RECLAMATION

Managing Water in the West

Plan of Study
Delta-Mendota Canal Recirculation Project

Central Valley Project
Mid-Pacific Region

U.S. Department of the Interior
Bureau of Reclamation

May 2006

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ACRONYMS AND ABBREVIATIONS

ASR	Alternatives Screening Report
CEQA	California Environmental Quality Act
CDFG	California Department of Fish and Game
cfs	cubic feet per second
CNDDB	California Natural Diversity Data Base
CNPS	California Nature Plant Society
CVP	Central Valley Project
DEIS	Draft Environmental Impact Study
DMC	Delta-Mendota Canal
DO	dissolved oxygen
DSM	Delta Simulation Model
DWR	Department of Water Resources
EC	electrical conductivity
EIR	Environmental Impact Report
EIS	Environmental Impact Study
EPA	U.S. Environmental Protection Agency
EQ	environmental quality
HORB	head of Old River barrier
IAIR	Initial Alternatives Information Report
I-O	input-output
IS	initial study
JPOD	joint point of diversion
MAF	million acre-feet
NED	National Economic Development
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOP	notice of preparation
OSE	other social effects
POA	plan of action
POS	Plan of Study
PSR	Public Scoping Report
PTM	particle tracking model

ACRONYMS AND ABBREVIATIONS (Continued)

RED	regional economic development
ROD	record of decision
RWQCB	Regional Water Quality Control Board
SDIP	South Delta Improvement Program
SDWA	South Delta Water Agency
SJR	San Joaquin River
SJRWQMG	San Joaquin River Water Quality Management Group
SLDMWA	San Luis Delta Mendota Water Authority
SLR	San Luis Reservoir
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TDS	total dissolved solids
TMDL	total maximum daily load
TOC	total organic carbon
TPP	Tracy Pumping Plant
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VAMP	Vernalis Adaptive Management Plan
VELB	Valley Elderberry Longhorn Beatle
WDR	waste discharge requirements
WQCP	Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
WQO	water quality objective
WSRDP	West Side Regional Drainage Plan

1.0 PROJECT DESCRIPTION

1.1 PROJECT PURPOSE

The purpose of this Plan of Study (POS) is to describe how the U.S. Bureau of Reclamation (Reclamation) will conduct a feasibility study (FS) to evaluate the feasibility, benefits, and impacts of recirculating water from the Sacramento-San Joaquin Delta through the Central Valley Project (CVP) pumping and conveyance facilities to the San Joaquin River (SJR). The purpose of this Delta-Mendota Canal (DMC) Recirculation Project is to provide greater flexibility in meeting the existing water quality standards and flow objectives for which the Central Valley Project has responsibility so as to reduce the demand on water from New Melones Reservoir used for water quality and flow purposes and to assist the Secretary in meeting any obligation to Central Valley Project contractors from the New Melones Project.

1.2 STUDY OBJECTIVES

The objectives of the DMC Recirculation Project FS are to:

1) Help meet SJR flow and water quality objectives at Vernalis while minimizing impacts to fish and wildlife resources;
2) Provide flexibility through enhanced water quality benefits for other CALFED programs;
3) Achieve SJR flow and water quality objectives at Vernalis while minimizing impacts to existing water users in the basin;
4) Improve south Delta water levels for irrigation; and
5) Increase the survival of juvenile anadromous fish populations during the spring out-migration period and contribute to the health and survival of other aquatic species in the south Delta.

1.3 AUTHORITY FOR STUDY

The Recirculation Project FS, for which this POS is being prepared, is authorized by the CALFED Bay-Delta Authorization Act of 2004 (Public Law 108-361). Section 103(d)(2)(D)(i) directs the Secretary to "develop and initiate implementation of a program to meet all existing water quality standards and objectives for which the Central Valley Project has responsibility."

In addition, (D)(iii) states, "The Secretary shall incorporate into the program a recirculation program to provide flow, reduce salinity concentrations in the San Joaquin River, and reduce the reliance on the New Melones Reservoir for meeting water quality and fishery flow objectives through the use of excess capacity in export pumping and conveyance facilities."

Finally, (D)(vi) states, "The purpose of the authority and direction provided to the Secretary under this subparagraph is to provide greater flexibility in meeting the existing water quality standards and objectives for which the Central Valley Project has responsibility so as to reduce the demand on water from New Melones Reservoir used for that purpose and to assist the Secretary in meeting any obligation to Central Valley Project contractors from the New Melones Project."

Section 103 (f)(1)(G) states, "Funds may be used to conduct feasibility studies, evaluate, and, if feasible, implement the recirculation of export water to reduce salinity and improve dissolved oxygen in the San Joaquin River."

1.4 NEED FOR STUDY

This FS was authorized by PL 108-361 to evaluate the potential for using recirculated Delta export water to reduce salinity and increase the dissolved oxygen (DO) in the SJR. The State Water Resources Control Board (SWRCB) has established Delta water quality and flow requirements that must be met as a condition of the operation of the Tracy Pumping Plant (TPP) and the State Water Project (SWP) Harvey O. Banks Pumping Plant (BPP). The current governing standards for operation of the CVP and the SWP facilities in the Delta are the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (SWRCB, 1995) (hereafter the 1995 WQCP) and the *Water Rights Decision 1641* (SWRCB, 1999) issued on December 29, 1999, and revised on March 15, 2000 (hereafter the D-1641).

D-1641 amended Reclamation's water rights permits to allow CVP water to be diverted at the BPP, subject to the permission of the Department of Water Resources (DWR), as part of joint operations of the state and federal export facilities. This joint operation of the CVP and SWP projects is commonly referred to as the joint point of diversion (JPOD). As part of the amendment of permits under D-1641 to allow JPOD, the SWRCB required Reclamation to prepare a Plan of Action (POA) to evaluate the potential impacts of recirculating water from the DMC through the Newman Wasteway, in consultation with National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), DWR, and the South Delta Water Agency (SDWA). The SWRCB directed Reclamation to address the following specific issues:

- Potential impacts of changes in water composition on Delta native fish and on the imprinting of juvenile fall run chinook salmon and steelhead in the SJR basin;
- Potential effects of increased exports on in-Delta hydrodynamics and fish entrainment at the SWP and CVP export facilities;
- Potential effects of salt and contaminant loading in the SJR basin from the recirculation of water through the Newman Wasteway;
- Impacts on water deliveries to Exchange Contractors and other contractors receiving water from the DMC, the California Aqueduct, and the San Luis Reservoir;
- The capacity of the physical facilities to implement recirculation, including a description of any needed structural/channel modifications, a cost estimate, and a determination of potential conserved water (compared to other alternatives) to meet Delta flow and Vernalis Adaptive Management Plan (VAMP) requirements; and
- Potential for improvements in water quality in the SJR as a result of recirculation.

The POA was submitted by Reclamation on December 15, 2000 (Reclamation, 2000) and approved by the SWRCB in a letter dated March 21, 2001 (SWRCB, 2001). However, the POA did not receive Congressional authorization and funding until the passage of PL 108-361. In October 2005, Reclamation submitted a revised POA (Reclamation, 2006) to the SWRCB that included a long-term schedule for completion of a study in compliance with D-1641. Reclamation submitted a revised Plan of Action to the SWRCB on April 24, 2006

1.5 DESCRIPTION OF STUDY AREA

The DMC is on the western side of Central California's San Joaquin Valley and runs for approximately 120 miles, beginning near the city of Tracy at the southern edge of the Sacramento River and San Joaquin Delta and terminating at the Mendota Pool on the SJR, at the town of Mendota. The areas served by the DMC include primarily agricultural lands on the western side of the San Joaquin Valley, from Tracy in the north to Kettleman City in the south, and primarily urban uses in the San Felipe unit of the CVP, in San Benito and Santa Clara County, west of the Coast Range. The DMC generally runs parallel to the California Aqueduct, a state-owned facility providing primarily agricultural water to southern portions of the San Joaquin Valley and primarily urban supplies to southern California. The DMC is part of the federal CVP Delta export facilities that also include the TPP, the Westley and Newman Wasteways, the O'Neill Pumping Plant, the O'Neill Forebay, and the San Luis Reservoir (SLR). The facilities and features that are likely to be used directly as part of the project include, but may not be limited to, the TPP, the DMC, the Westley or Newman Wasteway, and the SJR, below its confluence with the Merced River. The project also may impact the operations of other CVP facilities either directly or indirectly, including the SLR and the New Melones Reservoir on the Stanislaus River (see Figure 1).

The project study area can be defined as the lower main stem of the SJR below its confluence with the Merced River, the areas served by the Merced, Tuolumne, and Stanislaus Rivers on the western side of the Sierra Nevada Mountains, and the areas served by the DMC, as described, including approximately 30 water agencies. The study area includes five major irrigation districts served by the SJR tributaries, including the Modesto and Turlock Irrigation District on the Tuolumne River and the Merced Irrigation District on the Merced River, and the South San Joaquin and Oakdale Irrigation District on the Stanislaus River. Immediately downstream from the confluence with the Stanislaus River, the SJR becomes part of the Delta, which serves as a source of water supply for agricultural and urban uses within the Delta area. Therefore, the south Delta will be considered part of the project study area.

1.6 PREVIOUS INVESTIGATIONS

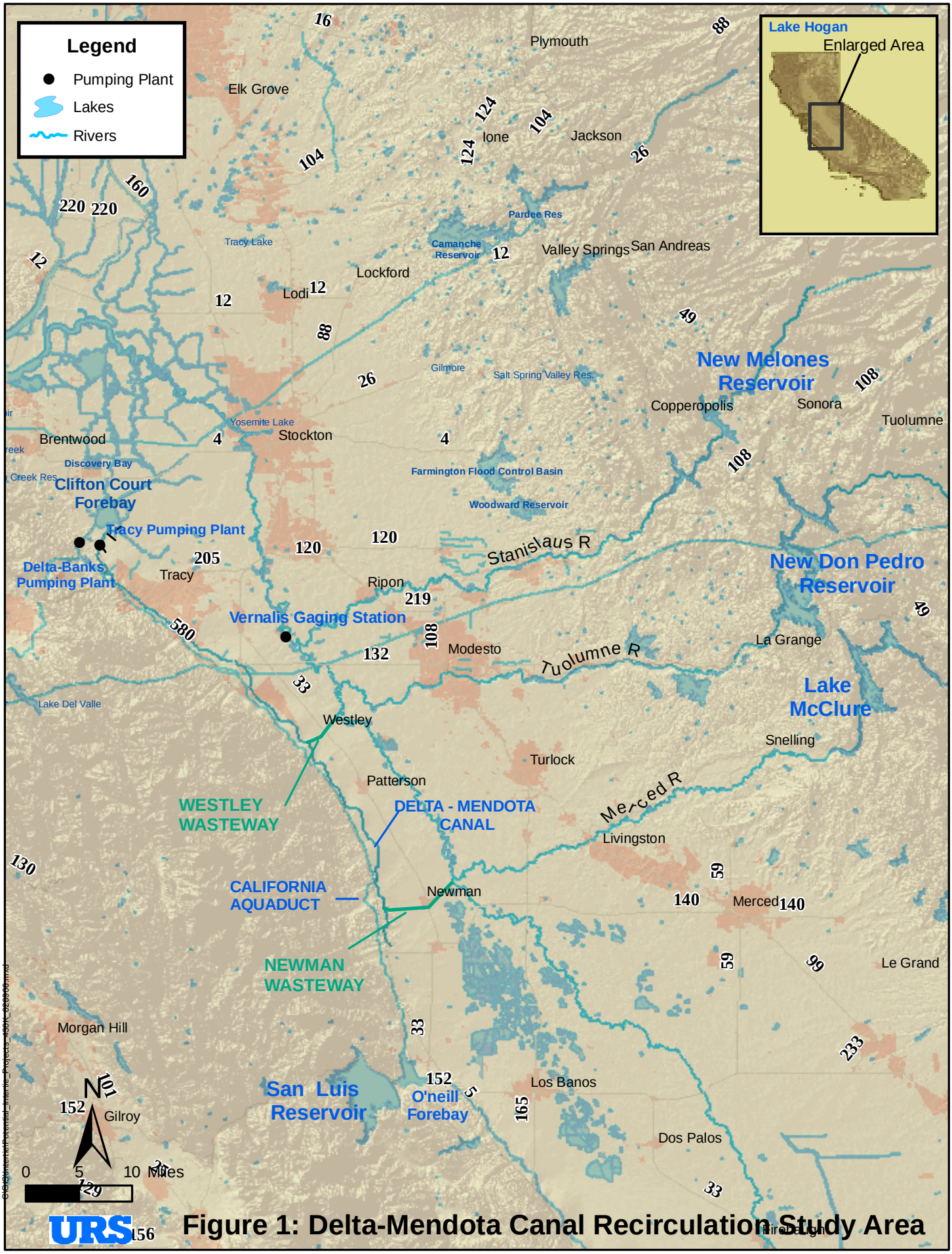
Previous recirculation studies have consisted of modeling and physically discharging water from the DMC to the SJR via the wasteways that connect the DMC to the river, to meet the April 15 through May 15 pulse flow mandated by the 1995 WQCP.

