those found in higher-elevation deserts, and seldom experiences frost. Precipitation occurs over two seasons, one in winter and one in late summer. The common habitats of the Colorado Desert Region are creosote bush scrub; mixed scrub, including yucca (*Yucca* spp.) and cholla (*Opuntia* spp.) cactus; desert saltbush (*Atriplex polycarpa*); sandy soil grasslands; and desert dunes. Higher elevations are dominated by pinyon pine (primarily *Pinus monophylla, P. edulis* and *P. quadrifolia*), and California juniper (*Juniperus californica*), with areas of manzanita (*Arctostaphylos* spp.) and Coulter pine (*P. coulteri*).

In the Colorado Desert region's arid climate, aquatic and wetland habitats are uncommon but critical to wildlife. Springs and runoff from seasonal rains form alluvial fans, arroyos, fan palm oases, freshwater marshes, brine lakes, washes, ephemeral and perennial streams, and riparian vegetation communities dominated by cottonwood (*Populus* spp.), willow (*Salix* spp.), and invasive tamarisk (*Tamarix* spp.). The region's two largest water systems are the Salton Sea and the Colorado River.

The largest land manager of the region is the BLM, overseeing 2.9 million acres. Department of Defense land accounts for 500,000 acres. A number of other public landholdings occur around the Salton Sea. Slightly less than half of the Joshua Tree National Park lies within the Colorado Desert Region. Anza Borrego Desert State Park encompasses more than 600,000 acres. Santa Rosa Wildlife Area encompasses about 100,000 acres.

Although the Colorado Desert remains one of the least populated regions in California, human activities have had a substantial impact on the region's habitat and wildlife. Some of the greatest human-caused effects on the region have resulted from water diversions and flood control measures along the Colorado River. In addition, portions of the region are experiencing substantial growth and development pressures, most notably within the Coachella Valley.

Major stressors affecting wildlife and habitats in the Colorado Desert Region include water management conflicts and water transfer effects, inappropriate off-road vehicle use, loss

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Horizon WATER and ENVIRONMENT

Figure 4.3-1
Biological Regions in California (after Bunn et al., 2007)

and degradation of dune habitats, growth and development, solar energy development, and invasive species.

None of the Suction Dredger Survey respondents reported dredging in the Colorado Desert Region (see Appendix F).

South Coast Region

The 8 million acres of California's South Coast Region extend along the coast from the middle of Ventura County in the north, to the Mexican border in the south. Inland, the region is bounded by the Peninsular Ranges and the transition to the Mojave and Colorado Deserts on the east, and by the Transverse Ranges on the north. The landscape varies from wetlands and beaches to hillsides, rugged mountains, arid deserts, and densely populated metropolitan areas. The region's coastal habitats include coastal strand, lagoons, and river-mouth estuaries that transition from riparian wetlands to freshwater and saltwater marshes. Inland, the predominant hillside and bluff communities are coastal sage scrub and chaparral. Low- to mid-elevation uplands often feature oak woodlands, while coniferous forests dominate higher-elevation mountainous areas.

The region's largest river drainages include the Tijuana, San Diego, San Luis Rey, Santa Margarita, Santa Ana, San Gabriel, Los Angeles, Santa Clara, and Ventura Rivers. Pine forests occur along the high-elevation stream reaches, and mountain drainages support southern mountain yellow-legged frog (*Rana mucosa*), California red-legged frog (*R. draytonii*), arroyo toad (*Bufo californicus*), arroyo chub (*Gila orcuttii*), Santa Ana sucker (*Catostomus santaanae*), and Santa Ana speckled dace (*Rhinichthys osculus* ssp.). In urbanized coastal areas, many sections of the region's river corridors are channelized with concrete.

Major stressors affecting wildlife and habitats in the South Coast Region include growth and development, water management conflicts and degradation of aquatic ecosystems, invasive species, altered fire regimes, and recreational pressures.

In recent history, suction dredging in this region has primarily occurred on the East Fork of the San Gabriel River, Cajon Creek (below Highway 138) and Big Tujunga Creek (USFS, 2007). Suction dredging has also occurred on tributaries of the Santa Clara River (e.g., Piru Creek). Suction Dredger Survey respondents reported dredging in several other drainages within the South Coast Region, including Holcomb Creek and the Azusa River (see Appendix F).

Central Coast Region

The 8 million acres of California's Central Coast Region extend from the southern boundary of Los Padres National Forest north to the San Francisco Bay lowlands. Inland, the region is bounded on the east by the Diablo and Temblor mountain ranges. A rugged coastline characterizes the landscape, with small mountain ranges that roughly parallel the coast, river valleys with rich alluvial soils, and arid interior valleys and hills. Across the region, differences in climate, geography, and soils result in widely varying ecological conditions, supporting diverse coastal, montane, and desert-like natural communities. The region's coastal habitats include river mouth estuaries, lagoons, sloughs, tidal mudflats, marshes, coastal scrub, and maritime chaparral. Coastal scrub and grasslands extend inland along river valleys. The outer coastal ranges support mixed coniferous forests and oak woodlands.

The region's largest drainages include the Santa Ynez, Santa Maria, Carmel, Salinas, and Pajaro watersheds. The outer coastal ranges, including the Santa Cruz and Santa Lucia mountains, run parallel to the coastline.

Major stressors affecting wildlife and habitats in the Central Coast Region include population growth, expansion of intensive types of agriculture, invasions by exotic species, and overuse of regional water resources.

None of the Suction Dredger Survey respondents reported dredging in the Central Coast Region (see Appendix F), however many of the Central Coast counties were closed to dredging under the previous regulations.

North Coast–Klamath Region

The 14-million-acre North Coast–Klamath Region extends along the Pacific coast from the Oregon-California border to the San Francisco Bay watershed. The region's inland boundary is formed by the Cascade Ranges along the north and the transition to the Sacramento Valley in the south. The region is characterized by large expanses of rugged, forested mountains that range in elevation from 3,000 feet to over 9,000 feet. The climate features high precipitation in the coastal areas and dry conditions in some inland valleys. The region's coastal habitats include beaches, rocky shorelines, estuaries, lagoons, marshes, open-water bays, grasslands, coastal shrub, pine forests, mixed evergreen forests, and redwood forests. The inland ecological communities include moist forests dominated by Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus contorta*), and sugar pine (*Pinus lambertiana*) mixed with a variety of other conifers and hardwoods.

The region's major inland waterways are part of the Klamath River system, which includes the Klamath, Scott, Shasta, Salmon, and Trinity Rivers. River systems draining the Coast Ranges include the Eel, Russian, Mattole, Navarro, Smith, Mad, Little, and Gualala Rivers, and Redwood Creek. The majority of California's rivers with state or federal "wild and scenic river" designations are in the North Coast–Klamath Region, including portions of the Klamath, Trinity, Smith, Scott, Salmon, Van Duzen, and Eel Rivers.

Major stressors affecting wildlife and habitats in the North Coast–Klamath Region include water management conflicts, in-stream gravel mining, forest management conflicts, altered fire regimes, agriculture and urban development, excessive livestock grazing, non-native fishes, and invasive species. The introduction of nonnative fish to formerly fishless lakes and streams has substantially affected the aquatic life of the region, particularly in the subalpine and alpine ecosystems. Decades of stocking fish to create and maintain a recreational fishery have contributed to the decline of some native species in the region. The North Coast–Klamath Region is the focus of some of the highest use by suction dredgers. The Suction Dredger Survey (Appendix F) indicates that the activity has been particularly concentrated on tributaries of the Klamath, Trinity, Salmon and Scott rivers.

Modoc Plateau Region

The Modoc Plateau Region is framed by and includes the Warner Mountains and Surprise Valley along the Nevada border on the east, and the edge of the southern Cascade Ranges on the west. The region extends north to the Oregon border and south to include the Skedaddle Mountains and the Honey Lake Basin. Elevations range from 4,000 to 5,000 feet. The region is situated on the western edge of the Great Basin and supports high-desert plant communities and ecosystems similar to that region, including shrub-steppe, perennial grasslands, sagebrush, antelope bitterbrush, mountain mahogany, and juniper woodlands. Conifer forests dominate the higher elevations. Wetland, spring, meadow, vernal pool, riparian, and aspen communities are scattered throughout the rugged and otherwise dry desert landscape. The region's major waterway is the Pit River and its tributaries.

Sixty percent of the region is federally managed: The Forest Service manages 30%, the BLM manages 26%, and USFWS and Department of Defense manage about 2% of the land in the region. CDFG manages 1% of the land, while about 37% is privately owned or belongs to municipalities.

The 3-million-acre Pit River watershed is the major drainage of the Modoc Plateau, providing 20% of the water to the Sacramento River. The upper reaches of the watershed are in creeks of the Warner Mountains that drain into Goose Lake. The north fork of the Pit River flows from Goose Lake southwest and merges with the south fork of the Pit River, which drains the southern Warner Mountains. Several endemic aquatic species, including Modoc sucker (*Catostomus microps*), Goose Lake redband trout (*Oncorhynchus mykiss* ssp.), Goose Lake tui chub (*Gila bicolor* spp.), Goose Lake (Pacific) lamprey (*Lampetra tridentata*), and Shasta crayfish (*Pacifastacus fortis*), inhabit the watershed (Moyle, 2002).

Creeks of the northern Modoc Plateau (or Lost River watershed) drain to Clear Lake. The outlet of Clear Lake is the Lost River, which circles north into Oregon farmland and then joins the Klamath River system. The Lost River watershed has its own endemic aquatic fish and invertebrates.

Major stressors affecting wildlife and habitats in the Modoc Plateau Region include excessive livestock grazing, excessive feral horse grazing, altered fire regimes, Western juniper (*Juniperus occidentalis)* expansion, invasive plants, forest management conflicts, and water management conflicts and degradation of aquatic ecosystems. The introduction of exotic aquatic species [e.g., largemouth bass (*Micropterus salmoides*) and nonnative trout to lakes; and bullheads (*Ameiurus* spp.), catfishes, and signal crayfish to rivers and streams] has reduced or extirpated populations of native amphibians and fish and affected invertebrates in many segments of the rivers, creeks, and lakes of the region. None of the Suction Dredger Survey respondents reported dredging in the Modoc Plateau Region (see Appendix F).

Sierra Nevada and Cascades Region

The Sierra Nevada and Cascade Ranges form the spine of California's landscape, extending 525 miles from north to south. The southern Cascades extend from north of the Oregon border southeastward to Mount Lassen, where they merge with the Sierra Nevada range. The Sierra Nevada range extends to the south to the Mojave Desert, where it curves south to link with the Tehachapi Mountains. The region includes oak woodland foothills on the western slope of the Sierra Nevada and Cascade Ranges and, on the east, the Owens Valley and edges of the Great Basin. On the west side, elevations gradually increase from near sea level at the floor of the Central Valley to ridgelines ranging from 6,000 feet in the north to 14,000 feet in the south. The east slope of the Sierra Nevada drops off sharply, and the east side of the Cascade Range slopes gradually. As elevations increase from west to east, habitats transition from chaparral and oak woodlands to lower-level montane forests of ponderosa and sugar pine to upper montane forests of firs, Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine and above timberline to alpine plant communities.

Sixty-one percent of the Sierra Nevada and Cascade Ranges are managed by federal agencies: the Forest Service manages 46%, the National Park Service manages 8%, and BLM manages 7%. State parks and wildlife areas account for 1% of the region, while the remaining area is privately owned.

The hundreds of creeks and streams on the western slope of the Sierra Nevada and Cascade Ranges drain via major river basins to merge with the Sacramento River in the north and the San Joaquin River in the south. The southernmost streams drain into the Tulare Basin via the Kings, Kaweah, Tule, and Kern rivers, while the streams east of the Sierra Nevada crest drain into the Great Basin via the Lahontan, Mono, and Owens drainages. Many of the creeks and streams of northeastern California drain via the Pit River, which joins the Sacramento River at Lake Shasta.

There are 67 aquatic habitat types in the region. Major riparian habitats include valley foothill riparian, montane riparian, wetland meadow, and aspen. Numerous invertebrate and vertebrate species are associated with these moist habitats. Other wildlife species, including some raptors and numerous songbirds, live in drier plant communities and rely on nearby aquatic and riparian habitats for hunting, foraging, cover, and resting. Of the 67 aquatic habitat types, nearly two-thirds are in decline. Ecosystem functions have been disrupted in thousands of riparian areas, and more than 600 miles of river habitat have been submerged under reservoirs.

Major stressors affecting wildlife and habitats in the Sierra Nevada and Cascades Region include growth and land development, forest management conflicts, altered fire regimes, excessive livestock grazing, invasive plants, recreational pressures, climate change, and introduced nonnative fish.

The Sierra Nevada range, particularly the Mother Lode Region, is the focus of some of the highest use by suction dredgers. Suction Dredge Survey respondents reported activity throughout the Sierra Nevada including drainages within Plumas, Butte, Sierra, Nevada, Yuba, Placer, El Dorado, Amador, Calaveras, Tuolumne, Madera and Mariposa counties. Dredging was reported on more than 150 different streams in the region. (For more information, see Appendix F.)

Central Valley and Bay-Delta Region

The Central Valley and Bay-Delta Region comprises most of the low-lying lands of central California. Forty percent of the state's water falls as either rain or snow over much of the northern and central parts of the state and drains into the Sacramento or San Joaquin Rivers, which feed into the Sacramento–San Joaquin Delta (Delta). The Delta and the San Francisco Bay together form California's largest estuary (1,600 square miles of waterways). The region has four subregions, each with its own unique climate, topography, ecology, and land use: the San Francisco Bay area, the Delta, the Sacramento Valley, and the San Joaquin Valley.

The San Francisco Bay area is the most densely populated area of the state of California outside of the southern California metropolitan region. The region consists of low-lying baylands, aquatic environments, and watersheds that drain into the San Francisco Bay. The region is bounded on the east by the Delta, on the west by the Pacific Ocean, in the north by the North Coast–Klamath Region, and on the south by the Central Coast Region. Low coastal mountains surround the region, with several peaks rising above 3,000 feet. The climate is characterized by relatively cool, often foggy summers, and cool winters. The area receives 15–25 inches of rain annually from October to April, leaving most of the smaller streams dry by the end of summer. The topography of the San Francisco Bay area allows for a variety of habitats, including deep and shallow estuarine environments in the bay itself. The bay also supports many marine species. Along the shoreline are coastal salt marshes, coastal scrub, tidal mudflats, and salt ponds. Ninety percent of the surface water from the Sacramento and San Joaquin Rivers and their tributaries is received via the Delta. Other major river drainages include the Napa and Petaluma Rivers and the Sonoma, Petaluma, and Coyote Creeks.

The Great Central Valley contains the Sacramento Valley, the San Joaquin Valley, and the Delta. Together they form a vast, flat valley, approximately 450 miles long and averaging 50 miles wide, with elevations almost entirely less than 300 feet. The Sutter Buttes (2,000 feet) are the only topographic feature that exceeds that height. The Central Valley is surrounded by the Sierra Nevada on the east, the Coast Ranges on the west, the Tehachapi Mountains on the south, and the Klamath and Cascade mountains on the north. The Central Valley has hot, dry summers, and foggy, rainy winters. Annual rainfall averages from 5 to 25 inches, with the least rainfall occurring in the southern portions and along the west side (in the rain shadow of the coastal mountains). Agriculture dominates land use in the Central Valley. The major natural upland habitats are annual grassland, valley oaks on floodplains, and vernal pools on raised terraces.

The Delta is a low-lying area that contains the tidally influenced portions of the Sacramento, San Joaquin, Mokelumne, and Cosumnes Rivers. The Delta was once an extensive brackish marsh formed by the confluence of the Sacramento and San Joaquin Rivers, but has been extensively diked and drained for agriculture, flood protection and water supply.

The Sacramento Valley contains the largest river in the state, the Sacramento River. The Sacramento River and its numerous tributaries support winter-run, spring-run, and fall-/late fall–run Chinook salmon (*Oncorhynchus tshawytscha*) populations; steelhead (*O. mykiss*); green sturgeon (*Acipenser medirostris*); and hardhead (*Mylopharodon conocephalus*). The lower 180 miles of the river are contained by levees, and excess floodwaters are diverted into large bypasses to reduce risks to human populations.

The San Joaquin Valley has two distinct, or separate, drainages. In the northern portion, the San Joaquin River flows north toward the Delta. It captures water from the Stanislaus, Tuolumne, and Merced Rivers and supports fall-/late fall–run Chinook salmon populations, steelhead, and hardhead populations. The southern portion of the valley is isolated from the ocean and drains to the closed Tulare Basin, except in very wet years when the Tulare Basin overflows to the San Joaquin River. Lakes and vast wetlands in this region are now dry most of the time because water has been dammed and diverted for agriculture.

Major stressors affecting wildlife and habitats in the Central Valley and Bay-Delta Region include urban, residential, agricultural, and solar energy growth and development; water management conflicts; water pollution; invasive species; and climate change. Suction Dredger Survey respondents reported dredging in a few drainages within the Central Valley and Bay-Delta Region (Appendix F).

Wildlife Habitats

The California Wildlife Habitat Relationships (CWHR) system classifies and describes the major wildlife habitat types that occur in the state. At present, 59 habitat types have been classified (Mayer and Laudenslayer, 1988). Because the geographic scope of the Proposed Program encompasses the entire state, suction dredging has the potential to occur in any of the aquatic and riparian-associated habitats within the state.

Based on the historical distribution of suction dredging activity, Proposed Program activities would most likely to take place in and adjacent to: *riverine, montane riparian,* and *valley foothill riparian* habitats. Suction dredgers would be likely to access and egress dredging site through developed sites (e.g., boat ramps), barren areas, and/or through the following wildlife habitat types: *annual grassland, blue oak-foothill pine, Douglas-fir, Klamath mixed conifer, lodgepole pine, montane chaparral, montane hardwood, montane hardwood-conifer, ponderosa pine,* and *Sierran mixed conifer*. Description of these habitat types are provided in Appendix I (after Mayer and Laudenslayer, 1988).

Special-Status Species

Regulatory Classification

Many potential impacts discussed in this chapter are assessed in the context of their potential to affect special-status species, which are herein defined to include all species that have been specifically identified by USFWS, NMFS, or CDFG as warranting some level of protection from human impacts. Special-status plants also include California Rare Plant Rank[1] List 1 and 2 species. The following terms are used by state and federal agencies to designate special-status species:

Fully protected (FP): species designated as fully protected under Fish and Game Code Sections 3511, 4700, 5050, or 5515. FP species may not be taken at any time unless authorized by CDFG for necessary scientific research, which cannot include actions for project mitigation. Necessary scientific research includes efforts to recover fully protected, endangered, and threatened species. A notification must be published in the California Regulatory Notice Register prior to CDFG authorizing take of fully protected species. While some species included under these statutes are also listed as threatened, endangered or Species of Special Concern, others are not.

[1] CDFG has formally changed the name of the "CNPS List" or "CNPS Ranks" to "California Rare Plant Rank" (or Rare Plant Rank, RPR). The Rare Plant Status Review groups (300+ botanical experts from government, academia, NGOs and the private sector) produce the rank assignments for rare plants. This collaborative effort is jointly managed by DFG and CNPS (CDFG, 2010).

Federal endangered (FE): species designated as endangered under ESA. A FE species is one that is in danger of extinction throughout all or a significant portion of its range. Incidental take of any individual of an FE species is prohibited except with prior authorization from USFWS or NMFS.

State endangered (SE): species designated as endangered under CESA. These include native species or subspecies that are in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease (CESA § 2062). Take, as defined by Fish and Game Code Section 86, of any state endangered species is prohibited, except as authorized by the Fish and Game Code

Federal threatened (FT): species designated as threatened under ESA. A FT species is one that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range. At the discretion of USFWS or NMFS, incidental take of any individual of an FT species may be prohibited or restricted.

State threatened (ST): species designated as threatened under CESA. These include native species or subspecies that, although not presently threatened with extinction, are likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts (CESA § 2067). Take, as defined by Fish and Game Code Section 86, of any state endangered species is prohibited, except as authorized by the Fish and Game Code.

State candidate (SC): species designated as a candidate for listing under CESA. These are native species or subspecies for which the Commission has accepted a petition for further review under CESA Section 2068, finding that there is sufficient scientific information to indicate that the petitioned action may be warranted." Take, as defined by Fish and Game Code Section 86, of any state endangered species is prohibited, except as authorized by the Fish and Game Code.

State Species of special concern (SSC): a species, subspecies, or distinct population of a vertebrate animal native to California that has been determined by CDFG to warrant protection and management intended to reduce the need to give the species formal protection as an SE, ST, or SC species. "Species of special concern" is an administrative designation and carries no formal legal status. Generally, species of special concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined in Section 15380 of the CEQA Guidelines. That said, some older lists of Species of Special Concern were not developed using criteria relevant to CEQA and the information used in generating those lists is out of date. Therefore, the current circumstances of each unlisted Species of Special Concern must be considered against those criteria and not automatically assumed to be rare, threatened or endangered.

Federal proposed (FP): species that have been proposed by USFWS or NMFS for listing as endangered or threatened under the ESA. Federal proposed species must be evaluated in the Section 7 consultation for any federal action (described above under "Endangered Species Act Section 7") and are normally evaluated in the NEPA review of any action that may affect the species.

Federal candidate (FC): species that are candidates for listing as endangered or threatened under the ESA. Such species have not yet been proposed for listing. Consideration of FC species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and thereby possibly remove the need to list species as endangered or threatened. Thus, FC species are normally evaluated in the NEPA review of any action that may affect the species.

Federal species of concern (FSC): "Species of concern" are not defined or mentioned in the ESA, but some offices of both NMFS and USFWS use this term to describe special-status species that have not been designated under any of the formal federal status terms described above. Usually these are species for which the agency (NMFS or USFWS) has some concerns about status or threats, but for which there are insufficient data to indicate that the species warrants treatment as a candidate for listing. Some FSC species are addressed in this chapter because of USFWS concerns about the possible effects of the Proposed Program on these species.

California Rare Plant Rank (RPR) Lists 1 and 2 species: California RPR Lists are jointly managed by CDFG and the California Native Plant Society (CNPS). List 1A plants are presumed extinct in California. List 1B plants are considered rare, threatened, or endangered in California and elsewhere. List 2 plants are rare, threatened, or endangered in California, but more common elsewhere.

Designated critical habitat and recovery plans: Many FE and FT species have designated critical habitat or approved recovery plans, or both. There is also one adopted State Recovery Strategy (Fish & G. Code, § 2112) for coho salmon. Federal regulations prohibit actions that would destroy or adversely modify designated critical habitat. One reason for designation of critical habitat is that, although such habitat may not be currently occupied, it is essential in order to achieve recovery of these species. Accordingly, for these species, the species' range is assumed to include the known range of the species plus any additional areas of designated critical habitat. Species recovery plans identify actions that are required in order to secure recovery of a species. Accordingly, the Proposed Program is assessed with reference to the question of whether it may interfere with the implementation of recovery plans.

4.3.4 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to biological resources are possible for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings within this SEIR are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

The 1994 EIR analyzed impacts on fish, amphibians, benthic invertebrates, threatened and endangered species, and stream and riparian habitats. Findings for each of these biological resources were as follows:

Fin Fish

Impacts from entrainment for adults and juveniles were considered to be less than significant. Though initially considered to be potentially significant adverse, effects on yolk, sac fry, and eggs were ultimately identified as being less than significant with the incorporation of regulations specifying area closures during fish spawning periods.

Other impacts to fish related to turbidity, sedimentation, and disturbance to spawning gravels were considered to be temporary, localized, and less than significant under regulated conditions. Such regulations include the specific area closures, restriction on nozzle sizes, as well as prohibitions on importing of materials, dredging into streambanks, and diversions of flow.

Behavior and Distribution

Adverse impacts on adult summer holding areas were considered effectively reduced with regulations such that overall effects would not be deleterious. Effects on large habitat features (e.g., boulders, woody debris), habitat substrate, and flow modifications were also found to be less than significant with regulations, including the restrictions on nozzle size and the prohibitions on impeding fish passage and movement of boulders. Other effects on habitat were found to be potentially beneficial, such as the loosening of compacted substrates and providing additional fish holding and resting areas with dredging holes.

Amphibians

Potential impacts on amphibians and their habitats were considered non-deleterious under regulated conditions. Regulations stipulating area closures, restriction on nozzle sizes, and prohibitions on material import, high-banking, and damage to riparian habitat would all effectively reduce all potential impacts to less than significant.

Benthic Invertebrates

Suction dredging activity was found to have short-term, localized adverse impacts on the local invertebrate abundance and community composition. However, overall these impacts were considered less than significant and were further minimized by proposed regulations.

Threatened and Endangered Species

Effects on threatened and endangered species were initially considered potentially significant. However, the proposed regulations were found to adequately reduce impacts to a less than significant level.

Stream and Riparian Habitats

Substrate Impacts

Effects of suction dredge activities were found to have potentially negative effects on stream substrate by channelizing streams, increasing embeddedness of substrates downstream of dredging sites, and developing holes and piles. However, the 1994 EIR concluded that the regulations adequately address these potential effects such that there would be a less than significant impact.

Streambank Impacts

The 1994 EIR found effects on streambanks from suction dredging activities were potentially significant. However, the EIR concluded that the regulations for suction dredging included stipulations which addressed these issues and reduced the impacts to levels below significance.

Riparian Habitat Impacts

According to the 1994 EIR, suction dredging could have significant indirect and direct effects on riparian vegetation along stream courses. However, the Report found that the regulations addressed these issues and effectively reduced these impacts to less than significant.

Methodology

Selection and Organization of Species Considered in this SEIR

This evaluation considers the effects of Proposed Program activities on biological resources throughout the state. Figure 4.3-2 depicts the process by which specific animal and plant species were identified for consideration in this SEIR. The process began by considering all species included in the CNDDB, which is a subset of all species known to occur in California. For the purposes of this analysis, it is assumed that California animal and plant species not included in the CNDDB are sufficiently widespread and common such that impacts of the Proposed Program would be less than significant for all significance criteria (See *Criteria for Determining Significance* below). For species that are tracked by the CNDDB, the following methodology was utilized to identify species with the potential to be impacted by Proposed Program activities:

1. Data from the USGS National Hydrography Dataset (NHD) were used to identify perennial waterbodies within the state. Specifically, the geographic information system (GIS) shapefile “nhd_peren_nolakes” was used to identify lotic waterbodies (i.e., rivers, creeks, tidal waters); the GIS shapefile “nhdgtqtracre” was used to identify lentic waterbodies (i.e., lakes and ponds) greater than 0.25 acres (USGS, 2010).
2. For assessment purposes, a 500-foot buffer was applied around all perennial waterbodies to account for channel width, riparian areas, and accuracy of the NHD.
3. All species occurrences within the CNDDB, January 2010 update were overlaid on the perennial waterbody dataset with the 500-foot buffer. The CNDDB occurrences that intersected with the perennial waterbody dataset and buffer were considered

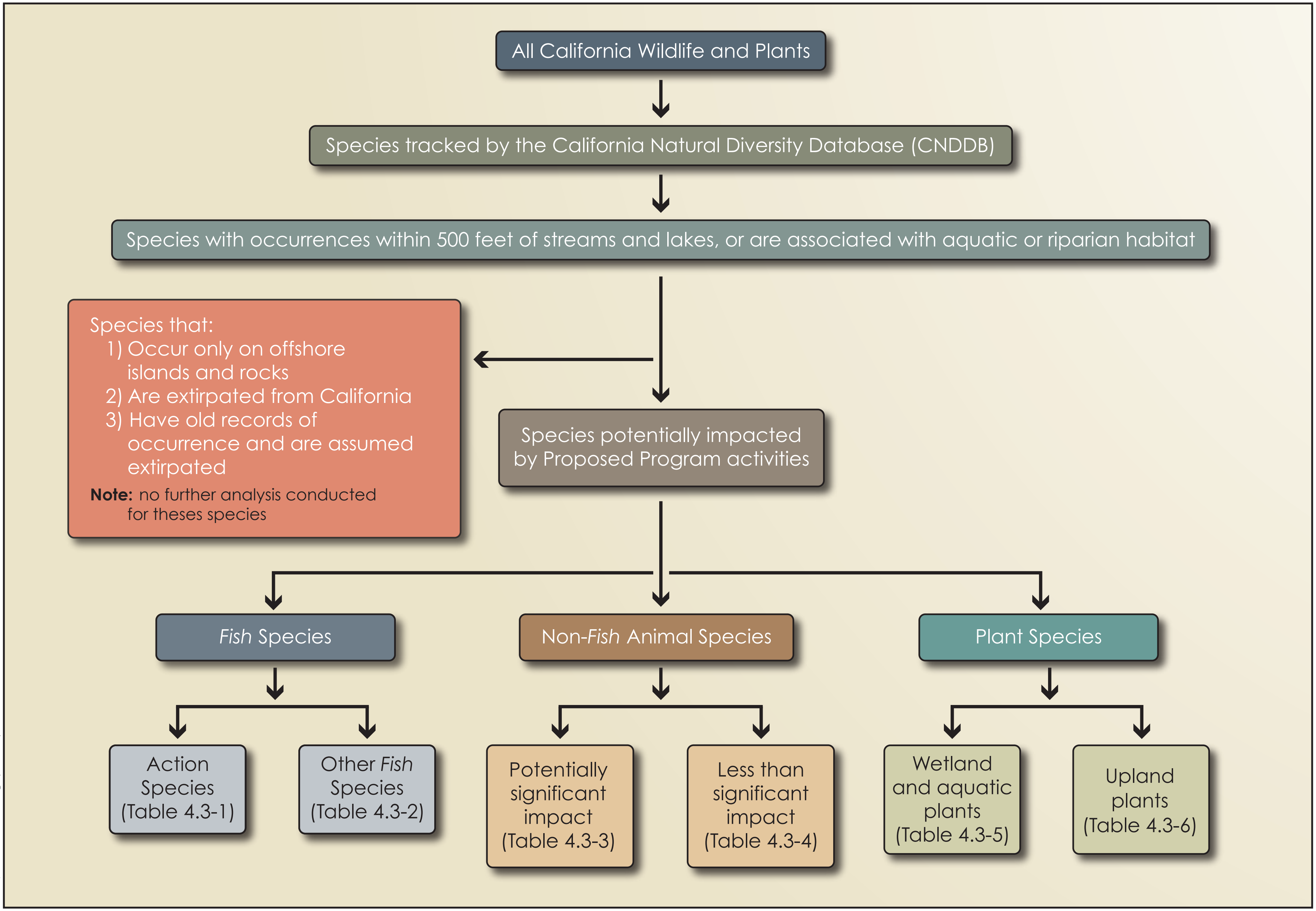

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Figure 4.3-2
Selection and Organization of Species Considered in the SEIR

to be the species with the potential to be impacted by the Proposed Program. The CNDDB includes some species for which there are no spatial data regarding their locations (i.e. no occurrences records). Species that currently have no occurrences in the CNDDB, but occupy aquatic and riparian habitats, were also included.

4. Species were removed from the list if: (1) they occur only on offshore islands or rocks; (2) are extirpated from California; or (3) are known only from older historic records, but for which a determination about extirpation has not been made.

The CNDDB data query described above generated 625 animal species and 1287 plant species. Appendix J contains a complete list of species generated in the CNDDB data query. These species are considered to have the potential to be impacted by the Proposed Program activities. These species were then organized as follows for further analysis (Figure 4.3-2):

- *Fish* Species: Species for which CDFG has authority under Fish and Game Code section 5653 to regulate the Proposed Program activities. These species are sub-divided into the following groups:
  - **Action Species:** Species for which CDFG has developed spatial and temporal restrictions on suction dredging activities so that a deleterious effect (and/or significant impact) to the species is not likely to occur (See Table 4.3-1 at the end of this chapter); and
  - **Other *Fish* Species**: Species for which CDFG has determined that no spatial or temporal restrictions on suction dredging are necessary to avoid a deleterious effect (and/or significant impact) to the species, for one of the following reasons: (1) suction dredging activities have low potential to have a deleterious effect on the species; (2) surrogate protection is provided by the restrictions developed for one or more action species; or (3) the general operational requirements in the proposed regulations are sufficiently protective (See Table 4.3-2 at the end of this chapter).

- Non-*Fish* Animal Species: Animal species for which CDFG does not have the authority to regulate under Fish and Game Code section 5653, but has considered in this SEIR:
  - **Potentially Significant Impact:** Species for which CDFG has determined that in the absence of the Proposed Program regulations, suction dredging has the potential to result in a significant impact. The level of impact to these species is first considered in the absence of Proposed Program regulations, and then with incorporation of the regulations (See Table 4.3-3 at the end of this chapter);
  - **Less than Significant Impact**: Species for which CDFG has determined that the program activities have a low potential for impacts due to life history, habitat requirements, distribution, low likelihood of dredging in suitable habitat, etc. For species listed in Table 4.3-4, the potential impacts of the Proposed Program are considered less than significant with respect to all of the significance criteria described in this section (See *Criteria for Determining Significance* below), and are generally not discussed in further detail in the impact analysis below.

- Plant Species: Plant species for which CDFG does not have the authority to regulate under Fish and Game Code section 5653, but has considered in this SEIR:
  - **Aquatic and Wetland Species:** Species that are associated with aquatic and wetland habitats (See Table 4.3-5 at the end of this chapter); and
  - **Upland**: Species that are associated upland habitats (See Table 4.3-6 at the end of this chapter).

Methods of Assessing Impacts

The direct and indirect effects of suction dredging events are considered to be a function of the intensity, frequency, duration and location of the activity, as illustrated in the conceptual model shown in Figure 4.3-3. This conceptual model demonstrates how several governing (independent) variables influence the outcome of a dredging event. The regulations under the Proposed Program are an attempt to establish limits on the governing variables to ensure that suction dredging, consistent with the regulations, will not be deleterious to *Fish* (See Chapter 2, Section 2.2.2 for the definition of deleterious).

Another consideration in evaluating potential impacts of this program is the probability that gold will be present in a river, stream or lake. This is a function of the underlying geology. Figure 4.2-2 shows the locations of historic gold mines in California. In watersheds with historic gold mining, the probability of suction dredging is likely to be higher. Similarly, the Socioeconomic Report prepared for this Program provides information from suction dredgers on locations of suction dredge mining in 2008 (see Chapter 3 for further details). This information, while useful, is not conclusive since some rivers, streams and lakes were closed in 2008 – some of those previously closed waters would be available and utilized for suction dredging under the Proposed Program.

Further, the analysis of the Proposed Program's impact on biological resources is considered at multiple spatial scales. Site specific examples are provided, where appropriate, to demonstrate the range of potential outcomes and illustrate the complexity of determining the effects of one or many suction dredging events. CDFG believes that the level of detail and related analysis is appropriate to the scale of the Proposed Program (i.e., statewide), and is sufficient to ensure meaningful analysis and disclosure of the potential impacts of the Proposed Program.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact to biological resources if it would meet one or more of the following criteria

- **Criterion A**: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG, USFWS, or NMFS;

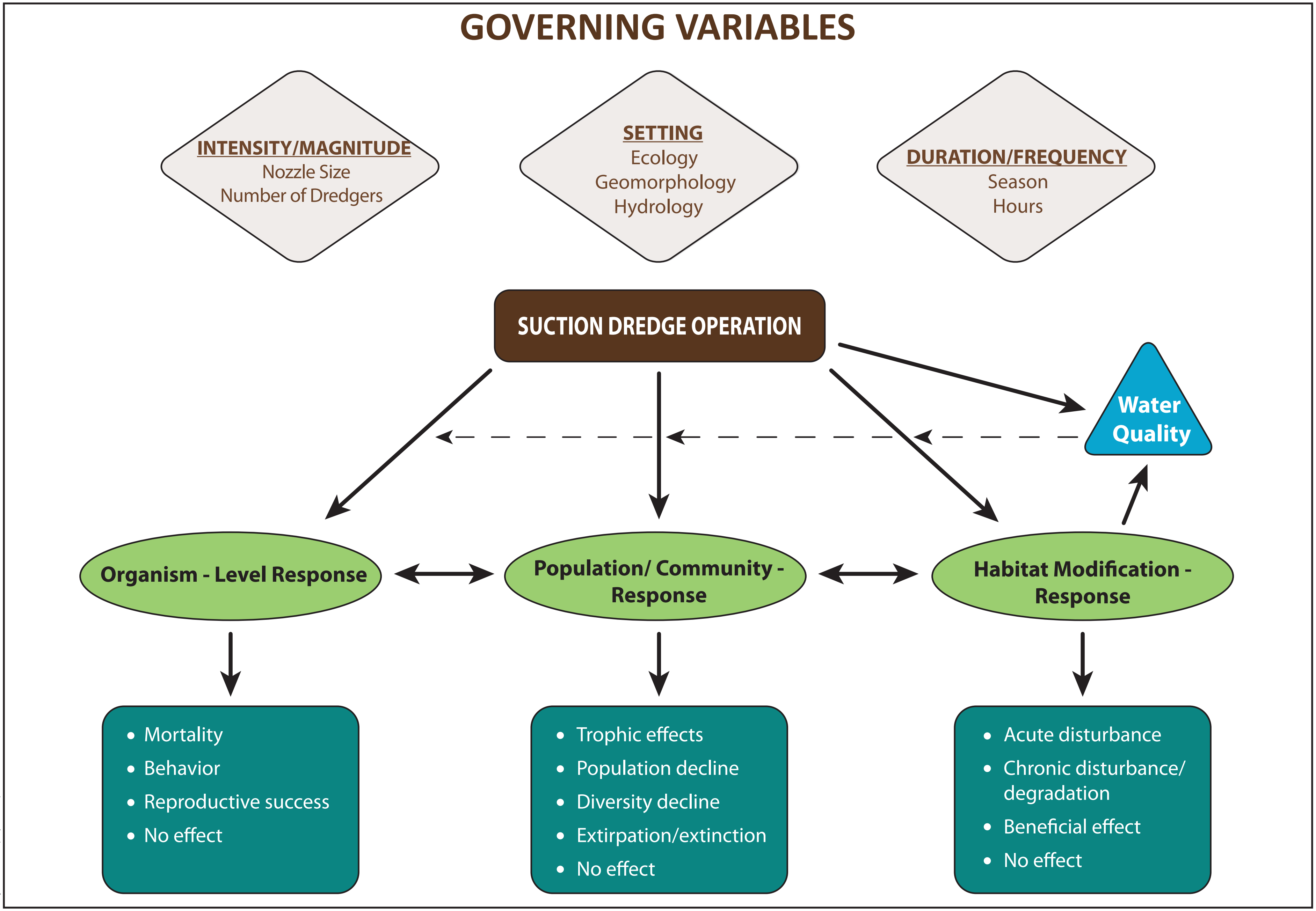

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Figure 4.3-3
Conceptual Model of Suction Dredging Effects on Biological Resources

- **Criterion B**: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFG, USFWS, or NMFS;
- **Criterion C**: Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means; or
- **Criterion D**: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

The analysis, in evaluating the potentially significant impacts of suction dredging activities to biological resources, considers both species and their habitats. These impacts are considered in the context of the Proposed Program, which incorporates spatial and temporal restrictions on suction dredging activities that are based on life history, distribution and abundance of action species. A determination is provided which evaluates if the regulations are sufficient to ensure that the impacts can be considered "less than significant." A *less than significant* impact generally refers to a situation where there is a measureable impact, but the impact is not likely to result in an adverse population-level effect on a particular species, or a wide-spread or long-lasting adverse effect on a natural community. For example, a suction dredge operation may disturb benthic habitat, an impact which can be measured, but this impact may not be substantial when considered in the overall context of the affected benthic species.

If an impact remains "potentially significant" following the evaluation, then mitigation strategies are discussed and considered. Any impact that remains significant even after mitigation is considered significant and unavoidable.

Note that in the context of the above, CDFG did not consider impacts to individual members of a population to be significant, unless the species was extremely rare. While a more conservative approach was contemplated, it was determined to be inappropriate because it would not be an effect that would be considered “substantial,” especially given the statewide scope of the Proposed Program. For these reasons, the analysis focuses instead on population- and range-level effects.

Impacts related to turbidity, temperature, and toxicity/water quality contaminants are discussed in Chapter 4.2, *Water Quality and Toxicology.*

4.3.5 Environmental Impacts

Impact BIO-FISH-1: Direct Effects on Spawning Fish and their Habitat (Less than Significant)

Discussion

Among the possible effects of suction dredging is the potential impact on *Fish* (specifically, fin fish and amphibian) reproduction. Spawning is a stressful period, and *Fish* are highly vulnerable to disturbance during this period (Mazeaud et al., 1977). High levels of human activity, including swimming, wading, boating and equipment noise, have the ability to cause reduced success in egg deposition or completion of the redd (i.e., nest of fish eggs) (Murphy et al., 1995). In some cases *Fish* may abandon redd construction (Mueller, 1980). Human activity such as wading on shallow, salmonid-spawning habitats during the period before hatching can kill eggs and fry (Roberts and White, 1992).

Many *Fish* species, including salmonids (*Oncorhynchus* spp.) such as Chinook and coho salmon, steelhead, cutthroat trout, golden trout, several lamprey species (*Lampetra* spp.), suckers (*Catostoma* spp.), sculpin (*Cottus* spp.), stream-dwelling speckled dace (*Rhinichthys osculus*), and minnows such as hardhead utilize small gravel to cobble substrates for spawning. In addition, unlike salmonids, lamprey larvae may also emerge from the redd and find backwater or low gradient areas of sand and silt to continue development for up to seven years, filtering substrates to feed on detritus (Moyle, 2002). Therefore, for lamprey, many areas of the channel may be considered sensitive to disturbance.

The act of dredging has the potential to reduce substrate embeddedness in areas impacted by other human activities such as stream regulation and input of fine sediments associated with watershed development. Although dredge tailings may be attractive to spawning *Fish*, they may be potentially less suitable for spawning than natural gravels. The loose substrate often found in dredge tailings may be too unstable; embryos may experience reduced survival under these conditions due to increased scouring (Thomas, 1985; Harvey and Lisle, 1999), which can be exacerbated as embryo development frequently coincides with periods of high flow which mobilizes streambeds (Holtby and Healey, 1986; Lisle and Lewis, 1992). Hence, loose tailings could have a substantial adverse effect on eggs and developing *Fish* unless this material is allowed to disperse before spawning commences.

Findings

If left unrestricted, impacts of suction dredging on spawning of *Fish* would be potentially significant with respect to Significance Criteria A and D. However, the Proposed Program incorporates spatial and temporal restrictions on suction dredging activities that are based on life history, distribution and abundance of *Fish* action species. This includes restrictions on suction dredging in the period immediately before spawning and during critical early life stages (i.e., spawning, incubation, and early emergence) of *Fish* action species (Table 4.3-1). Streams within the state that provide habitat for *Fish* species that are either very limited in number and/or distribution are proposed to be closed to suction dredging (Class A), or closed during critical spawning periods. Therefore, the disturbance of spawning *Fish* and crushing of embryos and larvae by the act of suction dredging is not likely to occur for *Fish* action species. Impacts of dredging to other *Fish* species (i.e., those listed in Table 4.3-2, as well as more common or widespread native and non-native *Fishes*) are also not likely to result in impacts that would be considered significant.

The following Proposed Program regulations would further minimize the potential for disturbance to all spawning *Fishes* and their habitats:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if deleterious effects are identified.

- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site. This will minimize the potential for *Fish* to spawn on unstable substrate.
- Section 228(k)(16): requires dredgers to avoid the disturbance of redds and adult fish.

Thus, with respect to Significance Criteria A and D, the impacts on spawning *Fish* and their habitat would be less than significant. (See Chapter 4.1, Impact GEO-1 for additional discussion on the physical effects of dredging on stream substrate).

Impact BIO-FISH-2: Direct Entrainment, Displacement or Burial of Eggs, Larvae and Mollusks (Less than Significant)

Discussion

Entrainment of Fish Eggs, Fry and Larvae

Suction dredging can cause excavation and subsequent displacement of eggs, fry and larvae (Harvey and Lisle, 1998). Harvey and Lisle (1998) state that entrainment in a dredge (i.e., being drawn into the dredge hose by suction) would likely kill larvae of several fishes. Sculpins, suckers, and minnows (Cyprinidae) all produce small larvae (commonly 5 to 7 mm at hatching) easily damaged by mechanical disturbance. Eggs of non-salmonid fishes, which often adhere to rocks in the substrate, also are unlikely to survive entrainment. Fish eggs, larvae, and fry removed from the streambed by entrainment that survived passage through a dredge would likely suffer high mortality from subsequent predation and unfavorable physio-chemical conditions. This includes direct mortality due to sunlight (ultra-violet) exposure (Flamarique and Harrower, 1999). While little research has been performed to explore the direct effects of entrainment on eggs and larvae of fish species, the work that has been done suggests that these impacts can be severe. Suction dredging has been shown to cause high mortality among eggs and developing fishes through the direct effects of entrainment (until trout reach approximately 4 inches, at which point they can generally avoid entrainment) (Griffith and Andrews, 1981), or by predation following entrainment (Gerstung, pers comm., as cited in the CDFG 1994 EIR).

Entrainment of Mollusks (Bivalves and Gastropods)

Mollusks, such as bivalves (clams and mussels) and gastropods (snails and limpets), are an important component of stream ecology. However, in California, little is known about them and many have yet to be described (Taylor, 1981; Frest and Johannes, 1999). According to the USFS (2001), mollusks could suffer mortality during suction dredging entrainment. In a study on the effects of suction dredging on freshwater mussels' short-term survival in Washington, Krueger et al. (2007) found no obvious physical damage to mussels due to entrainment by suction dredge; entrainment had no effect on mussel survival up to six weeks. While no direct studies have been conducted on the effects of suction dredging on gastropods, it is presumable that similar to mussels, adult gastropods, protected by their shells could survive entrainment. However, many mollusks go through earlier larval lifestages (e.g. trochophore; veliger) that may not provide the protection of an outer shell and might be more susceptible to entrainment injury or mortality.

Displacement and Burial of Mollusks (Bivalves and Gastropods)

Disturbance of the substrate by suction dredging could have a variety of other effects on mollusks, including direct effects via displacement of individuals or indirect effects through alteration of their food source. Change or reduction in food, such as reduction in submerged macrophytes or algae, could negatively affect some snail species (Lodge and Kelly, 1985). Harvey and Lisle (1998) state that re-colonization would take longer where dredging moves substantial amounts of substrate occupied by aquatic mollusks. In general, freshwater bivalves have low dispersal rates and limited distribution. Many mollusks are not broadly abundant in river streams, may not have high dispersal rates, and may be influenced by local events such as suction dredging.

In a study by Marking and Bills (1979), 50% of mussels buried in sand and silt to depths of 10 to 17.5 cm or more were prevented from emergence and eventually resulted in death. The disorientation of mussels (manually positioned on their sides during burial) also reduced their ability to emerge (Marking and Bills, 1979). Burial by dredge tailings resulted in the death of a substantial percentage of the two mussel species studied, and no mussels were able to excavate from experimental dredge tailings. While no such work has been carried out on gastropods, many pulmonate snails must come to the surface to access air or at least remain in water with dissolved oxygen levels above 1.5 to 1.8 ppm (Pennak, 1989), suggesting that burial within dredger tailings could have a negative effect.

Entrainment of Amphibian Eggs and Tadpoles

When substrate is sucked through a dredge, amphibian eggs and larvae can be entrained, potentially resulting in mortality or injury of some individuals. For amphibians, the outer capsule of an anuran (frogs and toads) egg surrounding the ovum, perivitelline chamber and the vitelline membrane is composed of soft gelatinous envelopes and would not likely be able to withstand the mechanical action of transport through a suction dredge.

One amphibian species with habitat requirements similar to the conditions found in suction dredging streams is the foothill yellow-legged frog (*Rana boylii*). The foothill yellow-legged frog is one of a few obligate stream breeding ranid frogs in the United States (Wheeler and Welsh, 2008). Breeding/spawning areas of foothill yellow-legged frog typically occur along the shallow margin of run habitat and on the shallow upstream end of a cobble bar. Eggs attach to substrates that range from small cobbles in the run to large cobble and small boulders on the bar, to bedrock along portions of the streambanks and in pools (Kupferberg et al., 2009).

Foothill yellow-legged frog tadpoles typically escape predators using a "dash and hide" behavior. This behavior is used when the environment changes. For example, when water velocity increased, foothill yellow-legged frog tadpoles sought refuge in the substrate (Kupferberg et al., 2009). Increased water velocities (as low as 10 cm/sec) caused negative reactions from foothill yellow-legged frog, and caused 25% of the tadpoles studied to be displaced, with recently hatched tadpoles lethally affected (Kupferberg et al., 2009).

Research from Australia on spatial variation in flow regime of tadpoles that occur in rapidly flowing and turbulent riffle habitats showed that at 50 cm/s all tadpoles were dislodged irrespective of size (Richards, 2002). Critical swimming velocity, maximum current velocity at which a tadpole can swim or maintain its position, is related to tadpole size, with large tadpoles having significantly lower critical velocities than small tadpoles, and vulnerability increased as tadpoles reached metamorphosis (Kupferberg et al., 2009). A burst of activity requires only a few seconds of energy; longer continuous energy use can result in lactate accumulation (Ultsch et al., 1999).

Flow velocity at the intake of a suction dredge nozzle can be compared with tadpole escape speeds to characterize the potential for entrainment. A mass balance approach was used to estimate flow velocity at the intake of a suction dredge nozzle. The mass balance utilized the values estimated for suction dredge production (Chapter 3, Table 3-2) to estimate flow velocities for various nozzle sizes (Table 4.3-7).

TABLE 4.3-7. ESTIMATE FLOW VELOCITIES FOR VARIOUS SUCTION DREDGE NOZZLE SIZES

Dredge Nozzle Size	Velocity	
(inches)	(ft/s)	(cm/s)
2	4.1	125
2.5	3.3	100
3	4.5	138
4	3.8	117
5	4.9	149
6	4.0	121
8	4.8	146

Velocity values estimated in the Table 4.3-7 range from approximately 3.3 to 4.9 ft/s (100 to 149 cm/s). It is important to note that these values are estimates for velocity at the nozzle intake; velocity decreases as distance from the nozzle intake increases. In the case of tadpoles, the fastest steady velocity a tadpole can swim is 12 body lengths/sec (Hoff et al., 1999), but this cannot be sustained. Kupferberg et al. (2009) found that tadpoles swimming against a 5 cm/s current quickly leads to exhaustion and impingement (impact). Foothill yellow-legged frog tadpoles measure less than 0.8 cm total length at emergence, and reach a maximum total length of approximately 5.5 cm (Nussbaum et al. 1983; Zeiner et al., 1988). Assuming an escape velocity of 12 body lengths/sec, a foothill yellow-legged frog tadpole would be capable of a maximum swim velocity of approximately 10 to 66 cm/sec. Thus, if subjected to the near-field velocity of a suction dredge, neither behavior nor speed would allow a tadpole to escape. Therefore, in the case of foothill yellow-legged frog tadpoles, the animal would likely be entrained, flushed downstream, and displaced from its natal area.

Although focused on fisheries, Harvey and Lisle (1998) report that if young were to survive the passage through the dredge they would most likely suffer from predation and physiological stressors. Research conducted in Holland revealed that dredging had a temporary negative effect on the presence of the caddisfly larvae, regardless of the method of dredging; and dredging between April and August had a negative effect on the presence of amphibian larvae due to the fact that amphibian larvae are only present during spring and early summer (Twisk et al., 2000). Disturbance during the larval developmental period apparently has a considerable negative impact on the presence of amphibian larvae (Twisk et al., 2000).

<u>Findings</u>

If left unrestricted, direct entrainment, displacement or burial of eggs, larvae and mollusks by suction dredging would be potentially significant with respect to Significance Criteria A and D. However, the Proposed Program incorporates spatial and temporal restrictions to protect the most vulnerable early life stages of *Fish* action species (Table 4.3-1).

CDFG has utilized a broad range of scientific data and management tools to develop dredging regulations that ensure a deleterious effect and/or significant impact to *Fish* species is not likely to occur. For example, for foothill yellow-legged frog, Class E restrictions are proposed for select watersheds in CDFG Region 2. These watersheds are generally tributaries of mainstem streams that have hydrology altered by hydropower operations. In these watersheds, the tributaries provide important refugia for the species, and therefore Class E restrictions are proposed to avoid or minimize impacts to early lifestages. To provide additional protection for this species, streams within the known range of foothill yellow-legged frog, which encompasses a significant portion of the state, are designated Class D. The Class D restriction would protect egg masses from entrainment; while tadpoles may still be present at the times that streams are open to suction dredging, sufficient refugia are believed to exist such that significant impacts would not result. Further, year-round closures(Class A) have been identified for other action species which in many cases would provide surrogate protection for foothill yellow-legged frog tadpoles Similarly, surrogate protection may result from land use designations (e.g., National Parks, Wilderness Areas). Finally, Section 228(k)16 of the regulations requires dredgers to avoid disturbance of eggs, redds, tadpoles and mollusks. In summary, for the example of the foothill yellow-legged frog, the Proposed Program's use of spatial, temporal and operational restrictions would ensure that suction dredging activities would not have a significant impact on the species as a whole, and therefore the potential impacts are considered to be less than significant.

The following regulations would further minimize the potential for entrainment, displacement, or burial of eggs, larvae and mollusks in areas open to suction dredging:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if deleterious effects are identified.
- Section 228(k)(13): prohibits dredging in mussel beds.
- Section 228(k)(14): requires dredgers to take reasonable care to avoid dredging silt and clay materials that may result in increased turbidity and deposition of fines on the gravels.
- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site.
- Section 228(k)(16): requires dredgers to avoid the disturbance of eggs, redds, tadpoles and mollusks.

With these regulations in place the direct entrainment of eggs and larvae of *Fish* species by a suction dredge would be less than significant with respect to Significance Criteria A and D. The amount of burial of mollusks that is likely to occur is also considered less than significant based on the restriction on dredging in mussel beds, and the historical and projected level of suction dredging activity.

Impact BIO-FISH-3: Effects on Early Life Stage Development (Less than Significant)

Discussion

Effects on Fish

To produce viable young, several fish species (including salmonids and lampreys) require uncompacted gravels with high permeability that consists of unclogged interstices which allow for the removal of metabolic wastes (Hausle and Coble, 1976). The availability of intragravel water flow (Vaux, 1962; Cooper, 1965) and dissolved oxygen are also critical for the survival of developing salmonid eggs (Cooper, 1965; Daykin, 1965). Reduced flow and oxygen concentrations (e.g., from higher levels of fine particles [fines] or increased organic matter) can result in a number of negative effects, including the reduced size of embryos at various developmental stages, premature emergence of alevins (newly hatched salmon still attached to the yolk sac), increased alevin development time, and higher pre‑ and post– hatching mortality (Silver et al., 1963; Shumway et al., 1964; Brannon, 1965; Spence et al., 1996; Merz et al., 2006). Dredging has potential to release fine materials which can clog interstitial spaces and cause such effects. Increased fines in dredged areas may also delay emergence of fry; this may result in smaller fry that are less able to compete for resources than their larger counterparts (e.g., those that have experienced normal emergence) (Everest et al., 1987). While the severity of these effects would likely vary depending on the species or the hydrologic conditions of the watershed, dredging may have a substantial negative effect on the spawning grounds and on the developing eggs and larvae of many fish species. Excessive sedimentation from a variety of activities, including mining and road construction may also smother substrates and impair egg-laying or survivorship of eggs or young mollusks (Duncan, 2005).

Effects on Amphibians

Increased suspension of solids in the water column can affect the development of amphibian embryos and tadpoles in several ways. First, suspended solids can result in decreased amounts of dissolved oxygen in the water column. Dissolved oxygen is critical for the survival of developing amphibian eggs (McDiarmid and Altig, 1999), which may suffocate when waters become oxygen-depleted. Pre‑metamorphic larvae (i.e., those that are at the hatchling development stage [Gosner stage 21 through 24]), are also at risk for suffocation during this period as they are respiring aquatically (McDiarmid and Altig, 1999).

Because of their tendency to inhabit the areas in between loose, coarse substrates that comprise a typical streambed, increased siltation within a stream can also affect populations of stream amphibians (Welsh and Ollivier, 1998). Gillespie (2002) found that spotted tree frog (*Litoria spenceri*) tadpole growth and development were reduced by increases of sediment and activities in catchments that increase sediment loads in streams. Disturbance processes that increase stream sediment loads may have contributed to the observed declines of spotted tree frog and other lotic anurans (frogs living in flowing water) in south‑eastern Australia (Gillespie, 2002).

In California, several amphibian species have been identified as being directly impacted by the increase in sedimentation that results from suction dredging. Sweet (2007) cites a USFS file report (Sweet, 1992) in which the direct effect of mortality on the eggs and larvae of arroyo toad was described. The USFWS's recovery plan for arroyo toad identifies suction dredging as a current threat to recovery of the species (USFWS, 1999). The recovery plan notes that suction dredge mining occurring in or adjacent to arroyo toad breeding pools can result in destruction or degradation of breeding habitat (USFWS, 1999). The USFWS (2002) predicts that suction dredge mining may threaten California red‐legged frog, based on evidence observed in red‐legged frog occupied Piru Creek, Ventura County, where heavy siltation caused by upstream suction dredging was documented. USFWS (2002) states that disturbance to streambed substrates and water quality resulting from extensive suction dredging activity at or near a Mountain (Sierra Madre) yellow-legged frog (*Rana muscosa*) breeding site could have harmful effects on eggs and developing larvae. Changes to hydrologic conditions and associated sediment loads during the spring breeding and summer larval rearing season are the principal threat to the conservation of foothill yellow-legged frog (Kuperfberg et al., 2009).

Sediment increases in a stream in northern California caused significantly lower densities of amphibians (Welsh and Ollivier, 1998). Although the sediment effects were species‐specific, reflecting differential use of stream microhabitats, the reflected decrease in densities by these species (such as tailed frog, *Ascaphus truei*) due to increased fine sediments on the streambed matrix is probably the result of their common reliance on the interstitial spaces in the streambed matrix for critical life requisites, such as cover and foraging (Welsh and Ollivier, 1998). Other species that may be subject to similar effects and present in locations of suction dredging include Arroyo toad (*Bufo californicus*), as described above, and foothill yellow-legged frog.

Finally, tadpole growth and development can be significantly reduced by increases of sediment and activities in catchments that increase sediment loads in streams. It has been reported that some species, such as American bullfrog (*Lithobates catesbeiana*), are able to breathe air while aquatically respiring; however, this is for buoyancy rather than gas exchange from the lungs (Ultsch et al., 1999). Sedimentation downstream of the dredging area coats the sand and gravel supporting interstitial algae, bacteria and diatoms upon which tadpoles feed. In addition, suction dredging may reduce the abundance of tadpole prey resources through the direct scour or entrainment of periphyton (i.e., algae, microbes, and detritus) in the vicinity of the dredging activity. Although this may be a temporary effect, it may occur at a critical developmental stage, and therefore, have negative impacts on the organisms.

Findings

If left unrestricted, impacts of suction dredging early life stages of *Fish* would be potentially significant under Significance Criteria A and D. However, the Proposed Program incorporates spatial and temporal restrictions on suction dredging where necessary to protect the development of critical early life stages of *Fish* action species (Table 4.3-1). Spatial and temporal closures of streams for *Fish* action species provides surrogate protection for many other species of aquatic fauna with life histories similar to the action species. In addition, the following regulations would further minimize the potential impacts to critical early life stages:

- Section 228(k)(3): prohibits dredgers from dredging within 3 feet of the lateral edge of the current water level. This regulation would protect against streambank destabilization that could result in release of fine sediment.
- Section 228(k)(4): prohibits dredgers from damaging or removing streamside vegetation. This regulation would protect against streambank destabilization that could result in release of fine sediment.
- Section 228(k)(14): requires dredgers to take reasonable care to avoid dredging silt and clay materials that may result in increased turbidity and deposition of fines on the gravels. This will reduce the potential for eggs and larvae to be impacted by increased turbidity and fine sediment.
- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site. This regulation will ensure that large piles of fines are not left in the stream that could later blanket embryos.
- Section 228(k)(16): requires dredgers to avoid the disturbance of redds and tadpoles.

With the Proposed Program regulations in place, substantial impacts by a suction dredge(s) to development of early life stages of *Fish* species would be less than significant with respect to Significance Criteria A and D.

Impact BIO-FISH-4: Direct Entrainment of Juvenile or Adult Fish in a Suction Dredge (Less than Significant)

<u>Discussion</u>

While the long term impacts of entrainment (e.g., disorientation, abrasions, and secondary infections) have not been assessed in the literature, it has been shown that juvenile and adult fish avoid or survive entrainment by suction dredging (North, 1993) and a high percentage of benthic invertebrates survive entrainment (Griffith and Andrews, 1981). Krueger et al. (2007) found no obvious physical damage to mussels due to entrainment, and entrainment had no significant effect on mussel survival.

The vulnerability of fish to entrainment by a suction dredge was assessed by comparing estimated flow velocity at the suction dredge intake (Table 4.3-7) with swimming speeds of fish. It is assumed that fish will not be able to avoid entrainment if flow velocity exceeds a fish's burst swimming speed. Burst swimming speed (or darting speed) is the maximum velocity a fish can execute for a few seconds by exclusive utilization of white muscle tissue (Webb 1978). This can only be maintained for a matter of seconds and is typically used to escape predation and/or for feeding (Powers and Orsborn, 1985; Bell, 1986; Mitchell, 1989). A fish that reaches burst/darting speed will require a period of rest before continued movement to reduce muscle tissue damage and recover from the activity (Webb 1978). This means that a fish that is put in a position to use burst speed may be more vulnerable to entrainment in subsequent encounters and/or predation thereafter (Ingólfsson et al., 2007).

The lengths of fish vulnerable to entrainment by suction dredge velocities were calculated using methods described by Reiser and Peacock (1985) and Gallagher (1999) (as cited in Meixler, 2009):

Dart Speed (m/s) = 9L
where: L is the total length of a typical fish species

Fish darting speed is calculated as 8 to 12 times the average fish length with higher numbers indicating healthier fish. A conservative estimate of 9 was used given a general lack of knowledge of individual fish health and relative broad application to numerous species (Meixler 2009).

As shown in Table 4.3-8, adults of large fish species, such as the salmonids, would generally be able to easily avoid entrainment unless habituated to equipment or actively pursued by an operator. Some resident adult salmonids such as golden trout may be much smaller (5 inches) and would be vulnerable to most of the nozzle sizes if surprised or acclimated to the hose (Knapp and Dudley, 1990). However, the greatest likelihood of entrainment would occur with young fish (e.g. lamprey ammocoetes) and adults of smaller species (e.g., sculpins and sticklebacks) that either use cover (e.g., substrate and/or vegetation) as a defense mechanism or defend territories. In this situation, damage to fish entrained with substrate or debris could be via crushing or otherwise impacting with sediment within the hose and subsequent increased vulnerability to predation, disease or other physiological stress.

TABLE 4.3-8. ESTIMATED LENGTH OF FISH VULNERABLE TO ENTRAINMENT FOR VARIOUS SUCTION DREDGE INTAKE NOZZLE DIAMETERS

Dredge Nozzle Size	Intake Velocity		Estimated Fish Length Vulnerable	
(inches)	(ft/s)	(cm/s)	(inches)	(mm)
2	4.1	125	5.4	138
2.5	3.3	100	4.4	111
3	4.5	138	6.1	154
4	3.8	117	5.1	130
5	4.9	149	6.5	166
6	4.0	121	5.3	135
8	4.8	146	6.4	162

Findings

If left unrestricted, direct entrainment of juvenile and adult fish by suction dredging would be potentially significant with respect to Significance Criteria A and D. This impact would only be significant for those species who are not able to escape velocities at the dredge intake, and whose populations are severely limited in size or distribution. Streams within the state that provide habitat for species that are very limited in number and distribution are proposed to be closed to suction dredging (Class A), thus avoiding potential for impacts. These closures are necessary to maintain the viability of these species, as direct impacts or degradation of habitat could have a substantial effect on the population or range of the species. In addition, the following Proposed Program regulations would further minimize the potential for entrainment of juvenile and adult Fish:

- Section 228(j)(3): requires that the intake for the suction dredge pump be covered with screening mesh, which effectively eliminates the potential for entrainment of juvenile salmonids into the pump intake.
- Section 228(k)(16): requires dredgers to avoid the disturbance of fish.

While some entrainment of juveniles and adult *Fish* species is likely to occur, it is avoided or minimized based on spatial and temporal restrictions on dredging, and the operational requirements outlined above. Thus, with respect to Significance Criteria A and D, the impact is considered less than significant.

Impact BIO-FISH-5: Behavioral Effects on Juvenile or Adults (Less than Significant)

Discussion

Effects on Fish

Fish behavior can be altered as a result of numerous environmental changes and stimuli. Silt deposition as a result of mechanized activities, such as suction dredging, can have adverse effects on invertebrates and fish, including clogging of respiratory structures, reduced feeding rates, increased invertebrate drift, disruption of courtship displays and spawning behavior, and reduced hatching rates in fish (see Murphy et al., 1995 for review).

Fish behavioral responses to noises and vibrations generated by dredging have not directly been quantified, but observations have shown a range of fish behavior changes to anthropogenic noises and human activity. Fish as well as other vertebrates are capable of detecting a wide range of stimuli in the external environment (Feist and Anderson, 1991). The modalities most often detected include sound, light, chemicals, temperature, and pressure. The response of fish to sounds in their environment is varied. The classic fright response of salmonids to sound is the “startle” or “start” behavior (Moore and Newman, 1956; Burner and Moore, 1962; VanDerwalker, 1967). These behaviors involve sudden bursts of swimming that are short in duration and distance traveled (usually <60 cm; Feist et al., 1992). Responses of other fish to sound include packing or balling, polarizing, increases in swimming speed, diving, or avoidance (Hering, 1968; Olsen, 1976). Few studies have shown that sound can attract or repel salmonids over great distances or for long periods of time (McKinley and Patrick, 1986).

Mueller et al. (1998) subjected 30-70 mm rainbow trout (*O. mykiss*) and Chinook salmon (*O. tshawytsha*) fry to low (7-14 Hz) and higher frequency 150, 180, and 200 Hz (similar to small combustion engines) sound fields to assess the possibility of using underwater sound as a behavioral barrier for enhancing fish screening facilities. Both species responded to infrasound by an initial startle response followed by a flight path away from the source and to deeper water. These observations indicate that juvenile salmonids, as small as 30 mm long, have infrasound detection capability. They also observed a startle response in wild Chinook salmon when exposed to high-intensity (162 dB //mPa), 150-Hz pure tone sound; but no observable effects were noted on hatchery Chinook salmon or rainbow trout fry when exposed to 150, 180, or 200 Hz high-intensity sound. Therefore, the noise generated by a suction dredging motor may have mixed behavioral effects on juvenile salmonids, depending on species, age and origin.

Very little work has been done on the effects of diving and other human activity on the behavior of stream fishes. Hassler et al., (1986) observed trout actively feeding behind suction dredging operations. However, this was a qualitative assessment and did not directly measure changes in individual fish behavior or the overall effects on the fish population. More recent work has been done on the effects of tourist diving on marine reef fishes. Ilarri et al. (2008) observed that diversity, equitability and species richness were significantly higher at a Brazilian coral reef when divers were absent. How well these results translate to California streams is unclear, but it is reasonable to assume based on the available literature that diving activity in association with equipment operation can affect fish behavior.

While some work suggests that adult spring-run Chinook salmon behavior is unaffected by suction dredging (Stern, 1988), other studies suggest that different disturbances (e.g., recreational activity) increased salmon movement in pools, and may increase adult stress (Campbell and Moyle, 1992). Even minor disturbances during the summer may harm adult anadromous salmonids because their energy supply is limited, and the streams they occupy can be near lethal temperatures (Nielsen et al., 1994). The USFS (2001; 2009 states that suction dredging can disturb spring Chinook salmon holding in deep pools during the summer, particularly if numerous dredges are operating, or if water temperatures are elevated. Suction dredging dislocates and can kill aquatic insects used as a food source by a variety of fish species in a variety of life stages. If animals avoid a refuge area as a result of disturbance or perceived predation (Frid and Dill, 2002), these animals may experience greater predation by other predators (Crowder et al., 1997; Sih et al., 1998; De Goeij et al., 2001). If forced to relocate to new feeding areas, fish may experience increased stress due to predation, exposure to sub-optimal conditions, and increased competition with other fish for food and space, as well as stress from agonistic behavior (i.e., contests for dominance).

Effects on Amphibians

Responses by adults and metamorph amphibians to noise and vibrations have not been quantified; however, avoidance by individuals of disturbances is likely. Research shows that abundance of Iberian frogs (*Rana iberica*) has been reported to decrease with proximity to recreational areas (Rodríguez‑Prieto and Fernández‑Juricic, 2005). Human visitation along streambanks resulted in 80 to 100 percent decrease in frog use with a five‑fold and 12‑fold increase in direct disturbance (Rodríguez‑Prieto and Fernández‑Juricic, 2005). Avoidance behaviors by frogs to humans, including suction dredgers, could remove individuals from an existing established territory, and push them into either marginal or unsuitable habitat or into a new, already occupied territory, potentially impacting the relocated individual and the defending individual, expending critical energy reserves.

Findings

If left unrestricted, impacts of suction dredging on the behavior of juvenile and adult *Fish* would be potentially significant with respect to Significance Criteria A and D. Behavioral impacts are of particular concern during mating, spawning and early life stages. The Proposed Program regulations incorporate spatial and temporal restrictions on suction dredging in the period immediately before spawning/breeding and during critical early life stages of *Fish* action species (i.e., incubation, development, early emergence) (Table 4.3-1). The Proposed Program regulations also include specific closures of areas within streams that are known to provide thermal refugia (i.e., cold water holding pools) for Chinook and coho salmon in the Klamath River basin (Appendix L). Closures of these areas provide for protection of organisms and maintenance of stream features that serve as habitat during stressful periods (e.g. over-summer habitat for juveniles). Therefore, the potential to stress holding adults and/or juveniles of these species from actions associated with suction dredging is not likely to commonly occur. In addition, the following regulations would further minimize the potential for suction dredging to result in behavioral effects on fish and amphibians:

- Section 228(k)(16): requires dredgers to avoid the disturbance of fish.

With the Proposed Program regulations in place, impacts related to behavioral effects would be avoided and/or minimized. Thus, with respect to Significance Criteria A and D, the impact is considered less than significant.

Impact BIO-FISH-6: Effects on Movement/Migration (Less than Significant)

Discussion

Effects on Fish and Invertebrates

Aquatic organisms such as fish and invertebrates migrate or move to spawn, feed, seek refuge from predators, and escape harmful environmental conditions or access more productive areas (see Fausch et al., 2002). The success of migration, whether upstream, downstream or laterally (to floodplain and off channel habitat) is limited by the presence of barriers that can impede passage (Meixler et al., 2009). Barriers to movement can either be physical (e.g. water that is too shallow, fast or hot) or behavioral (perceived or real danger) in nature. Direct and indirect impacts related to creating passage issues for migrating fish include:

- Blockage: Both complete and partial
- Fatigue: Can't complete immediate passage or reduced ability to complete migration or life strategy
- Vulnerability: Predation and disease
- Injury: Impact, scrapes and abrasions
- Desiccation: tissue damage or reduction in gill function due to being out of water for prolonged periods
- Disorientation: Fish cannot find pathway or access to passage, impeding or reducing migration success

Whether human activity or a change to the channel is a barrier to fish movement depends on the several factors including: the amount or frequency of noise generated by the activity; the physical and hydraulic features of the channel alteration and the physiology; and life stage and behavior of the fish (Bell, 1990; Webb, 1995). This can change with species and age of fish and acclimation of the organism over time (Davidson et al., 2009). Such activities may create velocity, depth, and slope conditions that fish cannot physically overcome, may disorient fish, or fish may avoid such conditions.

Effects on Amphibians

For most amphibians, the metapopulation concept of population biology applies, which is defined as populations that are spatially structured in assemblages of local breeding populations, with their own independent dynamics, and migration among the local populations has some effect on local dynamics, including the possibility of population reestablishment following extinction of any one of the local populations (Whittaker, 1998).

Movement per generation is of a lower rate in amphibians than in invertebrates, mammals or reptiles, and low recruitment of dispersing individuals probably plays an important role in decline and extinction in amphibian populations in fragmented landscapes (Cushman, 2006). A number of studies have indicated that populations may decline if immigration is prevented and may not be recolonized following a local extinction (Cushman, 2006).

For the smaller vertebrates, such as amphibians, movement could be impeded if suction dredgers are densely active or consistently active within a season within a stream corridor. Movement from the main channel into small tributaries, or vice versa, may be impeded by suction dredging. Suction dredging could also result in the sterilization of a once viable and active movement corridor along the littoral area, thus barring movement.

Interruption of movement or dispersal corridors can be detrimental to small populations of amphibians. The viability of a population is dependent on movements between populations, and without such movements, populations become susceptible to loss of genetic diversity by random drift and, ultimately falling to the effects of inbreeding (Beebee and Griffiths, 2005). Connectivity appears to be of particular importance even in unfragmented landscapes, as amphibian populations experience relatively frequent local extinction and turnover (Cushman, 2006). Thus movements and dispersal are critical for recolonization of local populations and maintenance of regional populations.

Findings

If left unrestricted, impacts of suction dredging on movement would be potentially significant with respect to Significance Criterion D. However, the Proposed Program incorporates spatial and temporal restrictions on suction dredging activities within the range of *Fish* action species. Streams within the state that provide habitat for species that are either very limited in number and/or distribution are proposed to be closed to suction dredging (Class A), thus avoiding the potential for impacts. These restrictions are intended to maintain the viability of these species, as disruptions of migration or movement may have a substantial effect on the population or range of the species. Areas of the state designated Class B through G similarly provide direct protection for *Fish* action species and surrogate protection for the movement and migration of many other species (Appendix J, Tables J-1 and J-2). In addition, the following Proposed Program regulations would further minimize the potential for impacts to migration and movement of *Fish*:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if deleterious effects are identified.
- Section 228(k)(6): Prohibits the diversion of a stream into the bank.

- Section 228(k)(7): Prohibits:
  - Construction of permanent or temporary dams
  - Concentrating flow in a way that reduces the total wetted area of the stream.
  - Obstructing a stream or lake in such a manner that fish passage is impeded.
- Section 228(k)(16): requires dredgers to avoid the disturbance of fish.

With the Proposed Program regulations in place, impacts related to movement and migration would be sufficiently avoided and/or minimized. Thus, with respect to Significance Criterion D, the impact is considered less than significant.

Impact BIO-FISH-7: Effects on the Benthic Community/Prey Base (Less than Significant)

Discussion

Benthic and epibenthic (i.e., stream bottom) communities, such as diatoms, periphyton, and invertebrate organisms, are important components of the stream ecosystem because they help form the foundation of the stream food web. Changes in benthic community composition and productivity can affect higher trophic levels (e.g., fish and amphibian production) and other stream processes (e.g., organic matter processing).

Disturbance and Distance from Dredging Activity

Thomas (1985) and Harvey (1986) measured statistically significant reductions in some benthic invertebrate taxa within 10 m of dredges that disturbed the substrate. Harvey (1986) found that large-bodied insect taxa that avoid sand (e.g., hydropsychid caddisflies and perlid stoneflies) were most affected. In a study of dredging effects in an Alaska stream, Royer et al. (1999) found that the density of benthic invertebrates was greatly reduced in the first 10 meters downstream of the activity. Values returned to upstream composition within 80 to 160 meters.

Frequent disturbance may keep assemblages in an early stage of development, affecting the composition of benthic and epibenthic invertebrates on and within the stream substrate. Robinson and Rushforth (1987) observed that disturbance frequency had no effect on diatom species diversity in open canopy sections of a 3rd order tributary. However, species diversity significantly decreased as disturbance frequency increased in closed canopy areas. Robinson and Minshall (1986) examined the effects of disturbance frequency on invertebrates and periphyton. Invertebrate species richness and density were reduced as disturbance frequency increased. These trends were evident for both seasons (summer and fall) and sites (open vs. closed canopy). Invertebrate species diversity was not affected during the fall experiment; however, diversity was reduced at high frequencies of disturbance during the summer. Colonization of the benthos by less common species is impaired by increased disturbance. Periphyton biomass is negatively correlated to increased disturbance frequency in open canopy areas and frequently disturbed areas maintained low standing crops at an open canopy site. These data suggest that disturbance frequency can directly influence the benthic community at local scales by reducing invertebrate richness, total animal density, and periphyton biomass. Seasonality also plays a role in the effect of disturbance on species diversity.

Mortality and Population Recovery

Griffith and Andrews (1981) found that benthic invertebrates in four Idaho streams suffered low mortality (<1% of over 3,600 individuals) following entrainment in a dredge. Rapid recovery (within 4-6 weeks) occurred, both in terms of numbers and species composition. In contrast, Bernell et al. (2003) stated that invertebrate colonies situated in riverbeds are almost entirely destroyed by suction dredging.

In general, benthic invertebrates (Mackay, 1992), hyporheic[2] invertebrates (Boulton et al., 1991), and periphyton (e.g., Stevenson, 1991; Stevenson and Peterson, 1991) all rapidly re-colonize small patches of new or disturbed substrate in streams. Abundance and general taxonomic composition of benthic invertebrates can be restored on dredge tailings four to six weeks after dredging (Griffith and Andrews 1981; Thomas 1985; Harvey 1986). Boulton et al. (1991) argued that recolonization of tailings by hyporheic invertebrates (those living beneath the surface of the substrate) is probably also rapid. Griffith and Andrews (1981) studied the effects of a small suction dredge on fishes and invertebrates in Idaho streams and found that most of the recolonization of dredged plots by benthic invertebrates was completed after 38 days. Hall and Harding (1997), who observed a suction dredge experiment in a marine environment, found that it revealed some statistically significant effects; taken as a whole the results indicated that the faunal structure in disturbed plots recovered (i.e., approached that of the un-disturbed controls) by 56 days. A U.S. Department of the Interior (Prussian et al., 1999) study of three Alaska streams found short term decreases (during dredge operation) in numbers and diversity, with minimal long term (1 year later) impacts. Impacts depended on substrate size; harsh winters in Alaska were also an added factor for recovery.

The effects of suction dredging on rare, long-lived macroinvertebrate species have not been well documented. Fore et al. (1996) discusses the importance of assessing rare or long-lived organisms (for instance the presence or absence of a long-lived stonefly genus such as *Pteronarcys* spp. with a 2-3 year life cycle) as important tools for assessing anthropogenic impacts. Wright and Li (1998) found that chronic recreational impacts on caddisfly (*Dicosmoecus gilvipes*) densities within the riparian zone were apparent for instars 3-5 (the latter three of five development stages), but effects were greater on earlier instars than later instars. In 1995, sites with low human use had statistically significant densities of caddisfly which were higher than sites exposed to intense recreation (Wright and Li 1998).

There are several limitations to the studies above as they apply to the Proposed Program. Identified studies did not take into account the effects of the sediment plume or that tailings may be more susceptible to erosion. Growth and development of aquatic organisms can be significantly reduced by increases of fine sediment and activities in catchments that increase stream sediment loads (Suttle et al., 2004). Sedimentation downstream of the dredging area coats the sand and gravel supporting interstitial algae, bacteria and diatoms which are important prey resources. Although this effect may be temporary, it can occur at a critical developmental stage, and therefore, have negative impacts on certain organisms.

[2] The hyporheic zone is the area beneath and/or beside the stream channel or floodplain where surface and groundwater exchange regularly occurs.

Many of these studies have been performed on streams where human impact is already present, utilized very general assessments of “similarity” and were somewhat short in duration. The use of such terms as “minimal” and “rapid” in studies may be considered subjective. Some juvenile salmonids may spend 1 – 12 months in natal streams before emigrating. This would suggest that food and habitat within the dredging area may be affected from 8 – 100% of the residence time of an individual fish. Parameters such as food and cover quantity and quality can greatly influence energy reserves and hence, growth, behavior and metabolic processes such as smoltification (the process by which juvenile salmonids prepare for living in salt water).

Suction dredging may benefit species by temporarily improving the availability of prey resources through mobilization of the benthic invertebrate community. Many studies have observed increased feeding by juvenile anadromous, resident juvenile and adult salmonids below active suction dredging operations due to invertebrates becoming dislodged and floating downstream (Stern, 1988; Thomas, 1985; Hassler et al., 1986; Harvey, 1986). The action of stirring up the stream bottom by suction dredgers can temporarily expose invertebrates, making them readily available as forage for fish. Conversely, the studies identified above suggest that availability of prey to fish and other resources may actually be reduced during periods immediately after dredging would cease.

In conclusion, suction dredging can have substantial short-term and localized adverse impacts on local benthic invertebrate abundance and community composition. Benthic communities seem to recover over time frames of 30-60 days after the disturbance ceases and the adverse impacts of suction dredging are not evident after one year (unless there is a very small population that is threatened or endangered). However, when considering the extent of benthic disturbance and its recovery, the extent to which it affects a juvenile salmonid’s reliance on the natal stream before emigrating is important, as is larval development of other native species that depend on a healthy benthic invertebrate community.

Findings

If left unrestricted, the impacts of suction dredging on stream benthic communities would be less than significant with respect to all significance criteria. Less than significant temporal impacts to benthic and epibenthic communities would be reduced by the Program regulations that incorporate spatial and temporal restrictions for streams within the state that provide habitat for *Fish* species. These restrictions would either completely avoid impacts to benthic and epibenthic communities (i.e., in streams designated Class A) or allow for recovery of the benthic community (i.e., in streams designated Class B through G). In addition, the following Proposed Program regulations would further minimize the potential for impacts to benthic and epibenthic communities:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.
- Section 228(j)(1): limits the nozzle size of dredging equipment, which effectively reduces the potential area disturbed by an individual dredger.

- Section 228(k)(4): prohibits the removal or damage of streamside vegetation. Terrestrial invertebrates can make up a significant portion of a fish's diet during some periods (Nakano and Murakami, 2001; Garman, 1991). Riparian trees and other vegetation are the source of these organisms. Prohibiting the removal of riparian vegetation will help maintain this component of the prey base.
- Section 228(k)(5): prohibits the cutting, movement or destabilization of woody debris, which is important for macroinvertebrate habitat and production.

Thus, with respect to all significance criteria, this impact is considered less than significant.

Impact BIO-FISH-8: Creation and Alteration of Pools and other Thermal Refugia (Less than Significant)

Discussion

Stream pools provide important habitat for aquatic organisms such as amphibians (Wilkins and Peterson, 2000) and fish, including refuge from bird and mammal predation (Harvey and Stewart, 1991). Pools that provide coldwater (or thermal) refugia are important to salmonids and other fishes as both over-summering juvenile and adult holding habitat. For instance, adult spring Chinook salmon returning from the ocean in late spring migrate upstream, hold in cooler river reaches during the summer months, and then spawn in the fall when stream temperatures become more tolerable. Adult salmon cease to feed upon entering freshwater and, therefore, function on energy reserves until spawning. Because salmon metabolic rates increase directly with temperature, high water temperatures prior to spawning compromise energy necessary to insure reproductive success. Therefore, coldwater refugia are important stream components (Torgersen et al., 1995). These sites also provide refuge for macroinvertebrates, herpetofauna and other fish species.

Suction dredging activities have the potential to result in creation, alteration or destruction of pool habitat. The act of dredging often creates pools locally, but these features may not be persistent, nor function hydrologically in a manner similar to naturally formed pools. Suction dredging can alter or destroy pools by redistributing stream substrate in a manner that would destabilize bed form, or simply by filling a pool with dredge tailings (See Chapter 4.1, *Hydrology and Geomorphology* for a more detailed discussion of dredging impacts to channel form and function).

Temperatures within streams may be affected by surface discharge, but a primary effect is connectivity with the hyporheic environment (i.e. beneath and lateral to the streambed) (Ebersole et al., 2001). Other effects on temperature include solar radiation and ambient air temperature. This is further influenced by solar declination, length of day and shading. Pool depth and water residence time will affect mixing, how much energy is stored in the water and therefore the temperature within the area. In-stream structures such as log jams, riffles, and gravel bars are common in natural streams and stream restoration projects, and are also known to enhance hyporheic exchange (Kasahara and Wondzell, 2003) affecting channel temperatures (Hester et al., 2009). Suction dredging may affect the ability of a section of stream to provide thermal refuge in several ways; dredging a hole that allows the connection of surface water to the hyporheic zone is one aspect. Another is affecting the porosity of the substrate that in turn affects hyporheic flow.

Filling of pore spaces between coarse gravel and cobble at the bottom of pools can reduce the use of such habitat by amphibians (Welsh and Olliver, 1998). Suction dredging can lead to sedimentation of pools downstream of the dredging site, thus filling in pool habitat. For example, after one year of dredging activity on Gold Creek in Missoula County, Montana, all of the gravel deposited at the dredged area had moved downstream and completely filled in a downstream pool (Thomas, 1985). However, the authors of this study found, overall, that the creation of a pool at the dredged site led to no net loss of pool habitat in the stream.

It is unclear how sustainable pools created by dredging activity are compared to those that develop under more natural conditions. Where pools form, their size and how they are maintained is dictated by gradient, sediment source, substrate size, channel width, flow and the presence of forcing features (e.g., bedrock outcropping, boulders, wood material) (MacWilliams et al., 2006). These factors are rarely, if ever, considered by suction dredgers when creating pools.

Findings

If left unrestricted, impacts of suction dredging on thermal refugia would be potentially significant with respect to Significance Criteria A, B and D. More specifically, unrestricted dredging of thermal refugia utilized by Chinook salmon in the Klamath and Salmon River watersheds could result in a substantial decline of the species, alteration of thermal refugia habitat, and affect movement of the species within summer holding areas. However, the Proposed Program regulations include specific year-round closures of areas within streams that are known to provide thermal refugia for this species (Appendix L). Closures of these areas, and appropriate buffers in the upstream direction, will provide protection for this type of habitat. In addition, the following Proposed Program regulations would further minimize the potential for suction dredging to alter or otherwise degrade pool habitat:

- Section 228(k)(5): prohibits the cutting, movement or destabilization of woody debris, which is important for pool habitat formation and maintenance.
- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site. This regulation would limit the potential for dredgers to leave tailings that could be easily transported downstream and fill pools, and plug or reduce hyporheic flow in critical areas.

With the Proposed Program regulations in place, impacts related to alteration of pool and thermal refugia habitat would be sufficiently avoided and/or minimized. Thus, with respect to Significance Criteria A, B and D, the impact is considered less than significant.

Impact BIO-FISH-9: Destabilization/Removal of Instream Habitat Elements (e.g., Coarse Woody Debris, Boulders, Riffles) (Less than Significant)

Discussion

This section primarily discusses the biological effects of destabilization/removal of instream habitat elements. The effects on channel form and function are discussed in Chapter 4.1, *Hydrology and Geomorphology*. For the purposes of this discussion coarse woody debris (CWD), also commonly referred to as large woody debris or LWD, refers to instream wood greater than 12 inches in diameter (measured at any point) and 6 feet in length, and root wads of any size.

Woody Debris and Large Boulders

Suction dredgers sometimes remove CWD and large boulders from stream channels or reduce the stability of these elements by removing surrounding material (Harvey and Lisle, 1998). The importance of these features for aquatic habitat and stream structure is well documented. Many pools are formed by scour around large roughness elements (Keller and Swanson, 1979; Lisle, 1986; Montgomery et al., 1995; Merz et al., 2006) and therefore, the stability and maintenance of these structures are important to the long-term maintenance of such habitat. CWD, especially in smaller streams, increases flow complexity and water retention (Gurnell et al., 2002). When the flow of the water is backed up by CWD or boulders, pools may form, which are an important habitat for many species of fish (McIntosh et al., 2000). This can become especially important during dry periods to maintain stream biota (Lisle, 1986). Instream structure provides important habitat for juvenile and adult salmonids (House and Boehne, 1985; Flebbe and Dolloff, 1995; Merz, 2001).

Woody debris is also an important energy source for benthic invertebrates (Anderson et al., 1978; Bisson et al., 1987), which are a principal food of juvenile salmonids (Mundie,1974). Woody debris provides cover for adult salmonids (Bjornn and Reiser, 1991) and low gradient sediment deposits upstream of debris accumulation can provide suitable spawning substrate in sediment-poor drainages (Everest and Meehan, 1981). Large pieces and conglomerations of CWD are especially important because they induce scour of larger pools with tail-outs appropriate for redd construction in sediment-rich streams and can be more stable than smaller pieces (Sedell et al., 1982; Bilby 1984).

Many studies provide evidence that CWD and other large elements affect various ecological processes and conditions in streams, including the microbial uptake and transfer of organic matter (Tank and Winterbourn, 1996), the species composition and productivity of benthic invertebrates (Benke et al., 1984), and the density of fish (e.g., Fausch and Northcote, 1992; Crispin et al., 1993). CWD and snags are important habitat components for benthic macroinvertebrate communities (Brown and May, 2000). Woody debris is an important refuge and source of macroinvertebrate recolonizers. Loss of wood structure can have a negative effect on macroinvertebrate diversity and production in streams (Hax and Golladay, 1998). Sundbaum and Näslund (1998) demonstrated that the presence of woody debris decreases intraspecific competition through visual isolation, allowing fish to reduce aggressive interactions and energy expenditure.

Harvey and Lisle (1998) state that suction dredging likely only affects the presence of CWD locally; thus, it has a limited effect on a stream's aquatic biota. However, many western streams may be particularly vulnerable to CWD removal or disturbance because other human activities have already depleted them of CWD (Bilby and Ward, 1991; Ralph et al., 1994).

Removal or reduction of CWD retention in river channels can have variable and substantial impacts on the stream environment. Warren and Kraft (2006) found that in a New York stream, substrates did not change significantly in response to wood removal. However, the relative proportion of macroinvertebrate grazers increased upstream and downstream from removed woody debris dams in all streams. Bilby (1984) found that the removal of CWD resulted in reduced numbers of pools and scouring and lowering of the bed in several Washington streams. Smith et al. (1993) found that wood removal from a gravel-bed stream resulted in dramatic redistribution of bed sediment and changes in bed topography. Removal of CWD changed the primary flow path, thereby altering the size and location of bars and pools, and causing local bank erosion and channel widening. Increased bed material mobility was attributable to destabilization of sediment storage sites by removal of debris buttresses, elimination of low-energy, backwater environments related to debris, and an inferred increase in boundary shear stress resulting from the removal of debris-related flow resistance. Sediment deposition was favored by the elimination of debris-related scouring turbulence and by increased flow resistance from a developing sequence of alternate bars. Mean spacing of thalweg (i.e., the low point in the stream) cross-overs and pools did not change measurably following debris removal, although variability of spacing between thalweg cross-overs tended to decrease with time as the location of bars stabilized. However, Smith et al. (1993) found no consistent pattern of change in mean residual depth of pools or in distribution of depths occurred within the first 4 years following debris removal.

Wondzell et al. (2009) found that in the first few years after CWD was removed from a stream, hyporheic exchange flow was reduced by smoothing of the streambed and water surface elevation profiles due to streambed scour and sediment deposition. Also, large contiguous patches of downwelling or upwelling were fragmented. These flows are important to the production of benthic invertebrates and the survival and development of developing fish embryos (Fowler and Death, 2001; Merz et al., 2006; Bilski, 2008).

Riffles

Pool-riffle channels have an undulating bed that defines a sequence of pools and bars. Pools are topographic depressions within the channel and bars are corresponding high points that form riffles. Therefore, the two are defined relative to each other (see Montgomery and Buffington, 1997). Pools are rhythmically spaced about every five to seven channel widths in self-formed, pool-riffle channels (Leopold et al., 1964; Keller and Mellhorn, 1978), however the frequency of pool-riffle sequencing is also affected by stream gradient, substrate size, and the amount and frequency of structure, such as CWD (Montgomery et al., 1995). Riffles represent storage locations for bed material and are generally utilized for fish spawning. The particle sizes and distributions of bed material influence channel characteristics, bedload transport, food supplies for fish and other organisms, spawning conditions, cover, and rearing habitat (see Beschta and Platts, 1986). The riffle bed is typically comprised of gravel and cobble substrate and the interstitial spaces between the rock particles provide places for plants to resist the current, and can trap organic matter such as sticks, leaves and detritus which are an important component of the stream's food web. These areas also provide refuge habitat for aquatic macroinvertebrates and incubation habitat for many organisms including salmonids (Shumway et al., 1964; Hose et al., 2005). The rapid movement of water over a coarse riffle substrate results in complex flow, a turbulent water surface and high dissolved oxygen levels (Kim, 2006). Constriction of the water flow at the interface between pools and riffles increases downwelling, upwelling, hyporheic flow and filtration of water through the riffle's coarse bed material which maintains the physical requirements for numerous organisms that utilize this habitat (Geist et al., 2002).

Riffle-pool complexes enhance the heterogeneity of the river channel which is particularly valuable for fish and wildlife habitat (Lind et al., 1996; Welsh and Ollivier, 1998). The creation and maintenance of riffles in relationship to pools has a significant effect on the life history of numerous aquatic species, including spawning and embryo development in salmonids (Montgomery et al., 1999; Malcolm et al., 2004). Riffle habitats and the hyporheic environment they provide, even in intermittent streams, may support greater numbers of invertebrate taxa and individuals than other areas of the stream (Hose et al., 2005).

Because natural channel form, including pool-riffle morphology, is created by complex actions such as flow convergence and divergence of flow, it is often difficult to re-create these features without considerable engineering and design (Frissell and Nawa, 1992; Kondolf et al., 1996; Pasternack et al., 2008; Sawyer et al., 2010). Potential impacts from suction dredging may include the discharge of dredged material to pools and riffles, or the elimination of riffles directly through the action of dredging or indirectly through the destabilization of CWD features. Activities that reduce riffle–pool ratios or alter the substrate matrix in these habitats may reduce aeration and filtration of the water column and reduce habitat diversity. Activities that shift or change channel morphology may alter stream hydrology, increase mobility of bed sediments, increase fine sediments, reduce habitat complexity and alter water quality, both at the surface and within the hyporheic zone having negative connotations for fish and wildlife resources (Kaufmann and Hughes, 2006).

Dredge tailings may be attractive to spawning salmonids as sites for redd construction because tailings are often located near riffle crests where fish frequently spawn, and they provide relatively loose, appropriately sized substrate. However, dredge tailings may reduce embryo survival because they tend to be less stable than natural spawning gravels. Embryos in tailings may suffer high mortality if high flows scour the tailings, thereby destroying redds (Harvey and Lisle, 1998).

Findings

The importance of CWD and large boulders on the formation and maintenance of aquatic habitat structure is well documented in the preceding discussion. If left unrestricted, impacts of suction dredging on the abundance and distribution of CWD in sensitive habitats, including but not limited to USFWS/NMFS designated critical habitat, would be potentially significant with respect to Significance Criterion B. Likewise, displacement of large boulders that are important for formation and maintenance of aquatic habitat and stream structure would be potentially significant with respect to Significance Criterion B. However, the following Proposed Regulations would minimize the potential for suction dredging to destabilize or remove instream habitat features:

- Section 228(k)(1): prohibits the use of motorized winches or other motorized equipment to move boulders or logs without prior approval and section 1602 notification. This regulation would limit the potential for dredgers to destabilize or alter instream habitat by moving large objects.
- Section 228(k)(5): prohibits the cutting, movement or destabilization of woody debris including root wads and stumps or logs.

- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site. This regulation would limit the potential for dredgers to destabilize or alter riffle and pool habitat.

With the Proposed Program regulations in place, the potential for key stream elements to be destabilized or removed by suction dredging would not commonly occur. Thus, with respect to Significance Criteria B, the impact is considered less than significant.

Impact BIO-FISH-10: Destabilization of the Streambank (Less than Significant)

This section discusses the biological effects of destabilization of streambanks. The effects on channel form and function are discussed in Chapter 4.1, *Hydrology and Geomorphology*.

Discussion

Physical habitat quality, including streambanks dynamics, plays a vital role in the biological condition of aquatic habitat (Barbour, 1991). Streambanks support riparian vegetation, which is important to aquatic food web dynamics, regulation of stream hydraulics (e.g., velocity) and temperature, and storage of alluvial sediment. Destabilization of streambanks can have adverse effects on aquatic and riparian habitats including sedimentation, increased flow velocity, increased water temperatures, reduced cover habitat (e.g., undercut banks), and reductions in allochthonous (originating from outside the stream) organic matter inputs.

Streambank erosion is one of the primary non-point sources of sediment in a watershed (U.S. EPA, 1999). While streambank erosion is a natural process, excessive erosion caused by human activity can substantially degrade aquatic habitat downstream of the erosion site. Simon et al., (2006) estimated that streambank erosion accounts for about 25% of the total fine sediment load entering Lake Tahoe. The USFWS has identified sedimentation of aquatic habitat as a threat to the recovery of listed amphibian species including arroyo toad and California red-legged frog (USFWS, 1999; USFWS, 2002). Excessive sedimentation from a variety of activities may also smother substrates and impair egg-laying or survivorship of eggs (Duncan, 2005).

Findings

If left unrestricted, impacts of suction dredging on streambank stability would be potentially significant with respect to Significance Criteria A, B and C. Specifically, streambank destabilization may result in excessive sedimentation in habitat utilized by *Fish* species; degradation of sensitive habitat such as riparian areas; and result in adverse effects on federally protected wetlands in or adjacent to streams through direct modification or sedimentation. The following Proposed Program regulations would reduce the potential for suction dredgers to destabilize streambanks:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.

- Section 228(k)(2): Prohibits dredging with within 3 feet of the current water level at the time of dredging. This would greatly reduce the likelihood that a dredger would destabilize a streambank.
- Section 228(k)(4): prohibits the removal of streamside vegetation.

While the Proposed Regulations prohibit suction dredge activities into streambanks, similar regulations were previously in place and it has been observed that some illegal activity occurred that caused bank erosion and instability (McCleneghan and Johnson, 1983; USFS, 2007); this is also likely to occur under the Proposed Program. This potential for bank erosion and instability as an outcome of suction dredge activities is considered a departure from the current baseline condition whereby no suction dredging occurs because it is prohibited by statute and court order. It is anticipated that with the Proposed Program regulations in place, the extent of bank destabilization caused by dredging activity would be minimal and would not substantially degrade the biological function of rivers and stream of the state. Thus, with respect to Significance Criteria A, B and C, the impact is considered less than significant.

Impact BIO-FISH-11: Effects on Habitat and Flow Rates Through Dewatering, Damming or Diversions (Less than Significant)

This section discusses the biological effects of dewatering, damming and diversions. The effects on channel form and function are discussed in Chapter 4.1, *Hydrology and Geomorphology*.

Discussion

Channel flow manipulations, such as damming, dewatering and diversions, may adversely impact *Fish*. Changes in flow patterns and properties (e.g., depth, velocity) can affect fish behavior and migration patterns. Changes to hydrologic conditions (primarily unnatural flow fluctuations from dam releases) and associated sediment loads during the spring breeding and summer larval rearing season are the principal threat to the conservation of foothill yellow - legged frog (Kupferberg et al., 2009). Dewatering or diversion of the stream channel may strand fish and expose tadpoles to unnatural conditions and increase predation. Increased water velocities as a result of diversions can create barriers to fish movement and displace tadpoles. Damming a waterway to increase the level of water to float dredges may also create barriers to fish movement and could flood suitable amphibian breeding habitat. Damming in some cases may temporarily create/improve pools, providing an extension of habitat for embryonic forms and rearing habitat.

Findings

If left unrestricted, impacts of modification of flow regimes by suction dredgers would be considered potentially significant with respect to Significance Criteria A and D. More specifically, diversion or dewatering caused by dredgers may strand or impeded the movement or migration of *Fish* species. Section 228(k)(7) of the Proposed Regulations prohibits: construction of permanent or temporary dams; concentrating flow in a way that reduces the total wetted area of the stream; and obstructing a stream or lake in such a manner that fish passage is impeded. Such activities would require compliance with Fish and Game Code section 1602, which may require a project-specific CEQA analysis. In addition, the Proposed Program regulations incorporate restrictions to protect the development of critical early life stages of *Fish* action species such that unauthorized diversion, dewatering or damming are not likely to cause significant impacts. Section 228(c)(2) of the Proposed Program regulations, which requires dredgers to provide CDFG with information regarding the location of their dredging operation(s), would enable CDFG to monitor dredging activities and enforce Program regulations that prohibit diversion, dewatering or damming of streams. While some unauthorized channel manipulations are likely to occur in spite of these restrictions, these are not anticipated to be widespread because of the Proposed Regulations which prohibit this type of activity. Thus, with respect to Significance Criteria A and D, the impact is considered less than significant.

TERRESTRIAL WILDLIFE & NON-RIVERINE AQUATIC INVERTEBRATES

Impact BIO-WILD-1: Effects on Special-Status Terrestrial and Non-Riverine Aquatic Invertebrates (e.g., Fairy Shrimp) (Less than Significant)

Discussion

Suction dredging access points and encampments may occur in close proximity to, or within areas that provide habitat for special-status terrestrial and non-riverine aquatic invertebrate species. Special-status terrestrial and non-riverine aquatic invertebrates species are listed in Tables 4.3-2 through 4.3-4., and include species such as fairy shrimp (*Branchinecta* spp.), vernal pool tadpole shrimp (*Lepidurus packardi*), Trinity bristle snail (*Monadenia infumata setosa*) and valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). Special-status terrestrial and non-riverine aquatic invertebrate species and their habitats may be trampled or otherwise disturbed by suction dredgers, their equipment or vehicles as they access/egress streams or establish encampments. The potential severity of such effects depends on the type of habitat, the intensity of use, time of year and relative disturbance prior to use by dredgers. The sensitivity to disturbance of an area prior to use by a suction dredger would in part determine the severity of impact. Highly trafficked or developed areas (e.g., bridges, boat ramps, improved camp sites) are less likely to support these species, and would be less sensitive to disturbance. In general, pristine habitats with little human traffic are more likely to support sensitive species; however, fairy shrimp are known to inhabit highly disturbed vernal pool habitats.

Findings

Suction dredging itself is not likely to adversely affect special-status terrestrial and non-riverine aquatic invertebrate species; ancillary activities such as encampments have a higher potential to impact these organisms and their habitats. However, the Proposed Program regulations solely address the suction dredging activity itself, and not related activities such as deployment of suction dredge equipment and camping. Therefore, even with the Proposed Program regulations in place, ancillary activities associated with suction dredging may still result in impacts to one or more special-status terrestrial/non-riverine aquatic invertebrates species, some of which are protected under ESA or CESA.

With respect to fairy shrimp, vernal pools that support listed species are not common habitat features in the landscapes where dredging activities most commonly occur (see Chapter 3 for a description and maps of suction dredging locations). Furthermore, vernal pools that do occur adjacent to streams would often be dry and organisms would be in the dormant embryonated cysts form when dredgers would be present (typically the summer and fall months due to seasonal restrictions for other species). Thus, the potential for substantial disturbance to fairy shrimp and their habitat would be minimized because when vernal pools are dry the organisms are in a life stage that is relatively resilient to disturbance (i.e., cyst form), and (2) the habitat would be less prone to disturbance/degradation that may be caused by ancillary suction dredge activities (e.g., encampments).

In the case of Trinity bristle snail and valley elderberry longhorn beetle, there would be a somewhat higher potential for impacts due to dredging because their life cycles are not timed such that they enjoy surrogate protection from disturbance by activities that are ancillary to dredging. Thus, it is likely that some level of disturbance to terrestrial/non-riverine aquatic invertebrates would occur. However, the level of impact associated with activities that are ancillary to dredging (e.g., camping, access and egress) is not likely to result in a substantial adverse effect to any special-status terrestrial/non-riverine aquatic invertebrate species. Thus, with respect to Significance Criteria A, B and C, the impact is considered less than significant.

