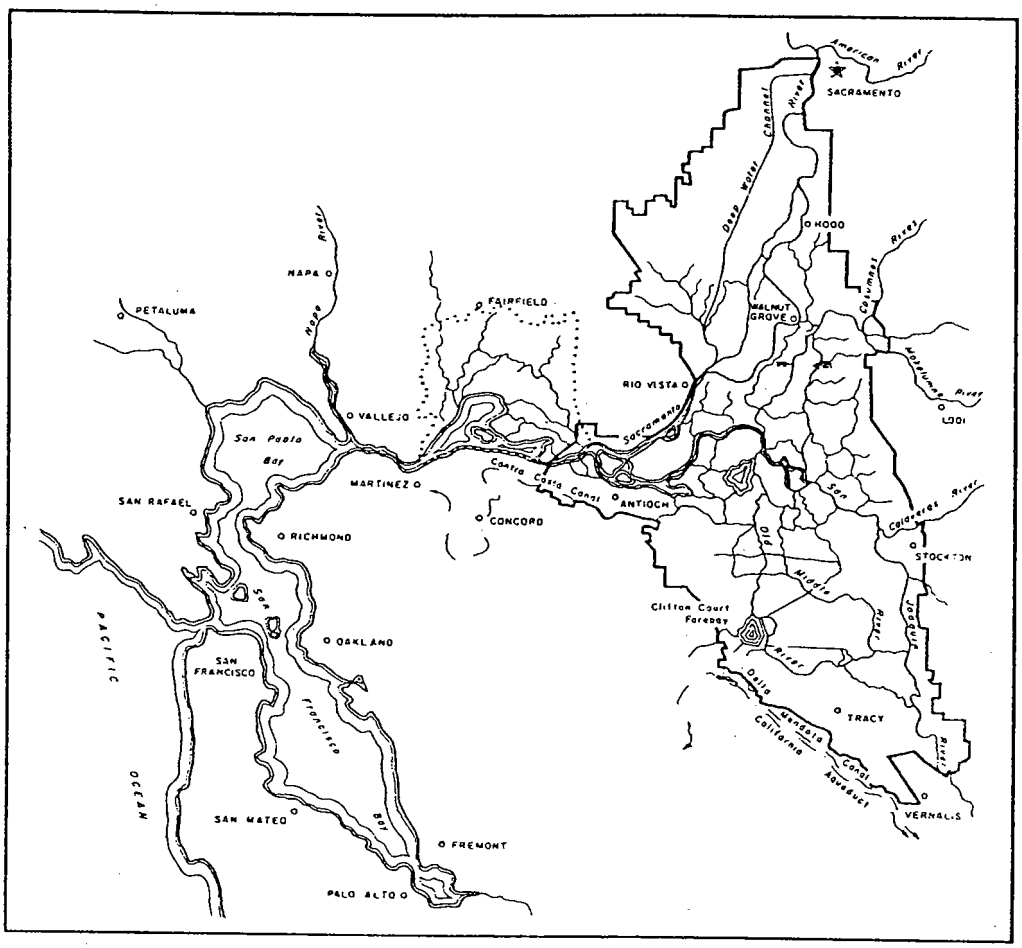

DRAFT

Water Right Decision 1630

SAN FRANCISCO BAY/ SACRAMENTO - SAN JOAQUIN DELTA ESTUARY

APRIL 1993

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE OF CALIFORNIA
Pete Wilson, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
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NOTICE OF FURTHER PROCEEDINGS

WATER RIGHT PHASE OF THE BAY-DELTA ESTUARY PROCEEDINGS

On December 9, 1992, the State Water Resources Control Board (State Water Board) released a draft of Water Right Decision 1630 (D-1630) for public review. Since then, several natural and regulatory events have occurred which diminish the urgency of adopting an interim water right decision. Additionally, the State Water Board has received numerous valuable comments on D-1630 which it has carefully considered. In addition to requesting changes in D-1630, many of the comments recommended that the Board prepare an Environmental Impact Report (EIR) and conduct further hearings before adopting a decision. The comments include a letter from Governor Wilson asking the State Water Board to return to the effort of establishing permanent standards for protection of the Delta.