1.6.1 *Delta Mendota Canal Recirculation Study – Final Report on Hydrologic Modeling (May 2003)*

The modeled study was prepared by Reclamation and submitted to the SWRCB in August 2004 to fulfill the requirements of Tasks 1 & 2 of the POA submitted to and approved by the SWRCB on December 15, 2000. The study was the first phase of an appraisal-level study that included hydrologic modeling of the potential impacts on water supply from implementing recirculation under two scenarios:

- Alternative 1: During the 31-day pulse flow period (April 15 to May 15) in lieu of releases from tributary reservoirs; and
- Alternative 2: During February through June to supplement SJR flows, in addition to releases from New Melones Reservoir, excluding the 31-day pulse flow period in April and May.

The study concluded for Alternative 1 that recirculation could be used to supplement SJR flow during the pulse flow period with potential major impacts to south of Delta CVP delivery and minor impacts on reservoir operation, CVP/SWP deliveries north of the Delta, and reservoir storage in the SLR. The study


Legend
Pumping Plant
Lakes
Rivers
Lake Hogan
Enlarged Area
Plymouth
Elk Grove
Ione
Jackson
Pardee Res
Tracy Lake
Camanche Reservoir
Valley Springs
San Andreas
Lockford
Lodi
Gilmore
Salt Spring Valley Res.
New Melones Reservoir
Copperopolis
Sonora
Tuolumne
Yosemite Lake
Brentwood
Stockton
Discovery Bay
Farmington Flood Control Basin
Woodward Reservoir
Clifton Court Forebay
Tracy Pumping Plant
Delta-Banks Pumping Plant
Tracy
Ripon
Stanislaus R
New Don Pedro Reservoir
Vernalis Gaging Station
Modesto
La Grange
Tuolumne R
Lake McClure
Lake Del Valle
Westley
Snelling
Turlock
Patterson
Merced R
WESTLEY WASTEWAY
DELTA - MENDOTA CANAL
Livingston
CALIFORNIA AQUADUCT
Newman
Merced
NEWMAN WASTEWAY
Le Grand
Morgan Hill
San Luis Reservoir
O'neill Forebay
Los Banos
Dos Palos
Gilroy
N
0 5 10 Miles
URS
Figure 1: Delta-Mendota Canal Recirculation Study Area

concluded for Alternative 2 that recirculation could be used to supplement flow during February through June and possibly during October and November with minimal overall water supply impact because required recirculation flow is small.

1.6.2 *Recirculation Pilot Study Final Report (June 2005)*

The pilot study was conducted during August 2004, and the report was prepared by Reclamation in June 2005. The pilot study consisted of diverting up to 300 cubic feet per second (cfs) into the Newman Wasteway and discharging the water into the SJR 1.24 miles upstream from the Merced River confluence. During the study period, flows and predetermined water quality constituents were measured and analyzed. The study generally concluded that recirculated flow through the Newman Wasteway was effective in increasing flow and reducing salinity (electrical conducting [EC]) at Vernalis. It also concluded that there was no water supply impact to CVP contractors during the pilot study, though it was difficult to measure losses in the river because of insufficient data and controls during the recirculation operation. The analysis suggested that real time monitoring of water quality and flows will be required to realize savings in New Melones water quality releases.

1.7 CURRENT ACTIVITIES

This section describes ongoing studies by Reclamation and others that might affect the DMC Recirculation Project FS.

Vernalis Adaptive Management Plan (VAMP)
Following the adoption of the 1995 WQCP, the obligation to meet salinity standards and the proposed spring pulse flow was debated among the entities that operated the dams on the SJR tributaries. Reclamation had constructed and operated New Melones in part to help meet the water quality requirements at Vernalis and in the south Delta, but the new pulse flow requirement was intended primarily to assist out-migrating salmon from all of the tributaries. The districts operating the reservoirs on the Merced and Tuolumne Rivers were concerned that, without a head of Old River barrier (HORB), the out-migrating salmon would be adversely impacted by TPP and BPP pumping during the pulse flow. In addition, the districts that relied on water rights and contract supplies on the Stanislaus River were concerned that their water supplies would be impacted if too large of an obligation were placed on New Melones. The affected parties, including state and federal project operators, fishery agencies, water agency stakeholders, and environmental stakeholders, ultimately negotiated the SJR Agreement, which implemented the VAMP, a 12-year study program involving defined pulse-flow levels, export pumping limits, installation of the HORB, and water purchases from the water rights holders on the tributaries. The VAMP was implemented in 2000, as part of D-1641, and is currently in its sixth year of implementation.

CALFED Conveyance Program – South Delta Improvement Program
The CALFED conveyance program includes south Delta planning and potential actions, known as the South Delta Improvement Program (SDIP), that would increase SWP and CVP exports, install permanent operable barriers in the south Delta to control water levels and quality, increase fish protection by improving fish screening at CVP and SWP facilities, and improve flood protection. The SDIP is currently completing the environmental documentation required prior to implementation. Some of the potential SDIP actions could affect the amount of water required to meet current water quality and flow objectives. For example, the installation of permanent operable barriers may affect the spring pulse flows necessary to assist out-migrating salmon.

San Joaquin River Water Quality Management Group

The SJR Water Quality Management Group (SJRWQMG) was formed by stakeholders in 2004 to develop recommendations to assist policy makers in deciding what action should be implemented to meet water quality objectives in the SJR, specifically the salinity objective at Vernalis and the DO objective in the Stockton Deep Water Ship Channel. A report of the summary recommendations of the SJRWQMG, distributed in June 2005, included a list of recommendations for achieving the salinity and DO standards.

West Side Regional Drainage Plan

The West Side Regional Drainage Plan (WSRDP) is an integrated plan to eliminate irrigated agricultural drainage water from, and enhance water supply reliability for, about 100,000 acres in the Grasslands Drainage area. The Program began as a successful effort to reduce selenium discharges to the SJR. It is now being proposed for expansion to go beyond regulatory requirements and eliminate selenium and salt discharges to the SJR while maintaining the productivity of production agriculture in the region and enhancing water supplies to lands remaining in production. To the extent this program is successful, it will reduce salinity and could reduce the amount of water released from storage or recirculation that is necessary to maintain salinity standards. It may also result in reduced total flows in the SJR.

1.8 PROBLEMS AND OPPORTUNITIES

Problems and Needs

- Find Alternative Methods to Reliably Meet Flow Objectives at Vernalis and in south Delta Channels
- Find Alternative Methods to Meet Water Quality Requirements at Vernalis and in south Delta Channels

Opportunities

- Improve Water Supply Reliability to Stanislaus River Users and Export Contractors
- Reduce Groundwater Overdraft
- Augment Flow to Improve Anadromous Fish Survivability
- Improve south Delta water levels

This section discusses current and projected water resources problems that may be resolved, needs that may be met, and opportunities that may be created by the DMC Recirculation Project. The identification of problems, needs, and opportunities provides a foundation for formulating alternative plans. Problems and needs to be addressed by the project will be further defined through stakeholder input as the project proceeds.

1.8.1 Problems and Needs

Find Alternative Methods to Reliably Meet Flow Objectives at Vernalis and in South Delta Channels

To protect beneficial uses in the lower SJR and south Delta, the SWRCB has established flow requirements for the Sacramento-San Joaquin Delta Estuary that the CVP and SWP must meet as a condition of operating the TPP and BPP, respectively. These flow requirements are established in the 1995 WQCP and D-1641, issued on December 29, 1999, and revised on March 15, 2000. The 1995 WQCP includes a prescribed spring pulse flow at Vernalis (the point at which the SJR enters the Delta) scheduled to coincide with fish migration in the SJR tributaries and the Delta. SJR flow objectives were developed to provide attraction and transport flows and suitable habitat for various life stages of aquatic organisms, including Delta smelt and chinook salmon.

Flow requirements established for fish and wildlife beneficial uses in the 1995 WQCP are provided in Table 1.

TABLE 1

Minimum Monthly Average Flow Requirements for San Joaquin River at Airport Way Bridge, Vernalis (Interagency Station C-10)

Water Year Type	Time Period	Flow (cfs)
Wet, Above Normal	February 1 – April 14 and May 16 – June	2,130 or 3,420
Dry, Below Normal		1,420 or 2,280
Critical		710 or 1,140
Wet	April 15 – May 15	7,330 or 8,620
Above Normal		5,730 or 7,020
Below Normal		4,620 or 5,480
Dry		4,020 or 4,880
Critical		3,110 or 3,540
All	October	1,000[a]

[a] Includes up to an additional 28 thousand acre-feet (TAF) pulse/attraction flow during all water year types. The amount of water is limited to the amount necessary to provide a monthly average flow of 2,000 cubic feet per second (cfs). The additional 28 TAF is not required in a critical year following a critical year.

Source: SWRCB, 1995.

Reclamation constructed, and has historically operated, New Melones Dam and Reservoir to assist in meeting its obligations related to the flow requirements at Vernalis, as a condition of operating the TPP. The 1993 listing of the Delta smelt as an endangered (threatened) species and the new spring pulse flows established by the 1995 WQCP could significantly increase the releases from New Melones to meet flow standards. During the evidentiary and public input portions of the SWRCB process leading to adoption of both the 1995 WQCP and D-1641, interested parties suggested that DMC recirculation was an alternative method for meeting flow obligations that could be more efficient and provide potential water supply benefits to water users on the Stanislaus River. In D-1641, the SWRCB required that Reclamation prepare a POA to study the feasibility of DMC recirculation as a means of meeting flow requirements at Vernalis.

Finding Alternative Methods to Meet Water Quality Requirements at Vernalis and in south Delta Channels

Water quality in the lower SJR and the south Delta has been the subject of several historical, current, and pending regulatory actions and studies. Low flows and discharges from agricultural areas, wildlife refuges, and municipal and industrial treatment plants all contribute to water quality problems. Areas of particular concern include the portion of the SJR downstream from its confluence with the Stanislaus River, in the vicinity of Stockton and Vernalis. The water quality in the south Delta, downstream from Vernalis, also is influenced by diversions of water by the SWP and CVP, diversions by local users, tidal action, return flows and urban runoff wastewater discharges, and channel capacity. The lower SJR has been listed as an impaired water body by the SWRCB and United States Environmental Protection Agency (EPA) because of its high concentrations of salts (EC), boron, and selenium, as well as unknown toxicity, and low concentrations of DO in the Stockton Deep Water Ship Channel (EPA, 2003).

Delta water quality standards for operation of CVP and SWP facilities were established by the SWRCB in the 1995 WQCP and D-1641. Water quality objectives (WQOs) in the 1995 WQCP include objectives established to protect municipal, industrial, agricultural, and fish and wildlife beneficial uses. Salinity objectives published in D-1641 are shown in Table 2. The 1995 WQCP for the Southern Delta (SJR at Airport Way Bridge, Vernalis) expressed the salinity objective as a maximum 30-day running average of mean daily EC for the protection of agricultural beneficial uses. Additional salinity objectives are established for fish and wildlife beneficial uses in the SJR within the Delta.

TABLE 2

Water Quality Objectives for Salinity from D-1641

Location	Time Period	Water Year Type	Electrical Conductivity (mmhos/cm)
Electrical conductivity objective for agricultural beneficial uses	April – August	All	0.7
	September – March	All	1.0

The Salinity and Boron total maximum daily load (TMDL) (SJR at Vernalis) Basin Plan Amendment (Regional Water Quality Control Board, Central Valley Region [RWQCB], 2005a) was approved by the Central Valley RWQCB in November, 2005, but has not received final approval from EPA. Under the recommended implementation program, allowable discharges are to be based on the assimilative capacity (or flow rate). In addition to managing discharges of salinity and boron, the total maximum daily load (TMDL) also allows dischargers to increase the assimilative capacity by providing clean freshwater flows. Modeling conducted as part of previous investigations by Reclamation indicated that under some recirculation alternatives such as the VAMP flow compliance, salinity might increase in some locations (such as Vernalis) and decrease in other locations (such as below the Newman Wasteway) as a result of substitution of Merced River released for DMC releases (Reclamation, 2003).