Impact BIO-WILD-2: Effects on Special-Status Passerines Associated with Riparian Habitat (Significant and Unavoidable)

Discussion

Recreational activities, such as suction dredging, may impact special-status passerine[3] species by altering behavior, movements and distributions, which may lead to nesting failure and expenditure of critical energy reserves (Knight and Skagen, 1986). Human activity, including mechanical noise, can alter bird species composition associated with the activity area, causing nest abandonment, increased nest predation, and discouragement of late-nesting birds from settling in disturbed areas (Ellison and Cleary, 1978; LaGory et al., 2001).

Specific disturbance mechanisms include noise associated with dredge rigs, dredgers accessing streams, direct disturbance of riparian habitat, alteration of prey resource base, and suction dredging encampment activities at night (e.g., lights and noise). Suction dredging activities that occur during the passerine breeding season (typically March through August) may alter behavioral patterns of special-status passerines species such as Bank Swallow (*Riparia riparia*), Western Yellow-billed Cuckoo *(Coccyzus americanus occidentalis),* Least Bell's Vireo (*Vireo bellii pusillus*) and Willow Flycatcher (*Empidonax traillii*) (Table 4.3-3). In some cases this may prevent individuals from continued nesting in a section of their territory or result in nest abandonment (even temporary), causing mortality to eggs or nestlings.

Findings

Suction dredging and associated activities may cause impacts to special-status passerines species and their habitats that would be considered potentially significant with respect to Significance Criteria A, B and D. Table 4.3-3 list the special-status passerines species for

[3] Passerines are birds belonging to the order Passeriformes, a large subset of birds that have evolutionary traits adapted for perching.

which a potentially significant impact may occur in the absence of regulations. As discussed in Table 4.3-3, the Proposed Program regulations incorporate spatial and temporal restrictions based on *Fish* action species that would provide partial or full surrogate protection for nesting passerines within portions of these species' ranges. The following Proposed Program regulations, though not specifically intended to do so, would further minimize the potential for suction dredgers to impact nesting passerines species and their habitats:

- Section 228(k)(3): prohibits dredging within 3 feet of the lateral edge of the current water level. This will minimize potential disturbance to nesting habitat for a variety of passerines including Bank Swallow.
- Section 228(k)(4): prohibits the removal of streamside vegetation. This will minimize potential disturbance to nesting habitat for a variety of passerines including federally protected passerine species such as Willow Flycatcher and Least Bell's Vireo.

Potential for impacts to special-status passerine species would largely be minimized with incorporation of the Proposed Regulations, but not completely avoided. The potential for direct disturbance of nests or adverse behavior modifications due to human activity would remain. For several of these species (e.g., Least Bell's Vireo), even a small disturbance could be substantial considering the restricted population and/or range of the species in question. Thus, for those passerine species listed in Table 4.3-3, the level of impacts would remain potentially significant with respect to Significance Criterion A.

Mitigation measures are available to reduce impacts to a less-than-significant level for passerines that may be affected by a project. These mitigation measures include research using the CNDDB and other sources to identify potential locations of species, field surveys by qualified biologists to determine the location of sensitive passerines prior to dredging activities, and implementation of seasonal avoidance measures (e.g., buffers around known nests during the breeding season). Despite the advisory information that will be contained in the "Best Management Practices" packets to avoid such adverse effects, CDFG does not have the jurisdictional authority to adopt or enforce mitigation for impacts to non-*Fish* species under this program. Therefore, impacts to these passerine species are considered significant and unavoidable.

Impact BIO-WILD-3: Effects on Special-Status Raptors Associated with Riparian Habitat (Less than Significant)

<u>Discussion</u>

Recreational activities, such as suction dredging, may impact raptor species by altering behavior, movements and distributions, which may lead to nesting failure and expenditure of critical energy reserves (Knight and Skagen, 1986). Human activity and associated noise can increase nest desertion by adults and reduce success in fledging young (White and Thurow, 1985). Specific disturbance mechanisms include noise associated with dredge rigs, dredgers accessing streams, and direct disturbance of suitable riparian habitat. Suction dredging activities that occur during the raptor breeding season (typically March through August) may alter behavioral patterns of individual birds and potentially prevent special-status raptors species from continued nesting in a section of their territory. This may result in nest abandonment (even temporary), causing mortality to eggs or nestlings.

Findings

Suction dredging and associated activities may cause impacts to special-status raptor species and their habitats. Impacts to special-status raptor species listed in Table 4.3-4 are not likely to result in significant impacts with respect to Significance Criteria A, B and D. In the absence of the Proposed Regulations, impacts to raptor species listed in Table 4.3-3 would be considered potentially significant with respect to Significance Criteria A, B and D (Table 4.3-3). The Proposed Regulations incorporate spatial and temporal restrictions based on *Fish* action species that will provide surrogate protection for some nesting raptors within portions of these species ranges. The following Proposed Program regulations, though not specifically intended to do so, would further minimize the potential for suction dredgers to impact nesting special-status raptor species and their habitats:

- Section 228(k)(3): prohibits dredging within 3 feet of the lateral edge of the current water level. This will minimize potential disturbance to nesting raptors and their habitat.
- Section 228(k)(4): prohibits the removal of streamside vegetation. This will minimize potential disturbance to nesting raptors and their habitat.

While it is likely that some level of disturbance to raptors would occur, it is not likely to result in a substantial adverse effect on special-status raptor species or their habitats. Thus, with respect to Significance Criteria A, B and D, the impact is considered less than significant.

Impact BIO-WILD-4: Effects on other Special-Status and Non-listed Terrestrial Wildlife Species (Less Than Significant)

Discussion

Suction dredging and ancillary upland activities can alter the habitat of an animal, which can affect behavior, survival, reproduction, and distribution of individuals. Actions that can affect riparian associated wildlife species include dumping of waste materials, nocturnal light sources, ground disturbance, and noise from encampments. Collection of firewood and clearing areas for encampment can have negative consequences for wildlife species (Garton et al., 1977). Disruption of breeding and/or rearing activities can reduce fecundity and recruitment (Goodrich and Berger, 1994; Linnell et al., 2000; Mullner et al., 2004; Johnson et al. 2005). The nutritional or hormonal costs of avoiding or responding to a disturbance may have cumulative and important implications for individual fitness and population productivity (MacArthur et al., 1979; Fowler, 1999; Kerley et al., 2002). More directly, human access can increase mortality through non-monitored and controlled hunting, vehicle collisions, or the removal or destruction of problem animals (Johnson and Todd, 1977; Johnson, 1985; Del Frate and Spraker, 1991; Wilkie et al., 2000). Human presence and activities can also alter interspecific interactions, namely rates of predation (Bergerud et al., 1984; Rich et al., 1994; James and Stuart-Smith, 2000; Marchand and Litvaitis, 2004). Riparian associated species may be impacted by off-road vehicle use, which may result in collision, displacement or avoidance, habitat loss and fragmentation, snag or downed log reduction, increasing routes for predators/competitors, and disturbance at a specific location. Wildlife movement for small vertebrates could be impeded if suction dredgers are densely or consistently active within a stream corridor. This could displace animals utilizing movement corridors along the littoral areas.

Findings

Activities associated with suction dredging have the potential to impact other special-status and non-listed terrestrial wildlife species and their habitats. The Proposed Regulations that incorporate spatial and temporal restrictions on suction dredging activities for *Fish* species will provide surrogate protection for other special-status and non-listed terrestrial wildlife species within the same geographical areas. The following regulations, though not specifically intended to do so, would further minimize the potential for suction dredgers to impact other special-status and non-listed terrestrial wildlife species and their habitats:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.
- Section 228(k)(3): prohibits dredging within three feet of the lateral edge of the current water level . This regulation would limit the potential for bank destabilization, and the subsequent impact to adjacent habitats that may support other special-status and non-listed terrestrial species.
- Section 228(k)(4): prohibits the removal of streamside vegetation. This will limit the potential for disturbance to areas that provide habitat for other special-status and non-listed terrestrial species.
- Section 228(k)(19): requires that all equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in streams. This regulation will limit the dispersal of potentially harmful chemicals, invasive species, and other noxious materials.

While it is likely that some level of disturbance to other special-status and non-listed terrestrial wildlife species would occur, it is not likely to result in a substantial adverse effect of any species listed in Table 4.3-4. Thus, with respect to Significance Criteria A, B and D, impacts related to Proposed Program activities are considered less than significant.

VEGETATION

Impact BIO-PLANT-1: Effects on Aquatic and Wetland-Associated Special-Status Plant Species and their Habitat (Less than Significant)

Discussion

Aquatic and wetland-associated plant species range from those species that grow in permanently inundated conditions (i.e., aquatic vegetation), to those that are likely to occur in wetlands. CDFG recognizes 293 special-status aquatic and wetland-associated plant species with the potential to be affected by the Proposed Program (Table 4.3-5). Special-status aquatic and wetland associated plant species have the potential to be adversely affected by suction dredging through: access to and egress from streams; establishment of encampments in riparian areas; the dispersal of non-native or invasive species; and unauthorized dredging-associated activities such as direct removal of aquatic or riparian vegetation, destabilization of streambanks, or release of noxious materials (e.g., fuel).

Findings

Activities associated with the Proposed Program may cause impacts to special status aquatic and wetland-associated plant species and their habitats that would be considered potentially significant with respect to Significance Criteria A and D. Table 4.3-5 provides a determination with regard to the potential for suction dredging to impact special-status aquatic and wetland associated plant species and their habitats in the absence of the Proposed Regulations. Species associated with vernal pools, freshwater marshes, bogs, seeps, and fens are considered to have a "Low" potential for adverse impacts, since these are areas where suction dredgers are unlikely to be dredging or conducting related activities (e.g., staging, camping). Therefore, while these habitats may occur adjacent to, or in the vicinity of, streams, the potential for significant adverse impacts to these habitats is low. Species that only occupy areas where suction dredging is not likely to occur (e.g., Mojave Desert endemics such as Mojave tarplant [*Deinandra mohavensis*]) are also considered to have a low potential for adverse impacts. In general, species associated with lotic aquatic habitat, riparian areas, wet meadows and streambanks are considered to have a "Moderate" potential to be impacted by suction dredging activities, since they have a higher potential to be co-located with suction dredging and related activities.

Of the 293 special-status aquatic and wetland associated plant species with the potential to occur in the Program Area, 48 were considered to have a moderate potential to be impacted by the dredging in the absence of the Proposed Regulations. None of the 48 species have federal or state listing status; 22 of the species are RPR list 1.b status, and 26 are RPR List 2 status (Table 4.3-5).

While RPR List 1.b and 2 species are believed to occur in the vicinity of suction dredging activities, the precise locations of these species relative to specific suction dredging activities is not known. Where they do occur in proximity to one another, there is the potential for suction dredgers to trample, disturb or otherwise destroy individuals of these species. The following regulations, though not specifically intended to do so, would minimize the potential for suction dredgers to impact special-status aquatic and wetland-associated plant species and their habitats:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.
- Section 228(k)(3): restricts dredging within 3 feet of the lateral edge of the current water level.
- Section 228(k)(4): prohibits the removal of streamside vegetation.
- Section 228(k)(19): requires that all equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in

streams. This regulation will limit the dispersal of potentially harmful chemicals, invasive species, and other noxious materials.

With the Proposed Program regulations in place, impacts related to special-status aquatic and wetland-associated plant species would be avoided or minimized. It is reasonably foreseeable that some disturbance to special-status aquatic and wetland-associated plant species would occur, particularly RPR List 1.b and 2 species; however, with the Proposed Regulations in place, there is a low probability that activities authorized under the Proposed Program would result in a substantial adverse effect to special-status aquatic or wetland plant species. Thus, with respect to Significance Criteria A and B, the impact is considered less than significant.

Impact BIO-PLANT-2: Effects on Upland Special-Status Plant Species and their Habitat (Less than Significant)

Discussion

Upland plant species include those that grow in a broad range of habitats throughout the state including chaparral, coastal scrub, grasslands, woodlands, coniferous forest, etc. CDFG recognizes 912 special-status upland plant species with the potential to be affected by the Proposed Program activities (Table 4.3-6). Special-status upland plant species have the potential to be adversely affected by suction dredging activities through: access to and egress from streams; establishment of encampments in upland areas; the dispersal of non-native or invasive species; and activities such as direct removal of vegetation, or release of noxious materials (e.g., fuel).

Findings

Of the 912 special-status upland plant species with the potential to occur in the Program Area, 14 were considered to have a moderate potential to be impacted by the dredging in the absence of the Proposed Regulations. These 14 are generally associated with streams, alluvial floodplains and/or riparian habitats. One of these species, slender-horned spineflower (*Dodecahema leptoceras*), is list as endangered under the federal and state ESAs. Eight of the species are RPR list 1.b status, and 6 are RPR List 2 status (Table 4.3-6).

While special-status upland plant species are believed to occur in the vicinity of suction dredging activities, the precise locations of these species relative to specific suction dredging activities is not known. Where they do occur in proximity to one another, there is the potential for suction dredgers to trample, disturb or otherwise destroy individuals of these species. That said, activities associated with suction dredging that may affect upland plants, such as camping and access to streams, are most likely to occur in previously disturbed areas that have a low potential to support special-status upland plant species (e.g., campgrounds). Furthermore, the disturbance mechanisms associated with these activities are not likely to substantially alter sub-surface plant or soil structure, though some moderate compaction and erosion may occur. Complete destruction of suitable habitat or a local population is highly unlikely to occur. The following regulations, though not specifically intended to do so, would further minimize the potential for suction dredgers to impact upland plant species and their habitats:

- Section 228(k)(3): prohibits dredging within 3 feet of the lateral edge of the current water level. This would minimize the potential for disturbance of upland vegetation located at the top of bank.
- Section 228(k)(4): prohibits the removal of streamside vegetation (including upland species).
- Section 228(k)(19): requires that all equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in streams. This regulation will limit the dispersal of potentially harmful chemicals, invasive species, and other noxious materials.

With the Proposed Program regulations in place, impacts related to special-status upland plant species would be minimized. While the above regulations would reduce the potential for suction dredging itself to affect these species, it is reasonably foreseeable that some disturbance to special-status upland species would occur as a result of related activities (e.g., camping). However, there is a low probability that these activities would result in a substantial adverse effect to special-status upland plant species. Thus, with respect to Significance Criteria A and B, the impact is considered less than significant.

WETLANDS, RIPARIAN HABITAT AND OTHER SENSITIVE NATURAL COMMUNITIES

Impact BIO-HAB-1: Effects on Federal and State Protected Wetlands (Less than Significant)

Discussion

Federally protected wetlands defined by Section 404 of the CWA include (1) wetlands adjacent to traditionally navigable waters, (2) and wetlands that abut non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (USEPA-USACE, 2008). Wetlands protected by the state include federally protected wetlands as well as waters of the state as defined under Water Code Section 13050(e), which include wetlands that are often considered isolated such as vernal pools.

Federally and state protected wetlands have the potential to be adversely affected by suction dredging activities through: access to and egress from streams; direct dredging in wetlands; the dispersal of non-native or invasive species; and unauthorized activities such as filling of wetlands, direct removal of vegetation, destabilization of streambanks, or release of noxious materials (e.g., fuel spills).

Findings

The Proposed Regulations (Chapter 2) were developed to prevent suction dredging activities from being deleterious to *Fish.* The regulations include measures to protect habitats that *Fish* are dependent upon, such as wetlands within and adjacent to streams. The following regulations would minimize the potential for suction dredgers adversely affect federally and state protected wetlands:

- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.

- Section 228(k)(1): prohibits the use of motorized winches or other motorized equipment to move boulders or logs without prior authorization and section 1602 notification. This regulation would limit the potential for dredgers to destabilize or alter wetland habitat by moving large objects.
- Section 228(k)(3): prohibits dredging within three feet of the lateral edge of the current water level. This would minimize the potential for disturbance to off-channel wetlands such as vernal pools.
- Section 228(k)(4): prohibits the removal of streamside vegetation. This regulation would limit the potential for disturbance of wetland, riparian and upland vegetation.
- Section 228(k)(6): Prohibits the diversion of a stream into the bank.
- Section 228(k)(7): Prohibits:
  - Construction of permanent or temporary dams,
  - Concentrating flow in a way that reduces the total wetted area of the stream,
  - Obstructing a stream or lake in such a manner that fish passage is impeded.

  These measures would limit the potential for wetlands to be dewatered.
- Section 228(k)(8): prohibits the import of any earthen or fill material into a stream, river or lake. This regulation would limit the potential for dredgers to fill wetlands.
- Section 228(k)(9): requires that all fueling and servicing of dredging equipment must be done in a manner such that petroleum products are not leaked, spilled or otherwise released into waters of the state.
- Section 228(k)(11): requires that stream substrates may only be moved within the current water level. This regulation would limit the potential for disturbance of aquatic and wetland vegetation.
- Section 228(k)(19): requires that all equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or use in streams. This regulation will limit the dispersal of potentially harmful chemicals, invasive species, and other noxious materials.

While it is likely that some level of disturbance associated with the Proposed Program activities would occur, with the above regulations in place, it is not likely to result in substantial adverse effects to federal and state protected wetlands when considered statewide. Thus, with respect to Significance Criteria B and C, the impact is considered less than significant.

Impact BIO-HAB-2: A Fundamental Change to the Structure of a Community or Stream Ecosystem, Including Substantial Reductions in Biodiversity or Resiliency to Disturbance (Less than Significant)

Discussion

Stream ecosystem composition, diversity and resiliency have the potential to be adversely affected by dredging activities. Suction dredging can have substantial short-term and localized adverse impacts on benthic invertebrate abundance and community composition. Persistent or repeated dredging may cause the benthic community to remain in an early state of succession, which could reduce resiliency to disturbance. Dredging can also disrupt the stream ecosystem by: displacing large volumes of material; changing substrate characteristics; dispersing non-native or invasive species; and unauthorized releases of noxious materials (e.g., fuel spills).

Findings

The Proposed Program regulations were developed to prevent suction dredging activities from being deleterious to *Fish.* These regulations include measures designed to maintain stream ecosystem function so that substantial reductions in biodiversity or resiliency do not occur. The following regulations would minimize the potential for suction dredgers to adversely impact community or ecosystem level structure and function:

- Seasonal closures of streams, which allows for recovery from disturbance caused by Program activities, and permanent closures of other streams, which would prevent disturbance caused by Program activities.
- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.
- Section 228(j)(1): limits the nozzle size of dredging equipment, which effectively reduces the potential area disturbed and the amount of material displaced by an individual dredger.
- Section 228(k)(1): prohibits the use of motorized winches or other motorized equipment to move boulders or logs without prior authorization and section 1602 notification. This regulation would limit the potential for dredgers to destabilize or alter habitat by moving large objects.
- Section 228(k)(5): prohibits the cutting, movement or destabilization of woody debris, which is important for macroinvertebrate habitat and production.
- Section 228(k)(6): Prohibits the diversion of a stream into the bank.
- Section 228(k)(7): Prohibits:
  - Construction of permanent or temporary dams,
  - Concentrating flow in a way that reduces the total wetted area of the stream,
  - Obstructing a stream or lake in such a manner that fish passage is impeded,

  These measures would limit the potential for alteration of the channel structure.

- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site.

Activities associated with the Proposed Program are likely to cause noticeable temporary reductions in biodiversity and/or resiliency at the dredging site and potentially at the reach scale. However, the Program activities, when viewed at the state-wide scale, are unlikely to cause a measureable departure from the baseline condition with respect to stream community and ecosystem structure and function, or a measureable reduction in biodiversity or resiliency. Moreover, most reductions in biodiversity and/or resiliency at dredging sites are likely to be only temporary; the relevant literature indicates that most sites will largely recover their structure and function within a few months to a year following disturbances. Thus, with respect to Significance Criterion B, the impact is considered less than significant.

Impact BIO-HAB-3: Direct Disturbance to Riparian and Aquatic Habitats, and Other Sensitive Natural Communities (Less than Significant)

Discussion

Suction dredging, by definition, takes place in aquatic habitats. Suction dredging and ancillary activities also have the potential to impact sensitive ecotone and upland natural communities identified in the "*List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database, September 2003 Edition*" (CDFG, 2003), such as Mixed Conifer – Tanoak / Mountain Dogwood (88.600.11), Douglas-fir - Bigleaf Maple / Hazel (82.200.01), White Fir - Douglas-fir - Black Oak (82.200.29), and Jeffrey Pine / Idaho Fescue (87.020.03). Sensitive natural communities have the potential to be adversely affected by suction dredging activities through: access to and egress from streams; establishment of encampments; direct dredging in aquatic and riparian areas; the dispersal of non-native or invasive species; and unauthorized activities such as direct removal of vegetation, destabilization of streambanks, or release of noxious materials (e.g., fuel spills).

Findings

CDFG regulates activities that occur in aquatic and riparian habitats through Fish and Game Code section 1602, which states that no person shall "substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake" without first notifying CDFG of that activity. The Proposed Program regulations include provisions which may allow suction dredgers to use equipment (e.g., larger nozzle size dredges, motorized winches) which has the potential to substantially alter aquatic and riparian habitat, after CDFG conducts an on-site inspection and notification to CDFG as specified in Fish and Game Code section 1602 subdivision (a)(1) and the provisions of Fish and Game Code section 1602 subdivision (a)(4)(A) or section 1602 subdivision (a)(4)(B) have been completed.

The Proposed Regulations were developed to prevent suction dredging activities from being deleterious to *Fish.* The regulations include measures to protect habitats that *Fish* are dependent upon, such as aquatic and riparian habitats. The following Proposed Program regulations would minimize the potential for suction dredgers to adversely affect aquatic and riparian habitats.

- Seasonal closures of streams which allows for recovery from disturbance caused by Program activities.
- Section 228(c)(2): requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor and manage areas with high dredging use, and potentially modify regulations if it identifies deleterious effects.
- Section 228(j)(1): limits the nozzle size of dredging equipment, which effectively reduces the potential area disturbed and the amount of material displaced by an individual dredger.
- Section 228(k)(1): prohibits the use of motorized winches or other motorized equipment to move boulders or logs without prior authorization and section 1602 notification. This regulation would limit the potential for dredgers to destabilize or alter aquatic habitat by moving large objects.
- Section 228(k)(5): prohibits the cutting, movement or destabilization of woody debris.
- Section 228(k)(15): requires dredgers to level all tailing piles prior to working another excavation site or abandoning the excavation site. This regulation would limit the potential for dredging to impact the aquatic habitat by not filling pools, destroying riffles, or removing and destabilizing structural components.

Though not specifically intended to do so, many these regulations would also minimize the potential for suction dredgers to impact sensitive upland natural communities. While it is likely that some level of disturbance associated with Proposed Program activities will occur, it is unlikely to cause a substantial departure from the baseline condition with respect to the integrity, function and quality sensitive natural communities throughout the state. Thus, with respect to Significance Criterion B, the impact is considered less than significant.

Impact BIO-HAB-4: Introduction and/or Dispersal of Aquatic Invasive Species and Pathogens (Less than Significant)

Discussion

Suction dredging equipment including intake nozzles, pumps, pontoons, sluice boxes, masks, wetsuits and other items, moved from one waterbody to another may transport aquatic invasive species (AIS). The California Aquatic Invasive Species Management Plan does not specifically identify suction dredging as a vector for aquatic invasive species dispersal, but it is clear that dredging activities share numerous similarities to other recreational activities that are considered primary AIS vectors such as boating, fishing, and other water sports (see Appendix M). Aquatic invasive species that may be transported by dredging activities include, but are not limited to, New Zealand mud snail (*Potamopyrgus antipodarum*), quagga mussel (*Dreissena rostriformis bugensis*), zebra mussel (*Dreissena polymorpha*), hydrilla (*Hydrilla verticillata*), and creeping water-primrose (*Ludwigia peploides ssp. montevidensis*).

It is widely thought that some diseases of fish and amphibians may be transmitted on recreational equipment. Diseases implicated by this mechanism include whirling disease (Gates et al., 2008), didymo (*Didymosphenia geminata*) (Pennsylvania Fish and Boat

Commission, 2009), and amphibian chytridiomycosis (Padgett-Flohr, 2009), which are currently present and causing harm to trout and amphibian populations in California. Amphibian chytridiomycosis has been detected in California populations of California red-legged frogs, foothill yellow-legged frogs, mountain yellow-legged frogs, Yosemite toads, California tiger salamanders, and several other species not of conservation concern (Padgett-Flohr, 2007); a few localized didymo infestations have been reported (e.g. on the South Fork of the American River [Elwell, 2009]); and whirling disease is now widespread in California's trout streams (Modin, 1998). The introduction of any of these diseases has potential to result in substantial declines or even extirpation of local populations of special-status species.

Findings

Currently, CDFG has an active program to educate boaters, anglers and other recreationists such as suction dredgers concerning the risks of AIS and the methods available to address those risks. The Proposed Regulations require that all dredging equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or used in streams. While this regulation will minimize the potential dispersal of AIS and pathogens, suction dredging equipment is still likely to serve as a vector for AIS. However, most waters accessed by dredgers are also used by other recreationists such as anglers, kayakers, and rafters. Thus, it is likely that introductions would occur regardless of Proposed Program activities because dredgers constitute only a very small fraction of all recreational water users, averaging 3,650 permits annually for the 15 years prior to the moratorium established in July 2009. In addition, because dredging equipment is heavy and cumbersome, dredgers cannot change locations as readily as other recreationists; dredgers typically only occupy several waterbodies in a given season. Finally, the Proposed Program requires dredgers to provide CDFG with information regarding the location of their dredging operation(s). This will allow CDFG to monitor Program activities, and inform dredgers of the AIS status and risks in the areas they are accessing. While it is likely that some dispersal of AIS and pathogens will be associated with Proposed Program activities, it is not likely a major source of dispersal when considered among other user groups and vector mechanisms. Thus, with respect to Significance Criteria A and B, the impact is considered less than significant.

Impact BIO-HAB-5: Introduction and/or Dispersal of Non-native Invasive (terrestrial) Plant Species (Less than Significant)

Discussion

Non-native species are those that have been introduced to California after European contact or as a result of human activity. Non-native invasive plants are those species that (1) are not native to, yet can spread into, wildland ecosystems, and that also (2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (Cal-IPC, 2010). Examples of these species include giant reed (*Arundo donax*), yellow starthistle (*Centaurea solstitialis*), Himalayan blackberry (*Rubus discolor*), tree of heaven (*Ailanthus altissima*), and many others. Suction dredging equipment including dredging rigs, vehicle trailers, camping gear and clothing have the potential to disperse non-native invasive terrestrial plant species.

Findings

The Proposed Regulations require that all dredging equipment be cleaned of mud, oil, grease, debris, and plant and animal material before accessing riparian areas or used in streams. While this regulation will reduce the potential dispersal of non-native invasive terrestrial plants, suction dredging activities are still likely to serve as a vector. However, dredgers constitute only a very small fraction of all recreational wildland users. While it is likely that some dispersal of non-native invasive terrestrial plants will be associated with Proposed Program activities, it is not likely a major source of dispersal when considered among other user groups and vector mechanisms. Thus, with respect to Significance Criteria A and B, the impact is considered less than significant.

Impact BIO-HAB-6: Effects of Encampments and Other Activities Associated with Suction Dredging (Less than Significant)

Discussion

Recreational impacts, such as suction dredging encampments, can have long-lasting damaging effects on habitat. Streambank erosion and channel widening have been found to be more common around areas of concentrated use, such as extended use campgrounds. Other impacts associated with encampments include the trampling of vegetation and compaction of soils. These impacts can affect plant communities, wildlife habitat quality, and a variety of species that are sensitive to habitat structure (e.g., rodents, reptiles, amphibians, and invertebrates). Impacts known to be associated with dredging encampments include improper disposal of trash and chemicals, unsanitary disposal of human waste, and use of off-road vehicles.

Findings

There is the potential for suction dredgers' encampments to have an adverse affect on the environment. As with any user group, it is possible that unauthorized activities will occur that could substantially harm the environment. Issuance of a suction dredge permit does not authorize the permittee to violate any local, state or federal laws that address public health and safety, hazardous materials, protection of the environment, or any other statute. Encampments of permittees that adhere to local, state and federal laws are not likely to pose a significant threat to the environment or cause lasting degradation of functional wildlife habitats. Thus, with respect to Significance Criteria B and D, the impact is considered less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities which require notification under Fish and Game Code section 1602 may increase the potential for adverse effects on biological resources. Suction dredging with larger nozzle sizes and use of power winches has the potential to result in substantial adverse effects to instream and riparian habitat or other sensitive natural communities, as well as impacts to federally protected wetlands. Larger nozzle sizes, by increasing the area of disturbance, could further deplete the prey base, have greater effects on pools and thermal refugia, and increase potential for destabilizing streambanks. The physical and noise disturbance associated with larger nozzles and power winches may also have additional behavioral effects on fish and/or result in impeding migration and movement. Similarly, the creation of dams or diversions could create physical barriers to migration or movement of aquatic species. Finally, suction dredging in lakes and reservoirs has potential for impacts in locations, and related species and habitats, which have not otherwise been considered in this impact analysis. Such issues, to the extent to which they could be significant, would be evaluated in a CEQA analysis.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
Riverine Aquatic Invertebrates						
California freshwater shrimp	*Syncaris pacifica*	FE	SE	A	Distribution per USFWS 5-year review[1]	Species abundance and distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
Shasta crayfish	*Pacifastacus fortis*	FE	SE	A	Distribution per USFWS 5-year review[2]	Species abundance and distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
Anadromous or Estuarine Non-Salmonid Fishes						
eulachon	*Thaleichthys pacificus*	FT	SSC	D	Species range per Moyle 2002[3]	Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning season usually occurs between December and May and peaks between February and March; incubation lasts about 2-3 weeks and larvae are washed out to sea after

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						hatching (Moyle 2002). Seasonal restriction on dredging would avoid potential impacts to spawning adults and early lifestages. Class D restriction is proposed.
green sturgeon (southern DPS)	*Acipenser medirostris*	FT	SSC	D	NOAA critical habitat for southern DPS Green Sturgeon[4]	Impacts to spawning adults and early lifestages could result in a deleterious effect. Klamath River spawning period is March through July, and peaks between mid-April to mid-June; Sacramento River spawning times are likely similar (Moyle, 2002). Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class D restriction is proposed.
green sturgeon (northern DPS)	*Acipenser medirostris*	FSC	SSC	D	Species range per Moyle 2002 and Benson et al. 2006[5]	
white sturgeon	*Acipenser transmontanus*	None	None	D	NOAA critical habitat for southern DPS Green Sturgeon	Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is late February through early June. Sacramento River spawning times are likely similar (Moyle, 2002). Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class D restriction is proposed.
Salmonids						
Coho salmon (central California coast ESU)	*Oncorhynchus kisutch*	FE	SE	A	Species range per CDFG-CalFish	Species abundance has declined 90-95% in the past 50 years. Habitat degradation is a major factor in species

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
					Distribution[6] dataset	decline (Moyle 2002; NMFS, 2010[7]). Species is believed to have entered onto an "extinction vortex" (NMFS, 2010). Minor impacts to organisms or designated Critical Habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of juveniles could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
Coho salmon (southern Oregon/northern California coast ESU)	*Oncorhynchus kisutch*	FT	ST	C; select spawning and juvenile rearing streams Class A or B	Species range per CDFG-CalFish Distribution[6] and Abundance[8] datasets	Impacts to spawning adults and early lifestages (i.e., incubation and sac fry periods) could result in a deleterious effect. Spawning period is generally November through January, with egg incubation and emergence of fry (young juveniles) occurring up to June. Juveniles rear in freshwater for about 1 year (NMFS, 2010). A Class C seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults, egg incubation and emergence. Select streams and thermal refugia known to provide important juvenile rearing habitat are proposed to be designated Class A. Streams in the Smith River drainage are proposed to be designated Class B.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
Chinook salmon (Sacramento River winter-run ESU)	*Oncorhynchus tshawytscha*	FE	SE	A	Sacramento River from Thomes Creek upstream to Keswick Dam	Abundance has declined substantially since construction of Shasta Dam on the 1940s. Winter-run Chinook enter freshwater in the winter months (January to March) and migrate to the upper Sacramento River, spawning in April through August. Class A restriction is proposed to avoid impacts to holding/spawning adults, early life stages and important spawning/rearing habitat.
Chinook salmon (Central Valley spring-run ESU)	*Oncorhynchus tshawytscha*	FT	ST	A	Portions of Butte, Mill, and Deer creeks and the Feather River (Adapted from USBR, 2008[9]).	Estimates of historic abundance indicate about 700,000 spawners, which has declined to a current level of and 500 to 4,500 spawners (NMFS, 2009[10]). Migration extends from March to September, peaking in May-June; spawning occurs in August through October. Class A restriction is proposed to avoid impacts to spawning adults, early life stages and important spawning/rearing habitat on select Central Valley streams.
Chinook salmon (California coastal ESU)	*Oncorhynchus tshawytscha*	FT	None	C	Species range per NOAA Distribution[11] dataset	Impacts to spawning adults and early lifestages (i.e., incubation and sac fry periods) could result in a deleterious effect. Spawning period is generally November through January, with egg incubation and emergence of fry occurring through May. A Class C seasonal restriction on dredging would

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						avoid or minimize potential impacts to spawning adults, egg incubation and emergence.
Chinook salmon (Klamath-Trinity rivers spring-run ESU)	*Oncorhynchus tshawytscha*	None	SSC	A / C	Class C: Species range per CDFG-CalFish Abundance[12] dataset. Class A thermal refugia: Klamath River per North Coast RWQCB; Salmon River per CDFG internal (unpublished) data	Impacts to spawning adults and early lifestages (i.e., incubation and sac fry periods) could result in a deleterious effect. Spawning period typically begins in mid-September in the Salmon River and early October in the Trinity basin. A Class C seasonal restriction on dredging is proposed. Thermal refugia known to provide important holding habitat are proposed to be designated Class A.
Chinook salmon (Central Valley fall-/late fall–run ESU)	*Oncorhynchus tshawytscha*	None	SSC	C	Species range per CDFG-CalFish Abundance[12] dataset	Impacts to spawning adults and early lifestages could result in a deleterious effect. Peak spawning period is generally October to November, but can continue through January. Fry typically emerge December through March. A Class C seasonal restriction on dredging is proposed to avoid or minimize potential impacts to spawning adults, egg incubation and emergence.
steelhead (southern California DPS)	*Oncorhynchus mykiss irideus*	FE	SSC	A	NOAA Critical Habitat for southern California DPS steelhead[13]	Runs have declined from 55,000 fish in historical time to fewer than 500 fish now, and the DPS has been extirpated from more than half of its historic range (NMFS, 2010[14]). Alteration of streamflow and habitat has contributed to species decline (NMFS, 2007[15]).

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						Impacts to organisms or designated Critical Habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of juveniles could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
steelhead (south/central California coast DPS)	*Oncorhynchus mykiss irideus*	FT	SSC	A	Species range per NOAA Distribution[11]	Species abundance has declined substantially throughout its historic range. Alteration of streamflow and habitat are a major factors in species decline (NOAA 2007[15]). Impacts to organisms or their habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of juveniles could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
steelhead (central California coast DPS)	*Oncorhynchus mykiss irideus*	FT	None	A	Species range per NOAA Distribution[11]	
steelhead (northern California DPS)	*Oncorhynchus mykiss irideus*	FT	SSC	C	Species range per NOAA Distribution[11]	Impacts to spawning adults and early lifestages could result in a deleterious effect. Peak spawning period is generally December through April, but can continue through May. Embryos incubate for 18 to 80 days depending on water temperatures and emergence from the gravel occurs after 2 to 6 weeks (Moyle 2002). A Class C seasonal

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						restriction on dredging for the species distribution is proposed to avoid impacts to adults and early lifestages.
steelhead (Central Valley DPS)	*Oncorhynchus mykiss irideus*	FT	None	C	NOAA Critical Habitat for Central Valley DPS steelhead[13] (with minor modification to correct mapping accuracy)	Adults begin to enter freshwater in August, peaking in late-September to October. Adults hold in mainstem drainages until flows in tributaries are high enough to enter for spawning (Moyle, 2002). Peak spawning period is generally December through April. Impacts to spawning adults and early lifestages could result in a deleterious effect. A Class C seasonal restriction on dredging in NOAA Critical Habitat is proposed to avoid impacts to adults and early lifestages.
steelhead (Klamath Mountains Province DPS)	*Oncorhynchus mykiss irideus*	None	SSC	C	CDFG-CalFish winter-run Distribution[16] and Abundance[17] datasets	Impacts to spawning adults and early lifestages could result in a deleterious effect. Summer-run steelhead spawning begins in late December and peaks in January, except in the Trinity River, where peak spawning occurs in February. Spawning of winter-run steelhead in the Trinity River peaks in March; fry emerge starting in April and migrate downstream beginning in May. A Class C seasonal restriction on dredging is proposed to avoid impacts to adults and early lifestages.
rainbow trout	*Oncorhynchus*	None	None	Class C for the North Fork of	North Fork American	Rainbow trout are the native trout in the Pacific drainages of California. At

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
	mykiss irideus			the American River and tributaries	River and tributaries	present two groups of rainbow trout are recognized as native to California: coastal rainbow trout (*Oncorhynchus mykiss irideus*) and redband trout of the Upper Kern and Upper Sacramento rivers. In California, the coastal rainbow trout are recognized by six groups of "steelhead" all of which have non-migratory populations in their watersheds (Moyle 2002). Steelhead are the anadromous or migratory form of the coastal rainbow trout. Results of genetic analysis conducted by Garza et al. (2004[18]) showed that all naturally-spawned steelhead populations within the Central Valley basin were closely related, regardless of whether they were sampled above or below a known barrier to anadromy. Lower genetic diversity in above-barrier populations indicated a lack of substantial genetic input upstream, highlights lower effective population sizes for above-barrier populations, and additionally suggests little ingression with planted hatchery raised trout. Genetic analysis further indicates that above barrier populations are likely to most accurately represent the ancestral population genetic structure of

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						steelhead in the Central Valley. Wild coastal rainbow trout are spring spawners. Spawning can occur between February and June depending on local water temperatures. At high elevations spawning can be delayed until July or August (Moyle, 2002). Eggs and sac fry of coastal rainbow trout could suffer significant mortality during passage through a suction dredge. As a result protecting above-barrier populations of coastal rainbow trout during spawning periods is of vital importance. This applies to the wild populations of coastal rainbow trout in the North Fork American River and all its tributaries; the wild populations in the other forks of the American River are protected through closures for other species.
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*	FT	None	Class A for occupied streams; Class D for recovery habitat	CDFG Program-specific dataset	Species abundance and distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Many restoration projects are underway to restore habitat and distribution. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat. Class D restriction is proposed for "recovery habitat" including the Truckee River below Lake Tahoe, East (below Carson Falls) and West Fork Carson River, and East and West Fork Walker River.
Little Kern golden trout	*Oncorhynchus mykiss whitei*	FT	None	A	Occupied habitat per CDFG internal (unpublished) data	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat.
Paiute cutthroat trout	*Oncorhynchus clarkii seleniris*	FT	None	A	CDFG Program-specific dataset	Species abundance and distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Many restoration projects are underway to restore habitat and distribution. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						their habitat. Thus, Class A restriction is proposed for occupied habitat.
California (Volcano Creek) golden trout	*Oncorhynchus mykiss aguabonita*	None	SSC	A	Occupied habitat per CDFG internal (unpublished) data	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat.
Eagle Lake rainbow trout	*Oncorhynchus mykiss aquilarum*	None	SSC	A	Pine Creek (tributary to Eagle Lake)	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Principle spawning drainage (Pine Creek) has the potential to be impacted by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for principal spawning drainage.
Goose Lake redband trout	*Oncorhynchus mykiss ssp. 1*	None	SSC	A	Tributaries to Goose Lake	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat.
Kern River rainbow trout	*Oncorhynchus mykiss gilberti*	None	SSC	A	Occupied habitat per CDFG internal (unpublished) data	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat.
McCloud River redband trout	*Oncorhynchus mykiss ssp. 2*	None	SSC	A	Upper McCloud River	Species distribution is limited. Minor impacts to organisms or suitable habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed for occupied habitat.
mountain whitefish	*Prosopium williamsoni*	None	None	C	Species range per Moyle 2002	Impacts to migrating and spawning adults and early lifestages could result in a deleterious effect. Spawning period is generally October to early December;

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						spawning is preceded by migration to suitable spawning habitat (Moyle, 2002). A Class C seasonal restriction on dredging is proposed to avoid or minimize potential impacts to migrating and spawning adults, egg incubation and emergence.
Freshwater Fishes						
Modoc sucker	*Catostomus microps*	FE	SE, FP	A	USFWS Critical Habitat for the Modoc Sucker[19]	Species abundance and distribution is limited. Habitat degradation has historically been a factor in the species decline; habitat conditions are on an upward trend due to improved land management (USFWS, 2009[20]). Impacts to organisms or suitable habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would sufficiently avoid potential impacts to suitable habitat. Thus, Class A restriction is proposed.
razorback sucker	*Xyrauchen texanus*	FE	SE, FP	A	Mainstem Colorado River	Wild populations have been extirpated from California. Recovery efforts are on-going in the lower Colorado River. Class A restriction is proposed for recovery habitat.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
Lost River sucker	*Deltistes luxatus*	FE	SE, FP	A	Species range per Moyle 2002	Species distribution extremely limited in California. Habitat degradation in Upper Klamath Basin is noted as a major factor in the decline of the Lost River and shortnose sucker (USFWS, 1993[21]). Habitat restoration, including control of sedimentation, is principal component of USFWS Species Action Plan (USFWS, 2009[22]). Impacts to organisms or suitable habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would sufficiently avoid potential impacts to suitable habitat. Thus, Class A restriction is proposed.
shortnose sucker	*Chasmistes brevirostris*	FE	SE, FP	A	Species range per Moyle 2002	
Santa Ana sucker	*Catostomus santaanae*	FT	SSC	E (with select streams/ reaches Class A)	USFWS Critical Habitat for the Santa Ana sucker [23]	Species distribution is limited. Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is March to July with a peak in April (Feeney and Swift, 2008[24]). Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class E restriction is proposed, with Class A restriction for refugia sites on the East Fork of the Gabriel River above Cattle Canyon and the entire West Fork of the San Gabriel

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						River.
Owens sucker	*Catostomus fumeiventris*	(-)	SSC	E	CDFG Program-specific dataset	Species distribution is limited. Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is May to early July (Moyle, 2002). Seasonal restriction on dredging would avoid potential impacts to spawning adults and early lifestages. Class E restriction is proposed.
Jenny Creek sucker	*Catostomus rimiculus ssp. 1*	None	None	A	Jenny Creek	Species distribution is extremely limited in California. Class A restriction for species range in California is proposed to protect potential spawning and rearing habitat.
Klamath largescale sucker	*Catostomus snyderi*	None	SSC	C	Lost River drainage	Species distribution is limited. Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is generally March to early May (Moyle, 2002). Seasonal restriction on dredging would avoid potential impacts to spawning adults and early lifestages. Class C restriction is proposed.
mountain sucker	*Catostomus platyrhynchus*	None	SSC	E	Species range per Moyle 2002	Species populations are in general decline due to dam construction resulting in isolated populations (Moyle, 2002). Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning takes place in gravelly riffles immediately

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						upstream of deep pools from June through early August. Seasonal restriction on dredging would avoid potential impacts to spawning adults and early lifestages. Class E restriction is proposed.
hardhead	*Mylopharodon conocephalus*	None	SSC	C	Species range per Moyle 2002	Species relatively widespread, but populations in foothill streams are increasingly becoming isolated making them vulnerable to localized extinctions (Moyle, 2002). Hence, impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning mainly occurs in April and May; some evidence suggests spawning may occur into August (Moyle, 2002). Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class C restriction is proposed.
desert pupfish	*Cyprinodon macularius*	FE	SE	A	Current distribution per USFWS 5-year review[25]	Species has extremely limited distribution, and small population size. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would sufficiently avoid potential impacts to occupied habitat.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						Thus, Class A restriction is proposed.
Owens pupfish	*Cyprinodon radiosus*	FE	SE	A	Current distribution per USFWS 5-year review[26]	Species has extremely limited distribution, and small population size. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
Amargosa pupfish	*Cyprinodon nevadensis amargosae*	None	SSC	A	Species range per Moyle 2002	Species has extremely limited distribution. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
unarmored three-spined stickleback [includes Santa Ana (=Shay Creek) threespine stickleback]	*Gasterosteus aculeatus williamsoni [santaeannae]*	FE	SE, FP (SSC for *G.a. santae-annae*)	A	Current distribution per USFWS 5-year review[27]	Species has limited distribution and isolated populations. Species reproduces year-round. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
Owens speckled dace	*Rhinichthys osculus* ssp	None	SSC	A	Species range per Moyle 2002	Species has extremely limited distribution, and is in danger of extinction (Moyle, 2002). Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
Santa Ana Speckled dace	*Rhinichthys osculus* ssp	None	SSC	E	Limited information available regarding distribution; assumed to overlap with Santa Ana sucker	Species range has diminished primarily due to development/habitat alteration (Moyle, 2002). Current information on distribution is limited; assumed to be similar to Santa Ana sucker. Impacts to spawning adults and early lifestages could result in a deleterious effect. Seasonal restriction on dredging would avoid potential impacts to spawning adults and early lifestages. Class E restriction is proposed.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
rough sculpin	*Cottus asperrimus*	FSC	FP, ST	A	Fall River and major tributaries; Hat Creek (Shasta County)	Species has limited distribution and occurs in sensitive habitat. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
reticulate sculpin	*Cottus perplexus*	None	SSC	C	Species range per Moyle 2002	Species distribution extremely limited in California, but is common in Oregon (Moyle, 2002). Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning takes place in March through May. Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class C restriction is proposed.
Mohave tui chub	*Gila bicolor mohavensis*	FE	SE, FP	A	Species range per CNDDB	Species has extremely limited distribution. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
bonytail	*Gila elegans*	FE	SE	A	Mainstem Colorado River	Wild populations have been extirpated from California. Recovery efforts are on-going in the lower Colorado River. Class A restriction is proposed for recovery habitat.
Owens tui chub	*Gila bicolor snyderi*	FE	SE, FP	A	USFWS Critical Habitat for Owens tui chub[28]	Species has extremely limited distribution. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. No seasonal restrictions would avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
arroyo chub	*Gila orcuttii*	None	SSC	E	Species range per Moyle 2002	Species has been extirpated through much of its native range (Moyle, 2002). Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is February to August. Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class E restriction is proposed. Class A restriction for

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						Santa Ana sucker on West Fork of the San Gabriel River would provide additional protection for species.
Clear Lake hitch	*Lavinia exilicauda chi*	None	SSC	E	Tributaries to Clear Lake	Species has limited range and appears to be in decline (Moyle, 2002). Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is generally March to May and may extend into June. Seasonal restriction on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class E restriction is proposed.
Red Hills roach	*Lavinia symmetricus*	None	None	E	Tributaries to Six Bit Gulch including Horton, Amber and Roach Creeks	Species has extremely limited distribution. Impacts to organisms and habitat must be carefully managed to avoid deleterious effect. Occupied habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. Class E restriction is proposed to minimize potential impacts to spawning adults, early lifestages, and occupied habitat.
Pit roach	*Lavinia symmetricus mitrulus*	None	SSC	E	Species range per Moyle 2002	Species has been extirpated through much of its native range. Populations are locally at risk of extinction (Moyle, 2002). Impacts to spawning adults and early lifestages could result in a deleterious effect. Spawning period is March to early July. Seasonal restriction

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						on dredging would avoid or minimize potential impacts to spawning adults and early lifestages. Class E restriction is proposed. Class A restriction for Santa Ana sucker on West Fork of the San Gabriel River would provide additional protection for species.
Amphibians						
Sierra Madre (Mountain) yellow-legged frog (southern DPS)	*Rana muscosa*	FE	SCE	A	USFWS Critical Habitat[29] for Transverse Range populations of species. CWHR range[30] for southern Sierra Nevada populations.	Species abundance and distribution is limited. Approximately 95% of populations in historic range have been extirpated (CDFG, 2010[31]). Minor impacts to organisms or suitable habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. Tadpoles are present in streams year-round. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed. USFWS critical habitat represents the most accurate data source for species distribution in Transverse Range. CWHR range represents the most accurate data source for species distribution in southern Sierra Nevada populations.

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
Sierra Nevada (Mountain) yellow-legged frog	*Rana sierra*	FC	SCE	A	Species range per CWHR[32] except for portions of CDFG Region 2. For CDFG Region 2, occupied streams in CDFG High Mountain Lakes database and USFS data (unpublished).	Species abundance and distribution is limited. Approximately 93% of populations in historic range have been extirpated (CDFG, 2010[31]). Minor impacts to organisms or suitable habitat could result in a deleterious effect. Suitable habitat has the potential to be degraded by suction dredging; entrainment of organisms could also occur. Tadpoles are present in streams year-round. No seasonal restrictions would avoid potential impacts to organisms or their habitat. Thus, Class A restriction is proposed.
California red-legged frog	*Rana draytonii*	FT	SSC	A	Known stream-breeding populations in CDFG Regions 2, 3 and 5.	Populations largely breed in lentic or off-channel habitats; these habitats are not likely to be significantly impacted by suction dredging activities. Select populations are known to breed in streams, particularly in southern portions. These populations in southern California are fragmented, and the species has been extirpated throughout significant portions of its historical range. Impacts to organisms or suitable habitat could result in a deleterious effect. No seasonal restrictions would avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed for known stream-breeding populations in CDFG

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						Regions 2, 3, and 5.
foothill yellow-legged frog	*Rana boylii*	None	SSC	Class D for species range per CWHR. Class E for select watersheds in CDFG Region 2.	Class D for species range per CWHR[33] (except CDFG Region 2). Class E for select watersheds in CDFG Region 2.	Impacts to early lifestages could result in a deleterious effect. Class D restriction for species range would avoid or minimize impacts to egg masses. Operation restrictions that prohibit dredging within three feet of the lateral edge of the current water level [Section 228(k)3] and disturbance of egg masses or tadpoles [Section 228(k)16] would further minimize impacts to early lifestages and breeding habitat. Class E restrictions are proposed for select watersheds in CDFG Region 2. These watersheds are generally tributaries of mainstem streams that have hydrology altered by hydropower operations. In these watersheds tributaries are important refugia for the species, and therefore Class E restrictions are proposed to avoid or minimize impacts to early lifestages.
arroyo toad	*Bufo (=Anaxyrus) californicus*	FE	SSC	A	USFWS Critical Habitat[34] and two additional known occurrences in the San Bernardino National Forest	Species has isolated populations and limited distribution. Species habitat requirements are complex and varied (i.e., sandy benches, low flow streams and back waters, adjacent riparian habitat, braided main channel, and no interaction with non-native predators). Impacts to organisms or occupied

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging through increased sedimentation, creation of features that harbor non-native predators, and physical disturbance of beaches/bars. No seasonal restrictions would avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
black toad	*Anaxyrus exsul*	None	ST, FP	A	Occupied streams in Inyo County	Species has isolated populations and limited distribution. Impacts to organisms or occupied habitat could result in a deleterious effect. Occupied habitat has the potential to be degraded by suction dredging. No seasonal restrictions would avoid potential impacts to spawning and early lifestages, or sufficiently avoid potential impacts to occupied habitat. Thus, Class A restriction is proposed.
Cascades frog	*Rana cascadae*	None	SSC	A	Select streams in Shasta/Lassen region per Fellers et al., 2007[35]	Species breeds from May through July with incubation, larvae development and metamorphosis occurring through October (Garwood, 2009[36]). Species breeds in lentic waterbodies in Klamath/Trinity region, but egg masses have been observed in slow flowing streams in the Lassen region (Garwood

TABLE 4.3-1. ACTION SPECIES

Common Name	Scientific Name	Federal listing status*	State listing status*	Proposed Temporal Dredging Restriction	Spatial Data Guiding Dredging Restriction	General Rationale for Proposed Regulations*
						and Welsh, 2007[37]). Species is relatively abundant in the Klamath/Trinity portion of its range, but populations in the Lassen region are at risk of extirpation (Fellers et al, 2007). Class A restriction is proposed for occupied streams in Lassen region.

** See Appendix K for detailed life history accounts*

** List of Abbreviations for Federal and State Species Status follow below:*

FC	*Federal candidate for listing*
FE	*Federal endangered*
FP	*State fully protected species*
FPT	*Federal proposed: threatened*
SSC	*State species of special concern*
FSC	*Federal species of concern (per NOAA or USFWS website)*
SCE	*State candidate: endangered*
SE	*State endangered*
SSC	*State species of special concern*
ST	*State threatened*

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TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Amphibians						
California tiger salamander	*Ambystoma californiense*	FT	ST	Central Valley DPS federally listed as threatened. Santa Barbara & Sonoma counties DPS federally listed as endangered.	Need underground refuges, especially ground squirrel burrows & vernal pools or other seasonal water sources for breeding	**Less than Significant.** Suction dredging highly unlikely to occur in suitable breeding habitat.
Santa Cruz long-toed salamander	*Ambystoma macrodactylum croceum*	FE	SE, FP	Wet meadows near sea level in a few restricted locales in Santa Cruz and Monterey counties.	Aquatic larvae prefer shallow (<12 inches) water, using clumps of vegetation or debris for cover. Adults use mammal burrows.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable breeding habitat.
Pacific tailed frog	*Ascaphus truei*	None	SSC	Occurs in montane hardwood-conifer, redwood, Douglas-fir & ponderosa pine habitats.	Restricted to perennial montane streams. Tadpoles require water below 15 degrees C.	**Less than Significant.** Proposed restrictions for foothill yellow-legged frog would minimize potential impacts to species. Restrictions on dredging within 3 feet of a streambank would further minimize impacts by limiting dredging on margins of channel where eggs and tadpoles commonly occur, and setting a minimum width of stream (6 ft) in which dredging may occur. Residual impacts are not likely to result in a deleterious effect to species.
Inyo Mountains slender	*Batrachoseps campi*	None	SSC	Moist canyons on the west & east slopes of the Inyo Mountains, where surface	Takes cover under rocks on moist sandy loam in steep-walled canyons	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
salamander				water is present.	with permanent springs. Also in underground crevices.	activities are not likely to impact reproduction or dispersal of species.
San Gabriel slender salamander	*Batrachoseps gabrieli*	None	None	Known only from the San Gabriel Mountains. Found under rocks, wood, fern fronds & on soil at the base of talus slopes.	Most active on the surface in winter and early spring.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Kings River slender salamander	*Batrachoseps regius*	None	None	Mixed chaparral with buckeye, laurel, canyon and blue oak, ponderosa and lowland pine.	Found under rocks in areas of talus.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
relictual slender salamander	*Batrachoseps relictus*	None	SSC	Mixed coniferous forest on the western slope of southern Sierra Nevada between Kings River drainage & Kern River Canyon.	Usually found under boards, rotting logs, rocks & surface litter. Surface activity limited to rainy winter months.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Kern Plateau salamander	*Batrachoseps robustus*	None	None	Only in the semiarid Kern Plateau & Scodie Mountains. Frequents Jeffery pine/red fir, lodgepole pine & riparian scrub.	Found under rocks, bark fragments, logs and within and under wet logs, especially in spring and seep areas.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Kern Canyon slender salamander	*Batrachoseps simatus*	None	ST	Only in the lower Kern River Canyon in valley-foothill hardwood, valley-	Found under downed pine, oak & chaparral scrub logs, as well as	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				foothill hardwood-conifer, & mixed chaparral.	under rocks & talus on steep, north-facing slopes.	activities are not likely to impact reproduction or dispersal of species.
Tehachapi slender salamander	*Batrachoseps stebbinsi*	None	ST	Valley-foothill hardwood-conifer & valley-foothill riparian in the Piute & Tehachapi Mountains of Kern County.	Prefers wet talus slopes or log-strewn hillsides with a steep, north-facing exposure.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Yosemite toad	*Bufo (=Anaxyrus) canorus*	FC	SSC	Vicinity of wet meadows in central High Sierra, 6400 to 11,300 feet in elevation.	Primarily montane wet meadows; also in seasonal ponds associated with lodgepole pine and subalpine conifer forest.	**Less than Significant.** Species breeds in the edges of wet meadows and slow moving streams (Jennings and Hayes, 1994)[1]. Species range is a subset of mountain (Sierra Nevada/Sierra Madre) yellow-legged frog. Therefore, Class A closures for mountain yellow-legged frog provide surrogate protection for species. Moreover, most of the species range is in National Park lands or Wilderness Areas.
yellow-blotched salamander	*Ensatina eschscholtzii croceator*	None	SSC	Forests and well-shaded canyons, as well as oak woodlands and old chaparral.	Needs surface objects, such as logs, boards, and rocks. Also needs old rodent burrows or other underground retreats.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
large-blotched salamander	*Ensatina klauberi*	None	SSC	Found in conifer and woodland associations.	Found in leaf litter, decaying logs and shrubs	**Less than Significant.** Reproduction is terrestrial.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
					in heavily forested areas.	Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
limestone salamander	*Hydromantes brunus*	None	ST, FP	Limestone outcrops in digger pine-chaparral belt along the Merced River and its tributaries, from 800-2600 feet in elevation.	California buckeye ia an indicator of optimal habitat. Seeks cover in limestone caverns, talus, rock fissures, surface objects.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Mount Lyell salamander	*Hydromantes platycephalus*	None	SSC	Massive rock areas in mixed conifer, red fir, lodgepole pine, and subalpine habitats, 4000 to 11,600 feet in elevation.	Active on the surface only when free water is available, in the form of seeps, drips, or spray.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Shasta salamander	*Hydromantes shastae*	None	ST	Cool, wet ravines and valleys; dominant vegetation is oak woodland or chaparral, also pine and fir; 100 to 2550 ft elevation.	Seeks cover under surface objects such as logs, rocks, and limestone slabs or talus, near limestone fissures or caves.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Owens Valley web-toed salamander	*Hydromantes sp. 1*	None	SSC	Oak Creek in Charlie Canyon, Inyo County.	Rocky habitat, including cliff faces and cave walls.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
northern leopard frog	*Lithobates pipiens*	None	SSC	Native range is east of Sierra Nevada-Cascade	Highly aquatic species. Shoreline cover,	**Less than Significant.** Suction dredging not likely to occur in

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				Crest. Near permanent or semi-permanent water in a variety of habitats.	submerged and emergent aquatic vegetation are important habitat characteristics	preferred breeding habitat (i.e., dense emergent vegetation).
Scott Bar salamander	*Plethodon asupak*	None	ST	Found only in the vicinity of the Scott River in Siskiyou County		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Del Norte salamander	*Plethodon elongatus*	None	SSC	Old-growth associated species with optimum conditions in the mixed conifer/hardwood ancient forest ecosystem.	Cool, moist, stable microclimate, a deep litter layer, closed multi-storied canopy, dominated by large, old trees.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Siskiyou Mountains salamander	*Plethodon stormi*	None	ST	Mixed conifer habitat of dense, pole-to-mature size, trees. Active above ground only during spring & fall rains.	Found under loose rock rubble at the base of talus slopes or under surface objects.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
northern red-legged frog	*Rana aurora*	None	SSC	Humid forests, woodlands, grasslands, & streamsides in northwestern California, usually near dense riparian cover.	Generally near permanent water, but can be found far from water, in damp woods and meadows, during non-breeding season.	**Less than Significant.** Suction dredging unlikely to occur in suitable breeding habitat.
Oregon spotted frog	*Rana pretiosa*	FC	SSC	Low swampy areas in mountainous woodlands	Standing water needed for breeding.	**Less than Significant.** Species is a "pond" or "quiet-water" frog

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				& wet meadows, springs, small cold streams & lakes in northeastern Calif.		(Stebbins, 2003)[2] reproduces in off-channel aquatic habitat. Suction dredging not likely to significantly impact breeding habitat.
southern torrent salamander	*Rhyacotriton variegatus*	None	SSC	Coastal redwood, Douglas-fir, mixed conifer, montane riparian, and montane hardwood-conifer habitats. Old growth forest.	Cold, well-shaded, permanent streams and seepages, or within splash zone or on moss-covered rock within trickling water.	**Less than Significant.** Proposed restrictions for foothill yellow-legged frog would minimize potential impacts to species. Restrictions on dredging within 3 feet of banks would further minimize impacts by limiting dredging on margins of channel where eggs and larvae commonly occur, and setting a minimum width of stream (6 ft) in which dredging may occur. Residual impacts are not likely to result in a deleterious effect to species.
western spadefoot	*Spea hammondii*	None	SSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands.	Vernal pools are essential for breeding and egg-laying.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable breeding habitat.
Coast Range newt	*Taricha torosa torosa*	None	SSC	Coastal drainages from Mendocino County to San Diego County.	Lives in terrestrial habitats & will migrate over 1 km to breed in ponds, reservoirs & slow moving streams.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Fish						
Sacramento perch	*Archoplites interruptus*	None	SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley.	Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	**Less than Significant.** Proposed restrictions for listed salmonids and sturgeon would provide surrogate protection for species.
flannelmouth sucker	*Catostomus latipinnis*	None	None	Colorado River bordering California.	Spawns in riffles, usually over a substrate of coarse gravel.	**No Impact.** Extirpated from California.
Goose Lake sucker	*Catostomus occidentalis lacusanserinus*	None	SSC	Restricted to the Goose Lake Basin.	Spawns in Goose Lake tributary streams. Adults found in streams & lake all year round. Feeds on algae & diatoms.	**Less than Significant.** Adults associated with lentic habitat. Dredging in lake habitat prohibited without compliance with Fish and Game Code Section 1602. Approximately two-thirds of Goose Lake watershed is within Oregon (Heck et al., 2008)[3], suggesting the majority of suitable spawning habitat is outside of California. Additionally, no activity by dredgers was reported in this geographic area (Appendix F).
riffle sculpin	*Cottus gulosus*	None	None	Present in permanent, cold headwater streams where riffles and rocky substrates predominate (Moyle, 2002)		**Less than Significant.** Species is locally abundant and widely distributed (Moyle, 2002)[4]. In addition, proposed restrictions for salmonids would provide surrogate protection for species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Upper Klamath marbled sculpin	*Cottus klamathensis klamathensis*	None	None	In California, species is found mainly in Lost River drainage and Klamath River above Iron Gate Reservoir (Moyle, 2002)[5]		**Less than Significant.** Proposed restrictions for shortnose sucker would provide surrogate protection for species.
bigeye marbled sculpin	*Cottus klamathensis macrops*	None	SSC	Found in the Pit River system & 3 tributaries - Hat Creek, Burney Creek & the Fall River system.	Large, clear, cool spring-fed streams, but sometimes found in reservoirs. Prefers abundant vegetation & coarse substrates	**Less than Significant**. Proposed restrictions for rough sculpin and Shasta crayfish would provide surrogate protection for species.
Lower Klamath marbled sculpin	*Cottus klamathensis polyporus*	None	None	Widely distributed in Trinity River and larger tributaries, and Klamath River and tributaties below Klamath Falls.		**Less than Significant.** Proposed restrictions for foothill yellow-legged frog would provide surrogate protection for species.
Saratoga Springs pupfish	*Cyprinodon nevadensis nevadensis*	None	SSC	Only known from Saratoga Springs and its outflow in Death Valley.	A series of marshes and shallow lakes. Water temps vary from 10 to 49 C.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
Shoshone pupfish	*Cyprinodon nevadensis shoshone*	None	SSC	Found in Shoshone Spring and throughout its outlet creek, Inyo Co. Habitat has been drastically altered.	Historically the spring pool had clear water over a mud bottom with overhanging banks. Outflow was probably marshy.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
Cottonball Marsh pupfish	*Cyprinodon salinus milleri*	None	ST	Two joined marshy areas in the northwest portion of Death Valley National	Shallow pools with salinities from 14 to 160 ppt.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				Park.		
tidewater goby	*Eucyclogobius newberryi*	FE	SSC	Brackish water habitats along the Calif coast from Agua Hedionda Lagoon, San Diego Co. to the mouth of the Smith River.	Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water & high oxygen levels.	**Less than Significant.** Suction dredging unlikely to occur in suitable habitat. Proposed restrictions for salmonids and sturgeon would provide surrogate protection for species.
resident threespine stickleback	*Gasterosteus aculeatus microcephalus*	None	None	Populations widely distributed throughout the coastal drainages of California.		**Less than Significant.** As a whole, species not likely to be adversely affected by dredging. Individual isolated populations may have higher risk of an adverse impacts. However, proposed restrictions for salmonids and other fishes in southern California (e.g., Santa Ana sucker, arroyo chub) would provide surrogate protection for species such that a deleterious effect is not likely to occur.
Lahontan Lake tui chub	*Gila bicolor pectinifer*	None	SSC	Inhabits large, deep lakes. Tolerates a wide range of physiochemical water conditions.	Spawns in near-shore shallow areas over beds of aquatic vegetation.	**Less than Significant.** Species is abundant and widely distributed in eastern Sierra Nevada watersheds (Moyle, 2002). Suction dredging not likely to result in deleterious effect.
Goose Lake tui chub	*Gila bicolor thalassina*	None	SSC	Confined to the Goose Lake Basin of Oregon and California.	Chubs prefer pools & are generally not found in swift water. They've been found in habitats with temps from 9-29 degrees	**Less than Significant.** Adults associated with lentic habitat. Dredging in lake habitat prohibited without compliance with Fish and Game Code Section

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
					C.	1602. Approximately two-thirds of Goose Lake watershed is within Oregon (Heck et al., 2008), suggesting the majority of suitable spawning habitat is outside of California. Additionally, no activity by dredgers was reported in this geographic area (Appendix F).
Cow Head tui chub	*Gila bicolor vaccaceps*	None	SSC	Known only from the Cow Head sub-basin of the Warner Basin.	Need sufficient water to maintain the large pools that support the fish, especially during drought years.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
blue chub	*Gila coerulea*	None	SSC	Abundant in lakes, but found in a variety of habitats, from small streams & rivers to shallow reservoirs & deep lakes.	Most abundant in warm, quiet waters with mixed substrates. Spawns over shallow rocky areas.	**Less than Significant.** Species primarily occurs in warm water lakes. Dredging in lake habitat prohibited without compliance with Fish and Game Code Section 1602. Residual impacts are not likely to result in a deleterious effect to species.
Delta smelt	*Hypomesus transpacificus*	FT	SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay.	Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	**Less than Significant.** Suction dredging unlikely to occur in suitable habitat. Proposed restrictions for salmonids and sturgeon provide surrogate protection for species.
Clear Lake tule perch	*Hysterocarpus traski lagunae*	None	None	Inhabits Clear Lake and upper and lower Blue Lakes (Lake County)		**Less than Significant.** Proposed restrictions for Clear Lake hitch would provide surrogate

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						protection for species. Dredging in lake habitat would require compliance with Fish and Game Code Section 1602.
Russian River tule perch	*Hysterocarpus traski pomo*	None	SSC	Low elevation streams of the Russian River system.	Requires clear, flowing water with abundant cover. They also require deep (> 1 m) pool habitat.	**Less than Significant.** Proposed restrictions for listed salmonids would provide surrogate protection for species.
Sacramento-San Joaquin tule perch	*Hysterocarpus traski traski*	None	None	Lowland rivers and creeks in the Central Valley up to major canyons or waterfalls.		**Less than Significant.** Suction dredging not likely to commonly occur in preferred habitat.
Kern brook lamprey	*Lampetra hubbsi*	None	SSC	San Joaquin River system and Kern River.	Gravel-bottomed areas for spawning and muddy-bottomed areas where ammocoetes can burrow and feed.	**Less than Significant.** Proposed restrictions for salmonids would provide surrogate protection for spawning adults in portions of species range. Disturbance of ammocoetes not likely to result in deleterious effect to species. Additionally, minimal activity by dredgers was reported within species range (Appendix F).
Pit-Klamath brook lamprey	*Lampetra lethophaga*	None	None	In California it is found only in the Pit River system.	Low-gradient reaches of clear, cool rivers and streams with sand-mud bottoms or edges.	**Less than Significant.** Proposed restrictions for Pit roach would provide surrogate protection for spawning adults in portions of species range. Disturbance of ammocoetes not likely to result in deleterious effect to species.
Klamath River	*Lampetra similis*	None	SSC	Upper Klamath River and	Adults need coarser	**Less than Significant.** Proposed

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
lamprey				upper Klamath Lake.	gravel-rubble substrate for spawning. Ammocoetes need sand/mud substrate in shallow pools.	restrictions for salmonids and sturgeon provide surrogate protection for spawning adults. Disturbance of ammocoetes not likely to result in deleterious effect to species.
Pacific lamprey	*Lampetra tridentata*	None	None	Found in Pacific Coast streams north of San Luis Obispo Co., however regular runs in Santa Clara River. Size of runs is declining.	Swift-current gravel bottomed areas for spawning with water temps between 12-18 degrees C. Ammocoetes need soft sand or mud.	**Less than Significant.** Proposed restrictions for salmonids and sturgeon would provide surrogate protection for spawning adults in portions of species range. Residual impacts, including disturbance of ammocoetes, not likely to result in deleterious effect to species.
Goose Lake lamprey	*Lampetra tridentata ssp. 1*	None	SSC	Adults live in shallow, alkaline Goose Lake.	Require gravel rifles in streams for spawning. Ammocoetes require muddy backwater habitats downstream of spawning areas.	**Less than Significant.** Adults associated with lentic habitat. Dredging in lake habitat prohibited without compliance with Fish and Game Code Section 1602. Approximately two-thirds of Goose Lake watershed is within Oregon (Heck et al., 2008), suggesting the majority of suitable spawning habitat is outside of California. Additionally, no activity by dredgers was reported in this geographic area (Appendix F).
Central Valley hitch	*Lavinia exilicauda*	None	None	Warm, low-elevation lakes, sloughs, and slow		**Less than Significant.** Suction dredging not likely to commonly

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
	exilicauda			moving stretches of river and in clear low gradient streams (Moyle, 2002).		occur in occupied habitat. Proposed restrictions for salmonids would provide surrogate protection for a portion of the species range. Residual impacts are not likely to result in a deleterious effect to species.
Pajaro/Salinas hitch	*Lavinia exilicauda harengus*	None	None	Pajaro and Salinas Rivers and larger tributaries		**Less than Significant.** Proposed restrictions for salmonids would provide surrogate protection for species.
Navarro roach	*Lavinia symmetricus navarroensis*	None	SSC	Habitat generalists. Found in warm intermittent streams as well as cold, well-aerated streams.		**Less than Significant.** Suction dredging unlikely to occur in suitable habitat. Proposed restrictions for salmonids would provide surrogate protection for species.
Gualala roach	*Lavinia symmetricus parvipinnis*	None	SSC	Found only in the Gualala River.		**Less than Significant.** Proposed restrictions for salmonids provide surrogate protection for species.
Sacramento-San Joaquin roach	*Lavinia symmetricus ssp. 1*	None	SSC	Sacramento-San Joaquin Valley.		**Less than Significant.** Proposed restrictions for salmonids would provide surrogate protection for portions of species range. Residual impacts are not likely to result in a deleterious effect to species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Tomales roach	*Lavinia symmetricus ssp. 2*	None	SSC	Tributaries to Tomales Bay.		**Less than Significant.** Proposed restrictions for listed salmonids would provide surrogate protection for species.
Clear Lake - Russian River roach	*Lavinia symmetricus ssp. 4*	None	None	Clear Lake drainage and the Russian River		**Less than Significant.** Proposed restrictions for Clear Lake hitch and salmonids would provide surrogate protection for species.
Monterey roach	*Lavinia symmetricus subditus*	None	SSC	Tributaries to Monterey Bay, specifically the Salinas, Pajaro, & San Lorenzo drainages.		**Less than Significant.** Suction dredging unlikely to occur in suitable habitat. Proposed restrictions for salmonids would provide surrogate protection for species.
coast cutthroat trout	*Oncorhynchus clarkii clarkii*	None	SSC	Small coastal streams from the Eel River to the Oregon border.	Small, low gradient coastal streams & estuaries. Need shaded streams with water temps <18C, & small gravel for spawning	**Less than Significant.** Proposed restrictions for listed salmonids and sturgeon would provide surrogate protection for species.
pink salmon	*Oncorhynchus gorbuscha*	None	SSC	Most spawn in intertidal or lower reaches of streams & rivers in Sept & Oct. Move further upstream in Sacramento River.	Optimal temperature is 5.6 to 14.4 C. Embryos & alevins require fast-flowing, well oxygenated water for development & survival.	**Less than Significant.** Proposed restrictions for listed salmonids and sturgeon would provide surrogate protection for species.
chum salmon	*Oncorhynchus keta*	None	SSC	Short freshwater & extensive marine life stage. Especially dependent upon estuaries	Select spawning sites where there are good intragravel flows with optimum spawning	**Less than Significant.** Proposed restrictions for listed salmonids and sturgeon would provide surrogate protection for species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				during non-migratory juvenile stage	temps of 7.2 - 12.8 C.	
Sacramento splittail	*Pogonichthys macrolepidotus*	None	SSC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay & associated marshes.	Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning & foraging for young.	**Less than Significant.** Proposed restrictions for listed salmonids and sturgeon would provide surrogate protection for species. Dredging not likely to occur in suitable spawning habitat.
Amargosa Canyon speckled dace	*Rhinichthys osculus ssp. 1*	None	SSC	Found only in Amargosa Canyon and tributaries of the Amargosa River, esp. Willow Creek & Willow Creek Reservoir.	Prefers pools with relatively deep water (0.5 - 0.75 m) and slow water velocity.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat.
Long Valley speckled dace	*Rhinichthys osculus ssp. 5*	None	None	Found only in Long Valley in the Owens River drainage.	Occurs only in Whitmore Spring and Little Alkali Lake (Moyle, 2002)[5].	**Less than Significant.** Suction dredging not likely to occur in occupied habitat. Dredging in lake habitat would require compliance with Fish and Game Code Section 1602.
Eagle Lake tui chub	*Siphateles bicolor ssp. 1*	None	SSC	Found only in Eagle Lake, Lassen County.	Requires beds of aquatic vegetation in shallow, inshore areas for successful spawning.	**Less than Significant.** Species associated with lentic habitat. Suction dredging not unlikely to occur in suitable habitat. Dredging in occupied habitat would require compliance with Section 228.(k) of the proposed regulations.
Pit River tui chub	*Siphateles bicolor ssp. 3*	None	None	Common in reservoirs and some streams in Pit River basin.		**Less than Significant.** Proposed restrictions for Pit roach would provide surrogate protection for

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						streams within species range. Dredging in lake habitat would require compliance with Fish and Game Code Section 1602.
longfin smelt	*Spirinchus thaleichthys*	None	ST	Euryhaline, nektonic & anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column.	Prefer salinities of 15-30 ppt, but can be found in completely freshwater to almost pure seawater.	**Less than Significant.** Suction dredging unlikely to occur in suitable spawning habitat. Proposed restrictions for salmonids and sturgeon would provide surrogate protection for species.
Invertebrates						
tight coin (=Yates' snail)	*Ammonitella yatesii*	None	None	Inhabits limestone caves and outcroppings; favors north-facing slopes.	Found in humus in limestone outcroppings.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
hooded lancetooth	*Ancotrema voyanum*	None	None	Occurs mostly in the Shasta-Trinity National forests in the northern half of Trinity County. Associated with limestone substrates, mostly in an elevation range of 1680960 meters.	All known occurrences are near streams or in draws (intermittent stream channel). Needs permanent dampness. Late successional conditions provide suitable habitat conditions.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
California floater	*Anodonta californiensis*	None	None	Freshwater lakes and slow-moving streams and rivers. Taxonomy under	Generally in shallow water.	**Less than Significant.** Proposed regulations prohibit disturbance of mussel beds. Residual impacts

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				review by specialists.		are not likely to result in a deleterious effect to species.
Mono brine shrimp	*Artemia monica*	None	None	Endemic to Mono Lake, located in the Great Basin Desert of Mono County.	Mono Lake is permanent, clear-water, carbonate-rich, saline lake with 96-ppt TDS, and a pH around 10; temp 4-24 deg C.	**Less than Significant.** Dredging in lake habitat prohibited without compliance with Fish and Game Code Section 1602.
Badwater snail	*Assiminea infima*	None	None	Restricted to saline spring sources in the Death Valley region, Inyo County.	Occurs either under a salt-crust roof fringing the water's edge or on moistened vegetation; often found fully submerged.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
pocket pouch fairy shrimp	*Branchinecta campestris*	None	None	In California it is found in Soda Lake, Carrizo Plains. Active only in El Nino years.	Very salt tolerant	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat.
Conservancy fairy shrimp	*Branchinecta conservatio*	FE	None	Endemic to the grasslands of the northern two-thirds of the Central Valley; found in large, turbid pools.	Inhabit astatic pools located in swales formed by old, braided alluvium; filled by winter/spring rains, last until June.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
longhorn fairy shrimp	*Branchinecta longiantenna*	FE	None	Endemic to the eastern margin of the Central Coast mtns in seasonally astatic grassland vernal pools.	Inhabit small, clear-water depressions in sandstone and clear-to-turbid clay/grass-bottomed pools in shallow swales.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						habitat.
vernal pool fairy shrimp	*Branchinecta lynchi*	FT	None	Endemic to the grasslands of the Central Valley, Central Coast mtns, and South Coast mtns, in astatic rain-filled pools.	Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
midvalley fairy shrimp	*Branchinecta mesovallensis*	None	None	Vernal pools in the Central Valley.		**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
San Diego fairy shrimp	*Branchinecta sandiegonensis*	FE	None	Endemic to San Diego and Orange County mesas.	Vernal pools.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
Sequoia cave isopod	*Caecidotea sequoiae*	None	None	Troglophilic.	Collected in caves, and also near outlet of Big Spring by overturning rocks.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Tomales isopod	*Caecidotea tomalensis*	None	None	Inhabits localized fresh-water ponds or streams		**Less than Significant.** Known occurrences are from wells and

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				with still or near-still water in several Bay Area counties.		springs in counties along the Coast Range. Suction dredging not likely to occur in occupied or suitable habitat.
An isopod	*Calasellus californicus*	None	None	Known from Lake, Napa, Marin, Santa Cruz and Santa Clara counties.		**Less than Significant.** Known occurrences are from ponds/springs in Bay Area counties (CDFG, no date)[5]. Suction dredging not likely to occur in occupied or suitable habitat.
An isopod	*Calasellus longus*	None	None	Spring		**Less than Significant.** Only known population is in Shaver Lake in Fresno County (Lewis, 2001)[6]. Dredging in occupied habitat would require compliance with Section 228.(k) of the proposed regulations.
canary duskysnail	*Colligyrus convexus*	None	None	Limnocrenes & hyporheic streams in the Pit River basin.	Most abundant on the undersides of cobbles and boulders in shallow to moderate depths.	**Less than Significant.** Species associated with limnocrenes (spring basins) and hyporheic streams in the Pit River basin. Distribution is not well documented, but species is often found in association with Shasta crayfish (NatureServe, 2010)[7]. Proposed restrictions for Shasta crayfish and other Pit River basin species (e.g., rough sculpin) would provide surrogate protection for species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						Restrictions on dredging within 3 feet of banks would further minimize impacts by setting a threshold on the width of stream in which dredging may occur. Furthermore, no activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.
hairy water flea	*Dumontia oregonensis*	None	None	Vernal pools. In California, known only from Mather Field.		**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
Morongo (=Colorado) desertsnail	*Eremarionta morongoana*	None	None	Known only from a gulch on the north side of Morongo Pass, San Bernardino County, near Riverside County line.	Found under rocks.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Baker's desertsnail	*Eremarionta rowelli bakerensis*	None	None	Inhabits N slope of a small range of limestone hills, 0.5 miles south of Baker, San Bernardino County.	Found in rockslides.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
California Mccoy snail	*Eremarionta rowelli mccoiana*	None	None	Found in various sites in the McCoy Mtns and the Big Maria Mtns.	Inhabits rockslides in gullies.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						species.
nugget pebblesnail	*Fluminicola seminalis*	None	None	Originally from near mouth of the Sacramento River upstream into the Pit River. Now extirpated from the Sacramento River.	Prefers gravel-cobble substrate and clear, cold flowing water. It typically is found in large streams and rivers. However, it is also found in a very few large spring pools with soft, mud substrates (Furnish and Monthey, 1998)[9].	**Less than Significant**. Densities of 2000-3000 individuals per m^2 reported in the Pit and McCloud Rivers (Furnish and Monthey, 1998)[8]. Proposed restrictions for Shasta crayfish and other Pit River basin species (e.g., rough sculpin) would provide surrogate protection for portion of species range. No activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.
western ridged mussel	*Gonidea angulata*	None	None	Primarily creeks & rivers & less often lakes. Originally in most of state, now extirpated from Central & Southern Calif.		**Less than Significant.** Proposed regulations would minimize impacts by prohibiting disturbance of mussel beds. Residual impacts are not likely to result in a deleterious effect to species.
Great Basin rams-horn	*Helisoma newberryi*	None	None	Larger lakes & slow rivers, including larger spring sources & spring-fed creeks.	Snails burrow in soft mud.	**Less than Significant.** Suction dredging highly unlikely to occur in preferred habitat (i.e., larger lakes and slow rivers).
Merced Canyon shoulderband	*Helminthoglypta allynsmithi*	None	None	Merced River Canyon, 3-6 miles below El Portal; 150 ft elev.	Inhabits rockslides	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						reproduction or dispersal of species.
mountain shoulderband	*Helminthoglypta arrosa monticola*	None	None	Known only from the King Range in Humboldt County.	Found in talus slopes.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Pomo bronze shoulderband	*Helminthoglypta arrosa pomoensis*	None	None	Found near the coast in heavily-timbered redwood canyons of Mendocino County.	Found under redwoods.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Kern shoulderband	*Helminthoglypta callistoderma*	None	None	Known only from Tulare and Kern counties, along the lower Kern River Canyon.	Has been collected from dead vegetation along the water's edge.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
mesa shoulderband	*Helminthoglypta coelata*	None	None	Known only from a few locations in coastal San Diego County.	Found in rock slides, beneath bark and rotten logs, and among coastal vegetation.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Oregon shoulderband	*Helminthoglypta hertleini*	None	None	Found on basaltic talus slopes; partial riparian associate.	Found wherever permanent ground cover/moisture is available. Somewhat	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
					adapted to dry conditions during a portion of the year.	reproduction or dispersal of species.
Victorville shoulderband	*Helminthoglypta mohaveana*	None	None	Known only from along the Mojave River in San Bernardino County.	Found among granite boulders and at the base of rocky cliffs.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Bridges' coast range shoulderband	*Helminthoglypta nickliniana bridgesi*	None	None	Inhabits open hillsides of Alameda and Contra Costa counties.	Tends to colonize under tall grasses and weeds.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
redwood shoulderband	*Helminthoglypta sequoicola consors*	None	None	Known only from south slope of San Juan Grade, near Foot, 8 miles NW of Salinas.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Trinity shoulderband	*Helminthoglypta talmadgei*	None	None	Limestone rockslides, litter in coniferous forests, old mine tailings, and along shaded streams in the Klamath Mountains		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
westfork shoulderband	*Helminthoglypta taylori*	None	None	Vicinity of the Mojave River.	Under logs and leaves.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						activities are not likely to impact reproduction or dispersal of species.
leaden slug	*Hesperarion plumbeus*	None	None	Terrestrial snail known to occur in Shasta County		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
topaz juga	*Juga acutifilosa*	None	None	Cold, well-oxygenated, unpolluted water, generally with stable gravel substrate.		**Less than Significant.** This species is known to occur at 12 isolated spring complexes, all but one in Northern California. Additional occupied sites may be discovered in the vicinity of Fall River Mills and in Lassen National Park east of Hat Creek (USFS, 2007)[9]. Suction dredging not likely to occur in occupied habitat (i.e., isolated spring complexes, and in National Park boundaries).
Chace juga	*Juga chacei*	None	None	Small permanent streams at low to middle elevations in the Smith River drainage.	Generally on gravel substrate, always in cold, clear, highly oxygenated, unpolluted, running water.	**Less than Significant.** Occurs in rivulets and small creeks [California fish and game (Volume 67, no. 3)]. Proposed regulations which would restrict dredging within 3 feet of a streambank [Section 228.(k)(3)] would preclude dredging in much of this habitat type.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						Limited activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.
scalloped juga	*Juga occata*	None	None			**Less than Significant.** Species exists in widely separated sites in the Pit River below the "Falls" in Shasta County (USFS, 2007). Proposed restrictions for Shasta crayfish and other Pit River basin species (e.g., rough sculpin) would provide surrogate protection for portion of species range. No activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.
redwood juga	*Juga orickensis*	None	None	High to low elevation coastal streams in northwestern California & southern Oregon.	Small spring-fed permanent rivulets to creeks, often on gravel, always in unpolluted, clear, cold, running water.	**Less than Significant.** Occurs in Del Norte, Humboldt, and western Trinity counties (NatureServe, 2010)[10]. Proposed regulations which would restrict dredging within 3 feet of a streambank would preclude dredging in much of this habitat type. Residual impacts are not likely to result in a deleterious effect to species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
kneecap lanx	*Lanx patelloides*	None	None	Endemic to upper Sacramento River system. Breath entirely through mantle, & are very sensitive to polluted water.	Prefers fast, cold, well-oxygenated water and cobble-boulder substrate.	**Less than Significant**. Species co-occurs with nugget pebblesnail (*Fluminicola seminalis*) (Furnish and Monthey, 1998). Proposed restrictions for Shasta crayfish and other Pit River basin species (e.g., rough sculpin) would provide surrogate protection for portion of species range. No activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.
vernal pool tadpole shrimp	*Lepidurus packardi*	FE	None	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed & highly turbid.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
California linderiella	*Linderiella occidentalis*	None	None	Seasonal pools in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions.	Water in the pools has very low alkalinity, conductivity, and TDS.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Santa Rosa Plateau fairy shrimp	*Linderiella santarosae*	None	None	Found only in the vernal pools on Santa Rosa Plateau in Riverside County.	Southern basalt flow vernal pools.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat.
western pearlshell	*Margaritifera falcata*	None	None	Aquatic.	Prefers lower velocity waters.	**Less than Significant.** Proposed regulations would minimize impacts by prohibiting disturbance of mussel beds. Residual impacts are not likely to result in a deleterious effect to species.
Natural Bridge megomphix	*Megomphix californicus*	None	None	Forested areas.	In moist leaf litter & under rotting logs on streambanks. Associated with perennial seeps and springs.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
downy sideband	*Monadenia callipeplus*	None	None	Old growth and riparian associate.	Found among rocks and leaf litter along forested streambanks.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Siskiyou shoulderband	*Monadenia chaceana*	None	None	Lower reaches of major drainages. Found in talus and rock slides, under rocks and woody debris in moist conifer forests, caves, and riparian corridors in shrubby	Rocks and woody debris serve as refugia during the summer.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				areas.		
Klamath sideband	*Monadenia churchi*	None	None	Lives mostly in limestone outcrops, caves, talus slides, and lava rockslides, but also occurs under forest debris in heavy shade on wooded hillsides.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
keeled sideband	*Monadenia circumcarinata*	None	None	Endemic to the Tuolumne River canyon, in association with steep limestone outcrops and talus slopes.	Occurs in limestone where fractures or loose talus allow deep, sub-surface sheltering.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
crested sideband	*Monadenia cristulata*	None	None	Old growth and riparian associate.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
A terrestrial snail	*Monadenia fidelis leonina*	None	None	Old growth and riparian associate; local endemic.	Dead alder leaves and trunks near a stream, in relatively undisturbed forest.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
yellow-based sideband	*Monadenia infumata ochromphalus*	None	None	Old growth and riparian associate. Not collected since the early 1960s.	Found on leaves, sticks, concrete wall of irrigation ditch and mossy boulders and stones.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						reproduction or dispersal of species.
Trinity bristle snail	*Monadenia infumata setosa*	None	ST	Known only from along a few streams in the Trinity River drainage.	Juveniles are found under bark of standing dead broadleaf trees, and the species may require this habitat.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Button's Sierra sideband	*Monadenia mormonum buttoni*	None	None	Known from the central Sierra Nevada counties.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
hirsute Sierra sideband	*Monadenia mormonum hirsuta*	None	None	Known only from a few basaltic outcrops in Tuolumne County.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Shasta sideband	*Monadenia troglodytes troglodytes*	None	None	Associated with limestone terrain in Shasta and Siskiyou counties. Associated with pine-oak woodlands.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Tuolumne sideband	*Monadenia tuolumneana*	None	None	Endemic to the Tuolumne River canyon, in association with steep limestone outcrops and	Occurs in limestone where fractures or loose talus allow deep, sub-surface sheltering.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				talus slopes.		reproduction or dispersal of species.
Yosemite Mariposa sideband	*Monadenia yosemitensis*	None	None	Known only from Yosemite Valley along the Merced River, Mariposa County.	Known to inhabit rockslides.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Ten Mile shoulderband	*Noyo intersessa*	None	None	Found in coastal dunes, coastal scrub, and riparian redwood forest habitats.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Warner Valley redband trout	*Oncorhynchus mykiss ssp. 3*	None	None	Only present in the Warner Lakes Basin, in the extreme northeastern portion of California.		**Less than Significant.** Species dependent primarily on habitat in Oregon. Dredging in California portion of species range not likely to result in a deleterious effect.
robust walker	*Pomatiopsis binneyi*	None	None	Freshwater.		**Less than Significant.** Species is found in perennial seeps and rivulets, where it is protected from seasonal flushing in the rainy season (USFS, 2010)[11]. Proposed regulations which would restrict dredging within 3 feet of a streambank would preclude dredging in this habitat type.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
pristine pyrg	*Pristinicola hemphilli*	None	None	Found in small springs.		**Less than Significant.** Species occurs in small springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would preclude dredging in this habitat type.
Trinity Spot	*Punctum hannai*	None	None	Uncommon localized species with a disjunct range divided between the Klamath Mountains & Sierra Nevada.	In moist leaf litter in forests, and in more areas, along streams or near seeps, springs, bogs & swamps.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Benton Valley (=Aahrdahl's) springsnail	*Pyrgulopsis aardahli*	None	None	Endemic to the type locality - a spring at Bramlette Ranch in Benton Valley, Mono County.	Common in dense watercress in uppermost portion of outflow of small, highly degraded spring.	**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
Archimedes pyrg	*Pyrgulopsis archimedis*	None	None	Springs and streams in the Pit and Klamath Basins.	Snails typically found on mud substrate.	**Less than Significant.** Proposed restrictions on dredging within 3 feet of a streambank would further minimize impacts by setting a threshold on the width of stream in which dredging may occur. Furthermore, no activity by dredgers was reported in this geographic area (Appendix F). Anticipated level of activity not likely to result in a deleterious effect.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Ash Valley pyrg	*Pyrgulopsis cinerana*	None	None	Cold springs associated with upper Ash Creek, Ash Valley, upper Pit River basin.	Helocrenes.	**Less than Significant.** Species occurs in springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would preclude dredging in this habitat type.
Diablo Range pyrg	*Pyrgulopsis diablensis*	None	None	Found in unnamed creek in Del Puerto Canyon.	Stream is poorly shaded and slightly disturbed from pastoral and recreational activities.	**Less than Significant.** Suction dredging unlikely to occur in occupied habitat.
Smoke Creek pyrg	*Pyrgulopsis eremica*	None	None	Springs & spring brooks within the Great Basin of northeastern California.		**Less than Significant.** Species occurs in springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would preclude dredging in the majority of suitable habitat.
Likely pyrg	*Pyrgulopsis falciglans*	None	None	Restricted to two closely adjacent springs along the south fork Pit River.		**Less than Significant.** Species occurs in springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would likely preclude dredging in occupied habitat. Furthermore, no activity by dredgers was reported in this geographic area (Appendix F).
Surprise Valley pyrg	*Pyrgulopsis gibba*	None	None	Found in springs in the Great Basin of northeastern California.		**Less than Significant.** Species occurs in springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would likely

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						preclude dredging in occupied habitat. Furthermore, no activity by dredgers was reported in this geographic area (Appendix F).
Willow Creek pyrg	*Pyrgulopsis lasseni*	None	None	Upper reaches of Willow Creek and an associated warm nasmode in the upper Pit River basin.	Snails found in warm (22 degrees C) nasmode and in cooler Willow Creek. Snails more abundant in Willow Creek.	**Less than Significant.** Species occurs in springs. Proposed regulations which would restrict dredging within 3 feet of a streambank would likely preclude dredging in occupied habitat. Furthermore, no activity by dredgers was reported in this geographic area (Appendix F).
Fish Slough springsnail	*Pyrgulopsis perturbata*	None	None	Found in three of the four main springs in Fish Slough.	Found only in small vestiges of rheocrene habitat at small orifices in NW springs & at start of outflow of NE springs.	**Less than Significant.** Proposed restrictions for Owens pupfish would provide surrogate protection for species.
Sucker Springs pyrg	*Pyrgulopsis rupinicola*	None	None	Endemic to a single site in the Pit River basin.	Found in a large, cold spring outflow with slow to moderate current.	**Less than Significant.** Proposed restrictions for Shasta crayfish would provide surrogate protection for species.
San Luis Obispo pyrg	*Pyrgulopsis taylori*	None	None	Freshwater habitats in San Luis Obispo County.		**Less than Significant.** Specific habitat requirements not defined. Assumed to be similar to other Pyrgulopsis species. Proposed regulations which would restrict dredging within 3 feet of a streambank would likely preclude dredging in most suitable habitat.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Wong's springsnail	*Pyrgulopsis wongi*	None	None	Owens Valley. Along east side from Pine Creek to Little Lake & along west side from French Spring to Marble Creek.	Seeps and small-moderate size spring-fed streams. Common in watercress and/or on small bits of travertine & stone.	**Less than Significant.** Suction dredging unlikely to occur in most suitable habitat (i.e., springs). Proposed restrictions for mountain sucker and mountain whitefish would minimize potential for impacts in springs along streams. Proposed regulations which would restrict dredging within 3 feet of a streambank would further reduce potential for impacts dredging. Residual impacts are not likely to result in a deleterious effect to species.
Warner Springs shoulderband	*Rothelix warnerfontis*	None	None	Known only from two localities near Warner Springs, San Diego Co.	Found in wood rat nests; as development eliminates rat nests, snail has become scarce.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Riverside fairy shrimp	*Streptocephalus woottoni*	FE	None	Endemic to W RIV, ORA & SDG counties in areas of tectonic swales/earth slump basins in grassland & coastal sage scrub.	Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat. Proposed restrictions on dredging into streambanks would provide protection for species and their habitat.
Grady's Cave amphipod	*Stygobromus gradyi*	None	None	Known only from Central California.	Mostly found in caves, but one collection from a spring.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
						activities are not likely to impact reproduction or dispersal of species.
Hara's Cave amphipod	*Stygobromus harai*	None	None	Central California foothills.	Mostly found in caves & mine tunnels. Also taken from a spring	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Wengerors' Cave amphipod	*Stygobromus wengerorum*	None	None	Known only from two caves in Mariposa County.	Subterranean groundwater habitats.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Shasta chaparral	*Trilobopsis roperi*	None	None	Found within 100 meters of limestone outcroppings and talus slopes with some protective shade, or caves with shrubs or oak cover.		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
mimic tryonia (=California brackish water snail)	*Tryonia imitator*	None	None	Inhabits coastal lagoons, estuaries and salt marshes, from Sonoma County south to San Diego County.	Found only in permanently submerged areas in a variety of sediment types; able to withstand a wide range of salinities.	**Less than Significant.** Suction dredging highly unlikely to occur in suitable habitat.
Grapevine Springs elongate tryonia	*Tryonia margae*	None	None	Endemic to Grapevine Springs, Death Valley, Amargosa River basin,		**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
				California		
Grapevine Springs squat tryonia	*Tryonia rowlandsi*	None	None	Endemic to springs in the Amargosa River basin		**Less than Significant.** Suction dredging highly unlikely to occur in occupied habitat.
Karok hesperian	*Vespericola karokorum*	None	None	Occurs primarily under riparian vegetation (alders, maples), which provide shading from sunlight and a moist substrate.	Inhabits leaf litter, wood debris, or soil & sand containing stones/pieces of wood; often found in large aggregations.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Marin hesperian	*Vespericola marinensis*	None	None	Found in moist spots in coastal brushfield and chaparral vegetation in Marin County.	Under leaves of cow-parship, around spring seeps, in leafmold along streams, in alder woods & mixed evergreen forest.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Big Bar hesperian	*Vespericola pressleyi*	None	None	Only found in Trinity County, within the boundaries of Shasta-Trinity National Forest.	Found in conifer or hardwood forests in permanently damp areas within 200 meters of stable streams, seeps, and springs.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.
Shasta hesperian	*Vespericola shasta*	None	None	Primarily found in the vicinity of Shasta Lake, up to 915 meters elevation.	Moist bottom lands such as riparian areas, springs, seeps, marshes, and in the mouths of caves.	**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.

TABLE 4.3-2. OTHER *FISH* SPECIES

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Determination regarding effects of Proposed Program
Siskiyou hesperian	*Vespericola sierranus*	None	None	Found under logs in a swampy meadow in Siskiyou County		**Less than Significant.** Reproduction is terrestrial. Suction dredging and associated activities are not likely to impact reproduction or dispersal of species.

** List of Abbreviations for Federal and State Species Status follow below:*

FC	*Federal candidate for listing*
FE	*Federal endangered*
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FPT	*Federal proposed: threatened*
SSC	*State species of special concern*
FSC	*Federal species of concern (per NOAA or USFWS website)*
SCE	*State candidate: endangered*
SE	*State endangered*
SSC	*State species of special concern*
ST	*State threatened*

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TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
Invertebrates							
valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	None	Occurs only in the central valley of California, in association with blue elderberry (*Sambucus mexicana*).	Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	**Potentially Significant.** If left unrestricted, suction dredging would have the potential to disturb/destroy host plants (i.e., blue elderberry) by dredging into streambanks. This would cause loss of suitable or occupied habitat which may be potentially significant.	**Less than Significant.** Compliance with proposed regulations which restrict dredging within 3 feet of a streambank, and prohibit the damage or removal of streamside vegetation, would minimize the potential for disturbance/destruction of host plants. Ancillary activities such as access/egress to and from streams and camping are not likely to cause significant impacts to species or host plants.
Birds							
southwestern willow flycatcher	*Empidonax traillii extimus*	FE	SE	Riparian woodlands in Southern California.		**Potentially Significant.** Species breeding activity generally extends from May through August (USFWS, 2002)[1]. If left unrestricted, suction dredging or ancillary activities would have the potential to disturb breeding and potentially cause nesting failure (See Impact BIO-WILD-2). If disturbance caused by	**Potentially Significant.** The Proposed Regulations, which include spatial and temporal restrictions on suction dredging, would provide surrogate protection for the vast majority of the USFWS designated critical habitat. Of the 17,212 acres of critical habitat in California, approximately 75% (nearly 13,000 acres) would be closed to dredging (Class A or E) during the nesting season, thereby limiting the potential

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
						suction dredging or ancillary activities resulted in nest abandonment and/or failure of the species to successfully reproduce, this would be considered a significant impact.	for impacts during the nesting season. However, dredging that may occur in unrestricted areas of the species range has the potential to disrupt nesting of the species. Therefore, the impact remains potentially significant.
least Bell's vireo	*Vireo bellii pusillus*	FE	SE	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. elevation.	Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	**Potentially Significant.** Species breeding activity generally extends from April through July (Wellik et al., 2009)[2]. If left unrestricted, suction dredging or ancillary activities would have the potential to disturb breeding and potentially cause nesting failure (See Impact BIO-WILD-2). If disturbance caused by suction dredging or ancillary activities resulted in nest abandonment and/or failure of the species to successfully reproduce, this would be	**Potentially Significant.** The Proposed Regulations, which include spatial and temporal restrictions on suction dredging, would provide surrogate protection for the majority of the USFWS designated critical habitat. Of the 36,988 acres of critical habitat in California, approximately 58% (more than 20,000 acres) would be closed to dredging (Class A or E) during the nesting season, thereby limiting the potential for impacts during the nesting season. However, dredging that may occur in unrestricted areas of the species range has the potential to disrupt nesting of the species. Therefore, the impact remains potentially significant.

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
						considered a significant impact.	
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FC	SE	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	**Potentially Significant.** In California, stable breeding populations (i.e., greater than five pairs which persist every year) are currently limited to the Sacramento River from Red Bluff to Colusa, and the South Fork Kern River from Isabella Reservoir to Canebrake Ecological Reserve (Layman, 1998)[3]. Species breeding activity generally extends from June through mid-September; peak nesting activity on the South Fork Kern River occurs in the first half of July (Layman, 1998)[3]. If left unrestricted, suction dredging or ancillary activities would have the potential to disturb breeding and	**Potentially Significant.** The Proposed Regulations include spatial and temporal restrictions on suction dredging. Much of the known breeding habitat for species along the Sacramento and South Fork Kern River would be open to dredging from July 1 through September 30 (Class F). This restriction would not limit potential impacts during the species' nesting season. The level of activity anticipated to occur in breeding habitat on the Sacramento River is not anticipated to result in a significant impact. The level of activity anticipated to occur in breeding habitat on the South Fork Kern River is not known. Therefore, the impact remains potentially significant.

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
						potentially cause nesting failure (See Impact BIO-WILD-2). If disturbance caused by suction dredging or ancillary activities resulted in nest abandonment and/or failure of the species to successfully reproduce, this would be considered a significant impact.	
little willow flycatcher	*Empidonax traillii brewsteri*	FSC	SE	Mountain meadows and riparian habitats in the Sierra Nevada and Cascades.	Nests near the edges of vegetation clumps and near streams.	**Potentially Significant.** Species' breeding activity in the Sierra Nevada generally extends from late May through August. If left unrestricted, suction dredging or ancillary activities would have the potential to disturb breeding and potentially cause nesting failure (See Impact BIO-WILD-2). If disturbance caused by suction dredging or ancillary activities resulted in nest abandonment and/or	**Potentially Significant.** Under the Proposed Regulations significant portions of the species range would be open to suction dredging during the nesting season. Suction dredging activity may occur in occupied breeding habitat. Therefore, the impact remains potentially significant.
willow flycatcher	*Empidonax traillii*	None	SE	Inhabits extensive thickets of low, dense willows on edge of wet meadows, ponds, or backwaters; 2000-8000 ft elevation.	Requires dense willow thickets for nesting/roosting. Low, exposed branches are used for singing posts/hunting perches.		