Consequently, the State Water Board will not consider adopting D-1630 as an interim measure, nor will it consider any alternative water right decision until it has prepared environmental documentation under Public Resources Code Section 21000 et seq. and has conducted further hearings. Enclosed is a copy of the final draft of D-1630 as it was revised in response to all of the comments of the parties. This version incorporates the directions of the members of the State Water Board after consideration of all public comments. This draft represents the State Water Board staff's recommendation for D-1630, as it would have been presented to the State Water Board for adoption if the Board had proceeded to adopt an interim water right decision. This revised draft is provided as one alternative to be reviewed as part of the preparation of environmental documentation.

The reasons for not adopting an interim water right decision for the Bay-Delta Estuary are as follows:

1. It is not currently necessary for the State Water Board to establish emergency protection for the Bay-Delta ecosystem because other regulatory protections are expected to be in place at least for the period that will be necessary for the State Water Board to prepare permanent requirements to protect the Bay-Delta ecosystem from the effects of water diversion and use under water rights. The other regulatory protections are biological opinions for winter-run Chinook salmon and for Delta smelt by the National Marine Fisheries Service and the United States Fish and Wildlife Service. The two biological opinions will enforce reasonable and prudent alternatives under which the Department of Water Resources and the United States Bureau of Reclamation are authorized to operate the State Water Project and the federal Central Valley

--over--

Project in the Delta. Together with the requirements in Water Right Decision 1485, the biological opinions will provide short-term protection for the estuarine ecosystem under current hydrological conditions.

2. Earlier, it appeared urgent that the Board adopt an interim water right decision, because California was in the grip of an extended drought which, together with increasing water diversions, was causing fishery declines in the Bay-Delta Estuary. During the drought, D-1630 would have regulated the timing of flows and operational controls to ensure that the limited water supplies were apportioned among the beneficial uses to avoid irredeemable losses and to provide the most benefit with the available supplies. Hydrologically, the current year is at least an above-normal year for fish and wildlife standards. Because of the quantity of precipitation this year, substantial uncontrolled runoff, together with the operational controls described above, will help protect the fisheries during the spring period when they are most vulnerable to flow reductions caused by diversions. Unless conditions change significantly these controls are expected to be adequate.

The parties have questioned the Board's authority to adopt D-1630 without an EIR. The State Water Board can adopt a decision such as D-1630 to enforce the mandates of the public trust doctrine and of Article X, Section 2 of the California Constitution without preparing an EIR. Nevertheless, the changes in the water supply and the biological opinions by the National Marine Fisheries Service and the United States Fish and Wildlife Service reduce the urgency of adopting D-1630 to protect the Bay-Delta ecosystem against further harm in the short term. If the physical conditions change significantly, prompt enforcement action could again become necessary.

The State Water Board will resume its proceeding to establish a long-term water right decision to replace Water Right Decision 1485. This proceeding was interrupted a year ago when the State Water Board embarked on its proceeding to consider interim requirements for the Bay-Delta Estuary. At that time, the State Water Board's staff had conducted scoping for an EIR and was preparing a draft EIR. The State Water Board staff will now continue preparing environmental documentation for a water right decision that will replace Water Right Decision 1485. Two of the alternatives to be analyzed in the environmental documentation will be the requirements from revised draft D-1630 (provided with this notice) and the requirements of Water Right Decision 1485. Shortly, the State Water Board staff will notify the parties of its schedule for preparing the environmental documentation, and will designate a period during which the parties may submit written comments and recommendations for preparing the environmental documentation. During preparation of the environmental documentation, the staff may consult with individual parties and public agencies from time to time to obtain specific data.

Maureen Marché
Administrative Assistant to the Board

Date: April 22, 1993

Attachments

STATE OF CALIFORNIA - CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, *Governor*

STATE WATER RESOURCES CONTROL BOARD
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(916) 657-2181

April 22, 1993

WATER RIGHT PHASE OF THE BAY-DELTA ESTUARY PROCEEDING

To: Interested Parties

AVAILABILITY OF FINAL DRAFT DECISION 1630

A final draft of Decision 1630 is now available from the State Water Resources Control Board (State Water Board). As described in the attached notice, the State Water Board will not consider adoption of the draft decision as an interim measure.