The Dissolved Oxygen TMDL Basin Plan Amendment (RWQCB, 2005b) was approved by the Central Valley RWQCB in February 2005 and by the State Board in November 2005, but has not received final approval from EPA. This TMDL identifies three primary factors that affect DO concentrations in the Stockton Deep Water Ship Channel, including channel geometry, loads of oxygen demanding substances and reduced flows.

1.8.2 Opportunities

Improve Water Supply Reliability for Stanislaus River Users and Export Contractors

The recirculation of water to improve water quality and flows also may have the potential to improve water supply reliability for CVP contractors in the Delta export areas and the Stanislaus River. To the extent that recirculation would contribute to consistently meeting the Vernalis flow and salinity standards without reducing contract water service supplies in any year, the reliability of CVP Delta export water service supplies could be enhanced in the long term. Similarly, to the extent that meeting Vernalis flow and salinity standards through recirculation could reduce releases from New Melones for those purposes, the reliability of contract water service for CVP contractors along the Stanislaus River with water supplies derived from New Melones storage could increase in the long term.

Reduce Groundwater Overdraft

Recirculation may reduce the existing groundwater overdraft to the extent that it reduces the reliance on New Melones and other reservoirs for water to meet the flow and quality objectives established in the 1995 WQCP and D-1641. The SJR hydrologic region covers approximately 9.7 million acres. The region depends heavily on groundwater for agricultural and urban use, especially during drought periods, and portions of the Merced County area and eastern San Joaquin County are entirely dependent on groundwater. Groundwater use within the region accounts for about 30% of the average annual supply for agricultural and urban use. Overdraft conditions in the western portion of the basin contribute to the deterioration of groundwater quality by promoting the recharge of streamflow from marine sediments in the Coast Range with high total dissolved solids (TDS) levels.

Irrigation districts and cities pump groundwater from the Merced, Modesto, and Eastern San Joaquin County groundwater basins to help meet demand during drought conditions. All three of these basins are in a state of overdraft. In Bulletin 160-93, DWR reported that the overdraft in the Merced Groundwater Basin is occurring at a rate of 28 TAF per year, based on the 1990 Level of Demand. Overdraft conditions can contribute to subsidence, groundwater quality degradation, and declines in agricultural productivity. Under some conditions, subsidence can lead to the irreversible loss of storage capacity in an aquifer. Subsidence from hydrocompaction has occurred in two particular areas west of Mendota (United States Geological Survey [USGS] 82-370) and more generally most of the area from Tracy north.

Augment Flow to Improve Anadromous Fish Survivability (or Migration)

Improved flow in the SJR might benefit the survivability of juvenile and adult anadromous fish. In D-1641, the SWRCB requires an evaluation of the potential imprinting impacts on out-migrant juvenile fall run chinook salmon and steelhead in the San Joaquin Basin that could result from the project. Under certain scenarios, recirculation could be used to improve DO levels in the Stockton area, potentially aiding the upstream migration of adult salmonids. This evaluation should clarify whether improving the flow in the river through recirculation poses a greater benefit or liability to anadromous fish.

Improve South Delta Water Levels

During periods when low SJR flows combine with high export rates and low tides, south Delta water levels can become so low as to constrain diversions for irrigation. The problem of south Delta low water levels is multifaceted; it may be addressed, in full or in part, by the SDIP and DMC recirculation during late summer periods. The DMC recirculation project would improve the likelihood of the SDIP for being

successful in addressing low water levels. The SDIP involves installing permanent operable barriers at key locations within the Delta and carefully focused channel dredging, among other actions. Water levels for irrigation during the low-flow summer months also may be improved by combining recirculation with low lift pumps at the operable barriers in the south Delta. This evaluation should determine whether, and to what extent, DMC recirculation would enhance the ability of SDIP to maintain desired water levels in the south Delta during critical irrigation periods.

1.8.3 Summary

Table 3 summarizes the relationship between the problems, needs, and opportunities discussed in this section and the identified FS objectives.

TABLE 3

Problems, Needs, and Opportunities Relative to Project Objectives

	Problems, Needs, and Opportunities	Project Objectives
Problems and Needs	Alternative Methods to Reliably Meet Flow Objectives at Vernalis and in south Delta Channels – There is a problem in meeting the water quality objectives and minimum flow established in D-1641 without impacting other commitments to water agencies. Improved operational flexibility improves the reliability of meeting the flow requirements at the Vernalis gauging station.	Help meet SJR flow and water quality objectives at Vernalis while minimizing impacts to fish and wildlife resources. Provide flexibility through enhanced water quality benefits for other CALFED programs.
	Alternative Methods to Meet Water Quality Requirements at Vernalis and in the south Delta Channels – The lower SJR has been listed as an impaired water body by the SWRCB and EPA because of its high concentrations of salts (EC), boron, and selenium, as well as toxicity, and low concentrations of DO in the Stockton Ship Channel (EPA, 2003).	

TABLE 3

(Continued)

	Problems, Needs, and Opportunities	Project Objectives
Opportunities	Improve Water Supply Reliability for Stanislaus River Users and Export Contractors – The recirculation of water to improve water quality and flows also may improve water supply reliability for CVP contractors in the Delta export areas and the Stanislaus River.	Provide alternative to meet SJR flow and water quality objectives at Vernalis while minimizing impacts to existing water users in the basin.
	Reduce Groundwater Overdraft – Recirculation may reduce the existing groundwater overdraft to the extent that it reduces the reliance on New Melones and other reservoirs for water to meet the flow objectives established in D-1641. Merced and Oakdale Irrigation Districts pump groundwater from the Merced, Modesto, and Eastern San Joaquin County groundwater basins to help meet demand during drought conditions.	
	Augment Flow to Improve Anadromous Fish Survivability – Improved flow in the SJR may benefit the survivability of anadromous fish. In D-1641, the SWRCB requires an evaluation of potential imprinting impacts on juvenile fall run chinook salmon and steelhead in the San Joaquin Basin that may result from the project. This evaluation should clarify whether improving the flow in the river through recirculation poses a greater benefit or liability relative to anadromous fish.	Increase the survival of anadromous fish populations during the critical spring flow migration periods and contribute to the health and survival of other aquatic species in the south Delta.
	Improve South Delta Water Levels – It may be possible to improve water levels for irrigation during the summer months by timing the recirculation to occur when SJR flows are lowest in combination with low-lift pumps at the operable barriers in the south Delta.	Improve water levels for irrigation; provide alternative to meet SJR flow and water quality objectives at Vernalis while minimizing impacts to existing water users in the basin.

1.9 RESOURCE AVAILABILITY AND COST SHARING

Recirculation will require Reclamation's commitment of various resources, including water, power, physical facilities, land (or rights of way), finances, and staffing, as well as other resources to be determined. The following resources are available to Reclamation to implement DMC recirculation to alleviate the problems and realize the opportunities described. Optimum use of Reclamation and other federal resources will require appropriate levels of cooperation and commitment from other agencies including, but not limited to, DWR, CDFG, USFWS, NMFS, RWQCB, SWRCB, and local districts. The FS will help to determine whether the necessary resources are available at appropriate times or in sufficient quantity and whether their use will cause any unacceptable adverse impacts. Cost sharing for this project is proposed to be covered under a programmatic Agreement in Principal for the cost sharing of the CALFED conveyance program. If DWR and Reclamation cannot consummate this proposed Agreement, an alternative cost sharing agreement will be necessary. A cursory evaluation of the pertinent water and related land resources is provided in Table 4.

TABLE 4

Resource Availability

Resource	Comments
Water Rights	Reclamation's existing Delta export water rights permits allow the use of recirculated water to meet the project's objectives if they are achievable.
Water Supply	A fundamental premise of DMC recirculation is that it is a non-consumptive use of CVP water that can accomplish the project objectives without adversely impacting Reclamation's ability to meet other project obligations. Export pumping at TPP is typically in the range of two million acre-feet (MAF) to three MAF, depending on water year type. Recirculation will require the use of a relatively small share of total pumping capacity. The final determination of the availability of water supply resources will depend on many variables, including, but not limited to, recirculation rate, timing, duration, and hydrologic year type(s).
Facilities	The Reclamation facilities available to implement DMC recirculation include the Tracy Fish Facility, TPP, DMC, and Newman Wasteway. Use of the Westley Wasteway would require an extension of the channel and reconstruction of the outfall structure, given the movement of the channel as a result of river meander. The maximum recirculation flow rate will be limited by the DMC capacity, Newman Wasteway turnout capacity, and pumping capacity at the TPP. Recirculation flow rates at less than full pumping capacity will be limited to certain incremental flow rates determined by the available combinations of pumps at the TPP
Power	In most years, Reclamation produces sufficient CVP-generated power to implement recirculation. However, in a sequence of dry and critically dry years and drought conditions, power generation during certain potential recirculation time frames could be inadequate to meet normal project loads and recirculation loads. Further, CVP power generated over and above project loads is contractually made available to Preference Power customers; therefore, recirculation could reduce the availability of Preference Power under some circumstances.
Land	Reclamation currently owns or has rights of way for all facilities necessary to implement DMC recirculation using the Newman Wasteway. Other pathways for implementing recirculation may require the acquisition of land or rights of way to convey water from the DMC to the river. As identified under " Facilities," the use of the Westley Wasteway would involve the extension of the channel and a new outfall structure on land created by movement of the river channel.

1.10 ISSUES AND CONCERNS

As discussed earlier, the need for this FS arose out of concerns regarding how Reclamation and other parties will be able to meet the 1995 WQCP standards and exercise their various water rights. Key stakeholders are identified in Table 5.

TABLE 5

Key Stakeholders Influencing the Study

Category	Stakeholders
Federal Agencies	• U.S. Fish and Wildlife Service (USFWS) – Federal jurisdiction over aquatic and terrestrial wildlife, including all endangered species except for anadromous fish. Of key concern relative to SJR flows and quality is the Delta smelt and pelagic fish or other organisms in the Delta. • National Oceanic and Atmospheric Administration –National Marine Fisheries Service (NOAA/NMFS) – Federal jurisdiction over anadromous fisheries, including steelhead and winter run salmon. • U.S. Environmental Protection Agency (EPA) – Federal jurisdiction over water quality pursuant to the Clean Water Act. • U.S. Army Corps of Engineers (USACE) – Federal jurisdiction with respect to levees, flooding, and wetlands.
State Agencies	• California Department of Water Resources (DWR) – State jurisdiction over water resources and supplies, including operation of the State Water Project, including BPP. • State Water Resources Control Board (SWRCB) – State jurisdiction over water rights, including CVP and SWP. • Regional Water Quality Control Board (RWQCB) – State jurisdiction over surface and groundwater quality. • California Department of Fish and Game (CDFG) – State jurisdiction over aquatic and terrestrial wildlife, including all state-listed endangered species. • California Bay Delta Authority (CBDA) – a federal advisory committee charged with directing the activities of CALFED Bay-Delta programs
Other Public Agencies and Interest Groups (not an exhaustive listing of all interested groups)	• Central Delta Water Agency – California special district that includes lands impacted by water quality and levels in the central portion of the Delta. • South Delta Water Agency – California special district that includes lands impacted by water quality and levels in the southern portion of the Delta. • San Joaquin River Group Authority – Joint powers authority including five public agencies that have water supply interests impacted by water quality and flows in the lower SJR. • San Luis and Delta-Mendota Water Authority – Joint powers authority consisting of 32 agencies that rely on CVP Delta exports. • San Joaquin River Exchange Contractors Authority – Joint powers authority consisting of agencies with prior rights on the San Joaquin River. • State Water Project contractors – Association of public agencies that receive Delta export water supplies from the

	State Water Project. • Environmental Water Caucus – Association of environmental interests with concerns regarding the operations of water projects in California, including such organizations as Delta Keepers, The Bay Institute, Natural Resources Defense Council and Environmental Defense.

It is not anticipated that custom procedures will be required for evaluating the National Economic Development (NED) benefits or that a plan will be selected that does not maximize NED benefits.

Water supply issues and concerns address sensitive stakeholder involvement issues. Water quality and fishery concerns and issues address the most sensitive regulatory agency issues.