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
						failure of the species to successfully reproduce, this would be considered a significant impact.	
Swainson's hawk	*Buteo swainsoni*	None	ST	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands with groves or lines of trees.	Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Potentially Significant.** Species breeding activity generally extends from April through July. If left unrestricted, suction dredging or ancillary activities would have the potential to disturb breeding and potentially cause nesting failure (See Impact BIO-WILD-3). If disturbance caused by suction dredging or ancillary activities resulted in nest abandonment and/or failure of the species to successfully reproduce, this would be considered a significant impact.	**Less than Significant.** In California 95% of Swainson's Hawks are in the Central Valley (CDFG, 2005)[4] and about 85% of Swainson's Hawks nests in the Central Valley are within riparian forest or remnant riparian trees (Woodbridge, 1998)[5]. The vast majority of nesting occurs from Tehama County south to Tulare and Kings Counties. The greatest density of nests occur in Contra Costa, Colusa, Sacramento, San Joaquin, Solano, Sutter, Yolo counties and portions of northeastern Siskiyou county (CDFG, 2005)[4]. Nearly all nesting habitat would be closed to suction dredging through June or July (Class C or F). In the Central Valley, young have fledged by mid-June and are relatively safe without parental protection (CDFG, 2000)[6]; nest failure would be unlikely. Furthermore, dredging activity

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
							in the Central Valley and other portions of the species breeding range is not anticipated to be common or widespread. Therefore, impacts are likely to be less than significant.
bank swallow	*Riparia riparia*	None	ST	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**Potentially Significant.** Species nests in streambanks. Breeds from early May through July, with peak activity from mid-May to mid-June (Garrison, 1999)[7]. If left unrestricted, suction dredging would have the potential to disturb/destroy nests by dredging into streambanks. This would cause loss of suitable or occupied habitat which may be potentially significant. If disturbance caused by suction dredging or ancillary activities resulted in nest abandonment and/or failure of the species to successfully reproduce, this would be	**Less than Significant.** Major breeding is confined to the Sacramento and Feather rivers and their major tributaries north of their confluence. Other relatively large breeding populations of several colonies occur in: (1) Scott River, Siskiyou County; (2) Cache Creek, Yolo County; (3) Pit River, Shasta and Lassen counties; (4) American River, Sacramento County; (5) Cosumnes River, Sacramento County; (6) Salinas River, Monterey County; (7) Fall River, Shasta County; (8) Hat Creek and Lake Briton area, Shasta County; (9) Susan River and Baxter Creek, Lassen County; (10) Tule and Lower Klamath Lake area, Siskiyou and Modoc counties; (11) Clear Lake Reservoir, Modoc County; (12) Indian Creek, Plumas County; (13) Long Valley Creek, Lassen

TABLE 4.3-3. NON-*FISH* ANIMAL SPECIES WITH POTENTIALLY SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat	Potential for Significant Impact prior to Program Regulations	Level of Significance with Proposed Regulations
						considered a significant impact.	County; and (14) Bishop area, Inyo County (Garrison, 1998)[8]. Much of the species nesting habitat, including the mainstem Sacramento and Feather Rivers, would be closed to dredging during the peak nesting season. Proposed regulations which prohibit dredging within 3 feet of a streambank would further minimize the potential for disturbance/destruction of nests. Residual impacts from ancillary activities such as access/egress to and from streams and camping are not likely to cause significant impacts to species.

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FSC	*Federal species of concern (per NOAA or USFWS website)*
SCE	*State candidate: endangered*
SE	*State endangered*
SSC	*State species of special concern*
ST	*State threatened*

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TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Amphibians					
Couch's spadefoot	*Scaphiopus couchii*	None	SSC	Temporary desert rainpools that last a least 7 days, with water temps > 15 C & with subterranean refuge sites close by.	An insect food base especially termites must be available.
Birds					
Cooper's hawk	*Accipiter cooperii*	None	WL	Woodland, chiefly of open, interrupted or marginal type.	Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.
northern goshawk	*Accipiter gentilis*	None	SSC	Within, and in vicinity of, coniferous forest. Uses old nests, and maintains alternate sites.	Usually nests on north slopes, near water. Red fir, lodgepole pine, Jeffrey pine, and aspens are typical nest trees.
sharp-shinned hawk	*Accipiter striatus*	None	WL	Ponderosa pine, black oak, riparian deciduous, mixed conifer & Jeffrey pine habitats. Prefers riparian areas.	North-facing slopes, with plucking perches are critical requirements. Nests usually within 275 ft of water.
tricolored blackbird	*Agelaius tricolor*	None	SSC	Highly colonial species, most numberous in Central Valley & vicinity. Largely endemic to California.	Requires open water, protected nesting substrate, & foraging area with insect prey within a few km of the colony.
southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	None	WL	Resident in Southern California coastal sage scrub and sparse mixed chaparral.	Frequents relatively steep, often rocky hillsides with grass & forb patches.
grasshopper sparrow	*Ammodramus savannarum*	None	SSC	Dense grasslands on rolling hills, lowland plains, in valleys & on hillsides on lower mountain slopes.	Favors native grasslands with a mix of grasses, forbs & scattered shrubs. Loosely colonial when nesting.
Bell's sage sparrow	*Amphispiza belli belli*	None	WL	Nests in chaparral dominated by fairly dense stands of chamise.	Nest located on the ground beneath a shrub or in a shrub 6-18 inches

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				Found in coastal sage scrub in south of range.	above ground. Territories about 50 yds apart.
golden eagle	*Aquila chrysaetos*	None	WL, FP	Rolling foothills, mountain areas, sage-juniper flats, & desert.	Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.
great egret	*Ardea alba*	None	None	Colonial nester in large trees.	Rookery sites located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.
great blue heron	*Ardea herodias*	None	None	Colonial nester in tall trees, cliffsides, and sequestered spots on marshes.	Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.
short-eared owl	*Asio flammeus*	None	SSC	Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields.	Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.
long-eared owl	*Asio otus*	None	SSC	Riparian bottomlands grown to tall willows & cottonwoods; also, belts of live oak paralleling stream courses.	Require adjacent open land productive of mice and the presence of old nests of crows, hawks, or magpies for breeding.
burrowing owl	*Athene cunicularia*	None	SSC	Open, dry annual or perenial grasslands, deserts & scrublands characterized by low-growing vegetation.	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.
ruffed grouse	*Bonasa umbellus*	None	WL	Extreme northern humid coastal strip, in Del Norte, Humboldt, and Siskiyou Counties.	Inhabits dense canyon-bottom or stream-side growths, usually of mixed deciduous and coniferous trees.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
marbled murrelet	*Brachyramphus marmoratus*	FT	SE	Feeds near-shore; nests inland along coast from Eureka to Oregon border & from Half Moon Bay to Santa Cruz.	Nests in old-growth redwood-dominated forests, up to six miles inland, often in Douglas-fir.
cackling (=Aleutian Canada) goose	*Branta hutchinsii leucopareia*	Delisted	None	Winters on lakes and inland prairies.	Forages on natural pasture or that cultivated to grain; loafs on lakes, reservoirs, ponds.
ferruginous hawk	*Buteo regalis*	None	WL	Open grasslands, sagebrush flats, desert scrub, low foothills & fringes of pinyon-juniper habitats.	Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.
Costa's hummingbird	*Calypte costae*	None	None	Desert riparian, desert and arid scrub foothill habitats.	
coastal cactus wren	*Campylorhynchus brunneicapillus sandiegensis*	None	SSC	Southern California coastal sage scrub.	Wrens require tall opuntia cactus for nesting and roosting.
northern cardinal	*Cardinalis cardinalis*	None	WL	Extremely rare resident along the Colorado River.	Dense brushy river bottom thickets, well-vegetated dry washes & dense desert scrub.
greater sage-grouse	*Centrocercus urophasianus*	None	SSC	Found in the northeastern, Great Basin portion of state.	Restricted to flat/rolling terrain vegetated by sage-brush, upon which it depends for both food and shelter.
rhinoceros auklet	*Cerorhinca monocerata*	None	WL	Off-shore islands and rocks along the California coast.	Nests in a burrow on undisturbed, forested and unforested islands, and probably in cliff caves on the mainland.
western snowy plover	*Charadrius alexandrinus nivosus*	FT	SSC	Sandy beaches, salt pond levees & shores of large alkali lakes.	Needs sandy, gravelly or friable soils for nesting.
mountain plover	*Charadrius montanus*	Proposed FT	SSC	Short grasslands, freshly plowed fields, newly sprouting grain fields, &	Short vegetation, bare ground & flat topography. Prefers grazed areas &

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				sometimes sod farms	areas with burrowing rodents.
northern harrier	*Circus cyaneus*	None	SSC	Coastal salt & fresh-water marsh. Nest & forage in grasslands, from salt grass in desert sink to mountain cienagas.	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.
gilded flicker	*Colaptes chrysoides*	None	SE	Sonoran desert habitat and riparian woodlands along the Colorado River.	Uses willows, cottonwood, tree yucca and, when available, saguaro cactus.
yellow rail	*Coturnicops noveboracensis*	None	SSC	Summer resident in eastern Sierra Nevada in Mono County.	Fresh-water marshlands.
black swift	*Cypseloides niger*	None	SSC	Coastal belt of Santa Cruz & Monterey Co; central & southern Sierra Nevada; San Bernardino & San Jacinto Mountains.	Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above the surf; forages widely.
fulvous whistling-duck	*Dendrocygna bicolor*	None	SSC	Fresh-water marsh.	Tule/cattail marsh.
yellow warbler	*Dendroica petechia brewsteri*	None	SSC	Riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores, & alders for nesting & foraging.	Also nests in montane shrubbery in open conifer forests.
Sonoran yellow warbler	*Dendroica petechia sonorana*	None	SSC	Summer resident of Colorado River Valley, in riparian deciduous habitat. Below 600 ft elevation.	Inhabits cottonwoods and willows, particularly the crown foliage; nests in understory, usually 2-16 ft above ground.
snowy egret	*Egretta thula*	None	None	Colonial nester, with nest sites situated in protected beds of dense tules.	Rookery sites situated close to foraging areas: marshes, tidal-flats, streams, wet meadows, and borders of lakes.
white-tailed kite	*Elanus leucurus*	None	FP	Rolling foothills and valley margins with scattered oaks & river	Open grasslands, meadows, or marshes for foraging close to

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				bottomlands or marshes next to deciduous woodland.	isolated, dense-topped trees for nesting and perching.
California horned lark	*Eremophila alpestris actia*	None	WL	Coastal regions, chiefly from Sonoma Co. to San Diego Co. Also main part of San Joaquin Valley & east to foothills.	Short-grass prairie, "bald" hills, mountain meadows, open coastal plains, fallow grain fields, alkali flats.
merlin	*Falco columbarius*	None	WL	Seacoast, tidal estuaries, open woodlands, savannahs, edges of grasslands & deserts, farms & ranches.	Clumps of trees or windbreaks are required for roosting in open country.
prairie falcon	*Falco mexicanus*	None	WL	Inhabits dry, open terrain, either level or hilly.	Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores.
American peregrine falcon	*Falco peregrinus anatum*	Delisted	Delisted, FP	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Nest consists of a scrape or a depression or ledge in an open site.
tufted puffin	*Fratercula cirrhata*	None	SSC	Open-ocean bird; nests along the coast on islands, islets, or (rarely) mainland cliffs.	Requires sod or earth into which the birds can burrow, on island cliffs or grassy island slopes.
gull-billed tern	*Gelochelidon nilotica*	None	SSC	Only known breeding colonies in Imperial & Riverside Counties.	Nests on low, sandy islets. Known to feed on fishes at mouth of Colorado River and on grasshoppers in alfalfa fields.
saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	None	SSC	Resident of the San Francisco Bay region, in fresh and salt water marshes.	Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.
lesser sandhill crane	*Grus canadensis canadensis*	None	SSC		

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
greater sandhill crane	*Grus canadensis tabida*	None	ST, FP	Nests in wetland habitats in northeastern California; winters in the Central Valley.	Prefers grain fields within 4 mi of a shallow body of water used as a communal roost site; irrigated pasture used as loafing sites
California condor	*Gymnogyps californianus*	FE	SE	Require vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude.	Deep canyons containing clefts in the rocky walls provide nesting sites. forages up to 100 miles from roost/nest.
bald eagle	*Haliaeetus leucocephalus*	Delisted	SE, FP	Ocean shore, lake margins, & rivers for both nesting & wintering. Most nests within 1 mi of water.	Nests in large, old-growth, or dominant live tree w/open branches, especially ponderosa pine. Roosts communally in winter.
harlequin duck	*Histrionicus histrionicus*	None	SSC	Breeds on west slope of the Sierra Nevada, nesting along shores of swift, shallow rivers.	Nest often built in a recess, sheltered overhead by stream bank, rocks, woody debris, usually within 7 ft of water.
Caspian tern	*Hydroprogne caspia*	None	None	Nests on sandy or gravely beaches and shell banks in small colonies inland and along the coast.	Inland fresh-water lakes and marshes; also, brackish or salt waters of estuaries and bays.
yellow-breasted chat	*Icteria virens*	None	SSC	Summer resident; inhabits riparian thickets of willow & other brushy tangles near watercourses.	Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 ft of ground.
least bittern	*Ixobrychus exilis*	None	SSC	Colonial nester in marshlands and borders of ponds and reservoirs which provide ample cover.	Nests usually placed low in tules, over water.
gray-headed junco	*Junco hyemalis caniceps*	None	WL	Summer resident of Clark Mountain (eastern San Bernardino County) & Grapevine Mtns (Inyo County).	Inhabits white fir association at 7300 ft (Clark Mountain); also, from dense pinyons above 6700 ft (Grapevine

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					Mountains).
loggerhead shrike	*Lanius ludovicianus*	None	SSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, & riparian woodlands, desert oases, scrub & washes.	Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.
California gull	*Larus californicus*	None	WL	Littoral waters, sandy beaches, waters & shorelines of bays, tidal mud-flats, marshes, lakes, etc.	Colonial nester on islets in large interior lakes, either fresh or strongly alkaline.
California black rail	*Laterallus jamaicensis coturniculus*	None	ST	Inhabits freshwater martshes, wet meadows & shallow margins of saltwater marshes bordering larger bays.	Needs water depths of about 1 inch that does not fluctuate during the year & dense vegetation for nesting habitat.
Gila woodpecker	*Melanerpes uropygialis*	None	SE	In California, inhabits cottonwoods and other desert riparian trees, shade trees, and date palms.	Cavity nester in riparian trees or saguaro cactus.
Suisun song sparrow	*Melospiza melodia maxillaris*	None	SSC	Resident of brackish-water marshes surrounding Suisun Bay.	Inhabits cattails, tules and other sedges, and Salicornia; also known to frequent tangles bordering sloughs.
Alameda song sparrow	*Melospiza melodia pusillula*	None	SSC	Resident of salt marshes bordering south arm of San Francisco Bay.	Inhabits Salicornia marshes; nests low in Grindelia bushes (high enough to escape high tides) and in Salicornia.
San Pablo song sparrow	*Melospiza melodia samuelis*	None	SSC	Resident of salt marshes along the north side of San Francisco and San Pablo bays.	Inhabits tidal sloughs in the Salicornia marshes; nests in Grindelia bordering slough channels.
wood stork	*Mycteria americana*	None	SSC	Freshwater and saltwater sloughs, lagoons, shallow ponds and marshes.	
brown-crested flycatcher	*Myiarchus tyrannulus*	None	WL	Inhabits desert riparian along Colorado River, as well as other	Requires riparian thickets, trees, snags, and shrubs for foraging

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				desert oases & riparian area NW to Victorville.	perches, nesting cavities, and cover.
black-crowned night heron	*Nycticorax nycticorax*	None	None	Colonial nester, usually in trees, occasionally in tule patches.	Rookery sites located adjacent to foraging areas: lake margins, mud-bordered bays, marshy spots.
fork-tailed storm-petrel	*Oceanodroma furcata*	None	SSC	Colonial nester on small, offshore islets. Forages over the open ocean, usually well off-shore.	Birds choose off-shore islets which provide nesting crannies beneath rocks or sod for burrowing.
ashy storm-petrel	*Oceanodroma homochroa*	None	SSC	Colonial nester on off-shore islands. Usually nests on driest part of islands. Forages over open ocean.	Nest sites on islands are in crevices beneath loosely piled rocks or driftwood, or in caves.
osprey	*Pandion haliaetus*	None	WL	Ocean shore, bays, fresh-water lakes, and larger streams.	Large nests built in tree-tops within 15 miles of a good fish-producing body of water.
Harris' hawk	*Parabuteo unicinctus*	None	WL	Was in lower Colorado River & Imperial Valley in riparian forests of cottonwoods near mesquite thickets.	Deciduous woods and adjacent open ground, of river or delta bottomlands.
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	None	SE	Inhabits coastal salt marshes, from Santa Barbara south through San Diego County.	Nests in Salicornia on and about margins of tidal flats.
large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	None	SSC	Breeds along the Colorado River delta in Mexico; winters at the Salton Sea.	Saline emergent wetlands at the Salton Sea and southern coast.
American white pelican	*Pelecanus erythrorhynchos*	None	SSC	Colonial nester on large interior lakes.	Nests on large lakes, providing safe roosting and breeding places in the form of well-sequestered islets.
California brown pelican	*Pelecanus occidentalis californicus*	Delisted	Delisted, FP	Colonial nester on coastal islands just outside the surf line.	Nests on coastal islands of small to moderate size which afford immunity from attack by ground-dwelling

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					predators. Roosts communally.
double-crested cormorant	*Phalacrocorax auritus*	None	None	Colonial nester on coastal cliffs, offshore islands, & along lake margins in the interior of the state.	Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.
hepatic tanager	*Piranga flava*	None	WL	White fir-pinyon forest on desert peaks, 5300-8100 ft elev. Understory of xerophytic shrubs.	
summer tanager	*Piranga rubra*	None	SSC	Summer resident of desert riparian along lower Colorado River, & locally elsewhere in California deserts.	Requires cottonwood-willow riparian for nesting and foraging; prefers older, dense stands along streams.
white-faced ibis	*Plegadis chihi*	None	WL	Shallow fresh-water marsh.	Dense tule thickets for nesting interspersed with areas of shallow water for foraging.
black-capped chickadee	*Poecile atricapillus*	None	WL	Inhabits riparian woodlands in Del Norte and northern Humboldt Counties.	Mainly found in deciduous tree-types, especially willows and alders, along large or small watercourses.
coastal California gnatcatcher	*Polioptila californica californica*	FT	SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California.	Low, coastal sage scrub in arid washes, on mesas & slopes. Not all areas classified as coastal sage scrub are occupied.
black-tailed gnatcatcher	*Polioptila melanura*	None	None	Primarily inhabits wooded desert wash habitats; also occurs in desert scrub habitat, especially in winter.	Nests in desert washes containing mesquite, paloverde, ironwood, acacia; absent from areas where salt cedar introduced.
mardon skipper	*Polites mardon*	FC	None	Known from western Washington State and extreme northwestern Del Norte Co.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
purple martin	*Progne subis*	None	SSC	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, & Monterey pine.	Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag.
vermilion flycatcher	*Pyrocephalus rubinus*	None	SSC	During nesting, inhabits desert riparian adjacent to irrigated fields, irrigation ditches, pastures, & other open, mesic areas	Nest in cottonwood, willow, mesquite, and other large desert riparian trees.
light-footed clapper rail	*Rallus longirostris levipes*	FE	SE, FP	Found in salt marshes traversed by tidal sloughs, where cordgrass and pickleweed are the dominant vegetation.	Requires dense growth of either pickleweed or cordgrass for nesting or escape cover; feeds on molluscs and crustaceans.
California clapper rail	*Rallus longirostris obsoletus*	FE	SE, FP	Salt-water & brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay.	Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.
Yuma clapper rail	*Rallus longirostris yumanensis*	FE	ST, FP	Nests in fresh-water marshes along the Colorado River and along the south and east ends of the Salton Sea.	Prefers stands of cattails and tules dissected by narrow channels of flowing water; principle food is crayfish.
black skimmer	*Rynchops niger*	None	SSC	Nests on gravel bars, low islets, and sandy beaches, in unvegetated sites. Nesting colonies usually less than 200 pairs.	
Brewer's sparrow	*Spizella breweri*	None	None	East of Cascade-Sierra Nevada crest, mountains & high valleys of Mojave Desert & mountains at south end of San Joaquin Valley	For nesting they prefer high sagebrush plains, slopes & valley with Great Basin sagebrush & antelope brush.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
California least tern	*Sternula antillarum browni*	FE	SE, FP	Nests along the coast from San Francisco Bay south to northern Baja California.	Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, land fills, or paved areas.
great gray owl	*Strix nebulosa*	None	SE	Resident of mixed conifer or red fir forest habitat, in or on edge of meadows.	Requires large diameter snags in a forest with high canopy closure, which provide a cool sub-canopy microclimate.
Bendire's thrasher	*Toxostoma bendirei*	None	SSC	Migratory; local spring/summer resident in flat areas of desert succulent shrub/Joshua tree habitats in Mojave Desert.	Nests in cholla, yucca, paloverde, thorny shrub, or small tree, usually 0.5 to 20 feet above ground.
Crissal thrasher	*Toxostoma crissale*	None	SSC	Resident of southeastern deserts in desert riparian and desert wash habitats.	Nests in dense vegetation along streams/washes; mesquite, screwbean mesquite, ironwood, catclaw, acacia, arrowweed, and willow.
Le Conte's thrasher	*Toxostoma lecontei*	None	SSC	Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats.	Commonly nests in a dense, spiny shrub or densely branched cactus in desert wash habitat, usually 2-8 feet above ground.
Lucy's warbler	*Vermivora luciae*	None	SSC	Lower Colorado River Valley & the washes & arroyos emptying into it.	Partial to thickets of mesquite, riparian scrub & even stands of tamarisk.
Virginia's warbler	*Vermivora virginiae*	None	WL	East slope of Southern Sierra Nevada, in arid, shrubby, mixed-conifer, pinyon-juniper, montane-chaparral. 7000-9000 ft	Nests on arid slopes w/ stands of tall shrubs/scattered trees; also, riparian thickets of willow/wild rose along streams.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Arizona bell's vireo	*Vireo bellii arizonae*	None	SE	Summer resident along Colorado River. Chiefly inhabits willow thickets with undergrowth of Baccharis glutinosa	Nests in willow, mesquite, or other small tree/shrub, within 8 ft (usually 2-3 ft) of ground.
gray vireo	*Vireo vicinior*	None	SSC	Dry chaparral; west of desert, in chamise-dominated habitat; mountains of Mojave Desert, associated with juniper & Artemisia.	Forage, nest, and sing in areas formed by a continuous growth of twigs, 1-5 ft above ground.
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	None	SSC	Nests in freshwater emergent wetlands with dense vegetation & deep water. Often along borders of lakes or ponds.	Nests only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.
Invertebrates					
Oso Flaco robber fly	*Ablautus schlingeri*	None	None	Sand dunes.	
Opler's longhorn moth	*Adela oplerella*	None	None	From Marin County & the Oakland area on the inner coast ranges south to Santa Clara County. One record from Santa Cruz County.	All but Santa Cruz site is on serpentine grassland. Larve feed on Platystemon californicus.
Ciervo aegilian scarab beetle	*Aegialia concinna*	None	None	Known only from Fresno County in sandy substrates.	
Death Valley agabus diving beetle	*Agabus rumppi*	None	None	Known only from Carson Slough which drains Ash Meadows; 2200 ft elevation.	Appears to inhabit either the very edges or the extreme depths.
Kelso jerusalem cricket	*Ammopelmatus kelsoensis*	None	None	Inhabits a limited area of the Kelso Dunes (type locality), San Bernardino County.	Found at the north base of a sand declivity, 15-25 ft high; assoc plants: sandpaper weed, croton, sand dune grass.
Andrena macswaini	*An andrenid bee*	None	None	This bee is oligolectic on morning-opening, yellow-flowered spp of	Nests in deep, sandy soil; the only species in the subgenus Diandrena

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				Camissonia.	with aggregated nests associated with depressions.
Blennosperma vernal pool andrenid bee	*Andrena blennospermatis*	None	None	This bee is oligolectic on vernal pool blennosperma.	Bees nest in the uplands around vernal pools.
A vernal pool andrenid bee	*Andrena subapasta*	None	None	Collects pollen primarily from Arenaria californica but also Orthocarpus erianthus & Lasthenia sp.	Nests in uplands near vernal pools.
Carlson's dune beetle	*Anomala carlsoni*	None	None	Known primarily from creosote scrub in vicinity of Algodones Dunes, Imperial County. Also taken from Borrego, San Diego County.	Host preferences unknown.
Antioch Dunes anthicid beetle	*Anthicus antiochensis*	None	None	Extirpated from Antioch Dunes but present in several localities along the Sacramento and Feather rivers.	
Sacramento anthicid beetle	*Anthicus sacramento*	None	None	Restricted to sand dune areas.	Inhabit sand slipfaces among bamboo and willow but may not depend on presence of these plant species.
Grubbs' Cave pseudoscorpion	*Aphrastochthonius grubbsi*	None	None		
Lange's metalmark butterfly	*Apodemia mormo langei*	FE	None	Inhabits stabilized dunes along the San Joaquin River. Endemic to Antioch Dunes, Contra Costa County.	Primary host plant is Eriogonum nudum var auriculatum; feeds on nectar of other wildflowers, as well as host plant.
Oso Flaco flightless moth	*Areniscythris brachypteris*	None	None	Open, coastal sand dune slopes in San Luis Obispo County.	Larvae live in tubes attached to buried, green parts of plants at the margin of the active, moving sand

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					dunes.
Wawona riffle beetle	*Atractelmis wawona*	None	None	Aquatic; found in riffles of rapid, small to medium clear mountain streams; 2000-5000 ft elevation.	Strong preferce for inhabiting submerged aquatic mosses.
Galile's cave harvestman	*Banksula galilei*	None	None	Known only from the type locality, lime rock caves, El Dorado County.	Species is troglobitic.
Grubbs' cave harvestman	*Banksula grubbsi*	None	None	Known only from the type locality, Black Chasm Cave, Volcano, Amador County.	Species is troglobitic.
Martins' cave harvestman	*Banksula martinorum*	None	None	Known only from the type locality, Heater Cave, 8 km north of Columbia.	Species is troglobitic.
Melones Cave harvestman	*Banksula melones*	None	None	Limestone caves in the vicinity of New Melones Reservoir on the Stanislaus River, Calaveras/Tuolumne Counties.	Cave temps range from 14-16 degrees C; humidity, from 82-97%. Found under rocks or wandering on floor or walls.
Rudolph's cave harvestman	*Banksula rudolphi*	None	None	Known only from the type locality, Chrome Cave, Pardee Reservoir, Amador County.	Species is troglobitic.
Tuolumne cave harvestman	*Banksula tuolumne*	None	None	Known only from the type locality, Tuolumne Crystal Cave, Tuolumne, Tuolumne County.	Species is troglobitic.
King Tut Cave harvestman	*Banksula tutankhamen*	None	None	Known only from the type locality, King Tut Cave, Calaveras County.	Species is troglobitic.
Saratoga Springs belostoman bug	*Belostoma saratogae*	None	None	Known only from Saratoga Spring in Death Valley, San Bernardino County.	Inhabits the hot spring pool and inlet/outlet channels; have been collected year-round.
Belkin's dune tabanid fly	*Brennania belkini*	None	None	Inhabits coastal sand dunes of Southern California.	

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Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
San Benito harvestman	*Calicina arida*	None	None	Known only from the type locality, Panoche Road, San Benito County.	Found on serpentine rocks.
Stanislaus harvestman	*Calicina breva*	None	None	Known only from the type locality, 1.6 km south of Knight's Ferry, Stanislaus County.	Found under basalt rocks in grassland.
Clough Cave harvestman	*Calicina cloughensis*	None	None	Known only from the type locality, Clough Cave.	
Crane Flat harvestman	*Calicina conifera*	None	None	Known only from Crane Flat Junction, Tuolumne County. Known only from the holotype male and two female paratypes.	Found under fallen bark in a mixed coniferous forest.
marbled harvestman	*Calicina macula*	None	None	Known only from the type locality, 14.5 km (9 miles) SE of Academy, Fresno County. Known only from the type series.	Serpentine endemic.
Table Mountain harvestman	*Calicina mesaensis*	None	None	Known only from the type locality, Table Mountain, Fresno County. Known only from the type series.	
Edgewood blind harvestman	*Calicina minor*	None	None	Open grassland in areas of serpentine bedrock.	Found on the underside of moist serpentine rocks near permanent springs.
Piedra harvestman	*Calicina piedra*	None	None	Known only from the type locality, 2.6 km SW of Piedra, Fresno County. Known only from the type series.	Found under unspecified type of rocks.
Briggs' leptonetid spider	*Calileptoneta briggsi*	None	None	Known only from the type locality, Indian Valley Creek Cave, and nearby Butter Creek Cave, Trinity County.	Troglobitic species.
Ubick's leptonetid spider	*Calileptoneta ubicki*	None	None	Known only from the type locality, Arroyo Seco, Monterey County.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Mendocino leptonetid spider	*Calileptoneta wapiti*	None	None	Known only from the type locality, Elk, and nearby sites in Mendocino County.	
San Bruno elfin butterfly	*Callophrys mossii bayensis*	FE	None	Coastal, mountainous areas with grassy ground cover, mainly in the vicinity of San Bruno Mountain, San Mateo County.	Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is Sedum spathulifolium.
Marin elfin butterfly	*Callophrys mossii marinensis*	None	None	Found only in the redwood forest areas of Marin County.	Larvae collected and reared on Sedum spathulifolium
Thorne's hairstreak	*Callophrys thornei*	None	None	Associated with the endemic tecate cypress (Cupressus forbesii).	Only known from vicinity of Otay Mountain.
Lake Tahoe benthic stonefly	*Capnia lacustra*	None	None	Endemic to Lake Tahoe. Found at depths of 95-400 ft.	Associated with deepwater plant communities of algae, mosses & liverworts.
Sonoma arctic skipper	*Carterocephalus palaemon magnus*	None	None	Redwood forest.	Most specimens collected in deep shade or at the edge of forested clearings.
Bradley's cuckoo wasp	*Ceratochrysis bradleyi*	None	None		
Piute Mountains cuckoo wasp	*Ceratochrysis gracilis*	None	None	Known only from the holotype female.	
A cuckoo wasp	*Ceratochrysis longimala*	None	None		
Menke's cuckoo wasp	*Ceratochrysis menkei*	None	None		
Leech's chaetarthrian water scavenger beetle	*Chaetarthria leechi*	None	None	Aquatic; known only from Hayfork Creek, Trinity County.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Oso Flaco patch butterfly	*Chlosyne leanira elegans*	None	None	Sand dune habitat around Oso Flaco Lake, San Luis Obispo County.	Distribution corresponds to its foodplant, Castilleja affinis.
Tulare cuckoo wasp	*Chrysis tularensis*	None	None		
western tidal-flat tiger beetle	*Cicindela gabbii*	None	None	Inhabits estuaries and mudflats along the coast of Southern California.	Generally found on dark-colored mud in the lower zone; occasionally found on dry saline flats of estuaries.
sandy beach tiger beetle	*Cicindela hirticollis gravida*	None	None	Inhabits areas adjacent to non-brackish water along the coast of California from San Francisco Bay to northern Mexico.	Clean, dry, light-colored sand in the upper zone. Subterranean larvae prefer moist sand not affected by wave action.
western beach tiger beetle	*Cicindela latesignata latesignata*	None	None	Mudflats and beaches in coastal Southern California.	
Ohlone tiger beetle	*Cicindela ohlone*	FE	None	Remnant native grasslands with California oatgrass & purple needlegrass in Santa Cruz County.	Substrate is poorly-drained clay or sandy clay soil over bedrock of Santa Cruz mudstone.
senile tiger beetle	*Cicindela senilis frosti*	None	None	Inhabits marine shoreline, from Central California coast south to salt marshes of San Diego. Also found at Lake Elsinore.	Inhabits dark-colored mud in the lower zone and dried salt pans in the upper zone.
San Joaquin tiger beetle	*Cicindela tranquebarica ssp.*	None	None	Known only from Tulare and Kings Counties.	
greenest tiger beetle	*Cicindela tranquebarica viridissima*	None	None	Inhabits the woodlands adjacent to the Santa Ana River basin.	Usually found in open spots between trees.
globose dune beetle	*Coelus globosus*	None	None	Inhabitant of coastal sand dune habitat, from Bodega Head in Sonoma County south to Ensenada, Mexico.	Inhabits foredunes and sand hummocks; it burrows beneath the sand surface and is most common beneath dune vegetation.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
San Joaquin dune beetle	*Coelus gracilis*	None	None	Inhabits fossil dunes along the western edge of San Joaquin Valley; extirpated from Antioch Dunes (type locality).	Inhabits sites containing sandy substrates.
Yontocket satyr	*Coenonympha tullia yontockett*	None	None	Coastal dunes north of Crescent City in Del Norte County.	Grassy areas among dunes with coniferous lee slopes & grassy exposed slopes, also dunes around sphagnum bogs.
Cosumnes spring stonefly	*Cosumnoperla hypocrena*	None	None	Known only an intermittent tributary of the Cosumnes River in El Dorado County.	
Denning's cryptic caddisfly	*Cryptochia denningi*	None	None	Larvae found in small, cool streams.	
Kings Canyon cryptochian caddisfly	*Cryptochia excella*	None	None	Narrowly distributed in cold springs in the Sierra Nevada.	Restricted to spring stream and source.
confusion caddisfly	*Cryptochia shasta*	None	None	Creeks.	
monarch butterfly	*Danaus plexippus*	None	None	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico.	Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.
amphibious caddisfly	*Desmona bethula*	None	None	Mostly small first order streams in open, wet meadows. Also found in beaver ponds & second order streams.	Final instar larvae leave the water at night to feed on riparian vegetation & return to water at sunrise.
Casey's June beetle	*Dinacoma caseyi*	Proposed FE	None	Found only in two populations in a small area of southern Palm Springs.	Found in sandy soils; the females live underground and only come to the ground surface to mate.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
California diplectronan caddisfly	*Diplectrona californica*	None	None		
brownish dubiraphian riffle beetle	*Dubiraphia brunnescens*	None	None	Aquatic; known only from the NE shore of Clear Lake, Lake County.	Inhabits exposed, wave-washed willow roots.
Giuliani's dubiraphian riffle beetle	*Dubiraphia giulianii*	None	None	Aquatic; found in the slow part of the Russian River.	Inhabits rocks and vegetation.
Stage's dufourine bee	*Dufourea stagei*	None	None	Species is a ground-nesting bee.	
Kings Creek ecclysomyian caddisfly	*Ecclisomyia bilera*	None	None	Narrowly distributed in springs in the Sierra Nevada & Cascades.	
Antioch efferian robberfly	*Efferia antiochi*	None	None	Known only from Contra Costa and Fresno Counties.	
Delta green ground beetle	*Elaphrus viridis*	FT	None	Restricted to the margins of vernal pools in the grassland area between Jepson Prairie and Travis AFB.	Prefers the sandy mud substrate where it slopes gently into the water, with low-growing vegetation, 25-100% cover.
redheaded sphecid wasp	*Eucerceris ruficeps*	None	None	Central California interior dunes.	Nest in hard-packed sand utilizing abandoned halictine bee burrows.
Andrew's marble butterfly	*Euchloe hyantis andrewsi*	None	None	Inhabits yellow pine forest near Lake Arrowhead and Big Bear Lake, San Bernardino Mountains, San Bernardino County, 5000-6000 ft elevation.	Hostplants are Streptanthus bernardinus & Arabis holboellii var pinetorum; larval foodplant is Descurainia richardsonii.
Henne's eucosman moth	*Eucosma hennei*	None	None	Endemic to the El Segundo Dunes (type locality), Los Angeles County.	Larval foodplant is Phacelia ramosissima var austrolitoralis;

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					larvae can be found on woody stems and upper root parts.
El Segundo blue butterfly	*Euphilotes battoides allyni*	FE	None	Restricted to remnant coastal dune habitat in Southern California.	Hostplant is Eriogonum parvifolium; larvae feed only on the flowers and seeds; used by adults as major nectar source.
Comstock's blue butterfly	*Euphilotes battoides comstocki*	None	None	Hostplant is Eriogonum sp.	
Smith's blue butterfly	*Euphilotes enoptes smithi*	FE	None	Most commonly associated with coastal dunes & coastal sage scrub plant communities in Monterey & Santa Cruz Counties.	Hostplant: Eriogonum latifolium and Eriogonum parvifolium are utilized as both larval and adult foodplants.
Bay checkerspot butterfly	*Euphydryas editha bayensis*	FT	None	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay.	Plantago erecta is the primary host plant; Orthocarpus densiflorus & O. purpurscens are the secondary host plants.
Mono checkerspot butterfly	*Euphydryas editha monoensis*	None	None		
quino checkerspot butterfly	*Euphydryas editha quino*	FE	None	Sunny openings within chaparral & coastal sage shrublands in parts of Riverside & San Diego Counties.	Hills & mesas near the coast. need high densities of food plants Plantago erecta, P. insularis, Orthocarpus purpurescens
Kern primrose sphinx moth	*Euproserpinus euterpe*	FT	None	Found in the Walker Basin, Kern Co., and several other scattered locations (Carrizo Plain, Pinnacles NM).	Host plant is Camissonia contorta epilobioides (evening primrose).
long-tailed caddisfly	*Farula praelonga*	None	None	Cold water streams fed by springs in the Sierra Nevada.	
Kelso Dunes scarab glaresis beetle	*Glaresis arenata*	None	None	Known only from the Kelso Dunes.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Palos Verdes blue butterfly	*Glaucopsyche lygdamus palosverdesensis*	FE	None	Restricted to the cool, fog-shrouded, seaward side of Palos Verdes Hills, Los Angeles County.	Host plant is Astragalus trichopodus var. lonchus (locoweed).
Sagehen Creek goeracean caddisfly	*Goeracea oregona*	None	None	Found in relatively warm springs. Known from several sites in Nevada County, and perhaps also from Mount Tamalpais in Marin County.	
haromonius halictid bee	*Halictus harmonius*	None	None	Known only from the foothills of the San Bernardino Mts., possibly also the San Jacinto Mts.	
Borax Lake cuckoo wasp	*Hedychridium milleri*	None	None	Endemic to Central California. Only collection is from the type locality.	External parasite of wasp and bee larva.
Morro shoulderband (=banded dune) snail	*Helminthoglypta walkeriana*	FE	None	Restricted to the coastal strand in the immediate vicinity of Morro Bay.	Inhabits the duff beneath Haplopappus, Salvia, Dudleya, and Mesembryanthemum.
White Mountains skipper	*Hesperia miriamae longaevicola*	None	None	Above the timberline (above 10,500 ft elevation) in the White Mountains.	Scree slopes just off of summits & grassy saddles between high ridges & summits. Oviposition on Festuca brachyphylla.
Arroyo Seco short-tailed whipscorpion	*Hubbardia secoensis*	None	None	Known only from the type locality, Arroyo Seco, Monterey County.	
Ricksecker's water scavenger beetle	*Hydrochara rickseckeri*	None	None	Aquatic.	
wooly hydroporus diving beetle	*Hydroporus hirsutus*	None	None	Aquatic.	Known only from Mt. Goethe, Fresno County. Species may be restricted to high elevations.
Leech's skyline diving beetle	*Hydroporus leechi*	None	None	Aquatic.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
simple hydroporus diving beetle	*Hydroporus simplex*	None	None	Known from aquatic habitats in Tuolumne and San Bernardino Counties.	
curved-foot hygrotus diving beetle	*Hygrotus curvipes*	None	None	Aquatic; known only from Alameda & Contra Costa Counties.	
travertine band-thigh diving beetle	*Hygrotus fontinalis*	None	None	Aquatic; occurs in the run-off pools from hot springs in a limestone outcrop.	
Middlekauff's shieldback katydid	*Idiostatus middlekauffi*	None	None	Known only from Antioch Dunes.	
San Francisco forktail damselfly	*Ischnura gemina*	None	None	Endemic to the San Francisco Bay area.	Small, marshy ponds and ditches with emergent and floating aquatic vegetation.
Cold Spring caddisfly	*Lepidostoma ermanae*	None	None	Only known from cold springs in the vicinity of Sagehen Creek.	
Algodones sand jewel beetle	*Lepismadora algodones*	None	None	Found in and along the old canal on W side of Algodones Dunes, Imperial County.	Found on flowers of Tiquilia plicata during the hottest part of the day in June and July.
white sand bear scarab beetle	*Lichnanthe albipilosa*	None	None	Inhabit coastal sand dunes of San Luis Obispo County, in the vicinity of Dune Lakes.	Found hovering close to the surface of the dunes near the lake, but some distance from the surf.
bumblebee scarab beetle	*Lichnanthe ursina*	None	None	Inhabits coastal sand dunes from Sonoma County south to San Mateo County.	Usually flies close to sand surface near the crest of the dunes.
Fort Dick limnephilus caddisfly	*Limnephilus atercus*	None	None	Known only from Fort Dick in Del Norte County.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Hermes copper butterfly	*Lycaena hermes*	None	None	Found in southern mixed chaparral & coastal sage scrub at western edge of Laguna Mountains.	Host plant is Rhamnus crocea. Although R. crocea is widespread throughout the coast range, Lycaena hermes is not.
Hopping's blister beetle	*Lytta hoppingi*	None	None	Inhabits the foothills at the southern end of the Central Valley.	
moestan blister beetle	*Lytta moesta*	None	None	Central California.	
molestan blister beetle	*Lytta molesta*	None	None	Inhabits the Central Valley of California, from Contra Costa to Kern and Tulare Counties.	
Morrison's blister beetle	*Lytta morrisoni*	None	None	Inhabitant of the southern Central Valley of California.	
Kelso giant sand treader cricket	*Macrobaenetes kelsoensis*	None	None	Known only from the Kelso Dunes, San Bernardino County; 2500 ft elevation.	Found on bare, hard-packed sand ridges, 0.5 mile inland from margin.
Coachella giant sand treader cricket	*Macrobaenetes valgum*	None	None	Known from the sand dune ridges in the vicinity of Coachella Valley.	Population size regulated by amount of annual rainfall; some spots favor permanent habitation where springs dampen sand.
Shirttail Creek stonefly	*Megaleuctra sierra*	None	None	Stenothermic and found in spring-like areas.	
A mellitid bee	*Melitta californica*	None	None	Desert regions of SW Arizona, SE California, and Baja California, Mexico. Also collected from Torrey Pines, San Diego County.	Earlier records of M. wilmattae pertain to this species; species was synonymized with M. californica in 1981.
Dolloff Cave spider	*Meta dolloff*	None	None	Known from caves in the Santa Cruz area.	This species is an orb-weaver and occurs from the cave mouth into deep twilight.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Hurd's metapogon robberfly	*Metapogon hurdi*	None	None	Known only from Antioch (Dunes?) and Fresno.	
Hom's micro-blind harvestman	*Microcina homi*	None	None	Known only from Santa Clara County in xeric habitats.	Known only from serpentine rocks in grassland habitats.
Nelson's miloderes weevil	*Miloderes nelsoni*	None	None	Eureka Valley.	
South Forks ground beetle	*Nebria darlingtoni*	None	None	Restricted to the canyon of the South Fork American River.	
Siskiyou ground beetle	*Nebria gebleri siskiyouensis*	None	None	Restricted to the Klamath Mountain system in northwestern California and southwestern Oregon.	
Tinity Alps ground beetle	*Nebria sahlbergii triad*	None	None	Restricted to the Klamath Mountain system of northwestern California. May extend into Oregon.	
golden-horned caddisfly	*Neothremma genella*	None	None	Small streams in the Sierra.	Larger population numbers downstream from the source and in more open areas.
Wilbur Springs minute moss beetle	*Ochthebius recticulus*	None	None	Aquatic; known only from Wilbur Hot Springs area, Colusa County; 1250 ft elevation.	Inhabits the shoreline of the creek at Wilbur Hot Springs.
cheeseweed owlfly (cheeseweed moth lacewing)	*Oliarces clara*	None	None	Inhabits the lower Colorado River drainage.	Found under rocks or in flight over streams. Larrea tridentata is the suspected larval host.
Lange's El Segundo Dune weevil	*Onychobaris langei*	None	None	Known from El Segundo Dunes.	
Pinnacles optioservus riffle beetle	*Optioservus canus*	None	None	Aquatic.	Found on rocks and in gravel of riffles in cool, swift, clear streams.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Dry Creek cliff strider bug	*Oravelia pege*	None	None	Known only from Dry Creek in Fresno County.	Found in cracks & crevices of a sheer rocky cliff moistened by seeping water and under debris at the base of the cliff.
gold rush hanging scorpionfly	*Orobittacus obscurus*	None	None	Known only from a small area on the western slopes of the central Sierra Nevada	Darkly shaded crannies w/ high humidity, i.e. under tree roots, in overhanging banks, below rock outcrops, along streams
wandering (=saltmarsh) skipper	*Panoquina errans*	None	None	Southern California coastal salt marshes.	Requires moist saltgrass for larval development.
Wilber Springs shore fly	*Paracoenia calida*	None	None	Endemic to Wilbur Hot Springs, Colusa County.	Inhabits all but the hottest portion of the hot spring effluent; water temp 20-40 deg C.
A cuckoo bee	*Paranomada californica*	None	None		
Borrego parnopes cuckoo wasp	*Parnopes borregoensis*	None	None		
Amargosa naucorid bug	*Pelocoris shoshone*	None	None	Endemic to the Amargosa River drainage in Death Valley, Inyo County, and San Bernardino County.	
Antioch andrenid bee	*Perdita scitula antiochensis*	None	None	Known only from Antioch Dunes and Oakley.	Visits flowers of Eriogonum, Gutierrezia californica, Heterotheca grandiflora, Lessingia glandulifera.
Antioch sphecid wasp	*Philanthus nasalis*	None	None	Previously known only from Antioch Dunes, in Contra Costa County. Now known only from the inland sandhills in Santa Cruz County.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Boharts' blue butterfly	*Philotiella speciosa bohartorum*	None	None	Known from the foothills of the southern Sierra Nevada, near Briceburg, Mariposa County.	Associated with Chorizanthe membranacea.
White Mountains icarioides blue butterfly	*Plebejus icarioides albihalos*	None	None	Found in the White Mountains of the California-Nevada border.	
Mission blue butterfly	*Plebejus icarioides missionensis*	FE	None	Inhabits grasslands of the San Francisco peninsula.	Three larval host plants: Lupinus albifrons, L. variicolor, and L. formosus, of which L. albifrons is favored.
Morro Bay blue butterfly	*Plebejus icarioides moroensis*	None	None	Inhabits stabilized dunes & adjacent areas of coastal San Luis Obispo & NW Santa Barbara Counties.	Larval foodplant thought to be Lupinus chamissonis.
Point Reyes blue butterfly	*Plebejus icarioides parapheres*	None	None	Confined to the Point Reyes peninsula, from Point Reyes proper north to Tomales Point.	Stabilized sand dunes with the common bush Lupinus arboreus & L. variicolor. L. variicolor is the likely foodplant.
White Mountains saepiolus blue butterfly	*Plebejus saepiolus albomontanus*	None	None	Primarily alpine fell-fields, but also wet meadows and along streams at high elevations (>2800 m) in the White Mountains	Principal hostplant is Trifolium andersonii.
San Gabriel Mountains blue butterfly	*Plebejus saepiolus aureolus*	None	None	Type locality is a wet meadow seep in yellow pine forest.	Foodplant is Trifolium wormskioldii.
San Emigdio blue butterfly	*Plebulina emigdionis*	None	None	Found in desert canyons and along riverbeds on the southernmost edge of the San Joaquin Valley.	Hostplant is Atriplex canescens; maybe Lotus purshianus also.
Mount Hermon (=barbate) June	*Polyphylla barbata*	FE	None	Known only from sand hills in vicinity of Mt. Hermon, Santa Cruz	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
beetle				County.	
Death Valley June beetle	*Polyphylla erratica*	None	None	Halophytic species. Larva, pupae & adults found in moist, salt-encrusted soil in the Amargosa River system.	Larvae taken at roots of Distichlis divaricata.
Atascadero June beetle	*Polyphylla nubila*	None	None	Known only from sand dunes in San Luis Obispo County.	
Wasbauer's protodufourea bee	*Protodufourea wasbaueri*	None	None	Chaparral and desert scrub.	Nests in the ground. Oligolectic on Emmenanthe sp., a plant that blooms in profusion after fires, then declines.
Carson wandering skipper	*Pseudocopaeodes eunus obscurus*	FE	None	Found in grasslands on alkaline substrates in eastern California (around Honey Lake) & western Nevada (Washoe Co.) below 5,000 ft.	The larval host plant is salt grass. Needs open areas near springs or water.
desert monkey grasshopper	*Psychomastax deserticola*	None	None	Occurs in very arid environments in the vicinity of the San Bernardino Mountains.	Known to occur on chamise (Adenostoma fasciculatum).
Laguna Mountains skipper	*Pyrgus ruralis lagunae*	FE	None	Only in a few open meadows in yellow pine forest between 5,000 & 6,000 ft. in the vicinity of Mt Laguna & Palomar Mtn.	Eggs laid on leaves of Horkelia bolanderi clevelandi. Larvae feed on leaves and overwinter on the host plant.
Delhi Sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	FE	None	Found only in areas of the Delhi Sands formation in southwestern San Bernardino & northwestern Riverside Counties.	Requires fine, sandy soils, often with wholly or partly consolidated dunes & sparse vegetation. Oviposition req. shade.
El Segundo flower-loving fly	*Rhaphiomidas terminatus terminatus*	None	None	Presumed extinct but recently discovered on Malaga Dunes, Los Angeles County.	Perched dunes.
Roberts' rhopalolemma bee	*Rhopalolemma robertsi*	None	None	Known only from the type locality 8 km south of Twentynine Palms.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Castle Crags rhyacophilan caddisfly	*Rhyacophila lineata*	None	None	Creeks.	
bilobed rhyacophilan caddisfly	*Rhyacophila mosana*	None	None	Known only from Castle Crags State Park, Shasta County.	
spiny rhyacophilan caddisfly	*Rhyacophila spinata*	None	None	Rhyacophilids generally prefer cool, running water.	
Wilbur Springs shorebug	*Saldula usingeri*	None	None	Requires springs/creeks with high concentrations of Na, Cl, & Li.	Found only on wet substrate of spring outflows.
Gertsch's socalchemmis spider	*Socalchemmis gertschi*	None	None	Known from only 2 localities in Los Angeles County: Brentwood (type locality) and Topanga Canyon.	
Monterey socalchemmis spider	*Socalchemmis monterey*	None	None	Known from only two localities in Monterey County: Los Padres National Forest, Arroyo Seco (type locality), and Cone Peak Trail.	
callippe silverspot butterfly	*Speyeria callippe callippe*	FE	None	Restricted to the northern coastal scrub of the San Francisco peninsula.	Hostplant is Viola pedunculata. Most adults found on E-facing slopes; males congregate on hilltops in search of females.
Carson Valley silverspot	*Speyeria nokomis carsonensis*	None	None	Wet meadows along the eastern base of the Carson Range from southern Washoe County Nevada to northern Alpine County California.	Occurs as isolated colonies.
Behren's silverspot butterfly	*Speyeria zerene behrensii*	FE	None	Restricted to the Pacific side of the Coast Ranges, from Point Arena to Cape Mendocino, Mendocino Co.	Inhabits coastal terrace prairie habitat. Foodplant is Viola sp.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Hippolyta frittilary	*Speyeria zerene hippolyta*	FT	None	Coastal meadows in Del Norte County.	The larvae feed only on the foliage of the western dog violet (Viola adunca).
Myrtle's silverspot	*Speyeria zerene myrtleae*	FE	None	Restricted to the foggy, coastal dunes/hills of the Point Reyes peninsula; extirpated from coastal San Mateo County.	Larval foodplant thought to be Viola adunca.
Antioch Dunes halcitid bee	*Sphecodogastra antiochensis*	None	None	Restricted to Antioch Dunes.	Host plant is Oenothera deltoides howellii. This bee nests in the ground in stabilized sand dunes in open, xeric areas.
Coachella Valley jerusalem cricket	*Stenopelmatus cahuilaensis*	None	None	Inhabits a small segment of the sand and dune areas of the Coachella Valley, in the vicinity of Palm Springs.	Found in the large, undulating dunes piled up at the north base of Mt San Jacinto.
Moody's gnaphosid spider	*Talanites moodyae*	None	None	Serpentine endemic.	
Sierra pygmy grasshopper	*Tetrix sierrana*	None	None	Known only from Madera and Mariposa Counties.	
A leaf-cutter bee	*Trachusa gummifera*	None	None		
serpentine cypress wood-boring beetle	*Trachykele hartmani*	None	None	Larvae develop in Sargent cypress. Restricted to Napa, Colusa, and Lake Counties.	
brown tassel trigonoscuta weevil	*Trigonoscuta brunnotesselata*	None	None	Known only from the Kelso Dunes, San Bernardino County.	
Dorothy's El Segundo Dune weevil	*Trigonoscuta dorothea dorothea*	None	None	Coastal sand dunes in Los Angeles County.	

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Doyen's trigonoscuta dune weevil	*Trigonoscuta sp.*	None	None	Species is restricted to one dune in the Los Medanos area, south of Kettleman Station in Kings County.	Found on an open "slip-face covering about 200 square meters of a modified, vegetated relict dune.
Zayante band-winged grasshopper	*Trimerotropis infantilis*	FE	None	Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem)	Mostly on sand parkland habitat but also in areas with well-developed ground cover & in sparse chaparral with grass.
serpentine cypress long-horned beetle	*Vandykea tuberculata*	None	None	Breeds in shaded-out lower branches of Sargent cypress and perhaps McNab cypress in serpentine soil/cypress habitats.	
Mammals					
Nelson's antelope squirrel	*Ammospermophilus nelsoni*	None	ST	Western San Joaquin Valley from 200-1200 ft elev. On dry, sparsely vegetated loam soils.	Dig burrows or use k-rat burrows. Need widely scattered shrubs, forbs & grasses in broken terrain with gullies & washes
pallid bat	*Antrozous pallidus*	None	SSC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting.	Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.
Sierra Nevada mountain beaver	*Aplodontia rufa californica*	None	SSC	Dense growth of small deciduous trees & shrubs, wet soil, & abundance of forbs in the Sierra Nevada & east slope.	Needs dense understory for food & cover. Burrows into soft soil. Needs abundant supply of water.
Point Arena mountain beaver	*Aplodontia rufa nigra*	FE	SSC	Coastal areas of Point Arena with springs or seepages.	North-facing slopes of ridges & gullies with friable soils & thickets of undergrowth.
Point Reyes mountain beaver	*Aplodontia rufa phaea*	None	SSC	Coastal area of Point Reyes in areas of springs or seepages.	North-facing slopes of hills & gullies in areas overgrown with sword ferns

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					and thimbleberries.
white-footed vole	*Arborimus albipes*	None	SSC	Mature coastal forests in Humboldt & Del Norte cos. Prefers areas near small, clear streams with dense alder & shrubs.	Occupies the habitat from the ground surface to the canopy. Feeds in all layers & nests on the ground under logs or rock.
Sonoma tree vole	*Arborimus pomo*	None	SSC	North coast fog belt from Oregon border to Sonoma County in Douglas fir, redwood & montane hardwood-conifer forests.	Feeds almost exclusively on Douglas fir needles. Will occasionaly take needles of grand fir, hemlock or spruce.
pygmy rabbit	*Brachylagus idahoensis*	None	SSC	Sagebrush, bitterbrush, & pinyon-juniper habitats in Modoc, Lassen & Mono Counties.	Tall dense, large-shrub stages of sagebrush, greasewood & rabbitbrush. May avoid heavily grazed areas.
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	None	SSC	Variety of habitats including coastal scrub, chaparral & grassland in San Diego Co.	Attracted to grass-chaparral edges.
northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	None	SSC	Coastal scrub, chaparral, grasslands, sagebrush, etc. in western San Diego County.	Sandy, herbaceous areas, usually in association with rocks or coarse gravel.
pallid San Diego pocket mouse	*Chaetodipus fallax pallidus*	None	SSC	Desert border areas in eastern San Diego County in desert wash, desert scrub, desert succulent scrub, pinyon-juniper, etc.	Sandy herbaceous areas, usually in association with rocks or coarse gravel.
Mexican long-tongued bat	*Choeronycteris mexicana*	None	SSC	Occasionally found in San Diego Co., which is on the periphery of their range.	Feeds on nectar & pollen of night-blooming succulents. Roosts in relatively well-lit caves, & in & around buildings.
Townsend's big-eared bat	*Corynorhinus townsendii*	None	SSC	Throughout California in a wide variety of habitats. Most common in	Roosts in the open, hanging from walls & ceilings. Roosting sites

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				mesic sites.	limiting. extremely sensitive to human disturbance.
Marysville California kangaroo rat	*Dipodomys californicus eximius*	None	SSC	Known only from the Sutter Buttes area.	Friable soil, grass-forb stages of chaparral.
Berkeley kangaroo rat	*Dipodomys heermanni berkeleyensis*	None	None	Open grassy hilltops & open spaces in chaparral & blue oak/digger pine woodlands.	Needs fine, deep, well-drained soil for burrowing.
Merced kangaroo rat	*Dipodomys heermanni dixoni*	None	None	Grassland and savanna communities in eastern Merced & Stanislaus Counties.	Needs fine, deep, well-drained soil for burrowing. Granivorous, but also eats forbs & green grasses.
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	FE	SE, FP	Coastal sage scrub on the south side of Morro Bay.	Needs sandy soil, but not active dunes, prefers early seral stages.
giant kangaroo rat	*Dipodomys ingens*	FE	SE	Annual grasslands on the western side of the San Joaquin Valley, marginal habitat in alkali scrub.	Need level terrain & sandy loam soils for burrowing.
Earthquake Merriam's kangaroo rat	*Dipodomys merriami collinus*	None	None	Known only from San Diego & Riverside Counties. Associated with riversidean sage scrub, chaparral, & non-native grassland.	Need sandy loam substrates for digging of burrows.
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	FE	SSC	Alluvial scrub vegetation on sandy loam substrates characteristic of alluvial fans and flood plains.	Needs early to intermediate seral stages.
short-nosed kangaroo rat	*Dipodomys nitratoides brevinasus*	None	SSC	Western side of San Joaquin Valley in grassland and desert shrub associations, especially Atriplex.	Occures in highly alkaline soils around Soda Lake. Needs friable soils. Favors flat to gently sloping terrain.
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	FE	SE	Alkali sink-open grassland habitats in western Fresno County.	Bare alkaline clay-based soils subject to seasonal inundation, with more friable soil mounds around shrubs &

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
					grasses.
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE	SE	Saltbrush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley.	Needs soft friable soils which escape seasonal flooding. Digs burrows in elevated soil mounds at bases of shrubs.
Argus Mountains kangaroo rat	*Dipodomys panamintinus argusensis*	None	None	Known only from the Argus Mountain range. Inhabitats creosote scrub, saltbush scrub, & Joshua tree woodland.	Sandy-gravelly soils with an overstory of big sage, pinyon pine, juniper, or yucca.
Panamint kangaroo rat	*Dipodomys panamintinus panamintinus*	None	None	Found only in the Panamint Range between 4,600 and 7,000 ft elevation in arid mountain steppe communities.	Found on coarse-textured soils on sloping ground with an overstory of yucca, pinyon pine, juniper & big sage.
Stephens' kangaroo rat	*Dipodomys stephensi*	FE	ST	Primarily annual & perennial grasslands, but also occurs in coastal scrub & sagebrush with sparse canopy cover.	Prefers buckwheat, chamise, brome grass & filaree. Will burrow into firm soil.
big-eared kangaroo rat	*Dipodomys venustus elephantinus*	None	SSC	Chaparral-covered slopes of the southern part of the Gabilian Range, in the vicinity of the Pinnacles.	Forages under shrubs & in the open. Burrows for cover and for nesting.
Santa Cruz kangaroo rat	*Dipodomys venustus venustus*	None	None	Silverleaf manzanita mixed chaparral in the Zayante Sand Hills ecosystem of the Santa Cruz Mountains.	Needs soft, well-drained sand.
spotted bat	*Euderma maculatum*	None	SSC	Occupies a wide variety of habitats from arid deserts and grasslands through mixed conifer forests.	Feeds over water and along washes. Feeds almost entirely on moths. Needs rock crevices in cliffs or caves for roosting.
western mastiff bat	*Eumops perotis californicus*	None	SSC	Many open, semi-arid to arid habitats, including conifer &	Roosts in crevices in cliff faces, high buildings, trees & tunnels.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				deciduous woodlands, coastal scrub, grasslands, chaparral etc	
San Bernardino flying squirrel	*Glaucomys sabrinus californicus*	None	SSC	Black oak or white fir dominated woodlands between 5200 - 8500 ft in the San Bernardino and San Jacinto ranges.	Need cavities in trees/snags for nests & cover. Needs nearby water.
California wolverine	*Gulo gulo*	None	ST, FP	Found in the north coast mountains and the Sierra Nevada. Found in a wide variety of high elevation habitats.	Needs water source. uses caves, logs, burrows for cover & den area. Hunts in more open areas. Can travel long distances
silver-haired bat	*Lasionycteris noctivagans*	None	None	Primarily a coastal & montane forest dweller feeding over streams, ponds & open brushy areas.	Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes & rarely under rocks. Needs drinking water.
western red bat	*Lasiurus blossevillii*	None	SSC	Roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer forests.	Prefers habitat edges & mosaics with trees that are protected from above & open below with open areas for foraging.
hoary bat	*Lasiurus cinereus*	None	None	Prefers open habitats or habitat mosaics, with access to trees for cover & open areas or habitat edges for feeding.	Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.
western yellow bat	*Lasiurus xanthinus*	None	SSC	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats.	Roosts in trees, particularly palms. Forages over water and among trees.
lesser long-nosed bat	*Leptonycteris yerbabuenae*	FE	None		
Oregon snowshoe hare	*Lepus americanus klamathensis*	None	SSC	Above the yellow pine zone in Canadian and Hudsonian provinces	Alder & willow thickets in riparian zone, also thickets of young conifers.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				in Northern California.	
Sierra Nevada snowshoe hare	*Lepus americanus tahoensis*	None	SSC	Boreal riparian areas in the Sierra Nevada.	Thickets of deciduous trees in riparian areas and thickets of young conifers.
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	None	SSC	Intermediate canopy stages of shrub habitats & open shrub / herbaceous & tree / herbaceous edges.	Coastal sage scrub habitats in Southern California.
western white-tailed jackrabbit	*Lepus townsendii townsendii*	None	SSC	Sagebrush, subalpine conifer, juniper, alpine dwarf shrub & perennial grassland.	Open areas with scattered shrubs & exposed flat-topped hills with open stands of trees, brush & herbaceous understory.
southwestern river otter	*Lontra canadensis sonora*	None	SSC	Aquatic habitats along the Colorado River.	Needs abundant food sources and sufficient water for shelter and foraging.
California leaf-nosed bat	*Macrotus californicus*	None	SSC	Desert riparian, desert wash, desert scrub, desert succulent scrub, alkali scrub and palm oasis habitats.	Needs rocky, rugged terrain with mines or caves for roosting.
American (=pine) marten	*Martes americana*	None	None	Mixed evergreen forests with more than 40% crown closure along North Coast & Sierra Nevada, Klamath & Cascade mountains.	Needs variety of different-aged stands, particularly old-growth conifers & snags which provide cavities for dens/nests.
Humboldt marten	*Martes americana humboldtensis*	None	SSC	Occurs only in the coastal redwood zone from the Oregon border south to Sonoma County.	Associated with late-successional coniferous forests, prefer forests with low, overhead cover.
Sierra marten	*Martes americana sierrae*	None	None	Mixed evergreen forests with more than 40% crown closure along Sierra Nevada & Cascade mountains.	Needs variety of different-aged stands, particularly old-growth conifers & snags which provide cavities for dens/nests.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Pacific fisher	*Martes pennanti (pacifica) DPS*	FC	SSC	Intermediate to large-tree stages of coniferous forests & deciduous-riparian areas with high percent canopy closure.	Uses cavities, snags, logs & rocky areas for cover & denning. Needs large areas of mature, dense forest.
Mohave river vole	*Microtus californicus mohavensis*	None	SSC	Occurs only in weedy herbaceous growth in wet areas along the Mojave River. May be found in some irrigated pastures.	Burrows into soft soil. Feeds on leafy parts of grasses, sedges and herbs. Clips grasses to form runways from burrow.
San Pablo vole	*Microtus californicus sanpabloensis*	None	SSC	Saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay.	Constructs burrow in soft soil. Feeds on grasses, sedges and herbs. Forms a network of runways leading from the burrow
Amargosa vole	*Microtus californicus scirpensis*	FE	SE	Known only from bulrush marshes along the Amargosa River.	Burrows in soft soil. Nests are constructed in the burrows. Creates runway system through grasses from burrow.
south coast marsh vole	*Microtus californicus stephensi*	None	SSC	Tidal marshes in Los Angeles, Orange and southern Ventura Counties.	
Owens Valley vole	*Microtus californicus vallicola*	None	SSC	Found in wetlands and lush grassy ground in the Owens Valley.	Needs friable soil for burrowing. Eats grasses, sedges & herbs. Clips grass to make runways leading from burrows.
western small-footed myotis	*Myotis ciliolabrum*	None	None	Wide range of habitats mostly arid wooded & brushy uplands near water. Seeks cover in caves, buildings, mines & crevices	Prefers open stands in forests and woodlands. Requires drinking water. Feeds on a wide variety of small flying insects.
long-eared myotis	*Myotis evotis*	None	None	Found in all brush, woodland & forest habitats from sea level to about 9000 ft. prefers coniferous	Nursery colonies in buildings, crevices, spaces under bark, & snags. Caves used primarily as night roosts.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				woodlands & forests.	
little brown bat	*Myotis lucifugus*	None	None	State rank for San Bernardino Mtns population only. Hibernates in mines or caves. Will use buildings for roosts.	Forages near water. Females return to same nursery colonies year after year.
Arizona Myotis	*Myotis occultus*	None	SSC	Lowlands of the Colorado River and adjacent desert mountain ranges.	Need roosting areas in tree hollows, rock crevices, under bridges, etc.
fringed myotis	*Myotis thysanodes*	None	None	In a wide variety of habitats, optimal habitats are pinyon-juniper, valley foothill hardwood & hardwood-conifer.	Uses caves, mines, buildings or crevices for maternity colonies and roosts.
cave myotis	*Myotis velifer*	None	SSC	Lowlands of the Colorado River and adjacent mountain ranges.	Require caves or mines for roosting.
long-legged myotis	*Myotis volans*	None	None	Most common in woodland & forest habitats above 4000 ft. Trees are important day roosts; caves & mines are night roosts.	Nursery colonies usually under bark or in hollow trees, but occasionally in crevices or buildings.
Yuma myotis	*Myotis yumanensis*	None	None	Optimal habitats are open forests and woodlands with sources of water over which to feed.	Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices.
lodgepole chipmunk	*Neotamias speciosus speciosus*	None	None	Summits of isolated Piute, San Bernardino, & San Jacinto mountains. Usually found in open-canopy forests.	Habitat is usually lodgepole pine forests in the San Bernardino Mts & chinquapin slopes in the San Jacinto Mts.
Colorado Valley woodrat	*Neotoma albigula venusta*	None	None	Low-lying desert areas in southeastern California. Closely associated with beaver-tail cactus & mesquite.	Intolerant of cold temperatures. Eats mainly succulent plants. Distribution influenced by abundance of nest building material.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
San Francisco dusky-footed woodrat	*Neotoma fuscipes annectens*	None	SSC	Forest habitats of moderate canopy & moderate to dense understory. May prefer chaparral & redwood habitats.	Constructs nests of shredded grass, leaves & other material. May be limited by availability of nest-building materials.
riparian (=San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	FE	SSC	Riparian areas along the San Joaquin, Stanislaus & Tuolumne rivers.	Need areas with mix of brush & trees. Need suitable nesting sites in trees, snags or logs.
San Diego desert woodrat	*Neotoma lepida intermedia*	None	SSC	Coastal scrub of Southern California from San Diego County to San Luis Obispo County.	Moderate to dense canopies preferred. They are particularly abundant in rock outcrops & rocky cliffs & slopes.
pocketed free-tailed bat	*Nyctinomops femorosaccus*	None	SSC	Variety of arid areas in Southern California; pine-juniper woodlands, desert scrub, palm oasis, desert wash, desert riparian, etc.	Rocky areas with high cliffs.
big free-tailed bat	*Nyctinomops macrotis*	None	SSC	Low-lying arid areas in Southern California.	Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.
Mt. Whitney pika	*Ochotona princeps albata*	None	None	Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation. At lower elevations found in rocky areas within forests or near lakes.	Talus slopes, occasionally on mine tailings. Prefers talus-meadow interface.
Yosemite pika	*Ochotona princeps muiri*	None	None	Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation. At lower elevations found in rocky areas within forests or near lakes.	Talus slopes, occasionally on mine tailings. Prefers talus-meadow interface.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
gray-headed pika	*Ochotona princeps schisticeps*	None	None	Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation. At lower elevations found in rocky areas within forests or near lakes.	Talus slopes, occasionally on mine tailings. Prefers talus-meadow interface.
White Mountains Pika	*Ochotona princeps sheltoni*	None	None	Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation.	Talus slopes above 8000 ft, occasionally on mine tailings. Prefers talus-meadow interface.
Taylor pika	*Ochotona princeps taylori*	None	None	Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation. At lower elevations found in rocky areas within forests or near lakes.	Talus slopes, occasionally on mine tailings. Prefers talus-meadow interface.
southern grasshopper mouse	*Onychomys torridus ramona*	None	SSC	Desert areas, especially scrub habitats with friable soils for digging. Prefers low to moderate shrub cover.	Feeds almost exclusively on arthropods, especially scorpions & orthopteran insects.
Tulare grasshopper mouse	*Onychomys torridus tularensis*	None	SSC	Hot, arid valleys and scrub deserts in the southern San Joaquin Valley.	Diet almost exclusively composed of arthropods, therefore needs abundant supply of insects.
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	None	None	Widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County.	Open, rocky, steep areas with available water and herbaceous forage.
peninsular bighorn sheep	*Ovis canadensis nelsoni DPS*	FE	ST, FP	Open desert slopes below 4,000 ft elevation from San Gorgonio Pass south into Mexico.	Optimal habitat includes steep walled canyons and ridges bisected by rocky or sandy washes, with available water.
Sierra Nevada bighorn sheep	*Ovis canadensis sierrae*	FE	SE, FP	Historically found along the east side and crest of the Sierra Nevada, and	Available water and steep, open terrain free of competition from

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				on the Great Western Divide.	other grazing ungulates.
Tehachapi pocket mouse	*Perognathus alticolus inexpectatus*	None	SSC	Arid annual grassland & desert shrub communities, but also taken in fallow grain field & in Russian thistle.	Burrows for cover & nesting. Aestivates and hibernates during extreme weather. Forages on open ground & under shrubs.
San Joaquin pocket mouse	*Perognathus inornatus inornatus*	None	None	Typically found in grasslands and blue oak savannas.	Needs friable soils.
Salinas pocket mouse	*Perognathus inornatus psammophilus*	None	SSC	Annual grassland & desert shrub communities in the Salinas Valley.	Fine-textured, sandy, friable soils. Burrows for cover & nesting.
Palm Springs pocket mouse	*Perognathus longimembris bangsi*	None	SSC	Desert riparian, desert scrub, desert wash & sagebrush habitats. most common in cresote-dominated desert scrub.	Rarely found on rocky sites. Occurs in all canopy coverage classes.
Los Angeles pocket mouse	*Perognathus longimembris brevinasus*	None	SSC	Lower elevation grasslands & coastal sage communities in and around the Los Angeles Basin.	Open ground with fine sandy soils. May not dig extensive burrows, hiding under weeds & dead leaves instead.
Jacumba pocket mouse	*Perognathus longimembris internationalis*	None	SSC	Desert riparian, desert scrub, desert wash, coastal scrub & sagebrush.	Rarely found on rocky sites, uses all canopy coverages.
Pacific pocket mouse	*Perognathus longimembris pacificus*	FE	SSC	Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles Co.	Seems to prefer soils of fine alluvial sands near the ocean, but much remains to be learned.
yellow-eared pocket mouse	*Perognathus parvus xanthonotus*	None	None	Known only from four canyons in the Tehachapi Mountains, northeastern Kern County. Elevational range 4000-5300 ft.	Desert shrub and Joshua tree communities with scattered pinyon pines. Occupies underground burrow when inactive.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
yellow-billed magpie	*Pica nuttalli*	None	None	Central Valley and coastal mountain ranges from south of San Francisco to Santa Barbara Co.	Open oak & riparian woodland, farm & ranchland or urban areas with tall trees near grassland, pasture or cropland.
Abert's towhee	*Pipilo aberti*	None	None	Desert riparian and desert wash habitats in the lower Colorado River Valley, also the Imperial & Coachella valleys.	Frequents dense vegetation, thickets of willow, cottonwood, mesquite, & saltcedar.
Yuma mountain lion	*Puma concolor browni*	None	SSC	Low elevations in the Colorado River Valley of California.	Live in dense bottomland vegetation, also found in adjacent, rocky uplands.
Salinas harvest mouse	*Reithrodontomys megalotis distichlis*	None	None	Known only from the Monterey Bay region.	Occurs in fresh and brackish water wetlands and probably in the adjacent uplands around the mouth of the Salinas River.
salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE	SE, FP	Only in the saline emergent wetlands of San Francisco Bay and its tributaries.	Pickleweed is primary habitat. Do not burrow, build loosely organized nests. Require higher areas for flood escape.
Angel Island mole	*Scapanus latimanus insularis*	None	None	Known only from Angel Island in San Francisco Bay.	Need friable soils for burrowing.
Alameda Island mole	*Scapanus latimanus parvus*	None	SSC	Only known from Alameda Island. Found in a variety of habitats, especially annual & perennial grasslands.	Prefers moist, friable soils. avoids flooded soils.
Yuma hispid cotton rat	*Sigmodon hispidus eremicus*	None	SSC	Along the Colorado River and in grass & agricultural areas near irrigation waters.	Wetlands & uplands with dense grass & herbaceous plants. Makes runways through vegetation. Nests on surface & in burrows.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Mount Lyell shrew	*Sorex lyelli*	None	SSC	High elevation riparian areas in the southern Sierra Nevada.	Requires moist soil, lives in grass or under willows. Uses logs, stumps, etc. for cover.
Buena Vista Lake shrew	*Sorex ornatus relictus*	FE	SSC	Marshlands and riparian areas in the Tulare Basin.	Prefers moist soil. Uses stumps, logs and litter for cover.
Monterey shrew	*Sorex ornatus salarius*	None	SSC	Riparian, wetland & upland areas in the vicinity of the Salinas River delta.	Prefers moist microhabitats. feeds on insects & other invertebrates found under logs, rocks & litter.
southern California saltmarsh shrew	*Sorex ornatus salicornicus*	None	SSC	Coastal marshes in Los Angeles, Orange and Ventura Counties.	Requires dense vegetation and woody debris for cover.
Suisun shrew	*Sorex ornatus sinuosus*	None	SSC	Tidal marshes of the northern shores of San Pablo and Suisun bays.	Require dense low-lying cover and driftweed and other litter above the mean hightide line for nesting and foraging.
salt-marsh wandering shrew	*Sorex vagrans halicoetes*	None	SSC	Salt marshes of the south arm of San Francisco Bay.	Medium high marsh 6-8 ft above sea level where abundant driftwood is scattered among salicornia.
riparian brush rabbit	*Sylvilagus bachmani riparius*	FE	SE	Riparian areas on the San Joaquin River in northern Stanislaus County.	Dense thickets of wild rose, willows, and blackberries.
American badger	*Taxidea taxus*	None	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Needs sufficient food, friable soils & open, uncultivated ground. Preys on burrowing rodents. Digs burrows.
San Joaquin kit fox	*Vulpes macrotis mutica*	FE	ST	Annual grasslands or grassy open stages with scattered shrubby vegetation.	Need loose-textured sandy soils for burrowing, and suitable prey base.
Sierra Nevada red fox	*Vulpes vulpes necator*	None	ST	Found from the Cascades down to the Sierra Nevada. Found in a variety of habitats from wet	Use dense vegetation & rocky areas for cover & den sites. Prefer forests interspersed w/ meadows or alpine

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
				meadows to forested areas.	fell-fields.
Mohave ground squirrel	*Xerospermophilus mohavensis*	None	ST	Open desert scrub, alkali scrub & Joshua tree woodland. Also feeds in annual grasslands. Restricted to Mojave Desert.	Prefers sandy to gravelly soils, avoids rocky areas. Uses burrows at base of shrubs for cover. Nests are in burrows.
Palm Springs round-tailed ground squirrel	*Xerospermophilus tereticaudus chlorus*	FC	SSC	Restricted to the Coachella Valley. Prefers desert succulent scrub, desert wash, desert scrub, alkali scrub, & levees.	Prefers open, flat, grassy areas in fine-textured, sandy soil. Density correlated with winter rainfall.
Point Reyes jumping mouse	*Zapus trinotatus orarius*	None	SSC	Primarily in bunch grass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows.	Eats mainly grass seeds w/ some insects & fruit taken. Builds grassy nests on ground under vegetation, burrows in winter
Reptiles					
western pond turtle	*Actinemys marmorata*	None	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches with aquatic vegetation below 6000 ft elevation.	Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 1/4 mile from water for egg-laying.
black legless lizard	*Anniella pulchra nigra*	None	SSC	Sand dunes and sandy soils in the Monterey Bay and Morro Bay regions.	Inhabit sandy soil/dune areas with bush lupine and mock heather as dominant plants. Moist soil is essential.
silvery legless lizard	*Anniella pulchra pulchra*	None	SSC	Sandy or loose loamy soils under sparse vegetation.	Soil moisture is essential. they prefer soils with a high moisture content.
orangethroat whiptail	*Aspidoscelis hyperythra*	None	SSC	Inhabits low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats.	Prefers washes & other sandy areas with patches of brush & rocks. Perennial plants necessary for its major food-termites

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
coastal whiptail	*Aspidoscelis tigris stejnegeri*	None	None	Found in deserts & semiarid areas with sparse vegetation and open areas. Also found in woodland & riparian areas.	Ground may be firm soil, sandy, or rocky.
rosy boa	*Charina trivirgata*	None	None	Desert & chaparral from the coast to the Mojave & Colorado deserts. prefers moderate to dense vegetation & rocky cover.	Habitats with a mix of brushy cover & rocky soil such as coastal canyons & hillsides, desert canyons, washes & mountains.
southern rubber boa	*Charina umbratica*	None	ST	Restricted to the San Bernardino and San Jacinto mtns; found in a variety of montane forest habitats.	Found in vicinity of streams or wet meadows; requires loose, moist soil for burrowing; seeks cover in rotting logs.
red-diamond rattlesnake	*Crotalus ruber*	None	SSC	Chaparrral, woodland, grassland, & desert areas from coastal San Diego County to the eastern slopes of the mountains.	Occurs in rocky areas & dense vegetation. Needs rodent burrows, cracks in rocks or surface cover objects.
San Bernardino ringneck snake	*Diadophis punctatus modestus*	None	None	Most common in open, relatively rocky areas. Often in somewhat moist microhabitats near intermittent streams.	Avoids moving through open or barren areas by restricting movements to areas of surface litter or herbaceous vegetation.
Panamint alligator lizard	*Elgaria panamintina*	None	SSC	Found in the White & Inyo Mtns to the north & west, & the Panamint Mtns to the south & east; 2800-6800 ft elevation.	Inhabits areas near permanent water, in canyons, damp gullies, and rocky areas near dense vegetation.
blunt-nosed leopard lizard	*Gambelia sila*	FE	SE, FP	Resident of sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief.	Seeks cover in mammal burrows, under shrubs or structures such as fence posts; they do not excavate their own burrows.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
desert tortoise	*Gopherus agassizii*	FT	ST	Most common in desert scrub, desert wash, and Joshua tree habitats; occurs in almost every desert habitat.	Require friable soil for burrow and nest construction. Creosote bush habitat with lg annual wildflower blooms preferred.
banded gila monster	*Heloderma suspectum cinctum*	None	SSC	Inhabits the lower slopes of rocky canyons and arroyos, but is also found on desert flats among scrub and succulents.	Eggs are laid in soil in excavated nests; thus, soil must be sandy or friable. Found in areas moister than surroundings.
California mountain kingsnake (San Bernardino population)	*Lampropeltis zonata (parvirubra)*	None	SSC	Bigcone spruce & chaparral at lower elev. Black oak, incense cedar, Jeffrey pine & ponderosa pine at higher elevations.	Well-lit canyons with rocky outcrops or rocky talus.
Califonia mountain kingsnake (San Diego population)	*Lampropeltis zonata (pulchra)*	None	SSC	Restricted to the San Gabriel and San Jacinto mtns of Southern California.	Inhabits a variety of habitats, including valley-foothill hardwood, coniferous, chaparral, riparian, and wet meadows.
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	None	SSC	Open, dry habitats with little or no tree cover. Found in valley grassland & saltbush scrub in the San Joaquin Valley.	Needs mammal burrows for refuge and oviposition sites.
Alameda whipsnake	*Masticophis lateralis euryxanthus*	FT	ST	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats.	Mostly south-facing slopes & ravines, with rock outcrops, deep crevices or abundant rodent burrows, where shrubs form a vegetative mosaic with oak trees and grasses.
coast horned lizard	*Phrynosoma blainvillii*	None	SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes.	Open areas for sunning, bushes for cover, patches of loose soil for burial, & abundant supply of ants & other insects.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
flat-tailed horned lizard	*Phrynosoma mcallii*	None	SSC	Restricted to desert washes and desert flats in central Riverside, eastern San Diego, and Imperial Counties.	Critical habitat element is fine sand, into which lizards burrow to avoid temp extremes; requires vegetative cover and ants.
Coronado Island skink	*Plestiodon skiltonianus interparietalis*	None	SSC	Grassland, chaparral, pinon-juniper & juniper sage woodland, pine-oak & pine forests in Coast Ranges of Southern California.	Prefers early successional stages or open areas. Found in rocky areas close to streams & on dry hillsides.
coast patch-nosed snake	*Salvadora hexalepis virgultea*	None	SSC	Brushy or shrubby vegetation in coastal Southern California.	Require small mammal burrows for refuge and overwintering sites.
northern sagebrush lizard	*Sceloporus graciosus graciosus*	None	None	Ground dweller, usually found near bushes, brush heaps, logs, or rocks.	Needs good light, open ground, & scattered low bushes.
giant garter snake	*Thamnophis gigas*	FT	ST	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals & irrigation ditches.	This is the most aquatic of the garter snakes in California.
two-striped garter snake	*Thamnophis hammondii*	None	SSC	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 ft elevation.	Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.
south coast garter snake	*Thamnophis sirtalis ssp.*	None	SSC	Southern California coastal plain from Ventura County to San Diego County, and from sea level to about 2,750 ft elevation.	Marsh & upland habitats near permanent water with good strips of riparian vegetation.
San Francisco garter snake	*Thamnophis sirtalis tetrataenia*	FE	SE, FP	Vicinity of freshwater marshes, ponds and slow moving streams in San Mateo County & extreme northern Santa Cruz County.	Prefers dense cover & water depths of at least one foot. upland areas near water are also very important.

TABLE 4.3-4. NON-*FISH* ANIMAL SPECIES WITH LESS THAN SIGNIFICANT IMPACTS

Common name	Scientific name	Federal listing status*	State listing status*	General Habitat	Micro Habitat
Coachella Valley fringe-toed lizard	*Uma inornata*	FT	SE	Limited to sandy areas in the Coachella Valley, Riverside County.	Requires fine, loose, windblown sand (for burrowing), interspersed with hardpan and widely spaced desert shrubs.
Mojave fringe-toed lizard	*Uma scoparia*	None	SSC	Fine, loose, wind-blown sand in sand dunes, dry lakebeds, riverbanks, desert washes, sparse alkali scrub & desert scrub.	Shrubs or annual plants may be necessary for arthropods found in the diet.

** List of Abbreviations for Federal and State Species Status follow below:*

FC *Federal candidate for listing*
FE *Federal endangered*
FP *State fully protected species*
FPT *Federal proposed: threatened*
SSC *State species of special concern*
FSC *Federal species of concern (per NOAA or USFWS website)*
SCE *State candidate: endangered*
SE *State endangered*
SSC *State species of special concern*
ST *State threatened*

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Sanicula maritima	None	Rare	1B.1	Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie.	Moist clay or ultramafic soils. 30-240m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus leiospermus var. ahartii	None	None	1B.2	Vernal pools.	Restricted to the edges of vernal pools. 30-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Paronychia ahartii	None	None	1B.1	Valley and foothill grassland, vernal pools, cismontane woodland.	Stony, nearly barren clay of swales and higher ground around vernal pools. 30-510m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Rhamnus alnifolia	None	None	2.2	Meadows and seeps, lower montane coniferous forest, upper montane coniferous forest, montane riparian scrub.	Mesic sites. 1370-2130m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Geum aleppicum	None	None	2.2	Meadows, Great Basin scrub, lower montane coniferous forest.	450-1515m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Ivesia kingii var. kingii	None	None	2.2	Meadows, Great Basin scrub, playas.	Alkaline meadows, alkaline flats, and low-lying alkaline basins; w/ Distichlis,	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					Sporobolus, Juncus, etc. 1200-2130m.	substantially impact suitable habitat.
Astragalus tener var. tener	None	None	1B.2	Alkali playa, valley and foothill grassland, vernal pools.	Low ground, alkali flats, and flooded lands; in annual grassland or in playas or vernal pools. 1-170m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sphaeromeria potentilloides var. nitrophila	None	None	2.2	Meadows and seeps, playas.	Usually alkaline soils. 2100-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nitrophila mohavensis	Endangered	Endangered	1B.1	Alkali playa, meadows and seeps.	Heavy alkaline mudflats, and saltgrass meadows. 425-750m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Glyceria grandis	None	None	2.3	Meadows.	Wet meadows, ditches, streams, and ponds in valleys and lower elevations in the mountains. 15-1980m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Scheuchzeria palustris var. americana	None	None	2.1	Bogs and fens, marshes and swamps.	Sphagnum bogs and on lake margins. 1360-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Trientalis arctica	None	None	2.2	Meadows and seeps, bogs and fens.	Coastal boggy areas. 0-15m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Grindelia fraxinipratensis	Threatened	None	1B.2	Meadows, chenopod scrub.	Saline clay soil, esp in depressions and in saturated soils next to standing water. 630-700m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Limnanthes bakeri	None	Rare	1B.1	Freshwater marsh, valley and foothill grassland, meadows and seeps, vernal pools.	Seasonally moist or saturated sites w/in grassland; also in swales, roadside ditches & margins of marshy areas. 175-910m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Navarretia leucocephala ssp. bakeri	None	None	1B.1	Cismontane woodland, meadows and seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest.	Vernal pools and swales; adobe or alkaline soils. 5-950m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pyrrocoma uniflora var. gossypina	None	None	1B.2	Pebble plain, meadows and seeps.	Meadows, meadow edges, and along streams in or near pebble plain habitat. 1600-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Plagiobothrys hystriculus	None	None	1B.1	Vernal pools, valley and foothill grassland.	Wet sites. 10-50m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						substantially impact suitable habitat.
Mertensia oblongifolia var. amoena	None	None	2.2	Great Basin scrub, meadows and seeps.	1630-2315m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Salix bebbiana	None	None	2.3	Riparian scrub, marshes and swamps.	Streambanks, lakeshores. 1200-1400m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Bensoniella oregona	None	Rare	1B.1	Bogs and fens, lower montane coniferous forest, meadows.	Wet meadows and openings in forest. 935-1400m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Sidalcea pedata	Endangered	Endangered	1B.1	Meadows and seeps, pebble plains.	Vernally mesic sites in meadows or pebble plains. 1600-2500m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Hymenoxys odorata	None	None	2	Riparian scrub, Sonoran desert scrub.	Sandy sites. 45-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Schoenus nigricans	None	None	2.2	Marshes and swamps.	Often in alkaline marshes. 150-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Potentilla basaltica	Candidate	None	1B.3	Meadows and seeps.	Alkaline, sandy, volcanic soils. 1530-1555m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Helodium blandowii	None	None	2.3	Meadows and seeps, bogs and fens, subalpine coniferous forest.	Moss growing on damp soil. 2000-2700m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Oxytropis deflexa var. sericea	None	None	2.1	Upper montane coniferous forest, meadows and seeps.	Moist meadows and turfy banks in the White Mountains. 2800-3355m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gratiola heterosepala	None	Endangered	1B.2	Marshes and swamps (freshwater), vernal pools.	Clay soils; usually in vernal pools, sometimes on lake margins. 5-2400m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Bruchia bolanderi	None	None	2.2	Lower montane coniferous forest, meadows and seeps,	Moss which grows on damp clay soils. This species has an ephemeral nature and takes	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				upper montane coniferous forest.	advantage of disturbed sites. 1700-2800m.	substantially impact suitable habitat.
Trifolium bolanderi	None	None	1B.2	Meadows and seeps, lower montane coniferous forest, upper montane coniferous forest.	Moist mountain meadows. 2075-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cicuta maculata var. bolanderi	None	None	2.1	Marshes, fresh or brackish water.	0-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cinna bolanderi	None	None	1B.2	Meadows and seeps, upper montane coniferous forest.	Streamsides and other mesic areas. 1670-2440m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Wolffia brasiliensis	None	None	2.3	Shallow freshwater marshes.	30-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex leptalea	None	None	2.2	Bogs and fens, meadows, marshes and swamps.	Mostly known from bogs and wet meadows. 0-790m.	Low. Suction dredging not likely to substantially impact suitable habitat.
Carex comosa	None	None	2.1	Marshes and swamps.	Lake margins, wet places; site below sea level is on a Delta island. -5-1005m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Atriplex depressa	None	None	1B.2	Chenopod scrub, meadows, playas, valley and foothill grassland, vernal pools.	Usually in alkali scalds or alk. clay in meadows or annual grasslnd; rarely assoc w/riparian, marshes, or V.P's. 1-320m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Meesia uliginosa	None	None	2.2	Meadows and seeps, bogs and fens, upper montane coniferous forest.	Moss on damp soil. 1300-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex vulpinoidea	None	None	2.2	Marshes and swamps, riparian woodland.	Wet places. 30-1200m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Rhynchospora capitellata	None	None	2.2	Lower montane coniferous forest, meadows and seeps, marshes and swamps, upper montane coniferous forest.	Mesic sites. 455-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lasthenia burkei	Endangered	Endangered	1B.1	Vernal pools, meadows and seeps.	Most often in vernal pools and swales. 15-580m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Limnanthes floccosa ssp. californica	Endangered	Endangered	1B.1	Vernal pools, valley and foothill grassland.	Wet or flowing drainages & depressions; often not in	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					discrete vernal pools; soils are usu Redding clay w/rocks. 50-930m.	occupied habitat or substantially impact suitable habitat.
Suksdorfia ranunculifolia	None	None	2	Upper montane coniferous forest, meadows and seeps.	Mesic sites; rocky. 1500-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Rhynchospora californica	None	None	1B.1	Bogs and fens, marshes and swamps, lower montane coniferous forest, meadows and seeps.	Freshwater seeps and open marshy areas. 45-1000m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Taraxacum californicum	Endangered	None	1B.1	Meadows and seeps.	Mesic meadows, usually free of taller vegetation. 1620-2800m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Orcuttia californica	Endangered	Endangered	1B.1	Vernal pools.	15-660m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Imperata brevifolia	None	None	2.1	Coastal scrub, chaparral, riparian scrub, mojavean scrub, meadows and seeps (alkali).	Mesic sites, alkali seeps, riparian areas. 0-500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						or their habitat.
Cladium californicum	None	None	2.2	Freshwater and alkali marshes, seeps.	Freshwater or alkaline moist habitats. 60-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex californica	None	None	2.3	Bogs and fens, closed-cone coniferous forest, coastal prairie, meadows, marshes and swamps.	Meadows, drier areas of swamps, marsh margins. 90-250m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Eleocharis torticulmis	None	None	1B.3	Bogs and fens, meadows and seeps, lower montane coniferous forest.	1005-1175m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Plagiobothrys strictus	Endangered	Threatened	1B.1	Broadleafed upland forest, meadows and seeps, valley and foothill grassland, vernal pools.	Alkaline sites near thermal springs and on margins of vernal pools in heavy, dark, adobe-like clay. 90-160m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Geothallus tuberosus	None	None	1B.1	Coastal scrub, vernal pools. most suitable habitat lost to urbanization.	Liverwort known from mesic soil. 10-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parnassia cirrata var. intermedia	None	None	2.2	Lower montane coniferous forest, upper	Rocky serpentine soil. 780-1980m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				montane coniferous forest, meadows and seeps, bogs and fens.		occupied habitat or substantially impact suitable habitat.
Cirsium fontinale var. obispoens	Endangered	Endangered	1B.2	Chaparral, cismontane woodland.	Serpentine seeps. 35-365m.	Low. Limited distribution; Occupied habitat not likely to overlap with suction dredging.
Erythronium revolutum	None	None	2.2	Bogs and fens, broadleafed upland forest, North Coast coniferous forest.	0-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sidalcea oregana ssp. eximia	None	None	1B.2	Meadows and seeps, North Coast coniferous forest, lower montane coniferous forest.	Nears meadows, in gravelly soil. 0-1800m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Rorippa columbiae	None	None	1B.2	Pinyon-juniper woodland, meadows and seeps, playas.	Moist sandy soil, low gravelly river banks, basaltic lava slopes. 360-1800m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Neostapfia colusana	Threatened	Endangered	1B.1	Vernal pools.	Usually in large, or deep vernal pool bottoms; adobe soils. 5-110m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Lasthenia conjugens	Endangered	None	1B.1	Valley and foothill grassland, vernal pools, cismontane woodland. Extirpated from most of its range; extrem. endangered.	Vernal pools, swales, low depressions, in open grassy areas. 1-445m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Triteleia ixioides ssp. cookii	None	None	1B.3	Cismontane woodland, closed-cone coniferous forest.	Streamsides, wet ravines; on serpentine and in serpentine seeps. Sometimes near cypresses. ?-500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Lotus oblongifolius var. cupreus	None	None	1B.3	Meadows, upper montane coniferous forest (mesic).	Wet meadow borders. 2400-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lasthenia glabrata ssp. coulteri	None	None	1B.1	Coastal salt marshes, playas, valley and foothill grassland, vernal pools.	Usually found on alkaline soils in playas, sinks, and grasslands. 1-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tuctoria mucronata	Endangered	Endangered	1B.1	Vernal pools, valley and foothill grassland.	Clay bottoms of drying vernal pools and lakes in valley grassland. 5-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Utricularia ochroleuca	None	None	2.2	Mesic meadows, marshes near lakes.	Mesic sites, including lake margins. 1435-1440m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						substantially impact suitable habitat.
Downingia concolor var. brevior	None	Endangered	1B.1	Meadows (mesic), vernal pools.	In vernal seeps, lakes and pools, and on mudflats, with Orthocarpus, Limnanthes, Collinsia. 1400-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Delphinium hesperium ssp. cuyamacae	None	Rare	1B.2	Lower montane coniferous forest, meadows.	On dried edge of grassy meadows, also described as in mesic sites. 1210-1630m.	Low. Suction dredging not likely to substantially impact suitable habitat.
Malacothamnus davidsonii	None	None	1B.2	Coastal scrub, riparian woodland, chaparral.	Sandy washes. 180-855m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Sisyrinchium funereum	None	None	1B.3	Meadows and seeps.	Alkaline meadows. 40-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex saliniformis	None	None	1B.2	Coastal prairie, coastal scrub, meadows and seeps, marshes and swamps (coastal salt).	Mesic sites. 3-230m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eryngium racemosum	None	Endangered	1B.1	Riparian scrub.	Seasonally inundated floodplain on clay. 3-75m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						habitat or impact suitable habitat.
Limosella subulata	None	None	2.1	Riparian scrub, freshwater marsh, brackish marsh. Probably the rarest of the suite of Delta rare plants.	Usually on mud banks of the Delta in marshy or scrubby riparian associations; often with Lilaeopsis masonii. 0-3m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lathyrus jepsonii var. jepsonii	None	None	1B.2	Freshwater and brackish marshes.	Often found w/ Typha, Aster lentus, Rosa calif., Juncus spp., Scirpus, etc. Usually on marsh and slough edges.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Plagiobothrys salsus	None	None	2.2	Chenopod scrub, marshes and swamps.	Moist, alkaline mud flats. 605-1360m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ivesia aperta var. canina	None	None	1B.1	Lower montane coniferous forest, meadows.	Shallow rocky soil of volcanic origin. 1600-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus dudleyi	None	None	2.3	Lower montane coniferous forest (mesic).	Wet areas in forest. 455-2000m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Puccinellia pumila	None	None	2.2	Meadows and seeps, marshes and swamps.	Mineral spring meadows and coastal salt marshes. 1-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Downingia pusilla	None	None	2.2	Valley and foothill grassland (mesic sites), vernal pools.	Vernal lake and pool margins with a variety of associates. In several types of vernal pools. 1-485m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Betula glandulosa	None	None	2.2	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, subalpine coniferous forest.	Mesic sites. 1310-2285m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Potamogeton zosteriformis	None	None	2.2	Marshes and swamps.	Ponds, lakes, streams. 0-1860m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Smilax jamesii	None	None	1B.3	North Coast coniferous forest, broadleafed upland forest?, lower montane coniferous forest, marshes and swamps.	Along streams and lake margins. 665-1820m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Drosera anglica	None	None	2.3	Bogs and fens, meadows.	1300-2000m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						substantially impact suitable habitat.
Potentilla glandulosa ssp. Ewanii	None	None	1B.3	Lower montane coniferous forest.	Edges of seeps and springs, small waterways. 1900-2400m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Lupinus padre-crowleyi	None	Rare	1B.2	Great Basin scrub, riparian scrub, riparian forest, upper montane coniferous forest.	Scattered on steep avalanche chutes, in sunny sites in drainages, & in valley bottoms; decomposed granite. 2500-4000m.	Low. Suction dredging not likely to substantially impact suitable habitat.
Navarretia leucocephala ssp. pauciflora	Endangered	Threatened	1B.1	Vernal pools.	Volcanic ash flow, and volc substrate vernal pools. 400-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Potamogeton foliosus var. fibrillosus	None	None	2.3	Marshes and swamps.	Shallow water, small streams. 5-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Astragalus agrestis	None	None	2.2	Great Basin scrub, meadows and seeps.	Vernally mesic sites. 1560-1650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus digitatus	None	None	1B.1	Cismontane woodland (openings), lower	In full sun, in the vernally damp ground of seeps, vernal pools	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				montane coniferous forest (openings), vernal pools.	and swales on gentle slopes over volcanic bedrock. 600-800m.	occupied habitat or substantially impact suitable habitat.
Astragalus lentiginosus var. piscinensis	Threatened	None	1B.1	Meadows, playas.	Usually found on mounds in alkali meadows with sparse vegetative cover. 1120-1300m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Utricularia intermedia	None	None	2.2	Bogs and fens, meadows and seeps, marshes and swamps.	Mesic meadows, lake margins, marshes, fens. 1200-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Thelypodium integrifolium ssp. complanatum	None	None	2.2	Great Basin scrub, meadows and seeps.	Alkaline or subalkaline soils; mesic sites. 1100-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gentiana fremontii	None	None	2.3	Meadows, upper montane coniferous forest.	Wet mountain meadows. 2400-2700m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Ranunculus hydrocharoides	None	None	2.1	Marshes and swamps.	In or bordering shallow springs or freshwater marshes in the mountains. 1100-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Nasturtium gambelii	Endangered	Threatened	1B.1	Marshes and swamps.	Freshwater and brackish marshes at the margins of lakes and along streams, in or just above the water level. 5-1305m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Dichanthelium lanuginosum var. thermale	None	Endangered	1B.1	Closed-cone coniferous forest, riparian forest, valley and foothill grassland.	Usually around moist, warm soil in the vicinity of hot springs. 445-815m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Solidago gigantea	None	None	2.2	Meadows and seeps, marshes and swamps.	Moist streambanks, lakesides, moist meadows. 1000-1500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Alisma gramineum	None	None	2.2	Marshes and swamps.	Freshwater marsh. 390-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Downingia laeta	None	None	2.2	Great Basin scrub, meadows and seeps, freshwater marshes, pinyon-juniper woodland, vernal pools.	In mesic sites or wetlands. 1220-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nemophila breviflora	None	None	2.3	Great Basin scrub, meadows and seeps,	Mesic sites. 1220-2410m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				upper montane coniferous forest.		occupied habitat or substantially impact suitable habitat.
Sanguisorba officinalis	None	None	2.2	Bogs & fens, meadows & seeps, broadleafed upland forest, marshes & swamps, North Coast coniferous forest, ripar. forest.	Rocky serpentine seepage areas and along stream borders. 60-1400m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Carex viridula var. viridula	None	None	2.3	Bogs and fens, marshes and swamps (freshwater), North Coast coniferous forest.	Mesic sites. 0-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tuctoria greenei	Endangered	Rare	1B.1	Vernal pools, valley and foothill grassland.	Dry bottoms of vernal pools in open grasslands. 30-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus supiniformis	None	None	2.2	Marshes and swamps, bogs and fens.	20-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcuttia pilosa	Endangered	Endangered	1B.1	Vernal pools.	25-125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Pseudobahia bahiifolia	Endangered	Endangered	1B.1	Valley and foothill grassland, cismontane woodland.	Clay soils, predominantly on the northern slopes of knolls, but also along shady creeks or near vernal pools. 15-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lepidium latipes var. heckardii	None	None	1B.2	Valley and foothill grassland, vernal pools.	Grassland, and sometimes vernal pool edges. Alkaline soils. 3-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Potentilla hickmanii	Endangered	Endangered	1B.1	Coastal bluff scrub, closed-cone coniferous forest, meadows and seeps, marshes and swamps.	Freshwater marshes, seeps, and small streams in open or forested areas along the coast. 5-125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Trichostema austromontanum ssp. compactum	Threatened	None	1B.1	Upper montane coniferous forest.	Seasonally submerged lake margins, decomposed granite. One site known: 2665m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Atriplex argentea var. hillmanii	None	None	2.2	Great Basin scrub, meadows and seeps.	Alkaline meadows in scrub. 1200-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cordylanthus mollis ssp. hispidus	None	None	1B.1	Meadows, playas, valley and foothill grassland.	In damp alkaline soils, especially in alkaline meadows and alkali sinks with Distichlis. 10-155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Eryngium aristulatum var. hooveri	None	None	1B.1	Vernal pools.	Alkaline depressions, vernal pools, roadside ditches and other wet places near the coast. 5-45m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Chamaesyce hooveri	Threatened	None	1B.2	Vernal pools, valley and foothill grassland.	Vernal pools on volcanic mudflow or clay substrate. 25-130m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pinguicula macroceras	None	None	2.2	Bogs and fens, meadows and seeps.	Meadow edges, seepage areas, serpentine soil. 20-1820m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Taraxacum ceratophorum	None	None	2.1	Meadows and seeps, valley and foothill grassland.	Mesic sites. 2895m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Astragalus hornii var. hornii	None	None	1B.1	Meadows and seeps, playas.	Lake margins, alkaline sites. 60-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Fimbristylis thermalis	None	None	2.2	Meadows (alkaline).	Near hot springs. 120-1340m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Puccinellia howellii	None	None	1B.1	Meadows and seeps.	Mineralized soils around mineral springs and seeps. One site known: 485m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Montia howellii	None	None	2.2	Meadows, North Coast coniferous forest, vernal pools.	Vernally wet sites; often on compacted soil. 0-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Thelypodium howellii ssp. howellii	None	None	1B.2	Great Basin scrub, meadows and seeps.	Moist alkaline meadows. 1200-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lycopodiella inundata	None	None	2.2	Bogs and fens, lower montane coniferous forest, marshes and swamps.	Peat bogs, muddy depressions, pond margins. 0-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Phacelia inyoensis	None	None	1B.2	Meadows and seeps.	Alkaline meadows. 1025-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sidalcea oregana ssp. valida	Endangered	Endangered	1B.1	Marshes and swamps.	Edges of freshwater marshes. 115-150m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						habitat or impact suitable habitat.
Erythronium klamathense	None	None	2.2	Upper montane coniferous forest, meadows and seeps.	1200-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gentiana plurisetosa	None	None	1B.3	Meadows and seeps, upper montane coniferous forest, lower montane coniferous forest.	Meadows in red fir and yellow pine forests; mesic sites. 1200-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex klamathensis	None	None	1B.2	Meadows and seeps, chaparral, cismontane woodland.	Serpentine. 1000-1140m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus nodosus	None	None	2.3	Meadows, marshes and swamps.	Mesic sites and lake margins. 1130-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cirsium loncholepis	Endangered	Threatened	1B.1	Coastal dunes, brackish marshes, riparian scrub.	Lake edges, riverbanks, other wetlands; often in dune areas. 5-185m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Carex lenticularis var. limnophila	None	None	2.2	Bogs and fens, marshes and swamps, North Coast	Lakeshores, beaches. 0-6m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				coniferous forest.		occupied habitat or substantially impact suitable habitat.
Sedella leiocarpa	Endangered	Endangered	1B.1	Valley and foothill grassland, vernal pools, cismontane woodland.	Level areas that are seasonally wet and dry out in late spring; substrate usually of volcanic origin. 365-790m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Legenere limosa	None	None	1B.1	Vernal pools. Many historical occurrences are extirpated.	In beds of vernal pools. 1-880m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Astragalus lemmonii	None	None	1B.2	Great Basin scrub, meadows and seeps, marshes and swamps.	Lakeshores, meadows and seeps. 1280-2200m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Lilium parryi	None	None	1B.2	Lower montane coniferous forest, meadows and seeps, riparian forest, upper montane coniferous forest.	Wet, mountainous terrain; gen in forested areas; on shady edges of streams, in open boggy meadows & seeps. 1300-2790m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Carex petasata	None	None	2.3	Lower montane coniferous forest, meadows.	600-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mimulus purpureus	None	None	1B.2	Meadows and seeps, pebble plain, upper montane coniferous forest.	Dry clay or gravelly soils under Jeffrey pines, along annual streams or vernal springs & seeps. 1900-2300m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Deinandra bacigalupii	None	None	1B.2	Meadows and seeps.	Alkaline meadows. 150-185m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eryngium constancei	Endangered	Endangered	1B.1	Vernal pools.	Volcanic ash flow vernal pools. 625-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Calochortus longebarbatus var. longebarbatus	None	None	1B.2	Meadows, lower montane coniferous forest.	In wet meadows or grassy areas along drainages within forest. Clay soils. 965-1900m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Stellaria longifolia	None	None	2.2	Meadows and seeps, riparian woodland.	Moist areas. 900-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex vallicola	None	None	1B.2	Chenopod scrub, valley and foothill grassland, vernal pools.	In powdery, alkaline soils that are vernally moist with Frankenia, Atriplex spp. and	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					Distichlis. 0-605m.	substantially impact suitable habitat.
Carex lyngbyei	None	None	2.2	Marshes and swamps (brackish or freshwater).	0m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ranunculus macounii	None	None	2.2	Great Basin scrub, meadows and seeps, pinyon-juniper woodland.	Mesic sites. 1400-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Erigeron maniopotamicus	None	None	1B.2	Meadows and seeps (open and dry), lower montane coniferous forest.	Open slopes, disturbed areas (road cuts), tan-colored, rocky soils. 1350-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Navarretia leucocephala ssp. plieantha	Endangered	Endangered	1B.2	Vernal pools.	Volcanic ash flow vernal pools. 30-950m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Fritillaria lanceolata var. tristulis	None	None	1B.1	Coastal bluff scrub, coastal scrub, coastal prairie.	Occurrences reported from canyons and riparian areas as well as rock outcrops; often on serpentine. 30-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Triglochin palustris	None	None	2.3	Meadows and seeps, freshwater marsh, subalpine coniferous	Mesic sites. 2285-3700m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				forest.		substantially impact suitable habitat.
Sidalcea oregana ssp. hydrophila	None	None	1B.2	Meadows and seeps, riparian forest.	Wet soil of streambanks, meadows. 545-2300m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Lathyrus palustris	None	None	2.2	Bogs & fens, lower montane conif. forest, marshes & swamps, N. Coast coniferous forest, coastal prairie, coastal scrub.	Moist coastal areas. 1-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arenaria paludicola	Endangered	Endangered	1B.1	Marshes and swamps.	Growing up through dense mats of Typha, Juncus, Scirpus, etc. in freshwater marsh. 10-170m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Scutellaria galericulata	None	None	2.2	Marshes and swamps, lower montane coniferous forest, meadows and seeps.	Swamps and wet places. 0-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Epilobium palustre	None	None	2.3	Bogs and fens, meadows and seeps.	Mesic sites. Known in California only from Grass Lake, El Dorado County. 2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Lilaeopsis masonii	None	Rare	1B.1	Freshwater and brackish marshes, riparian scrub.	Tidal zones, in muddy or silty soil formed through river deposition or river bank erosion. 0-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gentiana setigera	None	None	1B.2	Lower montane coniferous forest, meadows.	Meadows, seeps and bogs. Usually or always on serpentine. 490-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Fissidens pauperculus	None	None	1B.2	North coast coniferous forest.	Moss growing on damp soil along the coast. 10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Polygonum polygaloides ssp. esotericum	None	None	1B.1	Great Basin scrub, vernal pools, lower montane coniferous forest, meadows and seeps.	Edges of seasonal lakes and ponds with Deschampsia, Navarretia, etc. 1480-1690m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Deinandra mohavensis	None	Endangered	1B.3	Riparian scrub, chaparral.	Low sand bars in river bed; mostly in riparian areas or in ephemeral grassy areas. 850-1600m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Agrostis humilis	None	None	2.3	Alpine boulder and rock field, meadows and seeps, subalpine coniferous forest.	Probably undercollected; high elevation grass. 2700-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Nama stenocarpum	None	None	2.2	Marshes and swamps.	Lake shores, river banks, intermittently wet areas. 5-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex limosa	None	None	2.2	Bogs and fens, lower montane coniferous forest, meadows, marshes and swamps, upper montane coniferous forest.	In floating bogs and soggy meadows and edges of lakes. 1200-2775m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Poa napensis	Endangered	Endangered	1B.1	Meadows and seeps, valley and foothill grassland.	Moist alkaline meadows fed by runoff from nearby hot springs. 100-125m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Potentilla newberryi	None	None	2.3	Marshes and swamps.	Receding shorelines; drying marsh margins. 1290-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hierochloe odorata	None	None	2.3	Meadows and seeps.	Wet sites. 1500-1895m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pleuropogon hooverianus	None	Threatened	1B.1	Broadleafed upland forest, meadows and	Wet grassy, usually shady areas, sometimes freshwater	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				seeps, North Coast coniferous forest.	marsh; associated with forest environments; 10-1150m.	occupied habitat or substantially impact suitable habitat.
Ophioglossum pusillum	None	None	2.2	Marshes and swamps, meadows and seeps.	Marsh edges, low pastures, grassy roadside ditches. Also described as in "open swamp." 1000-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juglans hindsii	None	None	1B.1	Riparian forest, riparian woodland. Few extant native stands remain; widely naturalized.	Deep alluvial soil associated with a creek or stream. 0-395m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Carex arcta	None	None	2.2	Bogs and fens, North Coast coniferous forest.	Mesic sites. 60-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Corallorhiza trifida	None	None	2.1	Lower montane coniferous forest, meadows.	Wet, open to shaded, generally coniferous forest. In California, under firs, in partial shade. 1370-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex praticola	None	None	2.2	Meadows.	Moist to wet meadows. 0-3200m.	Low. Suction dredging not likely to substantially impact suitable habitat.
Microseris borealis	None	None	2.1	Bogs and fens, meadows and seeps, lower montane coniferous	940-2000m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				forest.		substantially impact suitable habitat.
Potamogeton epihydrus ssp. nuttallii	None	None	2.2	Marshes and swamps.	Shallow water, ponds, lakes, streams, irrigation ditches. 400-2110m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Saxifraga nuttallii	None	None	2.1	North Coast coniferous forest.	Cliff walls, moss-covered rocks along creeks; mesic sites. One site in California: 75m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brodiaea orcuttii	None	None	1B.1	Vernal pools, valley and foothill grassland, closed-cone coniferous forest, cismontane woodland, chaparral, meadows.	Mesic, clay habitats; sometimes serpentine; usu in vernal pools and small drainages. 30-1615m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Epilobium oreganum	None	None	1B.2	Bogs and fens, meadows, lower montane coniferous forest, upper montane coniferous forest.	In and near springs and bogs; at least sometimes on serpentine. 500-2610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Coptis laciniata	None	None	2.2	North coast coniferous forest, meadows and seeps.	Mesic sites such as moist streambanks. 0-1000m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Mertensia bella	None	None	2.2	Meadows and seeps, upper montane	Wet meadows, under taller herbs. 1420-2000m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				coniferous forest.		occupied habitat or substantially impact suitable habitat.
Pogogyne nudiuscula	Endangered	Endangered	1B.1	Vernal pools.	Dry beds of vernal pools and moist swales w/Eryngium aristulatum var parishii and Orcuttia californica. 85-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sidalcea covillei	None	Endangered	1B.1	Meadows and seeps, Great Basin scrub.	Moist alkaline meadows & freshwater seeps, fine sandy loam soil, one occurrence in stoney calcareous soil. 1090-1415m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Calochortus palmeri var. palmeri	None	None	1B.2	Meadows and seeps, chaparral, lower montane coniferous forest.	Vernally moist places in yellow-pine forest, chaparral. 600-2245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Centromadia parryi ssp. parryi	None	None	1B.2	Coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland.	Vernally mesic, often alkaline sites. 2-420m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex parishii	None	None	1B.1	Alkali meadows, vernal pools, chenopod scrub, playas.	Usually on drying alkali flats with fine soils. 4-140m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Limnanthes gracilis	None	Endangered	1B.2	Meadows and seeps,	Vernally moist areas and	Low. Limited