One copy will be provided at no cost; additional copies are available at $2.50 each. Please make check or money order payable to the State Water Resources Control Board, P.O. Box 2000, Sacramento, CA 95812-2000.

Please send _____ copy(ies) to:

Name _____

Address _____

City _____ State _____ Zip Code _____

Phone Number (___) _____

April 22, 1993

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STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the Matter of Permits and Licenses listed in Table I of this Decision held by various diverters of water from the watersheds of the SACRAMENTO-SAN JOAQUIN DELTA and from the channels of the SACRAMENTO-SAN JOAQUIN DELTA.	WATER RIGHT DECISION 1630

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DECISION ESTABLISHING TERMS AND CONDITIONS
FOR INTERIM PROTECTION OF PUBLIC TRUST USES OF THE
SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

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April 22, 1993

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

In the Matter of Permits and Licenses listed in Table I of this Decision held by various diverters of water from the watersheds of the SACRAMENTO-SAN JOAQUIN DELTA and from the channels of the SACRAMENTO-SAN JOAQUIN DELTA.	**WATER RIGHT DECISION 1630**

D

DECISION ESTABLISHING TERMS AND CONDITIONS FOR INTERIM PROTECTION OF PUBLIC TRUST USES OF THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

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S U M M A R Y

This water right decision necessarily takes into account both the needs of public trust resources and the needs of water users. Its purpose is to require reasonable measures that will stop the decline and begin the recovery of public trust resources in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary during an interim 5-year period while long-term standards are prepared. Primary causes of the decline are water diversions, including the export of water from the Sacramento River watershed using pumps in the southern Delta, and the prolonged drought. The Delta is a critical link for projects which transfer water from the northern part of the State to areas south or west of the Delta.

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To stabilize the public trust resources while maintaining adequate water supplies, this decision requires measures that will cause a shift in some export pumping from the late winter, spring and summer periods which are important to public trust protection, to the late fall and early winter periods. This decision also provides short-term flow increases that will aid fish migration. It also requires steps to improve carryover of water supplies.

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New Requirements

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Specifically, this decision includes the following additions to the existing flow and salinity requirements:

1. *On the average, there must be no reverse flows in the western Delta from February 1 through June 30. (Section II.C.3.) This requirement will increase Delta outflow and reduce Delta exports during this period.*

2. Reverse flows in the western Delta shall not exceed an average negative flow of 1,000 cubic feet per second from July 1-31 and 3,000 cubic feet per second from August 1 through January 31. (Section II.C.3.)

3. Springtime pulse flows are required from both the Sacramento and the San Joaquin Rivers to help transport young salmon and striped bass through the Delta and into Suisun Bay. (Section II.C.3.)

4. A fall pulse flow is required from the San Joaquin River to help attract migrating San Joaquin Chinook salmon. (Section II.C.3.)

5. New requirements are placed on export pumping during April, May and June in dry and critically dry years; during April in wet, above normal, and below normal years; and during the spring pulse flow from the San Joaquin River. (Section II.C.3.)

6. Real-time management of the Delta Cross Channel gates is required from February 1 through June 30 to protect salmon smolts, young fish, eggs, and larvae from diversion into the central Delta. The gates will be closed when real-time monitoring shows that significant numbers of salmon smolts, young fish, eggs, and larvae are present or are suspected to be present, and will be opened when smolts and other young fish are not present. (Section II.C.3.)

7. Broad urban water conservation measures are required. (Section II.A.3.)

8. Requirements are established to limit deep percolation of applied agricultural irrigation water in areas with agricultural drainage problems in the western San Joaquin Valley. (Section II.B.3.)

9. Requirements for determining the annual water deliveries by the SWP and the CWP are established to improve the carryover of water supplies to dry periods. (Section III.C.3.)

10. Mitigation and monitoring fees are established to fund additional mitigation measures and to distribute fairly the costs of monitoring. Three hundred million dollars will be collected to pay for mitigation projects. (Section III.A. and B.)

11. The requirements in this decision ensure that the recent changes in federal reclamation law (Reclamation Projects Authorization and Adjustment Act of 1992) are applied in accordance with state law and in a manner that takes into account the reasonable needs of all beneficial uses of water. (Section III.A.)