1.10.1 Water Supply Issues and Concerns

Water supply issues and concerns include:

- Impacts on water deliveries to Exchange Contractors, CVP water service contractors, and other contractors receiving water from the DMC, the California Aqueduct, and San Luis Reservoir;
- Potential disproportionate impacts to CVP contractors from individual units (e.g., San Felipe Unit, San Luis Unit, Stanislaus River, etc.);
- Potential impacts to available capacity at export pumps to convey transferred CVP and non-CVP water;
- Potential for recirculation to conserve water, compared to other alternatives, to meet Delta flow and VAMP requirements;
- Ability of recirculation to complement implementation of the CALFED SDIP or other water supply or conveyance programs;
- Appropriate baseline of operations from which to compare alternatives during the FS;
- Losses and disposition of lost water, including unauthorized and legal diversions (i.e., the difference between the amount diverted from the DMC to the wasteway and the amount of water returning to the Delta at Vernalis); and
- Potential for recirculation to cause indirect water supply impacts as a result of the alteration of facility maintenance schedules.

1.10.2 Water Quality Issues and Concerns

Water quality issues and concerns include:

- Potential effects of salt and contaminant loading in the San Joaquin basin for recirculation of water through the Westley or Newman Wasteways or other potential pathways;
- Potential for improvements in water quality in the SJR as a result of recirculation;
- Impact of recirculation on compliance with TMDL and permit requirements in the lower SJR;

- Establishing well-defined, specific, and measurable WQOs to define success, including acceptable levels of metals, DO, salinity and boron;
- Evaluation of water quality considerations downstream from Vernalis;
- Potential impacts to water quality in the San Luis Reservoir, particularly at low levels in the SLR;
- Potential for, and impacts of, increasing water temperatures in the SJR; and
- Potential for impacts, positive or negative, to drinking water quality and potential affects on water treatment costs.

1.10.3 Fishery Issues and Concerns

- Potential impacts of changes in water composition on Delta native and pelagic fish;
- Potential impacts on imprinting of juvenile fall run chinook salmon and steelhead in the San Joaquin basin;
- Potential increase in straying of Sacramento River winter-run chinook salmon, Central Valley spring-run salmon, Central Valley steelhead, and Central Valley fall/late-fall run chinook salmon;
- Potential effects of straying on listed salmonid population viability;
- Potential effects of changed operation on the cold water pool of the Sacramento and San Joaquin basin reservoirs;
- Potential effects of increased exports on in-Delta hydrodynamics;
- Potential for recirculation to increase fish entrainment at the SWP and CVP export facilities;
- Potential interaction of releases from Friant Dam as part of a settlement of current litigation; and
- Potential for staggered timing of recirculation to reduce impacts to fish.

1.10.4 General Issues and Concerns

- The physical and/or incremental capacities of the facilities used to implement recirculation;
- Determination and cost of any needed structural/channel and other facility modifications;
- Costs of recirculation and obligations to pay those costs;
- Increased electrical load on the state's power system resulting from recirculation;
- Clear definition of all operational assumptions, including circumstances when JPOD will be used to implement recirculation; and
- Potential impacts on TPP maintenance as a result of recirculation.

1.10.5 Major Alternatives to be Studied

The concept of recirculation was developed to facilitate compliance with Delta water quality, salinity, and flow standards in the lower SJR. Recirculation uses water pumped at the TPP to augment flow in the SJR. In principle, water to be recirculated is pumped from the Delta by the TPP then conveyed in the DMC to

one or the other (or both) of two existing wasteways (originally designed for emergency uses, such as a downstream canal failure) between the DMC and the SJR where it is diverted from the canal back into the river. The diverted water then flows to the SJR either just upstream from the San Joaquin/Tuolumne River confluence (Westley Wasteway path) or near the San Joaquin/Merced River confluence (Newman Wasteway path). Once in the SJR, the water returns to the Delta, helping to meet the Vernalis flow and water quality standards during the recirculation period. It must be understood that the recirculation concept assumes that the water begins the recirculation process by leaving the Delta with lower salinity, turbidity and total organic carbon (TOC) levels and combines with existing SJR flows of higher salinity, turbidity and TOC to improve the overall quality of the river water before it returns to the Delta. Recirculation will not be implemented when the quality of exported Delta water is worse than the quality of the SJR water at Vernalis.

Each alternative will include a description of the operations and implementation criteria, including when to use recirculation, for how long and at what flow rate(s). Alternative recirculation concepts to be studied will include the following.

- **Recirculation using the Westley Wasteway.** Recirculation via the Westley Wasteway would function as already described. The maximum theoretical discharge capacity would be 4,400 cfs, with the point of discharge to the SJR being approximately 4 miles upstream from the San Joaquin/Tuolumne River confluence. Any potential flow and water quality benefits, if realized, would not accrue upstream to the confluence of the Merced River.
- **Recirculation using the Newman Wasteway.** Recirculation via the Newman Wasteway would function as already described. The maximum theoretical discharge/recirculation rate would be 4,300 cfs, with the point of discharge to the SJR being on the main stem of the river, a few miles upstream from the San Joaquin/Merced River confluence. Flow and water quality benefits, if realized, would accrue from the confluence of the Merced River to Vernalis.
- **Recirculation during the 31-day spring pulse-flow period, in lieu of releases from tributary reservoirs.** Recirculation under this scenario would occur as already outlined, but it would be made in lieu of releases of higher quality water from SJR tributary upstream reservoirs. The total recirculation flow rate would have to be equal to the foregone upstream releases, with no flow-related benefits accruing.
- **Recirculation during February through June, other than the 31-day spring pulse-flow period, in addition to releases from New Melones.** Recirculation under this scenario would occur intermittently and as needed to meet salinity and flow requirements during spring periods, when flows on the SJR are low.
- **Recirculation during July through August to meet flow and salinity requirements at Vernalis and water level and salinity targets in the Delta.** Recirculation under this scenario would occur as already described using either of the two wasteways. This assumes that a net increase in south Delta water levels will occur, even though pumping is increased to support recirculation objectives.
- **A recirculation plan for which additional pumping is not simultaneous with discharges to the SJR. Recirculation under this scenario would differ markedly from other concepts.** Water for recirculation would have to be pumped/exported in advance and stored, presumably in the San Luis Reservoir, for later release. The location of both wasteways on the DMC upstream from O'Neill Forebay would necessitate an exchange agreement with the SWP because stored water is being released into the Joint Use Facilities in lieu of being

directly discharged to the Wasteways. Net power requirements for recirculation would increase, given the storage requirements. In addition San Luis Reservoir storage capacity might be a limiting factor in the feasibility of this concept. Water supply impacts to CVP Delta export contractors are expected to accrue at a 1:1 ratio.

Additional alternatives that might be evaluated include the following:

- **No action** – Continue to meet water quality and flow obligations through releases from New Melones; and
- Implement recommendations of the SJRWQMG for meeting salinity at Vernalis.

2.0 STUDY ORGANIZATION AND MANAGEMENT

Successful completion of the DMC recirculation FS requires a team consisting of Reclamation and consultant staff and collaboration with other agencies. Numerous stakeholders have been identified. Effective outreach and coordination of input from these stakeholders is crucial to the success of this project. The roles and responsibilities of FS project team members in regard to project management, stakeholder outreach, and participation on various focus teams (see Figure 2) are described in this section.

Project Management Team: Reclamation is the lead agency, and the Mid Pacific Region will supply the Team Leader for the FS. An Assistant Team Leader from a cooperative teaming partner may be identified during the course of the study. Candidate agencies for the cooperative local teaming partner include the DWR, and CDFG. The management team also will include the Project Manager from the consultant selected to support the FS. The management team will coordinate all major deliverables, including the Initial Alternatives Information Report (IAIR), Alternatives Screening Report (ASR), the Environmental Impact Report/Environmental Impact Statement (EIR/EIS), and the FS Report.

Stakeholder and Public Outreach Team: The stakeholder outreach team will include the Team Leader, the consultant's Outreach Task Leader, and a representative from Reclamation's Mid Pacific Region's Office of Public Affairs. This team will initiate two distinct outreach efforts. The first will provide outreach targeted to the needs of Reclamation contractors and other water agencies; the second will target the general public, including what is anticipated to be a significant number of third party groups interested in the environmental and recreational impacts of the project.

Collaborative Interagency Team: A series of collaborative interagency meetings is anticipated, with participation by the USFWS, NOAA/NMFS, USACE, DWR, CDFG, SWRCB, and Central Valley RWQCB . The San Francisco Bay RWQCB and the EPA also may be engaged in these meetings to some extent. Cooperating agency status also could be extended to local public agencies with special knowledge or resources, including, but not limited to, the San Luis Delta Mendota Water Authority (SLDMWA) and SDWA. The collaborative interagency team will be coordinated by the Team Leader and the consultant's Project Manager. A comprehensive list of permit requirements and a schedule for obtaining permitting and agency consultation will be developed by the consultant.

Technical Team: The technical team will include the consultant's Team Leads, with corresponding reviewers from Reclamation, its cooperative state teaming partner, and other agencies, as appropriate. The primary technical focus areas for the DMC recirculation FS are water quality, water supply and operations, fisheries, terrestrial biology (Reclamation may elect to identify a representative from USFWS to serve as the lead reviewer for this area), and benefits analysis. Additional technical teams will address other environmental compliance issues and develop a Basis of Design Report and cost estimate for project construction. These teams will be coordinated by the management team through monthly technical focus team meetings.

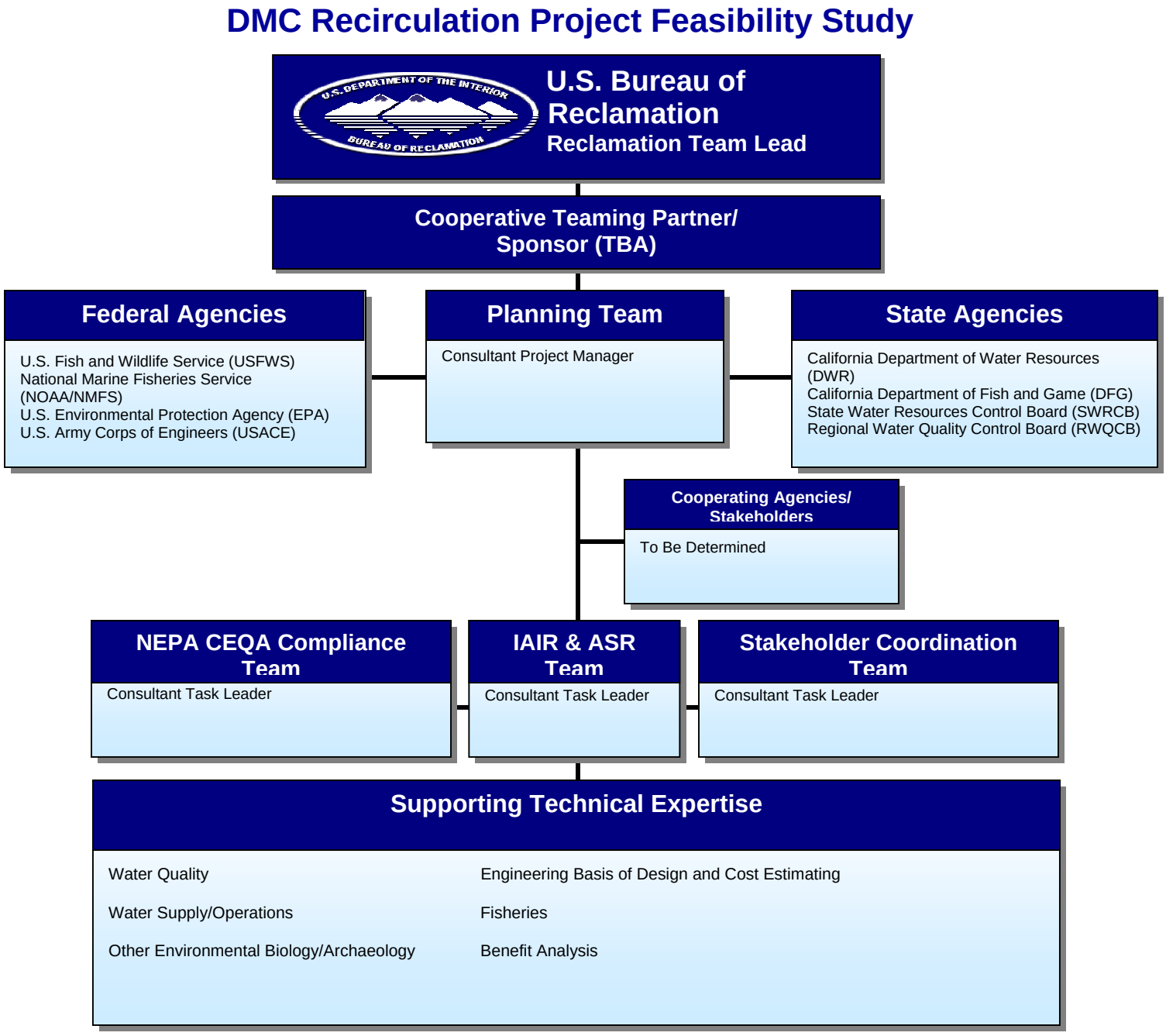


Figure 2. Organization Chart

3.0 STUDY REQUIREMENTS

The DMC recirculation FS will be a federal study prepared to conform to the federal Principles and Guidelines (P&Gs) (WRC, 1983).