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
ssp. parishii				vernal pools.	temporary seeps of highland meadows and plateaus; often bordering lakes and streams. 600-1760m.	distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Perideridia parishii ssp. Parishii	None	None	2.2	Lower montane coniferous forest, meadows, upper montane coniferous forest.	Damp meadows or along streambeds-prefers an open pine canopy. 1390-3000m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Scirpus pendulus	None	None	2.2	Meadows and seeps, freshwater marsh.	Mesic sites. 800-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ivesia pickeringii	None	None	1B.2	Lower montane coniferous forest, meadows.	In summer-drying, hanging bogs on serpentine ledges. 800-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Navarretia myersii ssp. myersii	None	None	1B.1	Vernal pools, valley and foothill grassland.	Clay soils within nonnative grassland. 20-330m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lilium pardalinum ssp. pitkinense	Endangered	Endangered	1B.1	Cismontane woodland, meadows and seeps, freshwater marsh.	Saturated, sandy soils w/ grasses and shrubs. 35-65m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Phacelia inundata	None	None	1B.3	Great Basin scrub, lower montane coniferous forest, playas.	Dried edges of alkali lakes and sinks, inundated clay soils. 1330-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sidalcea calycosa ssp. rhizomata	None	None	1B.2	Marshes and swamps.	Freshwater marshes near the coast. 5-75(245)m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Limnanthes douglasii ssp. sulphurea	None	Endangered	1B.2	Fresh. marsh, vernal pools, coastal prairie, meadows & seeps, cismontane woodland.	Vernally wet depressions in open rolling, coastal prairies & meadows; typically in dark clay soil. 10-120m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Carex hystericina	None	None	2.1	Marshes and swamps.	Wet places, such as stream edges. 610m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Sphenopholis obtusata	None	None	2.2	Cismontane woodland, meadows and seeps.	Open moist sites, along rivers and springs, alkaline desert seeps. 360-2325m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Navarretia prostrata	None	None	1B.1	Coastal scrub, valley and foothill grassland, vernal	Alkaline soils in grassland, or in vernal pools. Mesic, alkaline	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				pools.	sites. 15-700m.	occupied habitat or substantially impact suitable habitat.
Abronia alpina	Candidate	None	1B.1	Meadows and seeps.	Gravelly margins of meadows; in gravel and sand with Hulsea and Lupinus. 2400-2700m. [Occurs only in Ramshaw and Templeton meadows of Tulare County]	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Botrychium virginianum	None	None	2.2	Bogs and fens.	1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Collomia rawsoniana	None	None	1B.2	Riparian forest, lower montane coniferous forest.	On stabilized alluvium in riparian zones. 775-2060m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Packera indecora	None	None	2.2	Meadows and seeps.	Mesic sites. 1600-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus regelii	None	None	2.3	Upper montane coniferous forest, meadows and seeps.	Mesic sites. 760-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Potamogeton robbinsii	None	None	2.3	Marshes and swamps.	Deep water, lakes. 1520-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Rhynchospora globularis var. globularis	None	None	2.1	Marshes and swamps.	Freshwater marsh. 45-60m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcuttia viscida	Endangered	Endangered	1B.1	Vernal pools.	30-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Trifolium depauperatum var. hydrophilum	None	None	1B.2	Marshes and swamps, valley and foothill grassland, vernal pools.	Mesic, alkaline sites. 0-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sidalcea neomexicana	None	None	2.2	Alkali playas, brackish marshes, chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub.	Alkali springs and marshes. 0-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Symphyotrichum defoliatum	None	None	1B.2	Meadows and seeps, marshes and swamps, coastal scrub, cismontane woodland, lower	Vernally mesic grassland or near ditches, streams and springs; disturbed areas. 2-2040m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				montane coniferous forest, grassland.		suitable habitat.
Poa atropurpurea	Endangered	None	1B.2	Meadows and seeps.	Mesic meadows of open pine forests and grassy slopes, loamy alluvial to sandy loam soil. 1350-2455m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Parnassia cirrata var. cirrata	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest, meadows and seeps.	Mesic sites, streamsides, sometimes calcareous. 1250-2440m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Mimulus exiguus	None	None	1B.2	Meadows and seeps, pebble plains, upper montane coniferous forest.	Seeps and sandy sometimes disturbed soil in moist drainages of annual streams; clay soils. 1800-2315m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Castilleja lasiorhyncha	None	None	1B.2	Meadows, pebble plain, upper montane coniferous forest, chaparral.	Mesic to drying soils in open areas of stream and meadow margins or of vernally wet areas. 1135-2390m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Packera bernardina	None	None	1B.2	Meadows and seeps, pebble plains, upper montane coniferous forest.	Mesic, sometimes alkaline meadows, and dry rocky slopes. 1800-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Eryngium aristulatum var. parishii	Endangered	Endangered	1B.1	Vernal pools, coastal scrub, valley and foothill grassland.	San Diego mesa hardpan & claypan vernal pools & southern interior basalt flow vernal pools; usu surr by scrub. 15-620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Iva hayesiana	None	None	2.2	Marshes and swamps, playas.	Riverwashes. 10-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pogogyne abramsii	Endangered	Endangered	1B.1	Vernal pools.	Vernal pools within grasslands, chamise chaparral or coastal sage scrub communities; w/other rare plants. 90-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex coronata var. notatior	Endangered	None	1B.1	Playas, chenopod scrub, valley and foothill grassland, vernal pools.	Dry, alkaline flats in the San Jacinto River Valley. 400-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex joaquiniana	None	None	1B.2	Chenopod scrub, alkali meadow, valley and foothill grassland.	In seasonal alkali wetlands or alkali sink scrub with Distichlis spicata, Frankenia, etc. 1-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcuttia inaequalis	Threatened	Endangered	1B.1	Vernal pools.	30-755m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Sagittaria sanfordii	None	None	1B.2	Marshes and swamps.	In standing or slow-moving freshwater ponds, marshes, and ditches. 0-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Juncus luciensis	None	None	1B.2	Vernal pools, meadows, lower montane coniferous forest, chaparral, Great Basin scrub.	Vernal pools, ephemeral drainages, wet meadow habitats and streamsides. 300-2040m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Pogogyne clareana	None	Endangered	1B.2	Riparian woodland.	Tributaries of the Nacimiento River, in moist sandy soil. 300-490m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Sidalcea stipularis	None	Endangered	1B.1	Marshes and swamps.	Wet montane marshes fed by springs. 700-740m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Botrychium crenulatum	None	None	2.2	Bogs and fens, meadows, lower montane coniferous forest, freshwater marsh.	Moist meadows, near creeks. 1500-2670m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Pedicularis crenulata	None	None	2.2	Meadows and seeps.	Near streams in wet meadows. 2100-2300m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Limnanthes vinculans	Endangered	Endangered	1B.1	Mesic meadows, vernal pools, valley and foothill grassland.	Swales, wet meadows and marshy areas in valley oak savanna; on poorly drained soils of clays and sandy loam. 15-115m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex serpenticola	None	None	2.3	Meadows and seeps.	Mesic, serpentine sites. 60-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Neviusia cliftonii	None	None	1B.2	Lower montane coniferous forest, riparian woodland.	Shaded, north-facing, or sheltered canyons. Sometimes on limestone. Mesic areas. 300-500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Carex sheldonii	None	None	2.2	Lower montane coniferous forest, marshes and swamps, riparian scrub.	Mesic sites; along creeks and in wet meadows. 1065-1755m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Heterotheca shevockii	None	None	1B.3	Chaparral, cismontane woodland, riparian	Ditches, crevices, shallow sand. 230-900m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				woodland.		occupied habitat or substantially impact suitable habitat.
Plagiobothrys nitens	None	None	2.1	Alkaline meadows.	Moise alkaline meadows, near springs. 1510-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lewisia brachycalyx	None	None	2.2	Lower montane coniferous forest, meadows.	Dry to moist meadows in rich loam. 1400-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Raillardella pringlei	None	None	1B.2	Bogs and fens, meadows and seeps.	Streambanks, wet meadows and bogs in areas of serpentinized rock. 1200-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scutellaria lateriflora	None	None	2.2	Meadows and seeps, marshes and swamps.	Wet meadows and marshes. -3-500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Juncus nevadensis var. inventus	None	None	2.2	Bogs and fens.	0-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Balsamorhiza sericea	None	None	1B.3	Lower montane coniferous forest, meadows.	Collections from Douglas-fir forest, meadow, and Jeffrey pine forest. Can be on serpentine. 1310-1735m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cryptantha crinita	None	None	1B.2	Cismontane woodland, valley foothill grassland, lower montane coniferous forest, riparian forest, riparian woodland.	In gravelly stream beds. 85-220m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Astragalus argophyllus var. argophyllus	None	None	2.2	Meadows and seeps, playas.	Alkaline and saline meadows, stream banks and lake shores, in stiff alluvial clays and loams. 1280-2350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Castilleja miniata ssp. elata	None	None	2.2	Lower montane coniferous forest, bogs and fens.	Limited to mesic serpentine soils; often associated with bogs, seeps, stream benches, and dry gullies. 0-1750m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Phacelia leonis	None	None	1B.3	Upper montane coniferous forest, meadows and seeps.	Sandy, moist soil, sometimes on serpentine. 1200-1950m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Schoenoplectus heterochaetus	None	None	2.3	Marshes and swamps, lower montane coniferous forest.	Montane lake margins. In California: 1600m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						substantially impact suitable habitat.
Orcuttia tenuis	Threatened	Endangered	1B.1	Vernal pools.	30-1735m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Potamogeton filiformis	None	None	2.2	Marshes and swamps.	Shallow, clear water of lakes and drainage channels. 15-2310m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Thelypodium stenopetalum	Endangered	Endangered	1B.1	Meadows and seeps, pebble plains.	Seasonally moist alkaline clay soils; associated with seeps and springs in the pebble plains. 1900-2245m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Koeberlinia spinosa ssp. tenuispina	None	None	2.2	Sonoran desert scrub, riparian woodland.	Usually in sandy washes. 145-510m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Androsace filiformis	None	None	2.3	Upper montane coniferous forest, meadows and seeps.	Wet, clay, meadow soil with grasses and sedges; sometimes on streambanks; in somewhat disturbed sites (by cattle). 1800m	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Cirsium crassicaule	None	None	1B.1	Chenopod scrub, marshes and swamps, riparian scrub.	Sloughs, riverbanks, and marshy areas. 3-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parnassia parviflora	None	None	2.2	Meadows and seeps.	Wet areas. 2000-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex pusilla	None	None	2	Great Basin scrub, meadows and seeps.	Known from hot springs, alkali springs. 1300-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Centromadia pungens ssp. laevis	None	None	1B.1	Valley and foothill grassland, chenopod scrub, meadows, playas, riparian woodland.	Alkali meadow, alkali scrub; also in disturbed places. 0-480m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Erigeron nivalis	None	None	2.3	Alpine boulder and rock field, meadows and seeps, subalpine coniferous forest.	On volcanic rock outcrops in cracks and crevices. 1955-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Alopecurus aequalis var. sonomensis	Endangered	None	1B.1	Freshwater marshes and swamps, riparian scrub.	Wet areas, marshes, and riparian banks with other wetland species. 5-360m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Blennosperma bakeri	Endangered	Endangered	1B.1	Vernal pools, valley and foothill grassland.	Vernal pools and swales. 10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Thelypteris puberula var. sonorensis	None	None	2.2	Meadows and seeps.	Along streams, seepage areas. 50-550m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Scutellaria bolanderi ssp. austromontana	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	In gravelly soils on streambanks or in mesic sites in oak or pine woodland. 425-2000m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Centromadia parryi ssp. australis	None	None	1B.1	Marshes and swamps (margins), valley and foothill grassland.	Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-425m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eryngium spinosepalum	None	None	1B.2	Vernal pools, valley and foothill grassland.	Some sites on clay soil of granitic origin; vernal pools, within grassland. 100-420m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Navarretia fossalis	Threatened	None	1B.1	Vernal pools, chenopod scrub, marshes and swamps, playas.	San Diego hardpan & San Diego claypan vernal pools; in swales & V.P's, often surr. by other habitat types. 30-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pyrrocoma lucida	None	None	1B.2	Lower montane coniferous forest, meadows and seeps.	Alkaline flats, clay soils. 700-1880m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Castilleja campestris ssp. succulenta	Threatened	Endangered	1B.2	Vernal pools, valley and foothill grassland.	Moist places, often in acidic soils. 25-750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Symphyotrichum lentum	None	None	1B.2	Marshes and swamps (brackish and freshwater).	Most often seen along sloughs with Phragmites, Scirpus, blackberry, Typha, etc. 0-3m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Campanula californica	None	None	1B.2	Bogs and fens, closed-cone coniferous forest, coastal prairie, meadows, freshwater marsh, N Coast coniferous forest.	Bogs and marshes in a variety of habitats; uncommon where it occurs. 1-405m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Rorippa subumbellata	Candidate	Endangered	1B.1	Lower montane coniferous forest, meadows and seeps.	Sandy beaches, on lakeside margins and in riparian communities; on decomposed granite sand. 1885-1900(2395)m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Oreostemma elatum	None	None	1B.2	Bogs and fens, meadows and seeps, upper montane coniferous forest.	Mesic sites. 1005-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Draba praealta	None	None	2.3	Meadows and seeps.	Mesic sites. 2500-3415m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cordylanthus tecopensis	None	None	1B.2	Meadows (alkaline), chenopod scrub, Mojavean desert scrub.	Restricted to moist alkaline soils. 60-625m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brodiaea filifolia	Threatened	Endangered	1B.1	Cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Usually associated with annual grassland and vernal pools; often surr by shrubland habitats. Clay soils. 25-860m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Calamagrostis crassiglumis	None	None	2.1	Coastal scrub, freshwater marsh.	Usually in marshy swales surrounded by grassland or coastal scrub. 10-45m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex tiogana	None	None	1B.3	Meadows.	On terraces next to lakes; mesic sites. 3090-3310m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mertensia cusickii	None	None	2.2	Great Basin scrub, meadows and seeps.	1495-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lysimachia thyrsiflora	None	None	2.3	Meadows (mesic), marshes, upper montane coniferous forest.	Mesic sites; known from lake margins, along streams and in wet meadows. 975-1675m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Saxifraga cespitosa	None	None	2.3	Meadows and seeps.	Damp, rocky places. 915-2760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eryngium pinnatisectum	None	None	1B.2	Vernal pools, cismontane woodland, lower montane coniferous forest.	Volcanic soils; vernal pools and mesic sites within other natural communties. 250-450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sarcocornia utahensis	None	None	2.2	Chenopod scrub, playas.	Alkaline sites. 320m in california.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mimulus glabratus ssp. utahensis	None	None	2.1	Meadows and seeps, pinyon and juniper woodland.	600-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Thermopsis californica var. semota	None	None	1B.2	Lower montane coniferous forest, meadows and seeps, cismontane woodland, valley and foothill grassland.	Pine forests and meadow edges, on rocky slopes and outcrops, and along roadsides. 1030-1870m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Atriplex persistens	None	None	1B.2	Vernal pools.	Alkaline vernal pools. 10-115m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Schoenoplectus subterminalis	None	None	2.3	Marshes and swamps.	Montane lake margins, in shallow water. 750-2335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howellia aquatilis	Threatened	None	2.2	Freshwater marshes and swamps, lower montane coniferous forest.	In clear ponds with other aquatics and surrounded by ponderosa pine forest and sometimes riparian associates. 3-1375m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ribes hudsonianum var. petiolare	None	None	2.3	Riparian scrub.	Along creeks with Salix, Heracleum, etc. 1500-2215m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Lilium occidentale	Endangered	Endangered	1B.1	Coastal scrub, freshwater marsh, bogs and fens,	Well-drained, old beach washes overlain w/wind-	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
				coastal bluff scrub, coastal prairie, No. Coast coniferous forest.	blown alluvium & org. topsoil; usu near margins of Sitka spruce. 2-185m.	occupied habitat or substantially impact suitable habitat.
Packera hesperia	None	None	2.2	Upper montane coniferous forest, meadows and seeps.	Serpentine. 500-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Suaeda occidentalis	None	None	2.3	Great Basin scrub.	Alkaline soils; mesic sites.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex occidentalis	None	None	2.3	Lower montane coniferous forest, meadows and seeps.	1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex scirpoidea ssp. pseudoscirpoidea	None	None	2.2	Alpine boulder and rock field, meadows and seeps, subalpine coniferous forest.	Often on limestone; mesic sites. 3200-3700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex vallicola	None	None	2.3	Great Basin scrub, meadows and seeps.	Mesic sites. 1525-2805m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Viola primulifolia ssp. occidentalis	None	None	1B.2	Bogs and fens, marshes and swamps.	Streamside flats and bogs; serpentine soils. 100-990m.	Low. Suction dredging not likely to occur in

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						occupied habitat or substantially impact suitable habitat.
Carex atherodes	None	None	2.2	Meadows and seeps, marshes and swamps, pinyon-juniper woodland.	1300-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Rhynchospora alba	None	None	2.2	Bogs and fens, marshes and swamps.	Freshwater marshes and sphagnum bogs. 60-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Malaxis monophyllos ssp. brachypoda	None	None	2.1	Meadows and seeps, bogs and fens, upper montane coniferous forest.	Hillside bogs and mesic meadows. 2200-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pseudognaphalium leucocephalum	None	None	2.2	Riparian woodland, cismontane woodland, coastal scrub, chaparral.	Sandy, gravelly sites. 0-2100m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Carex albida	Endangered	Endangered	1B.1	Freshwater marsh, bogs and fens, meadows and seeps.	Wet meadows and marshes. 35-55m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Potamogeton praelongus	None	None	2.3	Marshes and swamps.	Deep water, lakes. 1645-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Campanula wilkinsiana	None	None	1B.2	Subalpine meadows, upper montane coniferous forest, subalpine coniferous forest.	Often on streambanks in meadows. 1515-2600m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Polyctenium williamsiae	None	None	1B.2	Alkali marshes, playas, vernal pools.	1350-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Antennaria lanata	None	None	2.2	Meadows and seeps.	Rocky sites. 2225m in California.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carex lasiocarpa	None	None	2.3	Bogs and fens, marshes and swamps.	Sphagnum bogs, freshwater marsh, and probably other moss-dominated habitats as well. 1800-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Trichocoronis wrightii var. wrightii	None	None	2.1	Marshes and swamps, riparian forest, meadows and seeps, vernal pools.	Mud flats of vernal lakes, drying river beds, alkali meadows. 5-435m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-5. AQUATIC AND WETLAND PLANT SPECIES

Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						suitable habitat.
Epilobium luteum	None	None	2.3	Lower montane coniferous forest, meadows.	Along streams and in seeps. 1500-1705m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Mimulus pulchellus	None	None	1B.2	Lower montane coniferous forest, meadows and seeps.	Sandy decomposed granite soils and moist meadows; vernally wet sites. 600-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Platanthera yosemitensis	None	None	1B.2	Meadows and seeps.	Mesic areas. Granite substrates. 2100-2285m.	Low. Limited distribution; Suction dredging highly unlikely to occur in occupied habitat or impact suitable habitat.
Plagiobothrys torreyi var. torreyi	None	None	1B.2	Lower montane coniferous forest, meadows and seeps.	1200-1370m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

** List of Abbreviations for Federal and State Species Status follow below:*

FC Federal candidate for listing
FE Federal endangered
FP State fully protected species
FPT Federal proposed: threatened
SSC State species of special concern
FSC Federal species of concern (per NOAA or USFWS website)
SCE State candidate: endangered
SE State endangered
SSC State species of special concern
ST State threatened

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Abert's sanvitalia	*Sanvitalia abertii*	None	None	2.2	Pinyon-juniper woodland.	Rocky limestone slopes and washes. 1570-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Abrams' oxytheca	*Acanthoscyphus parishii var. abramsii*	None	None	1B.2	Chaparral.	Shale to sandy places. 1150-2060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Abrams' spurge	*Chamaesyce abramsiana*	None	None	2.2	Mojavean desert scrub, Sonoran desert scrub.	Sandy sites. -5-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
adobe lomatium	*Lomatium roseanum*	None	None	1B.2	Lower montane coniferous forest, Great Basin scrub.	Rocky, gravelly openings. 1460-2145m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
adobe-lily	*Fritillaria pluriflora*	None	None	1B.2	Chaparral, cismontane woodland, foothill grassland.	Usually on clay soils; sometimes serpentine. 55-820m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Agoura Hills dudleya	*Dudleya cymosa ssp. agourensis*	Threatened	None	1B.2	Chaparral, cismontane woodland.	Rocky, volcanic breccia. 200-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Alexander's buckwheat	*Eriogonum ochrocephalum*	None	None	2.2	Great Basin scrub, pinyon and juniper	Shale or gravel. 1300-2880m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	var. alexanderae				woodland.		occupied habitat or substantially impact suitable habitat.
Algodones Dunes sunflower	*Helianthus niveus ssp. tephrodes*	None	Endangered	1B.2	Desert dunes.	On partialized stabilized desert dunes. 50-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
alkali hymenoxys	*Hymenoxys lemmonii*	None	None	2.2	Great Basin scrub, lower montane coniferous forest, meadows and seeps.	Subalkaline soils. 240-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
alkali mariposa-lily	*Calochortus striatus*	None	None	1B.2	Chaparral, chenopod scrub, Mojavean desert scrub, meadows.	Alkaline meadows and ephemeral washes. 90-1595m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Allen's pentachaeta	*Pentachaeta aurea ssp. allenii*	None	None	1B.1	Valley and foothill grasslands, coastal scrub.	Openings in scrub or grassland.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
alpine crisp moss	*Tortella alpicola*	None	None	2.3	Cismontane woodland.	Moss on volcanic rock. 1400m in California.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
alpine dusty maidens	*Chaenactis douglasii var. alpina*	None	None	2.3	Alpine boulder and rock fields.	Open, subalpine to alpine gravel and crevices; granitic substrate. 2725-3400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
alpine jewel-flower	*Streptanthus gracilis*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	Gravel pockets among granitic outcrops and talus boulders. 2800-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
alpine marsh violet	*Viola palustris*	None	None	2.2	Coastal scrub, bogs and fens.	Swampy, shrubby places in coastal scrub or coastal bogs. 0-15m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
angel trumpets	*Acleisanthes longiflora*	None	None	2.3	Sonoran desert scrub.	Generally on limestone. 10-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Anthony Peak lupine	*Lupinus antoninus*	None	None	1B.3	Upper montane coniferous forest, lower montane coniferous forest.	Open areas with surrounding forest; rocky sites. 1210-2285m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Antioch Dunes evening-primrose	*Oenothera deltoides ssp. howellii*	Endangered	Endangered	1B.1	Interior dunes.	Remnant river bluffs and sand dunes east of Antioch. 0-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
aphanisma	*Aphanisma blitoides*	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub.	On bluffs and slopes near the ocean in sandy or clay soils. In steep decline on the islands and the mainland. 1-305m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Applegate stonecrop	*Sedum oblanceolatum*	None	None	1B.1	Upper montane coniferous forest.	Rocky sites. 400-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
appressed muhly	*Muhlenbergia appressa*	None	None	2.2	Coastal sage scrub, Mojavean desert scrub, valley and foothill grassland. Possibly undercollected in California.	Rocky slopes, canyon bottoms. 20-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arburua Ranch jewel-flower	*Streptanthus insignis ssp. lyonii*	None	None	1B.2	Coastal scrub.	Serpentine slopes, also on non-serpentine. 230-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
arcuate bush-mallow	*Malacothamnus arcuatus*	None	None	1B.2	Chaparral.	Gravelly alluvium. 80-355m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arizona cottontop	*Digitaria californica*	None	None	2.3	Sonoran desert scrub, Mojavean desert scrub.	Rocky schist hillsides in California; open plains out of state. 290-1490m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arizona spurge	*Chamaesyce arizonica*	None	None	2.3	Sonoran desert scrub.	Sandy soils. 50-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
aromatic canyon gooseberry	*Ribes menziesii var. ixoderme*	None	None	1B.2	Chaparral, cismontane woodland.	In forest openings. 610-1160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arroyo de la Cruz mariposa-lily	*Calochortus clavatus var. recurvifolius*	None	None	1B.2	Coastal bluff scrub, maritime chaparral, coastal prairie, lower montane coniferous forest.	Ocean bluffs, grassy slopes, above riparian zones and in grassland bordering chaparral. 10-125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Arroyo Seco bush-mallow	*Malacothamnus palmeri var. lucianus*	None	None	1B.2	Chaparral, meadows and seeps.	Gravel banks and sandstone rocks on west-facing slopes in full sun. 10-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ash Creek ivesia	*Ivesia paniculata*	None	None	1B.2	Great Basin scrub, pinyon-juniper woodland, upper montane coniferous forest.	Gravelly, shallow volcanic ash on barren ridges. 1500-1915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ash Valley milk-vetch	*Astragalus anxius*	None	None	1B.3	Great Basin scrub, pinyon and juniper woodland, upper montane coniferous forest.	Gravelly, shallow, volcanic soils. 1550-1645m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
ash-gray paintbrush	*Castilleja cinerea*	Threatened	None	1B.2	Pebble plains, upper montane coniferous forest, Mojavean desert scrub, meadows, pinyon-juniper woodland.	Endemic to the San Bernardino Mountains, in clay openings; often in meadow edges. 1800-2835m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Ashland thistle	*Cirsium ciliolatum*	None	Endangered	2.1	Cismontane woodland, valley and foothill grassland.	Dry, grassy, south-facing slopes with rock outcrops. 800-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Aven Nelson's phacelia	*Phacelia anelsonii*	None	None	2.3	Joshua tree woodland, pinyon and juniper woodland.	Shady places in rich soil, base of sandstone or limestone cliffs, among rocks or in washes. 1200-1575m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bailey's ivesia	*Ivesia baileyi var. baileyi*	None	None	2.3	Lower montane coniferous forest.	Crevices in volcanic rock cliffs and on rock outcrops. 1575-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Baja navarretia	*Navarretia peninsularis*	None	None	1B.2	Lower montane coniferous forest, chaparral.	Wet areas in open forest. 1500-2425m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Baker's goldfields	*Lasthenia californica ssp. bakeri*	None	None	1B.2	Closed-cone coniferous forest, coastal scrub.	Openings. 60-520m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Baker's larkspur	*Delphinium bakeri*	Endangered	Endangered	1B.1	Coastal scrub, grasslands.	Only site occurs on NW-facing slope, on decomposed shale. Hist. known from grassy areas along fencelines too. 90-205m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Bakersfield cactus	*Opuntia basilaris var. treleasei*	Endangered	Endangered	1B.1	Chenopod scrub, valley and foothill grassland, cismontane woodland.	Coarse or cobbly well-drained granitic sand on bluffs, low hills, and flats within grassland. 90-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bakersfield smallscale	*Atriplex tularensis*	None	Endangered	1B.1	Chenopod scrub, alkali meadow.	Historically in valley sink scrub or with saltgrass. 90-110m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bald Mountain milk-vetch	*Astragalus umbraticus*	None	None	2.3	Cismontane woodland.	Dry open oak and pine woodlands. 200-1250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Baldwin Lake linanthus	*Linanthus killipii*	None	None	1B.2	Alkaline meadows, pebble plain, pinyon-juniper woodland, upper montane coniferous forest.	Usually on pebble plains with other rare species. 1700-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Barron's buckwheat	*Eriogonum spectabile*	None	None	1B.2	Upper montane coniferous forest.	Glaciated andesite, rocky or sandy sites. 2010-2025m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Barstow woolly sunflower	*Eriophyllum mohavense*	None	None	1B.2	Desert chenopod scrub, Mojavean desert scrub, desert playas.	Mostly in open, silty or sandy areas w/saltbush scrub, or creo. bush scrub. Barren ridges or margins of playas. 500-900m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Barton Flats horkelia	*Horkelia wilderae*	None	None	1B.1	Lower montane coniferous forest, upper montane coniferous forest, chaparral.	On rocky, north aspects in openings that hold persistent snowdrifts. 1675-2925m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beach goldenaster	*Heterotheca sessiliflora ssp. sessiliflora*	None	None	1B.1	Coastal dunes, coastal scrub, chaparral (coastal).	Sandy sites. 0-1224m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beach layia	*Layia carnosa*	Endangered	Endangered	1B.1	Coastal dunes. hugely reduced in range along California's North Coast dunes.	On sparsely vegetated, semi-stabilized dunes, usually behind foredunes. 0-75m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beach spectaclepod	*Dithyrea maritima*	None	Threatened	1B.1	Coastal dunes, coastal scrub. formerly more widespread in coastal habitats in So. Calif.	Sea shores, on sand dunes, and sandy places near the shore. 3-50m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beaked clarkia	*Clarkia rostrata*	None	None	1B.3	Cismontane woodland, valley and foothill grassland.	North-facing slopes; sometimes on sandstone. 60-460m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beaked tracyina	*Tracyina rostrata*	None	None	1B.2	Cismontane woodland, valley and foothill grassland.	Open grassy meadows within oak woodland and grassland habitats. 150-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bear Lake buckwheat	*Eriogonum microthecum*	None	None	1B.1	Lower montane coniferous forest.	Clay outcrops. 2000-2100m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	var. lacus-ursi						occupied habitat or substantially impact suitable habitat.
bearded lupine	*Lupinus latifolius var. barbatus*	None	None	1B.2	Upper montane coniferous forest.	Mesic sites. 1500-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
beautiful cholla	*Opuntia pulchella*	None	None	2.2	Desert dunes, Mojavean desert scrub, Great Basin scrub?	Sand of dunes, dry lake borders, river bottoms, washes, valleys and sagebrush desert. 1500-1980m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ben Lomond buckwheat	*Eriogonum nudum var. decurrens*	None	None	1B.1	Chaparral, cismontane woodland, lower montane coniferous forest.	Ponderosa pine sandhills in Santa Cruz County. 50-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ben Lomond spineflower	*Chorizanthe pungens var. hartwegiana*	Endangered	None	1B.1	Lower montane coniferous forest.	Zayante coarse sands in maritime ponderosa pine sandhills. 120-470m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
bent-flowered fiddleneck	*Amsinckia lunaris*	None	None	1B.2	Cismontane woodland, valley and foothill grassland.	50-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Betty's dudleya	*Dudleya abramsii ssp. bettinae*	None	None	1B.2	Coastal scrub, valley and foothill grassland, chaparral.	On rocky, barren exposures of serpentine within scrub vegetation. 20-180m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Big Bear Valley milk-vetch	*Astragalus lentiginosus var. sierrae*	None	None	1B.2	Mojavean desert scrub, meadows, pinyon-juniper woodland, upper montane coniferous forest.	Stony meadows and open pinewoods; sandy and gravelly soils in a variety of habitats. 1800-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Big Bear Valley phlox	*Phlox dolichantha*	None	None	1B.2	Pebble plains, upper montane coniferous forest.	Sloping hillsides, in shade under pines and Q. kelloggii, with heavy pine litter; also in openings. 2000-2970m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Big Bear Valley sandwort	*Arenaria ursina*	Threatened	None	1B.2	Pebble plain, pinyon and juniper woodland.	Mesic, rocky sites. 1750-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Big Bear Valley woollypod	*Astragalus leucolobus*	None	None	1B.2	Lower montane coniferous forest, pebble plain, pinyon and juniper woodland, upper montane coniferous forest.	Dry pine woods, gravelly knolls among sagebrush, or stony lake shores in the pine belt. (425)1670-2515m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
big tarplant	*Blepharizonia plumosa*	None	None	1B.1	Valley and foothill grassland.	Dry hills & plains in annual grassland. Clay to clay-loam soils; usually on slopes and often in burned areas. 15-455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
big-scale balsamroot	*Balsamorhiza macrolepis var.*	None	None	1B.2	Valley and foothill grassland,	Sometimes on serpentine. 35-1000m.	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	macrolepis				cismontane woodland.		occupied habitat or substantially impact suitable habitat.
black-flowered figwort	*Scrophularia atrata*	None	None	1B.2	Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub, riparian scrub.	Sand, diatomaceous shales, and soils derived from other parent material; around swales and in sand dunes. 10-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Blair's munzothamnus	*Munzothamnus blairii*	None	None	1B.2	Coastal scrub, coastal bluff scrub.	Rocky canyon walls. 20-455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Blakley's spineflower	*Chorizanthe blakleyi*	None	None	1B.3	Chaparral.	Closely related to C. palmeri. 600-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Blasdale's bent grass	*Agrostis blasdalei*	None	None	1B.2	Coastal dunes, coastal bluff scrub, coastal prairie. Includes Agrostis blasdalei var. marinensis, State-listed Rare.	Sandy or gravelly soil close to rocks; often in nutrient-poor soil with sparse vegetation. 5-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Blochman's dudleya	*Dudleya blochmaniae ssp. blochmaniae*	None	None	1B.1	Coastal scrub, coastal bluff scrub, valley and foothill grassland.	Open, rocky slopes; often in shallow clays over serpentine or in rocky areas w/little soil. 5-450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Blochman's leafy daisy	*Erigeron blochmaniae*	None	None	1B.2	Coastal dunes.	Sand dunes and hills. 3-185m.	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
blue alpine phacelia	*Phacelia sericea var. ciliosa*	None	None	2.3	Upper montane coniferous forest, subalpine coniferous forest.	Among rocks on ridgetops, peaks, and at the base of cliffs. 2100-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
blue coast gilia	*Gilia capitata ssp. chamissonis*	None	None	1B.1	Coastal dunes, coastal scrub.	2-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
blunt-fruited sweet-cicely	*Osmorhiza depauperata*	None	None	2.3	Lower montane coniferous forest.	1830-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
blushing wild buckwheat	*Eriogonum ursinum var. erubescens*	None	None	1B.3	Lower montane coniferous forest, montane chaparral.	Rocky sites including scree and talus. 1600-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bodie Hills cusickiella	*Cusickiella quadricostata*	None	None	1B.2	Great Basin scrub, pinyon-juniper woodland.	Endemic to the Walker River drainage; mainly confined to the shallow decomposed granite or clay soils. 1985-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Bodie Hills rock-cress	*Arabis bodiensis*	None	None	1B.3	Alpine boulder and rock field, Great Basin scrub, pinyon-juniper woodland, subalpine	In rock crevices, outcrops, and on steep slopes. Granite and volcanic substrates.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					coniferous forest.	2195-3530m.	suitable habitat.
Bolander's horkelia	*Horkelia bolanderi*	None	None	1B.2	Lower montane coniferous forest, chaparral, meadows, valley and foothill grassland.	Grassy margins of vernal pools and meadows. 450-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Booth's evening-primrose	*Camissonia boothii ssp. boothii*	None	None	2.3	Joshua tree woodland, pinyon-juniper woodland.	900-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Booth's hairy evening-primrose	*Camissonia boothii ssp. intermedia*	None	None	2.3	Great Basin scrub, pinyon-juniper woodland.	Sandy sites. 1500-2150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Borrego Valley pepper-grass	*Lepidium flavum var. felipense*	None	None	1B.2	Sonoran desert scrub, pinyon-juniper woodland.	Sandy, clay, or silty soils. 450-840m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brandegee's clarkia	*Clarkia biloba ssp. brandegeeae*	None	None	1B.2	Chaparral, cismontane woodland.	Often in roadcuts. 295-885m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brandegee's eriastrum	*Eriastrum brandegeeae*	None	None	1B.2	Chaparral, cismontane woodland.	On barren volcanic soils; often in open areas. 345-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Brandegee's sage	*Salvia brandegeei*	None	None	1B.2	Closed-cone coniferous forest, chaparral, coastal scrub.	Coastal bluffs and seaward canyons. 5-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brand's star phacelia	*Phacelia stellaris*	Candidate	None	1B.1	Coastal scrub, coastal dunes.	Open areas. 5-1515m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Braunton's milk-vetch	*Astragalus brauntonii*	Endangered	None	1B.1	Closed-cone coniferous forest, chaparral, coastal scrub, valley and foothill grassland.	Recent burns or disturbed areas; in stiff gravelly clay soils overlying granite or limestone. 4-640m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brewer's spineflower	*Chorizanthe breweri*	None	None	1B.3	Chaparral, cismontane woodland, coastal scrub, closed-cone coniferous forest.	Rocky or gravelly serpentine sites; usually in barren areas. 45-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Brewer's western flax	*Hesperolinon breweri*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Often in rocky serpentine soil in serpentine chaparral and serpentine grassland. 30-885m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
bristly scaleseed	*Spermolepis echinata*	None	None	2.3	Sonoran desert scrub.	Sandy or rocky sites. 60-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
brittle prickly-pear	*Opuntia fragilis*	None	None	2.1	Pinyon-juniper woodland.	Volcanic soils. 820m in california.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
broad-keeled milk-vetch	*Astragalus platytropis*	None	None	2.2	Alpine boulder and rock fields, pinyon-juniper woodland, subalpine coniferous forest.	Bare ridges above timber line in pumice gravel, granite, dolomite, or limestone. 2330-3550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
brook pocket moss	*Fissidens aphelotaxifolius*	None	None	2.2	Lower montane coniferous forest, upper montane coniferous forest.	Moss growing on rocks in stream channels and waterfalls; also in splash zones. 2000-2200m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
brown turbans	*Malperia tenuis*	None	None	2.3	Sonoran desert scrub.	Sandy places and rocky slopes. 15-335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
burro grass	*Scleropogon brevifolius*	None	None	2.3	Mojavean desert scrub.	Grassy areas, decomposed granite. 1575-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Butte County checkerbloom	*Sidalcea robusta*	None	None	1B.2	Chaparral, cismontane woodland.	Small draws and rocky crevices. 85-335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Butte County golden clover	*Trifolium jokerstii*	None	None	1B.2	Valley and foothill grassland, vernal pools.	Known only from 2 sites in Butte County in the vicinity of Table Mtn in	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						grassland & swales near oak woodland. 50-385m.	substantially impact suitable habitat.
calico monkeyflower	*Mimulus pictus*	None	None	1B.2	Broadleafed upland forest, cismontane woodland.	In bare ground around gooseberry bushes or around granite rock outcrops. 100-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California adolphia	*Adolphia californica*	None	None	2.1	Chaparral, coastal sage scrub, valley and foothill grassland.	From sandy/gravelly to clay soils within grassland, coastal sage scrub, or chaparral; various exposures. 15-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California ayenia	*Ayenia compacta*	None	None	2.3	Mojavean desert scrub, Sonoran desert scrub.	Sandy and gravelly washes in the desert; dry desert canyons. 150-1095m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California beardtongue	*Penstemon californicus*	None	None	1B.2	Chaparral, lower montane coniferous forest, pinyon-juniper woodland.	Stony slopes and shrubby openings; sandy or granitic soils. 1160-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California dissanthelium	*Dissanthelium californicum*	None	None	1B.2	Coastal scrub.	5-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California globe mallow	*Iliamna latibracteata*	None	None	1B.2	North Coast coniferous forest.	Seepage areas in silty clay loam. 500-2000m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
California jewel-flower	*Caulanthus californicus*	Endangered	Endangered	1B.1	Chenopod scrub, valley and foothill grassland, pinyon-juniper woodland.	Historical from various valley habitats in both the Central Valley and Carrizo Plain. 65-900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
California screw moss	*Tortula californica*	None	None	1B.2	Chenopod scrub, valley and foothill grassland.	Moss growing on sandy soil. 10-1460m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Callahan's mariposa-lily	*Calochortus syntrophus*	None	None	1B.1	Cismontane woodland.	525-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cambria morning-glory	*Calystegia subacaulis ssp. episcopalis*	None	None	1B.2	Chaparral, cismontane woodland.	60-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Canadian buffalo-berry	*Shepherdia canadensis*	None	None	2.2	Upper montane coniferous forest.	Rocky streamsides, on serpentine. 1731m in California.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
candleholder dudleya	*Dudleya candelabrum*	None	None	1B.2	Coastal scrub.	In rock walls and crevices, and on canyon sides. 4-535m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
canescent draba	*Draba breweri var. cana*	None	None	2.3	Alpine boulder and rock field, meadows, subalpine coniferous forest.	In Calif., known only from two occurrences near Lake Genevieve and Wheeler Pk. 3000-3505m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cantelow's lewisia	*Lewisia cantelovii*	None	None	1B.2	Broadfleafed upland forest, lower montane coniferous forest, cismontane woodland, chaparral.	Mesic rock outcrops and wet cliffs, usually in moss or clubmoss; on granitics or sometimes on serpentine. 330-1340m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Canyon Creek stonecrop	*Sedum paradisum*	None	None	1B.3	Chaparral, lower montane coniferous forest, subalpine coniferous forest, broadleafed upland forest.	Rock faces, in crevices of exposed granite. 1060-1860m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
caper-fruited tropidocarpum	*Tropidocarpum capparideum*	None	None	1B.1	Valley and foothill grassland.	Alkaline clay. 0-455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Caribou coffeeberry	*Frangula purshiana ssp. ultramafica*	None	None	1B.2	Lower montane coniferous forest, upper montane coniferous forest, chaparral.	On serpentine. 825-1930m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carmel Valley bush-mallow	*Malacothamnus palmeri var. involucratus*	None	None	1B.2	Cismontane woodland, chaparral.	Talus hilltops and slopes, sometimes on serpentine. Burn dependent. 30-1100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Carmel Valley malacothrix	*Malacothrix saxatilis var. arachnoidea*	None	None	1B.2	Chaparral.	Rock outcrops or steep rocky roadcuts. 25-1215m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Carquinez goldenbush	*Isocoma arguta*	None	None	1B.1	Valley and foothill grassland.	Alkaline soils, flats, lower hills. On low benches near drainages & on tops & sides of mounds in swale habitat. 1-20m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cascade alpine campion	*Silene suksdorfii*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest.	Rocky, volcanic soils. 2400-3100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cascade stonecrop	*Sedum divergens*	None	None	2.3	Alpine boulder and rock field.	Rocky alpine slopes and cool cliffs. 1520-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Castle Crags harebell	*Campanula shetleri*	None	None	1B.3	Lower montane coniferous forest.	In protected rock crevices in granite. 1210-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Castle Crags ivesia	*Ivesia longibracteata*	None	None	1B.3	Lower montane coniferous forest.	Crevices in granitic cliffs. About 1365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Catalina crossosoma	*Crossosoma californicum*	None	None	1B.2	Chaparral, coastal scrub.	On rocky sea bluffs, wooded canyons, and dry, open sunny spots on rocky clay. 0-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Chambers' physaria	*Physaria chambersii*	None	None	2.3	Pinyon-juniper woodland.	Limestone soils; rocky sites. 1500-2590m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
chaparral ash	*Fraxinus parryi*	None	None	2.2	Chaparral.	Open mixed chaparral and in the chaparral-sage scrub interface in California. 213-620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
chaparral harebell	*Campanula exigua*	None	None	1B.2	Chaparral.	Rocky sites, usually on serpentine in chaparral. 300-1250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
chaparral ragwort	*Senecio aphanactis*	None	None	2.2	Cismontane woodland, coastal scrub.	Drying alkaline flats. 20-575m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
chaparral sand-verbena	*Abronia villosa var. aurita*	None	None	1B.1	Chaparral, coastal scrub	Sandy areas. 80-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Charlotte's phacelia	*Phacelia nashiana*	None	None	1B.2	Joshua tree woodland, Mojavean	Granitic soils; sandy or rocky areas on steep	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					desert scrub, pinyon-juniper woodland.	slopes or flats. 600-2200m.	occupied habitat or substantially impact suitable habitat.
Chinese Camp brodiaea	*Brodiaea pallida*	Threatened	Endangered	1B.1	Valley and foothill grassland.	In flat, rocky, intermittent streambed on serpentine. 385m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Choris' popcorn-flower	*Plagiobothrys chorisianus var. chorisianus*	None	None	1B.2	Chaparral, coastal scrub, coastal prairie.	Mesic sites. 15-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cienega Seca oxytheca	*Acanthoscyphus parishii var. cienegensis*	None	None	1B.3	Upper montane coniferous forest.	Dry gravelly banks and granitic sand. 2090-2450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cima milk-vetch	*Astragalus cimae var. cimae*	None	None	1B.2	Great Basin scrub, Joshua tree woodland, pinyon-juniper woodland.	Mesas and stony hillsides, in stiff, calcareous clay soils, commonly among or sheltering under sagebrush. 890-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Clara Hunt's milk-vetch	*Astragalus claranus*	Endangered	Threatened	1B.1	Cismontane woodland, valley and foothill grassland, chaparral.	Open grassy hillsides, esp. on exposed shoulders in thin, volcanic clay soil moist in spring. 75-235m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cliff cinquefoil	*Potentilla rimicola*	None	None	2.3	Subalpine coniferous forest, upper montane coniferous	Granite crevices; rocky sites. 2390-3030m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest.		substantially impact suitable habitat.
cliff spurge	*Euphorbia misera*	None	None	2.2	Coastal bluff scrub, coastal scrub.	Rocky sites. 10-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Clifton's eremogone	*Eremogone cliftonii*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest, chaparral.	Openings; granitic substrates. 445-1770m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
closed-throated beardtongue	*Penstemon personatus*	None	None	1B.2	Lower montane coniferous forest, upper montane coniferous forest, chaparral.	Usually on N-facing slopes in metavolcanic soils. 1330-2120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Coachella Valley milk-vetch	*Astragalus lentiginosus var. coachellae*	Endangered	None	1B.2	Sonoran desert scrub.	Sandy flats, washes, outwash fans, sometimes on dunes. 60-360m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coast lily	*Lilium maritimum*	None	None	1B.1	Closed-cone coniferous forest, coastal prairie, coastal scrub, broadleaved upland forest, North Coast coniferous forest.	Historically in sandy soil, often on raised hummocks or bogs; today mostly in roadside ditches. 10-335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coast range bindweed	*Calystegia collina ssp. tridactylosa*	None	None	1B.2	Chaparral, cismontane woodland.	Rocky, gravelly openings in serpentine. 0-600m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Coast Range lomatium	*Lomatium martindalei*	None	None	2.3	Lower montane coniferous forest, coastal bluff scrub, meadows.	Bogs and seeps along creeks and on ridgetops, often on serpentine. 240-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coast woolly-heads	*Nemacaulis denudata var. denudata*	None	None	1B.2	Coastal dunes.	0-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coast yellow leptosiphon	*Leptosiphon croceus*	None	None	1B.1	Coastal bluff scrub, coastal prairie.	10-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coastal bluff morning-glory	*Calystegia purpurata ssp. saxicola*	None	None	1B.2	Coastal dunes, coastal scrub.	15-105m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coastal dunes milk-vetch	*Astragalus tener var. titi*	Endangered	Endangered	1B.1	Coastal bluff scrub, coastal dunes.	Moist, sandy depressions of bluffs or dunes along and near the Pacific Ocean; one site on a clay terrace. 1-50m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coastal triquetrella	*Triquetrella californica*	None	None	1B.2	Coastal bluff scrub, coastal scrub.	Moss growing on soil. 10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Cobb Mountain lupine	*Lupinus sericatus*	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	In stands of knobcone pine-oak woodland, on open wooded slopes in gravelly soils; sometimes on serpentine. 180-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cocks-comb cat's-eye	*Cryptantha celosioides*	None	None	2.3	Pinyon and juniper woodland.	1615m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Colusa layia	*Layia septentrionalis*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Scattered colonies in fields and grassy slopes in sandy or serpentine soil. 145-1095m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Comanche Point layia	*Layia leucopappa*	None	None	1B.1	Chenopod scrub, valley and foothill grassland.	Dry hills in white-grey clay soils, often with weedy grasses. 100-350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
common moonwort	*Botrychium lunaria*	None	None	2.3	Meadows, subalpine coniferous forest, upper montane coniferous forest.	2760-3400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
compact cobwebby thistle	*Cirsium occidentale var. compactum*	None	None	1B.2	Chaparral, coastal dunes, coastal prairie, coastal scrub.	On dunes and on clay in chaparral; also in grassland. 5-155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
compact daisy	*Erigeron compactus*	None	None	2.3	Pinyon-juniper woodland.	Rocky or gravelly sites. Limestone. 1300-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cone Peak bedstraw	*Galium californicum ssp. luciense*	None	None	1B.3	Broadleaved upland forest, lower montane coniferous forest, cismontane woodland.	In forest duff or gravelly talus of pine and oak forest, in partial shade. 875-1525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Conejo buckwheat	*Eriogonum crocatum*	None	Rare	1B.2	Chaparral, coastal scrub, valley and foothill grassland.	Conejo volcanic outcrops; rocky sites. 50-580m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Conejo dudleya	*Dudleya parva*	Threatened	None	1B.2	Coastal scrub, valley and foothill grassland.	In clayey or volcanic soils on rocky slopes and grassy hillsides. 60-450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Congdon's lewisia	*Lewisia congdonii*	None	Rare	1B.3	Chaparral, lower montane coniferous forest, cismontane woodland, upper montane coniferous forest.	North exposures; in crevices on slopes among rocks. Granitic substrates. 600-2060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Congdon's lomatium	*Lomatium congdonii*	None	None	1B.2	Cismontane woodland, chaparral.	Serpentine soils with serpentine chaparral plants and grey pines. 300-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	None	None	1B.2	Valley and foothill grassland.	Alkaline soils, sometimes described as heavy white clay. 1-230m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Congdon's woolly sunflower	*Eriophyllum congdonii*	None	Rare	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	In cracks in rock outcroppings, and on talus; sometimes with Quercus douglasii, Aesculus californica. 500-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Constance's rock-cress	*Arabis constancei*	None	None	1B.1	Chaparral, lower montane coniferous forest.	Mostly on open, bare, serpentine slopes and outcrops in chaparral and woodland. 975-2025m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Constance's sedge	*Carex constanceana*	None	None	1B.1	Subalpine coniferous forest.	2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Contra Costa wallflower	*Erysimum capitatum var. angustatum*	Endangered	Endangered	1B.1	Inland dunes.	Stabilized dunes of sand and clay near Antioch along the San Joaquin River. 3-20m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Coulter's saltbush	*Atriplex coulteri*	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland.	Ocean bluffs, ridgetops, as well as alkaline low places. 10-440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Coves' cassia	*Senna covesii*	None	None	2.2	Sonoran desert scrub.	Dry, sandy desert washes, slopes. 200-1070m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
coyote gilia	*Aliciella triodon*	None	None	2.2	Great Basin scrub, pinyon and juniper woodland.	Fine clayey sand or sand. 610-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
creamy blazing star	*Mentzelia tridentata*	None	None	1B.3	Mojavean desert scrub.	700-1160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
crested potentilla	*Potentilla cristae*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest.	Seasonally wet swales and seeps; gravelly or rocky sites; often on serpentine. 1800-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
crisp monardella	*Monardella crispa*	None	None	1B.2	Coastal dunes, coastal scrub.	Often on the borders of open, sand areas, usually adjacent to typical backdune scrub vegetation. 5-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cruciform evening-primrose	*Camissonia claviformis ssp. cruciformis*	None	None	2.3	Chenopod scrub, Great Basin scrub.	600-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Crystal Springs lessingia	*Lessingia arachnoidea*	None	None	1B.2	Coastal sage scrub, valley and foothill	Grassy slopes on serpentine; sometimes	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					grassland, cismontane woodland.	on roadsides. 60-200m.	occupied habitat or substantially impact suitable habitat.
Cuesta Pass checkerbloom	*Sidalcea hickmanii ssp. anomala*	None	Rare	1B.2	Closed-cone coniferous forest.	Rocky serpentine soil; associated with Sargent cypress forest. 600-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cup Lake draba	*Draba asterophora var. macrocarpa*	None	None	1B.1	Subalpine coniferous forest.	In relatively deep soil in the shade of granitic rocks. 2600-2670m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
curved-spine beavertail	*Opuntia curvispina*	None	None	2.2	Chaparral, Mojavean desert scrub, pinyon-juniper woodland.	Stabilized hybrid between O. phaecantha x O. chlorotica. 1000-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cushenbury buckwheat	*Eriogonum ovalifolium var. vineum*	Endangered	None	1B.1	Mojavean desert scrub, pinyon-juniper woodland, Joshua tree woodland.	Limestone mountain slopes. Dry, usually rocky places. 1400-2440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Cushenbury milk-vetch	*Astragalus albens*	Endangered	None	1B.1	Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland.	Sandy or stony flats, rocky hillsides, cyn washes, & fans, on granite or mixed granitic-calcareous debris. 1095-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cushion townsendia	*Townsendia condensata*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest.	Gravelly sites. 2865-3675m.	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Cusick's monkeyflower	*Mimulus cusickii*	None	None	2.3	Great Basin scrub, lower montane coniferous forest.	600-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cut-leaf checkerbloom	*Sidalcea multifida*	None	None	2.3	Lower montane coniferous forest, meadows and seeps, Great Basin scrub, pinyon and juniper woodland.	1750-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
cylindrical trichodon	*Trichodon cylindricus*	None	None	2.2	Broadleafed upland forest, upper montane coniferous forest.	Moss growing on sandy, exposed soil, roadbanks. 50-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dark-eyed gilia	*Gilia millefoliata*	None	None	1B.2	Coastal dunes.	2-20m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Darwin Mesa milk-vetch	*Astragalus atratus var. mensanus*	None	None	1B.1	Great Basin scrub, Joshua tree woodland, pinyon-juniper woodland.	Dry desert slopes and mesas, often sheltering under and entangled in shrubs, in volcanic clay and gravel. 1340-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Darwin rock-cress	*Arabis pulchra var. munciensis*	None	None	2.3	Chenopod scrub, Mojavean desert scrub.	On limestone. 1100-2075m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Davidson's saltscale	*Atriplex serenana var. davidsonii*	None	None	1B.2	Coastal bluff scrub, coastal scrub.	Alkaline soil. 3-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Dean's milk-vetch	*Astragalus deanei*	None	None	1B.1	Chaparral, coastal scrub, riparian forest.	Open, brushy south-facing slopes in Diegan coastal sage, sometimes on recently burned-over hillsides. 75-670m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Death Valley round-leaved phacelia	*Phacelia mustelina*	None	None	1B.3	Pinyon-juniper woodland; Mojavean desert scrub.	In crevices on the face of limestone cliffs, on volcanic outcrops, and in gravel talus. 725-2620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Death Valley sandpaper-plant	*Petalonyx thurberi ssp. gilmanii*	None	None	1B.3	Desert dunes, Mojavean desert scrub.	Dry washes and slopes. 255-1445m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
decumbent goldenbush	*Isocoma menziesii var. decumbens*	None	None	1B.2	Coastal scrub.	Sandy soils; often in disturbed sites. 10-910m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Dedecker's clover	*Trifolium dedeckerae*	None	None	1B.3	Pinyon-juniper woodland, subalpine coniferous forest, upper montane	Gravelly canyons and slopes, cracks in granite rock outcrops, and understory of pinyon	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					coniferous forest, lower montane conif forest.	pines. 2100-3500m.	suitable habitat.
deep-scarred cryptantha	*Cryptantha excavata*	None	None	1B.3	Cismontane woodland.	Sandy, gravelly, dry streambanks. 100-500m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Dehesa nolina	*Nolina interrata*	None	Endangered	1B.1	Chaparral.	Typically on rocky hillsides or ravines on ultramafic soils (gabbro or metavolcanic). 180-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Del Mar Mesa sand aster	*Corethrogyne filaginifolia var. linifolia*	None	None	1B.1	Chaparral, coastal scrub.	In coastal, shrubby communities on maritime sediments and conglomerates. 30-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Del Norte buckwheat	*Eriogonum nudum var. paralinum*	None	None	2.2	Coastal bluff scrub, coastal prairie.	Open places along immediate coast. 5-80m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Del Norte pyrrocoma	*Pyrrocoma racemosa var. congesta*	None	None	2.3	Chaparral, lower montane coniferous forest.	Serpentine soils, from dry roadsides to damp hills; often in forest openings. 200-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
delicate bluecup	*Githopsis tenella*	None	None	1B.3	Chaparral, cismontane woodland.	Mesic sites. 1100-1900m.	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
delicate clarkia	*Clarkia delicata*	None	None	1B.2	Cismontane woodland, chaparral.	235-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
delicate muhly	*Muhlenbergia fragilis*	None	None	2.3	Pinyon-juniper woodland.	Open, more-or-less disturbed limestone gravelly wash. 515m in California.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
desert beauty	*Linanthus bellus*	None	None	2.3	Chaparral.	Dry slopes and flats; open sandy spots in chaparral, mostly in loamy coarse sandy dg soil types. 920-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
desert cymopterus	*Cymopterus deserticola*	None	None	1B.2	Joshua tree woodland, Mojavean desert scrub. Most occurrences located near or in Edwards AFB.	On fine to coarse, loose, sandy soil of flats in old dune areas with well-drained sand. 625-910m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
desert germander	*Teucrium glandulosum*	None	None	2.3	Sonoran desert scrub.	Rocky sites. 400-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
desert pincushion	*Coryphantha chlorantha*	None	None	2.1	Mojavean desert scrub, Sonoran desert scrub, Joshua tree woodland, pinyon	Calcareous substrates; rocky and gravelly sites. 300-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					and juniper woodland.		suitable habitat.
desert spike-moss	*Selaginella eremophila*	None	None	2.2	Sonoran desert scrub.	Shaded sites, gravelly soils; crevices or among rocks. 300-2425m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Detling's silverpuffs	*Microseris laciniata ssp. detlingii*	None	None	2.2	Cismontane woodland.	Openings in clay soils. 600-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Diablo Canyon blue grass	*Poa diaboli*	None	None	1B.2	Chaparral (mesic sites), cismontane woodland, coastal scrub, closed-cone coniferous forest.	Shale, sometimes burned areas. 120-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Diablo helianthella	*Helianthella castanea*	None	None	1B.2	Broadleaved upland forest, chaparral, cismontane wdlnd, coastal scrub, riparian woodland, valley & foothill grassland.	Usually in chaparral/oak woodland interface in rocky, azonal soils. Often in partial shade. 25-1150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
diamond-petaled California poppy	*Eschscholzia rhombipetala*	None	None	1B.1	Valley and foothill grassland.	Alkaline, clay slopes and flats. 0-975m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Donner Pass buckwheat	*Eriogonum umbellatum var. torreyanum*	None	None	1B.2	Upper montane coniferous forest, chaparral, meadows.	Steep slopes and ridgetops; rocky, volcanic soils; usually in	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						bare or sparsely vegetated areas. 1840-2620m.	substantially impact suitable habitat.
doublet	*Dimeresia howellii*	None	None	2.3	Pinyon-juniper woodland.	On slopes in dry gravelly volcanic soils. 1330-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
drymaria-like western flax	*Hesperolinon drymarioides*	None	None	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland, valley and foothill grassland.	Serpentine soils, mostly within chaparral. 390-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Dudley's lousewort	*Pedicularis dudleyi*	None	Rare	1B.2	Chaparral, North Coast coniferous forest, valley and foothill grassland.	Deep shady woods of older coast redwood forests; also in maritime chaparral. 100-490m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Dugway wild buckwheat	*Eriogonum nutans var. nutans*	None	None	2.3	Great Basin scrub, chenopod scrub.	Sandy or gravelly sites; also cited as often in greasewood scrub in flat, silty areas. 1220-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dune horsebrush	*Tetradymia tetrameres*	None	None	2.2	Great Basin scrub.	Sandy soils. 1200-2135m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dune larkspur	*Delphinium parryi ssp. blochmaniae*	None	None	1B.2	Chaparral, coastal dunes (maritime).	On rocky areas and dunes. 30-375m.	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Dunn's mariposa-lily	*Calochortus dunnii*	None	Rare	1B.2	Closed-cone coniferous forest, chaparral.	On gabbro or metavolcanic soils; also known from sandstone; often assoc with chaparral. 375-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dwarf calycadenia	*Calycadenia villosa*	None	None	1B.1	Chaparral, cismontane woodland, valley and foothill grassland, meadows and seeps.	Open, dry meadows, hillsides, gravelly outwashes. 215-1275m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dwarf germander	*Teucrium cubense ssp. depressum*	None	None	2.2	Desert dunes, playas, Sonoran desert scrub.	Dunes, playa margins and scrub. 45-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dwarf goldenstar	*Bloomeria humilis*	None	Rare	1B.2	Coastal bluff scrub, chaparral, valley and foothill grassland.	Known mainly from Arroyo de La Cruz area on coastal bluffs. 10-60m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dwarf monolepis	*Micromonolepis pusilla*	None	None	2.3	Great Basin scrub.	Alkaline sites, openings. 1500-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
dwarf soaproot	*Chlorogalum pomeridianum var. minus*	None	None	1B.2	Chaparral, valley and foothill grassland.	Serpentine. 240-970m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Earlimart orache	*Atriplex erecticaulis*	None	None	1B.2	Valley and foothill grassland.	40-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eastwood's buckwheat	*Eriogonum eastwoodianum*	None	None	1B.3	Cismontane woodland.	Shale, including diatomaceous shale. 500-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Eastwood's goldenbush	*Ericameria fasciculata*	None	None	1B.1	Closed-cone coniferous forest, chaparral (maritime), coastal scrub, coastal dunes.	In sandy openings. 30-275m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
El Dorado bedstraw	*Galium californicum ssp. sierrae*	Endangered	Rare	1B.2	Cismontane woodland, chaparral, lower montane coniferous forest.	More often in pine-oak woodland than in chaparral; restricted to gabbroic soils. 100-585m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
El Dorado County mule ears	*Wyethia reticulata*	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	Stony red clay and gabbroic soils; often in openings in gabbro chaparral. 180-630m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
elongate copper moss	*Mielichhoferia elongata*	None	None	2.2	Cismontane woodland. Commonly called "copper mosses".	Moss growing on metamorphic rock; usually vernally mesic. 500-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Emory's crucifixion-	*Castela emoryi*	None	None	2.3	Mojavean desert scrub, Sonoran desert	Gravelly soils, sometimes in alkali	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
thorn					scrub, playas.	playas or washes. 85-770m.	occupied habitat or substantially impact suitable habitat.
Encinitas baccharis	*Baccharis vanessae*	Threatened	Endangered	1B.1	Chaparral.	On sandstone soils in steep, open, rocky areas with chaparral associates. 60-720m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
ephemeral monkeyflower	*Mimulus evanescens*	None	None	1B.2	Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland.	Gravelly or rocky sites; vernally mesic. 1250-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
falcate saltbush	*Atriplex gardneri var. falcata*	None	None	2.2	Chenopod scrub, Great Basin scrub.	Usually on subalkaline soils in low chenopod scrub. 1200-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
false buffalo-grass	*Munroa squarrosa*	None	None	2.2	Pinyon-juniper woodland.	Open, gravelly or rocky places. 1500-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Feather River stonecrop	*Sedum albomarginatum*	None	None	1B.2	Chaparral, lower montane coniferous forest.	In crevices and on ledges of serpentine outcrops and slopes. 300-1585m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
fell-fields claytonia	*Claytonia megarhiza*	None	None	2.3	Alpine fell fields, subalpine coniferous forest.	In the crevices between rocks, rocky or gravelly soil. 2600-3300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
felt-leaved monardella	*Monardella hypoleuca ssp. lanata*	None	None	1B.2	Chaparral, cismontane woodland.	Occurs in understory in mixed chaparral, chamise chaparral, and southern oak woodland; sandy soil. 300-1575m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ferris' milk-vetch	*Astragalus tener var. ferrisiae*	None	None	1B.1	Meadows, valley and foothill grassland.	Subalkaline flats on overflow land in the Central Valley; usually seen in dry, adobe soil. 5-75m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
field ivesia	*Ivesia campestris*	None	None	1B.2	Subalpine coniferous forest, upper montane coniferous forest, meadows.	Meadow edges. 2200-3100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
flagella-like atractylocarpus	*Campylopodiella stenocarpa*	None	None	2.2	Cismontane woodland.	Unknown. 100-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
flat-seeded spurge	*Chamaesyce platysperma*	None	None	1B.2	Sonoran desert scrub, desert dunes.	Sandy places or shifting dunes. Possibly a waif in California; more common in Arizona and Mexico. 60-950m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Follett's monardella	*Monardella follettii*	None	None	1B.2	Lower montane coniferous forest.	Open rocky serpentine slopes. 600-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
fountain thistle	*Cirsium fontinale var. fontinale*	Endangered	Endangered	1B.1	Valley and foothill grassland, chaparral.	Serpentine seeps and grassland. 90-180m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
fragrant fritillary	*Fritillaria liliacea*	None	None	1B.2	Coastal scrub, valley and foothill grassland, coastal prairie.	Often on serpentine; various soils reported though usually clay, in grassland. 3-410m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Franciscan onion	*Allium peninsulare var. franciscanum*	None	None	1B.2	Cismontane woodland, valley and foothill grassland.	Clay soils; often on serpentine. dry hillsides. 100-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Franciscan thistle	*Cirsium andrewsii*	None	None	1B.2	Coastal bluff scrub, broadleaved upland forest, coastal scrub.	Sometimes serpentine seeps. 0-135m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Freed's jewel-flower	*Streptanthus brachiatus ssp. hoffmanii*	None	None	1B.2	Chaparral, cismontane woodland.	Serpentine rock outcrops, primarily in geothermal development areas. 480-1030m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gander's cryptantha	*Cryptantha ganderi*	None	None	1B.1	Sonoran desert scrub, desert dunes.	On dunes and in washes. 170-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gander's pitcher sage	*Lepechinia ganderi*	None	None	1B.3	Closed-cone coniferous forest,	Usu. found in chap. or coastal scrub;	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					chaparral, coastal scrub, valley and foothill grassland.	sometimes in tecate cypress wdlnd. Gabbro or metavolcanic substrate. 300-1000m.	occupied habitat or substantially impact suitable habitat.
Gaviota tarplant	*Deinandra increscens ssp. villosa*	Endangered	Endangered	1B.1	Coastal scrub, valley and foothill grassland, coastal bluff scrub.	Known from coastal terrace near Gaviota; sandy blowouts amid sandy loam soil; grassland/coast scrub ecotone. 35-430m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gentner's fritillary	*Fritillaria gentneri*	Endangered	None	1B.1	Cismontane woodland, chaparral.	Open sites at edge of woodland or chaparral (in Oregon); sometimes on serpentine. 1080-1120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Geyer's milk-vetch	*Astragalus geyeri var. geyeri*	None	None	2.2	Chenopod scrub, Great Basin scrub.	Sandy flats and valley floors, depressions in mobile or stabilized dunes, and along draws. 1150-1550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
ghost-pipe	*Monotropa uniflora*	None	None	2.2	Broadleaved upland forest, North Coast coniferous forest.	Often under redwoods or western hemlock. 10-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
giant fawn lily	*Erythronium oregonum*	None	None	2.2	Cismontane woodland, meadows and seeps.	Openings. Sometimes on serpentine; rocky sites. 100-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
giant spanish-needle	*Palafoxia arida var. gigantea*	None	None	1B.3	Desert dunes.	Active and stable dune areas; assoc. with	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						Ammobroma sonorae, Astragalus lent. borreganus, etc. 15-100m.	occupied habitat or substantially impact suitable habitat.
Gilman's buckwheat	*Eriogonum gilmanii*	None	None	1B.3	Mojavean desert scrub.	Dry rocky places in desert mountains. 1800-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Gilman's cymopterus	*Cymopterus gilmanii*	None	None	2.3	Mojavean desert scrub.	Carbonate; dry rocky slopes in creosote bush scrub; from the Last Chance Range to Death Valley. 1000-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
glandular ditaxis	*Ditaxis claryana*	None	None	2.2	Mojavean desert scrub, Sonoran desert scrub.	In dry washes and on rocky hillsides. Sandy soils. 0-465m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
glandular western flax	*Hesperolinon adenophyllum*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Serpentine soils; generally found in sepentine chaparral. 425-1315m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
globose cymopterus	*Cymopterus globosus*	None	None	2.2	Great Basin scrub.	Sandy, open flats. 1200-2135m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
golden alpine draba	*Draba aureola*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest.	On serpentine or volcanic outcrops. 2000-3355m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
golden larkspur	*Delphinium luteum*	Endangered	Rare	1B.1	Chaparral, coastal prairie, coastal scrub.	North-facing rocky slopes. 0-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
golden violet	*Viola aurea*	None	None	2.2	Great Basin scrub, pinyon-juniper woodland.	Dry, sandy slopes. 835-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
golden-spined cereus	*Bergerocactus emoryi*	None	None	2.2	Coastal scrub, sometimes chaparral margins.	Limited to the coastal belt. Usually on clay soils. 3-395m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Great Basin claytonia	*Claytonia umbellata*	None	None	2.3	Subalpine coniferous forest.	Talus slopes, stony flats, crevices. 1285(?)-3520m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Great Basin lousewort	*Pedicularis centranthera*	None	None	2.3	Great Basin scrub.	Alluvial fans; dry, ashy loam w/ Artemisia tridentata, Juniperus, Chrysothamnus, etc. 1300-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Great Basin onion	*Allium atrorubens var. atrorubens*	None	None	2.3	Great Basin scrub, pinyon-juniper woodland.	In sandy, rocky, gravelly, or sometimes clay soils in the White Mountains. 1200-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Greata's aster	*Symphyotrichum greatae*	None	None	1B.3	Chaparral, cismontane woodland.	Mesic canyons. 800-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
green jewel-flower	*Streptanthus breweri var. hesperidis*	None	None	1B.2	Chaparral, cismontane woodland.	Openings in chaparral or woodland; serpentine, rocky sites. 130-760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Greene's mariposa-lily	*Calochortus greenei*	None	None	1B.2	Meadows, pinyon and juniper woodland, upper montane coniferous forest.	On volcanic outcrops and open, dry, gravelly soils. 1035-1890m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Greene's narrow-leaved daisy	*Erigeron greenei*	None	None	1B.2	Chaparral.	Serpentine and volcanic substrates, generally in shrubby vegetation. 75-1060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Greenhorn fritillary	*Fritillaria brandegeei*	None	None	1B.3	Lower montane coniferous forest.	Loamy, granitic soils; often in mixed conifer-black oak community. 1200-1910m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
grey-leaved violet	*Viola pinetorum ssp. grisea*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	Dry mountain peaks and slopes. 1800-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
hairy erioneuron	*Erioneuron pilosum*	None	None	2.3	Pinyon-juniper woodland.	Rocky or gravelly places; can be on	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						carbonate. 1500-2000m.	occupied habitat or substantially impact suitable habitat.
hairy marsh hedge-nettle	*Stachys palustris ssp. pilosa*	None	None	2.3	Great Basin scrub.	Mesic sites. 1200-1525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's bush-mallow	*Malacothamnus hallii*	None	None	1B.2	Chaparral.	Some populations on serpentine. 10-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's daisy	*Erigeron aequifolius*	None	None	1B.3	Broadleafed upland forest, lower montane coniferous forest, pinyon & juniper woodland, upper montane coniferous forest.	On dry rock outcrops in granite walls and canyons. 1500-2440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's harmonia	*Harmonia hallii*	None	None	1B.2	Chaparral.	Serpentine hills and ridges. Open, rocky areas within chaparral. 500-900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's meadow hawksbeard	*Crepis runcinata ssp. hallii*	None	None	2.1	Mojavean desert scrub, pinyon-juniper woodland.	Moist, alkaline valley bottoms. 375-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's monardella	*Monardella macrantha ssp.*	None	None	1B.3	Broadleaved upland forest, chaparral,	Dry slopes and ridges in openings within the	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	hallii				lower montane coniferous forest, cismontane woodland, valley & foothill grassland.	above communities. 695-2195m.	occupied habitat or substantially impact suitable habitat.
Hall's rupertia	*Rupertia hallii*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	On disturbed soils of roadsides and logged forests. 1000-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hall's tarplant	*Deinandra halliana*	None	None	1B.1	Cismontane woodland, chenopod scrub, valley and foothill grassland.	Reported from a variety of substrates incl. clay, sand, and alkaline soils. 300-950m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hammitt's clay-cress	*Sibaropsis hammittii*	None	None	1B.2	Valley and foothill grassland, chaparral.	Mesic microsites in open areas on clay soils in stipa grassland. Often surrounded by Adenostoma chaparral. 730-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hanaupah rock daisy	*Perityle villosa*	None	None	1B.3	Pinyon and juniper woodland.	Shaded rock crevices. 2120-2410m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hardham's bedstraw	*Galium hardhamiae*	None	None	1B.3	Closed-cone coniferous forest.	On serpentine with Cupressus sargentii. 390-975m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Hardham's evening-primrose	*Camissonia hardhamiae*	None	None	1B.2	Chaparral, cismontane woodland.	Decomposed carbonate. 330-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Harwood's eriastrum	*Eriastrum harwoodii*	None	None	1B.2	Desert dunes.	200-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Harwood's milk-vetch	*Astragalus insularis var. harwoodii*	None	None	2.2	Desert dunes.	Open sandy flats and sandy or stony desert washes; mostly in creosote bush scrub. -50-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
heart-leaved pitcher sage	*Lepechinia cardiophylla*	None	None	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland.	550-1370m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
heartscale	*Atriplex cordulata*	None	None	1B.2	Chenopod scrub, valley and foothill grassland, meadows.	Alkaline flats and scalds in the Central Valley, sandy soils. 1-150(600)m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Heckner's lewisia	*Lewisia cotyledon var. heckneri*	None	None	1B.2	Lower montane coniferous forest.	Rocky places. 225-1970m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Henderson's fawn lily	*Erythronium hendersonii*	None	None	2.3	Lower montane coniferous forest.	300-1600m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
Henderson's horkelia	*Horkelia hendersonii*	None	None	1B.1	Upper montane coniferous forest.	Granitic peaks and talus slopes at high elevations. 2000-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Henderson's lomatium	*Lomatium hendersonii*	None	None	2.3	Pinyon-juniper woodland, Great Basin scrub.	Rocky, clay soils. 1400-2440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Henderson's triteleia	*Triteleia hendersonii var. hendersonii*	None	None	2.2	Cismontane woodland.	Open slopes and roadbanks. 760-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hernandez spineflower	*Chorizanthe biloba var. immemora*	None	None	1B.2	Chaparral, cismontane woodland.	Sandy and gravelly soils on the east slope of the Diablo Range. 695-750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hickman's checkerbloom	*Sidalcea hickmanii ssp. hickmanii*	None	None	1B.3	Chaparral.	Grassy openings in chaparral, and on dry ridges. 330-1640m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hickman's onion	*Allium hickmanii*	None	None	1B.2	Closed-cone coniferous forest, chaparral, coastal scrub, valley and	Sandy loam, damp ground and vernal swales; mostly in grassland though can be	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					foothill grassland, coastal prairie.	assoc. with chaparral or woodland. 20-200m	suitable habitat.
Hillsborough chocolate lily	*Fritillaria biflora var. ineziana*	None	None	1B.1	Cismontane woodland, valley and foothill grassland.	Probably on serpentine; most recent site is in serpentine grassland. 90-160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
hillside arnica	*Arnica fulgens*	None	None	2.2	Great Basin scrub, lower montane coniferous forest, meadows.	Open, damp depressions and meadows in sagebrush scrub or juniper woodland. 1470-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
hillside wheat grass	*Leymus salinus ssp. mojavensis*	None	None	2.3	Pinyon-juniper woodland.	Rocky sites. 1350-2135m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hirshberg's rock-cress	*Arabis hirshbergiae*	None	None	1B.2	Pebble (or pavement) plains.	1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hitchcock's blue-eyed grass	*Sisyrinchium hitchcockii*	None	None	1B.1	Cismontane woodland, valley and foothill grassland.	Openings in woodland or in grassland. 305 m in California.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hockett Meadows lupine	*Lupinus lepidus var. culbertsonii*	None	None	1B.3	Meadows, upper montane coniferous forest.	Mesic, rocky sites. One site states: "level, dry site, surrounded by Jeffrey pines." 2425-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Hoffmann's rock-cress	*Arabis hoffmannii*	Endangered	None	1B.1	Coastal bluff scrub.	Volcanic cliff edges. 75-380m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hoffmann's slender-flowered gilia	*Gilia tenuiflora ssp. hoffmannii*	Endangered	None	1B.1	Coastal dunes, coastal scrub.	Island dunes; sandy soil. 5-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hoffman's bristly jewel-flower	*Streptanthus glandulosus var. hoffmanii*	None	None	1B.3	Chaparral, cismontane woodland, valley and foothill grassland.	Moist, steep rocky banks, in serpentine and non-serpentine soil. 120-475m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
hooked popcorn-flower	*Plagiobothrys uncinatus*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland, coastal bluff scrub.	Sandstone outcrops and canyon sides; often in burned or disturbed areas. 300-820m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hoover's bent grass	*Agrostis hooveri*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Sandy sites. 60-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hoover's calycadenia	*Calycadenia hooveri*	None	None	1B.3	Cismontane woodland, valley and foothill grassland.	On exposed, rocky, barren soil. 65-260m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hoover's eriastrum	*Eriastrum hooveri*	Delisted	None	4.2	Chenopod scrub, valley and foothill	On sparsely vegetated alkaline alluvial fans;	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					grassland, pinyon and juniper woodland.	also in the Temblor Range on sandy soils. 50-915m.	occupied habitat or substantially impact suitable habitat.
Hospital Canyon larkspur	*Delphinium californicum ssp. interius*	None	None	1B.2	Cismontane woodland, chaparral.	In wet, boggy meadows, openings in chaparral and in canyons. 225-1060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howell's fawn lily	*Erythronium howellii*	None	None	1B.3	Lower montane coniferous forest.	200-1145m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howell's jewel-flower	*Streptanthus howellii*	None	None	1B.2	Lower montane coniferous forest.	Dry serpentine slopes, in open pine woods or in brushy areas; on rocky soil. 300-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howell's sandwort	*Minuartia howellii*	None	None	1B.3	Lower montane coniferous forest, chaparral.	Dry open places, often on serpentine hillsides and ridges, near Jeffrey pines. 550-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howell's spineflower	*Chorizanthe howellii*	Endangered	Threatened	1B.2	Coastal dunes, coastal prairie, coastal scrub.	Sand dunes, sandy slopes, and sandy areas in coastal prairie. 0-35m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howell's tauschia	*Tauschia howellii*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	Hot dry ridge summits and slopes in decomposed granite gravel and red sand.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						1705-2500m.	suitable habitat.
Howell's triteleia	*Triteleia grandiflora var. howellii*	None	None	2.1	Great Basin scrub, pinyon-juniper woodland.	In rocky areas in sagebrush scrub, and in woodland. 700-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Howe's hedgehog cactus	*Echinocereus engelmannii var. howei*	None	None	1B.1	Mojavean desert scrub.	On desert hills and flats on well-drained rocky ledges and steep gravelly slopes. 500-770m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Humboldt Bay wallflower	*Erysimum menziesii ssp. eurekense*	Endangered	Endangered	1B.1	Coastal dunes.	Foredunes w/Artemisia pycnocephala, Solidago spathulata, Lathyrus sp., etc. 0-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Humboldt milk-vetch	*Astragalus agnicidus*	None	Endangered	1B.1	Broadleafed upland forest, redwood forest.	Disturbed openings in partially timbered forest lands; also along ridgelines; south aspects. 575-750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Hutchinson's larkspur	*Delphinium hutchinsoniae*	None	None	1B.2	Broadleafed upland forest, chaparral, coastal prairie, coastal scrub.	On semi-shaded, slightly moist slopes, usually west-facing. 0-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Indian Valley brodiaea	*Brodiaea coronaria ssp. rosea*	None	Endangered	1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland, valley and foothill grassland,	Serpentine gravelly creek bottoms, and in meadows and swales. 335-1450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					meadows.		
Indian Valley bush-mallow	*Malacothamnus aboriginum*	None	None	1B.2	Cismontane woodland, chaparral.	Granitic outcrops and sandy bare soil, often in disturbed soils. 150-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Indian Valley spineflower	*Aristocapsa insignis*	None	None	1B.2	Cismontane woodland.	300-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
intermediate mariposa-lily	*Calochortus weedii var. intermedius*	None	None	1B.2	Coastal scrub, chaparral, valley and foothill grassland.	Dry, rocky open slopes and rock outcrops. 120-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
intermontane lupine	*Lupinus pusillus var. intermontanus*	None	None	2.3	Great Basin scrub.	Sandy soils. 1220-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
intermountain milkwort	*Polygala intermontana*	None	None	2.3	Pinyon-juniper woodland.	2010-3080m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Inyo blazing star	*Mentzelia inyoensis*	None	None	1B.3	Great Basin scrub, pinyon-juniper woodland.	Rocky sites. 1150-1980m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Inyo County star-tulip	*Calochortus excavatus*	None	None	1B.1	Chenopod scrub, meadows (alkaline).	Mostly on fine, sandy loam soils with alkaline salts, grassy meadows in shadscale scrub. 1150-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Inyo hulsea	*Hulsea vestita ssp. inyoensis*	None	None	2.2	Pinyon-juniper woodland, Great Basin scrub.	In volcanic ash on steep slopes. 1635-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ione buckwheat	*Eriogonum apricum var. apricum*	Endangered	Endangered	1B.1	Chaparral.	In gravelly openings on Ione formation soil. 80-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Irish Hill buckwheat	*Eriogonum apricum var. prostratum*	Endangered	Endangered	1B.1	Chaparral.	Gravelly openings on Ione formation soils. 90-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
island alumroot	*Heuchera maxima*	None	None	1B.2	Coastal bluff scrub, chaparral, coastal scrub.	Moist north-facing canyon walls, rocky banks, and sea-cliffs. 5-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
island mallow	*Lavatera assurgentiflora ssp. assurgentiflora*	None	None	1B.1	Coastal bluff scrub, coastal scrub.	Sandy flats and rocky places. Mainland and Todos Santos Island plants probably planted. 15-245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
island rush-rose	*Helianthemum greenei*	Threatened	None	1B.2	Chaparral, coastal scrub, closed-cone	Rocky sites; usually in open places among	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					coniferous forest.	pines or chaparral. 15-480m.	occupied habitat or substantially impact suitable habitat.
island wallflower	*Erysimum insulare ssp. insulare*	None	None	1B.3	Coastal bluff scrub, coastal dunes.	Mesas and cliffs. 0-180m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
island white-felted paintbrush	*Castilleja lanata ssp. hololeuca*	None	None	1B.2	Chaparral, coastal scrub.	Rocky slopes. 5-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jack's wild buckwheat	*Eriogonum luteolum var. saltuarium*	None	None	1B.2	Upper montane coniferous forest, Great Basin scrub.	Sandy, granitic substrates. 1700-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jacumba milk-vetch	*Astragalus douglasii var. perstrictus*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Stony hillsides and gravelly or sandy flats in open oak woodland. 900-1370m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jaeger's milk-vetch	*Astragalus pachypus var. jaegeri*	None	None	1B.1	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland.	Dry ridges and valleys and open sandy slopes; often in grassland and oak-chaparral. 365-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Janish's beardtongue	*Penstemon janishiae*	None	None	2.2	Great Basin scrub, lower montane coniferous forest, pinyon-juniper	Volcanic soils; gravelly sites. 1065-2350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					woodland.		suitable habitat.
Jared's pepper-grass	*Lepidium jaredii ssp. jaredii*	None	None	1B.2	Valley and foothill grassland.	Alkali flats and sinks. Sandy, alkaline, sometimes adobe soils.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jepson's leptosiphon	*Leptosiphon jepsonii*	None	None	1B.2	Chaparral, cismontane woodland.	Open to partially shaded grassy slopes. on volcanics or the periphery of serpentine substrates. 100-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jepson's milk-vetch	*Astragalus rattanii var. jepsonianus*	None	None	1B.2	Cismontane woodland, valley and foothill grassland, chaparral.	Commonly on serpentine in grassland or openings in chaparral. 320-700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jepson's onion	*Allium jepsonii*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	On serpentine soils in Sierra foothills, volcanic soil on Table Mtn. on slopes and flats; usu in an open area. 450-1130m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Johnson's bee-hive cactus	*Sclerocactus johnsonii*	None	None	2.2	Mojavean desert scrub.	Granitic soils. 500-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Johnston's buckwheat	*Eriogonum microthecum var. johnstonii*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	Slopes and ridges on granite or limestone. 2210-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Johnston's rock-cress	*Arabis johnstonii*	None	None	1B.2	Chaparral, lower montane coniferous forest.	Granitic soil with pleistocene,non-marine clay deposits. With Adenostoma, Quercus wislizenii. 1350-2150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jolon clarkia	*Clarkia jolonensis*	None	None	1B.2	Cismontane woodland.	500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Jones' layia	*Layia jonesii*	None	None	1B.2	Chaparral, valley and foothill grassland.	Clay soils and serpentine outcrops. 5-155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Josephine horkelia	*Horkelia congesta ssp. nemorosa*	None	None	2.1	North Coast coniferous forest.	Vernally moist rock, clay. Generally serpentine. 300-800 m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kaweah brodiaea	*Brodiaea insignis*	None	Endangered	1B.2	Cismontane woodland, valley and foothill grassland.	Granite substates in deep, clayey soils on S-SW facing slopes; usu in grassland surr by foothill woodland. 150-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kaweah fawn lily	*Erythronium pusaterii*	None	None	1B.3	Subalpine coniferous forest, meadows.	On granitic loam soils and granite outcrops; also on metamorphics. 2200-2775m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Kaweah monkeyflower	*Mimulus norrisii*	None	None	1B.3	Chaparral, cismontane woodland.	Marble outcrops, soil pockets, moss-covered ledges, cracks in outcrops, sometimes on S-facing cliffs. 360-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Keck's checkerbloom	*Sidalcea keckii*	Endangered	None	1B.1	Cismontane woodland, valley and foothill grassland	Grassy slopes in blue oak woodland. 180-425m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
keil's daisy	*Erigeron inornatus var. keilii*	None	None	1B.3	Meadows, lower montane coniferous forest.	Dry slopes, meadows, in coniferous forest. 695-1820m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kellman's bristle moss	*Orthotrichum kellmanii*	None	None	1B.2	Chaparral, cismontane oak woodland.	Sandstone outcrops with high calcium concentrations from eroded boulders out of non-calcareous sandstone bedrock. Rock outcrops in small openings within dense chaparral with overstory of scattered Pinus attenuata. 343-685m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kellogg's buckwheat	*Eriogonum kelloggii*	Candidate	Endangered	1B.2	Lower montane coniferous forest, chaparral.	Rocky, serpentine sites. 925-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Kellogg's horkelia	*Horkelia cuneata ssp. sericea*	None	None	1B.1	Closed-cone coniferous forest, coastal scrub, chaparral.	Old dunes, coastal sandhills; openings. 10-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kelso Creek monkeyflower	*Mimulus shevockii*	None	None	1B.2	Joshua tree woodland, pinyon-juniper woodland.	Mostly known from Joshua tree-xeric conifer woodland in the high desert, in loose, granitic sandy soil. 825-1340m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern buckwheat	*Eriogonum kennedyi var. pinicola*	None	None	1B.1	Chaparral, pinyon and juniper woodland.	Open places on clay soil. 1400-1890m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern mallow	*Eremalche kernensis*	Endangered	None	1B.1	Chenopod scrub, valley and foothill grassland.	On dry, open sandy to clayey soils; usually within valley saltbush scrub; often at edge of balds. 70-515m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern Plateau bird's-beak	*Cordylanthus eremicus ssp. kernensis*	None	None	1B.3	Upper montane coniferous forest, pinyon-juniper woodland.	2100-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern Plateau horkelia	*Horkelia tularensis*	None	None	1B.3	Upper montane coniferous forest.	Metamorphic gravel along an exposed ridge top. 2280-2875m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern Plateau	*Astragalus*	None	None	1B.2	Meadows, subalpine	Dry, gravelly or sandy	Low. Suction dredging