D R A F T

Implementation

The federal Central Valley Project and the State Water Project will remain jointly and severally responsible in this decision for meeting all of the salinity and flow standards for the Bay/Delta Estuary, except for pulse flows. This decision establishes responsibilities of specified water right holders to contribute to pulse flows.

1. *The amount of water that large water storage projects must contribute to pulse flows is based on the unimpaired flow in their tributaries and their annual diversions to storage or for export. The maximum total contribution required from affected San Joaquin River water right holders for pulse flows will be 150,000 acre-feet per year.*

2. *Commencing in 1994, during pulse flows direct diverters of 100 cubic feet per second or more will be required to cease diversions for five days to avoid diverting fish that are being carried by the pulse flows.*

Effects of This Decision

1. *The State Water Board predicts, based on the use of Department of Water Resources' models and State Water Board staff analysis, that under this decision the average annual export of water during a reoccurrence of the base period (1984-1989) hydrology would be 5.3 million acre-feet. The base period is used for estimating environmental effects, and the period of 1984-1989 was selected because drought conditions altered water demands and deliveries from 1990 through 1992. With water transfers from the Sacramento Basin, the average annual export by the CVP and the SWP during the base period could be as high as 5.6 million acre-feet. The long-term average annual export by the CVP and SWP, assuming a 7.1 million acre-feet demand, during the 70-year period of record-keeping would be 5.79 million acre-feet. In both the 1984-1989 base period and over the 70-year period of record-keeping, there would be substantial variations from these averages in individual years. The actual average annual export during the base period was 5.3 million acre-feet; the highest export was 6.1 million acre-feet in 1989.*

2. *On the average, future exports by the CVP and the SWP may fall short of D-1485 estimates by 0.64 million acre-feet per year and in a single year out of 70, exports could fall short of D-1485 estimates by 1.73 million acre-feet per year. However, with allowable water transfers these values change to 0.41 and 1.5 million acre-feet, respectively. (The 1.5 million acre-feet value occurs in a below normal year and in only one year of the 70 years evaluated. A better indication of the upper range of export shortfalls compared to D-1485 is 1.2 million acre-feet.) This interim decision requires water conservation to help water users in the export areas meet their needs.*

Water transfers also are available to ensure adequate water supplies in the interim period of this decision. These measures should adequately supply increased populations during the interim period.

3. *This decision will stabilize and begin the recovery of the public trust resources in the Estuary compared with current conditions. A long-term goal of these proceedings is to restore fishery populations to levels which existed earlier. However, it would not be reasonable at this time to require additional operational measures that could further limit the water supply for consumptive uses. If necessary to respond to changes in circumstances, the State Water Board may approve annual variances from this decision if they will not adversely affect the environment.*

4. *This decision provides direction for the use of up to the 800,000 acre-feet per annum of Central Valley Project water required by recent federal legislation to be used for fish and wildlife protection.*

BY THE BOARD:

I. INTRODUCTION

The San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay/Delta Estuary or Estuary) is at the center of California's water dilemma. The need for water to be exported from the Bay/Delta Estuary is obvious. Millions of people rely upon the water exported from the Bay/Delta Estuary for municipal, industrial, and agricultural purposes. At the same time, the detrimental impact of these exports on fish and wildlife living in or going through the Delta has been clearly established. This impact is recorded and documented in prior State Water Resources Control Board (State Water Board or Board) decisions, water quality control plans, and in the publications of other involved public agencies.[1]

The purpose of this decision is to address the problems of the Bay/Delta Estuary in a fair and meaningful way. This decision establishes interim measures and long-term protection goals to

1 *See "Endnotes for Part I", page 6.*

ensure that the public trust uses of the Delta are reasonably protected and the available water supply is reasonably used.