The plan formulation process for federal water resource investigations and projects is defined in the P&Gs. The P&Gs include a six-step, structured approach to problem solving that provides a rational framework for sound decision-making. Following are the six steps.

Step 1 – *Identifying existing and projected future resource conditions without implementation of a project;*

Step 2 – *Defining water resources problems and needs to be addressed;*

Step 3 – *Developing planning objectives, constraints, and criteria and an overarching Mission Statement;*

Step 4 – *Identifying resource management measures and formulating potential alternative plans to meet study objectives;*

Step 5 – *Comparing and evaluating alternative plans; and*

Step 6 – *Selecting a plan for recommended implementation.*

3.1 FORMULATION CRITERIA

Each alternative plan must be formulated with consideration of the following four criteria described in the P&Gs.

- **Completeness –** Completeness is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other federal and non-federal entities.
- **Efficiency –** Efficiency is the extent to which the alternative plans are the most cost-effective means of achieving the planning objectives.
- **Effectiveness –** Effectiveness is the extent to which the alternative plans contribute to achieving the planning objectives.
- **Acceptability –** Acceptability is the extent to which the alternative plans are acceptable in terms of applicable laws, regulations, and public policies.

3.2 ACCOUNTS

The following four accounts are established to facilitate the evaluation and display of the effects of alternative plans.

- **National Economic Development.** The national economic development (NED) account displays changes in the economic value of national output of goods and services.
- **Environmental Quality.** The environmental quality (EQ) account displays non-monetary effects on significant natural and cultural resources.

- **Regional Economic Development.** The regional economic development (RED) account registers changes in the distribution of regional economic activity. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output, and population.
- **Other Social Effects.** The other social effects (OSE) account registers effects from perspectives that are relevant to the planning process but are not reflected in the other three accounts.

The national economic development account is required. Other information that is required by law, or that will have a material bearing on the federal decision-making process, should be included in the other accounts or in some other appropriate format used to organize information on effects. The accounts are applied to screen initial alternatives later in the planning process.

4.0 PUBLIC INVOLVEMENT PLAN

The DMC Recirculation Project is expected to be of high interest to agencies, stakeholders, and interest groups concerned about water operations in the south Delta and, specifically, in the following topics:

- Water quality in the lower SJR and the south Delta;
- Fisheries benefits and impacts in the lower SJR and the south Delta;
- Water quality and deliveries for export contractors;
- Water deliveries from New Melones Reservoir; and
- Coordination and integration of planning and operations in the south Delta.

Because the project is not likely to involve significant construction activities, and project operations are not likely to generate harmful impacts from pollutants, Reclamation anticipates little interest from communities or residents directly affected by project construction. The public involvement program is targeted primarily for agencies, stakeholders, interest groups, and individuals interested in water operations in the lower SJR, the south Delta, and the Bay-Delta system. Public involvement activities are designed to inform and involve these interests in planning, alternatives development, environmental review, and alternatives evaluation and selection for the DMC Recirculation Project. During the preparation of this POS, Reclamation held a stakeholder workshop to solicit input regarding the proposed FS process, as well as specific issues and concerns related to the identified topics. The stakeholder contact information developed for the workshop, including all workshop participants, will be used as an initial list for contacting stakeholders regarding opportunities for input during the FS.

The project team identified the following public involvement program goals for the DMC Recirculation Project FS:

- Identify and include all interested and affected governments, agencies, and stakeholders;
- Provide accurate, easy-to-understand, timely information on issues and activities throughout the FS process;
- Encourage and solicit agency and public comments on all aspects of the FS, especially before key decision points;
- Incorporate comments and feedback received into the FS process and key decisions;
- Ensure the letter and spirit of the California Environmental Quality Act and National Environmental Policy Act (CEQA/NEPA) are followed with respect to disclosure and opportunities to comment; and
- Build understanding of the FS and support among key audiences for implementation of the alternative selected by Reclamation.

To accomplish these goals, the Reclamation team will implement the following outreach and involvement strategies:

- Establish multiple means for informing stakeholders about the progress of the FS, including U.S. mail, e-mail, and a project Web site;

- Establish an interagency group to assist with the analysis of alternatives and to coordinate necessary permitting activities;
- Inform other interested parties, including elected officials, about the progress of the FS and obtain their comments and concerns;
- Provide forums for interested parties to express their viewpoints to each other as well as to Reclamation;
- Develop a methodology to respond to these comments, so that participants understand how their input is used; and
- Interface with the CALFED Bay-Delta Program and other related or relevant programs to foster cooperation and the integration of efforts.

5.0 WORK BREAKDOWN STRUCTURE

The FS will be conducted in two phases. The first phase will focus on alternative plan formulation and include the tasks necessary to prepare the ASR. Other deliverables completed during this phase will include an Initial Public Scoping Report, the IAIR, the Basis of Design Report, and the Water Rights Memorandum. The second phase of activity will develop the Feasibility Report and Final EIS/EIR. Project management and public involvement will continue throughout all phases of the FS.

5.1 PROJECT MANAGEMENT (WBS TASK 1)

- **Manage Project (WBS 1.1):** The Project Management Team will coordinate all project activities and deliverables. Monthly progress reports will be developed to assess the status of all project tasks and the project budget.
- **Conduct Management Team Coordination Meetings (WBS 1.2):** It is anticipated that the Project Management Team will have regularly scheduled meetings to review progress.
- **Participate in Technical Team Coordination Meetings (WBS 1.3):** The Project Management Team will meet periodically with the technical leads (including Reclamation's Mid Pacific Region, the Denver Technical Center, and consultant personnel) to review progress and establish the approach for the resolution of key technical issues.
- **Prepare Work Plan for Feasibility Study (WBS 1.4):** The selected Consultant will develop a work plan identifying specific project personnel and specifying their roles and responsibilities.

5.2 PUBLIC INVOLVEMENT (WBS TASK 2)

- **Plan and Coordinate Public Involvement (WBS 2.1):** The Reclamation project team will plan and coordinate the public involvement activities with the technical and environmental studies. This coordination will allow the project team to provide timely relevant information to agencies and the public and help identify public issues and concerns to assist in project decision-making. Activities will include the development and maintenance of a project mailing list and public involvement schedule and coordination meetings with the project team and Reclamation Public Affairs.
- **Coordinate with Agencies (WBS 2.2):** The Reclamation team will plan and schedule regular briefings and workshops for staff of cooperating agencies and agencies with regulatory responsibilities for the project. Agency briefings and workshops will allow the project team to respond to questions in a timely way, discuss regulatory and technical issues, and identify issues early in the process for incorporation into the FS.
- **Conduct Public Meetings and Briefings (WBS 2.3):** The Reclamation team will plan, announce, and manage public comment meetings during the scoping of the environmental review and the public comment period on the draft EIS/EIR. During the entire study process, the Reclamation team also will plan and conduct issue coordination meetings with interested stakeholders, including water users, environmental interests, Delta interests, and community leaders. These meetings will be opportunities to provide current project information on

analytical tools, evaluation methodologies, analysis results, impact analysis, mitigation development, and alternatives refinement. The Reclamation team also will plan, announce, and manage public comment meetings during the scoping of the environmental review and the public comment period on the draft EIS/EIR. The team also will coordinate briefings, alerts, and notifications for elected officials, the media, and interest groups to keep them informed of project activities.

- **Information Materials and Issue Tracking (WBS 2.4):** The Reclamation team will prepare public information materials at key milestones to provide current project information to agencies, stakeholders, and the public. The team will use fact sheets, newsletters, briefing packets, the Reclamation Web site, and presentations to keep elected officials, stakeholders, community leaders, and the public informed of project activities, results, and progress. The project team also will manage and track input and comments received from the public about the FS process, track developing issues, and respond to comments and inquiries.
- **Prepare Initial and Final Public Scoping Report (WBS 2.5):** The Reclamation team will prepare an initial public Scoping Report describing public involvement through the ASR. The final Public Scoping Report will incorporate input from the public during the NEPA/CEQA scoping processes and comment period for the draft EIS/EIR.

5.3 INITIAL ALTERNATIVES INFORMATION REPORT (IAIR) (TASK 3)

- **Develop Outline for IAIR (WBS 3.1).**
- **Refine Project Objectives (WBS 3.2):** Problems, needs, and opportunities will be refined, and the project objectives will be updated as appropriate.
- **Define Existing and Future Baselines (WBS 3.3):** The IAIR will inventory existing conditions and forecast likely without-project future resource conditions. Existing and future baselines will be defined for measuring the effectiveness of initial measures and alternatives.
- **Define Study Area (WBS 3.4):** The Study Area will be defined to evaluate with- and without-Project conditions.
- **Define Initial Measures (WBS 3.5):** Resource management measures will be identified to meet study objectives.
- **Develop Initial Alternatives (WBS 3.6):** Given the history of this project and the specific direction provided in D1641 and PL 108-361, the scope of alternatives to the project is limited. The initial list of alternatives might include the following:
  - Recirculation using the Westley Wasteway;
  - Recirculation using the Newman Wasteway;
  - Recirculation during the 31-day spring pulse-flow period in lieu of releases from tributary reservoirs;
  - Recirculation during February through June, other than the 31-day spring pulse-flow period, in addition to releases from New Melones;
  - Recirculation during July through August to meet flow and salinity requirements at Vernalis as well as water level and salinity targets in the Delta;

  - Recirculation plan in which additional pumping is not simultaneous with discharges to the SJR;
  - No action – continue to meet water quality and flow obligations through releases from New Melones; and
  - Implement recommendations of the SJRWQMG for meeting salinity standards at Vernalis.
- **Produce Draft and Final IAIR (WBS 3.7).**

5.4 ALTERNATIVES SCREENING REPORT (ASR) (TASK 4)

- **Develop Outline for ASR (WBS 4.1).**
- **Select and Use Analytical Tools (WBS 4.2):** The selection and use of analytical tools will depend on the level of quantitative analysis required for the factors being considered. Analytical tools may be required to support the analysis of water supply, water quality, aquatic biology, terrestrial biology, energy resources, regional economics, drinking water quality impacts and treatment costs, air quality, social issues, and environmental justice. Not all factors will require quantitative analysis or sophisticated analytical tools. For each factor, the FS also will identify significance criteria and thresholds for determination of feasibility and environmental impacts. Once it is determined which factors will require the use of analytical tools and which tools are available, it may be necessary to modify some of the tools to accommodate the needs of the FS.
  - Develop significance criteria and thresholds for environmental impacts (WBS 4.2.1).
  - Select analytical tools and models (WBS 4.2.2).
- **Evaluate Engineering and Operations Issues and Constraints (WBS 4.3):** Depending on the specific alternatives used for recirculation, most or all of the necessary facilities to implement recirculation are in place and operational. However, operational constraints for some of the facilities will require evaluation. Using the Westley Wasteway would require construction at the outfall structure because the river channel has meandered since initial construction. Operational issues to be evaluated include the following.
  - **Ability to Achieve Targeted Incremental Flows (WBS 4.3.1):** This includes evaluation of TPP operations and the conveyance capacity of the DMC.
  - **Capacity of Wasteway Turnout Structures, Channels, and Discharges (WBS 4.3.2):** The Newman and Westley Wasteways were designed and built during the late 1940s, with capacities of 4,400 cfs and 4,300 cfs, respectively, and were not intended nor designed for sustained operation. Since that time, these facilities have been operated only intermittently and not to full design conditions. The effects of subsidence over the past 50 years also may have impacted the capacity of the DMC, canal control structures, and canal turnouts.
  - **Impact of Wasteway Seepage on Shallow Groundwater (WBS 4.3.3):** The Newman and Westley Wasteways were designed to provide emergency releases of water from the DMC. Regular use of these unlined canals to convey water to the SJR could impact shallow groundwater.