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
milk-vetch	*lentiginosus var. kernensis*				coniferous forest.	slopes or flats. 2350-2600m.	not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern River daisy	*Erigeron multiceps*	None	None	1B.2	Joshua tree woodland, meadows, upper montane coniferous forest.	River banks and dry meadow borders; usually in open, grassy areas. 1780-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kern River evening-primrose	*Camissonia integrifolia*	None	None	1B.3	Chaparral.	700-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
King's eyelash grass	*Blepharidachne kingii*	None	None	2.3	Pinyon-juniper woodland, Mojavean desert scrub.	Rocky benches and alluvial fans on limestone. 480-2125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kings gold	*Tropidocarpum californicum*	None	None	1B.1	Chenopod scrub.	65m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Kings River buckwheat	*Eriogonum nudum var. regirivum*	None	None	1B.2	Cismontane woodland.	Rocky limestone slopes along the Kings River. 210-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
kitten-tails	*Synthyris missurica ssp. missurica*	None	None	2.3	Lower montane coniferous forest, subalpine coniferous	2000-2500m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest, upper montane coniferous forest.		substantially impact suitable habitat.
Klamath Mountain buckwheat	*Eriogonum hirtellum*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Dry serpentine rocky outcrops and ridges. 600-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Klamath Mountain catchfly	*Silene salmonacea*	None	None	1B.2	Lower montane coniferous forest.	Openings in serpentine. 775-1045m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Koch's cord moss	*Entosthodon kochii*	None	None	1B.3	Cismontane woodland.	Moss growing on soil. 500-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Koehler's stipitate rock-cress	*Arabis koehleri var. stipitata*	None	None	1B.3	Chaparral, lower montane coniferous forest.	Rocky, serpentine substrate. 155-1810m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
La Panza mariposa-lily	*Calochortus obispoensis*	None	None	1B.2	Chaparral, coastal scrub, valley and foothill grassland.	Often in serpentine grassland. 75-665m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Laguna Beach dudleya	*Dudleya stolonifera*	Threatened	Threatened	1B.1	Chaparral, cismontane woodland, coastal scrub, valley and	In thin soil on north-facing sandstone cliffs. 10-260m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					foothill grassland.		suitable habitat.
Laguna Mountains goldenbush	*Ericameria cuneata var. macrocephala*	None	None	1B.3	Chaparral.	Endemic to the Laguna Mountains. Among boulders; in crevices in granitic outcrops and in rocky soil. 1185-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lake County western flax	*Hesperolinon didymocarpum*	None	Endangered	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Serpentine soil in open grassland and near chaparral. 330-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lancaster milk-vetch	*Astragalus preussii var. laxiflorus*	None	None	1B.1	Chenopod scrub.	Alkaline clay flats or gravelly or sandy washes and along draws in gullied badlands. 725m in California.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
lance-leaved scurf-pea	*Psoralidium lanceolatum*	None	None	2.3	Great Basin scrub.	Sandy clearings in Great Basin and winter fat scrub, and, outside of California, on alluvial plains. 1220-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
large-flowered fiddleneck	*Amsinckia grandiflora*	Endangered	Endangered	1B.1	Cismontane woodland, valley and foothill grassland.	Annual grassland in various soils. 275-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Las Animas colubrina	*Colubrina californica*	None	None	2.3	Mojavean desert scrub.	On narrow, steep, rocky ravines or washes. 10-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Lassen Peak copper moss	*Mielichhoferia tehamensis*	None	None	1B.3	Alpine boulder and rock field.	Moss on volcanic rock and soil; mesic sites. 2500-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
late-flowered mariposa-lily	*Calochortus weedii var. vestus*	None	None	1B.2	Chaparral, cismontane woodland.	Dry, open coastal woodland, chaparral; on serpentine. 270-1910m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lavin's milk-vetch	*Astragalus oophorus var. lavinii*	None	None	1B.2	Great Basin scrub.	Dry, open areas. 2450-3050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Layne's ragwort	*Packera layneae*	Threatened	Rare	1B.2	Chaparral, cismontane woodland.	Ultramafic soil; occasionally along streams. 200-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
leafy reed grass	*Calamagrostis foliosa*	None	Rare	4.2	Coastal bluff scrub, North Coast coniferous forest.	Rocky cliffs and ocean-facing bluffs. 0-1220m. State-listed Rare. Element occurrences archived; CNPS List 4.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
leafy tarplant	*Deinandra increscens ssp. foliosa*	None	None	1B.2	Valley and foothill grassland.	300-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lemmon's jewelflower	*Caulanthus coulteri var.*	None	None	1B.2	Pinyon-juniper woodland, valley and	80-1220m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	lemmonii				foothill grassland.		occupied habitat or substantially impact suitable habitat.
lens-pod milk-vetch	*Astragalus lentiformis*	None	None	1B.2	Great Basin scrub, lower montane coniferous forest.	Shallow, volcanic soils among sagebrush, sometimes with Jeffrey pine. 1450-1925m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
lesser saltscale	*Atriplex minuscula*	None	None	1B.1	Chenopod scrub, playas, valley and foothill grassland.	In alkali sink and grassland in sandy, alkaline soils. 20-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Letterman's blue grass	*Poa lettermanii*	None	None	2.3	Alpine boulder and rock field.	Sandy or rocky sites. 3500-4265m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lewis Rose's ragwort	*Packera eurycephala var. lewisrosei*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest, chaparral.	Steep slopes and in canyons in serpentine soil, often along or near roads. 420-1515m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
lilliput lupine	*Lupinus uncialis*	None	None	2.2	Great Basin scrub, pinyon-juniper woodland.	Hilltops, bluffs, barrens, & talus in sagebrush scrub and p-j wdlnd. on limestone, rhyolite, volc ash, etc. 1300-14005m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
limestone beardtongue	*Penstemon calcareus*	None	None	1B.3	Mojavean desert scrub, pinyon-juniper woodland, Joshua tree woodland.	Rocky limestone cliffs and canyon bottoms. 1065-2040m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
little bulrush	*Trichophorum pumilum*	None	None	2.2	Alpine dwarf scrub?	Wet sites, limestone soils. 2875-3250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
little hulsea	*Hulsea nana*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest.	Rocky or gravelly sites; on volcanic substrates. 1920-3355m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
little ricegrass	*Oryzopsis exigua*	None	None	2.3	Great Basin scrub.	2345-2420m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Little San Bernardino Mtns. linanthus	*Linanthus maculatus*	None	None	1B.2	Desert dunes, Sonoran desert scrub, Mojavean desert scrub, Joshua tree woodland.	Sandy places; microhab difficult to pin down. Usu. in light-colored quartz sand; often in wash or bajada. 195-2075m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
little-leaved huckleberry	*Vaccinium scoparium*	None	None	2.2	Subalpine coniferous forest.	Rocky, subalpine woods; one site near Gasquet in "Boggy Creek." (135)1800-2365m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
lobed ground-cherry	*Physalis lobata*	None	None	2.3	Mojavean desert scrub, playas.	Decomposed granite soil, alkaline dry lakes. 500-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Loma Prieta hoita	*Hoita strobilina*	None	None	1B.1	Chaparral, cismontane woodland, riparian woodland.	Serpentine; mesic sites.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lompoc yerba santa	*Eriodictyon capitatum*	Endangered	Rare	1B.2	Closed-cone coniferous forest, chaparral.	Sandy soils on terraces. 40-455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
long bluebells	*Mertensia longiflora*	None	None	2.2	Great Basin scrub, lower montane coniferous forest.	1525-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Long Valley milk-vetch	*Astragalus johannis-howellii*	None	Rare	1B.2	Great Basin scrub.	In sandy volcanic ash or pumice with sagebrush scrub. 2030-2530m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
long-petaled lewisia	*Lewisia longipetala*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest.	Mesic rocky sites; in cracks of granite or gravelly volcanic soils. 2480-2925m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
long-spined spineflower	*Chorizanthe polygonoides var. longispina*	None	None	1B.2	Chaparral, coastal scrub, meadows, valley and foothill grassland.	Gabbroic clay. 30-1450m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
long-stiped campion	*Silene occidentalis ssp. longistipitata*	None	None	1B.2	Chaparral, lower montane coniferous forest, upper montane coniferous forest.	1000-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lyall's tonestus	*Tonestus lyallii*	None	None	2.3	Alpine boulder and rock field.	Alpine talus, barrens. 2500-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Lyon's pentachaeta	*Pentachaeta lyonii*	Endangered	Endangered	1B.1	Chaparral, valley and foothill grassland.	Edges of clearings in chap., usually at the ecotone btwn grassland and chaparral or edges of firebreaks. 30-630m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Macdougal's lomatium	*Lomatium foeniculaceum var. macdougalii*	None	None	2.2	Chenopod scrub, Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland.	Volcanic soil. 1200-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Madera leptosiphon	*Leptosiphon serrulatus*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	Dry slopes; often on decomposed granite in woodland. 80-1575m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
maidenhair spleenwort	*Asplenium trichomanes ssp. trichomanes*	None	None	2.3	Lower montane coniferous forest.	On rocks. 185-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
male fern	*Dryopteris filix-mas*	None	None	2.3	Upper montane coniferous forest.	In granite crevices. 2400-3100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
many-flowered thelypodium	*Thelypodium milleflorum*	None	None	2.2	Great Basin scrub, chenopod scrub.	Big sagebrush & rabbitbrush/bitterbrush scrubs in sandy soils; often w/other sand-related herbs. 1200-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
many-stemmed dudleya	*Dudleya multicaulis*	None	None	1B.2	Chaparral, coastal scrub, valley and foothill grassland.	In heavy, often clayey soils or grassy slopes. 0-790m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Marble Mountain campion	*Silene marmorensis*	None	None	1B.2	Broadleafed upland forest, lower montane coniferous forest, cismontane woodland.	Openings with little vegetation, shady areas, often along trails; can be on serpentine. 165-1250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
marble rockmat	*Petrophyton caespitosum ssp. acuminatum*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Limestone or granite. rocky sites. 1200-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
marbled wild-ginger	*Asarum marmoratum*	None	None	2.3	Lower montane coniferous forest.	Understory of coniferous forests. 200-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
marcescent dudleya	*Dudleya cymosa ssp. marcescens*	Threatened	Rare	1B.2	Chaparral.	On sheer rock surfaces and rocky volcanic cliffs. 180-520m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Marin checkerbloom	*Sidalcea hickmanii ssp. viridis*	None	None	1B.3	Chaparral.	Serpentine or volcanic soils; sometimes appears after burns. 0-430m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Marin County navarretia	*Navarretia rosulata*	None	None	1B.2	Closed-cone coniferous forest, chaparral.	Dry, open rocky places; can occur on serpentine. 200-635m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Marin western flax	*Hesperolinon congestum*	Threatened	Threatened	1B.1	Chaparral, valley and foothill grassland.	In serpentine barrens and in serpentine grassland and chaparral. 30-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mariposa clarkia	*Clarkia biloba ssp. australis*	None	None	1B.2	Chaparral, cismontane woodland.	Several EO's occur in the foothill woodland/riparian ecotone. 300-945m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Mariposa cryptantha	*Cryptantha mariposae*	None	None	1B.3	Chaparral.	On serpentine outcrops. 200-650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mariposa lupine	*Lupinus citrinus var. deflexus*	None	Threatened	1B.2	Chaparral, cismontane woodland.	Decomposed granitic sand on hilltops and hillsides on western slope of the Sierra Nevada, mostly S. exp. 400-640m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mariposa pussypaws	*Calyptridium pulchellum*	Threatened	None	1B.1	Cismontane woodland.	On granite domes, restricted to exposed sites. 400-1100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
marsh microseris	*Microseris paludosa*	None	None	1B.2	Closed-cone coniferous forest,cismontane woodland, coastal scrub, valley and foothill grassland.	5-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Masonic Mountain jewel-flower	*Streptanthus oliganthus*	None	None	1B.2	Pinyon-juniper woodland.	Volcanic or decomposed granite soils, along roadsides and in old mine dumps. 1965-3050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Masonic rock-cress	*Arabis cobrensis*	None	None	2.3	Great Basin scrub, pinyon-juniper woodland.	Sandy soils. 1375-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mason's neststraw	*Stylocline masonii*	None	None	1B.1	Chenopod scrub, pinyon-juniper woodland.	Sandy washes. 100-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mason's sky pilot	*Polemonium chartaceum*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest.	Gravelly slopes and rocky ledges on granite or volcanic soils. 1800-4215m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mcdonald's rock-cress	*Arabis macdonaldiana*	Endangered	Endangered	1B.1	Lower montane coniferous forest, upper montane coniferous forest.	Rocky outcrops, ridges, slopes, and flats on serpentine. 135-1455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mcgee Meadows lupine	*Lupinus magnificus var. hesperius*	None	None	1B.3	Great Basin scrub, upper montane coniferous forest.	Sandy substrates. 1260-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mecca-aster	*Xylorhiza cognata*	None	None	1B.2	Sonoran desert scrub.	Steep canyon slopes, in sandstone and clay. 20-305m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mendocino Coast paintbrush	*Castilleja mendocinensis*	None	None	1B.2	Coastal bluff scrub, coastal scrub, coastal prairie, closed-cone coniferous forest, coastal dunes.	Often on sea bluffs or cliffs in coastal bluff scrub or prairie. 0-160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Menzies' wallflower	*Erysimum menziesii ssp. menziesii*	Endangered	Endangered	1B.1	Coastal dunes.	Localized on dunes and coastal strand. 0-35m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Merced clarkia	*Clarkia lingulata*	None	Endangered	1B.1	Closed-cone coniferous forest,	Metamorphic gravels and talus and in red clay	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					chaparral, cismontane woodland.	on north-facing slopes and in canyon bottoms. 400-455m.	occupied habitat or substantially impact suitable habitat.
Merced phacelia	*Phacelia ciliata var. opaca*	None	None	1B.2	Valley and foothill grassland.	Adobe or clay soils of valley floors, open hills, or alkaline flats. 60-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
mesa horkelia	*Horkelia cuneata ssp. puberula*	None	None	1B.1	Chaparral, cismontane woodland, coastal scrub.	Sandy or gravelly sites. 70-810m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Metcalf Canyon jewel-flower	*Streptanthus albidus ssp. albidus*	Endangered	None	1B.1	Valley and foothill grassland.	Relatively open areas in dry grassy meadows on serpentine soils; also on serpentine balds. 45-245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mielichhofer's copper moss	*Mielichhoferia mielichhoferiana*	None	None	2.3	Subalpine coniferous forest.	1975m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mildred's clarkia	*Clarkia mildrediae ssp. mildrediae*	None	None	1B.3	Cismontane woodland, lower montane coniferous forest.	On decomposed granite; sometimes on roadsides. 245-1710m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Miles' milk-vetch	*Astragalus didymocarpus var. milesianus*	None	None	1B.2	Coastal scrub.	Clay soils. 20-90m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Milo Baker's lupine	*Lupinus milo-bakeri*	None	Threatened	1B.1	Cismontane woodland, valley and foothill grassland.	In roadside ditches, dry gravelly areas along roads, and along small streams. 360-440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mineral King draba	*Draba cruciata*	None	None	1B.3	Subalpine coniferous forest.	On steep rocky slopes with clayey soils, or sometimes on light sandy soils. 2500-3315m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
mingan moonwort	*Botrychium minganense*	None	None	2.2	Lower montane coniferous forest.	Creekbanks in mixed conifer forest. 1500-2275m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Modoc bedstraw	*Galium glabrescens ssp. modocense*	None	None	1B.2	Great Basin scrub.	Gravelly slopes and under the edges of rocks; sandy clay soil. 1575-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mojave Desert plum	*Prunus eremophila*	None	None	1B.2	Mojavean desert scrub.	Granitic or rhyolitic substrates; usually in washes. 975-1175m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mojave milkweed	*Asclepias nyctaginifolia*	None	None	2.1	Mojavean desert scrub, pinyon-juniper woodland.	1000-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mojave monkeyflower	*Mimulus mohavensis*	None	None	1B.2	Joshua tree woodland, Mojavean desert scrub.	Dry sandy or rocky washes along the Mojave River. 600-1175m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Monarch gilia	*Gilia yorkii*	None	None	1B.2	Chaparral, cismontane woodland.	Limestone outcrops. 1290-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Monarch golden-aster	*Heterotheca monarchensis*	None	None	1B.3	Cismontane woodland.	Limestone. 1095-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mono County phacelia	*Phacelia monoensis*	None	None	1B.1	Great Basin scrub, pinyon and juniper woodland, meadows and seeps.	Ridgetops in alkaline mountain meadows in clay soils; also roadsides. 1900-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mono Hot Springs evening-primrose	*Camissonia sierrae ssp. alticola*	None	None	1B.2	Upper montane coniferous forest.	In sand or gravel over granite in mixed conifer forest; with Gayophytum, Collinsia, etc. 2120-2335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mono Lake lupine	*Lupinus duranii*	None	None	1B.2	Great Basin scrub, subalpine coniferous forest, upper montane coniferous forest.	Pumice sand flats, coarse barren soils of volcanic origin. 2000-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mono milk-vetch	*Astragalus monoensis*	None	Rare	1B.2	Great Basin scrub, upper montane	Pumice flats with sparse vegetative cover. 2110-	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					coniferous forest.	3355m.	occupied habitat or substantially impact suitable habitat.
Monterey spineflower	*Chorizanthe pungens var. pungens*	Threatened	None	1B.2	Coastal dunes, chaparral, cismontane woodland, coastal scrub.	Sandy soils in coastal dunes or more inland within chaparral or other habitats. 0-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Morefield's cinquefoil	*Potentilla morefieldii*	None	None	1B.3	Alpine boulder and rock field.	Low areas in alpine calcareous (or granite?) rocks. 3300-4100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Moreno currant	*Ribes canthariforme*	None	None	1B.3	Chaparral.	Among boulders in oak-manzanita thickets; shaded or partially shaded sites. 340-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mormon needle grass	*Achnatherum aridum*	None	None	2.3	Joshua tree woodland, pinyon-juniper woodland.	Rocky limestone ridges. 500-2570m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mosquin's clarkia	*Clarkia mosquinii*	None	None	1B.1	Cismontane woodland, lower montane coniferous forest.	Usually on steep, rocky cutbanks and slopes. 185-1170m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
most beautiful jewel-flower	*Streptanthus albidus ssp. peramoenus*	None	None	1B.2	Chaparral, valley and foothill grassland, cismontane woodland.	Serpentine outcrops, on ridges and slopes. 120-730m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
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Mount Laguna aster	*Dieteria asteroides var. lagunensis*	None	Rare	2.1	Cismontane woodland, lower montane coniferous forest.	Openings in woodland or forest. 800-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mount Patterson senecio	*Senecio pattersonensis*	None	None	1B.3	Alpine boulder and rock field.	2900-3700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mount Tamalpais bristly jewel-flower	*Streptanthus glandulosus ssp. pulchellus*	None	None	1B.2	Chaparral, valley and foothill grassland.	Serpentine slopes. 150-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mountain Springs bush lupine	*Lupinus excubitus var. medius*	None	None	1B.3	Pinyon and juniper woodland, Sonoran desert scrub.	Dry, sandy, gently sloping canyon washes, sandy soil pockets, and flats in steeper slopes and drainages. 425-1370m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
mouse buckwheat	*Eriogonum nudum var. murinum*	None	None	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Dry sandy loam slopes in the Kaweah River drainage. 360-1130m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
mouse-gray dudleya	*Dudleya abramsii ssp. murina*	None	None	1B.3	Chaparral, cismontane woodland.	Serpentine outcrops. 90-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Mt. Diablo buckwheat	*Eriogonum truncatum*	None	None	1B.1	Chaparral, coastal scrub, valley and foothill grassland.	Dry, exposed clay or sandy substrates. 100-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Diablo fairy-lantern	*Calochortus pulchellus*	None	None	1B.2	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland.	On wooded and brushy slopes. 200-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Diablo phacelia	*Phacelia phacelioides*	None	None	1B.2	Chaparral, cismontane woodland.	Adjacent to trails, on rock outcrops and talus slopes; sometimes on serpentine. 500-1370m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Eddy draba	*Draba carnosula*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	On talus or small boulder-fields; known from both serpentine and granite. 1920-2730m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Hamilton coreopsis	*Coreopsis hamiltonii*	None	None	1B.2	Cismontane woodland.	On steep shale talus with open southwestern exposure. 530-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Hamilton fountain thistle	*Cirsium fontinale var. campylon*	None	None	1B.2	Cismontane woodland, chaparral, valley and foothill grassland.	In seasonal and perennial drainages on serpentine. 95-890m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Hamilton jewel-flower	*Streptanthus callistus*	None	None	1B.3	Chaparral, cismontane	Open talus slopes on shale with grey pine	Low. Suction dredging not likely to occur in

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					woodland.	and/or black oak. 600-790m.	occupied habitat or substantially impact suitable habitat.
Mt. Hamilton lomatium	*Lomatium observatorium*	None	None	1B.2	Cismontane woodland.	Open to partially shaded openings in Pinus coulteri-oak woodland. Sedimentary franciscan rocks & volcanics. 1219-1330m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Pinos onion	*Allium howellii var. clokeyi*	None	None	1B.3	Great Basin scrub, pinyon-juniper woodland.	1300-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Tamalpais thistle	*Cirsium hydrophilum var. vaseyi*	None	None	1B.2	Broadleafed upland forest, chaparral.	Serpentine seeps and streams in chaparral and woodland. 265-620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Mt. Whitney draba	*Draba sharsmithii*	None	None	1B.3	Alpine boulder and rock field.	Protected rock crevices. 3330-3940m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Muir's tarplant	*Carlquistia muirii*	None	None	1B.3	Chaparral, lower montane coniferous forest, upper montane coniferous forest.	Crevices of granite ledges and dry sandy soils. 1100-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Munro's desert mallow	*Sphaeralcea munroana*	None	None	2.2	Great Basin scrub.	2000m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Munz's cholla	*Opuntia munzii*	None	None	1B.3	Sonoran desert scrub.	Sandy and rocky desert flats and hills.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Munz's iris	*Iris munzii*	None	None	1B.3	Cismontane woodland.	Granitic moist sandy loam soil, often along streams. 335-800m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Munz's onion	*Allium munzii*	Endangered	Threatened	1B.1	Chaparral, coastal scrub, cismontane woodland, pinyon-juniper woodland, valley and foothill grassland.	Heavy clay soils; grows in grasslands & openings within shrublands or woodlands. 300-1035m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Munz's sage	*Salvia munzii*	None	None	2.2	Coastal scrub, chaparral.	Rolling hills and slopes, in rocky soil. 120-1090m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Munz's tidy-tips	*Layia munzii*	None	None	1B.2	Chenopod scrub, valley and foothill grassland.	Hillsides, in white-grey alkaline clay soils, w/grasses and chenopod scrub associates. 45-760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
naked flag moss	*Discelium nudum*	None	None	2.2	Coastal bluff scrub.	Moss that grows on soil on clay banks. 10-50m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Napa bluecurls	*Trichostema ruygtii*	None	None	1B.2	Cismontane woodland, chaparral, valley and foothill grassland, vernal pools, lower montane coniferous forest.	Often in open, sunny areas. Also has been found in vernal pools. 30-590m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Napa checkerbloom	*Sidalcea hickmanii ssp. napensis*	None	None	1B.1	Chaparral.	Rhyolitic substrates. 415-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Napa false indigo	*Amorpha californica var. napensis*	None	None	1B.2	Broadleafed upland forest, chaparral, cismontane woodland.	Openings in forest or woodland or in chaparral. 150-2000m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Napa western flax	*Hesperolinon sp. nov. "serpentinum"*	None	None	1B.1	Chaparral.	Mostly found in serpentine chaparral. 225-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
narrow-anthered California brodiaea	*Brodiaea californica var. leptandra*	None	None	1B.2	Broadleafed upland forest, chaparral, lower montane coniferous forest.	110-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
narrow-leaved psorothamnus	*Psorothamnus fremontii var. attenuatus*	None	None	2.3	Sonoran desert scrub.	Granitic or volcanic soils. 365-900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
narrow-leaved yerba santa	*Eriodictyon angustifolium*	None	None	2.3	Pinyon-juniper woodland.	1500-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nelson's evening-primrose	*Camissonia minor*	None	None	2.3	Chenopod scrub, Great Basin scrub.	Sandy slopes, flats. 1200-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nevada daisy	*Erigeron nevadincola*	None	None	2.3	Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland.	1400-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nevada onion	*Allium nevadense*	None	None	2.3	Pinyon-juniper woodland.	Sandy or gravelly slopes in desert mountains. 1300-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nevada oryctes	*Oryctes nevadensis*	None	None	2.1	Chenopod scrub, Mojavean desert scrub.	Dry sites in loose sandy soil in washes and desert foothills in the Owens Valley. 1100-2535m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nevin's woolly sunflower	*Constancea nevinii*	None	None	1B.3	Coastal bluff scrub, coastal scrub.	Slopes and cliffs. 5-410m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Niles' harmonia	*Harmonia doris-nilesiae*	None	None	1B.1	Lower montane coniferous forest, chaparral, cismontane woodland.	Serpentine barrens. 650-1660m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nine Mile Canyon phacelia	*Phacelia novenmillensis*	None	None	1B.2	Broadleafed upland forest, pinyon and juniper woodland, upper montane coniferous forest, cismontane woodland.	Dry disturbed banks, granitic or metamorphic soils. 1635-2530m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
nine-awned pappus grass	*Enneapogon desvauxii*	None	None	2.2	Pinyon and juniper woodland.	On decomposed granite, or in gravelly limestone soils. 1240-1825m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Nipomo Mesa lupine	*Lupinus nipomensis*	Endangered	Endangered	1B.1	Coastal dunes.	Dry sandy flats, restricted to back dunes, assoc. with central dune scrub habitat - a rare community type. 10-50m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
None	*Shasta orthocarpus*	None	None	1B.1	Great Basin scrub, meadows and seeps (?), valley and foothill grassland.	Alluvial plains, hillsides. 830-995m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Norris' beard moss	*Didymodon norrisii*	None	None	2.2	Cismontane woodland, lower montane coniferous	Moss from intermittently mesic sites; on rocks. 600-	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest.	1700m.	substantially impact suitable habitat.
North Coast phacelia	*Phacelia insularis var. continentis*	None	None	1B.2	Coastal bluff scrub, coastal dunes.	Open maritime bluffs, sandy soil. 10-160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
northern clarkia	*Clarkia borealis ssp. borealis*	None	None	1B.3	Chaparral, cismontane woodland, lower montane coniferous forest.	400-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
northern spleenwort	*Asplenium septentrionale*	None	None	2.3	Chaparral, lower montane coniferous forest, subalpine coniferous forest, upper montane coniferous forest.	Forms grass-like tufts in granitic rock crevices. 1615-3350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
northwestern moonwort	*Botrychium pinnatum*	None	None	2.3	Lower montane coniferous forest, meadows, upper montane coniferous forest.	Creekbanks. 1770-2010m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Nuttall's lotus	*Lotus nuttallianus*	None	None	1B.1	Coastal dunes, coastal scrub.	On sand dunes; plants are threatened by encroachment of exotics. 0-10m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
oil neststraw	*Stylocline citroleum*	None	None	1B.1	Chenopod scrub, coastal scrub?	Flats, clay soils in oil-producing areas. 50-300m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Ojai fritillary	*Fritillaria ojaiensis*	None	None	1B.2	Broadleaved upland forest (mesic), chaparral, lower montane coniferous forest.	Rocky sites; one reported as "moist shale talus." 300-670m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ojai navarretia	*Navarretia ojaiensis*	None	None	1B.1	Chaparral, coastal scrub, valley and foothill grassland.	Openings in shrublands or grasslands. 275-620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Onyx Peak bedstraw	*Galium angustifolium ssp. onycense*	None	None	1B.3	Cismontane woodland.	Grows from under and between large granite rocks and outcrops with scattered grey pines and oaks. 950-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
opposite-leaved lewisia	*Lewisia oppositifolia*	None	None	2.2	Lower montane coniferous forest.	In open, rocky, shallow soils; sometimes on serpentine. Mesic sites. 300-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
orange lupine	*Lupinus citrinus var. citrinus*	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous forest.	Rocky, decomposed granitic outcrops, usually open areas, on flat to rolling terrain. 600-1350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcutt's bird's-beak	*Cordylanthus orcuttianus*	None	None	2.1	Coastal scrub.	Found in coastal scrub associations on slopes; also reported from intermittently moist swales, and in washes.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						100-200m	
Orcutt's linanthus	*Linanthus orcuttii*	None	None	1B.3	Chaparral, lower montane coniferous forest.	Sometimes in disturbed areas; often in gravelly clearings. 1060-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcutt's pincushion	*Chaenactis glabriuscula var. orcuttiana*	None	None	1B.1	Coastal bluff scrub, coastal dunes.	Sandy sites. 3-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcutt's spineflower	*Chorizanthe orcuttiana*	Endangered	Endangered	1B.1	Coastal scrub, chaparral, closed-cone coniferous forest.	Sandy sites and openings; sometimes in transition zones. 3-125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orcutt's woody-aster	*Xylorhiza orcuttii*	None	None	1B.2	Sonoran desert scrub.	Arid canyons; often in washes. 265-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Oregon campion	*Silene oregana*	None	None	2.3	Great Basin scrub, subalpine coniferous forest.	1500-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Oregon coast paintbrush	*Castilleja affinis ssp. litoralis*	None	None	2.2	Coastal bluff scrub, coastal dunes, coastal scrub.	Sandy sites. 15-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Oregon meconella	*Meconella oregana*	None	None	1B.1	Coastal prairie, coastal scrub.	Open, moist places. 250-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Oregon polemonium	*Polemonium carneum*	None	None	2.2	Coastal prairie, coastal scrub, lower montane coniferous forest.	0-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Oregon sedge	*Carex halliana*	None	None	2.3	Pinyon-juniper woodland, meadows.	Often on pumice. 1370-2060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Orocopia sage	*Salvia greatae*	None	None	1B.3	Mojavean desert scrub, Sonoran desert scrub.	Broad alluvial bajadas and fans adjacent to desert washes in gravelly or rocky soil, rocky slopes of canyons. -40-825m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Otay tarplant	*Deinandra conjugens*	Threatened	Endangered	1B.1	Coastal scrub, valley and foothill grassland.	Coastal plains, mesas, and river bottoms; often in open, disturbed areas; clay soils. 25-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pacific gilia	*Gilia capitata ssp. pacifica*	None	None	1B.2	Coastal bluff scrub, coastal prairie, valley and foothill grassland.	5-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Pacific Grove clover	*Trifolium polyodon*	None	Rare	1B.1	Closed-cone coniferous forest, meadows and seeps, coastal prairie.	Along small springs and seeps in grassy openings. 5-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pale peat moss	*Sphagnum strictum*	None	None	2.3	Subalpine coniferous forest.	Moss growing on soil at lake margins. 2600-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pale-yellow layia	*Layia heterotricha*	None	None	1B.1	Cismontane woodland, pinyon-juniper woodland, valley and foothill grassland.	Alkaline or clay soils; open areas. 270-1365 (2675)m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pallid bird's-beak	*Cordylanthus tenuis ssp. pallescens*	None	None	1B.2	Lower montane coniferous forest.	Gravelly openings in brush patches next to coniferous forest; on volcanic alluvium. 690-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
palmate-bracted bird's-beak	*Cordylanthus palmatus*	Endangered	Endangered	1B.1	Chenopod scrub, valley and foothill grassland.	Usually on Pescadero silty clay which is alkaline, with Distichlis, Frankenia, etc. 5-155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Palmer's goldenbush	*Ericameria palmeri var. palmeri*	None	None	1B.1	Coastal scrub, chaparral.	On granitic soils, on steep hillsides. Mesic sites. 30-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Palmer's monardella	*Monardella palmeri*	None	None	1B.2	Cismontane woodland, chaparral.	On serpentine, often found associated with	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						Sargent cypress forests. 200-800m.	occupied habitat or substantially impact suitable habitat.
Panamint daisy	*Enceliopsis covillei*	None	None	1B.2	Mojavean desert scrub.	In deposits of subalkaline, clayish soil on dry canyon floors or slopes. 400-1830m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Panamint dudleya	*Dudleya saxosa ssp. saxosa*	None	None	1B.3	Mojavean desert scrub, pinyon and juniper woodland.	In exposed crevices of cliffs and rocks, on decomposed granite or on limestone. 1100-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Panoche pepper-grass	*Lepidium jaredii ssp. album*	None	None	1B.2	Valley and foothill grassland.	Alkali bottoms, slopes, washes, alluvial fans; clay and gypsum-rich soils. 65-910m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's alumroot	*Heuchera parishii*	None	None	1B.3	Lower montane conif. forest, subalpine coniferous forest, upper montane coniferous forest, alpine boulder & rock field.	Rocky places. 1500-3800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's chaenactis	*Chaenactis parishii*	None	None	1B.3	Chaparral.	Rocky sites. 1300-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's checkerbloom	*Sidalcea hickmanii ssp.*	None	Rare	1B.2	Chaparral, lower montane coniferous	Disturbed burned or cleared areas on dry,	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	parishii				forest.	rocky slopes, in fuel breaks & fire roads along the mtn summits. 1000-2135m.	occupied habitat or substantially impact suitable habitat.
Parish's club-cholla	*Grusonia parishii*	None	None	2.2	Mojavean desert scrub, Sonoran desert scrub, Joshua tree woodland.	Sandy sites. 300-1524m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's daisy	*Erigeron parishii*	Threatened	None	1B.1	Mojavean desert scrub, pinyon-juniper woodland, Joshua tree woodland.	Often on carbonate; limestone mountain slopes; often assoc. with drainages. 1090-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's desert-thorn	*Lycium parishii*	None	None	2.3	Coastal scrub, Sonoran desert scrub.	300-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's phacelia	*Phacelia parishii*	None	None	1B.1	Mojavean desert scrub, playas.	Alkaline flats and slopes or on clay soils. 535-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's popcorn-flower	*Plagiobothrys parishii*	None	None	1B.1	Great Basin scrub, Joshua tree woodland.	Alkaline soils; mesic sites. 750-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parish's rock-cress	*Arabis parishii*	None	None	1B.2	Pebble plain, pinyon-juniper woodland, upper montane	Generally found on pebble plains on clay soil w/quartzite	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					coniferous forest.	cobbles; sometimes on limestone. 1770-2900m.	substantially impact suitable habitat.
Parry's horkelia	*Horkelia parryi*	None	None	1B.2	Chaparral, cismontane woodland.	Openings in chaparral or woodland; especially known from the Ione formation in Amador County. 80-1035m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parry's sedge	*Carex parryana var. hallii*	None	None	2.3	Meadows, subalpine coniferous forest.	One collection in California near Station Peak in the White Mtns. 2850-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parry's spineflower	*Chorizanthe parryi var. parryi*	None	None	1B.1	Coastal scrub, chaparral.	Dry slopes and flats; sometimes at interface of 2 veg types, such as chap and oak wdland; dry, sandy soils. 40-1705m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parry's spurge	*Chamaesyce parryi*	None	None	2.3	Desert dunes, Mojavean desert scrub.	Sandy sites. 395-730m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Parry's tetracoccus	*Tetracoccus dioicus*	None	None	1B.2	Chaparral, coastal scrub.	Stony, decomposed gabbro soil. 150-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Peck's lomatium	*Lomatium peckianum*	None	None	2.2	Cismontane woodland, lower montane coniferous	Rocky slopes, flats, & sometimes grassy openings, in yellow	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest, pinyon and juniper woodland.	pine-black oak woodland, on volcanic soils. 700-1800m.	substantially impact suitable habitat.
Peirson's lupine	*Lupinus peirsonii*	None	None	1B.3	Joshua tree woodland, pinyon-juniper woodland, upper montane coniferous forest.	Decomposed granite slide and talus, on slopes and ridges. 1000-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Peirson's milk-vetch	*Astragalus magdalenae var. peirsonii*	Threatened	Endangered	1B.2	Desert dunes.	Slopes and hollows in mobile dunes, usually to the lee of the prevailing winds. -55-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Peirson's pincushion	*Chaenactis carphoclinia var. peirsonii*	None	None	1B.3	Sonoran desert scrub.	Open rocky or sandy sites. 3-80m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Peninsular nolina	*Nolina cismontana*	None	None	1B.2	Chaparral, coastal scrub.	Primarily on sandstone and shale substrates; also known from gabbro. 140-1275m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pennell's bird's-beak	*Cordylanthus tenuis ssp. capillaris*	Endangered	Rare	1B.2	Closed-cone coniferous forest, chaparral.	In open or disturbed areas on serpentine within forest or chaparral. 45-230m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
perennial goldfields	*Lasthenia californica ssp. macrantha*	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub.	5-520m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Philbrick's malacothrix	*Malacothrix foliosa ssp. philbrickii*	None	None	1B.2	Coastal scrub.	60-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pierpoint Springs dudleya	*Dudleya cymosa ssp. costafolia*	None	None	1B.2	Chaparral, cismontane woodland.	On limestone on S-facing slope w/ Arabis, Cercocarpus, Fremontodendron, etc. 1030-1455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pilot Ridge fawn lily	*Erythronium taylorii*	None	None	1B.2	Lower montane coniferous forest.	Steep, metamorphic rock outcrops in Douglas-fir/mixed conifer/black oak forest. 1340-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pine rose	*Rosa pinetorum*	None	None	1B.2	Closed-cone coniferous forest.	2-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pink creamsacs	*Castilleja rubicundula ssp. rubicundula*	None	None	1B.2	Chaparral, meadows and seeps, valley and foothill grassland.	Openings in chaparral or grasslands. On serpentine. 20-900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pink fairy-duster	*Calliandra eriophylla*	None	None	2.3	Sonoran desert scrub.	Sandy or rocky sites in the desert. 120-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
pink sand-verbena	*Abronia umbellata ssp. breviflora*	None	None	1B.1	Coastal dunes and coastal strand.	Foredunes and interdunes with sparse cover. A. umb. breviflora is usually the plant closest to the ocean. 0-12m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pinnacles buckwheat	*Eriogonum nortonii*	None	None	1B.3	Chaparral, valley and foothill grassland.	Sandy soils; often on recent burns; western Santa Lucias. 390-975m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pinyon rock-cress	*Arabis dispar*	None	None	2.3	Joshua tree woodland, pinyon-juniper woodland, Mojavean desert scrub.	Granitic, gravelly slopes & mesas. Often under desert shrubs which support it as it grows. 1200-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pismo clarkia	*Clarkia speciosa ssp. immaculata*	Endangered	Rare	1B.1	Chaparral, cismontane woodland, valley and foothill grassland.	On ancient sand dunes not far from the coast. sandy soils, openings. 25-185m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Piute Mountains jewel-flower	*Streptanthus cordatus var. piutensis*	None	None	1B.2	Broadleafed upland forests, closed-cone coniferous forest, pinyon-juniper woodland.	Along roadbanks and cliffs, metamorphic-red clay soils. 1095-1735m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Piute Mountains navarretia	*Navarretia setiloba*	None	None	1B.1	Cismontane woodland, pinyon-juniper woodland, valley and foothill grassland.	Red clay soils, other clay soils (?), or on gravelly loam. 300-1110m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
plains bee balm	*Monarda pectinata*	None	None	2.3	Joshua tree woodland, pinyon-juniper woodland.		Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
plains flax	*Linum puberulum*	None	None	2.3	Pinyon and juniper woodland, Great Basin scrub, Joshua tree woodland, Mojavean desert scrub.	Dry ridges. 1000-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
playa milk-vetch	*Astragalus allochrous var. playanus*	None	None	2.2	Mojavean desert scrub.	Sandy flats, in creosote bush scrub. 780-805m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pleasant Valley mariposa-lily	*Calochortus clavatus var. avius*	None	None	1B.2	Lower montane coniferous forest.	Josephine silt loam and volcanically derived soil; often in rocky areas. 305-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Plumas ivesia	*Ivesia sericoleuca*	None	None	1B.2	Great Basin scrub, lower montane coniferous forest, meadows, vernal pools.	Vernally mesic areas; usually volcanic substrates. 1450-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Plummer's mariposa-lily	*Calochortus plummerae*	None	None	1B.2	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous	Occurs on rocky and sandy sites, usually of granitic or alluvial material. Can be very common after fire. 90-1610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest.		
Point Reyes blennosperma	*Blennosperma nanum var. robustum*	None	Rare	1B.2	Coastal prairie, coastal scrub.	On open coastal hills in sandy soil. 10-145m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Point Reyes horkelia	*Horkelia marinensis*	None	None	1B.2	Coastal dunes, coastal prairie, coastal scrub.	Sandy flats and dunes near coast; in grassland or scrub plant communities. 5-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pointed broom sedge	*Carex scoparia*	None	None	2.2	Great Basin scrub.	Wet, open places. 130-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
prostrate buckwheat	*Eriogonum prociduum*	None	None	1B.2	Great Basin scrub, pinyon-juniper woodland, upper montane coniferous forest.	Dry volcanic slopes and hills, (Jepson Manual says granite). 1300-2705m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Pulsifer's milk-vetch	*Astragalus pulsiferae var. pulsiferae*	None	None	1B.2	Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland.	Volcanic substrate, sometimes in clay; sandy or rocky soil, often with pines or sagebrush. 1340-1880m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
purple amole	*Chlorogalum purpureum var. purpureum*	Threatened	None	1B.1	Cismontane woodland, valley and foothill grassland.	Often in grassy areas with blue oaks in foothill woodland. 300-330m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
purple mountain-parsley	*Oreonana purpurascens*	None	None	1B.2	Subalpine coniferous forest, upper montane coniferous forest, broadleafed upland forest.	Open, metamorphic ridgetops in red fir forest. 2360-2900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
purple stemodia	*Stemodia durantifolia*	None	None	2.1	Sonoran desert scrub.	Sandy soils; mesic sites. 180-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
purple-nerve cymopterus	*Cymopterus multinervatus*	None	None	2.2	Mojavean desert scrub, pinyon and juniper woodland, Joshua tree woodland.	Sandy or gravelly places. 790-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
purple-stemmed checkerbloom	*Sidalcea malviflora ssp. purpurea*	None	None	1B.2	Broadleafed upland forest, coastal prairie.	15-65m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pygmy hulsea	*Hulsea vestita ssp. pygmaea*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest.	Gravelly sites; on granite. 2835-3900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pygmy lotus	*Lotus haydonii*	None	None	1B.3	Sonoran desert scrub, pinyon-juniper woodland.	Creosote bush scrub to pinyon-juniper woodland; rocky sites. 600-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
pygmy pussypaws	*Calyptridium pygmaeum*	None	None	1B.2	Upper montane coniferous forest,	Sandy or gravelly sites. 1980-3110m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					subalpine coniferous forest.		occupied habitat or substantially impact suitable habitat.
pyrola-leaved buckwheat	*Eriogonum pyrolifolium var. pyrolifolium*	None	None	2.3	Alpine boulder and rock field.	Sandy or gravelly sites; on pumice. 1675-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rabbit-ear rockcress	*Boechera pendulina*	None	None	2.3	Great Basin scrub.	Gravelly or rocky substrates. 3050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Raiche's red ribbons	*Clarkia concinna ssp. raichei*	None	None	1B.1	Coastal bluff scrub.	Highly exposed rocky bluffs with a near-vertical slope. 15m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ramona horkelia	*Horkelia truncata*	None	None	1B.3	Chaparral, cismontane woodland.	Habitats in California include: mixed chaparral, vernal streams, and disturbed areas near roads. Clay soil. 400-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Raven's lomatium	*Lomatium ravenii*	None	None	2.3	Great Basin scrub.	Open, slightly alkaline flats, poorly drained adobe soils. Often with Artemisia tridentata, Grayia, etc. 1000-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Raven's milk-vetch	*Astragalus ravenii*	None	None	1B.3	Alpine boulder and rock field, upper	Gravelly flats and slopes on metamorphosed	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					montane coniferous forest.	sedimentary and volcanic bedrock. 3355-3460.	occupied habitat or substantially impact suitable habitat.
Rawhide Hill onion	*Allium tuolumnense*	None	None	1B.2	Cismontane woodland.	Restricted to serpentine soil, usu in grey pine chaparral. steep, rocky, S-facing slopes or small drainages. 300-600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rayless layia	*Layia discoidea*	None	None	1B.1	Chaparral, cismontane woodland, lower montane coniferous forest.	On serpentine alluvium and serpentine talus. 785-1585m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
recurved larkspur	*Delphinium recurvatum*	None	None	1B.2	Chenopod scrub, valley and foothill grassland, cismontane woodland.	On alkaline soils; often in valley saltbush or valley chenopod scrub. 3-685m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Bluff dwarf rush	*Juncus leiospermus var. leiospermus*	None	None	1B.1	Chaparral, valley and foothill grassland, cismontane woodlands, vernal pools.	Vernally mesic sites. Sometimes on edges of vernal pools. 30-1020m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
red four o'clock	*Mirabilis coccinea*	None	None	2.3	Pinyon-juniper woodland.	1070-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Hills ragwort	*Senecio clevelandii var. heterophyllus*	None	None	1B.2	Cismontane woodland.	Drying serpentine soils; often along streams. 255-385m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Red Hills soaproot	*Chlorogalum grandiflorum*	None	None	1B.2	Cismontane woodland, chaparral, lower montane coniferous forest.	Occurs frequently on serpentine or gabbro, but also on non-ultramafic substrates; often on "historically disturbed" sites. 240-760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Hills vervain	*Verbena californica*	Threatened	Threatened	1B.1	Cismontane woodland, valley and foothill grassland.	Mesic sites on serpentine; usually serpentine seeps or creeks. 255-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Mountain catchfly	*Silene campanulata ssp. campanulata*	None	Endangered	4.2	Lower montane coniferous forest, chaparral. State-listed endangered, but CNPS List 4; EO's mostly archived.	Rocky dry shallow serpentine soil. 420-1200m. Element occurrences archived; CNPS List 4.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Mountain stonecrop	*Sedum eastwoodiae*	Candidate	None	1B.2	Lower montane coniferous forest.	Serpentine soils among rocks. 600-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Red Rock poppy	*Eschscholzia minutiflora ssp. twisselmannii*	None	None	1B.2	Mojavean desert scrub.	Volcanic tuff; with Larrea, Lycium, Eriogonum, Isomeris, Hemizonia. 680-1230m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
red-flowered bird's-foot-trefoil	*Lotus rubriflorus*	None	None	1B.1	Valley and foothill grassland, cismontane	Most recent sighting from sterile, red soils-volcanic mudflow	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					woodland.	deposits. 200-425m.	substantially impact suitable habitat.
red-flowered buckwheat	*Eriogonum grande var. rubescens*	None	None	1B.2	Coastal bluff scrub, coastal scrub, chaparral.	10-165m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
red-wool saxifrage	*Saxifraga rufidula*	None	None	2.3	Upper montane coniferous forest.	Moist, rocky areas. 1850-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rigid pea	*Lathyrus rigidus*	None	None	2.2	Great Basin scrub, pinyon-juniper woodland.	Often in disturbed areas. 800-1525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Ripley's aliciella	*Aliciella ripleyi*	None	None	2.3	Mojavean desert scrub.	On limestone; rocky slopes, rock/cliff bases, and rock crevices. 305-1770m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Robinson's pepper-grass	*Lepidium virginicum var. robinsonii*	None	None	1B.2	Chaparral, coastal scrub.	Dry soils, shrubland. 1-945m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Robison's monardella	*Monardella robisonii*	None	None	1B.3	Pinyon-juniper woodland, Joshua tree woodland.	Rocky desert slopes, often among granitic boulders. 1000-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
robust false lupine	*Thermopsis robusta*	None	None	1B.2	North Coast coniferous forest, broadleafed upland forest.	Ridgetops; sometimes on serpentine. 360-1290m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
robust Hoffmann's buckwheat	*Eriogonum hoffmannii var. robustius*	None	None	1B.3	Mojavean desert scrub, pinyon and juniper woodland.	300-750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
robust monardella	*Monardella villosa ssp. globosa*	None	None	1B.2	Broadleaved upland forest, chaparral, cismontane woodland, valley and foothill grassland.	Openings. 30-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
robust spineflower	*Chorizanthe robusta var. robusta*	Endangered	None	1B.1	Cismontane woodland, coastal dunes, coastal scrub.	Sandy terraces and bluffs or in loose sand. 3-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rock sandwort	*Arenaria lanuginosa ssp. saxosa*	None	None	2.3	Subalpine coniferous forest, upper montane coniferous forest.	Mesic, sandy sites. 1800-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rock-loving oxytrope	*Oxytropis oreophila var. oreophila*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest.	Gravelly or rocky sites. 3400-3800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Roderick's fritillary	*Fritillaria roderickii*	None	Endangered	1B.1	Coastal bluff scrub, coastal prairie, valley	Grassy slopes, mesas. 15-610m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					and foothill grassland.		occupied habitat or substantially impact suitable habitat.
rose leptosiphon	*Leptosiphon rosaceus*	None	None	1B.1	Coastal bluff scrub.	0-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rose-flowered larkspur	*Delphinium purpusii*	None	None	1B.3	Chaparral, cismontane woodland, pinyon-juniper woodland.	On shady rocky slopes, often on carbonates. 300-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rosette cushion cryptantha	*Cryptantha circumscissa var. rosulata*	None	None	1B.2	Alpine boulder and rock fields, subalpine coniferous forests.	Gravelly, granitic substrates. 2950-3660m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
rough menodora	*Menodora scabra*	None	None	2.3	Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland.	Rocky soils; canyons. 1200-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
round-headed Chinese-houses	*Collinsia corymbosa*	None	None	1B.2	Coastal dunes, coastal prairie.	Dunes and coastal prairie. 10-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
round-leaved filaree	*California macrophylla*	None	None	1B.1	Cismontane woodland, valley and foothill grassland.	Clay soils. 15-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Rusby's desert-mallow	*Sphaeralcea rusbyi var. eremicola*	None	None	1B.2	Mojavean desert scrub, Joshua tree woodland.	In creosote bush scrub, blackbush scrub, Joshua tree woodland; sometimes on carbonate; sometimes in washes. 965-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sagebrush bluebells	*Mertensia oblongifolia var. oblongifolia*	None	None	2.2	Great Basin scrub, lower montane coniferous forest, meadows and seeps, subalpine coniferous forest.	Usually in mesic sites. 1000-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sagebrush loeflingia	*Loeflingia squarrosa var. artemisiarum*	None	None	2.2	Great Basin scrub, Sonoran desert scrub, desert dunes.	Sandy flats and dunes. Sandy areas around clay slicks w/Sarcobatus, Atriplex, Tetradymia, etc. 700-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
saguaro	*Carnegiea gigantea*	None	None	2.2	Sonoran desert scrub.	Rocky sites. 50-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Antonio milk-vetch	*Astragalus lentiginosus var. antonius*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Dry slopes in open yellow pine forest. 1500-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Benito evening-primrose	*Camissonia benitensis*	Threatened	None	1B.1	Chaparral, cismontane woodland.	On gravelly serpentine alluvial terraces. 750-1280m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
San Benito fritillary	*Fritillaria viridea*	None	None	1B.2	Chaparral.	Serpentine slopes. 200-1525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Benito pentachaeta	*Pentachaeta exilis ssp. aeolica*	None	None	1B.2	Cismontane woodland, valley and foothill grassland.	Grassy areas. 635-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Bernardino gilia	*Gilia leptantha ssp. leptantha*	None	None	1B.3	Lower montane coniferous forest.	Sandy or gravelly sites. 1500-2350m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Bernardino Mountains bladderpod	*Lesquerella kingii ssp. bernardina*	Endangered	None	1B.1	Pinyon and juniper woodland, lower montane coniferous forest.	Dry sandy to rocky carbonate soils. 2030-2485m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Bernardino Mountains dudleya	*Dudleya abramsii ssp. affinis*	None	None	1B.2	Pebble (pavement) plain, upper montane coniferous forest, pinyon and juniper woodland.	Outcrops, granite or quartzite, rarely limestone. 1270-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Bernardino rock-cress	*Arabis breweri var. pecuniaria*	None	None	1B.2	Subalpine coniferous forest.	On cliffs and talus slopes. 2700-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
San Diego ambrosia	*Ambrosia pumila*	Endangered	None	1B.1	Chaparral, coastal scrub, valley and foothill grassland.	Sandy loam or clay soil. in valleys; persists where disturbance has been superficial. Sometimes on margins or near vernal pools. 20-415m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego barrel cactus	*Ferocactus viridescens*	None	None	2.1	Chapparal, Diegan coastal scrub, valley and foothill grassland.	Often on exposed, level or south-sloping areas; often in coastal scrub near crest of slopes. 3-485m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego bur-sage	*Ambrosia chenopodiifolia*	None	None	2.1	Coastal scrub, mostly associated with maritime succulent scrub.	Slopes of canyons in open succulent scrub usually with little herbaceous cover. 55-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego County alumroot	*Heuchera rubescens var. versicolor*	None	None	2.3	Chaparral, lower montane coniferous forest.	Rocky outcrops. 1500-4000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego goldenstar	*Bloomeria clevelandii*	None	None	1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools.	Mesa grasslands, scrub edges; clay soils. Often on mounds between vernal pools in fine, sandy loam. 50-1090m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego gumplant	*Grindelia hirsutula var. hallii*	None	None	1B.2	Meadows, valley and foothill grassland, chaparral, lower montane coniferous forest.	Frequently occurs in low moist areas in meadows; assoc spp commonly incl Wyethia, Ranunculus, Sidalcea.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						180-1660m.	
San Diego hulsea	*Hulsea californica*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest, chaparral.	Coarse to fine sandy loam in disturbed chaparral openings at high elevations. 1000-2915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego milk-vetch	*Astragalus oocarpus*	None	None	1B.2	Chaparral, cismontane woodland, meadows.	Openings in chaparral or on gravelly flats and slopes in thin oak woodland. 305-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego sand aster	*Corethrogyne filaginifolia var. incana*	None	None	1B.1	Coastal scrub, coastal bluff scrub, chaparral.	Most sites are disturbed, so hard to tell: possibly in disturbed sites and ecotones. 3-115m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Diego thorn-mint	*Acanthomintha ilicifolia*	Threatened	Endangered	1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools.	Endemic to active vertisol clay soils of mesas & valleys. Usu on clay lenses w/in grasslnd or chap communities. 10-935m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Felipe monardella	*Monardella nana ssp. leptosiphon*	None	None	1B.2	Chaparral, lower montane coniferous forest.	Sometimes in openings and fuelbreaks or in the understory of forest or chaparral. 1200-1855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Fernando Valley spineflower	*Chorizanthe parryi var. fernandina*	Candidate	Endangered	1B.1	Coastal scrub.	Sandy soils. 3-1035m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
San Francisco Bay spineflower	*Chorizanthe cuspidata var. cuspidata*	None	None	1B.2	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub.	Closely related to C. pungens. Sandy soil on terraces and slopes. 5-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco campion	*Silene verecunda ssp. verecunda*	None	None	1B.2	Coastal scrub, valley and foothill grassland, coastal bluff scrub, chaparral, coastal prairie.	Often on mudstone or shale; one site on serpentine. 30-645m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco collinsia	*Collinsia multicolor*	None	None	1B.2	Closed-cone coniferous forest, coastal scrub.	On decomposed shale (mudstone) mixed with humus. 30-250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco gumplant	*Grindelia hirsutula var. maritima*	None	None	1B.2	Coastal scrub, coastal bluff scrub, valley and foothill grassland.	Sandy or serpentine slopes, sea bluffs. 15-400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco lessingia	*Lessingia germanorum*	Endangered	Endangered	1B.1	Coastal scrub.	From remnant dunes. Open sandy soils relatively free of competing plants. 20-125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco owl's-clover	*Triphysaria floribunda*	None	None	1B.2	Coastal prairie, valley and foothill grassland.	On serpentine and nonserpentine substrate (such as at Pt. Reyes). 10-160m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Francisco popcorn-	*Plagiobothrys diffusus*	None	Endangered	1B.1	Valley and foothill grassland, coastal	Historically from grassy slopes with marine	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
flower					prairie.	influence. 60-485m.	occupied habitat or substantially impact suitable habitat.
San Gabriel bedstraw	*Galium grande*	None	None	1B.2	Cismontane woodland, chaparral, broadleafed upland forest, lower montane coniferous forest.	Open chaparral and low, open oak forest; on rocky slopes; probably undercollected due to inaccessible hab. 425-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Gabriel linanthus	*Linanthus concinnus*	None	None	1B.2	Lower montane coniferous forest, upper montane coniferous forest.	Dry rocky slopes, often in Jeffrey pine/canyon oak forest. 1575-2545m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Gabriel Mountains dudleya	*Dudleya densiflora*	None	None	1B.1	Chaparral, coastal scrub, lower montane coniferous forest.	In crevices and on decomposed granite on cliffs and canyon walls. 300-520m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Jacinto linanthus	*Linanthus jaegeri*	None	None	1B.2	Subalpine coniferous forest, upper montane coniferous forest.	Dry rocky granitic outcrops; sheer, vertical habitat. 1815-3050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Jacinto mariposa-lily	*Calochortus palmeri var. munzii*	None	None	1B.2	Lower montane coniferous forest, chaparral, meadows.	Seen in open Jeffrey pine forest as well as in chaparral. 900-1640m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Jacinto Mountains bedstraw	*Galium angustifolium ssp. jacinticum*	None	None	1B.3	Lower montane coniferous forest.	Open mixed forest. 1630-1940m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
San Joaquin adobe sunburst	*Pseudobahia peirsonii*	Threatened	Endangered	1B.1	Valley and foothill grassland, cismontane woodland.	Grassy valley floors and rolling foothills in heavy clay soil. 85-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Joaquin woollythreads	*Monolopia congdonii*	Endangered	None	1B.2	Chenopod scrub and valley and foothill grassland.	Alkaline or loamy plains; sandy soils, often with grasses and within chenopod scrub. 60-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Luis Obispo County lupine	*Lupinus ludovicianus*	None	None	1B.2	Chaparral, cismontane woodland.	Open areas in sandy soil, Santa Margarita formation. 50-525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Luis Obispo mariposa-lily	*Calochortus simulans*	None	None	1B.3	Valley and foothill grassland, cismontane woodland, chaparral.	Decomposed granite. 395-1100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Luis Obispo monardella	*Monardella frutescens*	None	None	1B.2	Coastal dunes, coastal scrub.	Stabilized sand of the immediate coast. 10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Luis Obispo owl's-clover	*Castilleja densiflora ssp. obispoensis*	None	None	1B.2	Valley and foothill grassland.	10-215m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
San Luis Obispo sedge	*Carex obispoensis*	None	None	1B.2	Closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland.	Usually in transition zone on sand, clay, or serpentine; in seeps. 5-790m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Mateo thorn-mint	*Acanthomintha duttonii*	Endangered	Endangered	1B.1	Chaparral, valley and foothill grassland, coastal scrub.	Extant populations only known from very uncommon serpentinite vertisol clays; in relatively open areas. 50-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Mateo woolly sunflower	*Eriophyllum latilobum*	Endangered	Endangered	1B.1	Cismontane woodland.	Often on roadcuts; found on and off of serpentine. 45-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Miguel savory	*Satureja chandleri*	None	None	1B.2	Chaparral, cismontane woodland, coastal scrub, rip woodland, valley and foothill grassland.	Rocky, gabbroic or metavolcanic substrate. 120-1005m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
San Nicolas Island lomatium	*Lomatium insulare*	None	None	1B.2	Coastal bluff scrub.	Sandy slopes, "lower sea terraces." 15-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
San Simeon baccharis	*Baccharis plummerae ssp. glabrata*	None	None	1B.2	Coastal scrub.	In open shrub-grassland associations. 90-375m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
sand dune cryptantha	*Cryptantha fendleri*	None	None	2.3	Great Basin scrub.	1950-2210m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sand dune phacelia	*Phacelia argentea*	None	None	1B.1	Coastal dunes.	Stabilized and recently moving sand dunes. 3-25m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sand evening-primrose	*Camissonia arenaria*	None	None	2.2	Sonoran desert scrub.	Sandy or rocky sites. -70-915m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sand food	*Pholisma sonorae*	None	None	1B.2	Desert dunes.	Loose, deep sand dunes, usu on the more stable, windward face. 0-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sand gilia	*Gilia tenuiflora ssp. arenaria*	Endangered	Threatened	1B.2	Coastal dunes, coastal scrub, chaparral (maritime), cismontane woodland.	Bare, wind-sheltered areas often near dune summit or in the hind dunes; 2 records from Pleistocene inland dunes. 0-245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sand-loving wallflower	*Erysimum ammophilum*	None	None	1B.2	Chaparral (maritime), coastal dunes, coastal scrub.	Sandy openings. 0-130m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Santa Ana River woollystar	*Eriastrum densifolium ssp. sanctorum*	Endangered	Endangered	1B.1	Coastal scrub, chaparral.	In sandy soils on river floodplains or terraced fluvial deposits. 150-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Barbara honeysuckle	*Lonicera subspicata var. subspicata*	None	None	1B.2	Chaparral, cismontane woodland, coastal scrub.	35-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Barbara Island buckwheat	*Eriogonum giganteum var. compactum*	None	Rare	1B.3	Coastal bluff scrub.	Seabluffs; dry rocky outcrops and cliffs. 10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Barbara Island dudleya	*Dudleya traskiae*	Endangered	Endangered	1B.2	Coastal scrub, coastal bluff scrub.	In shallow soil pockets on rocky cliffs, and on coastal terraces. 15-110m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Catalina figwort	*Scrophularia villosa*	None	None	1B.2	Chaparral, coastal scrub.	Rocky canyons; "canyon floor." 45-510m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Catalina Island bedstraw	*Galium catalinense ssp. catalinense*	None	None	1B.2	Chaparral, coastal scrub.	5-300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Catalina Island currant	*Ribes viburnifolium*	None	None	1B.2	Chaparral.	Among shrubs in canyons. 30-300m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
Santa Clara Valley dudleya	*Dudleya setchellii*	Endangered	None	1B.1	Valley and foothill grassland, cismontane woodland.	On rocky serpentine outcrops and on rocks within grassland or woodland. 80-335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz clover	*Trifolium buckwestiorum*	None	None	1B.1	Coastal prairie, broadleafed upland forest, cismontane woodland.	Moist grassland. 60-545m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz Island bird's-foot trefoil	*Lotus argophyllus var. niveus*	None	Endangered	4.2	Chaparral, coastal scrub.	Dry rocky places and canyon walls of interior coastal sage\chaparral on Santa Cruz Island. 5-650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz Island bush-mallow	*Malacothamnus fasciculatus var. nesioticus*	Endangered	Endangered	1B.1	Coastal scrub, chaparral.	Steep slopes and outcrops. 30-215m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz Island malacothrix	*Malacothrix indecora*	Endangered	None	1B.1	Coastal dunes, coastal bluff scrub, chaparral.	Exposed sites on dry ridges and sea bluffs. 5-60m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz microseris	*Stebbinsoseris decipiens*	None	None	1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal	Open areas in loose or disturbed soil, usu. derived from sandstone, shale or serp., on	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					prairie, coastal scrub.	seaward slopes. 10-500m.	suitable habitat.
Santa Cruz Mountains beardtongue	*Penstemon rattanii var. kleei*	None	None	1B.2	Chaparral, lower montane coniferous forest.	Sandy shale slopes; sometimes in the transition between forest and chaparral. 400-1100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz Mountains pussypaws	*Calyptridium parryi var. hesseae*	None	None	1B.1	Chaparral, cismontane woodland.	Sandy or gravelly openings. 305-1530m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz tarplant	*Holocarpha macradenia*	Threatened	Endangered	1B.1	Coastal prairie, valley and foothill grassland.	Light, sandy soil or sandy clay; often with nonnatives. 10-260m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Cruz wallflower	*Erysimum teretifolium*	Endangered	Endangered	1B.1	Lower montane coniferous forest, chaparral.	Inland marine sands (Zayante coarse sand). 120-610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Lucia bedstraw	*Galium clementis*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Forming soft mats in shady rocky patches; on granite or serpentine; mostly on exposed peaks. 1130-1780m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Lucia bush-mallow	*Malacothamnus palmeri var. palmeri*	None	None	1B.2	Chaparral.	Dry rocky slopes, mostly near summits, but occasionally extending down canyons to the sea. 60-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Santa Rosa Island dudleya	*Dudleya blochmaniae ssp. insularis*	None	None	1B.1	Coastal bluff scrub.	Coastal bluffs; on rock flat near beach near mouth of creek. 3m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Rosa Mountains leptosiphon	*Leptosiphon floribundus ssp. hallii*	None	None	1B.3	Sonoran desert scrub.	Desert canyons. 900-1275m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Susana tarplant	*Deinandra minthornii*	None	Rare	1B.2	Chaparral, coastal scrub.	On sandstone outcrops and crevices, in shrubland. 280-760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Ynez false lupine	*Thermopsis macrophylla*	None	Rare	1B.3	Chaparral. Includes T. macrophylla var. agnina, State-listed Rare.	In open areas such as fuel breaks, after burns; on sandstone. 420-2050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Santa Ynez groundstar	*Ancistrocarphus keilii*	None	None	1B.1	Chaparral, cismontane woodland.	Sandy soils. 40-130m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
saw-toothed lewisia	*Lewisia serrata*	None	None	1B.1	Broadleafed upland forest, lower montane coniferous forest, riparian forest.	Shaded, north-facing moss-covered, metamorphic rock cliffs. 900-1435m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
scabrid alpine tarplant	*Anisocarpus scabridus*	None	None	1B.3	Upper montane coniferous forest.	Open stony ridges, metamorphic scree slopes of mountain peaks, and cliffs in or near red fir forest. 1650-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Schoolcraft's wild buckwheat	*Eriogonum microthecum var. schoolcraftii*	None	None	1B.2	Pinyon and juniper woodland, Great Basin scrub.	Sandy to rocky substrates. 1300-1750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scott Mountain bedstraw	*Galium serpenticum ssp. scotticum*	None	None	1B.2	Lower montane coniferous forest.	Generally on N-facing slopes on serpentine in mixed conifer forest. 1000-2075m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scott Mountain sandwort	*Minuartia stolonifera*	None	None	1B.3	Lower montane coniferous forest.	Serpentine soils, Jeffrey pine forest. 1250-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scott Mountains fawn lily	*Erythronium citrinum var. roderickii*	None	None	1B.3	Lower montane coniferous forest.	Serpentine. 815-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scott Valley buckwheat	*Eriogonum umbellatum var. lautum*	None	None	1B.1	Cismontane (oak) woodlands, lower montane coniferous forest.	Sandy to gravelly flats. 800-900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Scott Valley phacelia	*Phacelia greenei*	None	None	1B.2	Closed-cone coniferous forest, lower montane coniferous forest, subalpine coniferous forest, upper montane conif forest.	Bare serpentine ridges and openings in yellow pine and red fir forest communities. 800-2440m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scotts Valley spineflower	*Chorizanthe robusta var. hartwegii*	Endangered	None	1B.1	Meadows, valley and foothill grassland.	In grasslands with mudstone and sandstone outcrops. 230-245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Scribner's wheat grass	*Elymus scribneri*	None	None	2.3	Alpine boulder and rock field.	On rocky slopes. 2900-4200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sea dahlia	*Coreopsis maritima*	None	None	2.2	Coastal scrub, coastal bluff scrub.	Occurs on a variety of soil types, including sandstone. 5-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
seacoast ragwort	*Packera bolanderi var. bolanderi*	None	None	2.2	Coastal scrub, North Coast coniferous forest.	30-650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
seaside bird's-beak	*Cordylanthus rigidus ssp. littoralis*	None	Endangered	1B.1	Closed-cone coniferous forest, chaparral, cismontane woodland, coastal	Sandy, often disturbed sites, usually within chaparral or coastal scrub. 0-215m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					scrub, coastal dunes.		
seaside pea	*Lathyrus japonicus*	None	None	2.1	Coastal dunes.	1-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
seaside tarplant	*Hemizonia congesta ssp. congesta*	None	None	1B.2	Coastal scrub, valley and foothill grassland.	Grassy valleys and hills, often in fallow fields. 25-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
seep kobresia	*Kobresia bellardii*	None	None	2.3	Alpine boulder and rock field (mesic), meadows, subalpine coniferous forest.	Moist places in alpine and subalpine meadows; can be on limestone substrate. 2955-3230m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sequoia gooseberry	*Ribes tularense*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	In sandy loam derived from granitics or deep clays. With Abies, Pinus, Ribes, etc. 1500-2075m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
serpentine catchfly	*Silene serpentinicola*	None	None	1B.2	Chaparral, lower montane coniferous forest.	Serpentine openings, gravelly or rocky soils. 145-1650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
serpentine cryptantha	*Cryptantha clevelandii var. dissita*	None	None	1B.1	Chaparral.	Serpentine outcrops. 330-730m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
serpentine daisy	*Erigeron serpentinus*	None	None	1B.3	Chaparral.	Serpentine shrubland; one site known. 210m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
serrated balsamroot	*Balsamorhiza serrata*	None	None	2.3	Great Basin scrub.	Rocky sites. 1400-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
shaggyhair lupine	*Lupinus spectabilis*	None	None	1B.2	Chaparral, cismontane woodland.	Open rocky slopes of serpentine. Mostly in serpentine chaparral surr. by grey pine woodland. 260-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
shaggy-haired alumroot	*Heuchera hirsutissima*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	Often near large rocks. 1500-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sharsmith's onion	*Allium sharsmithiae*	None	None	1B.3	Cismontane woodland.	Rocky, serpentine slopes. 400-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sharsmith's stickseed	*Hackelia sharsmithii*	None	None	2.3	Subalpine coniferous forest, alpine boulder and rock fields.	Cracks, crevices in granite cliffs; large boulder talus. 3000-3700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shasta ageratina	*Ageratina shastensis*	None	None	1B.2	Chaparral, lower montane coniferous	Rocky, sometimes limestone. 400-1800m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest.		occupied habitat or substantially impact suitable habitat.
Shasta chaenactis	*Chaenactis suffrutescens*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Sandy or serpentine soils. 760-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shevock's bristle moss	*Orthotrichum shevockii*	None	None	1B.3	Joshua tree woodland, pinyon-juniper woodland.	Moss growing on granitic rocks. 750-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shevock's copper moss	*Schizymenium shevockii*	None	None	1B.2	Cismontane woodland.	Moss on metamorphic rocks, mesic sites. On rocks along roads, in same habitat as Mielichhoferia elongata. 750-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shevock's milk-vetch	*Astragalus shevockii*	None	None	1B.3	Upper montane coniferous forest.	Open Jeffrey pine forest, in granitic sand or volcanic soils and in pine-needle duff. 1875-1965m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
shining navarretia	*Navarretia nigelliformis ssp. radians*	None	None	1B.2	Cismontane woodland, valley and foothill grassland, vernal pools.	Apparently in grassland, and not necessarily in vernal pools. 200-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shirley Meadows star-tulip	*Calochortus westonii*	None	None	1B.2	Broadleaved upland forest, lower montane coniferous	Meadows, open woodlands; granite substrates. 1500-	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest, meadows.	2060m.	substantially impact suitable habitat.
Shockley's milk-vetch	*Astragalus serenoi var. shockleyi*	None	None	2.2	Chenopod scrub, pinyon and juniper woodland, Great Basin scrub.	Coarse, granitic alluvium. 1500-2250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shockley's rock-cress	*Arabis shockleyi*	None	None	2.2	Pinyon and juniper woodland.	On ridges, rocky outcrops and openings on limestone or quartzite; usually in pinyon or p-j series. 875-2205m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
short-fruited willow	*Salix brachycarpa ssp. brachycarpa*	None	None	2.3	Alpine dwarf scrub, meadows and seeps, subalpine coniferous forest.	Edges of lakes, and in wet meadows, on limestone, marble, and metamorphic substrates. 3150-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
short-joint beavertail	*Opuntia basilaris var. brachyclada*	None	None	1B.2	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon-juniper woodland, riparian woodland.	Sandy soil or coarse, granitic loam. 425-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
short-leaved evax	*Hesperevax sparsiflora var. brevifolia*	None	None	1B.2	Coastal bluff scrub, coastal dunes.	Sandy bluffs and flats. 0-200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
short-leaved hulsea	*Hulsea brevifolia*	None	None	1B.2	Upper montane coniferous forest.	Granitic or volcanic soil of forest openings and	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
						road cuts. 1500-2700m.	occupied habitat or substantially impact suitable habitat.
showy golden madia	*Madia radiata*	None	None	1B.1	Valley and foothill grassland, cismontane woodland, chenopod scrub.	Mostly on adobe clay in grassland or among shrubs. 25-1125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
showy island snapdragon	*Galvezia speciosa*	None	None	1B.2	Coastal scrub.	Rocky cliffs and canyons. 0-365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
showy rancheria clover	*Trifolium amoenum*	Endangered	None	1B.1	Valley and foothill grassland, coastal bluff scrub.	Sometimes on serpentine soil, open sunny sites, swales. Most recently sited on roadside and eroding cliff face. 5-560m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Shuteye Peak fawn lily	*Erythronium pluriflorum*	None	None	1B.3	Upper montane coniferous forest, meadows, subalpine coniferous forest.	Rocky granitic outcrops and slopes. 2060-2550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sierra draba	*Draba sierrae*	None	None	1B.3	Alpine boulder and rock field.	In coarse sandy and gravelly soil; granitic or carbonate substrate. 3500-4265m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sierra Valley ivesia	*Ivesia aperta var. aperta*	None	None	1B.2	Great Basin scrub, pinyon and juniper woodland, lower	Usually in loamy soils derived from volcanics. Grassy areas w/in	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					montane coniferous forest, meadows.	sagebrush scrub or other communities. 1475-2300m.	substantially impact suitable habitat.
silver-haired ivesia	*Ivesia argyrocoma*	None	None	1B.2	Meadows, pebble plains, upper montane coniferous forest.	In pebble plains and meadows with other rare plants. 1480-2680m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
simple androsace	*Androsace occidentalis var. simplex*	None	None	2.3	Upper montane coniferous forest.	Usually in mesic sites. 1675-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
singlewhorl burrobrush	*Ambrosia monogyra*	None	None	2.2	Chaparral, Sonoran desert scrub.	Sandy soils. 10-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Siskiyou checkerbloom	*Sidalcea malviflora ssp. patula*	None	None	1B.2	Coastal prairie, broadleafed upland forest.	Open coastal forest. 15-65m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Siskiyou fireweed	*Epilobium siskiyouense*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	On slopes in gravelly, serpentine soils. 1700-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sky-blue phacelia	*Phacelia coerulea*	None	None	2.3	Mojavean desert scrub, pinyon-juniper woodland.	1400-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
slender collomia	*Collomia tenella*	None	None	2.2	Upper montane coniferous forest.	Volcanic soils. 2170m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender cottonheads	*Nemacaulis denudata var. gracilis*	None	None	2.2	Coastal dunes, desert dunes, Sonoran desert scrub.	In dunes or sand. 0-560m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender lupine	*Lupinus gracilentus*	None	None	1B.3	Subalpine coniferous forest.	Semi-moist shaded areas. 2500-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender mariposa-lily	*Calochortus clavatus var. gracilis*	None	None	1B.2	Chaparral, coastal scrub.	Shaded foothill canyons; often on grassy slopes within other habitat. 420-760m	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender moonwort	*Botrychium lineare*	None	None	1B.3	Upper coniferous forest.	2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender silver moss	*Anomobryum julaceum*	None	None	2.2	Broadleafed upland forest, lower montane coniferous forest, north coast coniferous forest.	Moss which grows on damp rocks and soil; usually seen on roadcuts. 100-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
slender-horned spineflower	*Dodecahema leptoceras*	Endangered	Endangered	1B.1	Chaparral, coastal scrub (alluvial fan sage scrub).	Flood deposited terraces and washes; assoc include Encelia, Dalea, Lepidospartum, etc. 200-760m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
slender-leaved ipomopsis	*Ipomopsis tenuifolia*	None	None	2.3	Chaparral, pinyon and juniper woodland, Sonoran desert scrub.	Dry rocky or gravelly slopes. 100-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender-stalked monkeyflower	*Mimulus gracilipes*	None	None	1B.2	Chaparral.	Disturbed places such as burns and RR grades; also on thin granitic soil in cracks in large granite rocks. 500-1300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
slender-stemmed monkeyflower	*Mimulus filicaulis*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest, meadows and seeps, upper montane coniferous forest.	Within the transition zone of the Sierra Nevada, moist granitic sand and meadow edges; vernally mesic sites. 680-1750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small groundcone	*Boschniakia hookeri*	None	None	2.3	North Coast coniferous forest.	Open woods, shrubby places, generally on Gaultheria shallon. 90-885m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small mousetail moss	*Myurella julacea*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest.	Moss growing on damp rock and soil. 2700-3000m.	Low. Suction dredging not likely to occur in occupied habitat or

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
small-flowered androstephium	*Androstephium breviflorum*	None	None	2.2	Mojavean desert scrub, desert dunes.	Bajadas. One site known from sand dunes. 270-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small-flowered bird's-beak	*Cordylanthus parviflorus*	None	None	2.3	Joshua tree woodland, pinyon-juniper woodland, Mojavean desert scrub.	700-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small-flowered calycadenia	*Calycadenia micrantha*	None	None	1B.2	Chaparral, valley and foothill grassland, meadows and seeps, lower montane coniferous forest.	Rocky talus or scree; sparsely vegetated areas. occasionally on roadsides; sometimes on serpentine. 5-1500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small-flowered fescue	*Festuca minutiflora*	None	None	2.3	Alpine boulder and rock field.	3200-4050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
small-flowered sand-verbena	*Tripterocalyx micranthus*	None	None	2.3	Desert dunes, Mojavean desert scrub.	Sandy sites. 550-855m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Small's southern clarkia	*Clarkia australis*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	Open, rocky sites in conifer forest or oak woodland. 900-2060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
smooth lessingia	*Lessingia micradenia var. glabrata*	None	None	1B.2	Chaparral.	Serpentine; often on roadsides. 120-485m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
snake cholla	*Opuntia californica var. californica*	None	None	1B.1	Chaparral, coastal scrub.	30-150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
snow dwarf bramble	*Rubus nivalis*	None	None	2.3	North Coast coniferous forest.	Deep soil, with Douglas-fir overstory. 1075-1250m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Snow Mountain buckwheat	*Eriogonum nervulosum*	None	None	1B.2	Chaparral.	Dry serpentine outcrops, balds, and barrens. 300-2100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Snow Mountain willowherb	*Epilobium nivium*	None	None	1B.2	Upper montane coniferous forest, chaparral.	In crevices of rocky outcrops, and dry talus and shale slopes. 785-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
snow willow	*Salix nivalis*	None	None	2.3	Alpine dwarf scrub.	In California, on lakeshore with Potentilla, Salix spp., Penstemon, etc. 3100-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sodaville milk-vetch	*Astragalus lentiginosus var.*	None	Endangered	1B.1	Meadows.	In open areas and under shrubs on alkaline clay	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	sesquimetralis					soil surrounding springs. 950m.	occupied habitat or substantially impact suitable habitat.
soft-leaved paintbrush	*Castilleja mollis*	Endangered	None	1B.1	Coastal dunes, coastal bluff scrub.	5-20m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sonoma beardtongue	*Penstemon newberryi var. sonomensis*	None	None	1B.3	Chaparral.	Crevices in rock outcrops and talus slopes. 180-1390m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sonoma spineflower	*Chorizanthe valida*	Endangered	Endangered	1B.1	Coastal prairie.	Sandy soil. 10-50m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
South Coast saltscale	*Atriplex pacifica*	None	None	1B.2	Coastal scrub, coastal bluff scrub, playas, chenopod scrub.	Alkali soils. 1-500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
South Fork Mtn. lupine	*Lupinus elmeri*	None	None	1B.2	Lower montane coniferous forest.	1370-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
southern alpine buckwheat	*Eriogonum kennedyi var. alpigenum*	None	None	1B.3	Alpine boulder and rock fields, subalpine coniferous forest.	Dry granitic gravel. 2600-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
Southern California rock draba	*Draba corrugata var. saxosa*	None	None	1B.3	Alpine boulder and rock fields, subalpine coniferous forest, upper montane coniferous forest.	Rocky sites. 2440-3600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
southern jewel-flower	*Streptanthus campestris*	None	None	1B.3	Chaparral, lower montane coniferous forest, pinyon-juniper woodland.	Open, rocky areas. 600-2790m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
southern mountain buckwheat	*Eriogonum kennedyi var. austromontanum*	Threatened	None	1B.2	Pebble (pavement) plain, lower montane coniferous forest.	Usually found in pebble plain habitats. 1755-2375m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Spanish Needle onion	*Allium shevockii*	None	None	1B.3	Pinyon-juniper woodland, upper montane coniferous forest.	In soil pockets on rock outcrops and talus slopes; bulbs mostly on margins of outcrops. 2000-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
spear-fruited draba	*Draba lonchocarpa var. lonchocarpa*	None	None	2.3	Alpine boulder and rock fields.	On limestone scree. 3000-3295m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
spear-leaf matelea	*Matelea parvifolia*	None	None	2.3	Mojavean desert scrub, Sonoran desert scrub.	Dry rocky ledges and slopes. 440-1095m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
spiked larkspur	*Delphinium stachydeum*	None	None	2.3	Upper montane coniferous forest, Great Basin scrub.	Known in CA only from the Warner Mtns, on a dry, rocky ridge. 1950-2600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
spiny cliff-brake	*Pellaea truncata*	None	None	2.3	Pinyon-juniper woodland.	Granitic boulders and fissures in granite cliffs, also in volcanic or sandy limestone soils. 1200-2150m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
spiny milkwort	*Polygala subspinosa*	None	None	2.2	Great Basin scrub, pinyon-juniper woodland.	Volcanic mesas, gravelly soils; often in sagebrush scrub. 1270-1705m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Spjut's bristle moss	*Orthotrichum spjutii*	None	None	1B.3	Lower montane coniferous forest, pinyon-juniper woodland, subalpine coniferous forest, upper montane coniferous forest.	Moss growing on granitic rock; known only from near Sonora Pass. 2100-2400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Springville clarkia	*Clarkia springvillensis*	Threatened	Endangered	1B.2	Chaparral, cismontane woodland, valley and foothill grassland.	Cutbanks and openings in blue oak woodland. Decomposed granite loam. 330-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
squarestem phlox	*Phlox muscoides*	None	None	2.3	Alpine boulder and rock field, subalpine coniferous forest, Great Basin scrub.	Open rocky slopes. 1270-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
starved daisy	*Erigeron miser*	None	None	1B.3	Upper montane coniferous forest.	Rocky, granitic outcrops. 1755-2260m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stebbins' harmonia	*Harmonia stebbinsii*	None	None	1B.2	Chaparral, lower montane coniferous forest.	Ultramafic soils, often along roads. 400-1580m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stebbins' lewisia	*Lewisia stebbinsii*	None	None	1B.2	Upper montane coniferous forest, lower montane coniferous forest.	Relatively barren exposed ridges and slopes in nutrient poor soils (mostly serpentine). 1680-2050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stebbins' lomatium	*Lomatium stebbinsii*	None	None	1B.1	Lower montane coniferous forest, chaparral.	Thin, gravelly volcanic clay in open yellow pine forest. Grows where other vegetation is absent. 1235-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stebbins' monardella	*Monardella stebbinsii*	None	None	1B.2	Broadleaved upland forest, chaparral, lower montane coniferous forest.	On steep, loose slopes of generally reddish serpentine talus and boulders. 750-1100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stebbins' morning-glory	*Calystegia stebbinsii*	Endangered	Endangered	1B.1	Chaparral, cismontane woodland.	On red clay soils of the Pine Hill formation; gabbro or serpentine; open areas. 180-725m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Stebbins' phacelia	*Phacelia stebbinsii*	None	None	1B.2	Lower montane coniferous forest, cismontane woodland, meadows and seeps, riparian woodland.	Among rocks and rubble on metamorphic rock benches. 605-2050m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
Stephens' beardtongue	*Penstemon stephensii*	None	None	1B.3	Mojavean desert scrub, pinyon-juniper woodland.	Dry granitic or limestone rocky slopes and crevices. 1160-2120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sticky dudleya	*Dudleya viscida*	None	None	1B.2	Coastal scrub, coastal bluff scrub, chaparral.	On north and south-facing cliffs and banks. 10-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sticky geraea	*Geraea viscida*	None	None	2.3	Chaparral.	Loamy coarse sand to gravelly sand soils; often in post burned areas and in bulldozed areas. 450-1700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Stony Creek spurge	*Chamaesyce ocellata ssp. rattanii*	None	None	1B.2	Valley and foothill grassland.	Sandy or rocky soils. 85-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
straight-awned spineflower	*Chorizanthe rectispina*	None	None	1B.3	Chaparral, cismontane woodland, coastal scrub.	Often on granite in chaparral. 355-1035m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
striped adobe-lily	*Fritillaria striata*	None	Threatened	1B.1	Cismontane woodland, valley and foothill grassland.	Heavy clay adobe soils in oak grassland. 135-1455m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
subalpine aster	*Eurybia merita*	None	None	2.3	Upper montane coniferous forest.	1300-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
subalpine cryptantha	*Cryptantha crymophila*	None	None	1B.3	Subalpine coniferous forest.	On dry talus of volcanic formation. 2600-3200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
subtle orache	*Atriplex subtilis*	None	None	1B.2	Valley and foothill grassland.	Little info available. Madrono Vol. 44 No.2 only source currently. 40-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Suksdorf's broom-rape	*Orobanche ludoviciana var. arenosa*	None	None	2.3	Great Basin scrub.	1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Suksdorf's milk-vetch	*Astragalus pulsiferae var. suksdorfii*	None	None	1B.2	Great Basin scrub, lower montane coniferous forest, pinyon and juniper woodland.	Volcanic or clay soil; often gravelly or rocky. 1300-1930m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
supple daisy	*Erigeron supplex*	None	None	1B.2	Coastal bluff scrub, coastal prairie.	Usually in grassy sites. 5-50m.	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
surf thistle	*Cirsium rhothophilum*	None	Threatened	1B.2	Coastal dunes, coastal bluff scrub.	Open areas in central dune scrub; usually in coastal dunes. 3-60m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Susanville beardtongue	*Penstemon sudans*	None	None	1B.3	Great Basin scrub, lower montane coniferous forest, pinyon-juniper woodland.	1200-1775m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
sweet-smelling monardella	*Monardella beneolens*	None	None	1B.3	Alpine boulder and rock field, subalpine coniferous forest, upper montane coniferous forest.	Granitic soils; open conifer forest with Eriogonum spp.,Trifolium, Erigeron, etc. 2500-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Sweetwater Mountains draba	*Draba incrassata*	None	None	1B.3	Alpine boulder and rock field.	Endemic to the rhyolite substrates of the Sweetwater Mtns, on loose, steep talus slopes. 2500-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tahoe draba	*Draba asterophora var. asterophora*	None	None	1B.2	Alpine boulder and rock field, subalpine coniferous forest.	On open talus slopes, rock outcrops and crevices. On decomposed granite. 2500-3505m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
talus fritillary	*Fritillaria falcata*	None	None	1B.2	Chaparral, cismontane woodland, lower montane coniferous	On shale, granite, or serpentine talus. 300-1525m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest.		suitable habitat.
Tamalpais jewel-flower	*Streptanthus batrachopus*	None	None	1B.3	Closed-cone coniferous forest, chaparral.	Talus serpentine outcrops. 410-650m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tamalpais lessingia	*Lessingia micradenia var. micradenia*	None	None	1B.2	Chaparral, valley and foothill grassland.	Usually on serpentine, in serpentine grassland or serpentine chaparral. often on roadsides. 100-305m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
tear drop moss	*Dacryophyllum falcifolium*	None	None	1B.3	Coast redwood forest.	Limestone substrates and rock outcrops. 50-275m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tecate tarplant	*Deinandra floribunda*	None	None	1B.2	Chaparral, coastal scrub.	Often in little drainages or disturbed areas. 70-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tehachapi monardella	*Monardella linoides ssp. oblonga*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest, pinyon-juniper woodland.	On dry slopes of yellow pine forest, decomposed granitic soils; also in roadside disturbed areas. 1695-2470m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tehama County western flax	*Hesperolinon tehamense*	None	None	1B.3	Chaparral, cismontane woodland.	Serpentine barrens in chaparral. 545-1155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Tehipite Valley jewel-flower	*Streptanthus fenestratus*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forst.	Granite gravels and dry open sandy areas. 605-1760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tejon poppy	*Eschscholzia lemmonii ssp. kernensis*	None	None	1B.1	Valley and foothill grassland.	Little information available on habitat. 250-750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Temblor buckwheat	*Eriogonum temblorense*	None	None	1B.2	Valley and foothill grassland.	Barren clay or sandstone substrates. 300-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
The Cedars fairy-lantern	*Calochortus raichei*	None	None	1B.2	Closed-cone coniferous forest, chaparral.	On serpentine. Usually on shaded slopes, but also on barrens and talus. 200-395m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
The Lassics lupine	*Lupinus constancei*	None	None	1B.2	Lower montane coniferous forest.	Serpentine barrens. 1500-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
The lassics sandwort	*Minuartia decumbens*	None	None	1B.2	Lower montane coniferous forest, upper montane coniferous forest.	Endemic to serpentine, only known from upper, north-facing slopes under Jeffrey pines. 1500-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
thin-lobed horkelia	*Horkelia tenuiloba*	None	None	1B.2	Coastal scrub, chaparral.	Sandy soils; mesic openings. 45-500m.	Low. Suction dredging not likely to occur in

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
thorny milkwort	*Polygala acanthoclada*	None	None	2.3	Chenopod scrub, Joshua tree woodland, pinyon-juniper woodland.	760-2285m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
thread-leaved beardtongue	*Penstemon filiformis*	None	None	1B.3	Cismontane woodland, lower montane coniferous forest, meadows and seeps.	Dry stony sites, grassy openings, & meadows, often along trails & logging roads; sometimes on serpentine. 450-2125m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
three-awned grama	*Bouteloua trifida*	None	None	2.3	Mojavean desert scrub.	Limestone ravines and rocky hills, sometimes in narrow crevices. Assoc incl Agave utahensis, Salvia funerea. 700-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
three-bracted onion	*Allium tribracteatum*	None	None	1B.2	Chaparral, lower montane coniferous forest, upper montane coniferous forest.	Volcanic slopes and ridges. 1100-2750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tiburon buckwheat	*Eriogonum luteolum var. caninum*	None	None	1B.2	Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie.	Serpentine soils; sandy to gravaelly sites. 0-700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tiburon paintbrush	*Castilleja affinis ssp. neglecta*	Endangered	Threatened	1B.2	Valley and foothill grassland.	Rocky serpentine sites. 75-400m.	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							occupied habitat or substantially impact suitable habitat.
Tidestrom's lupine	*Lupinus tidestromii*	Endangered	Endangered	1B.1	Coastal dunes. Includes Lupinus tidestromii var. tidestromii, State-listed Endangered.	Partially stabilized dunes, immediately near the ocean. 0-35m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tidestrom's milk-vetch	*Astragalus tidestromii*	None	None	2.2	Mojavean desert scrub.	Washes; limestone. 600-1585m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tiehm's rock-cress	*Arabis tiehmii*	None	None	1B.3	Alpine boulder and rock field.	On windswept rocky ridges and in crevices on rocky slopes; in cushion plant community on granite. 2970-3590m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tompkins' sedge	*Carex tompkinsii*	None	Rare	4.3	Chaparral,cismontane woodland, lower montane coniferous forest, upper montane coniferous forest.	Often on granitic substrate; sometimes also on soils from metamorphic rock. 420-1800m. Occ's archived; CNPS List 4.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
tongue-leaf copper moss	*Scopelophila cataractae*	None	None	2.2	Cismontane woodland.	Moss on metamorphic substrate; on soil. 400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Torrey's blazing star	*Mentzelia torreyi*	None	None	2.2	Great Basin scrub, Mojavean desert	Sandy or rocky sites; alkaline, usually	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					scrub, pinyon-juniper woodland.	volcanic soils. 1170-2835m.	occupied habitat or substantially impact suitable habitat.
Tracy's beardtongue	*Penstemon tracyi*	None	None	1B.3	Upper montane coniferous forest.	Dry rocky ridges, ledges, and cliffs, often in crevices. 1785-2145m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tracy's eriastrum	*Eriastrum tracyi*	None	Rare	1B.2	Chaparral, cismontane woodland.	Gravelly shale or clay; often in open areas. 315-760m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tracy's romanzoffia	*Romanzoffia tracyi*	None	None	2.3	Coastal bluff scrub, coastal scrub.	Rocky sites. 15-30m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Trask's milk-vetch	*Astragalus traskiae*	None	Rare	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub.	Sandy, windswept ocean bluffs, gullied banks, and coastal dunes. 5-245m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
tree-anemone	*Carpenteria californica*	None	Threatened	1B.2	Cismontane woodland, chaparral.	An very localized endemic found on well-drained granitic soils, mostly on N-facing ravines and drainages. 340-1340m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Trinity buckwheat	*Eriogonum alpinum*	None	Endangered	1B.2	Subalpine coniferous forest, upper montane coniferous	Rocky soils and scree slopes in open and windswept areas on	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
					forest, alpine boulder and rock field.	serpentine substrate. 2200-2610m.	substantially impact suitable habitat.
triple-ribbed milk-vetch	*Astragalus tricarinatus*	Endangered	None	1B.2	Joshua tree woodland, Sonoran desert scrub.	Hot, rocky slopes in canyons and along edge of boulder-strewn desert washes, w/ Larrea and Encelia. 450-790m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tulare cryptantha	*Cryptantha incana*	None	None	1B.3	Lower montane coniferous forest.	Gravelly or rocky sites. 1430-2000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
tundra thread moss	*Pohlia tundrae*	None	None	2.3	Alpine boulder and rock field.	Moss growing on gravelly, damp soil. 2700-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tuolumne fawn lily	*Erythronium tuolumnense*	None	None	1B.2	Broadleaved upland forest, chaparral, lower montane coniferous forest.	Often on clay soils; on cliffs and near drainages. 510-1460m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Tuolumne iris	*Iris hartwegii ssp. columbiana*	None	None	1B.2	Cismontane woodland, lower montane coniferous forest.	600-1400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Twisselmann's buckwheat	*Eriogonum twisselmannii*	None	Rare	1B.2	Upper montane coniferous forest.	Dry, granitic outcrops. 2255-2800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							suitable habitat.
two-carpellate western flax	*Hesperolinon bicarpellatum*	None	None	1B.2	Serpentine chaparral.	Serpentine barrens at edge of chaparral. 150-820m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
umbrella larkspur	*Delphinium umbraculorum*	None	None	1B.3	Cismontane woodland.	Mesic sites. 400-1600m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Umpqua green-gentian	*Swertia umpquaensis*	None	None	2.2	Lower montane coniferous forest, meadows and seeps, chaparral, North Coast coniferous forest.	Mountain meadows; openings in forest. 1555-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
upswept moonwort	*Botrychium ascendens*	None	None	2.3	Lower montane coniferous forest.	Grassy fields, coniferous woods near springs and creeks. 1500-2060m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Utah beardtongue	*Penstemon utahensis*	None	None	2.3	Chenopod scrub, Great Basin scrub, Mojavean desert scrub, pinyon-juniper woodland.	Rocky sites. 1065-2500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Utah daisy	*Erigeron utahensis*	None	None	2.3	Pinyon-juniper woodland.	Limestone. 1500-2320m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
Vandenberg monkeyflower	*Mimulus fremontii var. vandenbergensis*	None	None	1B.1	Cismontane woodland, chaparral (Burton Mesa).	Sandy, often disturbed areas. 75-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
vanishing wild buckwheat	*Eriogonum evanidum*	None	None	1B.1	Chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Sandy sites. 970-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
variegated dudleya	*Dudleya variegata*	None	None	1B.2	Chaparral, coastal scrub, cismontane woodland, valley and foothill grassland.	In rocky or clay soils; sometimes associated with vernal pool margins. 3-550m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Vasek's clarkia	*Clarkia tembloriensis ssp. calientensis*	None	None	1B.1	Valley and foothill grassland.	North-facing slopes with Isomeris, other Clarkia spp. 270-335m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
veiny monardella	*Monardella douglasii ssp. venosa*	None	None	1B.1	Valley and foothill grassland, cismontane woodland.	In heavy clay; mostly with grassland associates. Rediscovered in 1992. 60-410m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Verity's dudleya	*Dudleya verityi*	Threatened	None	1B.2	Chaparral, cismontane woodland, coastal scrub.	On volcanic rock outcrops in the Santa Monica Mountains. 60-120m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
violet twining snapdragon	*Maurandya antirrhiniflora*	None	None	2.3	Joshua tree woodland, Mojavean	Steep rocky carbonate slopes. 760-1525m.	Low. Suction dredging not likely to occur in

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
	ssp. antirrhiniflora				desert scrub.		occupied habitat or substantially impact suitable habitat.
virgate halimolobos	*Halimolobos virgata*	None	None	2.3	Meadows, pinyon and juniper woodland.	2000-3000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
viviparous foxtail cactus	*Coryphantha vivipara var. rosea*	None	None	2.2	Mojavean desert scrub, pinyon and juniper woodland.	On gravelly limestone or volcanic slopes and brushy hillsides. 1250-2700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Waldo daisy	*Erigeron bloomeri var. nudatus*	None	None	2.3	Lower montane coniferous forest, upper montane coniferous forest.	In open areas on dry rocky outcrops on serpentine. 600-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Waldo rock-cress	*Arabis aculeolata*	None	None	2.2	Broadleafed upland forest, lower montane coniferous forest, upper montane coniferous forest.	Serpentine slopes and ridges. 410-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Waldo wild buckwheat	*Eriogonum pendulum*	None	None	2.2	Lower montane coniferous forest, upper montane coniferous forest.	On dry, rocky ultramafic soils; open somewhat grassy areas w/in pine forest. 225-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Wallace's nightshade	*Solanum wallacei*	None	None	1B.1	Chaparral, cismontane woodland.	Canyons; rocky sites. 3-410m.	Low. Suction dredging not likely to occur in occupied habitat or

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
							substantially impact suitable habitat.
Warner Mountains bedstraw	*Galium serpenticum ssp. warnerense*	None	None	1B.2	Subalpine coniferous forest, meadows.	In talus or in rock crevices or at base of rocks. 1450-2750m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Warner Mountains buckwheat	*Eriogonum umbellatum var. glaberrimum*	None	None	1B.3	Lower montane coniferous forest, upper montane coniferous forest.	Sandy or gravelly sites. 1600-2300m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Warner Springs lessingia	*Lessingia glandulifera var. tomentosa*	None	None	1B.3	Chaparral.	Along roadsides, sandy soil, in high desert chaparral. 860-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
wayside aster	*Eucephalus vialis*	None	None	1B.2	Lower montane coniferous forest, upper montane coniferous forest.	Gravelly substrates. 910-1545m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Webber's ivesia	*Ivesia webberi*	Candidate	None	1B.1	Great Basin scrub, lower montane coniferous forest.	Rocky, volcanic soils. 1500-2075m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Webber's milk-vetch	*Astragalus webberi*	None	None	1B.2	Lower montane coniferous forest.	Open brushy slopes and flats in xeric pine forest or mixed pine-oak forest. 800-1220m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
western goblin	*Botrychium montanum*	None	None	2.1	Lower montane coniferous forest.	Creekbanks in old-growth forest. 1500-1830m.	Moderate. In the absence of the proposed regulations, suction dredging activities may adversely impact species or their habitat.
western valerian	*Valeriana occidentalis*	None	None	2.3	Lower montane coniferous forest.	Mesic sites. 1500-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Wheeler's dune-broom	*Chaetadelpha wheeleri*	None	None	2.2	Desert dunes, Great Basin scrub, Mojavean desert scrub.	Sandy sites. 850-1900m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white bear poppy	*Arctomecon merriamii*	None	None	2.2	Chenopod scrub, Mojavean desert scrub.	Rocky slopes, calcareous soil, loose shale, or sandy washes. 490-1585m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
White Mountains horkelia	*Horkelia hispidula*	None	None	1B.3	Great Basin scrub, subalpine coniferous forest, alpine dwarf scrub.	Mostly in ancient bristlecone forest. 3000-3400m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white-bracted spineflower	*Chorizanthe xanti var. leucotheca*	None	None	1B.2	Mojavean desert scrub, pinyon-juniper woodland.	300-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
white-flowered rein orchid	*Piperia candida*	None	None	1B.2	North coast coniferous forest, lower montane coniferous forest, broadleafed upland forest.	Coast ranges from Santa Cruz County north; on serpentine. Forest duff, mossy banks, rock outcrops & muskeg. 0-1200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white-margined beardtongue	*Penstemon albomarginatus*	None	None	1B.1	Mojavean desert scrub, desert dunes.	Deep stabilized desert sand, in washes and along roadsides. 635-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white-margined everlasting	*Antennaria marginata*	None	None	2.3	Lower montane coniferous forest, upper montane coniferous forest.	Dry woods. 2120-3330m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white-rayed pentachaeta	*Pentachaeta bellidiflora*	Endangered	Endangered	1B.1	Valley and foothill grassland.	Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. 35-620m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
white-stemmed clarkia	*Clarkia gracilis ssp. albicaulis*	None	None	1B.2	Chaparral, cismontane woodland.	Dry, grassy openings in chaparral or foothill woodland. Sometimes on serpentine. 300-850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Whitney's farewell-to-spring	*Clarkia amoena ssp. whitneyi*	None	None	1B.1	Coastal bluff scrub, coastal scrub.	10-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Wiggins' croton	*Croton wigginsii*	None	Rare	2.2	Desert dunes, Sonoran desert scrub.	On sand dunes and sandy arroyos. 50-100m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
willowy monardella	*Monardella viminea*	Endangered	Endangered	1B.1	Coastal scrub/alluvial ephemeral washes with adjacent coastal scrub, chaparral, or sycamore woodland.	In canyons, in rocky and sandy places, sometimes in washes or floodplains; w/Baccharis, Iva, etc. 50-225m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
winged dock	*Rumex venosus*	None	None	2.3	Great Basin scrub.	Sandy substrates; broadly distributed; just barely gets into California at Honey Lake Valley. 1200-1800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Wolf's evening-primrose	*Oenothera wolfii*	None	None	1B.1	Coastal bluff scrub, coastal dunes, coastal prairie, lower montane coniferous forest.	Sandy substrates; usually mesic sites. 3-800m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
woolly balsamroot	*Balsamorhiza lanata*	None	None	1B.2	Cismontane woodland.	Open woods, grassy slopes. (575)800-1050m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
woolly mountain-parsley	*Oreonana vestita*	None	None	1B.3	Subalpine coniferous forest, upper montane coniferous forest.	High ridges; on scree, talus, or gravel. 2410-3500m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

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Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
woolly stenotus	*Stenotus lanuginosus*	None	None	2.2	Pinyon-juniper woodland, Great Basin scrub.	Exposed ridges and flats in shallow, rocky soil. Often in sagebrush at edges of other vegetation types. 1500-1850m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
woolly-headed gilia	*Gilia capitata ssp. tomentosa*	None	None	1B.1	Coastal bluff scrub.	Rocky outcrops on the coast. 15-155m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
woolly-headed spineflower	*Chorizanthe cuspidata var. villosa*	None	None	1B.2	Coastal scrub, coastal dunes, coastal prairie.	Sandy places near the beach. 3-60m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yadon's rein orchid	*Piperia yadonii*	Endangered	None	1B.1	Closed-cone coniferous forest, chaparral, coastal bluff scrub.	On sandstone and sandy soil, but poorly drained and often dry. 10-415m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yadon's wallflower	*Erysimum menziesii ssp. yadonii*	Endangered	Endangered	1B.1	Coastal dunes.	Foredunes. 0-15m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yakima bird's-beak	*Cordylanthus capitatus*	None	None	2.2	Lower montane coniferous forest, pinyon-juniper woodland.	On open dry slopes and woodlands. 1800-2095m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

Common name	Scientific Name	Federal listing status*	State listing status*	RPR List	General Habitat	Micro-Habitat	Potential for Significant Impact prior to Program Regulations
yellow-flowered eriastrum	*Eriastrum luteum*	None	None	1B.2	Broadleafed upland forest, cismontane woodland, chaparral.	On bare sandy decomposed granite slopes. 360-1000m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
yellow-tubered toothwort	*Cardamine nuttallii var. gemmata*	None	None	1B.3	Lower montane coniferous forest, North Coast coniferous forest.	On serpentine in a variety of aspects. 100-700m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yosemite lewisia	*Lewisia disepala*	None	None	1B.2	Lower montane coniferous forest, pinyon-juniper woodland, upper montane coniferous forest.	Fine gravel on rock outcrops, ridges, or domes. Granitic soils. 1560-2610m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yosemite onion	*Allium yosemitense*	None	Rare	1B.3	Broadleaved upland forest, chaparral, cismontane woodland, lower montane coniferous forest.	In pockets of wet soil or in wet cracks of metamorphic rock; also on slopes and walls. 535-2200m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yosemite woolly sunflower	*Eriophyllum nubigenum*	None	None	1B.3	Chaparral, lower montane coniferous forest, upper montane coniferous forest.	South facing slopes on granitic slabs and domes; gravelly soils. 1500-2365m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.
Yucaipa onion	*Allium marvinii*	None	None	1B.1	Chaparral.	In openings on clay soils. 760-1065m.	Low. Suction dredging not likely to occur in occupied habitat or substantially impact suitable habitat.

TABLE 4.3-6. UPLAND PLANT SPECIES

** List of Abbreviations for Federal and State Species Status follow below:*

FC	*Federal candidate for listing*
FE	*Federal endangered*
FP	*State fully protected species*
FPT	*Federal proposed: threatened*
SSC	*State species of special concern*
FSC	*Federal species of concern (per NOAA or USFWS website)*
SCE	*State candidate: endangered*
SE	*State endangered*
SSC	*State species of special concern*
ST	*State threatened*

Chapter 4.4
HAZARDS AND HAZARDOUS MATERIALS

4.4.1 Environmental Setting

This chapter focuses on the potential impacts of hazardous materials on human health. Hazardous materials that may be used as part of the suction dredge mining process or that may be exposed during the process are described. Potential impacts discussed in this chapter are divided according to human health hazards unique to suction dredging activities and common camping-related hazards. Environmental health impacts (e.g., mercury in fish) related to the use of or exposure to hazardous materials are discussed in other chapters, specifically the Water Quality and Toxicology and Biological Resources chapters.

Suction Dredging Hazards

Suction dredgers use a variety of hazardous materials to collect and process gold. Suction dredgers often recover both mercury (i.e., elemental mercury and mercury gold amalgam) and lead (e.g, fishing weights, lead bullets and shot, diving weights, etc.) while dredging, Dredgers use mercury to recover gold via amalgamation (as described in Section 3.4.7 "Processing of Materials" of Chapter 3, *Activity Description*). They use nitric acid to remove mercury from gold creating a liquid waste containing mercuric nitrate, and gasoline and oil/lubricants to run dredge engines. According to the results of the Suction Dredger Survey (Appendix F), very few suction dredgers reported using mercury and/or nitric acid to process concentrates (1.5% of non-resident and 2.5% of California resident permit holders reported doing so). However, over half of permit holders (56% of resident and 60% of non-resident) indicated that they recovered mercury while dredging. For the 2008 season, California resident permit holders reported removing on average approximately 1.6 ounces of mercury per dredger and non-California resident permit holders reported removing on average 2.6 ounces of mercury per dredger.

Hazardous Materials Associated with Encampments

Most (but not all) suction dredgers camp near the locations where they are mining for short or extended (days to months) periods. In addition to the hazardous materials described above, common materials used, stored, or generated at the suction dredging encampments include gas and lubricants used for generators and vehicles, propane, garbage, and human waste. Although some clubs recommend that all garbage, supply, food, and equipment items be kept safely and in a clean manner to minimize hazards, it has been observed that some miners have campsites strewn with garbage and debris (Sierra Fund, 2009).

The results of the Suction Dredger Survey (Appendix F) indicate that nearly three quarters of in-state respondents stay overnight when dredging, whereas nearly all out-of-state respondents (98%) reported doing so. When staying overnight, 44% of in-state respondents reported staying in developed campgrounds, while 54% reported staying in undeveloped campgrounds. Similarly, 51% of out-of-state respondents reported staying in developed campgrounds, and 54% reported staying in undeveloped campgrounds. Typically, facilities such as bathrooms and trash bins are not provided in undeveloped campground areas.

California resident permit holders reported an average of 14.69 yearly trips, spending a total of 30.06 days dredging, whereas non-resident permit holders reported less frequent, but longer yearly trips (averaging only 4 trips and a total of 33.39 dredging days). Based on this, in-state permit holders only spent two days dredging per trip on average. Non-resident permit holders on the other hand reported less frequent, but longer trips, spending about 8 days dredging per trip on average. Longer trip durations and greater distances from developed areas increase the quantity and type of personal provisions necessary for such excursions.

Exposure Pathways

Vaporizing mercury and using strong acids may result in a human health hazard. Mercury vapors and mercuric nitrate may damage the central and peripheral nervous systems, lungs, kidneys, skin and eyes in humans (Occupational Safety and Health Administration [OSHA], 1997; Environmental Health & Safety 2009). Additionally, it is also mutagenic and affects the immune system (OSHA, 1997). Acute exposure to high concentrations of mercury vapor causes severe respiratory damage (OSHA, 1997).

Human exposure to nitric acid is through inhalation, ingestion, and eye or skin contact. Nitric acid is an irritant that can cause corrosive effects on the skin, eyes, and mucous membranes (e.g., lungs). Effects of exposure may include any of the following symptoms depending on the exposure pathway, length of exposure, and the acid's concentration: laryngitis, bronchitis, pulmonary edema, dental discoloration, erosion of dental enamel, burns of the skin or mucous membranes, dermatitis, reduced vision, blindness, nausea, vomiting, or death. (Terra Industries Inc., 2006).