To achieve the purposes of this decision, the State Water Board will amend the terms and conditions in the water right permits already issued to the Department of Water Resources (DWR) for the State Water Project (SWP) and to the United States Bureau of Reclamation (USBR) for the federal Central Valley Project (CVP). This decision also specifies initial responsibilities of other large water right holders whose storage, diversion and use of water affect the public trust uses of the Bay/Delta Estuary.[2]

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The problems of the Bay/Delta Estuary are complex. The issues are legion. The number of persons and entities having an interest in the Bay/Delta Estuary is virtually beyond count. A number of such persons and entities are already addressing problems in the Bay/Delta Estuary and seeking solutions.[3]

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While the State Water Board commends such efforts, the modern history of the Bay/Delta Estuary is fraught with adversity and demonstrates that the actions taken thus far have not satisfactorily dealt with the Estuary's myriad issues.

All of the representative parties involved in the struggle over Bay/Delta Estuary waters, be they environmentalists, irrigators, or consumers, must recognize that they can only help themselves when they help each other.

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In its efforts to protect the Bay/Delta Estuary the State Water Board has often been concurrently criticized for doing too little and for doing too much. Yet the State Water Board is obligated to guard the public trust as well as to ensure that the needs of other water users are met.

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2 *See "Endnotes for Part I", page 6.*

3 *See "Endnotes for Part I", page 7.*

All parties must recognize that the solution to California's water dilemma can only be founded in effective protections for the Bay/Delta Estuary. They must also recognize that any solution must address the issues of both water quality and water supply. To deal with either one and ignore the other can only bring partial, temporary, and unsatisfactory solutions.

In this interim decision for the Bay/Delta Estuary, the State Water Board is taking a significant step toward a balanced solution to California's water dilemma. To be effective, this decision must be viewed as the sum of its parts. It recognizes the work done by others and is adopted in accordance with Governor Wilson's comprehensive water management policy for California.

The State Water Board has considered all the evidence in the record. Based on the evidence, the Board finds and concludes as follows:

* * * * *

ENDNOTES FOR PART I

1 The State Water Board has conducted numerous proceedings regarding both the water rights and the water quality that affect the Bay/Delta Estuary. Water Right Decision 1485 (D-1485) and the Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh (1978 Delta Plan), both adopted in August 1978, explain the history of the State Water Board's past regulatory proceedings to protect the beneficial uses of the waters of the Bay/Delta Estuary.

Water right decisions before this one have placed requirements only on the Department of Water Resources which operates the State Water Project and on the United States Bureau of Reclamation which operates the federal Central Valley Project. This decision is part of a coordinated consideration of water quality planning and water rights that commenced in 1987. The first decisions in this coordinated process were to adopt water quality policies and a water quality control plan. This water right decision enforces water quality objectives in the Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay/Delta Plan) adopted in May 1991 and salinity objectives in the 1978 Delta Plan that were not superseded by the Bay/Delta Plan. This decision establishes and implements new flow and operational requirements. This decision also enforces the public trust, the provisions of California Constitution Article X, Section 2, limitations on the availability of water, and the public interest.

2 Notice of public hearing was given on May 8, 1992 to consider specified issues aimed at providing reasonable protection on an interim basis for the public trust resources in the Bay/Delta Estuary. The Board will consider adopting a long-term decision regarding protection of the beneficial uses of the waters of the Bay/Delta Estuary within the next five years. A 14-day public evidentiary hearing was held in June, July, and August 1992, commencing on June 22 and concluding on August 4, 1992. In addition, a one-day hearing to receive policy statements was held on July 17, 1992. The issues for the 1992 hearing were:

1. "What additional interim requirements should be placed on the CVP and SWP for the benefit of the public trust uses of water in the Bay/Delta Estuary?"

2. "What interim requirements should be placed on other water users within the Bay/Delta Estuary watershed to protect the public trust resources in the Bay/Delta Estuary?"

3. "What interim requirements should be placed on users of water tributary to or exported from the Bay/Delta Estuary to ensure that water supplies are used reasonably and beneficially?"

4. "What long-term goals should the State Water Board establish to protect public trust resources in the Bay/Delta Estuary?"

In addition to the record developed during the hearing, the hearing record includes the record developed in 1987 during Phase I of the Bay/Delta Estuary hearings. The Phase I hearing was first noticed on March 27, 1987 and the Phase I hearing was held on 54 days starting on July 7, 1987 and concluding on December 29, 1987.

A draft of this decision was released for public comment on December 9, 1992. A staff workshop was held on February 10, 1993, to discuss changes, receive comments, and explain the decision. Written comments were received through February 16, 1993. On March 8 and 9, 1993, the State Water Board conducted a meeting at which additional proposed changes in this decision were discussed.