  - **Potential Impact on Tracy Pumping Plant Maintenance (WBS 4.3.4):** Under current operational constraints, maintenance and inspections at TPP must be completed within a 30- to 45-day period spanning the VAMP period. During this period, the TPP typically operates one unit, with the remaining five units offline and available for maintenance. Any activity, including recirculation, which necessitates the operation of more than two pumping units during the VAMP period could impact TPP maintenance and its long-term reliability and/or have a direct impact on water supplies because needed units would be out of service for maintenance during other times of the year.
  - **Feasibility Level Design and Cost Estimating (WBS 4.3.5).**

- **Evaluate Water Supply Issues and Impacts (WBS 4.4):** Recirculation of diversions from the Delta to the SJR can affect the water supply of the CVP, SWP, and San Joaquin Basin water users. Analytical tools and models will be required to evaluate the hydrologic effects of recirculation on SJR operations and CVP and SWP operations. Unless otherwise approved, CALSIM II will be the basis for hydrologic assessments. Supplementing CALSIM II will be Delta Simulation Model (DSM2) for the assessment of in-Delta hydrologic and hydraulic impacts. A proposal for analyzing DO will be developed. The models will be used to identify:
  - Hydrologic conditions for benchmark(s) for the comparison of recirculation alternatives; and
  - Hydrologic conditions for the recirculation alternatives.

  Hydrologic impacts to be determined include:
  - Impacts on water deliveries to CVP and SWP contractors and other entities receiving deliveries from the CVP and SWP Delta supplies;
  - Impacts on water deliveries and other allocations of water supply from New Melones;
  - Impacts on compliance to flow and water quality objectives at Vernalis and other D1641 and Basin objectives, including DO at Stockton and salinity at interior stations;
  - Impacts to water quality in the SJR;
  - Impacts to San Joaquin Basin tributary water deliveries and operations; and
  - Impacts to water levels and flow conditions in the Delta.

  Screening tools may be identified to facilitate narrowing the number of full model simulations.

- **Evaluate Water Quality Impacts (WBS 4.5):** In D-1641, the SWRCB directed that Reclamation address several issues with water quality implications. Some of these may be measurable in terms of physical changes and impacts on the attainment of beneficial uses. The evaluation will address:
  1) Changes in concentrations of salt (EC) in the SJR and south Delta during recirculation periods.
  2) Changes in concentrations of toxic substances in the SJR and south Delta during recirculation resulting from differences in source water (Delta pumping versus eastside reservoir releases).

3) Changes in concentrations of toxic substances and DO in the SJR as a result of scour and in the transport of sediments in the Newman Wasteway downstream as a result of recirculation flows.

Changes in water quality have the potential to impact municipal, industrial, agricultural, and recreational beneficial uses and commercial fishing beneficial uses.

- **Describe Features of Affected Environment Pertinent for Water Quality Analysis (WBS 4.5.1):** This task will include a description of each resource and present the water quality criteria used to indicate attainment. Specific constituents of concern will be selected following the review of regulatory requirements and existing data (WQOs, TMDLs, and pilot study results). Parameters of concern for the SJR include constituents on the 303(d) list (salt, boron, selenium, diazinon and chlorpyifos, and DO).
- **Describe Analytical Tools Used to Analyze Water Quality Impacts of Alternatives (WBS 4.5.2):** The selected tools should be able to be incorporated into or effectively link with, the hydrologic modeling tools and be able to incorporate other ongoing and developing projects into existing and future conditions: (e.g. South Delta Improvements Package, New Melones Revised Plan of Operations, San Joaquin River Water Quality Management Group Implementation Activities, Implementation of San Luis Drainage Features Re-evaluation, Salt and Boron TMDL Implementation Actions, real-time operations). Three major tools, the water quality planning model CALSIM II SJR or possibly SANMAN (for flow and EC), the source water quality model (for toxics and DO), and a sediment transport model (for scour), are expected to be used to assess changes in water quality as a result of recirculation.

- **Perform Preliminary Analysis of Aquatic Impacts (WBS 4.6):** D-1641 directed Reclamation to address multiple fishery and aquatic habitat issues in the SJR and within the Delta (see Section 1.4). In addition, during meetings with the USFWS and the NOAA/NMFS in regard to recirculation issues, these agencies indicated the following key points of concern:
  - The potential need for one or more additional pilot studies;
  - The potential for inappropriate imprinting and straying;
  - Increased pumping in the Delta;
  - Aquatic habitat issues in the SJR;
  - The need for consultation and coordination; and
  - The potential use of refuge water for recirculation.

  The aquatic impacts evaluation will address the potential effects on salmon straying, effects of increased pumping on Delta hydrodynamics, and potential effects on aquatic habitat conditions in the SJR and the Delta.

  - **Describe Affected Environment in the SJR and Delta (WBS 4.6.1):** This task will include a description of aquatic habitat and resources of the SJR system, including the tributaries and the Delta area, that are relevant to DMC recirculation. Recirculation will affect a suite of species, but the target species include anadromous chinook salmon and steelhead, Delta smelt, longfin smelt, and splittail. Other species of recreational or commercial importance may be affected either positively or negatively by the

recirculation. Their life history, distribution, and habitat needs will be addressed in this section of the plan.

- **Assess Potential for Anadromous Salmon and Steelhead Imprinting and Straying (WBS 4.6.2):** This task includes an assessment of the potential to induce straying of SJR fish into the Sacramento River and to induce straying of Sacramento River fish into the SJR. The mechanism that will effect both straying elements is the entrainment of a certain amount of Sacramento River water into the SJR through recirculation. Fish from the SJR will imprint on this water source during out-migration and may stray into the Sacramento River when they return as adults. A literature review of current scientific understanding of the imprinting mechanisms will be conducted. The literature review will summarize known information on how imprinting occurs and how fish use this imprinted olfactory image as a tool to retrace their migration pathway.
- **Salmon Straying Field Study (WBS 4.6.3 -Optional):** During the fall salmon migration period, straying will be evaluated by capturing, tagging, releasing and tracking adult salmon in the SJR. Adult salmon will be captured by gill net or other suitable means in the lower SJR. Fish will be tagged with radio tags and tracked by remote stationary receivers at strategic locations. The study will determine whether salmon migrating upstream during recirculation exhibit a higher rate of straying than salmon migrating when recirculation is not occurring. The study will have to be planned around a pilot recirculation study that will occur during a portion of the fall salmon migration season or be conducted as a follow-up study after recirculation is implemented. The study will track salmon upstream into the tributaries or into the SJR upstream from the confluence of the Merced River or into the Newman Wasteway.

- **Perform Preliminary Analysis of Terrestrial Environmental Impacts (WBS 4.7):** The project will affect primarily the source, amount, and frequency of water running through fixed canal structures. However, an extension of the Westley Wasteway to discharge water to the current location of the SJR may impact threatened and endangered terrestrial species protected by federal and state laws.
  - **Describe the Terrestrial Environment and Physical Changes (WBS 4.7.1):** A map will be prepared, along with a list of all locations where physical changes, such as canal construction, outfall modification, or lining, will occur that can affect terrestrial species. Insects (valley elderberry longhorn beetle [VELB]) and small mammals may be affected only in the direct vicinity of construction, but for animals such as Swainson's hawk, construction can affect a much larger area, potentially within a mile of construction. Therefore, the necessary buffer area (probably a half mile) will be identified to account for disturbances to wide-ranging species and to identify species that are recorded in the region. Terrestrial species also can be affected through hydrologic modification resulting from the project. For example, substantially increasing or reducing water availability at any natural location may cause failure of host plants (e.g. blue elder shrubs) for endangered species or enhance habitat that supports species. Identifying any areas that may be affected by a change in hydrology is an important part of the project description.
  - **Identify and Evaluate Threatened and Endangered Species (WBS 4.7.2):** The California Natural Diversity Data Base (CNDDB) and California Nature Plant Society (CNPS) databases for the USGS quadrangles of project areas defined in Task 1 will be used to determine whether protected species are recorded in the project area. Under this task, USFWS and CDFG will be contacted for local information on species concerns.

Once a list of target species is established, the sites will be viewed by reconnaissance survey to confirm information from the CNDDB and CNPS and to determine whether additional species or habitats may be present. Based on the databases, consultations, and field reconnaissance, a technical memorandum summarizing biological resources will be prepared to describe the extent and significance of habitats and terrestrial resources and to specify whether additional protocol or agency-described surveys will be necessary to support the EIR/EIS.

- **Perform National Economic Development Benefit Analysis (WBS 4.8):** Several resource topics referenced in D-1641 may reflect both market and nonmarket measures. This analysis will include a delineation of the specific types of benefits and costs likely to result from the recirculation project. The economic feasibility study should show the benefits and costs, thus net benefits, of proposed and alternative actions. For the DMC Recirculation Project, the potentially pertinent issues that may have economic implications include municipal and industrial (M&I) water supply, agriculture, recreation, and commercial fishing. Each is discussed and included in the proposed study for economic analysis of the DMC Recirculation Project, and the proposed approach for analysis of each must be consistent with the P&Gs.
  - **Describe Features of Affected Environment Pertinent for Economic Analysis (WBS 4.8.1):** This task will include a description of the potential economic impacts on M&I water supply, agriculture, recreation, and commercial fishing. Each description will be expressed quantitatively to the extent permitted by data availability.
  - **Describe Analytical Tools Used to Analyze Economic Impacts of Alternatives (WBS 4.8.2):** DMC contractors have entitlements of approximately 2.5 million acre-feet (AF) of agricultural water and 200,000 AF of M&I water annually. An additional 250,000 to 300,000 AF per year are used for wildlife refuges. Different approaches probably will be required to assess the potential impacts of the recirculation project on M&I water supply, agriculture, recreation, and commercial fishing. However, the analysis of benefits and costs for the impact areas for the alternatives will follow the P&Gs.
  - **Describe Regional Economic Impacts (WBS 4.8.3):** Regional economic impact analysis will be conducted to assess not only the regionwide effects of the resource areas discussed, but also those that relate to the costs for the alternatives. Regional economic impacts will be quantified through the use of input-output (I-O) models. For this study, the impacts on M&I and agricultural water supplies, recreation, and commercial fishing will be input as direct impacts into two or three I-O models to capture the effects on the entire regional economy of those direct impacts.
- **Evaluate Water Rights Issues (WBS 4.9):** Potential water rights issues may involve CVP and SWP water rights permits as well as SJR water rights holders. CVP and SWP water rights issues must be evaluated for two alternative recirculation methods, one using only CVP facilities and another using SWP facilities to pump and convey water to avoid or mitigate impacts to Delta export contractors. SJR water rights also may be involved. One of the concerns expressed by agencies and stakeholders is the ability to ensure that the additional flows in the SJR resulting from recirculation project implementation are protected. If such protection of flows is necessary, it may require action by the SWRCB under Water Code Section 1707, or another appropriate provision, to ensure the recirculated water reaches the Delta and achieves its intended instream uses.

  - **Inventory and Assess Potential Diversion Points Between Discharge and Vernalis (WBS 4.9.1):** Inventory will include the locations of all riparian, permitted, and pre-1914 water rights, including diversion capacity and recent (last 20 years) diversion patterns. The assessment will include a reasonable assumption regarding the extent to which increased flows, of the magnitude contemplated for recirculation, may result in increased diversions.
  - **Assess Need to Protect Flows from Unauthorized Diversion (WBS 4.9.2):** Based on the results of Task 1, this task will determine whether any likely increased diversions will adversely impact the benefits and value of recirculation.
  - **Identify Mechanisms to Protect Instream Flows from Unauthorized Diversion (WBS 4.9.3):** If it is determined that additional river diversions may have a significant adverse impact on the results of recirculation, this task will identify available protective measures, such as protections provided by Water Code Section 1707 or additional monitoring at critical locations.

- **Prepare Draft Alternatives Screening Report (WBS 4.10):** The consultant will integrate all of the resource area investigations described in Sections 3 and 4 into an ASR. The ASR will comprehensively:
  - Develop baseline and operational rules;
  - Develop modified operations rules for recirculation;
  - Develop alternative evaluation criteria using project goals and objectives;
  - Develop initial or modify existing screening tools; and
  - Provide a preliminary assessment of alternatives.
- **Prepare Final Alternatives Screening Report (WBS 4.12):** The consultant will prepare a final ASR incorporating Reclamation comments.