Lead is another metal that may present a potential human health hazard to suction dredge miners. Potential lead exposure pathways are: ingesting lead transferred from contaminated hands to food/drink, and inhaling lead fumes while casting diving weights. Lead is not typically absorbed into the body through the skin (Agency for Toxic Substances & Disease Registry, 2007). Effects of lead exposure include damage to the nervous system, increases in blood pressure particularly for middle-age or older people, anemia, and, at high levels, brain or kidney damage and death. (Agency for Toxic Substances & Disease Registry, 2007)

Wildland Fire Hazards

Man-made and natural wildland fires are a hazard throughout most of California, in part due to its Mediterranean climate and typically dry summers. Man-made causes of wildland fires include but are not limited to sparks from engines or other machinery, discarded cigarettes, arson, or campfires that were not properly extinguished. Lightning is the typical cause of natural wildland fires.

The California Department of Forestry and Fire Protection (CAL FIRE) has identified approximately 31+ million acres of state responsibility areas and provided facilities (i.e., control centers, fire stations, etc.) within these responsibility areas to support fire prevention and control (CAL FIRE, 2009). Areas within California that are outside of the state responsibility areas (SRAs) are protected by local (i.e., city or county) or federal agencies. Federal agencies that may be responsible for fire protection on federal lands in California include the U.S. Forest Service and the Bureau of Land Management. Local, state, and federal agencies also provide hazardous material response within their responsibility areas to control and clean-up spills of hazardous materials. Moderate, high, and very high risk wildland fire areas in SRAs have been identified based on fuel, terrain, weather, and other relevant factors in Figure 4.4-1 (CAL FIRE, 2007). Similarly, Figure 4.4-2 indicates fire hazard severity zones throughout California for local or other protection areas (CAL FIRE, 2007).

CAL FIRE also identifies wildland fire risks by county. As an example, a large portion of Yuba County, especially eastern Yuba County, is identified as a very high fire hazard zone in SRAs (Figure 4.4-3). As shown in Figure 4.4-4, most of Yuba County's lands within local responsibility areas are not considered subject to wildland fires (due to agricultural or other land uses) or are only subject to moderate fire hazards (CAL FIRE, 2007).

Local fire departments in California are responsible for fire protection and hazardous response in areas (typically urbanized areas) that are outside of SRAs and outside of federal lands. As an example, local fire protection and hazardous response within Yuba County are primarily provided by the City of Marysville's fire department though other smaller, volunteer fire districts, such as the Smartville Fire Protection District, may also provide some protection or response (Yuba County, 2005; City of Marysville, 2010). The City of Marysville's fire department protects an area of 85 square miles that is comprised of urban, agricultural, and wildland areas (City of Marysville, 2010). The Smartville Fire Protection District is primarily a volunteer force of twelve, with a Battalion Chief (Yuba County, 2005).

Schools

Sensitive receptors for hazardous wastes, including schools, may be located near potential suction dredge mining locations. The proximity of schools to suction dredge locations and encampments would vary throughout the state and annually based on the location of mining activities. For example, within Yuba County, there are five school districts—Camptonville, Marysville Joint Unified, Plumas Lake Elementary, Wheatland Elementary, and Wheatland Union High school districts—and approximately 36 elementary, middle, or high schools (Yuba County Office of Education, 2010). Most of the schools are not located near the rivers or streams of Yuba County. Not counting schools in the City of Marysville, there are 2 elementary schools (Cordua Elementary School and Browns Valley Elementary School) within one mile of the Yuba River, downstream from Englebright Lake and approximately 10 schools in the smaller communities upstream from Englebright Lake. The majority of schools in Yuba County, and indeed throughout California, are located well above and outside of the riverbed. However, there may be some exceptions whereby schools are located in proximity to waterways. For example, in Yuba County there is one school (Browns Valley Elementary School) located within ¼ mile of Dry Creek and another, the Washington Elementary School, located within ¼ mile of the South Fork Yuba River.

4.4.2 Regulatory Setting

The use, storage, and disposal of hazardous materials are regulated by local, state, and federal laws and regulations. The EPA is the federal agency that administers hazardous materials and hazardous waste regulations. The federal Occupational Safety & Health Administration (OSHA) develops and enforces health and safety standards in the workplace and recommends protective measures on the handling and use of hazardous chemicals. The California EPA (Cal/EPA) is one of the State agencies with jurisdiction over hazardous materials; it includes the California Department of Toxic Substances Control (DTSC). Another California agency, CAL FIRE, identifies and reviews wildland fire severity zone designations and provides protection against fires. Local agencies may have their own ordinances regarding the handling, storage, and disposal of hazardous materials and wastes. Local fire departments and hazardous waste collection centers may also serve an important role in responding to hazardous spills or assisting with the disposal of hazardous materials.

A description of each agency's jurisdiction and involvement in managing hazardous materials and wastes is provided below.

Federal Regulations

U.S. Environmental Protection Agency

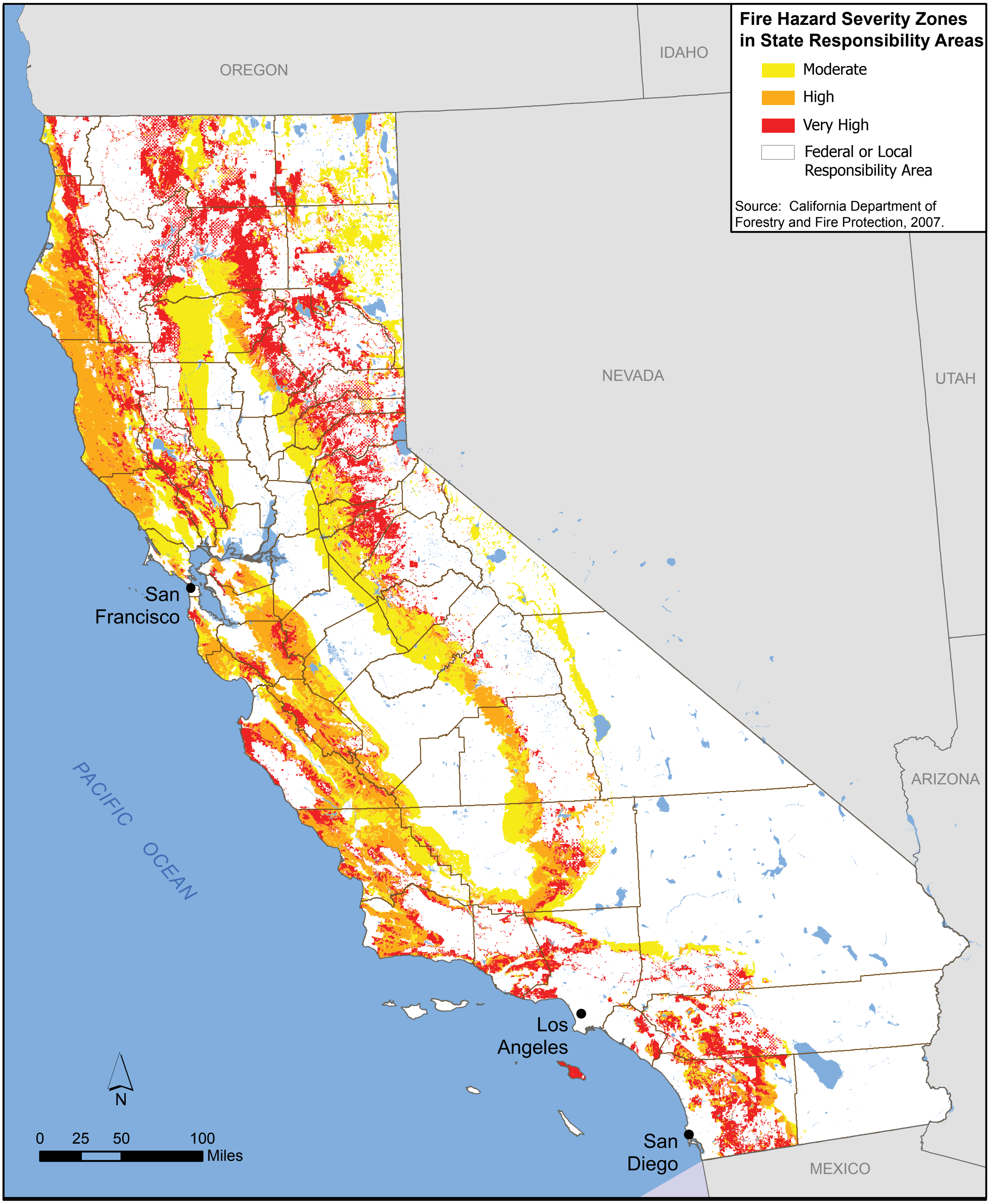
The EPA is responsible for the enforcement and implementation of federal laws and regulations pertaining to hazardous materials. The federal regulations are primarily codified in 40 CFR. The legislation is outlined in the Resource Conservation and Recovery Act of 1976 (RCRA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The EPA provides oversight for the storage and use of hazardous materials and has designated some widely generated hazardous wastes, including certain spent batteries, pesticides, mercury-containing equipment and light bulbs, as "universal wastes."

The EPA implements the Emergency Planning and Community Right-to-Know Act (EPCRA). Also known as Title III of the SARA, the EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

To implement the EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). The SERCs were required to divide their states into emergency planning districts and to name a Local Emergency Planning Committee (LEPC) for each district. LEPCs typically consist of representatives from a wide variety of groups, including firefighters, health officials, government and media representatives, community groups, industrial facilities, and emergency managers.

Occupational Safety & Health Administration

As described in the Occupational Safety and Health Act of 1970, the purpose of the OSHA is to ensure workplace safety for all workers in the United States and its territories. To fulfill this purpose, OSHA performs the following functions:



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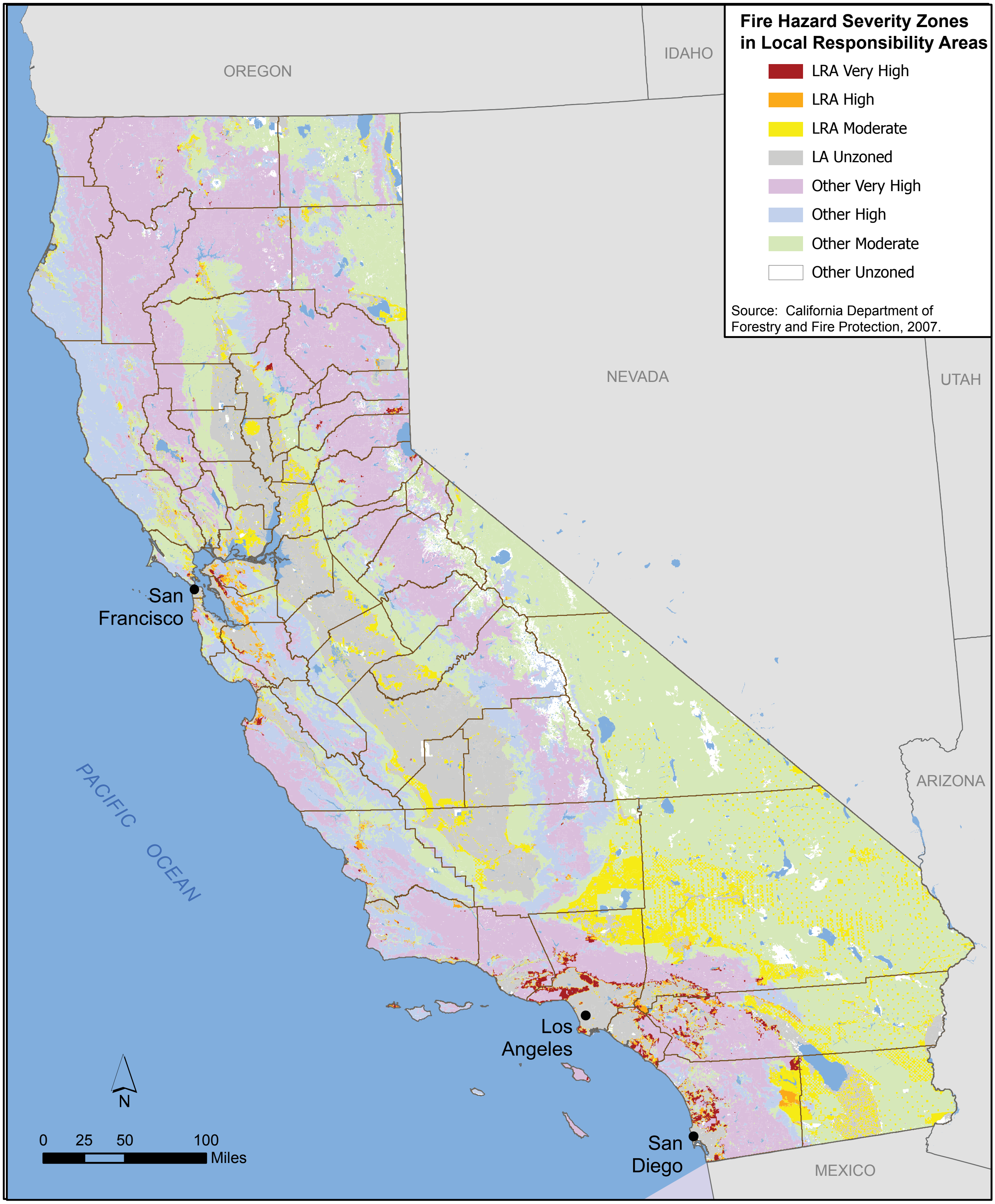
Horizon WATER and ENVIRONMENT

Figure 4.4-1
Wildland Fire Hazard Severity Zones in State Responsibility Areas



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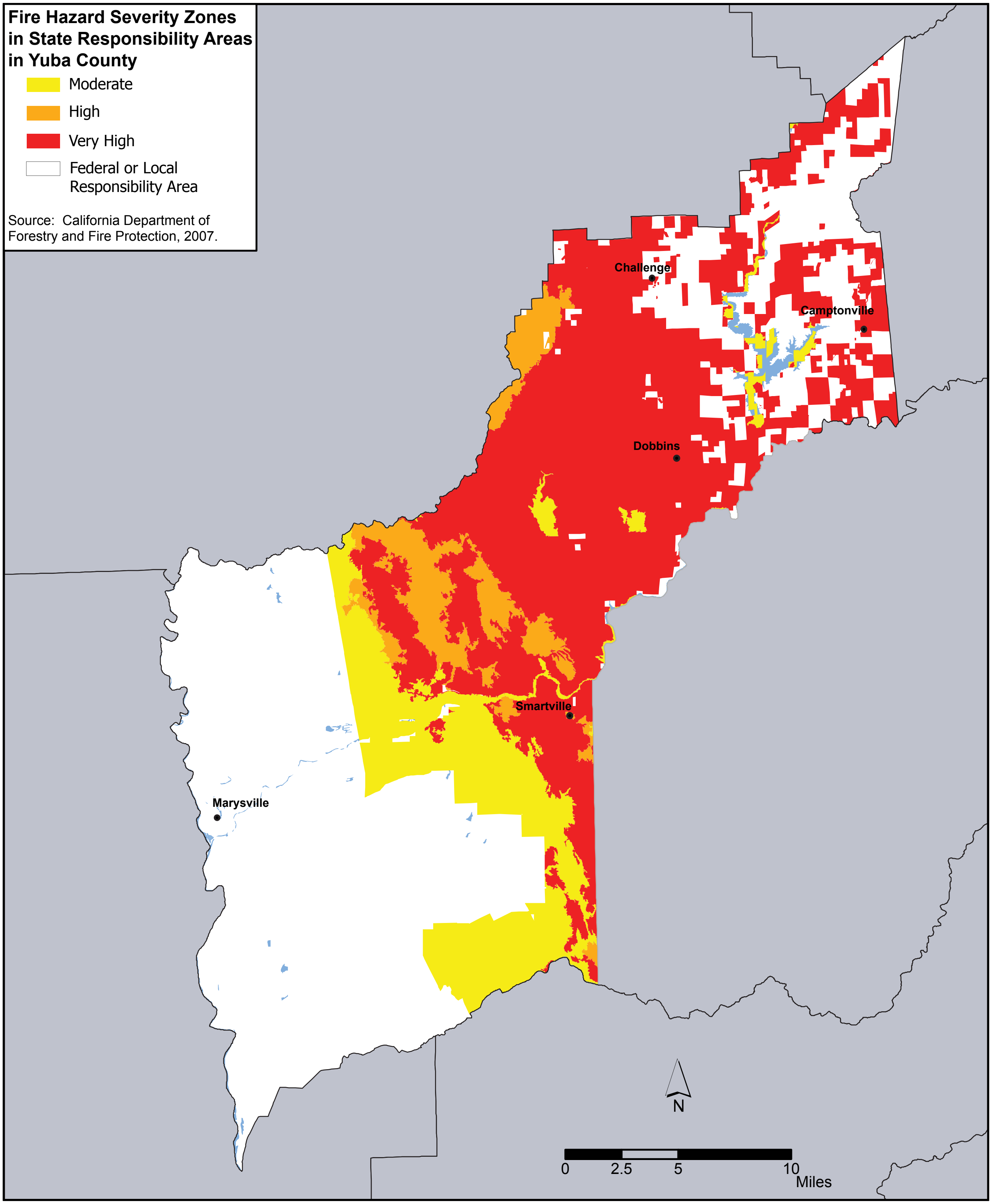
Horizon WATER and ENVIRONMENT

Figure 4.4-2
Fire Hazard Severity Zones in Local Responsibility Areas



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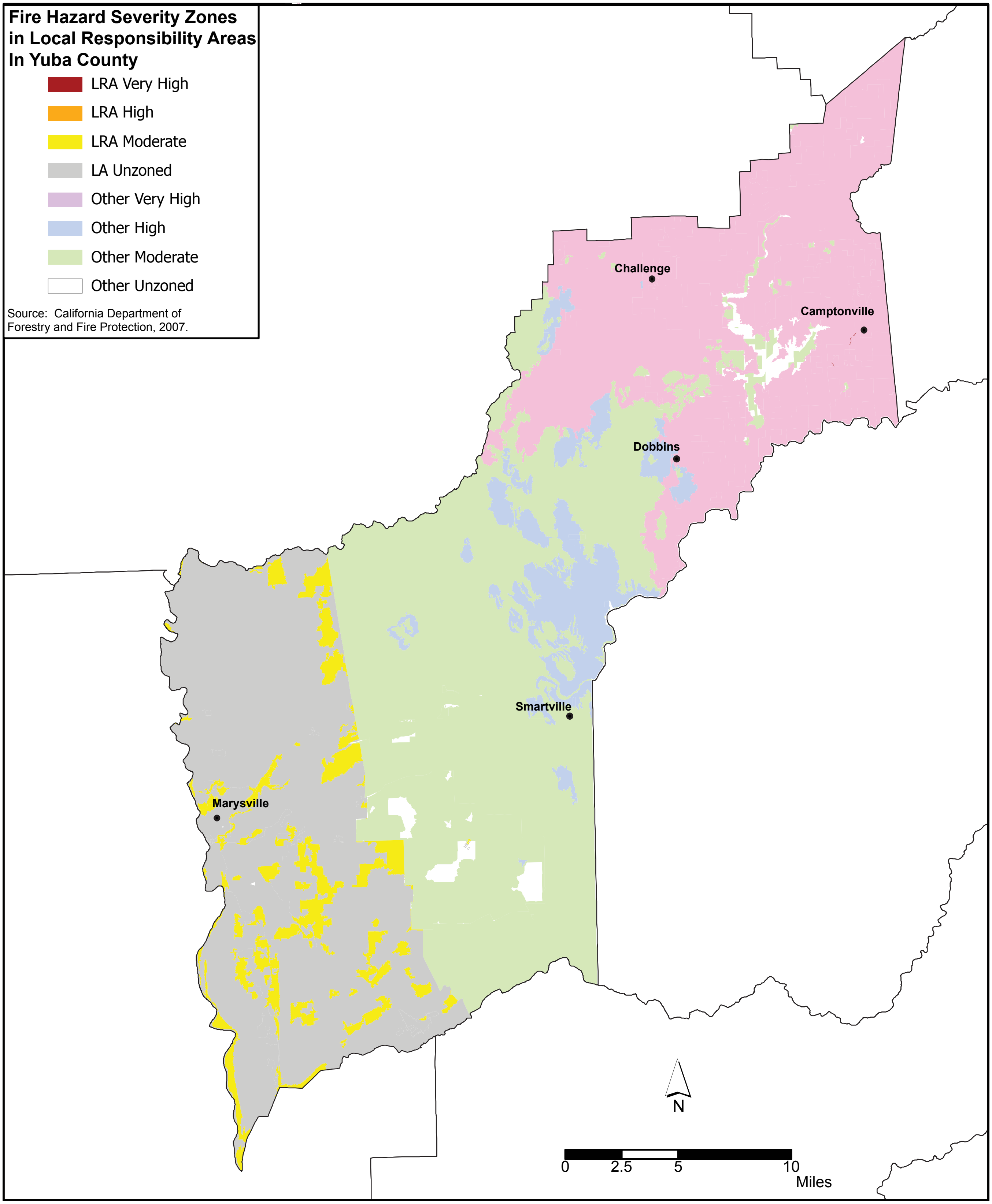
Horizon WATER and ENVIRONMENT

Figure 4.4-3
Yuba County Wildland Fire Hazard Severity Zones in State Responsibility Areas



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Horizon WATER and ENVIRONMENT

Figure 4.4-4
Yuba County Wildland Fire Hazard Severity Zones in Local Responsibility Areas

- develop and enforce workplace safety standards;
- approve and monitor state job safety and health programs; and
- provide for research, information, education, and training in the field of occupational safety and health (OSHA, 2010).

Although the federal workplace safety standards and the state job safety and health plans may not be directly applicable to suction dredging activities because the dredging is typically performed as a hobby and not as an occupation, OSHA's human health protection regulations related to the handling and use of hazardous chemicals may serve as a useful guideline for suction dredging miners.

Human Health Protection Measures

OSHA requires that manufacturers prepare material safety data sheets (MSDSs) that include but are not limited to handling and storage recommendations, personal protection measures, accidental release measures, hazards identification, and toxicological information, including recommended exposure limits. Key personal protection measures to protect humans from contact with mercury, nitric acid, lead, and other hazardous materials (ex., gasoline) are summarized below. Vapor exposure limits are listed in Table 4.4-1.

Personal protection measures listed in the MSDSs for the above chemicals focus on methods to prevent exposure to humans through contact with the skin or eyes, inhalation, or ingestion. Safety glasses or goggles are recommended to protect against injury to the eyes. Gloves, closed-toe shoes, and/or aprons are recommended when handling mercury or the acids. Use of these chemicals in open air or well ventilated spaces is recommended because the chemical vapors may be toxic and/or irritants. Following handling of these chemicals, the users' hands should be washed prior to the consumption of any foods/drinks or use of cigarettes to prevent accidental ingestion of the hazardous chemicals. Gasoline is flammable and should not be exposed to sources of flame or heat. Use of a respirator may be required if vapor exposure levels exceed the recommended limits. (Agency for Toxic Substances & Disease Registry, 2007; Albina Fuel, 2009; OSHA, 1997; Terra Industries, 2006)

TABLE 4.4-1. RECOMMENDED EXPOSURE LIMITS FOR CHEMICALS USED IN SUCTION DREDGING

Chemical	Vapor Exposure Limit (milligrams/cubic meters [mg/m^3])
Lead	50 micrograms (μg)/m^3
Mercury	0.1 (PEL)
Nitric acid	2 (TWA) or 4 (PEL)
Gasoline	300 (PEL)

TWA = time-weighted average
PEL = permissible exposure limit
Note: The lead exposure limit was established by OSHA for an 8-hour workday (Agency for Toxic Substances & Disease Registry 2007).
Sources: Agency for Toxic Substances & Disease Registry 2007, Albina Fuel 2009, OSHA 1997, Terra Industries 2006.

State Regulations

According to Title 22 California Code of Regulations section 66261, waste is considered hazardous if it exhibits at least one of the four characteristics of ignitability, corrosivity, reactivity, or toxicity, or if it is a "listed waste." Waste can be liquid, semi-solid, or gaseous.

Department of Toxic Substances Control

In California, the DTSC of Cal/EPA is authorized by the U.S. EPA to enforce and implement federal hazardous materials laws and regulations. California regulations pertaining to hazardous materials equal or exceed federal regulations. The DTSC implements RCRA regulations regarding the storage and use of hazardous materials.

Department of Industrial Relations

California's Department of Industrial Relations includes the Division of Occupational Safety and Health (DOSH) and Occupational Safety and Health Standards Board (OSHSB). The DOSH provides workplace safety and health assistance to employers and workers through its Cal/OSHA program and publishes a wide variety of educational materials on workplace safety and health topics (California Department of Industrial Relations, 2010). The OSHSB adopts safety and health standards that provide the basis for Cal/OSHA enforcement (California Department of Industrial Relations, 2010). Although the adopted safety and health standards are only applicable to workplace safety, many of the advised measures to prevent health effects from hazardous waste or chemicals may also be implemented by suction dredge miners.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the state hazardous waste management program, which is similar to, but more stringent than, the federal RCRA program. The act is implemented by regulations contained in 26 CCR, which describes the following required aspects for the proper management of hazardous waste: identification and classification, generation and transport, treatment standards, operation of facilities and staff training, closure of facilities and liability requirements, and design and permitting of recycling, treatment, storage, and disposal facilities.

These regulations list more than 800 materials that may be hazardous and establish criteria for identifying, packaging, and disposing of them. Under this act and 26 CCR, a generator of hazardous waste must complete a manifest that accompanies the waste from the generator to the transporter to the ultimate disposal location. Copies of the manifest must be filed with the DTSC.

Universal Waste Rule

The California "Universal Waste Rule" is a set of regulations that identify "universal wastes" and appropriate disposal methods. "Universal wastes" are considered hazardous upon disposal but pose a lower risk to humans and the environment than other hazardous wastes (DTSC, 2008). In addition to identifying universal wastes, the Universal Waste Rule establishes universal waste transport and handling requirements (DTSC, 2007a). California considers most products containing mercury (ex., fluorescent lamps, thermometers, old batteries, etc.) to be "universal wastes" that must be disposed of at an authorized recycling facility, hazardous waste collection center, or similar approved facilities. Many universal wastes, including mercury products, must be recycled to qualify for the reduced handling requirements for universal wastes instead of the more stringent hazardous waste requirements (DTSC, 2008). It is illegal to dispose of any mercury-containing products in the household trash or at a landfill (CalRecycle, 2010).

Mercury Waste Regulations

A number of California regulations related to the disposal of mercury waste and mercury products have been adopted. Some of the adopted regulations include the Mercury Thermostat Collection Act of 2008, a ban on mercury diostats, and the California Mercury Reduction Act (SB 633), which prohibits the sale in California of vehicles manufactured on or after January 1, 2005 that contain mercury light switches (DTSC, 2007b). Mercury-containing items must be recycled at an appropriate recycling facility or disposed of at a hazardous waste facility (DTSC, 2007b).

Emergency Services Act

Under the Emergency Services Act, the state has developed an emergency response plan to coordinate emergency services provided by federal, state, and local agencies. Rapid response to incidents involving hazardous materials or hazardous waste is an important part of the plan, which is administered by the California Governor's Office of Emergency Services. The office coordinates the responses of other agencies, including the EPA, the California Highway Patrol, the RWQCBs, air quality management districts, and county disaster response offices.

Fire Protection

Wildland fire protection in California is the responsibility of either the State, local government, or the federal government. Local responsibility areas include incorporated cities, cultivated agriculture lands, and portions of the desert. Local responsibility area fire protection is typically provided by city fire departments, fire protection districts, counties, and by the CAL FIRE under contract to local government.

The Government Code chapter defines responsibilities for CAL FIRE and for the local agency. In summary, sections 51178 and 51181 define the CAL FIRE Director's responsibility to identify very high fire hazard severity zones, transmit this information to local agencies, and to periodically review the recommendations. In part, sections 51178.5 and 51179 defines the local agency's responsibility to make the recommendation available for public review and to designate, by ordinance, very high fire hazard severity zones in its jurisdiction.

Local Regulations

Local authorities (e.g., fire departments) would generally be the primary responder to hazardous spills within local responsibility areas. However, for larger spills or in state or federal responsibility areas, state or federal fire and emergency response departments may be utilized.

Hazardous waste collection centers are located in cities or counties statewide to collect hazardous waste and hazardous materials. Types of hazardous materials and waste these facilities will typically accept include but are not limited to: cleaning products, acids, paint, gas and oil, brake and transmission fluids, electronic waste, mercury, batteries, and pesticides. Each facility may apply different disposal requirements depending on the type of disposer (i.e., household, business) and each facility's specific restrictions. One applied restriction is the quantity of hazardous materials accepted at a hazardous waste collection facility from a single disposer at one time. According to a California law, 15 gallons or 125 lbs. of hazardous waste is the maximum amount that homeowners can haul per trip (Yuba Sutter Recycles, 2010). The largest container of hazardous waste accepted is 5 gallons (Yuba Sutter Recycles, 2010). Additional facilities, such as automobile repair shops, may be available to collect specific hazardous wastes (ex., oil).

As an example, Yuba County has a collection center that can accept hazardous waste. The Yuba-Sutter Household Hazardous Waste (HHW) Facility is located at 134 Burns Drive, Yuba City and is only available to collect HHW on Saturdays (Yuba Sutter Recycles 2010). The center accepts all types of hazardous waste described above. Types of waste that this facility does not accept include: tires, medical waste, ammunition and explosives, radioactive materials, compressed gas cylinders, garbage, and medicines (Yuba Sutter Recycles, 2010).

4.4.3 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to hazards and hazardous materials may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

Garbage and sanitation disposal associated with campsites and dredge activities were identified as localized effects. These impacts were considered to be outside of the jurisdiction of CDFG to regulate; however the Report notes that dredgers are subject to Fish and Game Code section 5652 (which prohibits littering) and any regulations made by local and state health departments, the Regional Water Quality Control Boards, and the federal land managing agencies.

Methodology

Methods for determining the potential human health and environmental risks of the suction dredge activities focus on the effects of processing of materials collected during suction dredging, as well as suction dredge encampments more generally, and the potentially hazardous chemicals used to support these activities. Potential human health risks related to the exposure/mobilization of elemental mercury, mercury enriched sediment, and other contaminants in the river bed are addressed in Chapter 4.2, *Water Quality and Toxicology*.

This chapter's impact analysis considered the locations and types of activities related to the potentially hazardous chemical use and the exposure pathways. Location considerations for determining the environmental and human health risks included the proximity of the suction dredge activities to sensitive receptors or a water body. Types of activities considered include the transport, use, storage, and disposal methods (e.g., vaporizing these hazardous chemicals). The health and environmental risks of suction dredge encampments considered the types of camping activities (e.g., campfires) and the generation and disposal of wastes.

Human health risk exposure pathways considered during the impact analysis were as follows. Suction dredging miners may be exposed to mercury, acids, and lead by direct handling, handling soils and sediments contaminated with these materials, and inhaling and accidently ingesting these chemicals. Exposure to mercury vapor can occur through inhalation and eye or skin contact (OSHA, 2004). Exposure to nitric acid and mercuric nitrate may occur through contact with the skin or eyes, accidental ingestion, or inhalation of acid vapors. Lead (bullets, fishing weights, buckshot) collected during dredging may be accidentally ingested if suction dredgers do not wash their hands after handling it prior to eating or drinking. Lead fumes may also be inhaled if lead is melted and cast into diving weights. Lead is not typically absorbed into the body through the skin (Agency for Toxic Substances & Disease Registry, 2007).

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous material, substances, or waste within one-quarter mile of an existing or proposed school;
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Other impacts related to hazards and hazardous materials were eliminated from further consideration in the Initial Study and are not discussed further here.

In determining significance, the analysis sets as a standard, compliance with the proposed regulations. In other words, dredging requirements that are explicitly included in the proposed regulations (e.g., ban on dredging in proximity of stream banks), and under CDFG's enforcement authority, are assumed to be complied with by participants. For requirements that are under the jurisdiction of another agency (e.g., handling of hazardous materials, camping), the analysis assumed some level of non-compliance where there was evidence (including anecdotal) to suggest that such non-compliance occurs.

4.4.4 Environmental Impacts

Impact HAZ-1: Use, Handling, Storage, Transport, Disposal and/or Accidental Release of Oil or Gasoline Used in Suction Dredges (Less than Significant)

Suction dredging activities would require the transport, use, handling, and storage of fuel and oil for the operation of a gasoline- or diesel-fueled suction dredge engine. Typically, suction dredge miners would use a motor vehicle or boat to transport the engine, fuel, and oil to their campsites or mining sites, but miners may also carry the equipment if vehicular access is unavailable. Fuel and oil would generally be stored at the mining or campsite area and used, as necessary, during engine refueling, oil changing, or equipment cleaning activities. Accidental spills of fuel or oil could occur during any of the above activities and, if not properly contained and cleaned up, could potentially affect nearby water bodies via indirect (i.e., stormwater runoff) or direct transport. In addition, if miners did not properly dispose of fuels and oils at appropriate waste collection facilities, the fuels and oils would potentially be transported to nearby water bodies. These activities would present a potentially significant hazard to the public and/or the environment.

However, the regulations under the Proposed Program require that miners fuel and service equipment such that petroleum products are not leaked, spilled or otherwise released. In addition, miners are required to comply with relevant hazardous waste regulations (see the *Regulatory Setting* section, above). As detailed in Chapter 2, a "Best Management Practices" informational packet will be distributed by CDFG to provide guidance on safe practices and proper conduct as it relates to suction dredging activities. The "Best Management Practices" guidelines will include an overview of relevant hazardous waste regulations and appropriate procedures to follow in the event of a spill. Such measures may include a description on how and when to notify the Office of Spill Prevention and Response and site remediation steps, as appropriate. Operation in accordance with the proposed regulations and suggested "Best Management Practices" measures would reduce the potential for the handling, use, storage, transport, disposal, and/or accidental spilling of fuels and oils associated with the suction dredge mining activities to significantly affect the public and/or the environment. Therefore, this impact would be less than significant. No mitigation is required.

Impact HAZ-2: Handling, Storage, Transport and/or Disposal of Toxic Materials Collected by Suction Dredges (Less Than Significant)

Suction dredging recovers mercury, lead and other toxic substances from dredged stream sediment. These toxic substances may pose a human health risk, particularly to suction dredge miners, during the handling, storage, transport, and/or disposal processes. Miners may be exposed to mercury via inhalation and eye or skin contact. Handling lead collected by suction dredging or soils contaminated with lead may expose miners to lead. Other toxic substances may be present in black sand concentrates, and may pose a risk to miners during the suction dredging process.

Compliance with applicable laws guiding the proper handling, storage, transport, and disposal of such materials would ensure that significant impacts would not result. If miners implemented the OSHA-recommended toxic waste handling, storage, and disposal measures, the potential for any risk to the miners' health would be reduced. Similarly, as described in the setting, the State has established regulations related to the transport and disposal of household hazardous wastes (e.g., 15-gallon limit on the transport of household hazardous waste per trip and a 5-gallon limit on the maximum individual hazardous waste storage container size). The designated waste collection centers would accept various types of household hazardous waste, including potentially contaminated dredging concentrates.

However, each hazardous waste collection center has its own specific rules of operation, including types of wastes accepted and waste container labeling requirements, that should be verified with the specific hazardous waste collection center prior to the transport and disposal of hazardous wastes. Information regarding applicable State laws, OSHA-recommendations, and descriptions on how to obtain further information for local disposal and treatment of hazardous materials, will be included in the "Best Management Practices" information document and distributed to each individual permit holder. Compliance with the State regulations regarding the transport and disposal of hazardous wastes and the specific disposal and operation rules of the local hazardous waste collection center would reduce the potential risk of the collected wastes affecting human health or the environment.

No studies were found that documented suction dredger's handling practices regarding these materials; however, numerous anecdotal reports indicate that a substantial number of suction dredgers routinely handle, store, transport, and dispose of these materials in violation of existing laws (see for example Sierra Fund, 2009). Though such practices could result in the exposure of people or the environment to hazardous conditions, there has been no effort to determine if violations are common place. However, since the total number of suction dredgers state-wide is small, and the number of violations anticipated to be even smaller, such effects would not constitute a significant impact.

Impact HAZ-3: Use, Handling, Storage, Transport, Disposal, and/or Accidental Release of Materials Used to Process Suction Dredge Concentrates (Less than Significant)

Mercury may be used to amalgamate gold from suction dredging concentrates and nitric acid or heat may be used to remove mercury from gold. Mercury and nitric acid are hazardous chemicals and mercury vapor and mercuric nitrate (in "spent" nitric acid) are highly toxic. Humans exposed to mercury, mercury vapor, mercuric nitrate, or nitric acid may suffer a variety of health insults depending on the severity (i.e., duration and quantity) or mode of exposure. Exposure to mercury vapor can occur through inhalation and eye or skin contact. Humans may be exposed to nitric acid through contact with the skin or eyes, accidental ingestion, or inhalation of acid vapors. Suction dredge miners, in particular, could be exposed to any of these hazardous chemicals during use, handling, storage, transport, or disposal. In addition, accidental spills of any of these substances could result in potential impacts on human health and/or the environment.

As discussed in Impact HAZ-2, compliance with laws guiding the proper use, handling, storage, transport, and disposal of mercury and nitric acid would reduce the chances of significant impacts. If miners implemented the OSHA-recommended hazardous chemical handling, storage, and disposal measures, the potential for risk to the miners' health would be reduced. In addition, as discussed in HAZ-2, the State has regulations regarding the maximum quantity of household hazardous wastes that can be transported per trip and the maximum volume of an individual hazardous waste storage container. Hazardous waste collection centers may also have specific rules related to the types and quantities of hazardous wastes accepted. Thus, if suction dredge miners complied with the State regulations regarding the transport and disposal of hazardous chemicals/wastes and the specific disposal and operation rules of the local hazardous waste collection center, the potential risk of mercury or the acids affecting human health or the environment would be reduced. The designated waste collection centers would accept various types of household hazardous waste, including acids and mercury.

As previously noted, CDFG will provide information regarding the recommended and/or required protocols for the use, handling, storage, transport, and disposal of these hazardous chemicals in the "Best Management Practices" information document. This guidance document will be distributed to each individual permit holder to inform safe practices and proper conduct during dredge operations. If all suction dredge miners rigorously implement all of the recommended and/or required protocols, the chances of significant hazardous waste related incidents would be reduced. As such, this impact is considered to be less than significant.

Impact HAZ-4: Human Wastes from Dredge Encampments (Less Than Significant)

Suction dredge miners would generate human wastes (i.e., garbage, human excrement, etc.) at the mining sites or campsites. Existing laws, including those established by land managers (e.g., U.S. Forest Service or BLM), govern the handling and disposal of human waste at campsites. No studies were available for this SEIR that comprehensively documented suction dredger's compliance with these laws; however, numerous anecdotal reports indicate observations of unsanitary conditions at suction dredge encampments (see for example Sierra Fund, 2009). Improper disposal of human waste may lead to the exposure of people or the environment to hazardous conditions, including the transmission of disease-causing bacteria, and is considered a significant impact.

CDFG will incorporate into the "Best Management Practices" information document, guidance for the proper disposal of waste, including human waste, such as to avoid disturbance or contamination of streams, lakes or their surrounding environments. While such measures are outside of CDFG's jurisdiction to regulate, violations may be reported to the local authorities.. Therefore, this impact is considered to be less than significant.

Impact HAZ-5: Safety Hazards to Dredgers and Others from Suction Dredge Operations, Equipment, and/or Geomorphic Changes (Less than Significant)

Certain practices, including anchoring equipment across or along channels, creation of dredge potholes or tailings piles, and equipment staging may create safety issues to the dredgers or other individuals in the vicinity. The hazards presented by these items would be regulated by local law enforcement entities. While anecdotal reports exist regarding the hazards associated with these items, no specific incidents have been identified.

In addition, the Program includes general requirements prohibiting power-winching and any permanent grade alteration in the water body, and restricting the placement and movement of stream substrate. These requirements would reduce the potential for the suction dredge miners to create any long-term significant safety hazards. Therefore, this impact is considered less than significant.

Impact HAZ-6: Exacerbation of Wildland Fires (Less than Significant)

Typically, suction dredge mining activities would occur in undeveloped, remote locations where wildfires are a concern and when wildfire risk is high. The use of certain equipment, including engines and hazardous materials (e.g., fuels, oils, etc.), during suction dredging activities may cause accidental wildfires. In addition, campfires used by miners during overnight camping excursions would pose a wildfire risk if the fires were not properly controlled or extinguished.

However, the equipment used by suction dredgers is not substantially different from those used by other motorized recreationalists and, with implementation of standard precautions, would not be anticipated to result in a substantially increased threat of wildfire. Similarly, the wildfire risk associated with miners' campfires would not be substantially different than the risks from other overnight recreationalists. Suction dredge miners are required to comply with applicable wildfire-prevention measures, including limits or prohibitions on the use of campfires, established by the private land owners or state and federal land management agencies (e.g., U.S. Forest Service or BLM). An overview of applicable wildfire-prevention measures will be incorporated into the "Best Management Practices" informational packet and distributed to all permit holders. Thus, the risk of wildfire under the Proposed Program is considered to be less than significant.

Impact HAZ-7: Create Safety Hazards or Releases of Hazardous Materials in Proximity to a School (Less than Significant)

As described in Impacts HAZ-1 through HAZ-6, the suction dredging activities would require the use of hazardous materials and the potential creation of safety hazards. These hazardous materials would pose a potential hazard to sensitive receptors (i.e., schools) if they were transported (ex., via stormwater runoff) to nearby receptors. Schools or other sensitive receptors in proximity to rivers or creeks would have a relatively higher potential to be exposed to hazards associated with suction dredging. However, as described previously, suction dredging activities would typically occur in undeveloped, remote locations along rivers or creeks. Therefore, the likelihood of the hazards identified under Impacts HAZ-1 through HAZ-6 occurring near schools is considered low. As such, the potential for hazardous emissions or the handling of hazardous or acutely hazardous material, substances, or waste to occur within one-quarter mile of an existing or proposed school is not considered to be substantial. This impact is less than significant.

Impact HAZ-8: Exposure to Mercury or Acid Vapor (Less than Significant)

Suction dredge miners may vaporize hazardous chemicals (i.e., mercury, nitric acid, lead) during waste disposal or gold processing procedures. Vaporizing mercury, while illegal, is a disposal method known to be used by some suction dredge miners. A small portion of miners process their gold using mercury or nitric acid; however many miners do not (Suction Dredger Survey Results, Appendix F). Miners processing gold using mercury and nitric acid do so at their campsites and homes, in a garage or similar space. Mercury, mercuric nitrate, or nitric acid vapor inhalation may result in a human health hazard.

No studies or anecdotal reports were available during the preparation of this report that indicated that incidents of mercury or acid poisoning of suction dredgers are a substantial concern. However, as a precaution, safety warnings against improper usage and handling of mercury or other hazardous chemicals will be included in the "Best Management Practices" informational packet. For this reason, impacts are considered less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities which require notification under Fish and Game Code section 1602 may increase the potential for adverse effects related to hazards and hazardous materials. The increased substrate movement capacity associated with the use of larger nozzle sizes could increase the amount of recovered hazardous materials (i.e. mercury and lead) and cause greater alterations to the streambed. Power winching may leave heavy objects in a precarious state, subject to later movement from settling or disturbance. In addition, the use of additional equipment associated with power-winching may require greater amounts of fuel and lubricants for use and storage on-site, increasing the potential for spills. Furthermore, dredging in lakes or diverting flows could increase physical alterations and safety hazards in areas which would not otherwise be affected by dredging activities. Such issues, to the extent to which they could be significant, would need to be evaluated in a CEQA document.

Effects associated with the creation and disposal of human waste and safety hazards near schools are not anticipated to differ substantially for activities requiring notification and those which comply with the proposed regulations. Common adherence to the proposed regulations and the "Best Management Practices" guidance would ensure that effects remain below the threshold of significance. Therefore, these issues are not believed to require further evaluation.

Chapter 4.5
CULTURAL RESOURCES

4.5.1 Introduction

Cultural resources include prehistoric archaeological resources, historic-era archaeological resources, historic architectural resources, as well as paleontological resources (i.e., fossils). The Initial Study found that the Proposed Program would have no significant impacts to historic architectural resources or paleontological resources (see Appendix B). As such, this section focuses solely on the potential impacts of suction dredge mining on historical resources, including shipwrecks and Traditional Cultural Properties, prehistoric and historic-era archaeological resources, and human remains.

4.5.2 Regulatory Setting

The State of California implements the National Historic Preservation Act of 1966, as amended, through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation (OHP) is an office of the California Department of Parks and Recreation, and implements the policies of the National Historic Preservation Act (NHPA) on a statewide level. The OHP also maintains the California Historic Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdictions.

California Environmental Quality Act

CEQA, as codified in the California Public Resources Code (PRC) section 21000 et seq., is the principal statute governing the environmental review of projects in the state. CEQA requires lead agencies to determine if a proposed project would have a significant effect on historical resources, including archaeological resources. The CEQA Guidelines define a historical resource as: (1) a resource listed in or eligible for listing in the California Register of Historical Resources (CRHR); (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC section 21084.1 and CEQA Guidelines section 15064.5 would apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC section 21083 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC § 21083.2 [g]).”

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines S§ 15064[c][4]).

California Public Resources Code

Several sections of the California Public Resources Code (PRC) protect paleontological resources. Section 5097.5 prohibits “knowing and willful” excavation, removal, destruction, injury, and defacement of any paleontological feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted permission.

Section 7050.5 of the Health and Safety Code protects human remains by prohibiting the disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery. Section 5097.98 of the PRC (and reiterated in CEQA Section 15064.59 [e]) also states that in the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:

(1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:

(A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and

(B) If the coroner determines the remains to be Native American:

1. The coroner shall contact the Native American Heritage Commission within 24 hours.
2. The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American.
3. The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or

(2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.

(A) The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 48 hours after being notified by the commission.

(B) The descendant identified fails to make a recommendation; or

(C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

California Register of Historical Resources

The California Register of Historical Resources (CRHR) is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC § 5024.1[a]). The criteria for eligibility to the CRHR are based on National Register of Historic Places (NRHP) criteria (PRC § 5024.1[b]). Certain resources are determined by the statute to be automatically included in the CRHR, including California properties listed in or formally determined eligible for listing in the NRHP.

To be eligible for listing in the CRHR, a prehistoric or historic-era resource must be significant at the local, state, and/or federal level under one or more of the following criteria:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
- Has yielded, or may be likely to yield, information important in prehistory or history (CEQA §15064.5 [a][3]).

For a resource to be eligible for the CRHR, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the NRHP criteria may still be eligible for listing in the CRHR.

4.5.3 Environmental Setting

Prehistoric Setting

Introduction

The following prehistoric setting of California is approached by describing archaeological data, ethnographic/linguistic studies, and modern traditions which illustrate the settlement patterns, lifeways, languages, cultures, and beliefs of California's Native peoples. Each of these topical areas is described briefly below, followed by a discussion of prehistoric property types that are commonly found along California's waterways.

Archaeological Data

Current archaeological evidence indicates that human occupation in California began at least 15,000 years ago; earlier occupation dates have been debated though not firmly established (Erlandson et al., 2007:62). Perceptions of human colonization of the Americas have shifted in the past 20 years. The theory of terrestrial migration, where big-game hunters crossed over the ice bridge from northeastern Asia and traveled down the ice-free corridor into the central plains, has recently been remodeled. Archaeologists now understand that coastal migrations as well as multiple periods of migration should be included in a viable discussion about California's first human settlement (Erlandson et al., 2007).

Categorizing prehistoric human occupation into broad environmental regions and cultural stages allows researchers to describe a wide number of archaeological sites with similar cultural patterns and components in a particular location, during a given period of time, thereby creating a regional chronology. Numerous and varying cultural chronologies have been developed for California's regions (generally referred to as the Northwest, Northeast, San Francisco Bay Area, Central Valley, Sierra Nevada, Central Coast, Northern Bight, Southern Bight, Mojave Desert, and Colorado Desert); however, interregional diversity cannot be simplified. The variation of environments in California has created differences in both the cultural behavior of the prehistoric inhabitants as well as in the approach of archaeological methods and research, thereby creating a complex and ever expanding understanding of California prehistory (Moratto and Chartkoff, 2007).

While the names and dates of California's prehistoric periods vary by region, time has generally been divided into broad periods that reflect major changes in material culture and settlement patterns (i.e. the Paleoindian Period, the Early Period, the Middle Period, and the Late Period). Economic and technological types, socio-politics, trade networks, population density, and variations of artifact types further delineate cultural periods.

The Paleoindian Period (ca. 15,000 to 8000 B.C.) was characterized by big-game hunters occupying broad geographic areas. During the Early Period (ca. 8000 to 500 B.C.) geographic mobility continued and is characterized by the millingslab and handstone as well as large wide-stemmed and leaf-shaped projectile points. Cut shell beads and the mortar and pestle are first documented in burials during this period, indicating the beginnings of a shift to more sedentary ways. During the Middle Period (ca. 500 B.C. to A.D. 1200) geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The occurrence of sites in a wider range of environments suggests that the economic base was more diverse and mobility was slowly replaced by the development of small villages. During the Late Period (ca. A.D. 1200 to 1550), social complexity developed toward lifeways of large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the Late Period include the bow and arrow, small corner-notched points, and a diversity of beads and ornaments.

Ethnographies

Beginning in the early 16th century, but primarily during the late 19th and early 20th centuries, Native American lifeways and languages (i.e., ethnographic data) were documented throughout California. Whether by professional ethnographers/archaeologists, field personnel from government agencies such as the Bureau of Indian Affairs, soldiers, merchants, settlers, or travelers, ethnographic accounts partly illuminate the traditions, beliefs, and cultures of Native American groups during specific points in time. Synthesized narratives such as the *Handbook of North American Indians, California: Volume 8* (Heizer, 1978) categorize Native traditions and practices; however, the complexity of regional diversity should not be overlooked.

There are at least six primary language families in California, with perhaps over 300 different dialects of approximately 100 languages. The "geolingistic mosaic of the ethnographic period, with a startling diversity of languages and language families" indicates numerous major population shifts and migrations (Golla, 2007:71). Ethnographers have also quantified at least 60 greater Indian cultures with as many as 250 specific tribes.

Similarities between California's native populations crossed geographic, climatic, and cultural boundaries. Acorns, where available, were a staple throughout California. Deer, elk, small mammals, birds, and fish were relied upon. Resources were used to their fullest extent, with little to no waste product. Ethnographically-documented communities were generally focused on a central tribe with smaller satellite tribelets, however, this varied from region to region. Shamanism and ceremonialism played important roles in the lives of most California Native Americans. Basketry was well-practiced, although some southeastern tribes manufactured pottery. Hunting, trapping, and fishing technologies were shared across tribal and cultural boundaries, yet varied depending on environmental conditions.

Native American fishing techniques along inland waterways included the construction of fish weirs or dams across rivers to trap anadromous fish during upstream migration. Weirs were constructed of wood poles, logs, and small stakes to completely obstruct fish passage up a waterway. While some fish weirs were built and used by small groups, mainly individual families, communal constructions were also common (Gould, 1975). Cooperation to construct a communal fish weir included organized labor teams from many surrounding villages who would collect logs for the construction of the dam, catch fish, gather firewood, and process the catch. The dam would be in place for approximately ten days before the group would tear it down (Chartkoff, 2004). Other methods of fishing included net traps, harpoons, spears, platforms, and clubs. Tule balsa canoes and dugout canoes were also used in fishing (Wilson and Towne, 1978). Other important riverine subsistence species included steelhead, candlefish, lamprey, eel, and trout among others.

Trade was well developed in California. Shell beads as currency began as early as the later part of the Middle Period. Food, ornaments, household items, clothing, industrial materials such as obsidian, finished items including canoes, pottery, and basketry, and tobacco were used for trade items. Trade networks were well established, and although it appears that there were not professional traders, central villages served as focal points for trading (Heizer, 1978).

While regional differences are significant among Native American beliefs, there is a common identity and relationship with the environment. California Native peoples believe that nature is interrelated and immersed with sacred power. Creation myths are told in most California tribes, often explaining the origins of the earth, human existence, and individual cultural attributes. Stories often pointed morality or defined the establishment of elements. Modern Native American beliefs vary, but are rooted in their ancestral land and traditions.

Modern Native Americans

The 2000 U.S. Census recorded 220,657 American Indians in California, for those designating only one race, excluding Alaska Natives and Native Hawaiians. Of that number, some come from tribes outside the modern boundaries of California. Currently there are 107 federally-recognized Tribes in California and approximately 40 groups seeking to gain recognition. While the devastation brought about by the introduction of disease and displacement following European contact was overwhelming, Native American individuals and communities have continued to protect their cultural heritage and identity and maintain their languages and traditions.

Prehistoric Property-Types along California Waterways

Water—whether springs, creeks, rivers, lakes, bays, or the ocean—is one of the most important resources necessary for human use and settlement. Water, and access to water, gives sustenance, provides corridors for travel and trade, and establishes traditional boundaries. Both archaeological sites and Traditional Cultural Properties are located along waterways throughout California. Each of these types of properties is described below.

Archaeological Sites

Prehistoric archaeological sites generally found along California's waterways include permanent or semi-permanent habitation sites, temporary camps or food processing localities, and isolated artifacts. Archaeological materials that could be found at sites along waterways include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or tool making debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Native American human remains can also be found at prehistoric archaeological sites. Although it is less likely that these types of resources are located within the riverbed, there is a high potential that prehistoric resources are located on the adjacent riverbanks and surrounding vicinity (Foster, Dillon, and Sandelin, 2005).

While the construction of fish weirs and platforms is well documented ethnographically and traditionally, no archaeological evidence has been found in California related to these structures. However, evidence of semi-permanent wood-stake fish weirs have been identified on the Oregon Coast along tidal flats (Tveskov and Erlandson, 2003).

Traditional Cultural Properties

Places of importance to Native Americans can be considered historical resources as "areas" or "places" determined to be significant in the "social" and "cultural annals of California" (CEQA § 15064.5[a][3]). Defined as Traditional Cultural Properties (TCP) in the federal nomenclature, a TCP is generally significant because of its association with the "cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker, et. al., 1998). According to NRHP Bulletin 38, there are two integrity issues that should be considered in determining the eligibility of a TCP: (1) integrity of relationship and (2) integrity of condition. Assessing integrity of relationship includes developing "some understanding about how the group that holds the beliefs or carries out the practices is likely to view the property" (Parker, et. al., 1998). The condition of the TCP is determined by whether the property maintains that relationship. One defined TCP is a "Riverscape," or "a river and its environs, including their natural and cultural resources, wildlife, and domestic animals, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (King, 2004). Riverscape analysis requires that the entire river system be holistically considered for the cultural values that it conveys for Native peoples, and includes contributing elements such as spatial organization, topography, vegetation, wildlife (including fish), water features, and sites, structures, and objects (Gates, 2003).

Salmon is not only a source of subsistence for Native peoples, but also has ceremonial value in places where this resource is available. Most tribes consider the first salmon catch of the season an important ceremonial occasion; in some cases a shaman is required to spear the first fish that is then eaten communally. Only then can the salmon fishing season begin (Riddell, 1978:374). Other annual traditions include honoring the location where salmon was created (Bright, 1978:188). Ceremonial sites are potential Traditional Cultural Properties.

Historic Setting

Spanish Discovery

The earliest European presence in California came with the Spanish discovery and exploration of the California coast in the mid-sixteenth century. Alta California had been claimed for Spain in 1542 by the Portuguese Juan Cabrillo, who sailed up the Pacific Coast as far as Fort Ross. Due to the prosperity of its more southern colonies and the great distances required to travel so far north, Spain largely ceased overland and maritime exploration of Alta California (i.e., the area encompassing modern-day California) until the eighteenth century. Spain had originally focused its energy and attention on its southern colonies in New Spain; however, in the eighteenth century the increased presence of Russian settlements along the northwest coast and the British acquisition of Canada in 1763 encouraged Spain to explore and occupy Alta California in order to prevent Russian and British encroachment from the north.

Mission Period

European expansion into Alta California began when Spanish Mexico instigated the establishment of a string of Franciscan missions throughout the region. The California mission system had two goals: to Christianize and civilize the native population of California and to gain political and social control of the area for the Spanish government in Mexico.

Mission San Diego de Alcalá, the first of 21 California missions, was founded in July 1769. Over the next 50 years the mission system was extended further north. Alongside the missions came a network of military establishments or *presidios* and civilian settlements or *pueblos*. Exploration of the California hinterland focused predominantly on the identification of rancho sites to support the mission network as well as the recapture of runaway Natives.

Mexican Ranchos

Although the original Spanish plan for the mission system included secularization, the process did not begin until Mexican independence from Spain. Fueled by reports of Franciscans padres degrading the Native peoples and failing to provide food and services to the military, the Mexican government began secularization in mid-1834. During the process, the mission lands were to be divided among the Native American neophytes, although rarely did this actually happen. More often the mission lands were granted to high-ranking Mexican Californian soldiers, politicians, and socialites.

Mexican Californians, or *Californios*, were well known for their hospitality and easygoing lifeways. Early accounts describe rancho*s* with large households, operated by a large Native American labor force. Most rancho*s* were intensively involved in the hide-and-tallow trade, supporting huge herds of cattle on their vast landholdings. The cattle were driven to *matanzas*, or slaughter sites, that were usually as near to water transportation as possible for easy transport onto foreign trade vessels. The relationship between the *Californios* and the foreign ships had been active since the early 1820s. The ships imported all manner of trade goods, since little refined manufacturing occurred in Mexican California.

Beginning in the 1830s, Americans began to migrate to California. Many became Mexican citizens, married into prominent *Californio* families, and were granted lands from the governor. These first immigrants became acculturated into Mexican society and politics, while many were prominent businessmen and landowners.

Gold Rush

The discovery of gold in California in 1848 instigated one of the largest migrations in history. Thousands came by land and sea in search of their fortunes. Most came to dig for the gold, but many came with the foresight that miners needed supplies. Earlier residents of California, including many *Californios* and previous Euroamerican immigrants, capitalized on the new immigrant population. Many *Californios* also struggled to hold on to their vast landholdings. Although the Treaty of Guadalupe Hidalgo promised that property belonging to the Mexicans be "inviolably respected," the new Americans generally believed that the lands in California should be public property as a privilege of military victory. The vague land-grant maps, or *diseños,* that marked the boundaries of each rancho territory were protested and ignored by the land-hungry immigrants. "Squatters" settled on land officially owned by Mexicans and violence often erupted. Many *Californios* lost substantial amounts of land, despite legal efforts to hold on to it. Although many claims were confirmed, the Mexican landowners were often bankrupt by the end of the long and costly proceedings.

Settlers

Mining camps and towns were established almost immediately throughout the California's gold-bearing regions, which are generally located along the western foothills of the Sierra Nevada mountain range and along the Klamath and Trinity river basins. At the outset, the mining population was made up almost exclusively of single men. But miners needed food and supplies, and people who could provide those goods followed. Ultimately women and children also relocated to mining communities. The influx also brought an extreme diversity of cultures and nationalities. California gold mining was very successful; in 1852 California produced more than $81,000,000 worth of gold—60 percent of the world production for that year (Clark, 1957:223). Almost immediately after the discovery of gold, investors began talking about the construction of a transcontinental railroad that would connect eastern goods, money, and services to the new western enterprises. Prior to construction of the railroad however, the extensive inland waterway network of California was crucial for travel to the interior.

Suction Dredge Mining

Successful dredge mining operations began in California in the late 1890s (Caltrans, 2008). Dredging equipment included buckets or draglines attached to floating boats or barges that would scoop up gold-bearing gravel for processing. Dredging operations were generally located in rivers at lower elevations and created expansive tailing piles along the water banks. Large-scale dredge mining reached a peak during the 1930s. In the 1950s small-scale suction-dredge equipment was developed for the individual miner. The first machines were hand-constructed; however, manufactured suction dredges were soon available. Suction-dredge mining, for both recreational and financial opportunities, expanded in areas of California wherever placer gold deposits can be found.

Many other minerals were mined in California; however, gold deposits dominated the initial rush and continue to be a productive enterprise. Two types of gold deposits (placer and lode) involve four basic types of extraction (placer, hydraulic, underground, and dredging). All mining activities have left their mark on the landscape, including river diversions, waste rock and tailing piles, dredge tailings, cut banks, prospect pits, shafts, adits, and water conveyance systems such as dams, reservoirs, ditches, and flumes.

Historic-Era Property Types along California Waterways

Submerged Vessels

Potential historic-era resources that are located within California's river system are submerged vessels. The California State Lands Commission maintains a Shipwreck Database that currently identifies approximately 1,550 recorded shipwrecks in California, of which about 70 are recorded in California's river system (California State Lands Commission, 2009). The vast majority of these resources are wood-hulled, Gold Rush-era vessels submerged within the Sacramento, American, Feather, Yuba, and San Joaquin rivers in Central California. The title to all abandoned shipwrecks is under the jurisdiction of the California State Lands Commission. Any submerged vessel remaining in state waters for more than 50 years is considered a potentially significant historical resource.

Mining Sites and Features

Other historic-era resources that might be present in California's waterways are mining sites and features that are submerged within or adjacent to the state's river system. Property types include mining remains such as tailing piles and river diversions; water conveyance features such as ditches, flumes, and dams; and community remains including foundations, dugouts, and refuse deposits located along riverbanks and in the surrounding vicinity (Caltrans, 2008). Similar to submerged vessels, many of these other Gold Rush-era resources are concentrated within California's Sierra Nevada foothills, but may exist anywhere within the state's waterways.

Modern Development

California's waterways are a patchwork of both highly altered riverine systems and wild and scenic drainages that are undisturbed by modern development. The construction of dams, levees, canals, and reservoirs during modern times, whether for power generation, irrigation, flood control or transportation, have greatly altered the state's waterways, and with it, much of the surface evidence associated with the types of prehistoric and historic-era sites described above. Natural processes such as flooding and erosion/deposition have also altered or destroyed many of the cultural resources found along the state's waterways. Regardless of these natural and human-made disturbances, the state's waterways remain abundant with both recorded and unrecorded cultural resources, all of which provide a detailed record of California's rich cultural heritage.

4.5.4 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to cultural resources may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

The 1994 EIR did not make findings for this environmental resource area.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would cause:

- A substantial adverse change, when considered statewide, in the significance of historical resources that are either listed or eligible for listing on the National Register of Historic Places, the California Register of Historical Resources, or a local register of historic resources;
- A substantial adverse change, when considered statewide, in the significance of unique archaeological resources; or
- Disturbance of any human remains, including those interred outside of formal cemeteries.

<u>Historical Resources</u>

CEQA Guidelines section 15064.5 requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the CRHR, or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. Types of historical resources potentially located in areas where suction dredge mining is conducted includes submerged vessels, TCPs, and historic-era mining sites and features. Archaeological resources that are potentially historical resources according to section 15064.5 are addressed in *Unique Archaeological Resources* below.

<u>Archaeological Resources</u>

The effects of a project on archaeological resources, both as historical resources according to section 15064.5, as well as unique archaeological resources as defined in section 21083.2 (g) must also be considered.

<u>Human Remains</u>

Human remains, including those buried outside formal cemeteries, are protected under a number of state laws including Public Resources Code section 5097.98 and Health and Safety Code section 7050.5.

4.5.5 Environmental Impacts

Impact CUL-1: Substantial Adverse Changes, When Considered Statewide, in the Significance of Historical Resources (Significant and Unavoidable)

<u>Historical Resources</u>

A significant impact could occur if suction dredge mining would cause a substantial adverse change, when considered statewide, in the significance of historical resources that are either listed or eligible for listing on the NRHP, the CRHR, or a local register of historic resources. Substantial adverse change is defined as the demolition, relocation, or alteration of a resource to the extent that the character defining features which convey its significance would be lost.

Many cultural resources are known to exist in the rivers where suction dredge mining could occur. Some cultural resources may meet the criteria of significance defined in CEQA section 15064.5, and would be considered historical resources for CEQA purposes, while others may not meet the criteria, and therefore would not be considered historical resources under CEQA. The significance of cultural resources is derived from one or more factors including: associations with important historical events or persons; possession of high artistic value or distinctive characteristics; and the potential to yield important information. To be considered significant, a resource must also retain sufficient integrity, including integrity of location, design, setting, materials, workmanship, feeling, and association. Impacts to non-significant resources would not be a significant impact to historical resources under CEQA section 15064.5. However, suction dredge mining does have the potential to affect significant resources. Whether this impact would have a substantial adverse change in the significance of a resource when considered statewide is a function of the likelihood of disturbance to these resources and their individual and/or collective significance. It is unknown whether suction dredge mining would affect significant historical resources to a level that would be considered significant statewide. As described in Chapter 2, CDFG will distribute an informational packet to each suction dredge permit holder to provide “Best Management Practices” guidance. This information packet will include measures regarding the identification and avoidance of historic and cultural resources if they are encountered during dredging activities. However, such adverse impacts cannot be entirely discounted, even with the inclusion of avoidance measures contained within the “Best Management Practices” information packet. For this reason, impacts to historical resources are considered potentially significant.

For example, the numerous submerged vessels within California’s river system might be located within areas of suction dredge mining. Submerged historic-era vessels, both recorded and unrecorded, which have the potential to yield information important to statewide history, would be considered historical resources for CEQA purposes. While many of these resources are concentrated within the rivers and tributaries of the Sacramento-San Joaquin Delta, they may exist anywhere within the state’s waterways. Damage to, or destruction of, historically-significant submerged vessels would be a potentially significant impact. Although the potential damage to or destruction of such resources resulting from dredge mining operations is unknown and may be somewhat reduced by the information contained in the “Best Management Practices” packet, it cannot be entirely discounted. As both recorded and unrecorded submerged vessels may exist in locations where suction dredge mining may occur, potential damage to such resources is considered a significant impact.

Other potential historical resources that might be present in areas of suction dredge mining are historic-era mining sites and features that are submerged within or adjacent to waterways. Property types might include mining remains such as tailing piles and river diversions; water conveyance features such as ditches, flumes, and dams; and community remains including foundations, dugouts, and refuse deposits located along riverbanks and in the surrounding vicinity (Caltrans, 2008). Mining-related cultural resources are numerous in locations where modern suction dredge mining is conducted. Many of these Gold Rush-era resources are concentrated within California’s Sierra Nevada foothills, or

'Gold Country,' but may exist anywhere within the state's waterways. A previous study conducted on the effects of suction dredge mining on cultural resources concluded that the activity has the potential to affect historic-era resources along the creek banks during access and camping activities (USFS, 2006).

While the potential impacts to specific historical resources may be reduced if certain river reaches are closed to suction dredge mining, the potential impact to historical resources that continue to be part of the Program Area would not diminish. And though the guidance provided in the "Best Management Practices" packets could reduce these effects, the potential for Program activities to result in a substantial adverse change in the significance of a historical resource due to possible demolition, relocation, or alteration would remain. For these reasons, impacts to historical resources resulting from suction dredge mining activities are considered potentially significant.

Mitigation measures designed to reduce impacts to a less-than-significant level are available for historical resources that may be affected by a project. These mitigation measure include archival research at the California Historical Resources Information System (CHRIS) or the State Lands Commission, field surveys by qualified archaeologists and/or architectural historians, to determine the location of recorded resources prior to dredging activities, and data recovery and other documentation efforts designed to collect or record the significant data associated with the resources. Despite the information contained in the "Best Management Practices" packets to avoid such adverse effects, CDFG does not have the jurisdictional authority to mitigate impacts to historical resources. Therefore impacts to historical resources are considered significant and unavoidable.

Traditional Cultural Properties

TCPs are known to exist in and around waterways where suction dredge mining could occur. The natural settings associated with "Riverscapes" are a recognized type of TCP (King 2004). Riverscape analysis requires that the entire river system be holistically considered for the cultural values that it conveys for Native peoples, and includes contributing elements such as spatial organization, topography, vegetation, wildlife (including fish), water features, and sites, structures, and objects (Gates, 2003).

Suction dredging activities could cause a substantial adverse change to TCPs through the introduction of increased human activity around the state's waterways. Implications of suction dredge mining could include elevated noise levels, intrusion by non-local or non-tribal persons, and the potential alteration of the physical environment associated with TCPs. Some of the TCPs that might be subject to impacts from suction dredge mining may meet the criteria of significance, as defined in CEQA section 15064.5, and would be considered historical resources for CEQA purposes. Other TCPs may not meet the criteria of significance as defined in CEQA section 15064.5, and would not be considered historical resources for CEQA purposes. Because TCPs are distinctive depending on location, setting, context, and association, substantial adverse changes to even one TCP may be considered a significant impact even in the statewide context of the Program. The informational packet distributed to each suction dredge permit holder will include guidelines to minimize and avoid adverse affects to TCPs. However, such guidance would only be advisory and would therefore not reduce adverse effects to a less-than-significant level.

Information about TCPs is generally gathered through the processes of consultation with Native American groups and local communities and ethnographic study. Due to the broad statewide nature of the Program, consultation and study were not feasible within the context of this SEIR. Without consultation and study, it is not possible to determine whether TCPs that qualify as historical resources under CEQA will also be subject to impacts from suction dredge mining activities. Conversely, without consultation and analysis of all locations where suction dredge mining occurs, it is not possible to determine the specific locations of all CEQA-significant TCPs in a statewide context. Furthermore, some TCPs would be required to be kept confidential, which would make regulation of those sites difficult. Mitigation measures, including documentation and interpretation, designed to reduce impacts to a less-than-significant level are available for significant TCPs that may be affected by a project. However, as CDFG does not have the jurisdictional authority to mitigate impacts to historical resources, impacts to TCPs are therefore considered significant and unavoidable.

Impact CUL-2: Substantial Adverse Changes, When Considered Statewide, in the Significance of Unique Archaeological Resources (Significant and Unavoidable)

Archaeological resources are usually eligible to be listed in the CRHR as historical resources under criterion d: a resource that has yielded, or may be likely to yield, information important in prehistory or history. In order to evaluate an archaeological site under criterion d, data requirements, research questions, and the historic context of that property must be identified and the integrity of the property must be addressed. If an archaeological resource does not qualify as a historical resource under CEQA, then the resource must be evaluated to determine whether it meets the criteria to qualify as a unique archaeological resource. Unique archaeological resources can include prehistoric and historic-era archaeological sites, individual artifacts, or objects. To be considered a unique archaeological resource, the resource must: (1) contain important scientific information of interest to the public; (2) retain a special quality, such as being the oldest or best example of its type and/or; (3) be associated with an important event of person. Alteration or destruction of a unique archaeological resource would be a significant impact.

Riverine settings are considered highly sensitive for the existence of significant archaeological resources. Prehistoric archaeological sites generally found along riverways include permanent or semi-permanent habitation sites, temporary camps or food processing localities, and isolated artifacts. Although it is less likely that these types of resources are located within the riverbed and the immediate area of impact of suction dredge mining, there is a high potential that prehistoric resources are located on the adjacent riverbanks and surrounding vicinity (Meyer and Rosenthal, 2008).

Suction dredge mining activities could cause a substantial adverse change to a unique archaeological resource through riverbed suctioning and screening activities that could disturb or destroy cultural materials which may be located just below the surface of the riverbed or along its banks. Impacts to unique archaeological resources resulting from suction dredge mining could also occur through increased human activity in the vicinity of the state's waterways. A significant impact could occur if suction dredge mining activities would cause a substantial adverse change, when considered statewide, in the significance of unique archaeological resource. Whether this impact would have a substantial adverse change in the significance of a unique archaeological resource when considered statewide is a function of the likelihood of disturbance to such a resource and its individual and/or collective significance. It is unknown whether suction dredge mining would affect unique archaeological resources to a level that would be considered significant statewide. However, such adverse impacts cannot be entirely discounted even with the inclusion of avoidance measures contained within the "Best Management Practices" information packet. For this reason, impacts to unique archaeological resources are considered potentially significant.

Mitigation measures designed to reduce impacts to a less-than-significant level are available for unique archaeological resources that may be affected by a project. These mitigation measures include archival research at the California Historical Resources Information System (CHRIS) or the State Lands Commission, field surveys by qualified archaeologists and/or architectural historians, to determine the location of recorded resources prior to dredging activities, and data recovery and other documentation efforts designed to collect or record the significant data associated with the resources. Despite the advisory information contained in the "Best Management Practices" packets to avoid such adverse effects, CDFG does not have the jurisdictional authority to adopt or enforce mitigation for impacts to unique archaeological resources. Therefore, impacts to such resources are considered significant and unavoidable.

Impact CUL-3: Disturbance of Human Remains (Less than Significant)

A significant impact could occur if suction dredge mining would disturb, mutilate or remove human remains, including those which may be interred outside of a formal cemetery.

The potential for human remains to be located within or adjacent to areas of suction dredge mining activity is relatively low, but cannot be entirely discounted. Archaeological sites containing human remains may be located in areas subject to suction dredge mining. The suctioning and sorting activities of suction dredge mining could unearth, expose, disturb, and remove buried human remains, which would be considered a significant impact.

Potential impacts to human remains are significant; however California state law requires specific steps when human remains are discovered accidentally (section 7050.5 of the Health and Safety Code and section 5097.98 of the Public Resources Code). The specific steps to be taken in the event of discovery of human remains are described in the Regulatory Setting section above, and will be included in the information packet distributed to each suction dredge permit holder. Compliance with State law would ensure impacts are less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities requiring notification under Fish and Game Code section 1602 are likely to result in additional site disturbances, increasing the potential to cause adverse changes in the significance of archeological and/or historic resources. Larger nozzle sizes and power winching increase the amount of substrate movement capability, while dredging in lakes would result in potential for disturbances in locations that would not otherwise be subject to dredging under the Proposed Program. Furthermore, dredging in lakes or diverting flows could increase physical intrusions on, or alterations to, TCPs. Though impacts on historical and significant archeological resources (Impacts CUL-1 and CUL-2) have been found to be significant and unavoidable, activities requiring notification under Fish and

Game Code section 1602 may contribute to additional adverse effects; the extent of which would need to be evaluated in a CEQA analysis.

The potential for additional site disturbance also increase the potential to encounter or disturb human remains. Though activities requiring notification under Fish and Game Code section 1602 may increase the potential for accidental discovery, compliance with State laws would ensure that impacts on this resource would remain less than significant.

Chapter 4.6
AESTHETICS

4.6.1 Introduction

A brief overview of aesthetic concepts and terminology is provided below as a reference. The aesthetics environmental setting and impact analysis follows the introduction.

Concepts and Terminology

Definition of 'Aesthetics'

Aesthetics can be defined as the judgment of sentiment and taste based on perception (Silbey, 2001). Aesthetics (or visual resource) analysis is therefore a process to logically assess visible change related to project implementation, and viewer response to that change.

The assessment of visual resources typically involves the identification of the following four key aesthetic components: visual character, visual quality, visual sensitivity, and viewer response.

Visual Character

Both natural and artificial landscape features make up the character of a view. Character is influenced by geologic, hydrologic, botanical, wildlife, recreational, and urban features. Urban features include aspects of landscape settlement and development, such as roads, utilities, structures, earthworks, and the results of other human activities. The perception of visual character can vary significantly among viewers depending on their level of sensitivity and interest. Among sensitive viewers, perception can vary seasonally and even hourly as weather, light, shadow, and the elements that compose the viewshed change. Form, line, color, and texture are the basic components used to describe visual character and quality for most visual assessments (USFS, 1974; FHWA, 1983). The appearance of the viewshed is described in terms of the dominance of each of these components.

Visual Quality

Visual quality is evaluated using the well-established approach to visual analysis adopted by the Federal Highway Administration (FHWA) (Jones et al., 1975; FHWA, 1983), employing the concepts of vividness, intactness, and unity, as defined below:

- *Vividness* is the visual power or memorability of landscape components as they combine in striking or distinctive visual patterns.
- *Intactness* is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings.

- *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the artificial landscape.

Visual quality is evaluated based on the relative degree of vividness, intactness, and unity, as modified by its visual sensitivity. High-quality views are highly vivid, relatively intact, and exhibit a high degree of visual unity. Low-quality views lack vividness, are not visually intact, and possess a low degree of visual unity.

Visual Sensitivity and Viewer Response

The measure of the quality of a view must be tempered by the overall sensitivity of the viewer. Viewer sensitivity is based on the visibility of resources in the viewshed, the proximity of viewers to the visual resource, the elevation of viewers relative to the visual resource, the frequency and duration of viewing, the number of viewers, and the type and expectations of individuals and viewer groups.

The criteria for identifying importance of views are related in part to the position of the viewer relative to the resource. An area of the landscape that is visible from a particular location (e.g., an overlook) or series of points (e.g., a road or trail) is defined as a viewshed. To identify the importance of views of a resource, a viewshed may be broken into distance zones of foreground, middleground, and background. Generally, the closer a resource is to the viewer, the more dominant it is and the greater is its importance to the viewer. Although distance zones in viewsheds may vary between different geographic regions or types of terrain, a commonly used set of criteria identifies the foreground zone as 0.25–0.5 miles from the viewer, the middleground zone as extending from the foreground zone to 3–5 miles from the viewer, and the background zone as extending from the middleground zone to infinity (USFS, 1974).

Judgments of visual quality and viewer response must be made based in a regional frame of reference (USSCS, 1978). The same type of visual resource in different geographic areas could have a different degree of visual quality and sensitivity in each setting. For example, a small hill may be a significant visual element in a flat landscape but have very little significance in mountainous terrain.

Sensitivity is dependent on context and physical conditions of an area, and for recreationists sensitivity is often related to an individual’s goals and outdoor experience expectations (Bernell et al., 2003). Many recreationists and residents expect to enjoy natural aesthetic conditions of outdoor wilderness areas and are sensitive to any development or activities which conflict with these expectations. For further discussion regarding potential conflicts between suction dredging and other recreational activities, please refer to Chapter 4.8 of this SEIR, *Recreation.*

Generally, visual sensitivity is higher for views seen by people who are driving for pleasure, people engaging in recreational activities such as hiking, rafting, or camping, and local homeowners and employees, than for those by people driving to and from work or other destination (USFS, 1974; USSCS, 1978; FHWA, 1983). Non-recreational travelers have generally fleeting views and tend to focus on traffic and not on surrounding scenery, and therefore are generally considered to have low visual sensitivity.

Residential and commercial viewers typically have extended viewing periods and are concerned about changes in the views from their homes or workplaces; therefore, they generally are considered to have moderate to high visual sensitivity. Viewers using recreation trails and areas, scenic highways, and scenic overlooks are usually assessed as having high visual sensitivity, due to their expectations for the aesthetic conditions in these types of areas.

4.6.2 Environmental Setting

The setting section describes the regional characteristics of riverine areas in the state, an overview of areas designated for their scenic qualities, and descriptions of viewer groups and viewer responses. The reader is also directed to the *Activity Description* in Chapter 3 for a description of characteristics of suction dredging, and related activities and encampments.

Regional Characteristics of California's Riverine Areas

For the purposes of this analysis, riverine areas of California have been divided into five regions based on climatic and topographic characteristics. Each of these regions discussed below contains a distinct aesthetic character based on its geography and associated vegetative communities. Representative photos of each regional riverine area are shown in Figure 4.6-1. More detailed descriptions of these regions are included in Chapter 4.1, *Hydrology and Geomorphology*.

Klamath/Trinity

The Klamath/Trinity region encompasses the northernmost inland mountain areas. This region is characterized as being the least accessible and known mountain regions in the state. In the western edge of this region, heavy precipitation, fog, and mild temperatures result in a dense forest composition similar to that of Alaska and western Canada; including cedar, fir, hemlock, and spruce tree species. The eastern portion of the region is known as the Cascade Range and though similar, is predominantly characterized as coniferous forest dominated by Ponderosa Pine. This eastern edge traps moist air flow from traveling eastward, thus resulting in abundant snowfall which is visible on high-mountain peaks nearly year-round. (Schoenherr, 1992)

Four major river systems drain this region, the Klamath, Smith, Trinity and the Pit rivers (the Klamath and Trinity rivers are shown in Figure 4.6-1, Photo a). The Klamath, Smith, and Trinity rivers, though dammed upstream, still flow freely in the lower reaches. The Pit River, which drains the Cascade area, supplies part of the State Water Project, draining into the Shasta Reservoir. (Schoenherr, 1992)

This region is considered to have some of the highest visual character and quality in the state due to the large tracts of open space and relatively low level of development compared to other areas of the state. The majority of land within this region is managed by federal and state agencies as protected resource areas. Thus, river courses and vegetation are relatively pristine compared to other areas of the state; this region is perhaps the most unspoiled and untouched region in the state, especially along the many rivers and streams throughout the region. Views of the landscape are dramatic with high sharp mountain peaks and deep v-cut valleys with steep slopes extending down to stream channels. Rivers and streams meandering through narrow valleys are contrasting against the largely green steep landscape. Rivers channels widen and form braided gravel bars and side channels as they flow from higher to lower elevations.

Sierra Nevada

A single mountain range extending approximately 400 miles, the Sierra Nevada mountain range is one of the largest in the world. It is comprised of granitic rocks that contribute to its distinct appearance, recognizable in the works of Ansel Adams and John Muir. Photos (b) and (c) in Figure 4.6-1, depict views of the North Fork of the American River and Bear River, respectively. These two Sierra Nevada streams are popular suction dredging areas.

Climate patterns on the Sierra range result in abundant precipitation on the western slopes of the range, with the eastern slopes remaining considerably drier. On the western slopes, this heavy precipitation supports a dense coniferous forest where some of the tallest tree species are located, including sugar pine and giant sequoia (Schoenherr, 1992). In addition, large alpine meadows and numerous waterbodies including lakes, streams, and rivers are interspersed throughout the region. The eastern slopes of the Sierra transition to desert conditions.

This region is somewhat more populous than the Klamath/Trinity region, especially along the western foothills which border the Great Central Valley in the center of the state. Similar to the Klamath/Trinity region, the Sierra Nevada is a popular recreational destination for aesthetic enjoyment of the state's natural features, including glacial valleys, moraine lakes, and evergreen forests. Historic (1850-60's) gold mining activities in the Sierra, specifically hydraulic mining, have left visual scars on some rivers. Banks, particularly along upper Yuba River, were severely eroded by water cannons and now appear largely denuded of vegetation compared to the surrounding landscape. Today, the large majority of the region's resources are protected within federal and state parklands and scenic views to rivers and riverine areas are dominated by evergreen trees. Much like valleys in the Klamath/Trinity region, views of the landscape in the Sierras are defined by high mountain peaks and deep v-cut valleys. Slopes on the Sierras are somewhat gentler than in the northern region and stream flows are more heavily regulated due to dams constructed throughout the region. Perhaps the most visible non-natural features in the region are the many roads, bridges, and highways which traverse the region.

Coastal Areas

Coastal areas encompass the region of California where land meets the sea. These areas transition from sea-level elevations to terraces and mountainous landforms, sometimes very abruptly. There are three general areas along California's coastline where similar vegetation and geographies create distinct zones: the northern coast, the central coast, and the southern coast. In Figure 4.6-1, Photo (d) shows a view of the Russian River near California's coast.

The northern coast, for the purposes of this analysis, is generally defined as extending from the Oregon border southward to the Santa Barbara area. The climate and vegetation of this region is greatly influenced by heavy fog. Vegetation ranges from large tracts of heavily forested coast redwood in the north, to chaparral and oak woodlands in the south. In the

Photo a. Confluence of the Klamath River (right) and Trinity River (left) north of Hoopa, California.

Photo b. North Fork American River.

Photo c. Bear River near Auburn, California.

Photo d. View of the Russian River with Coastal Fog (Orton, 2009)

Photo e. Desert wash location in the Mojave Desert (Mite, 2005)

Photo f. Middlefork of the San Joaquin River near Devil's PostPile National Monument (Crossly, 2010)

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Horizon WATER and ENVIRONMENT

Figure 4.6-1
Riverine Areas of California

interior northern coast area, the landscape exhibits a distinct pattern of large, well-spaced trees with grassy understory. (Schoenherr, 1992)

The unique east-west transitions of the central or transverse coast results in characteristic chaparral and coniferous forest communities (Schoenherr, 1992). Prominent features in this region include the Santa Monica, San Gabriel, San Bernardino, and Santa Ynez ranges. Of these, the Santa Ynez range parallels the coastline from Santa Barbara to Ventura, and in addition to chaparral vegetation, features coastal sage scrub, oak woodland, and grasslands at lower elevations.

The southern coast region is defined by the Peninsular Ranges that extend from the Transverse Ranges near Santa Barbara and continue south into Mexico. These mountainous ranges are separated by several valleys and plains. The west side of this region includes the Los Angeles Basin which is highly urbanized. Coastal sage scrub vegetation is the predominant natural vegetation type; however, urban development and human activity are the dominant visual features in this area (Schoenherr, 1992).

The majority of the state's coastal areas can be viewed by motorists along State Highways 1 and 101. From coastal highways, views of the Pacific Ocean dominate to the west and views to sharp hills and cliffs dominate to the east. Riverine areas are vegetated by shorter scrub vegetation in southern areas of the state and tall redwood trees in northern areas of the state.

Desert Regions

There are three main desert regions in California – the Modoc Plateau, the Basin and Range, and the Mojave – all of which all lie east of the mountain formations of the Cascade and Sierra Nevada ranges. These regions receive very little precipitation and support scrub vegetation dominated by creosote bush, saltbrush, and some Joshua tree woodlands (Hornbeck, 1983). These regions are characterized by relatively monotone colors with highly contrasting shadows and interspersed vegetation. Riverine environments in the desert are ephemeral and supported by a small amount of precipitation compared to the rest of the state. Stream channels in flat areas are less defined compared to higher elevations where channels are steeply cut into the landscape (see Figure 4.6-1, Photo e).

The higher elevation desert areas include plateaus and mountain peaks. Here vegetation forms a sparse forest, mostly of subalpine pines and juniper species, which allows for long-range visibility (Schoenherr, 1992).

Central Valley

Between the coastal area and the Sierra Nevada regions lies the Central Valley. The northern portion of this region is drained by the Sacramento River and is known as the Sacramento Valley, while the San Joaquin River drains the southern region known as the San Joaquin Valley. This region is widely recognized for its agricultural production, particularly in the San Joaquin Valley (Schoenherr, 1992).

Climate of the Valley is a product of its relatively low elevation and surrounding mountain ranges which intercept precipitation and prevent the drainage of cold air (Schoenherr, 1992). This dry weather pattern supports the nearly tree-less grasslands and marsh vegetation that characterize the areas of the landscape that have not been converted to agricultural use (Hornbeck, 1983).

Views of this region are dominated by agricultural related structures, such as barns and grain silos, water canals, roadways, and intermittent urban centers. In nearly every location in the valley, views of either the Sierra Nevada to the east or the Coast Ranges to the west are visible (see Figure 4.6-1, Photo f).

Areas with Special Scenic Designations

Federal and state agencies actively designate and protect the scenic resources in California. Programs such as the National Landscape Conservation System, Wild and Scenic Rivers System, and Historic and Scenic Trails, are primarily aimed at preserving resources for the benefit of recreationalists. As such, these designated areas are described further in Chapter 4.8 *Recreation*.

Additionally, many local government authorities such as cities and counties designate scenic corridors or routes within their jurisdictional boundaries. These corridors are maintained according to adopted ordinances and general plan policies. Local land use plans and designated scenic corridors vary across the state.

National Wild and Scenic Rivers System

The National Wild and Scenic Rivers System was created by Congress in 1968 to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Rivers may be designated by Congress and each is administered by either a federal or state agency. For federally administered rivers, such as the Klamath River, which is managed by the U.S. Forest Service, the designated boundaries extend an average one-quarter mile on either bank to protect river-related values. Information on designated rivers and river segments in California can be reviewed online at: <http://www.rivers.gov>.

Rivers are classified as wild, scenic, or recreational:

- *Wild river areas* — rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.
- *Scenic river areas* — rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- *Recreational river areas* — rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Regardless of classification, river designation neither prohibits development nor gives the federal government control over private property. Recreation, agricultural practices, residential development, and other uses may continue. Protection of the river is primarily provided through voluntary stewardship by landowners and river users.

The Act prohibits federal support for actions such as the construction of dams or other instream activities that would harm the river's free-flowing condition, water quality, or outstanding resource values. However, designation does not affect existing water rights or the existing jurisdiction of states and the federal government over waters as determined by established principles of law.

California Wild and Scenic Rivers Act

The California Wild and Scenic Rivers Act (Public Resources Code Sec. 5093.50 et seq.) was passed in 1972 to preserve California's designated rivers possessing extraordinary scenic, recreation, fishery, or wildlife values. This act was patterned after the 1968 National Wild and Scenic Rivers Act, and both share similar criteria and definitions in regard to the purpose of protecting rivers, the process used to designate rivers, and in the prohibition of new water impoundments on designated rivers. Unlike the national act, the California Wild and Scenic Rivers Act provides protection only up to the first line of permanent vegetation and does not require a management plan for designated rivers. The California Legislature is responsible for classifying or reclassifying rivers by statute, though the Resources Secretary may recommend classifications. State designated rivers may be added to the federal system upon the request of the state Governor and the approval of the Secretary of the Interior. Adding state rivers to the federal system under this act does not require approval of the Legislature or Congress. State rivers added to the federal system are managed by the state.

The river segments initially protected in the state system when it was established in 1972 included the Smith, Klamath, Scott, Salmon, Trinity, Eel, Van Duzen, and American Rivers. These were added to the federal system in 1981. Examples of state designated rivers that are not also included in the federal system include the East Carson, West Walker, and South Yuba rivers.

California Scenic Highway Program

The California Scenic Highway Program was created by the Legislature in 1963 to protect the scenic qualities of California highways and adjacent corridors. To designate a scenic highway, a local government authority such as a city or county must delineate a scenic corridor and adopt ordinances, zones, or planning policies to protect the quality of the corridor. Once designated, the local city or county agency can apply for grant funding to maintain and enhance the scenic corridor. The Scenic Highway Program is administered by the California Department of Transportation (Caltrans). However, Caltrans is not directly responsible for enforcing the ordinances or planning policies established for the scenic corridor by a local government agency.

Viewer Groups and Viewer Responses

Different types of viewers have varying sensitivity to visual quality and changes in visual quality. Sensitivity is based on their familiarity with the view, sense of ownership of that view, and personal opinions regarding the activity being viewed (which determines how much attention is paid to the view). Viewers in the actual viewshed of the Program activities would include primarily recreational viewers, residential viewers, commercial viewers, and occasionally motorists.

It is important to note that this discussion addresses average viewer sensitivity. Some viewers are more or less sensitive than their activity or ownership would indicate. Individuals' reactions to views vary greatly, depending on a number of factors – including how much they know or care about the view, their personal tastes, and their opinions about the activity they are viewing.

Recreationists

Recreational use in the Program Area includes a variety of activities within both public and private recreation areas. To effectively assess the potential exposure to Program activities, recreational activities can be sub-divided into several broad categories based on duration and type of activities, as outlined below. There is some overlap between these groups; however, they represent unique viewer perspectives specific to their category.

Typically, viewer sensitivity is moderately high among recreationists because they tend to value the natural environment highly, appreciate the visual experience, and be sensitive to changes in views.

Duration of Activities

Depending on the individual's schedule and/or recreational goals, visits to recreation areas can either be short-term or extended. In this context, short-term outings are considered to be those which last from a few hours up to a full day, but do not include overnight stays. Typical activities engaged in this period of time may include picnicking, hiking, bird-watching, biking, fishing, and rafting.

Extended recreation stays include camping or other overnight lodging in addition to any outdoor activity participation. Stays may be as short as a single night, or as long as a few weeks or months.

Though similar, viewer sensitivity may be slightly higher among longer-term recreationists because they are more likely to base their location on existing views and notice changes that might occur during their stays.

Activity Type and Setting

There are a large number of opportunities for recreationists of all kinds within and surrounding the Program Area. Recreational viewers often come to these areas for their aesthetic qualities. Depending on the activity the viewer is participating in, their sensitivity may be slightly more or less acute.

Recreationists participate in activities that can be either described as land-based or water-based. Land-based activities are those which are conducted primarily on land, for example hiking, hunting, and biking. Water-based endeavors, on the other hand, require the use of or proximity to waterbodies. Such activities include swimming, wading, boating, fishing, kayaking, and rafting, to name a few. Generally, viewer groups are most sensitive to changes or disparities in the visual quality within the setting of their particular activity. While viewers may still be aware of visual changes occurring in alternate settings, sensitivity tends to only be average because it is not within the primary focus of their activities.

In addition, recreational viewers engaged in more active, and in particular motorized, recreation, such as playing sports or operating motorboats or all-terrain vehicles (ATVs), are expected to have only an average sensitivity to visual quality and visual changes. Although they are aware of their surroundings, they are usually focused on the recreational activity itself and/or may be quickly transitioning through different areas. People engaged in more passive recreation, such as picnicking, photography, nature hikes, bird watching, or rafting may be more aware of their surroundings and more sensitive to the visual quality. The visual quality is often an important element in their recreation. Some of these viewers would be very sensitive to visual changes if they regularly return to the same place for their recreation. Others, such as first-time or occasional viewers, who would not be as familiar with the views, would not be as apt to notice changes.

Residents

Residents are individuals whose homes are in proximity to waterways in the Program Area that may be subject to Program activities. Viewer sensitivity is particularly high amongst residents because they are likely to value their local visual resources highly, appreciate the visual experience, and be more sensitive to changes in views. For many homeowners and residents in these regions, it is the undeveloped and natural visual qualities which brought them to settle in these areas.

The sensitivity of this viewer group can be attributable to their familiarity with the view, their investment in the area (if they are homeowners or long-time residents), and their sense of ownership of the view. The view from their residences and yards represents a visual extension of their property; any noticeable changes in this view, temporary or long-term, can result in strong positive or negative reactions.

Motorists

Motorists use roadways at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., presence/absence of rain). Motorists who are travelling to simply get from one place to another, for business or pleasure, generally possess low to average visual sensitivity to their surroundings. The passing landscape is not of utmost relevance to these viewers, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Motorists who travel for sight-seeing purposes generally possess a higher visual sensitivity to their surroundings because they are likely to respond to the natural environment with higher regard and as a holistic visual experience.

Viewer sensitivity is moderately low among most roadway travelers within the Program Area. Views of Program activities from roadways are limited, being generally obscured by vegetation or topography. Furthermore, at standard roadway speeds, any views would be of such short duration that roadway users would only be fleetingly aware of these activities.

Commercial Viewers

Commercial viewers are individuals whose place of employment is in proximity to areas where Program activities would take place. This includes recreational facility employees, such as park operators, rafting guides, restaurant and/or shopkeepers in the Program Area, or those who may come into contact with such facilities as part of their work activities (e.g., delivery persons). Viewer sensitivity is moderate among workers because they generally are not highly focused on the visual resources surrounding their workplace, and will be less sensitive to changes in views, especially those that are temporary.

4.6.3 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to aesthetics may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

In the 1994 EIR, both the suction dredging activity itself and associated work and camp sites were found to potentially conflict with natural settings for outdoor activity. The physical presence of the dredging equipment in the waterways, combined with the associated noise and air pollution, were found to generally conflict with other recreational users' aesthetic enjoyment of the area. Similarly, the large campsites and numerous vehicles associated with suction dredging activities were cited as having a potentially adverse effect on visual quality and competing with other visitors for space. However, these visual effects were considered to be of personal perception and were outside the jurisdiction of CDFG to regulate. In addition, the 1994 EIR notes that some National Forests have placed limitations on the number of camps and vehicles along popular suction dredging areas to reduce impacts to natural resources and conflicts between recreational users.

Methodology

The methodology used to assess visual resources impact from the Program includes the following:

1) Objectively identify the visual features (visual resources) within the Program Area.
2) Assess the character and quality of those resources relative to overall regional visual character.
3) Identify the importance to people, or *sensitivity*, of views of visual resources in the viewshed.

By establishing the baseline (existing) conditions, the Proposed Program or other change to the viewshed can be objectively evaluated for its degree of impact. The degree of impact depends both on the magnitude of change in the visual resource (i.e., visual character and quality) and on viewers' responses to and concern for those changes. This general process is similar for all established federal procedures of visual assessment (Smardon et al., 1986) and represents a suitable methodology of visual assessment for other projects and areas. Implementation of the Program was evaluated based on the potential to impact the following viewer groups: recreationalists, residents, commercial viewers, and motorists.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway; or
- Substantially degrade the existing visual character or quality of the site and its surroundings.

Impacts related to light and glare were eliminated from further consideration in the Initial Study and are not discussed further here.

4.6.4 Environmental Impacts

Impact AES-1: Viewer Response to Suction Dredging Activities at the Suction Dredge Site (Less than Significant)

The representative photos in the Figure 4.6-2 illustrate typical suction dredge sites. In Figure 4.6-2, Photos (a) and (b) depict views of suction dredge camps and staging areas for equipment. The vivid colors of the dredge floats, hoses, and storage containers stand out from the natural green vegetation and rock materials surrounding the site. Staging areas such as these may be viewed by motorists on roadways, residents on adjacent properties, or recreationalists using public campsites and picnic areas. Staging areas are less screened from public view because larger clearings are required to load and unload equipment.

Photos (c) and (d) in Figure 4.6-2 depict assembled suction dredges anchored in the stream channel and ready for use. Views to the site and the surrounding setting would be altered by the colorful dredges and anchor ropes crossing the channel. This alteration in visual quality is especially evident in Photo (d) where the two dredges interrupt views of the stream channel. When in use, a viewer may or may not see the dredge operator because he/she is frequently underwater, as shown in Figure 4.6-2 Photo (e) as viewed looking down into the channel. When viewed from standing along the channel bank (like the angle shown in Figure 4.6-2 Photo (d)), the viewer would see water flowing from the back end of the floating dredge rig and perhaps a second operator standing at the rig to monitor the pumps and filtering mechanisms.

A wide range of viewer groups may be in contact with the activity, varying from very sensitive viewers (home or landowners / individuals opposed to suction dredging) to less sensitive viewers (other miners or motorized recreational proponents). However, the majority of views of the suction dredging activity within the stream channel are generally screened from view by riparian vegetation growing within the streambank corridor. Viewer response to the suction dredge and its operation will be variable, depending upon the viewer group in general, and perceptions of individuals within each viewer group.

Overall, the visual effects from the suction dredge for most viewers are short-term and limited (the average duration of suction dredging activities for California residents extend approximately 30 days per year with active dredging occurring an average of 5.24 hours per day; for non-California residents, the average duration of suction dredging activities extend for 33.4 days per year with an average active dredging duration of 5.43 hours per day [Suction Dredger Survey results, Appendix F]). The dredging activity itself is screened from view in many cases. Viewer response is anticipated to be a mix of positive and negative reactions. There are likely to be substantial adverse effects in particular locations with higher numbers of sensitive viewers and more intense dredging activity. However, when considering the relatively small number of dredgers dispersed throughout the state (a maximum of 4,000 permitted dredgers per year under the proposed regulations), and the relatively short percentage of the year that dredging activities would be occurring, adverse visual effects are not considered substantial in the statewide context of the Proposed Program. For these reasons, this impact is considered to be less than significant.

Impact AES-2: Temporary Degradation of Visual Character from Turbidity Plumes Generated by Suction Dredging (Less than Significant)

Turbidity in a stream is a naturally occurring phenomenon that generally occurs during precipitation events in winter months, when high stream flows suspend fine streambed sediments into the water column, causing it to become cloudy and alter the color of the water (usually resulting in brown or grey tinting). Suction dredging in stream channels can generate a plume of similarly cloudy or "turbid" water immediately surrounding and downstream from dredging activities while the dredging is underway. An active suction dredge with an operator controlling the suction nozzle is shown in Figure 4.6-2, Photos (e) through (j). As seen in the photos, turbid water originates from the area where the dredge operator disturbs the streambed (see clouded area extending from left to right in Figure 4.6-2 Photo (e)), and also from tail end of the floating dredge header box (distinct clouded area in Figure 4.6-2, Photos (f), (g), (h), (i), and (j)). In relatively clear streams, a turbid plume of suspended sediments can entirely block views to the bottom of the streambed. This effect is evident in photos (e), (f), (g), and (h) of Figure 4.6-2.

The extent to which dredging generates visible turbidity is related to the composition of streambed substrate (a higher proportion of fine-grained material generally leads to greater turbidity), background turbidity levels in a given water body, the size and number of dredges operating simultaneously, and the duration of the dredging activity. While variable, turbidity plumes generated by suction dredges are generally short-term, persisting during the dredge activity itself and extending for varying distances downstream (between 100 feet to up to one mile downstream) (see Chapter 4.2, *Water Quality and Toxicology.*) The visual intensity of the effect is also related to the scale of the turbidity plume in relationship to the size of the water body (e.g., whether the plume extends across the entire water body or over a small portion of the channel).

Photo a. Suction dredge wash camp. South Fork Yuba River.

Photo b. Suction dredge staging area and equipment. Middle Fork Yuba River.

Photo c. Suction dredge anchored to stream bank and ready for use.

Photo d. Two suction dredge rigs tied together and secured on a rope spanning the river channel.

Figure 4.6-2
Typical Dredge Sites

Photo e. Suction dredge in operation with diver underwater.

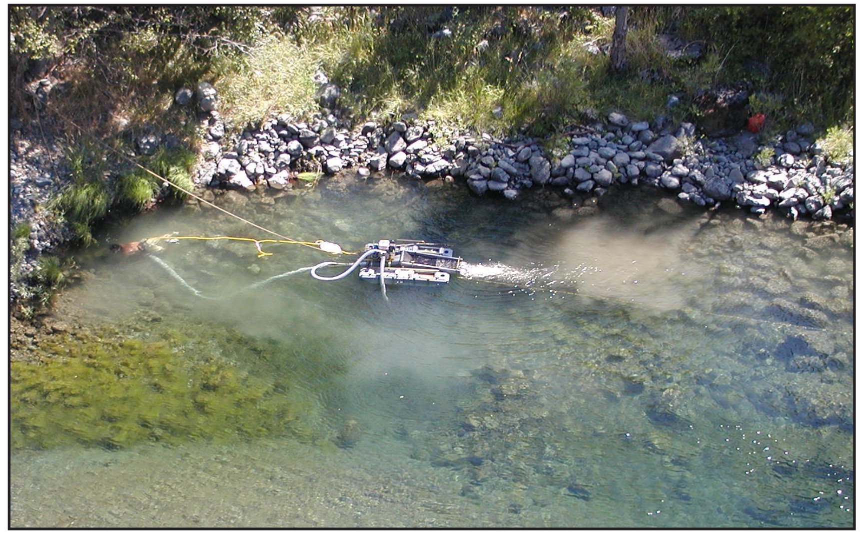

Photo f. Turbidity plume emitting from end of an active dredge, visible on right.

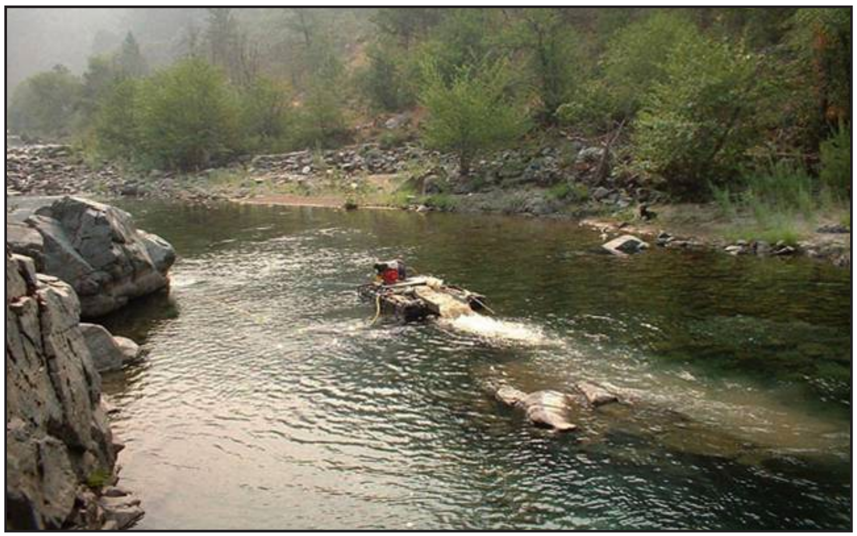

Photo g. Turbidity plume emitting from end of an active dredge, visible on right.

Photo h. Aerial view of an active dredge and resulting turbidity plume, visible on left.

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Figure 4.6-2 (cont.)
Typical Dredge Sites

Photo i. An active dredge.

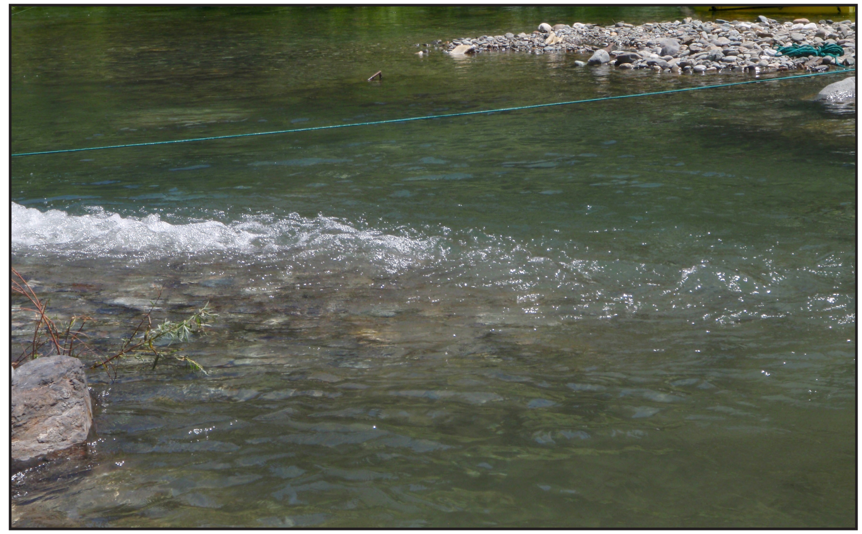

Photo j. Additional (close up) view of discharge from the dredge in Photo (i).

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Figure 4.6-2 (cont.)
Typical Dredge Sites

Though turbidity in stream channels occurs naturally, most suction dredge activities occur during the dry season when stream flows are low and would not naturally cause suspension of stream sediments. In many locations where suction dredging occurs, particularly in high elevation mountain streams, waters are relatively clear during the summer. The large majority of recreational activities also occur during the summer months. Thus, sensitive viewers in the vicinity of suction dredging activities in the summer would be likely to observe distinct changes in water color and clarity as a result of suction dredging activities. However, as stated above, the turbidity plume extends downstream for variable distances and dissipates shortly after dredging activities have ceased. In comparison to the viewshed of the dredging site, the viewer in many cases will likely be minimally affected by color and clarity changes over a small portion of the stream channel.

While there are likely to be substantial adverse effects in particular locations where suction dredging is resulting in more extensive turbidity plumes, the overall impact on most viewers would be short-term and limited. Additionally, the proposed regulations include provisions that will avoid or minimize the potential for generation of turbidity plumes, such as limits on dredge size and prohibitions on dredging in gravel bars or areas with silt and clays. For these reasons, the potential aesthetic impacts are not anticipated to be substantial in the statewide context of the Proposed Program. This impact is considered less than significant.

Impact AES-3: Alteration of Visual Character or Quality, or Scenic Resources, Following Completion of Suction Dredging Activities (Less than Significant)

Scenic resources in the study area may include natural features such as water bodies, vegetation, rock outcrops, and the overall landscape within a viewer's viewshed. Local, state, and federal agencies identify scenic resources and corridors as valuable to residents and recreationalists and enforce policies and regulations to protect these resources. Examples include river reaches protected under the National Wild and Scenic Rivers System and scenic highways designated by the California Scenic Highway Program.

Suction dredging activities as proposed under the Program would alter the physical morphology of the environment within a stream channel, including generation of dredge holes and tailings piles, and potentially movement of large rocks and boulders which serve as visual features. The proposed regulations (Section 228[k]) prohibit alteration to riparian or in-channel vegetation or to the overall channel form or functioning. This section of the proposed regulations also requires that suction dredgers restore the dredge site when ceasing dredge activities (e.g., leveling of tailing piles).

Unauthorized activities have been reported to occur, including dredging into banks, removal of large woody debris, and damage to riparian vegetation from cables used to anchor dredges, which may have long-term visual effects. Additionally, ropes and cables left attached to trees and rocks on the banks, abandoned mining equipment, and trash such as discarded vacuum hoses may be left in the area after dredging activities have ceased. However, visual effects of unauthorized activities are not considered to be substantial overall due to the relatively small number of dredgers believed to engage in such activities.

The extent to which changes resulting from suction dredging and related activities are visible and have adverse effects would be variable, and related to the sensitivity of the viewer group, the duration of exposure, etc. In many cases the duration of effect would be temporary and limited to a particular dredging season, as any residual evidence of dredging in the streambed itself is generally erased by winter storms (see Chapter 4.1, *Hydrology and Geomorphology*). Further, the average recreationalist or motorist (the majority of viewers within designated scenic resource areas) would not notice geomorphic changes remaining in the channel after dredging activities have ceased because they likely are viewing the site for the first time and have no previous reference to compare the pre- and post-dredging conditions of the site. A relatively small number of residential and commercial viewers who are very familiar with the viewshed and suction dredging sites are more likely to recognize geomorphic changes to the area. However, considering that dredging activities will be limited to a group of approximately 4,000 permittees who generally dredge a relatively small portion of the state in areas identified as a scenic resource, the overall viewer response would not be considered substantially adverse.

Visible changes resulting from suction dredging activities may occur in areas considered to be scenic resources, such as a designated Wild and Scenic River reach. However, when conducted according to the requirements of the Program, alterations to the site would not significantly or permanently alter the visual character or quality of the site in comparison with the larger viewshed. Thus, there would be a less than significant impact on scenic resources.

Impact AES-4: Alteration of Visual Character or Quality from Upland Activities Related to Suction Dredging (Less than Significant)

Suction dredging frequently is associated with upland activities such as camping and staging/access. As stated in Chapter 3, *Activity Description,* suction dredge encampments are not substantially different than encampments of other park or waterway users. Many suction dredgers camp in public campgrounds while others camp on private property or on property owned by mining clubs. Suction dredge-related campsites can range from 2 people to larger groups of 10 or more. Campsites in general can include tents, tarps, RV campers, portable toilets and showers, food containers, barbeques, and chairs and tables. Differing from a typical campsite, suction dredge campsites typically include a staging area for equipment (see Figure 4.6-2, Photos (a) and (b)) and large fuel containers and sometimes fuel-powered generators used to operate suction dredging equipment.

There are no known reports of adverse visual effects from staging and access. There are anecdotal reports of adverse aesthetic conditions caused by suction dredge encampments (housekeeping, trash, human waste, etc.) (Sierra Fund, 2009). However, there is no evidence that these conditions are present in a substantial proportion of dredge encampments. There is also no evidence that the general aesthetic character of suction dredge encampments differs from that of campsites in general (considering all types of campers).

As such, there is no information to suggest that suction dredge encampments would result in substantially different aesthetic conditions than those arising from camping in general, or that adverse aesthetic conditions are likely to be present in a substantial number of suction dredge encampments. As described in Chapter 2, CDFG will distribute an informational packet to each suction dredge permit holder to provide “Best Management Practices” advice. This information packet will include guidance on proper site maintenance, equipment storage, and conduct as it relates to suction dredging activities. Finally, management of campsites is overseen by the landowner/manager (public or private), which may implement restrictions limiting aesthetic impacts. For these reasons, this impact is less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities requiring notification under Fish and Game Code section 1602 are likely to result in greater visual disturbances associated with the use of larger nozzle sizes, power winching and water diversion techniques. Such methods could cause adverse effects related to turbidity plumes and displacement of natural features (i.e. boulders), which are likely to exceed the impacts that have been described in the discussion above. Furthermore, dredging in lakes could increase visual intrusions on, or alterations to, areas which would not otherwise be subject to the activity and increase negative viewer responses. Such issues, to the extent to which they could be significant, would need to be evaluated in a CEQA analysis.

In terms of upland effects, activities requiring notification Fish and Game Code section 1602 are likely to remain similar as those described above in Impact AES-3. Activities requiring notification are not anticipated to result in substantially different patterns of equipment storage and camping. However, such issues would be evaluated in a CEQA analysis to ensure that effects remain below the threshold of significance.

Chapter 4.7
NOISE

4.7.1 Introduction

This chapter describes the setting and potential impacts of noise associated with the implementation of the Proposed Program. This section begins with a brief discussion of noise terminology.

Overview of Noise Concepts and Terminology

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, a logarithmic scale is used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called "A-weighting," written "dBA."

Different types of measurements are used to characterize the time-varying nature of sound. Below are brief definitions of these measurements and other terminology used in this chapter.

- **Sound** is a vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, can be detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise** is sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB)** is a unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-weighted decibel (dBA)** is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Maximum sound level (L_{max})** is the maximum sound level measured during the measurement period.
- **Minimum sound level (L_{min})** is the minimum sound level measured during the measurement period.

- **Equivalent sound level (L_{eq})** is the equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy as a time-varying sound level during that same period of time.
- **Percentile-exceeded sound level (L_{xx})** is the sound level exceeded *x*% of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- **Day-night level (L_{dn})** is the energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels during the period from 10:00 p.m. to 7:00 a.m.
- **Community noise equivalent level (CNEL)** is the energy average of the A-weighted sound levels during a 24-hour period, with 5 dB added to the A-weighted sound levels between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels between 10:00 p.m. and 7:00 a.m.

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. Table 4.7-1 presents example noise levels for common noise sources; the levels are measured adjacent to the source.

TABLE 4.7-1. EXAMPLES OF COMMON NOISE LEVELS

Source	Noise Level (dBA)
Weakest sound heard by average ear	0
Whisper	30
Normal conversation	60
Ringing telephone	80
Power lawnmower	90
Tractor	96
Hand drill	98
Bulldozer	105
Chain saw	110
Ambulance siren	120
Jet engine at takeoff	140
12-gauge shot gun blast	165

Source: National Institute of Safety and Health, 2009

4.7.2 Regulatory Setting

Federal

No federal, plans, policies, regulations or ordinances related to noise are applicable to the Proposed Program.

State

The State of California General Plan Guidelines published by the Governor's Office of Planning and Research (2003) provides guidance for the acceptability of different land uses within specific L_{dn}/CNEL contours to assist local agencies in their preparation of general plan noise elements. This guidance is provided in Table 4.7-2. However, it is the responsibility of each local agency, county, or municipality to incorporate these or other noise standards.

Local

A general plan is a legal document required by state law which includes specific goals, policies, standards, and/or implementation programs that constitute the formal policy of the County or municipality for land use, development, and environmental quality. California Government Code Section 65302(f) requires that cities and counties include a noise element in their general plans. The purpose of the noise element is to provide a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise.

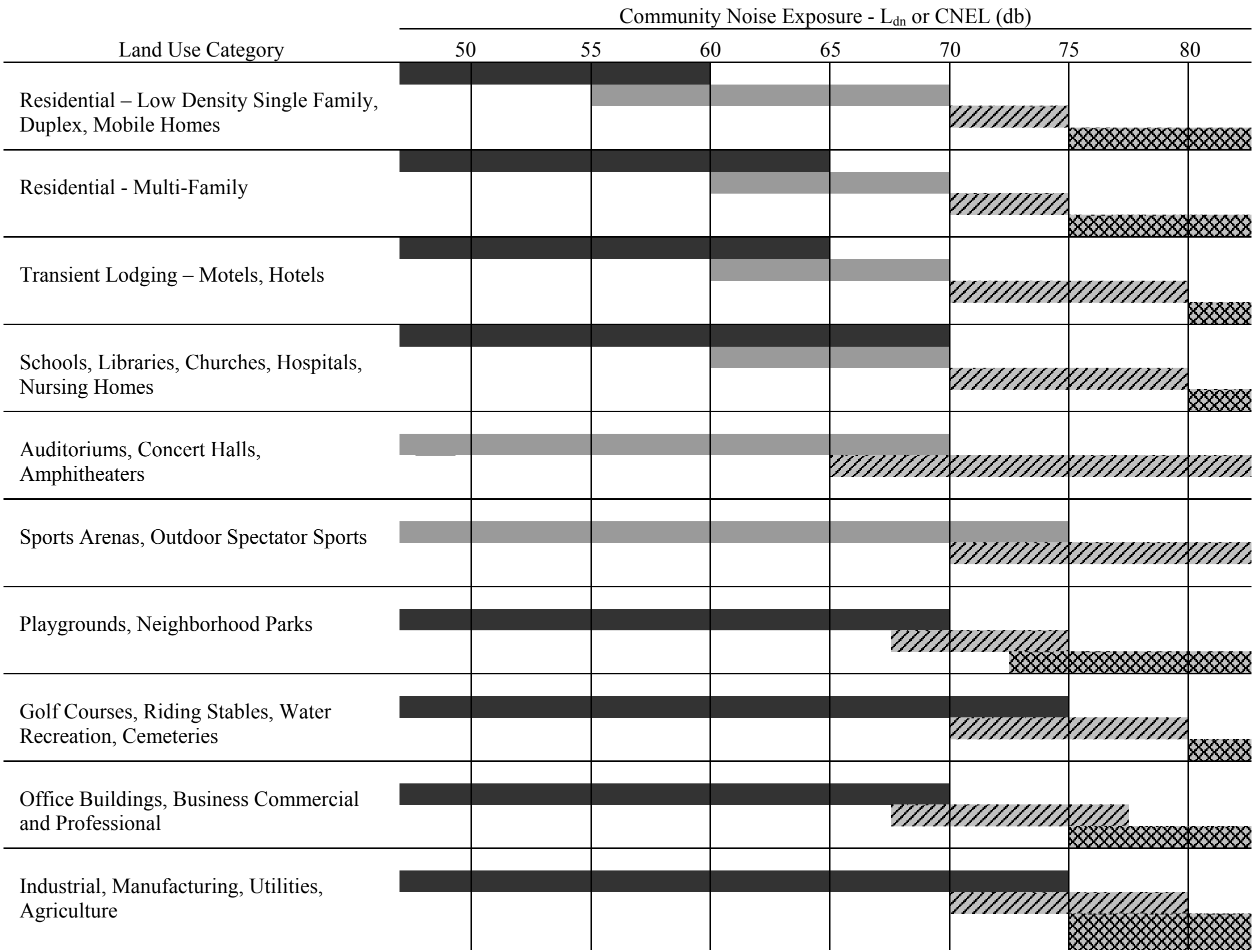
The general plan noise standards may vary throughout the state, depending on local conditions and adopted policies. As an example of such policies, Yuba County's General Plan noise objectives and standards are described in Tables 4.7-3 and 4.7-4.

Table 4.7-3 depicts the noise objectives contained within the Noise Element of Yuba County's General Plan. As shown, the ordinance provides recommended maximum ambient noise levels for several land use categories, including recreational areas. Recommendations are made for both day and night conditions.

Building upon the General Plan, the County adopted ordinance provisions to control unnecessary, excessive and annoying noise and vibration. Chapter 8.29 of the County's Ordinance Code describes noise policies. The ordinance provides definitions and thresholds for noise, and describes special provisions and enforcement of violations. Table 4.7-4 illustrates the County's established baselines and thresholds for noise. In addition, the Yuba County noise ordinance also contains specific regulations on machinery, equipment, fans, and air conditioning noise:

> ***Section 8.20.260 Machinery, Equipment, Fans, and Air Conditioning***
>
> *It shall be unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner as to create any noise which would cause the noise level at the property plane of any property to exceed the ambient noise level by more than five (5) decibels. (#1094)*

TABLE 4.7-2. STATE LAND USE COMPATIBILITY STANDARDS FOR COMMUNITY NOISE ENVIRONMENT



Normally Acceptable Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable New construction or development generally should not be undertaken.

Source: California Governor's Office of Planning and Research, 2003

TABLE 4.7-3. RECOMMENDED AMBIENT ALLOWABLE NOISE LEVEL OBJECTIVES

Land Use Category	7 a.m. – 10 p.m. (day)	10 p.m.-7 a.m. (night)
Low-density residential	50	50
Multi-family residential	55	50
Schools	45	45
Retail/commercial	60	55
Passive recreation	45	45
Active recreation	70	70
Hospitals/mental health facilities	45	40
Agriculture	50	50
Neighborhood commercial	55	55
Professional office	55	55
Light manufacturing	70	65
Heavy manufacturing	75	70

Source: Yuba County, 1994

TABLE 4.7-4. YUBA COUNTY NOISE REGULATIONS

Zone	Time Period	Ambient Level	Maximum Permissible Noise Levels (dBA)
Single-family residential	10 p.m. – 7 a.m. 7 p.m. – 10 p.m. 7 a.m.- 7 p.m.	45 50 55	55 60 65
Multi-family residential	10 p.m. – 7 a.m. 7 a.m. – 10 p.m.	50 55	60 65
Commercial- Business and Professional	10 p.m. – 7 a.m. 7 a.m.- 10 p.m.	55 60	65 70
General Industrial (M-1)	anytime	65	75
Extractive Industrial (M-2)	anytime	70	80

Yuba County Ordinance 8.20.140 - Ambient Base Noise Level

4.7.3 Environmental Setting

This section discusses the existing noise conditions in the Program Area.

Noise Sensitive Land Uses

Sensitive receptors in the Program Area include areas where people reside and/or participate in recreational activities which can be disrupted by unwanted noise. Areas that are adjacent to rivers and waterways where suction dredging activities take place may contain potential sensitive receptors to noise generation.

Given the extent of the Program Area, it is not plausible to identify the specific characteristics of every location that may be affected by the Program; however, a brief generalization of existing noise sensitive areas is provided below.

Recreational Camping and Activity Sites

Public parks and campgrounds, and a number of privately owned and operated campgrounds, may be located adjacent to areas where Program activities could occur. There is a wide range of facility types that may be used by suction dredge miners or located within hearing distance of suction dredge activities.

One end of the spectrum for camp or recreation sites may include remote, undeveloped areas where the only means of access is non-motorized. In these locations, motorized activity of any type is minimal, as it is difficult to transport heavy equipment in these conditions. Facilities such as showers/restrooms and designated camp lots in these types of areas are generally non-existent. Often, one can go for long periods of time without seeing many other individuals recreating in this type of setting. Ambient noise levels are predominantly characterized by the sounds of the natural environment.

As the inverse, highly-developed campgrounds and recreation facilities are also located within the Program Area. These types of areas may be fully accessible with areas for motor-home type camping or include more sheltered cabin or dorm structures. In addition, designated trails, boat or water equipment launching sites, restroom/shower areas, dining facilities, and other amenities may be available. Crowded conditions may be commonplace and may reach extreme conditions during peak seasons. In these areas, ambient noise is influenced by human activities and may fluctuate seasonally.

The majority of recreation sites in the Program Area are comprised of components from both the highly-developed and highly-undeveloped facility characteristics described above. The level of accessibility and types of amenities provided often dictate ambient noise levels, and characteristics (i.e., sources).

Residential Areas

Land uses surrounding the areas where Program activity could take place might include adjacent residential neighborhoods and homes. Residents in less-developed areas are potentially the most sensitive noise receptors within the Program Area, as noise from adjacent waterway activities may be the only significant human activity noise sources affecting these properties. Unlike recreational land uses, which are made up of transient user groups, residences are permanent dwellings. Residents are thus unable or less able to avoid noise from adjacent land uses.

The degree to which sound reaches residents from adjacent areas depends on the type of activity being conducted, distance to residence, and the building materials of the home. Though many counties and cities impose a minimum building setback from waterways to protect life and property, residences may still be subject to loud or continuous noise from area users.

Sensitivity

An individual's reaction to noise is determined by both the noise itself as well as the environment in which the noise occurs. Individuals accustomed to noisy environments or uses of such equipment are less likely to consider engine noise to be intrusive than those who are not. Likewise, the use of suction dredging equipment in areas with low ambient noise levels is more likely to be considered disruptive than usage in areas where noise levels are normally high.

Existing Conditions

As previously mentioned, ambient noise near waterways and recreational areas vary greatly due to local conditions. Many variables, including degree of development (rural vs. urban), proximity and size of nearby transportation facilities (airports, highways, roadways), and the size and characteristics of the waterway itself, can all contribute to the ambient noise level of the area.

A monitoring study of river recreation areas for the El Dorado County River Management Plan Update Draft EIR (1998) is useful in describing typical noise conditions near rivers. To quantify typical noise levels along the South Fork of the American River, continuous hourly noise level measurements were conducted at four sites along the river; near a resort, at a boat launch area, across from a bed-and-breakfast facility, and at an adjacent residence. In addition, short-term noise measurements of local water activities (kayaking, rafting) were taken at a popular turnout.

As stated by El Dorado County, the South Fork of the American River is characterized as being a medium- to low-density developed area. Land uses include a mix of commercial, residential, industrial, agricultural, and recreational uses. Commercial rafting outfitters and small businesses are scattered among private residences and small mining and rock harvesting operations (El Dorado County, 1998). It is important to note that the report focused primarily on non-motorized water recreation. Recorded engine noise was associated with vehicle activity getting to and from the sites.

The noise survey indicated that typical hourly noise levels in the monitoring area was in the range of 50-65 dB L_{eq}. According to the data, noise due to water flow was generally in the range of 48-50 dB. While this is not meant to definitively characterize the entire Program Area, it does provide a general baseline for ambient noise levels where suction dredging would occur. (El Dorado County, 1998)

This information supports the noise thresholds identified in previous reports as discussed in the Literature Review (CDFG, 2009). A 1979 report (Harris, 1979) provided a reference for ambient noise levels associated with natural and wild land settings, which were cited as varying from 25 dB (quiet wetlands) to 75 dB (developed recreation areas). The upper threshold limit identified in the 1979 report is still plausible in recreation areas which experience motorized activity (boats, all-terrain vehicles [ATVs], etc).

4.7.4 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to noise may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;
- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

The 1994 EIR did not make specific findings in this environmental resource area. Instead, noise-related effects were generally discussed as a component of "*Impacts on Recreational Opportunities*." Noise associated with suction dredge activities were generally found to detract from the enjoyment of other recreational users in the vicinity. Such conflicts between recreational users were cited as being outside of the jurisdiction of CDFG and were only discussed in the report for informational purposes. Furthermore, the report concluded that suction dredging is a legitimate recreational activity and is afforded equal rights to use public lands to participate in the activity, so long as it is done in a legal manner.

Methodology

To assess potential noise effects, activities associated with the Program that have a potential to generate noise have been identified as shown below.

Program Noise Sources

Noise associated with Program activities is primarily associated with the use of engines to power the dredge equipment. Noise levels generated by individual suction dredging operations would be dependent on the size and power of the engine and equipment being used. Little information is available on the noise emissions from suction dredge equipment; however the U.S. EPA (1971) identified the following noise levels associated with the operation of small horsepower engines:

TABLE 4.7-5. GENERAL NOISE LEVELS OF SMALL HP ENGINES

Engine HP	Decibel Level at 50 feet
20	76
15	75
10	73
8	72
6	71
5	70

U.S. EPA, 1971

When evaluating the noise effects of multiple sources, typically the loudest source dominates. For two sources that are very close in noise level, they can combine to produce a slightly higher noise level. However, for the purposes of this analysis, it is assumed that the loudest noise source is generally what is heard and has the greatest impact on the noise environment.

Other noise sources could include equipment use at encampments, such as electrical generators. However, these noise emitting devices are not required to conduct suction dredge activity. Instead, they are optional components of recreation and are common to many other types of recreational activities. Therefore, the noise levels associated with the use of such equipment were not quantified, but are anticipated to be similar to the noise levels outlined above.

Due to the overall size of the Program Area and the diverse range of ambient noise levels, potential noise effects are discussed qualitatively at a program level of detail.

Criteria for Determining Significance

- For the purposes of this analysis, the Proposed Program would result in a significant impact if it would: expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; or

- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Other noise impacts were eliminated from further consideration in the Initial Study and are not discussed further here.

4.7.5 Environmental Impacts

Impact NZ-1: Exposure of the Public to Noise Levels in Excess of City or County Standards (Significant and Unavoidable)

Suction dredging activities typically require the use of noise-generating equipment. The level of noise emissions is related to the size, type, and number of equipment being used, though the potential for exceeding noise standards depends on the local ordinances applicable to the particular site. The smallest engine shown in Table 4.7-5 (5 HP), generate 70 db at 50 feet, which would be in excess of many local noise standards, which typically have limits ranging between 60-70 db. That said, numerous other activities may occur in similar settings which also use powered-equipment (i.e. use of a motor boat, ATVs, etc.) and have potential to violate these standards. Even equipment regularly used in residential areas, (eg. ringing telephones and lawn mowers) violates these standards.

Suction dredging activities have potential to generate noise in excess of local noise standards, which would be a significant impact. However, the Program does not authorize permittees to use their equipment in a manner which violates any existing laws, including the creation of noise in excess of existing standards. As such, all recreationists using noise-generating equipment, including suction dredge miners, are equally required to abide by local noise ordinances. Violations can be reported at any time to the local authorities who have the jurisdiction to enforce applicable regulations as appropriate.

Even though local noise standards are outside of the scope of the Program to enforce, the impact cannot be discounted. Therefore, this impact is considered to be significant and unavoidable.

Impact NZ-2: Result in a Temporary Increase in Noise Above Ambient Levels (Less than Significant)

As previously noted, gasoline-powered engines are a primary component of suction dredge equipment. The operation of such noise-generating equipment in the existing environments of the surrounding recreational areas could result in a perceptible increase in noise. Although noise generated from these engines does not differ from those used in motorized boats or other motorized recreational equipment, the manner in which it is operated may distinguish suction dredging from other activities. As described in Chapter 3, suction dredge activities are generally stationary and equipment is often operated for extended periods throughout the day (just over 5 hours per day on average for both California resident and non-California resident permit holders [Suction Dredger Survey results, Appendix F]).

The extent to which the noise from suction dredging is perceptible is variable based on the ambient noise environment, which is affected by the other uses in the vicinity and the noise generated by the river itself. As previously shown in Table 4.7-5, noise levels of small horsepower engines are typically within the range of 70 dBA at close proximity (50 ft). Table 4.7-6 below further illustrates the estimated noise level associated with a 5 and 20 HP engine and distance from the source. Smaller engines generate somewhat lower noise levels (see Table 4.7-5).

TABLE 4.7-6. ESTIMATED NOISE LEVELS AND DISTANCE USING A 5 AND 20 HP ENGINE

Distance between Source and Receiver (ft)	Estimated Sound Level, Leq (dBA) with 5 HP Engine	Estimated Sound Level, Leq (dBA) with 20 HP Engine
50	70.0	76.0
100	68.3	74.3
200	64.9	70.9
300	61.6	67.6
400	58.2	64.2
500	54.8	60.8
600	51.5	57.5
700	48.1	54.1
800	44.7	50.7
900	41.4	47.4
1,000	38.0	44.0

U.S. EPA, 1971

Given that the general baseline of noise associated with water flow is within the range of 48-50 dB L_{eq} (El Dorado County, 1998), at close range and without any other noise contributors, suction dredge activities would be highly evident above the river noise. That said, the degree to which noise from suction dredging operations are perceptible is highly dependent on the existing ambient noise levels.

As the distance between the receptor and the engine source becomes greater, the estimated sound level observed from the dredging equipment decreases. As a conservative example, the estimated sound level from a 20 HP engine at a distance of 100 ft is approximately 74 dBA, which generally decreases by 10 dBA for every additional 300 ft. Therefore, in highly developed recreation areas where ambient noise levels can reach 75 dB (Harris, 1979), noise associated with the use of a 20 HP engine would not be highly noticeable beyond 100 ft of the suction dredge activity. This relationship is illustrated in the Figure 4.7-1, below.

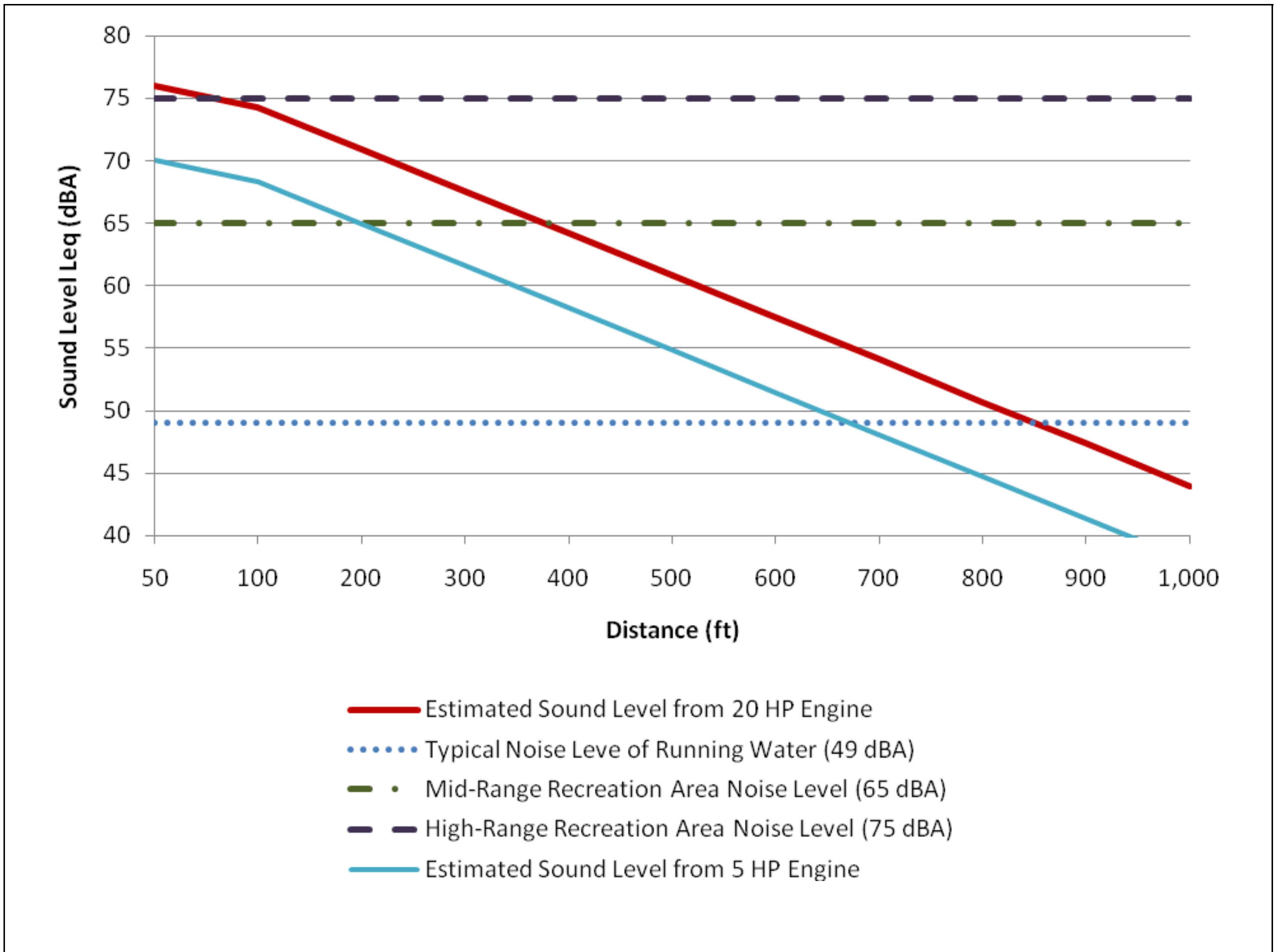


FIGURE 4.7-1. RELATIONSHIP BETWEEN NOISE LEVELS, DISTANCE, AND AMBIENT NOISE

Based on the assumption that typical ambient noise levels in recreation areas where suction dredging would occur are in the range of 50-65 dB L_{eq} (El Dorado County, 1998), noise associated with suction dredge equipment would remain within 3 dBA (just perceptible) within 300-700 ft of the activity location. Beyond 700 ft of the source, suction dredging noise would not be highly evident.

Therefore, engine noise is expected to be most apparent within 700 ft of suction dredging locations, and although temporary, this stationary source of noise may affect sensitive receptors. Receptors, both permanent (residents) and temporary (recreationists), are anticipated to experience varying levels of sensitivity towards the activity, partially guided by the relative increase in ambient noise level and/or duration of exposure. Sensitivity may be attributable to their personal views of the activity, their goals for recreation, and the importance that is attached to the existing ambiance. For example, other Program participants may not notice one another while recreating in the same river location, though a hiker seeking a quiet nature experience may find the noise of an engine out in the distance (beyond 1,000 ft) extremely disruptive.

Another potential source of noise generation associated with suction dredge activities is the use of generators for power at remote camp locations. However, this type of equipment is commonly used by campers in general, and noise generated specifically from suction dredge miners would not be substantially different or greater than that generated by other campers.

In summary, suction dredging would cause temporary increases in noise above ambient levels. The degree of increase would be highly dependent upon the ambient noise environment and distance from the suction dredging activity. It is likely that in certain instances, this increase would have the potential to adversely affect receptors, particularly those sensitive to increases in noise (e.g., residents, those seeking a quiet nature experience). However, this impact is not considered substantial overall due to the relatively small number of instances where these impacts are anticipated to occur, given the relatively small number of dredgers statewide, and the numerous other sources of noise that can be found in the riverine environment. This impact is therefore considered to be less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities requiring notification under Fish and Game Code section 1602 are likely to result in additional noise disturbances associated with the larger engine sizes used to power dredges equipped with nozzle sizes greater than 4 inches. However, the discussion above for Impact NZ-2 includes analysis of engines sizes up to 20 HP, which likely encompasses the entire range of engine sizes used to power the vast majority of dredge operations, including those requiring 1602 notification. As described in the impact section above, such effects are considered to be less than significant and no further discussion is required for operations using engines powered up to 20 HP. However, noise effects associated with the proposed use of engines above 20 HP may contribute to additional adverse effects. The extent to which they could be significant would need to be evaluated in a CEQA analysis.

Similarly, the use of engines associated with winching equipment could introduce additional noise emissions beyond the scope of the analysis provided in this SEIR. Even if the proposed activity employs engines with no greater than 20 HP, the use of multiple engines may increase noise emissions at the dredging location. Furthermore, dredging in lakes could result in greater effects on sensitive receptors as such areas generally exhibit lower ambient noise levels, whereby engine noise would be more readily apparent and disruptive. Therefore, such activities requiring notification under Fish and Game Code section 1602 may contribute to additional adverse effects. The extent to which they could be significant would need to be evaluated in a CEQA analysis.

Chapter 4.8
RECREATION

4.8.1 Introduction

This chapter presents an overview of recreational activities in the Program Area, and impacts related to the Proposed Program. Due to the size of the Program Area, this section focuses primarily on the publically-open lands as managed by city, state, and federal agencies; however, privately-operated and owned areas are briefly discussed.

4.8.2 Regulatory Setting

U.S. Forest Service's National Forests

The U.S. Forest Service manages the National Forests under the direction of approved land and resource management plans (also known as "forest plans") as required under Section 6 of the Forest and Rangeland Renewable Resources Planning Act (Resources Act) of 1974 (U.S. Forest Service, 2004). The Resources Act requires that the U.S. Forest Service: 1) establish guidelines (i.e., planning rules) that set up the process for the development and revision of land management plans; and 2) develop, maintain, and, as appropriate, revise integrated management plans for each national forest unit (U.S. Forest Service, 2009a; 2004).

Land and resource management plans must comply with the following goals of the Resources Act:

- Consider the economic and environmental aspects of various systems of renewable resource management to provide for outdoor recreation, range, timber, watershed, wildlife, and fish;
- Provide for diversity of plant and animal communities based on the sustainability and capability of the specific land area in order to meet overall multiple-use objectives;
- Allow for the research and evaluation of the effects of each management system to prevent substantial and permanent impairment of the land's productivity;
- Permit increases in harvest levels based on intensified management practices, such as reforestation, in accordance with the Multiple-Use Sustained-Yield Act of 1960;
- Ensure that timber is harvested from National Forests only where the designated conditions are met; and
- Ensure that clearcutting and similar activities will be used only in certain circumstances (U.S. Forest Service, 2004).

The land management plan provides strategic management direction for the overall management of a National Forest. Supplemental resource management plans may also be prepared to provide more specific direction on actions or protective measures that will be taken for a particular resource. For example, a water quality resources management plan may provide specific projects or best management practices that the U.S. Forest Service will implement to improve or protect water quality in a particular forest over the next 15 years. However, all resource management plans must be consistent with the applicable land management plan (U.S. Forest Service, 2004).

National Landscape Conservation System

In the year 2000, the Secretary of the Interior officially recognized certain specially designated public lands as part of a newly created National Landscape Conservation System (NLCS). The NLCS includes 880 special areas that are designated as Wild and Scenic Rivers, National Conservation Areas, Wilderness Areas, and National Historic and Scenic Trails, among others. These areas may be managed by one or more state or federal agencies including the Bureau of Land Management (BLM), National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service (USFWS), and the State of California Department of Water Resources, Department of Fish and Game, or California Department of Parks and Recreation (CDPR). However, as nationally recognized public lands, they are similarly managed to conserve, protect, and restore nationally significant landscapes recognized for their outstanding cultural, ecological, and scientific values. (BLM, 2009a)

California State Parks

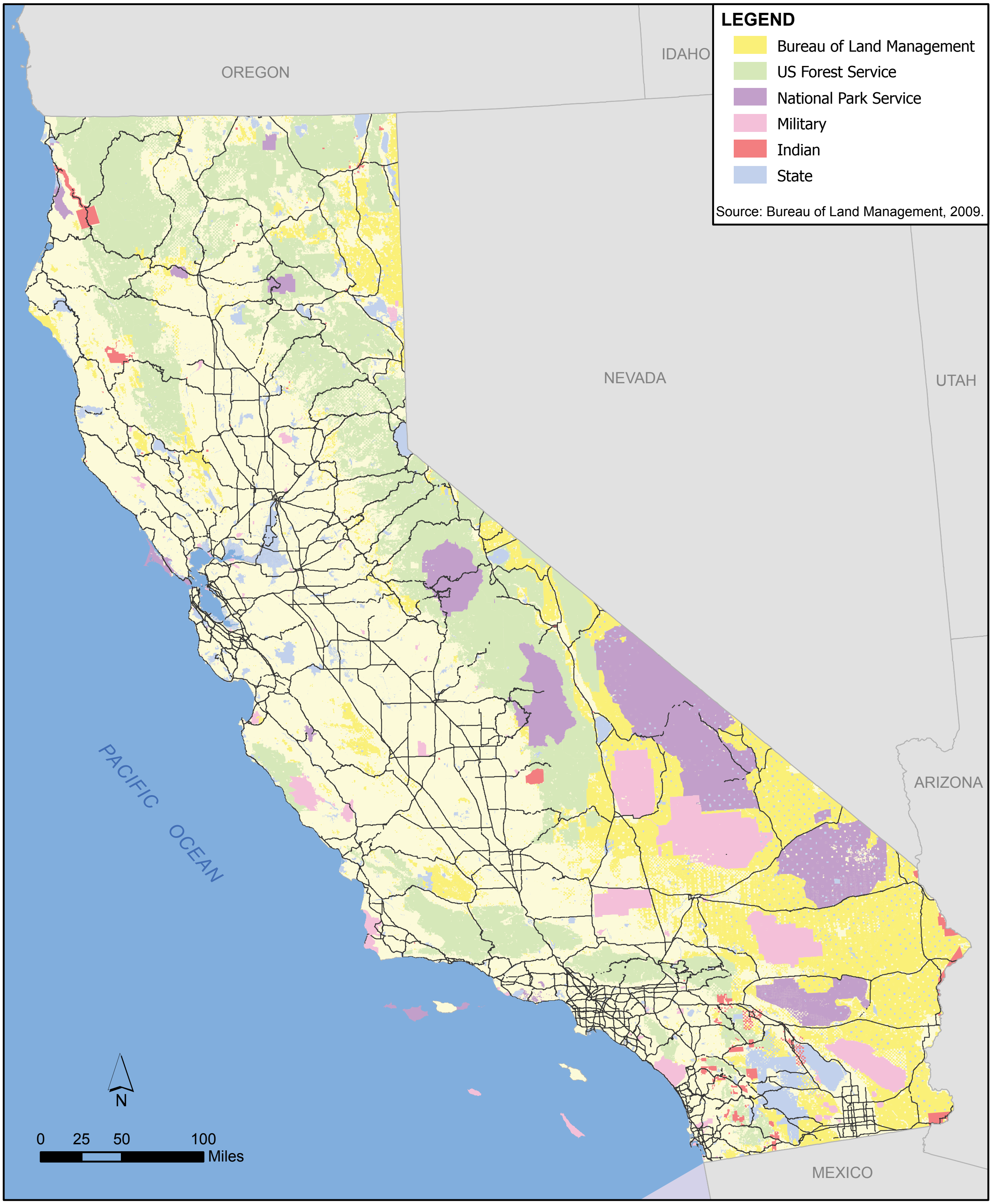
California State parks are broadly administered under the State Park System Plan, a state-wide planning document which identifies programs and initiatives based on California's future trends and needs. More focused detailed planning is provided by "general plans" for individual parks. These general plans direct the long-term development and management of park areas through policy and program guidance. An approved general plan must be in place for the State Park prior to the development of any major park facilities. (California State Parks, 2010a)

4.8.3 Environmental Setting

Opportunities for the enjoyment of recreational activities in California are available within lands owned by federal, state, and local governments and on privately owned land. Figure 4.8-1 illustrates the federal, state, and private recreational land ownership throughout the state of California (BLM, 2009b). Most recreational lands are federally owned and managed by the U.S. Forest Service or the BLM. The sections below further describe the types of recreational lands in California and the recreational activity types and frequencies.

National Forest Areas of California

Eighteen National Forests are located in California and comprise approximately 20 million acres. These National Forests are located in the North Coast, Cascade, and Sierra Nevada ranges and from Big Sur to the Mexican border in the south Coast range (U.S. Forest Service, 2009b). Typical recreational opportunities available in California's National Forests may include but are not limited to: hiking, mountain biking, rock climbing, picnicking, a wide variety of beach and water sports, horseback riding, cycle touring, wildlife watching, skiing,



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Horizon WATER and ENVIRONMENT

Figure 4.8-1
Recreational Lands in California

snowboarding, ice skating, sledding/tubing, snowmobiling and snowshoeing (U.S. Forest Service 2010).

Table 4.8-1 summarizes the acreage and average visitation totals for each forest. National Forest areas range in size from approximately 568,634 up to 2,813,997 acres (U.S. Forest Service, 2009c). The Lake Tahoe region (which includes both the Lake Tahoe Management Unit and the Tahoe National Forest) had the greatest number of visitors during 2000-2004.

TABLE 4.8-1. SUMMARY OF CALIFORNIA NATIONAL FOREST STATISTICS

National Forest	Total Acreage (NFS and related other acreage)	Estimated National Forest Visits (2000-2004)
Angeles	694,175	3,226,000
Cleveland	568,634	1,262,000
El Dorado	887,643	2,201,000
Inyo	1,940,766	4,229,000
Klamath	1,886,725	536,000
Lake Tahoe	1,239,729	3,217,000
Lassen	1,375,593	783,000
Los Padres	1,963,836	1,507,000
Mendocino	1,079,850	281,000
Modoc	1,979,327	108,000
Plumas	1,400,902	947,000
San Bernardino	823,816	1,756,000
Sequoia	1,193,315	1,657,000
Shasta-Trinity	2,813,997	2,763,000
Sierra	1,412,801	1,872,000
Six Rivers	1,118,247	392,000
Stanislaus	1,090,039	1,734,000
Tahoe	1,239,729	3,932,000

Sources: U.S. Forest Service 2006, 2009c.

California State Parks

The California State Park system includes several categories of parks, including state parks, beaches, historic parks, recreation areas, natural reserves, vehicular recreation areas, historical monuments, and state seashores. The specific number or type of areas within the State Park system may vary year to year as areas are added, reclassified, removed, or combined. Table 4.8-2 provides a summary of the total areas, facilities, and visitor attendance during the fiscal years 2001 through 2008.

Generally, the total number of properties and total acreage of the State Park system increased from 2001-2008 while the total visitor attendance declined. The total length of river waterfront areas within the State Park system was approximately 328 miles in fiscal year 2007/2008 (CDPR, 2009).

TABLE 4.8-2. DATA FROM CDPR'S THE CALIFORNIA STATE PARK SYSTEM STATISTICAL REPORT 2001– 2008

Fiscal Year	Total # of Properties	Total Acreage (total miles of river frontage)	Available Campsites		Non-camping overnight facilities*	Total Attendance	Attendance Breakdown	
			*Individual**	*Group*			*Day Use*	*Camping*
01/02	266	1,433,096.0 ac (292.1 mi)	15,142	227	590	85,537,217	78,619,687	6,917,530
02/03	273	1,460,697.0 ac (319.56 mi)	14,823	230	590	82,784,064	75,822,775	6,961,289
03/04	277	1,488,342.1 ac (316.34 mi)	14,795	262	583	82,028,457	75,015,737	7,012,720
04/05	278	1,505,571.9 ac (325.60 mi)	14,343	272	601	77,079,564	71,007,189	6,072,375
05/06	278	1,556,426.22 ac (326.6 mi)	14,187	258	621	76,130,726	69,479,605	7,130,121
06/07	278	1,556,426.22 ac (327.2 mi)	14,264	262	643	79,828,629	71,807,812	8,020,817
07/08	278	1,560,623.2 ac (327.99 mi)	13,542	321	645	79,967,354	72,189,693	7,777,661

*=decreases from 01/02 data due to errors in previous year's estimates, not actual losses in available sites.

Sources: CDPR 2003, 2005a-b, 2006a-b, 2007, and 2009.

During the most recent year for which information is available (i.e., the 2007/2008 fiscal year), the California State Park system included a total of 278 areas (CDPR, 2009). The size of individual areas in the system ranged from 0.11 to 584,170 acres, at the Watts Tower of Simon Rodia State Historic Park and the Anza-Borrego Desert State Park, respectively. During this time period, total annual visitor attendance was greatest (e.g., an estimated 6,490,800 visitors) at the Old Town San Diego State Historic Park (CDPR, 2010b). Some parks do not record the number of visitors because of their small size, expected low visitation rate, or budget restrictions (CDPR, 2009).

Potential recreation activities allowed within the state parks include but are not limited to: picnicking, camping, hiking, participation in interpretive or education programs, observation of cultural and historic resources, boating, swimming, kayaking, rafting, fishing, wildlife viewing, and the riding of off-highway motor vehicles. The recreation opportunities available may differ between the various state park areas, depending on the facility type, resources, location, and other factors.

Lands with Special Designation

As previously described, there are several different types of specially designated lands in the National Landscape Conservation System. While these areas vary in location, size, and setting, they are all recognized for their outstanding resources and are managed in such a way as to protect and enhance these features. Unless otherwise noted, the following information was obtained from the Bureau of Land Management's website *The National Landscape Conservation System* (BLM, 2010).

Wild and Scenic Rivers

Over 1,973 miles on 23 rivers are designated as Wild and Scenic in California. This national designation was created in 1968 by Congress to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for existing and future generations. Rivers may be classified as wild, scenic, or recreational. Regardless of classification, each designated river is managed with the goal of protecting and enhancing the values that caused it to be designated. While designation does not prohibit development or designate the federal government or other agency control over private property in the area, it does allow for stewardship through programs of federal, state, and tribal entities. A key aspect of the designation is the restriction on federal actions or developments which would restrict flows to these rivers (dams, etc). (USFWS, 2007a)

National Conservation Areas

Congress bestows this designation to areas which feature exceptional natural, recreational, cultural, wildlife, aquatic, archeological, paleontological, historical, educational, and/or scientific resources. Similar to Wild and Scenic Rivers, these National Conservation areas are managed with the goal of conservation, protection, enhancement, and benefit and enjoyment of present and future generations.

Nearly 26 million acres are included in the California Desert and the King Range National Conservation areas of California (BLM, 2005). This acreage represents the total land area within the conservation area, and may be owned or managed by one or more state, federal, or private entities. The King Range National Conservation Area was established in 1970 and encompasses the coastline area between the Mattole River and the Sinkyone Wilderness State Park, and is better known as the Lost Coast. Designated in 1976, the California Desert Conservation Area encompasses nearly 25 million acres in southern California, extending from northwest of the City of Ridgecrest south to El Centro. This large expanse of area includes sand dunes, canyons, 90 mountain ranges, and over 65 wilderness areas (Center for Biological Diversity, 2010).

Wilderness Areas

The Wilderness Act requires that areas designated or considered for wilderness preservation must possess several special characteristics including an existing good natural condition, offer outstanding opportunities for solitude or primitive and unconfined recreation, and being at least 5,000 acres or greater in size. In California alone, the U.S. Congress has designated 82 wilderness areas in California, totaling over 3.8 million acres (BLM 2009a). This is about 3.7% of the land acreage of California. According to the BLM, these areas are places of solitude where people can experience freedom from society and renew the human spirit through association with the natural world. These areas are managed in such a way to maintain these qualities for existing and future generations. Mechanized equipment, including suction dredging equipment, is not allowed in these designated areas.

Other National Areas

Historic and Scenic Trails

Another component of the National Landscape Conservation System includes areas designated as National Historic and Scenic Trails. National Historic Trails are extended pathways that closely follow a historic trail or route of travel of national significance. Historic designation identifies and protects historic routes, historic remnants, and artifacts for public use and enjoyment. National Scenic Trails, on the other hand, provide maximum outdoor recreation potential and promote the conservation and enjoyment of the various qualities of the areas they pass through.

Three National Historic Trails (the California, Juan Bautista de Anza, and Old Spanish trails) and one Scenic Trail (the Pacific Crest trail) are located in California and total approximately 580 miles.

National Monuments

National Monuments are protected historic landmarks, historic and prehistoric structures or other objects of historic or scientific interest, as designated by Congress or the President. Currently, there are three designated national monuments in California: the Carrizo Plain, Santa Rosa/San Jacinto Mountains, and the California Coastal national monuments. Each area specifies the permitted recreational activities that are allowed in national monument areas, in addition to other management strategies, such as livestock grazing. For example, while camping, hiking, biking, horseback riding, and hunting activities are allowed in the Carrizo Plain Monument, the area is withdrawn from any new mineral entry.

Forest Reserves and Outstanding Natural Areas

The Headwaters Forest Reserve, located in Humboldt County, is the only designated forest reserve in California. This 7,400 acre area has been set aside to protect and preserve the ecological and wildlife values of the old-growth redwood and stream systems which provide habitat for the marbled murrelet and coho salmon species. The area is open for day use only and recreation is limited to passive activities on trails; more intensive recreational activities (motorized access, hunting, vegetation gathering, and swimming) are not allowed.

Similarly, there is one designated Outstanding Natural Area in California: the Piedras Blancas Light Station. Situated on the central coast, just north of San Simeon, this area provides only limited, scheduled access to tour the lighthouse and the public is not allowed on wetlands, intertidal zones or other sensitive areas in the Area.

Other Recreational Areas

Recreational opportunities are also available on privately-owned lands or lands owned by local agencies such as cities and counties. Potential recreation activities that may occur on private lands include but are not limited to: hunting, fishing, concerts, camping, swimming, boating, bird watching, hiking, golf, and wine-tasting. Private land owners generally are responsible for the management of their recreation areas but may provide recreational opportunities to the public with the assistance or cooperation of federal and state agencies. As an example, the U.S. Forest Service's Pacific Region provides financial and technical assistance to private organizations through its State & Private Forestry (S&PF) program to help protect forest resources and assist landowners in practicing good quality land management (U.S. Forest Service, 2009b).

In addition to private lands, local agencies such as counties and cities provide and manage park and recreation resources in accordance with the applicable general plan(s) and policies. Recreational opportunities offered by local agencies may include parks, recreation centers, and organized group activities, such as softball or soccer leagues. As an example, Yuba County utilizes a Parks Master Plan to guide park development, identify necessary recreational facility improvements, and provide a set of goals and objectives that can be used to evaluate any new future projects (Yuba County, 2008).

Recreational Activities and Participation in California

California provides nearly endless recreational possibilities. For the purposes of this evaluation, activity types are grouped into two categories: those which are land-based, and those which are water-based. The activities within these categories are further grouped as being either motorized or non-motorized, as discussed below. While other recreational activities may take place in the Program Area, these two categories and the associated recreational activities comprise the primary forms of recreation that may affect, or be affected by, implementation of the Program.

Land-Based Recreation and Participation

Land-based recreational activities are those which occur primarily on land. These activities may include the use of motorized equipment, for example; all-terrain vehicle (ATV) uses and recreational vehicle (RV) camping. Non-motorized land based activities include camping, hiking, picnicking, horse-back riding, and wildlife or scenery viewing.

National surveys for recreational participation as coordinated by the U.S. Fish and Wildlife Service are shown in Table 4.8-3. As shown in the table, there were over 3 million participants in hunting and wildlife viewing activities in 2006. While hunting participation has declined by 45% since 1996, the number of wildlife watchers has remained steady.

TABLE 4.8-3. USFWS NATIONAL SURVEY OF FISHING, HUNTING, AND WILDLIFE-ASSOCIATED RECREATION IN CALIFORNIA (IN YEARS 1996, 2001, 2006)

Year	Fishing		Hunting		Wildlife Watching*		Total**
	Total Participants	*Average days per year*	*Total Participants*	*Average days per year*	*Total participants*	*Average days per year*	
1996	2,722,000	14	515,000	14	2,362,000	10	7.1 million
2001	2,444,000	11	274,000	13	2,270,000	10	7.2 million
2006	1,730,000	11	281,000	12	2,894,000	16	7.4 million

*= Includes only participants who travel and/or overnight for activity.
**= Total also includes wildlife watchers who participate within 1 mile of residence and are not included in the wildlife watching column. In addition, the total does not double-count recreationists who participated in more than one wildlife-related activity.

Source: USFWS 1998, 2003, and 2007b

On average hunters and wildlife viewers spent between 12 and 16 days per year participating in these activities in California. This corresponds with the National Sporting Goods Association (NGSA) survey which indicated that the average number of days for overnight camping was 13.42 in 2007 for California (NGSA, 2008).

Water-Based Recreation and Participation

Recreational activities that are water-based include those which occur on or along the inland waterways of California. Depending on the specific equipment requirements of the activity, water-based recreation may include the use of mechanized devices powered by motors or engines. Such activities include boating, suction dredging, and personal water-crafting. Non-motorized water recreation includes activities such as fishing, snorkeling or SCUBA diving, kayaking, rafting, and swimming.

Long-term data from the National Survey on Recreation and the Environment indicates that lakes, rivers and streams have always been of interest to recreationists and pressure on these resources is expected to continue to grow over time. Nationally, canoeing/kayaking has grown nearly tenfold since 1960, from 2.6 million to 27 million. During the same period in California, the percentage of the state's population participating in the following activities at least once during the year includes: swimming in lakes and streams (37.9%), visiting other watersides (besides beaches) (24.5%), viewing and photographing fish (22.1%), boat tours or excursions (20.1%), coldwater fishing (13.8%), anadromous fishing (5.7%), rafting (7%), canoeing (4.3%), and kayaking (4.4%) (Cordell, 2004). Additionally, the USFWS National Survey data indicates that on average, just over 2 million participants fished in California each year between 1996 and 2006 (see Table 4.8-3).

Oftentimes suction dredging and similar mining activities are not included in recreational surveys. However, suction dredging is a self-described recreational activity. CDFG conducted a survey of suction dredge mining operations during the development of this SEIR. The survey and a summary of results are presented in Appendix F, and the following conclusions are presented here:

- Of the in-state permit holders, approximately 82% of those surveyed identified themselves as “recreational” miners, while approximately 74% of out-of-state permit holders identified themselves as such;
- Approximately 72% of California-resident permit holders reported that they typically drove off paved roads to access dredging sites, of which 87% indicated that they used a car or truck in doing so. A smaller percentage of non-Californian permit holders typically drove off paved roads (68%); though of those who did, a similar percentage used a car or truck;
- Nearly three quarters of in-state respondents indicated that they stayed overnight when dredging, whereas nearly all out-of-state respondents (98%) reported doing so;
- When staying overnight, the majority of respondents stayed in either developed or undeveloped campgrounds. Both resident and non-resident permit holders indicated that of the developed campgrounds, State and privately-owned campsites were used most; whereas for undeveloped camp locations, federally-owned campgrounds were the most highly frequented; and
- California resident permit holders reported taking numerous short trips (averaging 14.69 trips and 30.06 total days dredging); whereas non-resident permit holders reported less frequent, but longer yearly trips (averaging only 4 trips and a total of 33.39 dredging days).

Additionally, suction dredge mining participation in California can be evaluated from the records of permits issuance by CDFG. As previously detailed in Chapter 3, there was a dramatic spike in the number of permits issued between 1980 and 1981, with a steady decline thereafter. The most recent data indicates that permit issuance is similar to 1976 levels, and the proposed regulations would establish a maximum permit issuance of 4,000 per year. The Suction Dredger Survey also indicated that the locations most visited for suction dredging include Siskiyou, Sierra, and Plumas counties (Chapter 3, Table 3-3). As shown in Figures 3-5 and 3-6 in Chapter 3, the greatest intensity of dredging for in-state permit holders occurred in the Yuba, and Feather rivers, whereas out-of-state permit holders most frequented the Klamath River.

4.8.4 Impact Analysis

The methodology described below accounts for activities conducted in accordance with the proposed regulations contained in Chapter 2. Additional or more extensive impacts related to recreation may result for those suction dredge activities requiring notification under Fish and Game Code section 1602. Notification is required for the following activities:

- Use of gas or electric powered winches for the movement of instream boulders or wood to facilitate suction dredge activities;

- Temporary or permanent flow diversions, impoundments, or dams constructed for the purposes of facilitating suction dredge activities;
- Suction dredging within lakes; and
- Use of a dredge with an intake nozzle greater than 4 inches in diameter.

A general description of how such activities requiring Fish and Game Code section 1602 notification would deviate from the impact findings are described at the end of the impact section below.

Findings of 1994 Environmental Impact Report

The 1994 EIR found that conflicts between suction dredgers and other recreational users were generally outside of the jurisdiction of CDFG and were only included for informational purposes. The 1994 report considered the effects of suction dredging on two forms of recreation: rafting and fishing. Both rafting and fishing participants were found to experience a high degree of conflict with suction dredging. For rafters, conflicts arise from noise, engine exhaust, and physical presence of dredges in the waterway. Fishing participants are additionally disturbed by access barriers (intimidation, lack of parking, equipment conflicts), safety issues (dredge holes), and localized effects on fish (turbidity, disturbance). However, the report concludes that suction dredging is a legitimate recreational activity and is afforded equal rights to use public lands to participate in the activity, so long as it is done in a legal manner.

Methodology

This section describes the methods used to determine the Proposed Program's impacts and lists the thresholds used to conclude whether an impact would be significant. Impacts of the Proposed Program are evaluated qualitatively, based on the potential for the Program to disrupt existing recreational access and uses. Generally, short-term loss of recreational opportunities can occur by disrupting use of, or access to, recreation areas or facilities. A long-term effect could occur if a recreational opportunity is eliminated as a result of implementation of the Proposed Program.

The methodology used to assess recreation resource impacts from the Program include the following:

1) Identify potential recreational resources throughout California with a focus on recreational activities near or within potential suction dredge mining areas;
2) Assess the quality of those resources; and
3) Identify the importance to people, or sensitivity, of recreational resources in the Program Area.

By establishing the baseline (existing) conditions, the Proposed Program and any resulting change to the recreation activities and facilities can be objectively evaluated for its degree of impact. The degree of impact depends both on the magnitude of change in the recreational resource (i.e., quality) and on recreationists' responses to and concern for those changes. Implementation of the Program was evaluated based on the potential to impact other recreational groups. Impacts on recreation related to aesthetics, noise, hazards, etc. have been addressed in those respective chapters.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would:

- substantially degrade the quality of recreational resources or experiences;
- alter the use of existing recreational facilities such that substantial physical deterioration of the resource would occur; or
- substantially change the availability of recreational resources in the vicinity of the project site.

4.8.5 Environmental Impacts

Impact REC-1: Effects on the Quality of Recreational Resources or Experience (Less than Significant)

Interpersonal or social values related conflicts may arise between suction dredge mining activities and other recreational uses in the Program Area. As described above, diverse recreational uses may occur near or within the Proposed Program Area and may include land-based, water-based, motorized, or non-motorized activities. Interpersonal conflicts between these recreational uses may occur if the physical presence or activities of a group interfere with the goals of another group (e.g., snowmobilers and cross-country skiers) (Bernell et al., 2003). Social value related conflicts may occur if individuals or parties of recreationists do not share the same lifestyle and opinion about the kinds of activities and behavior that are appropriate in wildland recreation areas (e.g., a tent camper in proximity to RV campers) (Bernell et al., 2003). Generally, the main conflicts between recreation groups occur between those who participate in "human-powered" activities and those who prefer motorized activities (Bernell et al., 2003).

The degree of conflict that may occur between suction dredge mining activities and other recreational uses varies widely between user groups that might be exposed to the Proposed Program's activities, and is largely based on personal perception of the activity. Suction dredge mining activities are motorized activities that involve both water-based (i.e., suction dredging) and land-based (ex., overnight camping) components. Thus, suction dredging activities may create a greater perceived conflict for recreationists who participate in non-motorized or "human-powered" activities (ex., hiking, rafting, fishing) than for recreationists participating in other "motorized" activities (ex., power boating) in the Proposed Program Area. Similarly, other recreationists may degrade or conflict with the recreational experience of the suction dredge miners. As an example, in Oregon's waterways, most conflicts between other recreationists and suction dredge miners were related to noise, level of development, degraded ecological conditions, and differences in social values (Bernell et al., 2003). Based on anecdotal reports, suction dredge mining can also serve as a source of interest and a compatible recreational use for other recreationists. On the other hand, the physical presence of miners may result in interpersonal conflicts with other recreationists, such as boating safety hazards. However, in the study conducted in Oregon, this was not the cause of most conflicts (Bernell et al., 2003). Overall, the

Proposed Program's potential impacts on the perceived quality of recreation resources or recreation experience of recreationists in the Program Area are anticipated to encompass a range, from adverse to beneficial.

As discussed above, some of the potential conflicts that can occur between suction dredge miners and other recreationists are related to perceptions that ecological conditions have been degraded by suction dredge mining. The regulations under the Proposed Program include numerous measures to protect and restore ecological conditions during and after suction dredge mining activities. Some of the applicable regulations include restrictions related to, chemical storage and use, equipment cleaning, vegetation removal or disturbance, and the disturbance of stream substrates or flows. Similarly, the "Best Management Practices" informational packet to be distributed by the CDFG will provide guidance regarding equipment storage, waste disposal, and proper conduct as it relates to suction dredging activities. Adherence to the guidelines and enforcement of the proposed regulations would reduce the potential for conflicts associated with suction dredge activities.

Finally, there are a relatively small number of suction dredge miners compared to the number of other recreationists in California, and most public recreational areas are managed to provide diverse opportunities for a wide variety of recreational activities and experiences, including suction dredging. Therefore, while individual instances may occur where non-suction dredging recreational resources or experiences may be substantially degraded under the Program; these occurrences are not expected to happen so frequently or for a long enough period of time to be considered substantial. Additionally, when taken as a whole, the overall impact on the quality of recreational resources, or the experiences of recreationists, in California, is not believed to be substantial. This impact is considered less than significant.

Impact REC-2: Changes in Recreational Facility Use or Availability (Less than Significant)

The Proposed Program would result in the occupation of limited portions of trails and/or recreation areas by suction dredge miners for access, staging, and suction dredging activities. Occupation or use of these trails and/or recreational areas by suction dredge miners could potentially affect the availability of these recreational facilities for other recreationists and result in the potential accelerated deterioration of nearby facilities if other recreationists were displaced. However, the access, staging, and dredging activities associated with suction dredge mining would be temporary and intermittent and would not cause entire trails or facilities to become unavailable. Furthermore, the "Best Management Practices" informational packet will identify site access and staging methods that demonstrate courtesy to other area users, as well as additional measures to reduce the potential for conflicts.

In addition, dredging operations typically take place on public lands, where the right to use the area is equally applicable to all users. While anecdotal observations have cited instances where miners have, in effect, excluded other recreationists from the use of a particular location, this is believed to only occur infrequently, and numerous other locations remain for others to recreate. Moreover, any actions by miners to illegally exclude other recreationists from using a public area would be a law enforcement issue, to be handled by the appropriate agency with jurisdiction over the affected area. Based on the quantity of suction dredge permits issued in recent years, the number of suction dredgers that would potentially use public recreational facilities in California would comprise only a very small portion of the millions of recreationists participating in other activities. Overall, the Program is not anticipated to result in a substantial decrease in available recreational areas. Thus, the Program would not result in a significant displacement of recreational users that could accelerate the deterioration of nearby facilities. This impact would be less than significant.

Activities Requiring Fish and Game Code Section 1602 Notification

Activities requiring notification under Fish and Game Code section 1602 are likely to result in greater visual and noise disturbances associated with the use of larger nozzle sizes, power winching and dredging in lakes. Such methods could decrease the quality of recreational experiences by potentially increasing adverse effects associated with turbidity plumes, displacement of natural features, usage and staging of additional equipment, and presence of activities in areas which would not otherwise be subject to the activity. Furthermore, the creation of dams or diversions could create physical barriers or alterations which may result in adverse changes to the area's recreational use. Such issues, to the extent to which they could be significant, would need to be evaluated in a CEQA document.

Chapter 4.9

TRANSPORTATION AND TRAFFIC

4.9.1 Environmental Setting

Site Access and Facilities

As previously shown in Figures 3-5 and 3-6, gold mining areas are wide-spread throughout California and can be located on either public or private lands. Access to these sites can vary greatly depending on the exact location used for mining. For instance, well developed recreation areas might provide paved two- or four-lane roadways and designated parking facilities, while other locations may be far less accessible. More rural or less frequented areas may be characterized by single lane roads, gravel or dirt paths, and/or limited parking. In many cases, the most accessible suction dredging sites are those which are located near roadways where vehicles can park and walk equipment down to the water's edge. These areas may not have locations designated for parking; however any space available is often utilized by visitors.

Parking availability and traffic conditions are often subject to seasonal fluctuations. During peak seasons (spring/summer), recreational users may experience higher degrees of traffic congestion and fewer available parking spaces than during off-peak times (fall/winter). This may not be as problematic in privately owned areas or those which monitor or limit the number of visitors to reflect available capacity.

4.9.2 Impact Analysis

Findings of 1994 Environmental Impact Report

The 1994 EIR did not make specific findings in this environmental resource area. Instead, traffic-related effects of suction dredging activities were generally discussed as a component of "*Impacts on Recreational Opportunities.*" Vehicles and equipment associated with suction dredge activities were found to be in completion for parking spaces with other recreational users in the vicinity. Such parking conflicts between recreational users are especially high during peak recreation seasons and where spaces are extremely limited. However, as previously discussed, these 'recreational conflicts' were considered to be beyond the jurisdiction of CDFG to regulate and were included in the 1994 EIR for informational purposes only. In addition, the 1994 EIR comments that suction dredging is a legitimate recreational activity and is afforded equal rights to use public lands to participate in the activity, so long as it is done in a legal manner.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact on transportation and traffic if it would:

- Substantially increase traffic hazards; or
- Result in inadequate parking capacity.

Other traffic impacts were eliminated from further consideration in the Initial Study and are not discussed further here.

Suction dredging activities requiring notification under Fish and Game Code section 1602 are not anticipated to result in any new or more severe impacts related to traffic and transportation beyond those which are described below.

4.9.3 Environmental Impacts

Impact TR-1: Traffic Hazards Caused by Suction Dredging (Less than Significant)

Dredgers frequently use personal vehicles in order to transport equipment and supplies to dredging locations. The number and size of vehicles used is highly dependent on the equipment being used, the number of persons in their group, and the duration of their stay. Such vehicular transport can range in size from small cars or pickups up to large SUVs and RVs. In addition, these vehicles may also be equipped with trailers towing the suction dredge or additional supplies.

Erratic or unsafe driving maneuvers, unsecured equipment, and malfunctioning vehicles or trailers can all potentially result in traffic hazards for the general public. However, this potential risk for traffic hazards is inherent to all drivers operating such vehicles on California's roadways. Because this risk is not exclusive to drivers who participate in suction dredging activities, and given the historically small percentage of drivers who are transporting suction dredge equipment relative to other drivers in these locations throughout California, the implementation of the Program would not result in a substantial increase in traffic hazards.

This impact is considered to be less than significant and no mitigation is necessary.

Impact TR-2: Inadequate Parking Capacity (Less than Significant)

Depending on the location and season, parking spaces may be a rare commodity. For instance, in rural areas such as the Klamath River corridor, there are only a limited number of pull-outs and adequate space for vehicles within the shoulders of roads can be non-existent. During the height of the summer tourist season, miners have been observed using these limited pull-outs along the road and depending on the vehicle size and positioning, may occupy these areas in a manner that excludes other users. In these situations, the result is that other vehicles are not able to find parking to access the river in these locations for the duration of the dredger's trip. In this way, the vehicular transport associated with suction dredging competes with other recreational activities for parking resources, which in certain areas or seasons, may be limited.

However, because parking is required by all activities involving personal vehicular transport to and from recreational areas, parking demand is not exclusive to the Program activities. Most parking spaces are generally utilized on a first-come, first-served basis regardless of recreational endeavor, whereby even individuals participating in suction dredging may be unable to find parking at their desired locations. Furthermore, Program participants are equally subject to local policies regarding long-term parking and may be cited for improper or illegal placement. As such, Program participants are not singularly responsible for lack of parking capacity, but rather, these conditions are a reflection of an area's recreational popularity and available facilities.

Because suction dredgers in general are anticipated to generate a small portion of the overall parking demand in areas subject to suction dredging, potential parking demand and utilization associated with the implementation of the Program is considered to be less than significant.

Chapter 4.10
MINERAL RESOURCES

4.10.1 Environmental Setting

Gold is the primary mineral resource sought by suction dredge miners. Gold naturally occurs in two types of deposits: lode or placer. Lode gold is found within solid rock, commonly as veins formed in quartz, while placer deposits are found within unconsolidated sediments, typically but not always in stream beds. Suction dredge gold mining involves the pursuit of placer deposits.

Approximately 115,330 ounces of gold were produced by a handful of commercial lode mines in California in 2008 (California Geological Survey [CGS], 2008). The largest lode mine in the state produced 108,000 ounces of gold in 2008 alone (CGS, 2008).

Placer Gold Mining in the State

Streams rich in gold include streams draining the Sierra Nevada, Klamath Mountains, and the Mojave Desert. Some dredging also occurs to a lesser extent within the Peninsular Ranges, Transverse Ranges, northern Great Valley, and Coast Ranges (CGS, 2002a). Dredging is popular in the "Mother Lode Region" which includes the American, Bear, Calaveras, Cosumnes, Feather, Merced, Mokelumne, and Yuba rivers. Most of this area was mined during the mid 1850s, and again during the 1970s and 1980s (CGS, 2002b; Clark, 1972). Table 4.10-1 illustrates the magnitude of placer gold production from the Gold Rush period to 1968.

TABLE 4.10-1. PLACER GOLD ACTIVITY IN CALIFORNIA

Period	Ounces of Placer Gold Extracted
1848-1858	26,200,000
1859-1884	21,200,000
1885-1899	2,200,000
1900-1934	10,800,000
1935-1968	7,800,000
Total	68,200,000

Source: Churchill, 2000

Most suction dredgers operate in rivers and streams that have been previously mined for gold, in some cases, several times.

Claims

In 1872, the General Mining Law, described further under the *Regulatory Setting* section below, authorized the prospecting and mining for locatable materials, such as gold, platinum, and silver on federal public lands. Under this Law, all citizens of the U.S., 18 years or older, have the right to locate a lode or placer mining claim on federal lands open to mineral entry. The mining law opens up land in the public domain that has never been set aside for a specific use. Land dedicated for specific uses such as military installations, national parks, or wilderness areas, are not subject to mineral entry. Land west of the Great Plains managed by the U.S. Forest Service or the Bureau of Land Management (BLM), unless designated as wilderness area, is generally open to mining claims. In California, federal lands administered by the National Forests or the BLM are available for prospecting (Demaagd pers. comm., 2009).

A miner may stake a 'claim' on public land, which is meant to declare an exclusive right to extract minerals in the claim area. However, an individual miner does not need a personal mining claim to mine; mining on an existing claim is legal if permission is given by the claimant. Claims may be either patented or unpatented. Unpatented claims simply give the holder the right to mine on the claim, while a patented claim gives the holder outright ownership of the claim. Once patented, the claim area becomes private land and is unavailable for public use. There is currently a moratorium by the Federal government on issuance of new patented claims. (Environmental Working Group, 2000)

There are four types of unpatented claims: (1) placer claims, (2) lode claims, (3) tunnel claims, and (4) mill site claims. An estimated 60,000 to 120,000 people engage in recreational placer mining, including use of pans and suction dredges, in the Sierra Nevada each year (U.S. Forest Service 2001). Much of this activity, including the majority of suction dredging takes place on unpatented placer claims. Table 4.10-2 below shows the number of reported mineral activity notices or permits within National Forest lands between 1997 and 1999 fiscal years.

TABLE 4.10-2. NUMBER OF MINERAL COLLECTION PERMITS AND NOTICES FOR PLANS TO CONDUCT MINING ACTIVITIES IN NATIONAL FOREST LANDS DURING 1997 AND 1999

National Forest	1997	1998	1999
El Dorado	80	29	45
Inyo	3	5	4
Lassen	43	42	0
Plumas	100	100	23
Sequoia	8	55	5
Sierra	164	144	24
Stanislaus	200	200	168
Tahoe	662	631	659
Lake Tahoe Basin	0	0	0
Toiyabe	0	0	0
Total	*1,260*	*1,206*	*928*

Source: Adapted from Table 5.4.a – Non-bonded operations (U.S. Forest Service, 2001)

However, activity is not directly related to the number of mining claims in an area because many claims sit idle for years while in other cases, a single operation may tie up several claims.

Suction Dredge Gold Mining

The popularity of recreational suction dredging fluctuates with the worldwide price of gold. In the last 45 years, the price of gold quickly fluctuated from $100 per ounce in 1974 to a peak of approximately $850 per ounce in 1980. The peak in 1980 was followed by a crash to $250 per ounce in 1999 and a recovery to approximately $1,200 per ounce in 2010, as of mid-July 2010 (GoldPrice, 2010).

In 2009, the California Department of Fish and Game received over 3,600 applications for suction dredge permits. This reflects a gradual decline in this activity from previous years. In the 1980s, the California Department of Fish and Game received an average of approximately 9,070 applications for suction dredge permits per year. This spike in interest appears to be related to the spike in gold prices. However, as gold prices decreased from their 1980 highs, permit requests for the last eight years have averaged fewer than 3,000 per year (see Figure 3-1 in Chapter 3).

Commercial mines report annual gold and silver production to the California Department of Conservation and pay a tax on the amount of gold and silver produced. There is no such requirement for suction dredgers to report how much gold they produce. However, based on the Suction Dredger Survey results, California resident permit holders recovered on average approximately 3.37 ounces of gold; while out of state permit holders reported a slightly higher amount (3.41 ounces). Based on a selling price of gold at $1,000 per ounce, this amount translates into an approximate value of $3,374 and $3,406 dollars. (Suction Dredger Survey results, Appendix F)

4.10.2 Regulatory Setting

Federal

Management of subsurface minerals pursuant to the General Mining Law of 1872 is administered by the BLM. The surface disturbance aspect of mining on federal lands is managed by the applicable land manager (e.g., BLM, U.S. Forest Service).

<u>General Mining Law of 1872</u>

The amended General Mining Law of 1872 allows any U.S. citizen, corporation, or alien who has declared their intention to become a U.S. citizen the right to prospect for, locate, and develop mining claims on open public-domain lands if they meet certain requirements (U.S. Forest Service, 2001; BLM, 2009). Patented mining claims provide the right for a mining claimant to obtain a title to the land and for the mining of locatable minerals, which include metallic minerals (ex., gold) and some types of nonmetallic minerals (ex., gemstones). Under this law, placer deposits can also be claimed and the mineral rights would be acquired by the claim holder (Diggles et al., 1996).

Unpatented claims provide rights to the mining of locatable minerals, but do not provide the claimant title to the land. A patented claim is private land and is unavailable for public use.

BLM has not been accepting new applications for patents since October 1, 1994 when Congress imposed a budget moratorium on BLM acceptance of any new mineral patent applications (BLM, 2009). Prior to the moratorium, to obtain a patented mining claim, a mining claimant was required to meet the following requirements:

- For mining claims, demonstrate a physical exposure of a valuable (commercial) mineral deposit (the discovery) as defined by meeting the BLM's Prudent Man Rule and Marketability Test;
- For mill sites, show proper use or occupancy for uses to support a mining operation and be located on non-mineral land;
- Have clear title to the mining claim (lode or placer) or mill site;
- Have assessment work and/or maintenance fees current and performed at least $500 worth of improvements (not labor) for each claim (not required for mill sites);
- Meet the requirements of the BLM's regulations for mineral patenting as shown in the Code of Federal Regulations at 43 CFR 3861, 3862, 3863, and 3864; and
- Pay the required processing fees and purchase price for the requested land (BLM, 2009).

The BLM is responsible for managing mineral resources, including the administration and enforcement of this law, on both U.S. Forest Service and BLM lands through its headquarter office and 12 state offices. The two fundamental components of administration of the law are adjudication and mineral examination. The adjudication process is performed by land law examiners in each state office and involves reviewing mineral applications for completeness and compliance with the law and regulations, except for the mineral examination process. Certified BLM geologists or mining engineers will perform a formal mineral examination once an application has been designated as complete and in compliance. Formal mineral examinations verify the discovery of a valuable (commercially viable) mineral deposit on the mining claims and proper use or occupancy for any mill sites, and include the preparation of a mineral report. A mineral contest proceeding may be conducted if applications do not demonstrate a discovery or proper use or occupation. The final approval process for a completed and verified application involves final review and action by the Secretary of the Interior and, if approved, issuance of a mineral patent by the BLM.

Federal Land Policy Management Act of 1976

The Federal Land Policy and Management Act (FLPMA) of 1976, as amended, was enacted to "establish public land policy, establish guidelines for its administration, provide for the management, protection, development, and enhancement of the public lands, and for other purposes" (U.S. Department of the Interior, 2001). Under the FLPMA, one of BLM's responsibilities is to manage public lands in a manner that considers the Nation's need for domestic mineral sources and implements the Mining and Minerals Policy Act of 1970 as it pertains to public lands (U.S. Department of the Interior, 2001). BLM authorizes and permits mineral exploration, mining, and reclamation actions on BLM public lands as mandated by Section 302(b) of FLPMA (BLM, 2009). Any activities that disturb the surface of a mining claim or site require authorization (BLM, 2009).

BLM can provide one of three levels of authorization: casual use, notice level, and plans of operations. The first level, casual use, does not require any sort of notification and applies to dredges with engines less than 10 hp. Under the second and third levels, the purpose of a notice of intent (NOI) or plan of operations is to minimize adverse environmental impacts on surface resources within public lands. These latter two levels require NEPA compliance and Endangered Species Act (ESA) consultation (if applicable).

An NOI is required from any person proposing to conduct operations which might cause a significant disturbance of surface resources. The NOI generally applies to exploratory activities involving the use of dredges larger than 10 hp, explosives, or other mechanized earth moving equipment. Camping for more than 14 days also triggers an NOI. Notice level activities must not exceed an annual total unreclaimed surface disturbance of 5 acres per calendar year. The NOI must identify the area involved, the nature of the proposed operations, the route of access to the area of operations, and the method of transport (Electronic Code of Federal Regulations, 2010). Following receipt of a notice of intent to operate, BLM will notify the operator if approval of a plan of operations is required before the operations may begin. In the absence of such a response, the miner is authorized to proceed with the activity following submittal of the NOI. Note that it is up to the miner to determine that the activity exceeds casual use and requires an NOI, although BLM also can inspect a site and require that an NOI be submitted.

Larger surface disturbance activities, and the transition from exploration to production, require a plan of operations that is approved by BLM, and reclamation bonding (BLM, 2009). A plan of operations is necessary when the activities will likely cause a significant disturbance to surface resources or if requested by BLM following submittal of an NOI. A plan of operations must include but not be limited to:

- contact information for the mining operator and/or claimant,
- a map of the project area and access roads, and
- detailed information on the proposed operations, including transport routes, period of operation, type of operation, and measures to protect the environment (Electronic Code of Federal Regulations, 2010).

Mining activities are not authorized to commence without approval of the plan of operation. A review of mining plans of operations by BLM may result in approval of the plans or a request for a validity examination. If BLM determines that a plan of operation has adequate measures to mitigate surface resource impacts to acceptable levels, a plan may be approved. However, if BLM determines that the potential impacts are excessive, a mineral examiner may be requested by BLM to review the plan of operations or conduct a validity examination. Based on the mineral examiner's findings related to the reasonableness of potential impacts, BLM may deny or approve the plan of operations.

Any removal of minerals from BLM lands (or public land in general) is considered mining, even if it is for recreational purposes. Miners should contact the appropriate BLM office to confirm the specific potential notification/authorization requirements for a proposed activity.

U.S. Forest Service Mining Oversight

Although BLM manages mineral resources themselves (i.e., mining claims) within U.S. Forest Service lands, the U.S. Forest Service is responsible for minimizing adverse environmental impacts from mining on surface resources in the national forests (U.S. Forest Service, 2001). Wildlife, recreation, timber, and water quality comprise surface resources in the national forests. The U.S. Forest Service protects surface resources from locatable mineral mining activities via proposing mineral withdrawals and noticing requirement similar to those described above for the BLM (U.S. Forest Service, 2001).

In terms of withdrawals, the U.S. Forest Service may propose that areas within the National Forests are no longer available for the location or entry of new mining activities permissible under U.S. mining laws and subject to valid existing rights. To finalize the withdrawal of National Forest System lands from mining, the BLM and/or Congress must provide final approval. The BLM is responsible for reviewing the U.S. Forest Service's proposal and potentially providing approval for withdrawals that have limited time periods (e.g., 20 years) and/or are less than 5,000 acres. For permanent withdrawals larger than 5,000 acres, Congress must provide its approval. Any existing mining rights at the time of a withdrawal must be honored or acquired. (U.S. Forest Service, 2001)

To obtain a permit for locatable mineral mining (e.g., suction dredge mining) on National Forest lands, the U.S. Forest Service uses the same approach as BLM (i.e., one of three levels of authorization: casual use, notice level, and plans of operations). However, the threshold for exceeding casual use is different than for BLM, and generally applies to situations in which there is a long-term encampment or use of closed roads. An exception to the notice of intent and plan of operation requirements is that certain activities require only an administrative pass from the U.S. Forest Service. For mining operations that will last less than 14 days and that will result in minimal surface resource disturbances, the U.S. Forest Service may issue an Administrative Pass that grants a temporary authorization for prospectors and miners who have a statutory right to enter and prospect on public lands (U.S. Forest Service, 2008).

State

Surface Mining and Reclamation Act of 1975 (SMARA)

The purpose of the Surface Mining and Reclamation Act of 1975 (SMARA) and its recent amendments is to "create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations" (California Department of Conservation [CDC], 2007a). Specific objectives of SMARA's surface mining and reclamation policies are to:

- prevent or minimize adverse environmental effects and reclaim mined lands to a condition that is readily usable for alternative land uses;
- encourage the production and conservation of minerals, while considering the values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment; and
- eliminate residual hazards to the public health and safety (CDC, 2007a).

The act's requirements apply to anyone, including government agencies, engaged in surface mining operations in California (including those on federally managed lands) that disturb more than one acre and/or remove more than 1,000 cubic yards of overburden or mineral product in any one location (CDC, 2007a; CDC, 2007b). Disturbance or removal activities include, but are not limited to: prospecting and exploratory activities, dredging and quarrying, streambed skimming, removing overburden, borrow pitting, and the stockpiling of mined materials. A disturbance is the occurrence of any of the above surface mining operations on mined lands. Mined lands include the surface, subsurface, and ground water of an area in which surface mining operations will be, are being, or have been conducted, including roads, land excavations, mining waste, and areas in which all structures and equipment related to the mining activities are stored. Overburden is defined as the soil, rock, or other materials that lie above a natural mineral deposit or in between mineral deposits, before or after their removal by surface mining operations (CDC, 2007a).

Mineral Classification

In addition to regulating mining and reclamation activities, SMARA requires the State of California to inventory and classify selected mineral resources within California. The intent of SMARA is to classify the absence or presence of mineral resources within a region, identify the market area of the commodity, and to estimate the future need of the commodity within a geographic area. Additionally, the mineral resource information is referenced in city and county general plans and used during the land-use planning process to restrict the development of incompatible land uses in areas with identified mineral deposits, especially those of regional or statewide significance (CDC, 2007b).

Areas are classified into Mineral Resource Zones (MRZ) depending on the occurrence and availability of the mineral resource. Pursuant to Section 2790 of SMARA, the state Mining and Geology Board designates certain mineral resource sectors within geographical areas to be of regional or statewide significance. MRZ maps are available by county. As of 2008, all counties except Los Angeles, Nevada, Marin, Sonoma, Napa, San Joaquin, and Kern have been surveyed for mineral resources (CGS, 2008).

As an example, in Yuba County the Yuba City-Marysville production-consumption region is the only area within the county that has MRZ classifications. The classifications are primarily for Portland cement concrete (PCC) aggregate; however, some areas of gold deposits have been identified. Most of the eastern portion of the county has not been classified. The Yuba City-Marysville area has vast quantities of low-cost, high-quality PCC aggregate materials locally available that are more than sufficient to meet the local demands. Within the Yuba City-Marysville production-consumption region, the dredge field in the Yuba River is classified as MRZ-2 for gold. MRZ-2 represents areas where the adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. (CDC, 1988)

SMARA Compliance Process

If a mining activity meets the disturbed/removed area or volume thresholds described above, a miner would be required to complete the SMARA compliance process through the local city or county and the California Department of Conservation, Office of Mine Reclamation (OMR). The SMARA compliance process generally includes: 1) approval of a surface mining permit and/or a conditional use permit, and 2) the preparation and approval of a reclamation plan (McNally pers. comm., 2010, Gonzalez pers. comm., 2010). The applicable city or county typically approves the surface mining or conditional use permits. The approval of reclamation plans is performed by a designated "lead agency," which may include a city, county, the San Francisco Bay Conservation and Development Commission, or the Mining and Geology board (CDC, 2007a). For El Dorado and Yuba counties, the OMR serves as the lead agency (Gonzalez pers. comm., 2010). Approval of the surface mining permits or conditional use permit and a reclamation plan is contingent on compliance with all other applicable environmental regulations, including but not limited to CEQA, the Clean Water Act, and CESA. The lead agency would inform the mining applicant of the type of CEQA document required and all required permits (McNally pers. comm., 2010). Additionally, approval of the reclamation plan would require approval of a financial assurance plan by the lead agency (Gonzalez pers. comm., 2010). Fees are typically associated with the application process and the required annual inspections of the mining site by the lead agency. Annual production activities must be reported to the OMR until a mine has been certified as reclaimed by the lead agency (Gonzalez pers. comm., 2010).

4.10.3 Impact Analysis

Findings of 1994 Environmental Impact Report

The 1994 EIR did not make findings for this environmental resource area.

Criteria for Determining Significance

For the purposes of this analysis, the Proposed Program would result in a significant impact if it would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan; and
- Conflict with any applicable mining regulations of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect.

As discussed in the *Regulatory Setting* section above, suction dredging miners may be required to comply with a variety of mining laws. An Appendix G threshold of the CEQA Guidelines related to consistency with other laws states an impact would be significant if a project would "Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project…*adopted for the purpose of avoiding or mitigating an environmental effect*." The General Mining Law of 1872 was not adopted for the purpose of avoiding or mitigating the environmental effects of mining. Therefore, this discussion does not address if suction dredging activities would comply with this law, because this threshold is not applicable.

Unlike the General Mining Law of 1872, one of the purposes of the USFS and BLM authorizations for surface disturbance associated with mining is to prevent or minimize adverse environmental effects. Similarly, one of the specific purposes for which SMARA was adopted is to prevent or minimize adverse environmental effects. Suction dredging miners may be required to comply with SMARA if they meet the threshold requirements. Therefore, the impact discussion below further considers and discusses the potential of the Proposed Program to comply with these requirements.

Suction dredging activities requiring notification under Fish and Game Code section 1602 are not anticipated to result in any new or more severe impacts related to mineral resources beyond those which are described below.

4.10.4 Environmental Impacts

Impact MIN-1: Availability of, or Access to, Placer Gold Deposits (Beneficial)

Mining methods that may be used to access placer gold deposits include but are not limited to suction dredging, high-banking, and panning. Implementation of CDFG's Program would lift an existing ban on suction dredging and would increase the potential access to placer gold deposits using this mining method. Other mining methods (high-banking, panning, etc.) would not be regulated by the Program and could be utilized with or without implementation of the Program, although they may be governed by other regulatory schemes (e.g., Fish & G. Code § 1602 covering alterations to streambeds in the case of high-banking).

By permitting the use of suction dredges, the Program would provide another means for recovery of gold from placer deposits. Adoption of the Proposed Program would result in a beneficial impact by allowing an additional method for extracting mineral resources (i.e., increasing the availability of such resources). The Proposed Program may also include measures to permanently or seasonally restrict suction dredging activities in certain areas of the State. However, these restrictions on suction dredging activities would not preclude other methods of mineral extraction. Therefore, the Proposed Program would not result in a loss of availability from the existing baseline conditions (i.e., prohibition of suction dredging) and would only change the allowable methods of mineral recovery. Therefore, the Proposed Program would have a beneficial impact on the availability and access to placer gold deposits.

Impact MIN-2: Compliance with Applicable Federal and State Mining Regulations (No Impact)

The Proposed Program would authorize suction dredge mining activities in California. As described previously in this chapter, suction dredge mining activities could occur on federal, state, or privately-owned lands throughout the state. The California SMARA applies to any surface mining activities that occur in the state, including activities performed by federal agencies or on federal lands, and that meet the SMARA volume or area thresholds. Therefore, any surface mining activity in California, including suction dredge mining activities, may be required to comply with SMARA. Similarly, suction dredging activities on federal land must comply with the requirements of USFS and the BLM.

Implementation of the Proposed Program would not affect the ability of placer miners using other mining techniques to comply with the applicable federal and state mining regulations because the Proposed Program would only apply to suction dredging miners. In addition, although the Proposed Program's requirements would not directly require compliance with other federal and state mining laws, because it is outside of CDFG's jurisdiction to enforce such a requirement, suction dredging miners would still be responsible for complying with any applicable mining regulations. CDFG is not aware that SMARA compliance has been required related to suction dredging in the past, and hence no known conflicts exist. Similarly, CDFG's past and currently proposed regulations may be stricter in certain respects than BLM and USFS requirements, but CDFG is not aware of any instances where implementation of its 1994 regulations generated conflicts with the requirements of those agencies. The Proposed Program is not believed to include any new or changed provisions that would introduce the potential for such conflicts. Thus, the Proposed Program would not affect the ability of placer miners to comply with applicable state and federal regulations. Therefore, there would be no impact.

Chapter 5
OTHER STATUTORY CONSIDERATIONS

5.1 Introduction

This chapter presents discussions of irreversible impacts, significant and unavoidable impacts, growth-inducing impacts, and cumulative impacts as required by the California Environmental Quality Act (CEQA) Guidelines (see generally Cal. Code. Regs., tit. 14, § 15000 et seq. [hereafter, CEQA Guidelines]).

5.2 Irreversible Impacts

CEQA Guidelines (Cal. Code Regs. tit. 14, §15126.2 subdiv. (c)) requires that an EIR identify any irreversible impacts, also referred to as irreversible environmental changes that may be caused by a proposed project including current or future commitments to using non-renewable resources, secondary, or growth-inducing impacts that commit future generations to similar uses. Section 15126 of the CEQA Guidelines states that significant irreversible environmental changes associated with a proposed project may include the following:

- uses of non-renewable resources during the initial and continued phases of the project which may be irreversible because a large commitment of such resources makes removal or nonuse thereafter unlikely;
- primary impacts and, particularly, secondary impacts (such as highway improvement that provides access to a previously inaccessible area) that commit future generations to similar uses; and
- irreversible damage, which may result from environmental accidents associated with the project.

The irretrievable commitment of nonrenewable resources would occur as a result of the Proposed Program, as follows. Implementation would involve the permitting of an activity which involves the use of fossil fuels and other non-renewable resources for equipment construction, operation and travel. In addition, the activity itself would extract non-renewable resources within the Program Area in the form of mineral deposits (gold). However, the total amount of gold recovered under the Program is anticipated to be low relative to the total placer gold present in the state, and as such is not considered to be a large commitment of gold resources. Furthermore, the Program, by making permits available, would not make extraction of gold compulsory. Also, the Program is not anticipated to have secondary impacts that commit future generations to similar uses or result in irreversible damage from accidents.

5.3 Significant and Unavoidable Impacts

Section 15126.2(b) of the CEQA Guidelines further requires an EIR to describe any significant impacts that cannot be mitigated to a level of insignificance. The analysis of Program effects did not identify any significant impacts which could be reduced to a level of less-than-significant through implementation of stand-alone mitigation measures; rather, because the Proposed Program consists of proposed statewide regulations, measures to reduce or avoid impacts were incorporated directly into the proposed regulations where feasible given the scope of CDFG's jurisdictional authority with respect to suction dredging. CDFG's authority is limited to impacts that are deleterious to fish pursuant to the provisions of Fish and Game Code section 5653. As a result, adverse impacts were found to be either *less-than-significant* (i.e., the proposed regulations would ensure that impacts are not significant) or *significant and unavoidable* (i.e., the proposed regulations would not reduce impacts to a level of insignificance and it was determined to be infeasible to implement further mitigation).

The following impacts have been identified as significant and unavoidable.

- *Impact WQ-4*: Effects of Mercury Resuspension and Discharge from Suction Dredging
- *Impact WQ-5*: Effects of Resuspension and Discharge of Other Trace Metals from Suction Dredging
- *Impact BIO-WILD-2:* Effects on Special-Status Passerines Associated with Riparian Habitat
- *Impact CUL-1:* Substantial Adverse Changes, When Considered Statewide, in the Significance of Historical Resources
- *Impact CUL-2:* Substantial Adverse Changes, When Considered Statewide, in the Significance of Unique Archaeological Resources
- *Impact NZ-1:* Exposure of the Public To Noise Levels in Excess of City of County Standards

In addition, the Program would result in significant and unavoidable contributions to adverse cumulative impacts. These are discussed in greater detail in Section 5.5, below.

5.4 Growth Inducement

Section 15126.2(d) of the state's CEQA Guidelines requires an EIR to include a detailed statement of a proposed project's anticipated growth-inducing impacts. The analysis of growth-inducing impacts must discuss the ways in which a proposed project could foster economic or population growth or the construction of additional housing in the project area. The analysis must also address project-related actions that, either individually or cumulatively, would remove existing obstacles to population growth. A project would be considered growth inducing if it induces growth directly (through the construction of new housing or increasing population) or indirectly (increasing employment opportunities or eliminating existing constraints on development). Under CEQA, growth is not assumed to be either beneficial or detrimental.

The Proposed Program would not involve new development or infrastructure installation that could directly induce population growth in the Program Area. Additionally, the Program would not involve construction of new housing or create a demand for additional housing. The proposed amendments to the regulations have been designed so that additional staff would not be required to administer the Program. Furthermore, the Proposed Program would not displace any existing housing units or persons. Finally, suction dredging is not anticipated to generate sufficient economic activity in communities near dredging locations such that they would experience substantial population growth.

Therefore, the Proposed Program would have a less than significant impact on population growth or housing demand.

5.5 Cumulative Impacts

A cumulative impact refers to the combined effect of "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines § 15355). As defined by the state of California, cumulative impacts reflect "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time." (CEQA Guidelines, § 15355, subdiv. (b).) Under CEQA, an EIR must discuss the cumulative impacts of a project when the project's incremental contribution to the group effect is "cumulatively considerable." An EIR does not need to discuss cumulative impacts that do not result in part from the project evaluated in the EIR.

In order to meet the adequacy standard established by section 15130 of the CEQA Guidelines, an analysis of cumulative impacts must contain the following elements.

- An analysis of related future projects or planned development that would affect resources in the project area similar to those affected by the proposed project.
- A summary of the environmental effects expected to result from those projects with specific reference to additional information stating where that information is available.
- A reasonable analysis of the combined (cumulative) impacts of the relevant projects.

It must also evaluate a proposed project's potential to contribute to the significant cumulative impacts identified, and discuss feasible options for mitigating or avoiding any contributions assessed as cumulatively considerable.

The discussion of cumulative impacts is not required to provide as much detail as the discussion of the effects attributable to the project alone. Rather, the level of detail should be guided by what is practical and reasonable.

5.5.1 Methods Used in this Analysis

Section 15130 of the CEQA Guidelines provide two recommended approaches for analyzing and preparing an adequate discussion of significant cumulative impacts. The approaches as defined in section 15130 of the CEQA Guidelines are either:

- the list approach, which would involve listing past, present, and reasonably probable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency; or

- the projection approach, which utilizes a summary of projections contained in an adopted general plan, a related planning document, or an adopted environmental document that evaluated regional or area-wide conditions contributing to the cumulative impact.

This discussion will utilize the list approach for the cumulative impact analysis. The level of detail of a cumulative impact analysis should consider a proposed project's geographic scope and other factors (e.g., a project's construction or operation activities) to ensure that the level of detail is practical and reasonable. Because of the broad geographic range of CDFG's Program, involving numerous suction dredge locations scattered statewide, this section provides a discussion of impacts by subject area (e.g., climate change) with representative examples of major projects rather than mention of all individual projects contributing to the possible cumulative effect. The discussion focuses on the potential cumulative impacts of the Program for relevant resource areas analyzed in previous chapters.

Table 5-1 defines the geographic scope that will be used in the impact analysis for each resource area.

TABLE 5-1. GEOGRAPHIC SCOPE FOR RESOURCES WITH POTENTIAL CUMULATIVE IMPACTS

Resource	Scope
Air Quality	Statewide and Global
Biological Resources	Statewide suction dredge locations
Water Quality and Toxicology	At and downstream of suction dredge locations
Noise	Statewide suction dredge locations

5.5.2 Cumulative Impact Analysis

Cumulative Setting

Projects and activities described in this analysis include those that occur in the same geographic area and produce similar impacts on biological and other resources as those of the Program. The broad geographic range of the Program's suction dredge locations requires an analysis of a number of past, current, and foreseeable activities that have affected California's surface waters and other resources. Specific past, current, and reasonably foreseeable future activities considered in this analysis are listed in Table 5-2. Table 5-2 also identifies the potential impacts by resource area resulting from each activity.

TABLE 5-2. OTHER ACTIVITIES (PAST, EXISTING, AND FUTURE) THAT MAY CUMULATIVELY AFFECT RESOURCES OF CONCERN OF THE PROGRAM

Other Activity Description	Potential Cumulative Impacts by Resource Area			
	Biological Resources	*Air Quality*	*Water Quality and Toxicology*	*Noise*
Agriculture	X	X	X	
Aquaculture	X	X	X	
Climate Change	X	X	X	
Commercial Fishing	X	X		

Other Activity Description	Potential Cumulative Impacts by Resource Area			
	Biological Resources	*Air Quality*	*Water Quality and Toxicology*	*Noise*
Dams	X		X	
Effluent Pollution	X		X	
Introductions of nonnative species	X			
Mining	X	X	X	
Recreational Activities (i.e., camping, off-road vehicle use, rafting, and trail construction or use)	X	X	X	X
Recreational Fishing	X			
Streambed Alteration	X		X	
Timber Harvest	X	X	X	X
TMDL Plans (related to mercury especially)	X		X	
Tribal Fishing	X			
Urbanization	X	X	X	X
Water Diversions	X		X	
Wildfire, fire suppression, and fuels management	X	X	X	

Agriculture

Agricultural activities, including farming and livestock grazing, may cumulatively affect the biological resources and water quality of California surface waters in addition to the effects from the Program. Agriculture may affect biological and water quality resources via the runoff and transport of pollutants, removal of stream bank vegetation, straightening of natural streams, removal of woody debris, water diversions, and excessive irrigation (State Water Resources Control Board [SWRCB] 2000). Typical potential pollutants resulting from agricultural operations include sediments; animal wastes; salts; and pesticides, herbicides, and fertilizers (SWRCB, 2000). The removal of stream bank vegetation or woody debris and the straightening of natural streams may affect the aquatic habitat complexity (ex., depth of pools) and stream water temperatures (Knight and Boyer, 2007). Grazing may also affect surface water quality and aquatic biota through direct loadings of animal wastes, reductions of streamside vegetation, increasing temperatures, siltation of spawning habitats, and erosion of streambanks.

Aquaculture

The operation of aquaculture facilities, including hatcheries, may contribute pollutants via direct discharges from the facilities to waters potentially affected by the Program. Potential pollutants of aquaculture facilities include but are not limited to: herbicides, sediments, and waste products. The CDFG issues licenses for every aquaculture operation that is involved in the controlled growing and harvesting of fish, shellfish and plants in marine, brackish and fresh water for human consumption or bait purposes. In addition, aquaculture facilities may require water diversions that have the potential to affect aquatic biological resources through entrainment and/or reduced downstream flows.

Aquaculture facilities may also impact native fish species through predation or competition between the native and hatchery-reared (i.e., stocked) fish. As an example, although many of CDFG's stocked trout, salmon, and steelhead hatcheries would have beneficial or less than significant impacts on native fish species populations, the release of hatchery-reared Chinook salmon and steelhead would potentially cause substantial competition and predation impacts on the Klamath and Trinity rivers' natural coho salmon and fall-run Chinook salmon populations (ICF Jones & Stokes, 2010). Thus, aquaculture may be a significant contributor to cumulative impacts on fish or aquatic species in streams with suction dredging.

Air Quality

Regulatory Setting - Federal Regulations.

The U.S. Environmental Protection Agency (EPA) carries out the provisions of the federal Clean Air Act (CAA), originally passed in 1963 and amended six times, most recently in 1990. U.S. EPA implements programs under the CAA that focus on reducing ambient air pollutant concentrations, reducing emissions of toxic pollutants, and phasing out production and use of chemicals that destroy stratospheric ozone. U.S. EPA sets ambient air limits, the National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: particulate matter, carbon monoxide, nitrogen oxides, sulfur oxides, ground-level ozone, and lead. Primary standards are set for protection of human health and secondary standards are set for environmental protection. Areas which meet the primary standards are considered in "attainment" while areas with air quality not meeting the primary standards are in "nonattainment."