5.5 EIR/EIS AND FEASIBILITY STUDY (TASK 5)

Task 5 will include production of the EIS/EIR for compliance with NEPA and CEQA and a Federal Feasibility Study Report to satisfy requirements to seek congressional approval for funding implementation. Two separate documents will be prepared but both documents will use a shared technical basis for their preparation. Specific subtasks will include:

- **Evaluate Supplemental Water Quality Impacts (WBS 5.1):** This task includes the analysis of the environmental consequences of the alternatives using the analytical frameworks and assumptions described. Results of the analysis will be provided in a technical memorandum for use by the project team in developing the FS and EIS/EIR. Specific resource areas that will be addressed include M&I use, agricultural use, recreational use, and commercial fishing.
- **Evaluate Aquatic Environment Impacts (WBS 5.2):** This task includes the analysis of the environmental consequences of the alternatives. It will involve using the analytical tools available for water circulation within the study area. Reclamation will meet with the agencies to define a study area for the purposes of refining the area to model and to define a range of baseline conditions for comparison purposes.

- **Evaluate Delta Hydrodynamics (WBS 5.2.1):** The effects on Delta hydrodynamics of increased pumping to support recirculation will be evaluated using the Delta Simulation Model 2 (DSM2) and the Particle Tracking Model (PTM). This effort will focus in the south Delta (that area of the Delta south and west of the SJR), including the SJR Middle River, Old River, and interconnecting sloughs and waterways. Reclamation will work to define the study area with other agencies and stakeholders for the purpose of running the DSM2 and the PTM. These effects will be evaluated in time steps that are agreed upon among agencies such as USFWS and CDFG. Overall changes in Delta conditions will be evaluated by examination of X2. Other models or tools that may be available and are acceptable to the agencies also may be employed.
- **Assess Changed Hydrodynamics on Delta Fishes (WBS 5.2.2):** The changes in individual channel hydrodynamics will be used to evaluate potential impacts on target species within the Delta. This assessment will be done in a narrative form by interpreting the changed hydrodynamics for channels that provide important migratory, spawning, or rearing habitat for target species with knowledge about life stage and location of target species in different areas of the Delta and the SJR.
- **Evaluate Effects on SJR Aquatic Habitat (WBS 5.2.3):** Potentially detrimental water quality conditions may be associated with the release of water from the DMC and down the Newman Wasteway. Using the SJR water quality model (SANMAN, CALSIM II SJR or other), this task will evaluate the expected changes in water quality developed in the water quality section and analyze that information with regard to the distribution and seasonal occurrence of target fish species using the SJR between the Newman Wasteway and Old River. Potential effects on target fish species will be evaluated in regard to water quality thresholds for each target species compiled from the literature.

- **Evaluate Terrestrial Environmental Impacts (WBS 5.3):** The description of the environment and physical changes will be refined based on the conclusions and alternatives included in the ASR or any alternatives added during the EIS/EIR scoping process. The list of threatened and endangered species impacted by the project alternatives will be modified as necessary and the environmental consequences of the project alternatives will be analyzed in accordance with the guidelines in CEQA and NEPA. Specifically the EIR/EIS will list the habitats affected and the common and listed terrestrial species that depend on them. The EIR/EIS will describe impacts and identify potential mitigation, where available, to avoid, minimize, or compensate for project impacts.
- **Analyze the Economic Consequences of Alternatives (WBS 5.4):** This task includes the analysis of the economic consequences of the alternatives.
  - **M&I Supplies (WBS 5.4.1):** If the proposed project or the alternatives are determined to have impacts on M&I supplies, the impacts will be estimated as follows:
    - Estimate future M&I water needs and water availability;
    - Measure deficit, if any, between future supplies and future needs;
    - Identify alternative supplies to meet needs;
    - Rank the alternatives and select the most likely alternative supply;
    - Compute benefits and costs of alternatives;

- Rank alternatives by least cost or greatest benefit; and
- Compute annualized benefits and costs.

– **Agricultural Supplies (WBS 5.4.2):** If the proposed or alternative recirculation projects are estimated to have measurable impacts on the availability of DMC water to agricultural users, the following process will be used to estimate those impacts:

- Identify crop yields and cropping patterns with the proposed, alternative, and no-action alternatives;
- If crop yields or cropping patterns are expected to change measurably, use farm budget analysis to analyze the revenue, cost, and profit implications of such changes at the individual farm enterprise level;
- Estimate changes in crop production and crop acreage at the regional level;
- Rank alternatives by least cost or greatest benefit; and
- Compute annualized benefits and costs.

– **Recreation (WBS 5.4.3):** If the proposed or alternative recirculation projects are determined to have measurable impacts on recreational activities, the following approach will be used to estimate those impacts:

- Delineate recreational resources likely to be affected;
- Project future recreational use for the proposed and alternative recirculation projects, including no action;
- Evaluate the increment in value of recreation that will be provided by the proposed and alternative recirculation projects; and
- Estimate total benefits from the proposed project and alternatives relative to the no-action alternative.

– **Commercial Fishing (WBS 5.4.4):** If it is determined that the recirculation project or alternatives will have an impact on commercial fishing, the following approach will be used to estimate the associated economic impacts:

- Describe commercial fishing industry and operations;
- Measure the commercial catch and value of that commercial catch;
- Project future catch levels under the proposed and alternative recirculation plans, including no action;
- Calculate the value of increased catch levels under the proposed and alternative recirculation plans, including no action; and
- Estimate the benefits from the proposed project and alternatives relative to the no action alternative.

– **Regional Economic Impacts (WBS 5.4.5):** The regional economic impacts of the alternatives will be analyzed using I-O models. The key inputs into those models will be the direct impacts on each of the resource areas described (i.e., M&I and agricultural

water supplies, recreation, and commercial fishing). Other inputs will include the costs of the alternatives and of ongoing operations, maintenance, and replacement.

- **Finalize Water Rights Issues Assessment (WBS 5.5):** Finalization of the water rights assessment includes the following tasks.
  - **Prepare Water Rights Issues Memorandum (WBS 5.5.1):** A memorandum will be drafted to identify the issues and recommend actions necessary to implement recirculation alternatives.
  - **Prepare and Submit Appropriate Water Rights Application to SWRCB (WBS 5.5.2 – optional):** If it is concluded that action by SWRCB under Water Code Section 1707 or other provisions is required, the appropriate application(s) and supporting documentation will be prepared for submittal to the SWRCB.
- **Prepare EIS/EIR (WBS 5.6):** This task will be to prepare a joint EIS/EIR for the recirculation project. The joint EIR/EIS will meet the requirements of both NEPA and CEQA. Preparation of the draft EIS/IER will consist of the following steps:
  - Prepare an initial study/notice of preparation (IS/NOP) and hold scoping meetings.
  - Describe existing conditions/affected environment.
  - Describe no action condition.
  - Describe alternatives for DMC recirculation.
  - Draft standards of significance.
  - Conduct impact assessment of alternatives.
  - Provide an alternatives comparison summary.
  - Conduct a NED analysis.
  - Draft an impacts section.
  - Identify mitigations and obtain commitments.
  - Prepare affected environment sections.
  - Describe other required disclosures.
  - Prepare administrative draft EIS/EIR.
  - Conduct administrative review and review comments.
  - Revise and publish draft EIS/EIR (DEIS).
  - Distribute DEIS.
- **Prepare Final EIS/EIR (WBS 5.7):** The final EIS/EIR will include the following activities:
  - Distribute public notice of availability and hearing.
  - Receive comments and prepare final EIS.
  - Prepare administrative draft final EIS/EIR.

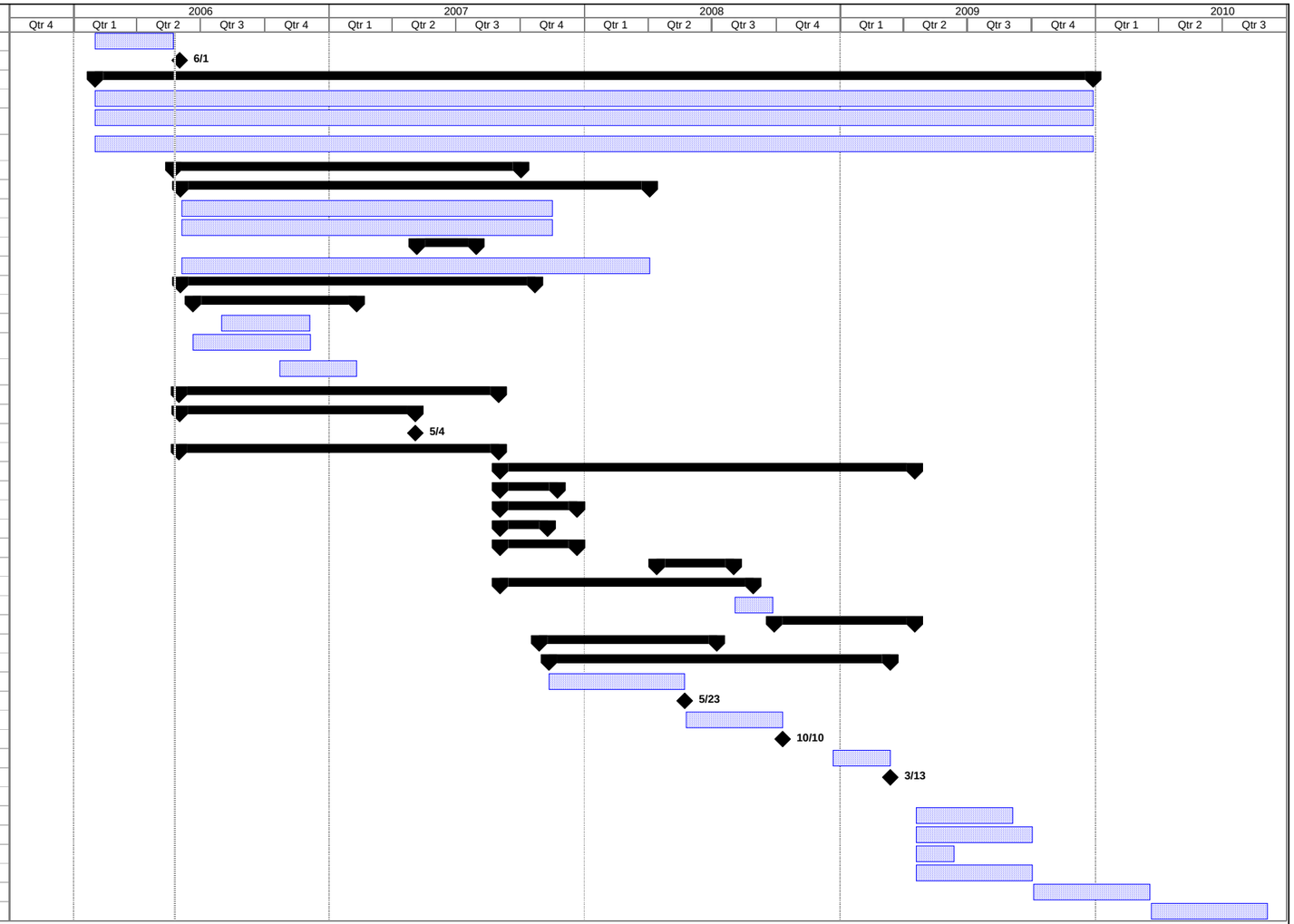
  - Conduct administrative review and review comments.
  - Revise and publish final EIS/EIR.
  - Publish Record of Decision (ROD).

- **Compliance with Permits and Regulations (WBS 5.8):** Most of the project will affect primarily the source, amount, and frequency of water running through fixed canal structures. However, there may be a need to build a physical extension on the Westley Drain to discharge water to the current SJR channel. That construction could impact threatened and endangered terrestrial species protected by federal and state laws. Permits and regulations requiring compliance will include the following:
  - Endangered Species Act Compliance (federal and State of California).
  - Clean Water Act/Porter Cologne Act.
  - USACE 404 Permit/SWRCB 401 Certification.
  - Other Permits and Approvals (e.g., Reclamation Board, State Lands Commission, Streambed Alteration Agreement, etc).
- **Prepare Feasibility Study Report (FSR) (WBS 5.9):** The FSR will include such items as: identification of present and future conditions, identification of problems and needs, evaluation of resource capabilities, formulation of alternative plans, analysis and comparison of alternatives, and plan selection. The feasibility study will be based on the analysis conducted under Tasks 3 and 4 and previous subtasks under task 5 (including the EIS/EIR) and will present the results in a format consistent with the P&Gs. Rational for selection of the preferred alternative that reasonably maximizes net NED benefits with acceptable impacts to the ecosystem and human environment will be presented. Alternatives optimizing Environmental Quality, Regional Economic Development, and Other Social Effects may also be developed and presented. The FSR will be completed at approximately the same time as the Final EIS/EIR.
  - Prepare Administrative Draft Feasibility Study Report
  - Receive comments and Prepare Draft Feasibility Study Report.
  - Prepare Final Feasibility Study Report.

6.0 STUDY SCHEDULE

The overall FS schedule is shown in Figure 4. It is expected that the FS will begin in June or July 2006 with the Final Feasibility Study Report completed in the first quarter of Calendar Year 2009.

ID	Task	Task Name	Duration	Start	Finish	Predecessors
1		Plan of Study (POS)	4 mons	Wed 2/1/06	Tue 5/23/06	
2		Initiate Feasibility Study	0 days	Thu 6/1/06	Thu 6/1/06	1FS+7 days
3	**1**	**PROJECT MANAGEMENT**	**1019 days**	**Wed 2/1/06**	**Mon 12/28/09**	
4	1.1	Project Management (including monthly reports)	1019 days	Wed 2/1/06	Mon 12/28/09	181FF
5	1.2	Project Management Coordination Meetings w/ Reclamation (including agendas	1019 days	Wed 2/1/06	Mon 12/28/09	181FF
6	1.3	Technical Team Coordination Meetings (including agendas and minutes)	1019 days	Wed 2/1/06	Mon 12/28/09	
7	**1.4**	**Work Plans**	**355 days**	**Wed 5/24/06**	**Tue 10/2/07**	
12	**2**	**PUBLIC INVOLVEMENT**	**479 days**	**Fri 6/2/06**	**Thu 4/3/08**	**9**
13	2.1	Public Involvement Planning and Coordination	380 days	Mon 6/5/06	Fri 11/16/07	
14	2.2	Agency Coordination	380 days	Mon 6/5/06	Fri 11/16/07	
15	**2.3**	**Public Meetings and Briefings**	**61 days**	**Mon 5/7/07**	**Mon 7/30/07**	
18	2.4	Information Materials and Issue Tracking	479 days	Mon 6/5/06	Thu 4/3/08	
19	**2.5**	**Scoping Reports**	**361 days**	**Fri 6/2/06**	**Mon 10/22/07**	
26		**Initial Agency Coordination**	**168 days**	**Wed 6/21/06**	**Fri 2/9/07**	
27		Complete Early (limited) ESA Consultation	90 days	Tue 8/1/06	Mon 12/4/06	
28		Tech Memos: Impact on Native Fish, Fall Run Chinook, and Steelhead	6 mons	Wed 6/21/06	Tue 12/5/06	1FS+1 mon
29		Obtain Non-Federal Partner Commitment (Study Cost Share Agreement with St	4 mons	Mon 10/23/06	Fri 2/9/07	31FF-3 mons
30		**PHASE 1: Alternatives Development**	**327 days**	**Thu 6/1/06**	**Fri 8/31/07**	
31	**3**	**INITIAL ALTERNATIVES INFORMATION REPORT**	**241 days**	**Fri 6/2/06**	**Fri 5/4/07**	
43		Submit Final Initial Alternative Information Report	0 days	Fri 5/4/07	Fri 5/4/07	42
44	**4**	**Alternatives Screening Report**	**327 days**	**Thu 6/1/06**	**Fri 8/31/07**	
95	**5**	**PHASE 2: FEASIBILITY REPORT/ EIS/ EIR**	**425 days**	**Mon 9/3/07**	**Fri 4/17/09**	**83**
96	**5.1**	**Water Quality Impacts Evaluation**	**60 days**	**Mon 9/3/07**	**Fri 11/23/07**	
100	**5.2**	**Aquatic Environment Impacts Evaluation**	**80 days**	**Mon 9/3/07**	**Fri 12/21/07**	
104	**5.3**	**Terrestrial Environment Impacts Evaluation**	**50 days**	**Mon 9/3/07**	**Fri 11/9/07**	
108	**5.4**	**National Economic Development Benefit Analysis**	**80 days**	**Mon 9/3/07**	**Fri 12/21/07**	
114	**5.5**	**Water Rights Issues**	**80 days**	**Mon 4/14/08**	**Fri 8/1/08**	
119	**5.6**	**PREPARE DRAFT EIS/EIR**	**260 days**	**Mon 9/3/07**	**Fri 8/29/08**	**94**
135		Public and Agency Review of Public Draft EIS/EIR and Feasibility Study Report	2 mons	Mon 8/4/08	Fri 9/26/08	133
136	**5.7**	**PREPARE FINAL EIS/EIR**	**145 days**	**Mon 9/29/08**	**Fri 4/17/09**	**135**
146	**5.8**	**Compliance With Permits and Regulations**	**182 days**	**Mon 10/29/07**	**Tue 7/8/08**	**124**
170	**5.9**	**PREPARE FEASIBILITY REPORT**	**350 days**	**Mon 11/12/07**	**Fri 3/13/09**	
171	5.9.1	Prepare administrative draft Feasibility Report	7 mons	Mon 11/12/07	Fri 5/23/08	130FF+30 days
172		Submit Administrative Draft FR	0 days	Fri 5/23/08	Fri 5/23/08	171
173	5.9.2	Prepare draft Feasibility Report	5 mons	Mon 5/26/08	Fri 10/10/08	172
174		Submit Draft FR	0 days	Fri 10/10/08	Fri 10/10/08	173
175	5.9.3	Prepare Final Feasibility Report	3 mons	Mon 12/22/08	Fri 3/13/09	141FF,174
176		Submit Final FR	0 days	Fri 3/13/09	Fri 3/13/09	175
177						
178		Request CWA Section 401 Certification	5 mons	Mon 4/20/09	Fri 9/4/09	144
179		Complete 404 Permit Process	6 mons	Mon 4/20/09	Fri 10/2/09	144
180		Report of Waste Discharge	2 mons	Mon 4/20/09	Fri 6/12/09	144
181		Construction Cost Sharing Agreement	6 mons	Mon 4/20/09	Fri 10/2/09	144
182		Construction Authority	6 mons	Mon 10/5/09	Fri 3/19/10	181
183		Receive Appropriation	6 mons	Mon 3/22/10	Fri 9/3/10	182



Project: Plan of Action Schedule_0507
Date: Thu 5/25/06

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

7.0 STUDY PRODUCTS

The development of the FS includes a series of iterative steps that can be revisited during any stage of the planning process. Stepwise development of the FS facilitates coordination with other agencies. The following deliverables will be prepared stepwise as supporting documents for the FS.

- **Public Scoping Report (PSR):** The Reclamation team will prepare an initial PSR describing public involvement through the ASR. The final PSR will incorporate input from the public during the NEPA/CEQA scoping processes and comment period for the draft EIS/EIR.

Administrative Draft -	**Submit before Draft Scoping Report**
Draft Report	**Submit before Final Scoping Report**
Final Report	**Submit by Fourth Quarter 2007**

- **Initial Alternatives Information Report (IAIR):** The IAIR will provide background information and define the scope for the federal FS; further refine the problems, needs, opportunities, planning objectives, criteria, and constraints; define the major features considered in the initial alternatives; and identify an initial set of alternatives to be considered in more detail in subsequent stages of the FS. The IAIR does not represent all steps of the planning process; for example the federal formulation criteria and accounts will be used in subsequent planning documents.

IAIR Table of Contents	**Submit before Draft IAIR**
Administrative Draft IAIR	**Submit before Final IAIR**
Final IAIR	**May 2007**

- **Basis of Design Report:** The project consultant team will review in detail all previous studies and documentation to identify any engineering data gaps that must be addressed. These findings will be documented in a Design Review Technical Memorandum. Following completion of the memorandum and any subsequent field studies, the consultant will provide appraisal-level design and cost estimates for use in the ASR. The appraisal level design will be of sufficient detail to determine whether the alternatives meet stated project objectives and are constructible and can be compared on an equivalent basis. The findings will be documented in a Basis of Design Report, including concept design and construction cost estimates for the alternatives. Quantities will be estimated, and prices will be based on vendor quotes, historical data bases, and simplified assessments of the productivity of main earthwork items.

Administrative Draft Report	**Submit before Draft EIR/EIS**
Draft Basis of Design Report	**Submit before Draft EIR/EIS**
Final Basis of Design Report	**Submit before Draft EIR/EIS**

- **Water Rights Issues Memorandum:** This memorandum will provide an inventory and assess potential diversion points between discharge and Vernalis, including locations, water rights, and diversion patterns. It will assess the potential for the diversion of recirculation water to impact the success of recirculation. It will identify appropriate mechanisms to protect instream flows, if necessary

Admin Draft WR Memo	**Submit before Draft EIR/EIS**
Draft WR Issues Memo	**Submit before Draft EIR/EIS**
Final WR Issues Memo	**Submit before Draft EIR/EIS**

- **Technical Memo: Impacts on Native Fish, Fall Run Chinook and Steelhead (Optional):** In accordance with the requirements of D1641 and Reclamation's Plan of Action submitted to the SWRCB, if an initial water quality analysis and fishery impacts review indicate that the project may result in potential significant adverse impacts to fisheries, the SWRCB shall be promptly advised to determine if the remaining analyses are necessary.

Administrative Draft Technical Memo	**Submit before Draft Technical Memo**
Draft Technical Memo	**Submit before Final Technical Memo**
Final Technical Memo	**Submit by Fourth Quarter 2006**

- **Alternatives Screening Report (ASR):** The ASR will update the description of without-project conditions; develop a set of comprehensive alternatives; describe preliminary plan effects and identify compensation measures; and evaluate the performance of the comprehensive alternatives using criteria identified and developed in the IAIR to address "completeness, effectiveness, efficiency, and acceptability" as required by the P&Gs.

ASR Table of Contents	**Submit before Draft EIR/EIS**
Draft ASR	**Submit before Draft EIR/EIS**
Final ASR	**Submit by Fourth Quarter 2007**

- **Environmental Impact Statement/Environmental Impact Report (EIS/EIR):** The EIS/EIR will include an analysis of potential direct, indirect, and cumulative environmental impacts for each of the comprehensive alternatives; discuss means to mitigate unavoidable adverse environmental impacts; summarize the alternatives comparison to identify and compare benefits/accomplishments of each comprehensive alternative; and present information to support other required disclosures as required by NEPA and CEQA (cumulative impacts, unavoidable adverse impacts, relationship between short-term uses and long-term productivity, irreversible and irretrievable commitments of resources, and compliance with related laws, rules, regulations, and executive orders).

EIS/EIR Table of Contents	**Submit before Admin Draft EIR/EIS**
Administrative Draft EIS/EIR	**Submit before Draft EIR/EIS**
Public Review Draft EIS/EIR	**Submit by Third Quarter 2008**
Response to Comments	**Submit before Draft Final EIS**
Draft Final EIS/EIR	**Submit by August 2008**
Final EIS/EIR	**Submit by First Quarter 2009**
Record of Dec./Notice of Determination.	**One month after Final EIS/EIR**

- **Feasibility Study Report (FSR):** The FSR will assess the desirability of seeking Congressional authorization to implement the DMC Recirculation Project. It will incorporate the EIS/EIR pursuant to the NEPA and other related statutes.

Feasibility Report Table of Contents	**Submit before Draft FSR**
Administrative Draft FSR	**Submit by Second Quarter 2008**
Draft FSR	**Submit by Third Quarter 2008**
Final FSR	**Submit by First Quarter 2009**

8.0 REFERENCES

California Regional Water Quality Control Board (RWQCB), Central Valley Region, 2001. Selenium TMDL Basin Plan Amendment.

RWQCB, 2005a. *Salinity and Boron TMDL (San Joaquin River at Vernalis) Basin Plan Amendment.*

RWQCB, 2005b. Dissolved Oxygen TMDL Basin Plan Amendment.

RWQCB, 2005c. *Diazinon and Chlorpyrifos TMDL Basin Plan Amendment.*

EPA, 2003. (Lower SJR as impaired water body) *303d List of Impaired Water Bodies.*

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SWRCB, 1995. *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.*

SWRCB, 1999 (Revised 2000). *Water Rights Decision 1641.* March.

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Reclamation, 2006. *Delta-Mendota Canal (DMC) Recirculation Study Revised Plan of Action.* February.

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