Regulatory Setting - State Regulations

California Air Resources Board. The California Air Resources Board (CARB) was established in 1967. CARB has set California Ambient Air Quality Standards (CAAQSs) that are more stringent than the NAAQS for most contaminants. These include standards for additional contaminants not covered in the NAAQS, including visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The California Clean Air Act was passed in 1988 and requires nonattainment areas to achieve and maintain the CAAQSs by the earliest time practicable, and local air districts to develop attainment plans for state standards.

CARB regulates motor vehicle emissions in the State, while local air quality management district's permit stationary sources.

CARB has designated 15 air basins in the State. The basin boundaries were decided by grouping similar geographic features together. Within the 15 air basins, thirty-five local air quality management districts are responsible for attainment and permitting in each basin and subbasin area.

Climate Change/Greenhouse Gas Emissions. In 2002, Assembly Bill 1493 (AB 1493) launched an innovative and pro-active approach to dealing with greenhouse gas (GHG) emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions; these regulations will apply to automobiles and light trucks beginning with the 2009 model year. AB 1493 cited several potential risks that California faces from climate change, including reduction in the state's water supply, increased air pollution creation by higher temperatures, harm to agriculture, and increase in wildfires, damage to the coastline, and economic losses caused by higher food, water, energy, and insurance prices. Further, the legislature stated that implementing technological solutions to reduce greenhouse gas emissions would stimulate California economy and provide jobs.

Attempts by CARB to receive the authority to implement the GHG emission reduction standards required by AB 1493 were initially denied. In March 2008, the U.S. EPA denied CARB's December 2005 waiver request that would grant CARB the required authority. The reasons for the waiver denial were based "on a finding that California's request to reduce GHG emissions from passenger vehicles did not meet the CAA requirement of showing that the waiver was needed to meet 'compelling and extraordinary conditions'" (CARB, 2010a). However, on June 30, 2009, the U.S. EPA rejected the earlier denial reasoning by returning to and applying EPA's traditional waiver review principles. Therefore, CARB expects that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016. (CARB, 2010a).

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: (1) 2000 levels by 2010; (2) 1990 levels by 2020; and (3) 80% below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a plan (including market mechanisms), and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

An approved CARB-prepared scoping plan to implement AB 32 was adopted on December 12, 2008. Key strategies of the scoping plan include: 1) a broad-based cap-and-trade program; 2) transportation reductions; 3) improved energy and efficiency use; 4) industry reductions; 5) high global warming potential gases reduction; 6) forestry projects; 7) agricultural reductions; and 8) waste and recycling reductions. The cap-and-trade program would cover 85% of California's emissions (e.g., electricity generation, large industrial sources, transportation fuels, and residential and commercial use of natural gas) and would involve connections to the Western Climate Initiative that would provide greater environmental and economic benefits. Transportation emission reduction efforts include reducing vehicle greenhouse gas emissions (known as Pavley standards) and implementing a low-carbon fuel standard, better land use planning, and more efficient truck delivery and goods movement. The improved energy and efficiency use strategy implements appliance efficiency standards and other aggressive energy efficiency measures. The industry reduction strategy would include an audit of the 800 largest emission sources in California to identify and implement greenhouse gas reduction opportunities or opportunities to reduce fugitive emissions. Actions to reduce high global warming potential gases will include capture of refrigerants and other high global warming potential gases already in use, and implementation of leak-resistant equipment and other restrictions or fees to reduce the potential for future impacts. Preserving forest sequestration and encouraging the use of forest biomass for sustainable energy generation are the primary components of the forestry strategy. Agricultural actions to reduce emissions would include utilizing more efficient agricultural equipment and fuel and water use approaches. Waste and recycling measures would include methane emissions reductions from landfills and increased recycling. The estimated reductions from the use of cap-and-trade and complementary measures and uncapped sources/sectors is, respectively 146.7 and 27.3 million tons of carbon dioxide equivalent (MMTCO2E). Thus, the total reduction toward the 2020 target from the strategies described above is estimated to be 174 MMTCO2E. (CARB, 2010b).

Climate change and GHG reduction is also a concern at the federal level; however, at this time, no legislation or regulations have been enacted specifically addressing GHG emissions reductions and climate change.

Existing Conditions

Air Quality Attainment Status. Since 1989, the CARB has provided area designations that establish if an air basin has met (i.e., attained) the CAAQSs for ten criteria pollutants. As necessary, these designations have been revised annually. The most current adopted area designations (i.e., the 2006 area designations) became effective on July 26, 2007. No revisions to the designations have been adopted since that time (CARB, 2010c). However, the CARB has proposed area designation modifications for 2010 based on data collected during 2006-2008 (CARB, 2010d). Following a public hearing to consider the proposed 2010 area designations, the CARB determined that the proposed designations should be adopted and submitted a final rulemaking package to the Office of Administrative Law (OAL) on July 15, 2010 (CARB, 2010d). The OAL has until August 26, 2010 to make a determination on the proposed designation modifications. Tables 5-3 and 5-4 illustrate the 2006 adopted state area designations and the proposed 2010 area designation modifications.

The CARB is also responsible for submitting recommended area designations to the U.S. EPA that illustrate which California air basins are in compliance with the NAAQSs. The U.S. EPA then reviews and adopts or modifies the CARB-recommended designations. The U.S. EPA-adopted NAAQS area designations for the 13 air basins are shown in Table 5-5.

TABLE 5-3. 2006 ADOPTED AREA DESIGNATIONS FOR CAAQSS BY AIR BASIN

	CAAQS Compliance									
Air Basin	**Ozone**	**PM2.5**	**PM10**	**CO**	**NO2**	**SO2**	**Sulfates**	**Hydrogen Sulfide**	**Lead**	**Visibility Reducing Particles**
Great Basin Valleys	U/N	U	N	U/A	A	A	A	U/A	A	U
Lake County	A	A	A	A	A	A	A	A	A	A
Lake Tahoe	U	A	N	A	A	A	A	U	A	U
Mojave Desert	N	U/N	N	U/A	A	A	A	U/N	A	U
Mountain Counties	U/N	U/N	U/N	U/A	A	A	A	U/N	A	U
North Central Coast	N	A	N	U/A	A	A	A	U	A	U
North Coast	N/A[1]	U	A/N[3]	U/A	A	A	A	U/A	A	U
Northeast Plateau	U/N	U	A/N[4]	U	A	A	A	U	A	U
Sacramento Valley	N/NT	U/N	N	U/A	A	A	A	U	A	U
Salton Sea	N	U/N	N	A	A	A	A	U	A	U
San Diego	N	N	N	A	A	A	A	U	A	U
San Francisco	N	N	N	A	A	A	A	U	A	U

	CAAQS Compliance									
Air Basin	**Ozone**	**PM2.5**	**PM10**	**CO**	**NO2**	**SO2**	**Sulfates**	**Hydrogen Sulfide**	**Lead**	**Visibility Reducing Particles**
San Joaquin Valley	N	N	N	U/A	A	A	A	U	A	U
South Central	N	A/U/N[2]	N	A	A	A	A	A/U	A	U
South Coast	N	N	N	A	A	A	A	U	A	U

Footnotes:
N = nonattainment A = attainment U = unclassified
NT = nonattainment-transitional
[1] = Sonoma County is in nonattainment and the rest of the basin is in attainment.
[2] = San Luis Obispo, Santa Barbara, and Ventura counties are in attainment, unclassified, and nonattainment, respectively.
[3] = Sonoma County is in attainment and the rest of the basin is in nonattainment.
[4] = Siskiyou County is in attainment. All other counties in the basin are in nonattainment.
Source: California Air Resources Board, 2010d

TABLE 5-4. 2010 PROPOSED AREA DESIGNATIONS FOR STATE AMBIENT AIR QUALITY STANDARDS BY AIR BASIN

	State Ambient Air Quality Standard Compliance									
Air Basin	**Ozone**	**PM2.5**	**PM10**	**CO**	**NO2**	**SO2**	**Sulfates**	**Hydrogen Sulfide**	**Lead**	**Visibility Reducing Particles**
Great Basin Valleys	U/N	***A***	N	U/A	A	A	A	U/A	A	U
Lake County	A	A	A	A	A	A	A	A	A	A
Lake Tahoe	***N***	A	N	A	A	A	A	U	A	U
Mojave Desert	N	U/N	N	U/A	A	A	A	U/N	A	U
Mountain Counties	U/N	U/N	U/N	U/A	A	A	A	U/N	A	U
North Central Coast	N	A	N	U/A	A	A	A	U	A	U
North Coast	***A***	U	A/N[4]	U/A	A	A	A	U/A	A	U
Northeast Plateau	U/***NT***	U	A/N[5]	U	A	A	A	U	A	U
Sacramento Valley	N/***NT***[1]	***A/***N/U[2]	N	U/A	A	A	A	U	A	U
Salton Sea	N	U/N	N	A	A	A	A	U	A	U
San Diego	N	N	N	A	A	A	A	U	A	U
San Francisco	N	N	N	A	A	A	A	U	A	U
San Joaquin Valley	N	N	N	U/A	A	A	A	U	A	U
South Central	N	A/U/N[3]	N	A	A	A	A	A/U	A	U
South Coast	N	N	N	A	***N***	A	A	U	***N***	U

Footnotes:
N = nonattainment A = attainment U = unclassified
NT = nonattainment-transitional
Bold and italicized area designations indicate a change from the adopted 2006 designations.
[1] = The CARB has proposed to designate Sutter and Yuba counties as nonattainment-transitional areas from an existing designation of nonattainment. This change occurs by operation of law under Health and Safety Code section 40925.5.

	State Ambient Air Quality Standard Compliance									
Air Basin	**Ozone**	**PM2.5**	**PM10**	**CO**	**NO2**	**SO2**	**Sulfates**	**Hydrogen Sulfide**	**Lead**	**Visibility Reducing Particles**

[2] = The CARB has proposed to designate Colusa, Placer, Shasta, Sutter and Yuba counties as attainment areas. The adopted designation for these counties was nonattainment for Placer County and unclassified for the other counties.
[3] = San Luis Obispo, Santa Barbara, and Ventura counties are in attainment, unclassified, and nonattainment, respectively.
[4] = Sonoma County is in attainment and the rest of the basin is in nonattainment.
[5] = Siskiyou County is in attainment. All other counties in the basin are in nonattainment.
Source: California Air Resources Board 2010d and 2010e

TABLE 5-5. CURRENT ADOPTED AREA DESIGNATIONS FOR NAAQSS BY AIR BASIN

	NAAQS Criteria Compliance						
Air Basin	**Ozone**	**PM2.5**	**PM10**	**CO**	**NO2**	**SO2**	**Lead**[1]
Great Basin Valleys	U/A	U/A	N/U	U/A	U/A	U	U/A
Lake County	U/A	U/A	U	U/A	U/A	U	U/A
Lake Tahoe	U/A	U/A	U	U/A	U/A	A	U/A
Mojave Desert	N/U/A	U/A	N/U/A	U/A	U/A	U	U/A
Mountain Counties	N/U/A	U/A/N	U	U/A	U/A	U	U/A
North Central Coast	U/A	U/A	U	U/A	U/A	U	U/A
North Coast	U/A	U/A	U	U/A	U/A	U	U/A
Northeast Plateau	U/A	U/A	U	U/A	U/A	U	U/A
Sacramento Valley	N/U/A	U/A/N	N/U	U/A	U/A	U	U/A
Salton Sea	N	U/A/N	N/U	U/A	U/A	U/A	U/A
San Diego	N	U/A	U	U/A	U/A	A	U/A
San Francisco	N	N	U	U/A	U/A	A	U/A
San Joaquin Valley	N	N	A	U/A	U/A	U/A	U/A
South Central	N/U/A	U/A	U	U/A	U/A	U/A	U/A
South Coast	N	N	N	U/A	U/A	A	U/A

Footnotes:
N = nonattainment A = attainment U = unclassified
NT = nonattainment-transitional
1 = CARB's recommended area designation for the 2008 federal lead standard is nonattainment for Los Angeles County of the South Coast Air Basin based on 2006-2008 lead air quality data. Additionally, Imperial County is the only county for which CARB recommends an attainment designation. All other counties/air basins are unclassifiable due to a lack of data.
Source: California Air Resources Board 2010c and 2009a, U.S. Environmental Protection Agency 2010

Class 1 Areas. Section 169A of the CAA established a national goal of preventing any future, and remedying any existing, impairment to natural visibility in designated "Class 1 areas" by 2064 (Parker and Blodgett, 2006; CARB, 2009b). Class 1 areas are designated national parks and wilderness areas. California has 29 Class 1 areas. The CARB prepared a Regional Haze Plan (RHP) in 2009 to establish a strategy for California to demonstrate reasonable progress in reducing haze by 2018, the first benchmark year established to meet the 2064 goals (CARB, 2009b). Table 5-6 provides the current visibility measurements in California's Class 1 areas and the future natural condition goals for the year 2064. The visibility improvement needed in the Class 1 areas from the current conditions to meet the 2064 goals ranges from 25-70% (CARB, 2009c).

TABLE 5-6. SUMMARY OF CALIFORNIA CLASS 1 AREAS CURRENT VISIBILITY CONDITIONS AND FUTURE VISIBILITY GOALS

California Class 1 Areas (Visibility Calculated in Deciviews)[1]			Current Conditions (2000-2004)		Future Natural Conditions (2064 Goals)		
IMPROVE Monitor Name and Elevation in meters)[2]		Class 1 Area(s)	Worst Days	Best Days (maintain in future years)	Natural Worst Days	Deciview Hurdle (baseline to 2064)	Improvement from Current Visibility on Worst Days (%)
Northern California							
TRIN (1014 m)	Trinity	Marble Mountain Wilderness, Yolla Bolly-Middle Eel Wilderness	17.4	3.4	7.9	9.5	55
LABE (1460 m)	Lava Beds	Lava Beds National Monument, South Warner Wilderness	15.1	3.2	7.9	7.2	48
LAVO (1733 m)	Lassen Volcanic	Lassen Volcanic National Park, Caribou Wilderness, Thousand Lakes Wilderness	14.1	2.7	7.3	6.8	48
Sierra California							
BLIS (2131 m)	Bliss	Desolation Wilderness, Mokelumne Wilderness	12.6	2.5	6.1	6.5	52
HOOV (2561 m)	Hoover	Hoover Wilderness	12.9	1.4	7.7	5.2	40
YOSE (1603 m)	Yosemite	Yosemite National Park,	17.6	3.4	7.6	10.0	57

California Class 1 Areas (Visibility Calculated in Deciviews)[1]			Current Conditions (2000-2004)		Future Natural Conditions (2064 Goals)		
IMPROVE Monitor Name and Elevation in meters)[2]		Class 1 Area(s)	Worst Days	Best Days (maintain in future years)	Natural Worst Days	Deciview Hurdle (baseline to 2064)	Improvement from Current Visibility on Worst Days (%)
		Emigrant Wilderness					
KAIS (2598 m)	Kaiser	Ansel Adams Wilderness, Kaiser Wilderness, John Muir Wilderness	15.5	2.3	7.1	8.4	54
SEQU (519 m)	Sequoia	Sequoia National Park, Kings Canyon National Park	25.4	8.8	7.7	7.7	70
DOME (927 m)	Dome Lands	Dome Lands Wilderness	19.4	5.1	7.5	11.9	61
Coastal California							
REDW (244 m)	Redwood	Redwood National Park	18.5	6.1	13.9	4.6	25
PORE (97 m)	Point Reyes	Point Reyes National Seashore	22.8	10.5	15.8	7.0	31
PINN (302 m)	Pinnacles	Pinnacles Wilderness, Ventana Wilderness	18.5	8.9	8	10.5	57
RAFA (957 m)	San Rafael	San Rafael Wilderness	18.8	6.4	7.6	11.2	60
Southern California							
SAGA (1791 m)	San Gabriel	San Gabriel Wilderness, Cucamonga Wilderness	19.9	4.8	7.0	12.9	65
SAGO (1726 m)	San Gorgonio	San Gorgonio Wilderness, San Jacinto Wilderness	22.2	5.4	7.3	14.9	67
AGTI (508 m)	Agua Tibia	Agua Tibia	23.5	9.6	7.6	15.9	68
JOSH (1235 m)	Joshua Tree	Joshua Tree National Park	19.6	6.1	7.2	12.4	63

California Class 1 Areas (Visibility Calculated in Deciviews)[1]		Current Conditions (2000-2004)		Future Natural Conditions (2064 Goals)		
IMPROVE Monitor Name and Elevation in meters)[2]	Class 1 Area(s)	Worst Days	Best Days (maintain in future years)	Natural Worst Days	Deciview Hurdle (baseline to 2064)	Improvement from Current Visibility on Worst Days (%)

[1] Deciview units are the natural logarithm of light extinction, which affects the visibility or clarity of objects viewed at a distance by the human eye. The deciview scale is zero for pristine conditions and increases as visibility degrades. Each deciview change represents a perceptible change in visual air quality to the average person. Generally, a one deciview change in the haze index is likely perceptible by a human regardless of background visibility conditions. This is approximately a 10 percent change in the light extinction reading.

[2] The IMPROVE (Interagency Monitoring of Protected Visual Environments) monitoring network is deployed throughout the United States. Seventeen sites (listed above) are operated in California.

Source: California Air Resources Board 2009c.

Greenhouse Gases. Anthropogenic emissions of greenhouse gases are widely accepted in the scientific community as contributing to global warming. According to Climate Change 2007: The Physical Science Basis: Summary for Policymakers (Intergovernmental Panel on Climate Change (IPCC) 2007), there is no doubt that the climate system is warming. Global average air and ocean temperatures, as well as global average sea level, are rising. Between 1995 and 2006, 11 years have ranked as among the warmest on record since 1850. While some of the increase is explained by natural occurrences, the 2007 report asserts that the increase in temperature is very likely (> 90%) due to human activity, most notably the burning of fossil fuels.

For California, similar effects are described in Our Changing Climate: Assessing the Risks to California (California Climate Change Center 2006). Based on projections using state of the art climate modeling, the temperatures in California are expected to rise between 3 degrees Fahrenheit (°F) and 10.5°F (1.7 degrees Celsius [°C] and 5.8°C) by the end of the century, dependent on how much California is able to reduce its GHG emissions. The report states that these temperature increases will negatively impact public health, water supply, agriculture, plant and animal species, and the coastline.

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and Toxic Air Contaminants, which are pollutants of regional and local concern. Worldwide, California is the 12th to 16th largest emitter of CO_2 (California Energy Commission [CEC], 2006), and is responsible for approximately 2% of the world's CO_2 emissions (CEC, 2006).

The IPCC has been established by the World Meteorological Organization and United Nations Environment Program to assess scientific, technical, and socio-economic information relevant to the understanding of climate change, its potential impacts and options for adaptation and mitigation. The IPCC predicts substantial increases in temperatures globally may affect the natural environment in California in the following ways, among others:

- rising sea levels along the California coastline, particularly in San Francisco and the San Joaquin Delta due to ocean expansion;

- extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent;
- an increase in heat-related human deaths, infection diseases, and a higher risk of respiratory problems caused by deteriorating air quality;
- reduced snow pack and stream flow in the Sierra Nevada, affecting winter recreation and water supplies;
- potential increase in the severity of winter storms, affecting peak stream flows and flooding;
- changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield; and/or
- changes in distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

GHG emissions in California are attributable to human activities associated with industry/ manufacturing, utilities, transportation, residential, and agricultural sectors (CEC, 2006) as well as natural processes. Transportation is responsible for 41% of the state's GHG emissions, followed by the electricity generation (23%), industrial sector (20%), agriculture and forestry (8%) and other sources (8%) (CEC, 2006). Emissions of CO2 and NO2 are byproducts of fossil fuel combustion, among other sources. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources. Sinks of CO2 include uptake by vegetation and dissolution into the ocean.

Commercial Fishing

Commercial fishing may be another historic, current, and/or future contributing factor to the cumulative effects on California's anadromous fish populations (e.g., Chinook salmon). The National Marine Fisheries Service (NMFS) regulates commercial, recreational, and tribal fishing of anadromous fish populations native to California, Oregon, and Washington through its Pacific Coast Salmon Fishery Management Plan (SFMP). The goals of the SFMP are to "achieve optimum yield, prevent overfishing, and ensure rebuilding of salmon stocks if their abundance has been depressed to an overfished level" (NMFS, 2010). By establishing an annual goal for the number of spawners of the major salmon stocks ("spawner escapement goals") and allocating the harvest among different groups of fishermen (commercial, recreational, tribal, various ports, ocean, and inland), the SFMP manages the fishing of Chinook salmon (NMFS, 2010). Annual goals are based on the geographic range and specific stocks (e.g., winter, fall, or spring runs).

In recent years, Chinook salmon stocks in California have not met the NMFS-designated spawner encasement objectives. The forecasted 2008 preseason spawner escapement for the Sacramento River fall Chinook salmon was 59,000 adults (NMFS, 2009). During that year, the actual spawner escapement for the Sacramento River fall Chinook salmon stocks was approximately 66,264 adults, which is the lowest escapement estimate on record and < 54% of the lower end of the SFMP conservation objective of 122,000 to 180,000 natural and hatchery adults (NMFS, 2009). The 2008 actual spawner escapement for the Klamath River fall Chinook salmon was approximately 30,925 adults, which was approximately 76% of the preseason forecasted escapement of 40,700 adults (NMFS, 2009). As a result of the failure of the preseason forecasted spawner escapement values to meet the minimum SFMP conservation goals , NMFS closed nearly all ocean fisheries potentially affecting Chinook salmon south of Cape Falcon, Oregon in 2008 (NMFS, 2009). Therefore, commercial fishing is managed to help minimize adverse effects on anadromous fish populations.

Dams

Dams are generally constructed and operated for flood control, recreation, water supply, and/or hydroelectric generation purposes. However, the implementation and operation of dams has multiple effects on the downstream biological resources, particularly to fish habitats, and water quality. Effects of dams typically include:

- creating migration barriers;
- blocking/reducing spawning and rearing habitat;
- reducing gravel transport downstream;
- altering the downstream hydrologic regime (e.g., flow quantities, flood pulse flows);
- creating slow water habitat unsuitable for native stream/river species; and/or
- altering downstream water temperatures (Knight and Boyer, 2007).

Almost every stream or river in the western Sierra Nevada has at least one dam or diversion to capture the water supplies from the Sierra Nevada snowpack (Moyle et al., 1996). These dams have blocked approximately 95% of the spawning and holding habitats for spring-run Chinook salmon and substantially reduced access to habitats for other runs of salmon, steelhead, and Pacific lamprey (Moyle et al., 1996). Additionally, alterations to a stream or lake by dams commonly allows for the presence or invasion of non-native species (Moyle et al., 1996).

In the Klamath River Basin, 4 hydroelectric dams currently operate along 300 miles of the Klamath River in southern Oregon and northern California. In addition to impeding the passage of anadromous fish, the presence of these dams have resulted in increased water temperatures, elevated nutrient levels, low dissolved oxygen concentrations, elevated pH, increased incidence of fish disease, and abundance of aquatic plant growth, all of which have led to a decreased the quality and quantity of suitable habitat for fish and aquatic life (SWRCB, 2010a). In addition, over-allocation of water resources related to the dams have contributed to the decline of endemic fish species, including the Lost River sucker and the short-nosed suckers of the Upper Klamath Lake and coho salmon in the Klamath River, which are a traditional food source of local tribes (Foster, 2002). The license to operate these dams expired in 2006 though in lieu of relicensing, several proposals are underway to study the costs and benefits of dam removal and to reach a comprehensive settlement for Klamath water usage.

Effluent Pollution

A variety of nonpoint and point sources may contribute pollutants to water bodies where suction dredge activities would occur. Point sources are defined as “any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, and well" (SWRCB, 2010b)." Types of point sources may include discharges from wastewater treatment plants and industrial or commercial uses. Nonpoint sources are diverse and widespread and commonly include agriculture, construction activities, forestry, mining, and urbanized areas. Rainfall and snowmelt runoff transport pollutants from nonpoint sources to surface waters as the runoff travels over and through the ground surface (U.S. EPA, 1994).

Water quality impairments in California's surface waters have been identified and categorized on the SWRCB's 303(d) list. Types of pollutant impairments include: mercury, other metals, nutrients, other inorganics, other organics, pathogens, pesticides, salinity, sediment, and toxicity. Other metals, mercury, and sediments are relevant to the Proposed Program as discussed in Chapter 4.2 *Water Quality and Toxicology*. As shown in Table 4.2-1 in the Water Quality and Toxicology chapter, 178 California water bodies have mercury impairments, 407 have other metal impairments, and 728 water bodies have sediment impairments. These pollutants can affect aquatic species directly (e.g., diseases or bioaccumulation) or indirectly (i.e., alteration of habitat type/quality due to altered sediment loads).

Introductions of Non-Native Species

Introductions of non-native fish species and other species are a cumulatively contributing factor to the decline of many native fish species. Non-native fish species may affect native fish species through predation, competition for prey, habitat destruction, harassment of adult fish, or serving as a food source for native species. Thirty species of non-native fish have been introduced into or have invaded most waters of the Sierra Nevada range in California (Moyle et al., 1996). Many of the non-native fish species are now located in waters, mainly at high elevations, that originally did not have fish. These non-native fish have had strong negative effects on ten of twenty fish species identified by Moyle et al. (1996) as being in decline with most significant effects occurring on native trout species. In addition to the direct effects on native species from the introduced species, efforts to remove introduced species may also cumulatively affect native species.

Mining

The California gold rush and the resulting extensive immigration of miners and use of hydraulic mining have had lasting cumulative impacts on the water quality and biological resources of California. Historic mining activities, particularly hydraulic mining, affected aquatic species through the release of great quantities of sediment into streams and the removal of large amounts of fish habitat. Mining activities have contributed to low fish populations in some areas through the lasting effects (i.e., siltation, streambank alteration) of hydraulic mining and the roads and tailing piles associated with hardrock mines (Moyle et al., 1996). As discussed in Chapter 4.2, *Water Quality and Toxicology*, mercury is a constituent of concern from past mining activities and is an identified 303(d) list impairment for numerous water bodies in California.

Also, it is important to note that there are other placer gold mining activities which take place within the riverine environment in similar locations as suction dredging. These include panning, high-banking, sluicing, power sluicing, use of non-motorized suction dredge equipment, etc. Some of these activities may have impacts which are similar to those of suction dredging, although in some cases (e.g., high-banking), the primary material that is being mined is above the existing water line.

Recreational Activities

Recreational activities may result in numerous potential cumulative impacts on resources at or near suction dredge locations, including potential impacts on air quality, biological resources, climate change, hydrology and water quality, and noise. Types of recreational activities may include but not be limited to: off-road vehicle use, camping, rafting, and the construction and/or use of trails. Travel to and from recreational areas and the use of off-road vehicles may cumulatively contribute to air quality impacts. The recreational activities could result in the disturbance or displacement of biological species (including nesting raptors) and loss of riparian habitat. In addition, according to Moyle et al. (1996) the success of fish spawning may be reduced by heavy use of streams by rafters or anglers and disturbances to fish that are holding or spawning. Cumulative water quality impacts of recreational activities would potentially be related to erosion caused by off-road vehicle use and any improper disposal of human waste or trash. In addition, recreationists may alter the short-term noise levels of outdoor areas primarily through the use of off-road vehicles. Short-term noise impacts may affect terrestrial biological resources, including nesting bird species.

Recreational Fishing

Recreational fishing of Chinook salmon and other fish species could cumulatively contribute to impacts on aquatic resources potentially affected by the Program. Declines in anadromous fish populations have resulted in NMFS-designated restrictions on recreational fishing for Chinook salmon (Pacific Fishery Management Council, 2009). In 2008, time harvest regulations severely restricted recreational angling in Central Valley Rivers relative to recent years. Approximately 1 percent (650 adults) of the Sacramento River fall Chinook salmon run was harvested (Pacific Fishery Management Council, 2009). Harvest rates in previous years (1991-2007) averaged approximately 14 percent of the river run. Additionally, the majority of the San Joaquin River has been closed to recreational salmon fishing because of the low escapements in the Stanislaus, Tuolumne, and Merced rivers since the late 1990s (Pacific Fishery Management Council, 2009).

Streambed Alteration

Numerous alterations of California streambeds have occurred in the past for flood control, water supply, agriculture, and other purposes. The alterations generally occur to deepen, straighten, enlarge, or relocate a stream or river channel (SWRCB, 2000). Types of alterations to streams include but are not limited to: channelization, straightening, levee construction, streambank stabilization, and woody debris removal.

Streambed alterations can cumulatively affect the water quality and the terrestrial and aquatic biological resources of surface waters potentially affected by the Program. Water quality effects of the streambed alteration activities may include altering the water temperature, changing the natural supply quantity or path of fresh water to a water body, and altering the rates and paths of sediment erosion, transport, and deposition (SWRCB, 2000). Levee, streambank stabilization, or channelization activities may accelerate the movement of surface water and pollutants from the upper to lower reaches of watersheds

(SWRCB, 2000). In addition, channelization of streams or rivers can "reduce the suitability of instream and streamside habitat for fish and wildlife by depriving wetlands and estuarine shorelines of enriching sediments, affecting the ability of natural systems to filter pollutants, and interrupting the life stages of aquatic organisms" (SWRCB, 2000). Alterations to streambeds are likely to continue in the future.

Timber Harvest

Timber harvesting is a cumulative contributor to impacts affecting climate change, water quality, and biological resources. The removal of trees may cumulatively contribute to climate change-related impacts as fewer plants would be available to absorb carbon dioxide, a greenhouse gas. Water quality impacts from timber harvesting are related to erosion and sediment transport from the construction of roads, increased flows, and altered peak runoff rates resulting from the removal of the land cover (i.e., trees). Historically, timber harvesting in the 1950s through the 1970s increased erosion and sediment delivery rates to extreme levels across the north coast of California (Klein, 2008). Although historic harvesting activities may have a continued impact on water quality or biological resources, current timber harvesting has a greater impact on these resource areas. Klein (2008) found that the turbidity concentrations of small streams in north coastal California were dramatically impacted by the extent of current timber harvesting activities within the respective watersheds. Stream turbidity concentrations in zero harvest (0%/year), low harvest (0.1-1.5%/year), and high harvest (>1.5%/year) watersheds were, respectively, 13, 20, and 61 formazin nephelometric units (FNU[1]). Both the low harvest and high harvest watersheds exceeded the California regulatory limit (20% above background) for northern streams by 38% and 349%, respectively (Klein, 2008). Removal of timber can affect biological resources via loss of shade and increased water temperatures, increased erosion and deposition of sediments on spawning habitats, and less woody debris in streams and less potential fish/aquatic organism habitat.

TMDL Plans

As described in Chapter 4.2 *Water Quality and Toxicology*, TMDLs for listed pollutants and water bodies, are an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). The SWRCB has identified 691 water bodies in California that require the development of TMDLs, 220 water bodies that are currently being addressed by TMDLs, and eight water bodies where actions other than TMDLs are being implemented to improve water quality (SWRCB, 2007). Thus, there are a number of water bodies that still require the implementation of TMDLs. Once established, the TMDL allocates the permissible contaminant loading among current and future pollutant sources to the water body to ensure that water bodies maintain compliance with the established water quality standards. As described in the Effluent Pollution discussion above, TMDLs can be prepared for a variety of pollutants, including mercury, heavy metals, and sediments. When implemented, TMDLs can improve water quality and reduce existing water quality impairments.

[1] FNU is a measurement of turbidity that is similar but not identical to nephelometric turbidity units (NTU). The difference is based on the wavelength of light used to make the measurement. Due to the fact that suspended particles scatter light of different wavelengths with varying efficiency, FNU data often are not directly comparable to NTU data. (USGS, 2005).

Tribal Fishing

Federally-recognized Native American tribes provide fisheries and wildlife resources management over approximately 52 million acres of reservation lands in the lower 48 states (Native American Fish and Wildlife Society [NAWFS], 2010). In addition, federally-recognized Native American tribes have co-jurisdiction over approximately 38 million acres of "Ceded and Usual and Accustomed Areas," which are lands outside of the reservations that allow a co-management status between tribes and states due to federal court decisions or voluntary cooperative agreements (NAWFS, 2010). There are 107 federally-recognized tribes in California and one in the Klamath Basin (USFWS, 2010).

The USFWS has established tribal partnerships to support fish and wildlife conservation efforts. As part of this partnership, the USFWS has a Tribal Wildlife Grant Program that provides funding to "federally-recognized tribes to develop and implement programs for the benefit of wildlife and their habitat, including species of Native American cultural or traditional importance and species that are not hunted or fished" (USFWS, 2010). From these grants, tribes have been able to increase their management capacities, enhance relationships with partners, and enhance recovery efforts for threatened and endangered species, in addition to other grant-supported actions (USFWS, 2010).

Fishery and wildlife resources management by tribes may allow for tribal fishing. Tribal fishing is typically conducted for ceremonial, subsistence, or commercial fisheries purposes that are managed to be consistent with federal fishery management goals. As described under the Commercial Fishing discussion above, NMFS annually allocates the salmon harvest among different groups of fishermen, including Native American tribes, and has historically limited or banned salmon harvests if the actual populations did not meet anticipated minimum SFMP conservation goals. Therefore, tribal fishing is managed to help minimize adverse effects on anadromous fish populations.

Urbanization

Continued population growth in California and the increasing conversion of lands to urbanized uses may contribute to cumulative impacts on climate change and the water quality and biological resources of California surface waters. Table 5-7 provides the projected population changes in California counties from 2010 to 2050 (California Department of Finance, 2007). Nearly all counties would experience population growth and some counties would experience greater than 100% growth. Increasing populations in California may lead to additional impacts on climate change, aquatic resources, and water quality through:

- Increased impermeable surfaces and greater or more polluted runoff loadings;
- Increased water demands and usage;
- Increased energy needs and consumption, including vehicle fuel usage; and
- Increased recreational use.

The primary pollutants found in runoff from urban areas include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, and viruses (SWRCB, 2000). Construction areas are a major source of suspended sediments, which contribute the largest mass of pollutant loadings to receiving waters from urban areas (SWRCB, 2000).

Increased water demands and usage could result in greater water diversions and the resulting impacts on aquatic biological resources, and greater energy usage to transport waters to urban areas. Energy use increases would result in the release of additional greenhouse gases and cumulatively contribute to climate change. An increased population may lead to an increase in recreational activities and the subsequent disturbances to aquatic or terrestrial habitats or water quality impacts.

TABLE 5-7. PROJECTED CALIFORNIA POPULATION CHANGES BY COUNTY, 2010 TO 2050

County	2010	2050	Change	County	2010	2050	Change
Alameda	1,550,133	2,047,658	32.1%	Orange	3,227,836	3,987,625	23.5%
Alpine	1,369	1,377	0.6%	Placer	347,543	751,208	116.1%
Amador	40,337	68,487	69.8%	Plumas	21,824	28,478	30.5%
Butte	230,116	441,596	91.9%	Riverside	2,239,053	4,730,922	111.3%
Calaveras	47,750	80,424	68.4%	Sacramento	1,451,866	2,176,508	49.9%
Colusa	23,787	41,662	75.1%	San Benito	64,230	145,570	126.6%
Contra Costa	1,075,931	1,812,242	68.4%	San Bernardino	2,177,596	3,662,193	68.2%
Del Norte	30,983	56,218	81.4%	San Diego	3,199,706	4,508,728	40.9%
El Dorado	189,308	314,126	65.9%	San Francisco	818,163	854,852	4.5%
Fresno	983,478	1,928,411	96.1%	San Joaquin	741,417	1,783,973	140.6%
Glenn	30,880	63,586	105.9%	San Luis Obispo	269,734	364,748	35.2%
Humboldt	134,785	152,333	13.0%	San Mateo	736,667	819,125	11.2%
Imperial	189,675	387,763	104.4%	Santa Barbara	434,497	534,447	23.0%
Inyo	19,183	25,112	30.9%	Santa Clara	1,837,361	2,624,670	42.8%
Kern	871,728	2,106,024	141.6%	Santa Cruz	268,016	333,083	24.3%
Kings	164,535	352,750	114.4%	Shasta	191,722	331,724	73.0%
Lake	67,530	106,887	58.3%	Sierra	3,628	3,547	-2.2%
Lassen	37,918	55,989	47.7%	Siskiyou	47,109	66,588	41.3%
Los Angeles	10,514,663	13,061,787	24.2%	Solano	441,061	815,524	84.9%
Madera	162,114	413,569	155.1%	Sonoma	495,412	761,177	53.6%
Marin	253,682	307,868	21.4%	Stanislaus	559,708	1,191,344	112.9%
Mariposa	19,108	28,091	47.0%	Sutter	102,326	282,894	176.5%
Mendocino	93,166	134,358	44.2%	Tehama	65,593	124,475	89.8%
Merced	273,935	652,355	138.1%	Trinity	15,172	30,209	99.1%
Modoc	10,809	24,085	122.8%	Tulare	466,893	1,026,755	119.9%
Mono	14,833	36,081	143.2%	Tuolumne	58,721	73,291	24.8%
Monterey	433,283	646,590	49.2%	Ventura	855,876	1,229,737	43.7%
Napa	142,767	251,630	76.3%	Yolo	206,100	327,982	59.1%
Nevada	102,649	136,113	32.6%	Yuba	80,411	201,327	150.4%
Total (State)	39,135,676	59,507,876	52.1%				

Source: California Department of Finance, 2007

Water Diversions

Surface water bodies provide a substantial portion of California's water supply and can be potentially impacted by numerous water diversions on each water body. The multiple purposes of water diversions may include serving as a water supply for municipal, industrial or agricultural irrigation uses, electricity generation, and other uses. Water diversions state-wide can cumulatively affect the biological resources and water quality of diverted or downstream water bodies potentially affected by the suction dredge activities.

Water diversions can impact biological resources through entrainment, capture on fish screens that result in death or injury, dewatering of stream reaches, reduced or altered hydrologic flow patterns, and/or effects on water quality, especially water temperature. Similar to dams, water diversions may also contribute to biological resource impacts by blocking movements and migrations, isolating populations, and causing increased human use of the watersheds (Moyle et al., 1996). In addition, alterations to the water quality of diverted water bodies may affect aquatic resources by changing the concentration of pollutants and impacting the potential toxicity or accumulation in food webs (Monsen et al., 2007). As an example, losses of fish at the State Water Project and Central Valley Project pumping facilities were up to 10% of Sacramento River Chinook salmon and 1-50% of adult Delta smelt (Kimmerer, 2008). In addition, NMFS estimates that the mortality rate for entrained fish at the State Water Project and Central Valley Project pumping facilities is approximately 65-84% (NMFS, 2009).

Other impacts of water diversions are on the water quality of diverted water bodies. Diversions can reduce downstream flows, which can lead to increased downstream water temperatures. In the Sacramento-San Joaquin River Delta, the large water diversions at the pumping facilities of the State Water Project and Central Valley Project can alter the water circulation pattern in Delta channels. Subsequent impacts of these water diversions include alterations to the source mixture of water (i.e., fresh waters from the Sacramento and San Joaquin River or estuarine waters from tidal exchange with the San Francisco Estuary), and the flushing time to carry nutrients or pollutants downstream (Monsen et al., 2007).

Wildfire, Fire Suppression, and Fuels Management

- Forest fires may contribute to numerous cumulative effects on the biological resources (e.g., riparian species, amphibians, and fish) and water quality at suction dredge locations. Additionally, forest fires may contribute cumulatively to climate change. Specific impacts that could affect biological resources and water quality include:
- Channel scour,
- Combustion,
- Debris flow and woody debris inputs,
- Decreased cover,
- Hydroperiod (increased surface water),
- Increased nutrients,
- Increased temperature,

- Sedimentation,
- Ash and fine silt in runoff from burned area (Pilliod et al., 2003).

Forest fire fuel management and/or suppression efforts include prescription burning; mechanical fuel reduction, thinning, and logging; construction of fire roads and firebreaks; and chemical applications. Many of the impacts described above relating to biological resources or water quality may occur as a result of the forest fire fuel management or suppression efforts. Fire management practices (ex., use of fire roads and chemical flame retardants) could contribute pollutants (ex., sediments, ammonia- based fire retardants or surfactant-based foams, etc.) to local water bodies. The chemical retardants can be slightly to moderately toxic to algae and invertebrates and moderately to highly toxic to fish (Pilliod et al., 2003). In addition, management of post-wildfire areas via timber harvesting may contribute to erosion depending on the extent of ground disturbance by equipment and road use, the size of the area to be harvested (Peterson, 2009). Forest fires and fuel management efforts (i.e., prescription burning) may contribute to climate change through the removal of trees, which can absorb the greenhouse gas carbon dioxide, and through the emission of carbon dioxide as the vegetation is burned.

5.5.3 Cumulative Impacts

Impact CUM-1. Effects on Fish Species and their Habitats (Less than Significant)

Tables 4.3-1 and 4.3-2 list the *Fish* species considered in this SEIR. *Fish* species include "wild fish, mollusks, crustaceans, invertebrates, and amphibians, including any part, spawn, or ova thereof." Potential adverse effects of suction dredging on *Fish* species may include: direct entrainment, creation of barriers to movement/migration, stress or other behavior impacts, alteration of prey base, alteration of flow rates, and degradation of habitat and/or water quality (See Chapters 4.1 through 4.3 for complete description of impacts). Non-program related activities that may impact *Fish* species either through increased competition, water quality degradation, flow alterations, barriers to movement/migration, or alterations to the natural hydrologic processes include: agriculture, aquaculture, climate change, dams, effluent pollution, introductions of nonnative species, recreational activities, streambed alteration, timber harvest, urbanization, water diversions, and wildfire, fire suppression, and fuels management. Additionally, commercial and recreational fishing have contributed to declines of select fin fish species, particularly salmonids.

Fish species listed in Tables 4.3-1 and 4.3-2 have been designated as special-status by the CDFG, USFWS, or NMFS, or are considered by CDFG to meet the criteria for "rare" as defined under section 15380 of the California Code of Regulations. The population status and/or viability varies for each of these species. For example, the Central California Coast Coho ESU is gravely imperiled and has entered into an extinction vortex (NOAA, 2010); even minor impacts could accelerate this ESU's decline and negate restoration and conservation efforts. Other species/ESUs have less dire population status (e.g., Klamath-Trinity rivers spring-run Chinook ESU), but remain vulnerable to anthropogenic impacts and natural environmental perturbations that further stress the species. In nearly all cases, declines in *Fish* species populations are primarily due to long-term degradation of environmental conditions, which is largely the cumulative result of the suite of anthropogenic activities listed above. Thus, by definition, it is cumulative impacts that threaten the viability of the *Fish* species considered in this SEIR (i.e., there is not a single project or impact that is responsible for the decline of these *Fish* species). The decline of these species is considered to be a significant cumulative impact.

When developing the Proposed Program regulations CDFG considered the population-level effects of suction dredging in the context of the cumulative stresses on *Fish* species with respect to the baseline condition. For example, the Proposed Program regulations close all streams within the range of Central California Coast Coho ESU, thus avoiding an incremental contribution to the cumulative impact affecting this ESU. This approach of avoiding an incremental contribution that would be cumulatively considerable is the only biologically sound manner to develop regulations that ensure deleterious effects are not likely to occur. As such, the cumulative effects of all known projects, foreseeable impacts, and environmental stressors have been considered in designing the suction dredging regulations such that the Proposed Program would not make a cumulatively considerable contribution to the decline of any *Fish* species. Thus, the incremental contribution of the Proposed Program is considered less than significant.

Impact CUM-2. Effects on Wildlife Species and their Habitats (Significant and Unavoidable)

Wildlife (non-*Fish*) species include non-riverine aquatic invertebrates, reptiles, birds and mammals. Tables 4.3-3 and 4.3-4 list the non-*Fish* species considered in this SEIR. Potential adverse effects of suction dredging and ancillary activities such as encampments on these species may include: direct physical disturbance such as trampling; indirect stress-inducing disturbances such as noise; creation of barriers to movement, migration or dispersal; and degradation of habitat (See Chapters 4.1 through 4.3 for complete description of impacts). Non-Program related activities that may impact terrestrial wildlife species either through direct disturbance or habitat alteration include: agriculture, aquaculture, climate change, dams, effluent pollution, introductions of nonnative species, recreational activities, streambed alteration, timber harvest, urbanization, water diversions, and wildfire, fire suppression, and fuels management.

Species listed in Tables 4.3-3 and 4.3-4 have been designated as special-status by the CDFG or USFWS, or are considered by CDFG to meet the criteria for "rare" as defined under section 15380 of the California Code of Regulations. The population status and/or viability vary for each of these species. Similar to *Fish* species, declines in non-*Fish* species populations are largely due to long-term degradation of environmental conditions. With few exceptions, the declines in the population of a non-*Fish* species are the result of the synergistic effects of anthropogenic activities, and not a single causative agent or project. Thus, by definition, it is cumulative impacts that threaten the viability of non-*Fish* species, and the Proposed Program has the potential to contribute to these significant cumulative impacts.

With respect to non-riverine invertebrates (e.g., vernal pool fairy shrimp, Valley elderberry longhorn beetle and Trinity bristle snail) suction dredging and ancillary activities are not likely to result in substantial loss or degradation of habitats that support these species, and direct impacts to individuals are unlikely. This conclusion is based on the known distribution of these organisms and their habitats in relationship to historical and anticipated dredging activity. Thus, the incremental contribution of the Proposed Program is not considered cumulatively considerable, and is considered less than significant.

Based on historical information and the distribution of placer gold, Western pond turtle (*Clemmys marmorata*) is the only reptile species for which suction dredging activities are anticipated to regularly occur in suitable habitat. Dredging may displace Western pond turtles from suitable habitat and ancillary activities may degrade suitable breeding/nesting habitat. However, given the baseline conditions for this species, it is not likely that these activities would contribute substantially to any foreseeable decline in the range or population viability of Western pond turtle. Thus, the incremental contribution of the Proposed Program is not considered cumulatively considerable, and is considered less than significant.

Suction dredging and ancillary activities are likely to occur in areas that provide habitat for several mammal species. Based on historical information and the known distribution of placer gold, suction dredging activities are not anticipated to occur in suitable habitat for federally or state listed threatened or endangered mammals such as the riparian brush rabbit (*Sylvilagus bachmani riparius*), riparian woodrat (*Neotoma fuscipes riparia*), and San Bernardino kangaroo rat (*Dipodomys merriami parvus*). Suction dredging and ancillary activities are likely to occur in areas that provide habitat Species of Concern such as snowshoe hare (*Lepus americanus* ssp.). The incremental effects of the Proposed Program on mammal Species of Concern would not be cumulatively considerable because these species are not likely to be particularly susceptible to suction dredging-related impacts (i.e., the animals can avoid the activity), and the magnitude of impact that may occur is not likely to contribute substantially to any foreseeable decline in the range or population viability of any decision mammal species given the anticipated level and temporal nature of the activity. Thus, the incremental contribution of the Proposed Program is not considered cumulatively considerable, and is considered less than significant.

Suction dredging and ancillary activities are likely to co-occur with several bird species. Of greatest concern are the incremental effects of the Proposed Program on species that are very rare and are likely to occur in close proximity to suction dredging activities. These species include those listed in Table 4.3-3. As described in Impact BIO-WILD-2, suction dredging activities may lead to significant impacts on several of these species at the individual (Proposed Program) level. The incremental contribution of these impacts is also considered considerable at the cumulative level. This impact is considered significant; as described in Impact BIO-WILD-2, no feasible mitigation is available, and as such, the impact is considered significant and unavoidable.

Impact CUM-3. Effects on Special-Status Plant Species (Less than Significant)

CDFG recognizes 293 special-status aquatic and wetland-associated plant species and 912 special-status upland plant species with the potential to be affected by the Proposed Program (Tables 4.3-5 and 4.3-6, respectively). Special-status plant species have the potential to be adversely affected by suction dredging through: access to and egress from streams; establishment of encampments in riparian areas; the dispersal of non-native or invasive species; and unauthorized dredging-associated activities such as direct removal of aquatic or riparian vegetation, destabilization of streambanks, or release of noxious materials (e.g., fuel). Non-program related activities that may impact special-status plant species either through direct disturbance or habitat alteration include: agriculture, climate change, dams, effluent pollution, introductions of nonnative species, recreational activities, streambed alteration, timber harvest, urbanization, water diversions, and wildfire, fire suppression, and fuels management. The primary causes of habitat destruction, degradation or fragmentation are conversion of natural areas to developed land uses and introduction of nonnative species. These factors, and others, act cumulatively to destroy or degrade suitable for special status plant species. Thus, the decline of these species is considered to be a significant cumulative impact.

Proposed Program activities have the potential to locally damage, disturb or destroy individuals or populations; contribute to the introductions of nonnative species; and contribute to climate change. As such, the Proposed Program has the potential to contribute to these significant cumulative impacts.

With respect to upland plant species (Table 4.3-6), suction dredging and ancillary activities are not likely to result in substantial loss or degradation of habitats that support these species, and direct impacts to individuals or populations are unlikely. This conclusion is based on the known distribution of these organisms and their habitats in relationship to historical and anticipated dredging activity. Thus, the incremental contribution of the Proposed Program is not considered cumulatively considerable, and is considered less than significant.

Dredging would be more likely to contribute to cumulative impacts on aquatic and wetland plant species (Table 4.3-5). However, as described in Impact BIO-PLANT-1, various program regulations (such as those prohibiting dredging of vegetation) would provide protection for these species. With these measures in place, the incremental contribution of the Proposed Program is not considered cumulatively considerable, and is considered less than significant.

Impact CUM-4. Contributions to Non-Attainment Status (Less than Significant)

Criteria pollutant emissions can result from the gasoline combustion engines typically used during suction dredge operations. The U.S. EPA establishes emission standards under the federal CAA for small non-road engines such as those used for suction dredges or other suction dredge-related equipment (e.g., generators) (U.S. EPA, 2008). The California Air Resources Board (CARB) has taken initiatives to further control emissions from most mobile sources, including small engines (25 HP or less) (CARB, 2009d).

Various regions in the state are in non-attainment for a range of these criteria pollutants (see Tables 5-3 through 5-5 above). Attainment plans have been developed for these pollutants, and the emissions associated with small engine mobile sources such as suction dredging and related activities are generally considered in the baseline emissions inventories in these plans. Regardless, the level of emissions of criteria pollutants in non-attainment areas (including those from suction dredging) are considered a significant cumulative impact.

Emissions from suction dredging, however, would be consistent with the amounts assumed in the baseline emissions inventories of the attainment plans, and would be relatively small compared to other sources of emissions, considering the number of dredgers, the emissions from the dredges, the frequency of use and distribution of use of the dredgers, and total emissions of the state. Further, on-road emissions associated with travel to/from dredge sites would decrease over time due to replacement of older, high emitting vehicles with newer, lower emitting ones. In addition, the Pavley rule, which is designed to reduce CO_2 emissions, will also reduce criteria pollutant emissions because vehicles will on average be more efficient and burn less fuel (and generate less emissions) per vehicle mile traveled (VMT).

For these reasons, the incremental contribution of emissions associated with suction dredging to the significant cumulative impact would not be cumulatively considerable.

Impact CUM-5. Greenhouse Gas Emissions (Less than Significant)

GHG emissions can result from a variety of sources, including the gasoline combustion engines typically used during suction dredge operations and the vehicles driven to and from dredge sites. Considered at a regional, statewide, or even global scale, the emission of GHGs (which includes emissions from suction dredge operations) is considered a significant cumulative impact due to its contribution to the problem of global climate change.

Information from the Suction Dredge Survey (Appendix F) was used to estimate the magnitude of GHG emissions resulting from the Proposed Program. Note that the future amount of suction dredging and related activity may be different under the Proposed Program than it was in 2008 (under the prior regulations). However, the survey was the best data source available to estimate the level of activity, and is considered adequately representative for the purposes of this analysis.

Two sources of emissions were estimated: (1) emissions from vehicles travelling to/from dredge sites; and (2) emissions from the suction dredges themselves. While other sources of emissions associated with suction dredging are possible (e.g., emissions from generators used at campsites), the two aforementioned sources are believed to be the major sources of emissions associated with the activity.

To calculate vehicle emissions, vehicle miles travelled (VMT) were derived and multiplied by an emissions factor, as follows:

TABLE 5-8. ESTIMATED VEHICLE EMISSIONS

	California Residents	Non-California Residents	Total
Average one-way distance travelled (miles)	132.66	850.65	
Average number of trips	14.69	4.10	
Average number of miles driven	3897.55	6969.19	
Average number of permits issued	3,200	450	
Estimate of VMT	12,472,173	3,136,136	15,608,309
		Estimated tons of annual CO_2 emissions[1]	**6,009**

[1] *Emissions were calculated at 0.77 pounds of CO_2 emitted per VMT*

Emissions from suction dredges were derived by calculating the total hours spent dredging, and once again multiplied by an emissions factor, as follows:

TABLE 5-9. ESTIMATED EMISSIONS FROM SUCTION DREDGES

	California Residents	Non-California Residents	Total
Average time spent dredging per day (hours)	5.24	5.43	
Average number of days spent dredging	30.06	33.39	
Average number of hours spent dredging in 2008 per dredger	157.51	181.31	
Average number of permits issued	3,200	450	
Estimate of total hours spent dredging	504,032	81,590	
Average engine horsepower	7.65	8.53	
Total horsepower-hours	3,855,845	695,963	4,551,808
		Estimated tons of annual CO_2 emissions[1]	**1,857**

[1]Emissions were calculated at 370 grams of CO_2 emitted per horsepower-hour

Considering the small size of the engines, the relatively small number of dredges that could be operated under the Proposed Program, and the temporary and seasonal nature of those operations, the emissions from suction dredge operations are exceedingly small even when considered at a local or regional scale, let alone a statewide or global scale. In addition, California Air Resources Board's recent Low Carbon Fuels Standard will reduce the carbon content and associated CO_2 emissions from gasoline and diesel fuel combustion by 10% by 2020. Further, as described above in Impact CUM-4, the Pavley regulation will additionally reduce CO_2 emissions from on-road travel to and from dredge sites by requiring miles per gallon efficiency improvements in the light duty car and truck vehicle fleet between 2009 and 2020. The combined effect of these rules should substantially reduce CO_2 emissions from suction dredge-related on-road travel when compared to 2008 conditions. Finally, over time, newer more efficient engines will be purchased as replacements for older higher emitting engines. This engine turnover should also reduce suction dredge CO_2 emissions.

The emissions from suction dredge operations are not anticipated to have a measurable effect on the State's ability to meet its greenhouse gas reduction goals under AB 32, and are therefore not considered to make a cumulatively considerable contribution to this significant cumulative impact. In making this determination, CDFG is keenly aware of the important issues faced by the State of California in terms of expected climate change. CDFG would like to be clear against this backdrop that its cumulative impacts significance determination is not based on a proportional comparison of expected project emissions relative to much larger emissions expected at a regional, statewide, national, or even global scale. That is, CDFG's determination that Program-related GHG emissions are not cumulatively considerable is not based on a conclusion that expected Program GHG emissions are small compared to a much larger problem. Rather, CDFG's determination is based on the extremely small quantity of GHG emissions expected with the Proposed Program and the conclusion that, with that small quantity, approval of the Proposed Program is not expected to have a measurable effect on or otherwise impair the State's ability to achieve its long term GHG reduction goals under AB 32.

Impact CUM-6. Turbidity/TSS Discharges from Suction Dredging (Significant and Unavoidable)

Approximately 3.8% of water bodies in CA are listed on the 303(d) list for turbidity/TSS impairments and have an existing TMDL or require implementation of one (SWRCB, 2007). Other past, present, and future pollutant sources that would contribute to the existing turbidity/TSS impairments include: agriculture, aquaculture, effluent pollution, streambed alteration, recreation, urbanization, timber harvest, and wildfire, fire suppression, and fuels management. Generation of turbidity/TSS (including that associated with suction dredging) in a waterbody listed as impaired would be considered a significant cumulative impact.

For 303(d)-listed waters, water quality conditions would improve as TMDL programs are completed. Additionally, implementation of regulations under the Proposed Program to restrict nozzle and hose sizes, prohibit motorized winching or import of fill material, minimize disturbances of streambanks and vegetation, and use reasonable care to avoid dredging silt and clay materials, would minimize the potential incremental contribution of the suction dredge discharges to a cumulative impact in impaired waters.

However, sediment discharges would not be entirely avoided under the Program, and where such discharges are occurring in water bodies with existing turbidity/TSS impairments, the incremental contribution from suction dredging would, to some extent, impede the improvement of these waters under the TMDL program. Thus, the Program's incremental contribution to the significant cumulative impact is determined to be cumulatively considerable. To reduce these effects, potential mitigation includes closures or restrictions on suction dredging in areas impaired for sediment. However, such closures are not within CDFG's jurisdiction to implement since they are not believed to be necessary to avoid deleterious effects to fish, are therefore considered infeasible. No other feasible mitigation measures exist. Therefore, this impact would be significant and unavoidable.

Impact CUM-7. Cumulative Impacts of Mercury Resuspension and Discharge from Suction Dredging (Significant and Unavoidable)

Approximately 178 water bodies in CA are listed on the 303(d) list (Table 4.2-1) for mercury impairments. Additionally, approximately 19% of California water bodies have metal/metalloid impairments, which include Hg impairments (SWRCB, 2007). Discharges of additional mercury to water bodies listed as impaired would be considered a significant cumulative impact due to the lack of assimilative capacity for mercury discharges in those water bodies.

The disturbance of existing river bed sediments and the potential use of mercury (Hg) during suction dredging activities in water bodies listed as impaired for mercury would contribute to a cumulative Hg discharge or impairment downstream. As detailed in Chapter 4.2 *Water Quality and Toxicology*, Hg is present in the sediments of historic gold-mining and gold-bearing regions, particularly in areas known as Hg "hot-spots," because elemental Hg was historically used in both placer and hard-rock gold mining. Disturbances of Hg in these sediments by suction dredging activities would potentially result in "flouring" of Hg and, ultimately, the potential for increased conversion of Hg to its methylmercury (MeHg) form, which can bioaccumulate in fish tissue and pose a human and ecological health hazard.

As detailed in Chapter 4.2 *Water Quality and Toxicology*, the discharge and transport of total Hg (THg) loads from suction dredging of areas containing sediments highly elevated in Hg and elemental Hg is substantial relative to background watershed loadings. Additionally, the flouring of elemental Hg during the suction dredging process would result in an increased Hg surface area and increased potential for downstream transport of Hg to areas favorable to methylation (i.e., downstream reservoirs and wetlands). Therefore, suction dredging has the potential to contribute considerably to: (1) watershed Hg loading to downstream reaches within the same water body and to downstream water bodies, (2) MeHg formation in the downstream reaches/water bodies, and (3) bioaccumulation in aquatic organisms in these downstream reaches/water bodies.

As described in Chapter 3 *Activity Description*, Hg may be used by miners at the suction dredging sites to process any collected gold (i.e., through the amalgamation process). If this Hg was spilled during storage, transport, or use, it could potentially contribute to a cumulative mercury impairment. However, as described in Chapter 4.4 *Hazards and Hazardous Materials*, the Proposed Program's regulations and guidance information would minimize the potential for any mercury discharges resulting from the use of Hg by suction dredging miners. Therefore, the use of Hg by suction dredging miners during processing would not be expected to result in a considerable contribution to cumulative Hg-related water quality impacts.

Other past, present, and future pollutant sources that have contributed to the existing mercury impairments include: effluent pollution, mining, and urbanization. Ultimately, water quality conditions in 303(d)-listed waters would improve as TMDL programs are completed. Additionally, implementation of the regulations under the Program related to nozzle size restrictions may reduce the potential for flouring and reduce the potential incremental contribution of the suction dredge discharges to the significant cumulative impact.

However, Hg discharges would not be entirely avoided under the Program, and the increment of such discharges would make a cumulatively considerable contribution to existing cumulative impacts related to watershed Hg loading, MeHg formation in downstream areas, and bioaccumulation in aquatic organisms (and associated risks related to human or wildlife consumption). To reduce these effects, potential mitigation includes closures or restrictions on suction dredging in areas impaired for Hg, or further restrictions on nozzle size, number of permits, and hours/days spent dredging. However, such closures are not within CDFG's jurisdiction to implement since they are not believed to be necessary to avoid deleterious effects to fish, and are therefore considered infeasible. No other feasible mitigation measures exist. Therefore, this impact would be significant and unavoidable.

Impact CUM-8. Cumulative Impacts of Resuspension and Discharge of Other Trace Metals from Suction Dredging (Less than Significant)

As identified in Table 4.2-1 in the *Water Quality and Toxicology* chapter, the Regional Water Boards have identified 407 stream segments on the 303(d) list of impaired water bodies for various trace metals. Additionally, approximately 19% of California water bodies have metal/metalloid impairments, which include other trace metal impairments (SWRCB, 2007). Past, present, and future pollutant sources that have contributed to the existing trace metal impairments include: effluent pollution (especially from industries), mining, and urbanization. Discharges of trace metals to water bodies listed as impaired for these substances would be considered a significant cumulative impact due to the lack of assimilative capacity for these contaminants in such water bodies.

The disturbance of creek sediments during suction dredging activities authorized under the Proposed Program could potentially result in discharges of trace metals. Trace metals besides Hg (i.e., copper, lead, silver, cadmium, and zinc) may be present in relatively elevated concentrations in the creek bed sediments from historic mining activities, industrial discharges, or other past sources. These metals would typically be adsorbed to sediment particles (in a total recoverable fraction) and not in a dissolved form.

Total recoverable and dissolved concentrations of trace metals could potentially increase downstream of creek bed sediment disturbances by suction dredge miners. Total recoverable trace metal fractions that are mobilized by suction dredging (i.e., fraction adsorbed to larger sediment particles) generally would settle out within a few hundred meters of the dredging site. The result is that trace metal concentrations that may be elevated in the dredging discharge tend to return to background levels within close proximity to the dredge. However, dissolved forms of trace metals may remain in the downstream water column, remain bioavailable (i.e., the ability for a metal to be taken into the body of an aquatic organism), and potentially affect a water body's ability to meet its beneficial uses. The specific water chemistry (ex., hardness) of a water body would dictate the fraction of the dissolved metals that is bioavailable. Discharges of dissolved trace metals from suction dredging activities would potentially affect aquatic life beneficial uses, which are the most sensitive beneficial uses to ambient water body concentrations of most trace metals.

As detailed in Chapter 4.2 *Water Quality and Toxicology*, suction dredging would not result in substantial, long-term degradation of trace metal conditions that would cumulatively cause substantial adverse effects to one or more beneficial uses of unimpaired water bodies. Aquatic organisms would not be exposed to toxic conditions in the temporary discharge plumes. Additionally, because trace metals addressed in this assessment are not bioaccumulative constituents, the potential to mobilize the trace metals discussed herein would not substantially increase the health risks to wildlife (including fish) or humans consuming these organisms through bioaccumulative pathways.

However, suction-dredging related disturbances of sediments with other trace metals could incrementally contribute to a cumulative impact for receiving water bodies with existing trace metal impairments. Suction dredging at known trace metal hot-spots having acid mine drainage issues and associated low pH levels and high sediment and pore water metal concentrations, including high dissolved and bioavailable forms of metals, has the potential to increase levels of one or more trace metal in water body reaches such that it would cumulatively adversely affect a water body's beneficial uses.

Ultimately, water quality conditions in 303(d)-listed waters would improve as TMDL programs are completed. Additionally, implementation of the regulations under the Program to restrict nozzle sizes, minimize disturbances of streambanks and vegetation, and use reasonable care to avoid dredging silt and clay materials may reduce the potential for dissolved trace metal discharges and reduce the potential incremental contribution of the suction dredge discharges to the cumulative impact. The increase in trace metal discharges as a result of suction dredging is anticipated to be relatively small and would not be considered a cumulatively considerable contribution to this cumulative impact.

Impact CUM-9. Cumulative Impacts on Ambient Noise Levels in Suction Dredge Locations (Less than Significant)

Suction dredge activities would potentially contribute to increases in existing ambient noise levels through the use of gasoline-powered engines for the suction dredging and/or the use of generators at the dredgers' campsites. The extent to which the noise from suction dredging is perceptible is variable based on the ambient noise environment. Engine noise is expected to be most apparent within 700 ft. of suction dredging locations, and although temporary, this stationary source of noise may affect sensitive receptors. Receptors, both permanent (residents) and temporary (recreationists), are anticipated to experience varying levels of sensitivity towards the activity, partially guided by the relative increase in ambient noise level and/or duration of exposure. Sensitivity may be attributable to their personal views of the activity, their goals for recreation, and the importance that is attached to the existing ambient noise environment.

The ambient noise environment at suction dredging locations is affected by the land uses and recreational activities, including suction dredging, in the vicinity and the noise generated by the river itself. Activities that would potentially contribute to ambient noise level increases near suction dredging locations are other recreational motorized activities (e.g., motorized boats, off-road vehicles, or campers with generators), timber harvesting, urbanization, and suction dredging. Recreational activities may contribute to the ambient noise levels through the use of motorized boats, motorized equipment, or generators used by campers. Timber harvesting may contribute to increases in ambient noise levels through noises generated from the tree-cutting machinery and logging trucks used to transport the fallen trees. Urbanization near potential suction dredging areas may contribute to ambient noise level increases through motor vehicle traffic, aircraft noise, emergency service sirens, construction activities, motorized landscaping equipment, or other sources. Noise generated from suction dredging engines would not differ from those used in motorized boats or other motorized recreational equipment, except that engines for suction dredging activities are usually stationary and operated for extended periods throughout the day. Generators are commonly used by campers in general, and noise generated specifically from suction dredge miners would not be substantially different or greater than that generated by other campers. Timber harvesting may contribute to increases in ambient noise levels through noises generated from the tree-cutting machinery and logging trucks used to transport the fallen trees. Urbanization near potential suction dredging areas may contribute to ambient noise level increases through motor vehicle traffic, aircraft noise, emergency service sirens, construction activities, motorized landscaping equipment, or other sources.

There was no evidence obtained from the research conducted for this EIR indicating that ambient noise levels at sensitive receptor locations along the water bodies covered by the Proposed Program currently occur at levels that would adversely affect such receptors in a widespread geographic context or that noise levels are likely to significantly increase in the future under the cumulative environment (including suction dredging). With the exception of urbanization, most of these activities are temporary or intermittent. Thus, this impact is not considered to be a significant cumulative impact to which suction dredging operations would make a cumulatively considerable incremental contribution.

Impact CUM-10. Cumulative Impacts on Recreational Facility Use or Availability (Less than Significant)

Suction dredge miners would utilize existing recreational facilities and trails in California. This use could potentially increase the use of recreational facilities, decrease the availability of these facilities for other recreationists, and potentially displace other recreational users. Recreational facilities in California at or near suction dredging locations may include the facilities and resources of recreational areas in the vicinity, such as rivers, streams, trails, campsites, restrooms, and picnic tables. Both land-based and water-based recreationists may utilize these facilities. As described in Chapter 4.8 *Recreation*, land-based recreationists may include ATV users, RV campers, hunters, horse-back riders, picnickers, hikers, campers, and wildlife or scenery viewers. Water-based recreationists may include boaters, suction dredgers, fishermen, kayakers, rafters, and swimmers.

There was no evidence obtained from the research conducted for this EIR indicating that recreational facilities in California at or near suction dredging locations are currently over-used to such a degree as to constitute a significant cumulative impact or that the increase in use of facilities by permitted suction dredgers under the Proposed Program would significantly increase the demand for or use of such facilities in a widespread geographic context. Thus, this impact is not considered to be a significant cumulative impact to which suction dredging operations would make a cumulatively considerable incremental contribution.

Chapter 6
ALTERNATIVES

6.1 Introduction

This chapter describes the alternatives considered for the proposed Suction Dredge Permitting Program and evaluates their environmental impacts as compared to the Proposed Program. The purpose of the alternatives analysis in an EIR is to describe a range of reasonable alternatives to the project that can feasibly attain most of the identified Program objectives, but reduce or avoid one or more of the project's significant impacts. A more detailed description of the CEQA regulatory requirements for alternatives analysis is provided in the section immediately below.

The chapter then continues with a description of the alternative development process, alternatives that were considered, and alternatives that were considered but dismissed. The chapter closes with a discussion regarding the environmentally superior alternative.

6.1.1 Regulatory Requirements

CEQA requires that an EIR evaluate a reasonable range of alternatives to the proposed project, including the No Project Alternative. The No Project alternative allows decision makers to compare the impacts of approving the action against the impacts of not approving the action. While there is no clear rule for determining a reasonable range of alternatives to the proposed project, CEQA provides guidance that can be used to define the range of alternatives for consideration in the environmental document.

The range of alternatives under CEQA must meet most of the basic project objectives, should reduce or eliminate one or more of the significant impacts of the proposed project (although the alternative could have greater impacts overall), and must be potentially feasible. In determining whether alternatives are potentially feasible, Lead Agencies are guided by the general definition of feasibility found in CEQA Guidelines section 15364: "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." In accordance with CEQA Guidelines section 15126.6[f], the Lead Agency should consider site suitability, economic viability, availability of infrastructure, general plan consistency, other regulatory limitations, and jurisdictional boundaries in determining the range of alternatives to be evaluated in an EIR. An EIR must briefly describe the rationale for selection and rejection of alternatives and the information that the Lead Agency relied upon in making the selection. It should also identify any alternatives that were considered by the Lead Agency but were rejected as infeasible during the scoping process and briefly explain the reason for their exclusion (CEQA Guidelines section 15126[d][2]). These guidelines were used in developing the alternatives and their evaluation as described below.

6.2 Alternatives Development Process

The previous regulations governing suction dredge mining were adopted by CDFG in 1994 after the preparation and certification an environmental impact report (State Clearinghouse Number 93102046) under CEQA. This 1994 EIR included the evaluation of 6 alternatives to the 1994 regulations, though the proposed regulations were determined to be superior to the alternatives given CDFG's regulatory authority and legal considerations. In addition, in 1997, CDFG considered amendments to the 1994 regulations. A draft subsequent EIR was prepared that same year which also included a description of 5 alternatives; however, it was never finalized or certified, and the regulations were never amended. Both sets of alternatives were developed based on the comments received during the scoping and public review periods of the EIRs.

The current effort under CEQA builds upon work completed in the 1994 and 1997 EIRs, but incorporates new assumptions and current information. In particular, the most current special-status species information has been incorporated into the biological analysis to update the species maps and to provide a new basis for the seasonal or permanent availability of areas to suction dredging activities. The current Program also includes an analysis of potential mercury resuspension and discharge, a topic of concern which has been the subject of additional study since the 1994 EIR. And finally, the current effort incorporates additional environmental topics of concern that were either not fully addressed or not included in either of the prior EIRs; such topics include noise, aesthetics, cultural resources, and traffic effects.

Given the scope of the current analysis, CDFG sought to obtain public input through a range of outreach and involvement strategies. The formal public involvement process began on October 26, 2009, when the IS/NOP for the Program was published for review. Around this same time, an internet page on CDFG's website was established to alert individuals of current Program information and upcoming scoping meetings, and to solicit comments on the Program itself. A mailing list was also created to inform interested parties of the renewed environmental review of the Program and to provide direction on how and when to provide comments. This list built upon that of the previous effort and included past permit holders, dredging associations, and manufacturers, as well as public agencies, non-profit organizations, and members of the general public. Public scoping meetings for the IS/NOP were held on consecutive days in three different locations throughout the state in an effort to reach as much of the interested public as possible. Following these meetings, a Public Advisory Committee (PAC) consisting of interested individuals, agencies, and organizations, was formed to help develop updates to the Program regulations. The PAC convened on three occasions from February to March 2010 to share information and knowledge on a wide range of topics related to suction dredging. The results of these workshops, as well as a detailed summary of the scoping process, are presented in Appendix (C and G). Suggestions and comments received from each of these activities informed the development of alternatives for the Program.

Concurrent with the activities described above, CDFG and other entities have conducted studies and prepared technical documents to develop a more detailed understanding of the Program activities and potential effects on the environment. The Literature Review (Appendix D) compiled and reviewed information related to suction dredge mining to assess the existing body of information and need for additional areas of study. CDFG also conducted a survey of suction dredge permit holders to update information gathered previously in 1994 (see Appendix F). This survey expanded upon the 1994 survey to develop a more current characterization of suction dredging operations and estimation of economic activity associated with the activity. These and other investigations, together with the public involvement process described above, collectively offered helpful insights for CDFG's consideration and use in the development of Programmatic alternatives.

A range of alternatives is presented below that address some of the potential impacts of the Proposed Program. Alternatives were developed with consideration of the Program's goals and objectives (i.e., purpose and need), the significant environmental impacts of the Program, and potential feasibility. These Programmatic alternatives seek to achieve similar goals as the Proposed Program, though they may achieve these goals to a greater or lesser extent.

6.2.1 Program Objectives

The Program was developed to achieve the following objectives:

- Comply with the December 2006 Court Order;
- Promulgate amendments to CDFG's previous regulations as necessary to effectively implement Fish and Game Code sections 5653 and 5653.9 and other applicable legal authorities to ensure that suction dredge mining will not be deleterious to fish;
- Develop a Program that is implementable within the existing fee structure established by statute for the California Department of Fish and Game's suction dredge permitting program, as well as the existing fee structure established by the CDFG pursuant to Fish and Game Code section 1600 et seq.;
- Fulfill the CDFG's mission of managing California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public; and
- Ensure that the development of the regulations consider economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation.
- Fulfill the CDFG's obligation to conserve, protect, and manage fish, wildlife, native plants, and habitats necessary for biologically sustainable populations of those species and as a trustee agency for fish and wildlife resources pursuant to Fish and Game Code section 1802.

6.2.2 Significant Environmental Impacts of the Proposed Program

The analysis of Program effects did not identify any significant impacts which could be reduced to a level of less-than-significant through implementation of mitigation; rather, measures to reduce or avoid impacts were incorporated directly into the draft updated regulations where feasible given the scope of CDFG's jurisdictional authority with respect to suction dredging. CDFG's authority is limited to avoiding or reducing impacts that are deleterious to fish pursuant to the provisions of Fish and Game Code section 5653. As a result, adverse impacts were found to be either *less-than-significant* (i.e., the proposed regulations would ensure that impacts are not significant) or *significant and unavoidable* (i.e., the proposed regulations would not reduce impacts to a level of insignificance and no other feasible mitigation within the authority of CDFG could be determined).

6.2.3 Significant and Unavoidable Environmental Impacts of the Proposed Program

The following impacts have been identified as significant and unavoidable:

- *Impact WQ-4:* Effects of Mercury Resuspension and Discharge from Suction Dredging
- *Impact WQ-5: E*ffects of Resuspension and Discharge of Other Trace Metals from Suction Dredging
- *Impact BIO-WILD-2:* Effects on Special-Status Passerines Associated with Riparian Habitat
- *Impact CUL-1:* Substantial Adverse Changes, When Considered Statewide, in the Significance of Historical Resources
- *Impact CUL-2:* Substantial Adverse Changes, When Considered Statewide, in the Significance of Unique Archaeological Resources
- *Impact NZ-1:* Exposure of the Public To Noise Levels in Excess of City of County Standards
- *Impact CUM-2*: Effects on Wildlife Species and their Habitats
- *Impact CUM-6*: Turbidity/TSS Discharges from Suction Dredging
- *Impact CUM-7:* Cumulative Impacts of Mercury Resuspension and Discharge from Suction Dredging

6.3 Alternatives Considered

The following alternatives have been evaluated for their potential feasibility and their ability to achieve most of the Program objectives while avoiding, reducing, or minimizing significant impacts identified for the Proposed Program. These alternatives (with the exception of the No Program Alternative) were determined to be feasible or potentially feasible, and would generally meet the Program objectives.

The degree to which these alternatives substantially lower the significant impacts identified for the Proposed Program is discussed below. All subject areas are analyzed for each alternative, though at a more general level than for the Proposed Program as provided by CEQA.

- No Program Alternative
- 1994 Regulations Alternative
- Water Quality Alternative

- Reduced Intensity Alternative

Table 6-1 provides a summary comparison of the impacts of each of the alternatives analyzed compared to the Proposed Program, including beneficial and adverse effects. Each of the alternatives, and associated impacts, are described below.

TABLE 6-1. ALTERNATIVES COMPARISON TABLE

CEQA Resource Topic	No Program Alternative	1994 Regulations Alternative[1]	Water Quality Alternative	Reduced Intensity Alternative
Hydrology and Geomorphology	○	●	○	○
Water Quality and Toxicology	○	●	○	○
Biological Resources	○	●	○	○
Hazards and Hazardous Materials	○	●	⦿	○
Cultural Resources	○	●	⦿	○
Aesthetics	○	●	○	○
Noise	○	●	○	○
Recreation	○	●	○	○
Transportation and Traffic	○	⦿	⦿	○
Mineral Resources	⦿	⦿	⦿	⦿
Cumulative Impacts	○	●	○	○

1. Note that this alternative would have similar or greater adverse effects than the Proposed Program overall; however, effects would be reduced in certain locations.

Symbol

(●) overall, alternative would have additional adverse effects compared to the Proposed Program (i.e. effects are more adverse)

(○) overall, alternative would have decreased adverse effects compared to the Proposed Program (i.e. effects are more beneficial)

(⦿) overall, effects would be similar as those described for the Proposed Program Proposed Program

6.3.1 No Program Alternative

Characteristics of this Alternative

Under the No Program Alternative, the current prohibitions on instream suction dredging operation would remain in effect and no further permit issuance by the California Department of Fish and Game would occur. Essentially, this would entail continuance of the existing environmental conditions of the Program area.

Impact Analysis

By continuing the moratorium on the use of suction dredges in California, all of the adverse environmental impacts related to the Proposed Program would be eliminated. By having no effect at all on these resources, the No Program Alternative would avoid all the significant and unavoidable effects of the Program and would further reduce or eliminate the effects reported as being less-than-significant. This includes the avoidance of noise and air emissions, recreational conflicts between users, and geomorphic and biologic effects, among others.

In relation to mineral resources, the No Program Alternative would not result in any discernable change from the Proposed Program. Though this alternative would no longer permit the use of a particular device to conduct gold mining, it does not entirely prohibit gold or other mineral extraction. This is similar to the Proposed Program in that methods other than suction dredging would still be allowed in the streams subject to seasonal or permanent closures under the proposed regulations.

6.3.2 1994 Regulations Alternative

Characteristics of this Alternative

Under this alternative, CDFG would resume administering the Program under the 1994 Regulations, which were in place prior to the moratorium. This includes the limits on nozzle size and operational requirements as outlined in those regulations, and suction dredge use classifications for waterways unchanged from the 1994 specifications. While the following analysis reveals that this alternative would have greater or similar impacts compared to the Proposed Program overall, impacts would be reduced in locations that would be closed to suction dredging under this alternative, but open under the Proposed Program. This alternative was also selected for analysis in this SEIR because of the value of the information that would be provided by such analysis. Because of the unique circumstances leading up to the preparation of this SEIR, it was determined that CEQA's informational purpose would be served by providing the interested public and Department decision-makers with this information comparing the Proposed Program to the regulations previously in place before the litigation and 2006 Court Order and the ensuing court and Legislative moratoria on suction dredging.

Impact Analysis

One common aspect of this alternative which contributes equally to all environmental resource topics is that the 1994 regulations did not establish a maximum limit on the number of permits CDFG could issue each year. Though based on historic records, CDFG issues an average of 3,650 permits annually; the actual distribution number can vary significantly. At the height of its popularity in 1980, over 12,000 suction dredging permits were issued. Depending on a number of factors, including the current selling price of gold, it is reasonable to assume that demands for permits under this alternative could reach, or even surpass, these peak levels. If this were the case, adverse effects identified for the Program could be exacerbated.

In addition, and perhaps more importantly, the listing of open or closed streams would differ under this alternative than under the Proposed Program. While all of the impacts of the Proposed Program would be eliminated in certain geographic areas (areas proposed to be open under the Proposed Program, but closed under the 1994 regulations), this would be offset to varying degrees by increased impacts in other locations (areas that are proposed to be closed under the Proposed Program but would be open under the 1994 regulations). In terms of reducing impacts of the Proposed Program, this alternative would eliminate all impacts in areas closed under the 1994 regulations but proposed to be open under the Proposed Program.

Hydrology and Geomorphology

Implementation of this alternative is likely to have a greater adverse effect on hydrology and geomorphology resources in the Program Area due to the potentially unlimited number of permits that could be issued each year and the less restrictive regulations.

Compared to the Proposed Program, the 1994 regulations allow for greater potential site disturbance associated with a larger permissible nozzle size and less restrictive operational requirements. Under the 1994 regulations, dredgers are able to use nozzles with diameter between 6 and 8 inches, as opposed to 4 inches under the Proposed Program. As detailed in Chapter 3, dredges equipped with 6-8 inch nozzles have a substantially greater excavating capacity compared to those using a 4 inch nozzle. Moreover, the 1994 regulations do not include certain operational restrictions which are expected to minimize effects on this resource. Under the 1994 regulations there would be no limitations on the hours of operation, and clear definitions of prohibited water diversions and bank disturbance are not provided. For instance, section (k) of the currently proposed regulations specify that permittees must level tailing piles and return the location to pre-mining grades to the greatest extent possible. Similarly, prohibitions on the alterations of flow now include actions which would concentrate flow in a way that reduces the total wetted area of the stream. Consequently, this alternative would potentially result in a greater extent of geomorphic disturbance to in-channel features, increasing the potential for destabilization or alteration of waterways beyond that described for the Proposed Program.

Water Quality and Toxicology

Operational requirements in the 1994 regulations are not as extensive as the Proposed Program in addressing accidental or preventable contamination of waterways. For instance, common activities such as the use and storage of fuels and other hazardous materials would remain unregulated, and measures to avoid excessive turbidity from dredging silt or clay would not be implemented. Consequently, this alternative would increase adverse effects involving the risk of contaminated discharges.

In addition, the increase in the volume of sediment movement achievable using larger nozzle sizes would further contribute to the significant adverse impacts affecting water quality and toxicology. As detailed in Chapter 4.2, the relative proportion of total mercury (THg) and trace metal loading from suction dredging activity is directly dependent on the dredge size, duration of operations during the year, and sediment characteristics and concentrations. Overall, available data show that fewer numbers of dredgers using more powerful equipment (nozzle sizes 6-8) are required to discharge similar amounts of mercury in contaminated areas. Several aspects of the 1994 regulations would create potential for greater mercury and trace metal discharges than under the Proposed Program, including the permitted use of larger nozzle sizes, the unlimited number of permits which can be issued each year, and unrestricted number of hours of operation per day. As a result, this alternative would increase adverse effects associated with mercury and trace metal loading, methylmercury formation, and bioaccumulation in areas downstream of dredging activity.

Biological Resources

Resuming dredging activities based on *Suction Dredge Use Classifications* from 1994 would result in additional adverse effects on biological resources compared to the Proposed Program. This is due in large part to the fact that the 1994 regulations do not take into consideration the up-to-date listings and information regarding the life history, distribution, and abundance of special-status species and habitats. By permitting dredging practices in areas currently supporting special-status resources, adverse impacts on these biological resources would be substantially greater under this alternative.

Furthermore, the operation of dredge equipment under the 1994 Regulations would increase the potential for a greater area of site disturbance. As described previously, the permitted use of larger nozzle sizes increases the volume of sediment displacement. Usage of more powerful equipment would increase disturbances to instream habitats and species, such as contributing to further habitat alteration and increased risk of entrainment and/or harm. General operational requirements intended to prevent damage or harm to biological resources under the 1994 regulations are also not as comprehensive as those included in the Proposed Program. This disparity in the protection of biological resources would increase adverse effects on fish and other species.

Hazards and Hazardous Materials

Certain practices, including the creation of tailings piles, accidental release of hazardous materials, use of toxic materials, and equipment staging pose safety risks to dredgers and other individuals in the vicinity. Such practices are regulated under the Proposed Program, but are not under the 1994 regulations. As such, the implementation of this alternative would increase the potential for adverse effects from hazards associated with dredging, compared to the Proposed Program.

Cultural Resources

The potentially increased number of Program participants under this alternative would intensify the risk of accidental discovery or disturbance of buried cultural resources. This would contribute to increased adverse effects on these resources as compared to the Proposed Program.

Aesthetics, Noise, and Recreation

Beyond the potential exacerbation of adverse effects related to increased users, the 1994 regulations do not include certain requirements that help prevent or avoid impacts under the Proposed Program. Unlike the Proposed Program, this alternative would not impose restrictions on daily operation of equipment. In addition, the allowance of larger nozzle sizes (6-8 inches in diameter) lends to the use of larger engines to provide adequate suction power. These factors would increase noise level exposure and duration of noise compared to the Proposed Program, though likely not to a significant level, due to the relatively small difference in noise levels associated with varying size dredges (see Table 4.7-5 in Chapter 4.7 *Noise*).

The 1994 regulations are also less specific in defining operational requirements compared to the Proposed Program. The Proposed Program advises permit holders on the proper treatment of wastes, provides additional protection of upland vegetation, and gives additional clarifications on permissible and prohibited in-stream disturbances. Under the 1994 alternative, none of these measures would be included. As such, the implementation of this alternative could result in additional disturbance and therefore intensified adverse aesthetic impacts at or near dredging sites compared with the Proposed Program.

These intensified adverse effects related to noise emissions and aesthetic conditions would correspond to a similar potential for greater recreational conflicts. Since user experience is based primarily on the conditions of a site, increases in noise level and site disturbance would negatively affect recreational experience for certain user groups. Therefore, the perpetuation of the 1994 regulations also would have increased adverse effects on recreational resources.

Transportation and Traffic

The primary aspect of this alternative affecting transportation and traffic is the potential number of permits issued by CDFG for this activity. However, an increase in Program participation is unlikely to cause noticeable additional adverse effects related to traffic hazards or parking capacity. These matters are common issues for all recreationists using motorized vehicles for transportation, and the extent to which any particular user group is responsible for adverse effects is difficult to discern, and suction dredgers in all cases would represent a relatively small number within the overall population of recreationalists. Rather, shortages and hazards are generally attributable to personal behaviors, as well as an area's recreational popularity and available facilities. As such, the 1994 Regulation Alternative would result in similar effects on this resource as the Proposed Program.

Mineral Resources

This alternative would have similar effects on mineral resources as described for the Proposed Program.

Cumulative Impacts

Increases in use, larger nozzle/engine sizes, and overall disturbances associated with operations would make a larger incremental contribution to some cumulative effects compared to the Proposed Program. In particular, impacts associated with mercury discharges, greenhouse gas emissions, and effects on fish species would be slightly increased under this alternative; however effects on terrestrial species and the remainder of cumulative effects would likely remain similar as described for the Proposed Program.

6.3.3 Water Quality Alternative

Characteristics of this Alternative

The Water Quality Alternative focuses on reducing the water quality impacts of the Program. In addition to applying the updated regulations of the Proposed Program, this alternative would include additional considerations for water bodies listed as impaired pursuant to Clean Water Act Section 303(d) for sediment or mercury. Specifically, listed areas would be closed to suction dredging in order to avoid further degradation of the water body from dredging activities.

As detailed in the *Water Quality and Toxicology* chapter of this SEIR, the current Section 303(d) list for California includes 178 water bodies listed for mercury impairment and 728 identified for sediment impairment. These impaired waters include portions of the Trinity River, the Eel River, the Feather River, San Joaquin, Stanislaus River, and the American River. While several of these listed waters are already classified as seasonally or permanently closed to suction dredging as part of the proposed regulations, it is likely that this alternative would result in new areas which are closed to suction dredging.

The listing of areas closed to dredging would be updated as necessary to remain consistent with the State Water Resources Control Board's determinations, which generally occurs every 2 years. Bi-annual updating of suction dredge regulations would require CDFG to prioritize budgeting to account for this additional effort.

Impact Analysis

Hydrology and Geomorphology

This alternative would impose additional restrictions which would reduce the number of locations open to suction dredging activities. As such, fewer areas would be subject to the geomorphic effects of suction dredging. And while this alternative could concentrate impacts in certain locations where suction dredging is permitted, such localized effects are anticipated to be offset by the greater proportion of the Program area where impacts are eliminated entirely. Furthermore, the bi-annual updates to the regulations could change the mosaic of open/closed areas such that some locations within the Program area are able to experience extended periods of rest and geomorphic recovery, as sites are added or removed from the 303(d) list.

Water Quality and Toxicology

This alternative would have the most evident reduction in effects on this resource, as it includes consideration of the Program's effects on water quality and restricts activities in all areas listed for mercury and sediment impairment. As detailed in Chapter 4.2, mercury discharge associated with suction dredging activities contributes to adverse fate and transport processes both locally and in downstream receiving waters. Such effects are especially pronounced when dredging occurs in areas containing highly-elevated sediment mercury concentrations. By preventing dredging in mercury impaired systems, this alternative would largely avoid the significant adverse water quality effects associated with mercury discharge in comparison to the Proposed Program.

Sediment resuspension into the water column caused by suction dredging increases turbidity and total suspended solid (TSS) concentrations in downstream areas. Such increases in turbidity and TSS have the potential to adversely affect aquatic organisms, water supplies, recreation, or other beneficial uses. Since waterbodies listed as impaired for these constituents have been determined to have no further assimilative capacity for sediment/turbidity, this alternative would avoid the further degradation of these impaired waterbodies.

As such, this alternative would have an overall reduced effect on water quality and toxicology as compared to the Proposed Program.

Biological Resources

Biological resources in the Program area would benefit from the prevention of dredging practices in areas with known sensitivity to further water quality degradation. Closures of such waterbodies would decrease the severity of secondary habitat effects associated with turbidity and water quality contamination in impaired areas. However, the greatest reduction in effects associated with this alternative stem from the reduced geographic area subject to dredging operations. Under this alternative, reduced disturbances to wildlife and plant species, including habitat alteration and risk of direct harm, would result from the less expansive area of operation. Furthermore, the general operational requirements intended to prevent damage or harm to biological resources are common to both this alternative and the Proposed Program. As such, effects associated with a more condensed activity area would not likely result in noticeable increases in localized adverse effects on fish or other species.

As a result, the provisions of this alternative would provide greater protection of biological resources and would help alleviate adverse effects on fish and other biological resources in the overall Program area.

Hazards and Hazardous Materials and Cultural Resources

Adverse effects associated with these resource topics are related to the potential risk of accidents or inadvertent disturbances. Given that this alternative would support a similar number of Program participants as the Proposed Program, the overall risks associated with dredging operations would remain similar. Likewise, though this alternative would likely concentrate Program participants to areas available for dredging (thus increasing risk of disturbances); this effect is counterbalanced by the more restricted Program area (thus eliminating effects in certain areas). Consequently, the risks of accidental releases of hazardous materials and inadvertent discovery or disturbance of buried cultural resources under this alternative are likely to remain similar to that of the Proposed Program.

Aesthetics, Noise, and Recreation

The additional area closures under this alternative may lead to concentrations of Program users in certain locations. At these particular locations, greater numbers of suction dredging operations would increase noise level exposure and could result in additional aesthetic disturbances and recreational conflicts at or near dredging sites. However, because the relative amount of suction dredgers is small compared to other users, it is unlikely that this alternative would exacerbate effects beyond those described for the Proposed Program. Furthermore, this alternative would also provide additional areas where other recreational users can go to avoid Program activities. By restricting dredging to fewer locations and creating additional areas where adverse effects are eliminated, this alternative would have an overall reduced impact on these resources within the Program area.

Transportation and Traffic

In relation to transportation and traffic, effects are primarily associated with the number of participants. Since this alternative would differ only in the permitted dredging locations and not the allowed number of participants, traffic effects would remain similar in the overall Program area. As suction dredgers represent only a proportion of the overall population of recreationalists, concentrations of Program participants at certain locations due to area closures are unlikely to cause noticeable additional adverse effects related to traffic hazards or parking capacity. Therefore, the Water Quality Alternative would result in similar effects on this resource as the Proposed Program.

Mineral Resources

Effects related to mineral resources under this alternative would not differ from those described for the Proposed Program.

Cumulative Impacts

Further restrictions on the Program area size, and elimination of disturbances associated with operations at certain locations would decrease the Program's incremental contribution to cumulative effects compared to the Proposed Program. In particular, impacts associated with mercury discharges and effects on wildlife species would be reduced under this alternative.

6.3.4 Reduced Intensity Alternative

Characteristics of this Alternative

The Reduced Density Alternative is similar to the Proposed Program but would incorporate a combination of additional restrictions on the total number of permits issued and general methods of operation to reduce the intensity of environmental effects in the Program area.

Under this alternative, a maximum of 1,500 permits would be issued annually by CDFG instead of a maximum of 4,000 under the Proposed Program. This would translate to a 59% decrease in dredging operations permitted annually compared to the recent historic average. As described in Chapter 3, the total number of permits issued by CDFG over the last 15 years has fluctuated; though on average approximately 3,650 permits have been issued each year.

Additional operational requirements would include density limitations, additional equipment restrictions, and restrictions on the duration of daily dredging and total number of days each individual could dredge. Dredging densities would be regulated by establishing a minimum spacing requirement of 500 feet between dredges. The maximum permissible diameter for nozzle sizes on dredging equipment would be set at 4 inches, with no exceptions. Equipment usage would also be limited to the hours of 10 a.m. to 4 p.m., and a total of 14 days per year for each permit holder.

Impact Analysis

Hydrology and Geomorphology

Implementation of this alternative would reduce adverse effects on hydrology and geomorphology resources in the Program area due to the substantially decreased number of permits that would be issued each year and the greater restrictions placed on dredge operations.

Enforcing yearly and greater daily dredging limitations would decrease potential site disturbances and result in an overall reduction in excavating capacity compared the

Proposed Program. Moreover, the reduction in Program participants would minimize effects on in-channel features. Consequently, this alternative would result in a lower volume of sediment movement and lessened disturbances to geomorphic features that could cause destabilization or alteration of waterways compared to the Proposed Program.

Water Quality and Toxicology

Fewer participants and shorter dredging periods would lower risks associated with dredging activities, such as those associated with the use and storage of fuels or other hazardous materials and discharges of contaminants. Chapter 4.2 describes that the relative proportion of total mercury (THg) and trace metal loading from suction dredging activity is directly dependent on the dredge size, duration of operations during the year, and sediment characteristics and concentrations. By cutting total participant maximums by half and imposing yearly dredging limitations, this alternative would reduce the potential overall volume of sediment movement in the Program area compared to the Proposed Program. As a result, this alternative would reduce adverse effects associated with mercury and trace metal loading, methylmercury formation, and bioaccumulation in areas downstream of dredging activity.

Similarly, turbidity effects associated with the Program would also be further reduced through the additional provision that ensures a minimum distance between active dredging operations. As such, this alternative would lessen the overall adverse effects on water quality and toxicology as compared to the Proposed Program.

Biological Resources

As described previously, the provision of greater operational restrictions would reduce the overall volume of sediment displacement. As such, the severity of both the direct and indirect effects on biological resources associated with Program activities would be reduced. This includes fewer secondary habitat effects associated with turbidity and toxicity/water quality contamination, as well as lessened disturbances to in-channel habitat features. Furthermore, fewer dredgers operating in the Program area would also reduce the intensity of habitat alteration and reduce the risk of entrainment and/or harm.

Thus, dredging activities based on these more stringent requirements would result in lessened adverse effects on sensitive species and habitats compared to the Proposed Program.

Hazards and Hazardous Materials/Cultural Resources

Fewer Program participants and more restrictive dredging requirements would decrease the risk of accidental discovery or disturbance of buried cultural resources, as well as the potential for accidental releases of hazardous materials. Likewise, the risk of safety hazards associated with equipment staging and operations would also be reduced in relation to the increased spacing requirement and shortened dredging season. As such, the additional restrictions imposed under this alternative would have a reduced adverse effect on these resources as compared to the Proposed Program.

Aesthetics/Noise/Recreation/ Transportation and Traffic

Decreases in the allowable number of Program participants and a reduced dredging season would lessen competition between recreational uses and for available parking. Furthermore, density restrictions and operational restrictions would decrease the extent to which Program activities affect these resources. Even though suction dredgers represent only a small proportion of the overall population of recreationalists, these additional restrictions on Program activities would reduce adverse effects on these resources compared to the Proposed Program.

Mineral Resources

This alternative would have similar effects on mineral resources as described for the Proposed Program.

Cumulative Impacts

The additional operational restrictions imposed on Program activities and further limitations on permit issuance would decrease the incremental contribution to cumulative effects compared to the Proposed Program. In particular, cumulative impacts associated with mercury discharges and effects on wildlife species would be reduced under this alternative.

6.4 Alternatives Considered and Dismissed

The following alternatives were considered but ultimately were not carried forward for detailed analysis because they did not meet most of the Program objectives, were determined to be infeasible, or did not avoid or substantially reduce one or more significant impacts of the Proposed Program.

In addition, some of the following alternatives, though feasible, included components beyond the regulatory authority of CDFG. As detailed in Chapter 2, CDFG's regulatory authority governing suction dredge mining is based specifically on Fish and Game Code section 5653 et seq. In general, these provisions of the Fish and Game Code provide that CDFG's permitting authority is limited to in-stream use of vacuum or suction dredge equipment within any river, stream, or lake in California. As such, CDFG's regulatory authority under this Program does not extend to other methods of placer mining or other activities that may be associated with suction dredging which occur in upland areas. Similarly, CDFG's authority related to issuance of suction dredging permits is related to effects that are considered deleterious to fish. CDFG does not have the authority through its power to promulgate regulations to limit use of suction dredging based on impacts to other resource areas (upland biological species, noise, aesthetics, etc.).

- **Increased Intensity Alternative.** This alternative would consist of permit requirements that are more lenient than those in the 1994 regulations. Under this scenario, there would be reduced or no nozzle size restrictions, and reduced or no areas closed to suction dredging. Although this alternative would be within the CDFG's authority to permit, it would not reduce any of the significant impacts of the Program. Therefore, this suggestion was dismissed from further consideration as it does not meet the CEQA requirements for an alternative.

- **Federal or State-listed Species Alternative.** Consideration of only federally- or state-listed species was suggested as a means of determining which California water bodies would be designated as open or closed to suction dredging activities. However, this suggestion excludes consideration of all unlisted section 15380 species and would not provide protection for these currently unlisted species. As such, application of this criterion would result in additional areas open to dredging compared to the Proposed Program. Given the increase in area, species, and habitats subject to suction dredge mining, this suggested alternative was not considered as it would not reduce any of the impacts of the Proposed Program.

- **Site-Specific Evaluations for Every Permit.** Under this alternative, a site-specific analysis would be required for each individual permit issued by CDFG. While such analysis could potentially lessen Program effects by considering site-specific conditions and necessary operational restrictions, the time and effort associated with these investigations would be impracticable and substantial. Specifically, CDFG believes it would be unable to implement such site-specific analyses within the current fee structure for permits, and it is not authorized to increase such fees. For these reasons, performing a site-specific analysis for every permit was determined to be an infeasible alternative and unnecessary as a matter of law under Fish and Game Code sections 5653 and CEQA. On that basis, along with the related language directing CDFG to issue permits, CDFG does not believe the Legislature intended CDFG to make individualized, permit-by-permit deleterious effects determinations.

  That said, the option to conduct site-specific analysis is incorporated into the Proposed Program. Under the Program, on-site inspections are required for certain suction dredging operations deviating from the standard provisions of the permit regulations. Such deviations require notification under Fish and Game Code section 1602 and can include, but are not limited to, activities involving dredging in lakes or reservoirs, dredging with nozzle sizes greater than 4 inches, and employing motorized winching equipment. Additionally, the Program acknowledges the authority of CDFG to monitor individual suction dredging operations for problems and to take enforcement action as may be necessary, as well as to modify the regulations in the future if persistent, significant problems arise.

- **Large-Scale Site-Specific Evaluations.** This alternative is similar, though more broadly-based, than the previous proposal. Here, dredging would be allowed only in areas that have received site-specific CEQA analysis. Such analyses could range in size from entire watersheds to individual river segments, depending on likely dredging potential. As proposed, these investigations would identify the specific requirements for dredging in those areas, including dredging capacity, timing, and operational requirements. However, this alternative was not considered feasible for the same reasons as the prior alternative.

  As noted above, the Proposed Program does incorporate site-specific analysis where appropriate for suction dredging operations requiring notification under Fish and Game Code Section 1602.

- **Only allow suction dredging in areas with no potential to have deleterious impacts to a single fish or individual fish populations.** This alternative was dismissed from further analysis as it does not meet the basic Program objectives of fulfilling the legislative intent of the regulation, which does not appear to consider "deleterious" to be an impact to a single fish or individual fish population. If implemented, this alternative would likely preclude all suction dredging in the state.

- **Only open areas where sufficient monitoring and enforcement capacity exists.** This alternative was not pursued because future budgets and staffing for monitoring and enforcement by Department law enforcement personnel are not known and will be variable from year to year, and are therefore outside the scope of the Proposed Program. Nonetheless, the systems currently in place provide an adequate level of service in responding to and enforcing regulations. In addition, CDFG believes that the vast majority of suction dredge miners operate in compliance with the regulations defined by CDFG.

- **Close sites that are "hot-spots" for mercury or other contaminants.** This alternative was not considered further because only limited data is available on the locations of any existing "hot-spots," and there is no definite consensus on the criteria for identifying an area as such. Furthermore, the cost and effort associated with an evaluation of the entire state to identify such locations is considered infeasible under CDFG's current fee structure.

- **Mitigate all significant adverse impacts.** This alternative would identify mitigation for all environmental resource topics (i.e. cultural resources, human health/fish consumption, etc.) to avoid, minimize, or offset impacts to the greatest extent possible. This alternative was dismissed from further analysis because mitigation for impacts without a nexus to the statutory directive to avoid actions "deleterious to fish" is not within CDFG's regulatory authority.

- **Tracking and adaptively managing stream use by suction dredgers.** This alternative could leverage existing Programs, such as CDFG Scientific Collecting Permit field reporting requirements, or use new approaches (dedicated Permit/GIS staff person) to track and monitor suction dredge effects on stream conditions. Data collected would guide and regulate activities. However, the time and expense involved in data collection, regulation updating and enforcement was determined to be infeasible to implement within CDFG's current fee structure.

6.5 Environmentally Superior Alternative

The No Program Alternative is considered the environmentally superior alternative, because it would eliminate all of the adverse effects of the Proposed Program by continuing the moratorium on suction dredging. However, CEQA requires that when the No Program Alternative is selected as the environmentally superior alternative, another environmentally superior alternative must be chosen from one of the action alternatives. Accordingly, the Reduced Intensity Alternative is considered the environmentally superior action alternative. By limiting the locations open to dredging and placing further restrictions on equipment and the number of permits issued, it would reduce the impacts associated with such operations for each resource category compared to the Proposed Program and other alternatives to the greatest extent.

The other Programmatic alternatives were not selected as the environmentally superior alternative for the following reasons:

- ***1994 Regulations Alternative.*** This alternative would eliminate all impacts in areas closed under the 1994 regulations but proposed to be open under the Proposed Program. However, this factor was overwhelmed by the substantially greater impacts that would be anticipated to result from the less restrictive operational requirements, as well as the greater disparity in the protection of biological resources. Since the 1994 regulations do not take into consideration the up-to-date special-status species and habitat information, this alternative have much greater potential for adverse impacts on special-status species.
- ***Water Quality Alternative.*** The avoidance of Program effects in areas listed as impaired for sediment or mercury were not as advantageous in reducing overall Program impacts, as compared to Reduced Intensity Alternative. Several resource areas, including hazards and hazardous materials, cultural resources, and transportation and traffic would have no discernable reduction in impacts compared to the Proposed Program or the Reduced Intensity Alternative.

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Chapter 8
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6. Alternatives

None cited