3 Other near-term actions to help ensure that the reasonable and beneficial uses of Bay/Delta waters are protected include but are not limited to the following:

1. The Governor's Bay-Delta Oversight Council will prepare environmental documentation that will serve as a planning framework to consider facilities for "fixing" the Delta. The environmental documentation process will be completed within three years. This environmental documentation will serve as a basis for consideration of actions by various state agencies.

2. *The DWR is working on interim actions in the southern Delta to help restore the environment and improve the water supply, including construction of flow control barriers, channel enlargements, and operational changes.*

3. *Several entities are planning additional off-stream reservoirs to store surplus water supplies for dry periods.*

4. *An in-Delta storage concept is being evaluated and a specific in-Delta storage project has been proposed.*

5. *Projects for ground water storage and conjunctive use of ground and surface water are underway.*

6. *The Department of Health Services is reviewing its policy regarding use of waste water reclamation to help that source of water be fully utilized.*

7. *The Three-Way Process group is developing long-term goals for Delta protection and water supply and assessing methods to implement these goals.*

8. *The National Marine Fisheries Service is consulting with the USBR and the DWR under the federal Endangered Species Act and has issued a long-term Reasonable and Prudent Alternative for protection measures for the winter-run Chinook salmon.*

9. *The U.S. Fish and Wildlife Service has listed Delta smelt as a threatened species and is engaged in consultation with USBR and DWR under the Endangered Species Act.*

10. *The Department of Fish and Game and the U.S. Fish and Wildlife Service are considering listing additional species under the state and federal Endangered Species Acts.*

II. REQUIREMENTS

This decision establishes requirements for protection of fish and wildlife in the Bay/Delta Watershed and for the use of water by urban water users and agricultural water users. The purpose of these requirements is to stabilize or enhance the public trust resources in the Bay/Delta Estuary and to foster the reasonable use of water. Under these requirements export rates and scheduling, outflows, salinity levels, flow direction, entrainment, and predation in the Estuary must be managed more effectively. Conservation, waste water reclamation and reuse,

conjunctive use of surface and ground water, water transfers, and use of all available alternative water supplies must be fully integrated.

A. URBAN WATER USE

The Notice of Public Hearing for this proceeding requested information on interim requirements that should be placed on users of water tributary to or exported from the Bay/Delta Estuary to ensure that water supplies are used reasonably and beneficially. Extensive testimony was received on urban water use, conservation, reclamation, conjunctive use, and water transfers. The State Water Board makes the following findings based on the evidence presented.

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1. Findings

- Approximately six million acre-feet (MAF) of California's developed water is used to satisfy the needs of residential, commercial, and industrial water users. On average, approximately 40 percent of this urban use is provided by exports from the Delta. Population growth and recent decreases in urban supplies from the Colorado River and Mono Basin will increase the demand for Delta watershed exports for urban uses in the future.

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- A "Memorandum of Understanding Regarding Urban Water Conservation in California" (MOU) was recently entered into by many urban water suppliers, public advocacy organizations, and other interested groups. The MOU commits the signatory water suppliers to good faith implementation of a program of water conservation which embodies a series of Best Management Practices (BMPs) for California's urban areas. It also commits all of the signatories to an ongoing, structured process of data collection through which other

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conservation measures, not yet in general use, can be evaluated as to whether they should be added to the list of BMPs. Finally, it commits all signatories to recommend to the State Water Board that the BMPs be taken as a benchmark for estimating reliable conservation savings for urban areas. (WRINT-CUWCC-1; WRINT-DWR-14.)

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- The California Urban Water Conservation Council (CUWCC) is comprised of the signatories to the MOU. Among other responsibilities, the CUWCC is charged with monitoring compliance with the MOU, adopting or modifying BMPs and their schedules of implementation, coordinating revisions to the MOU and making annual reports to the State Water Board on implementation progress. (WRINT-CUWCC-1; WRINT-DWR-14.)

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- There is no current estimate of total potential water savings by implementing the MOU. The MOU directs the signatories to develop savings estimates for their service areas.

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- Metropolitan Water District of Southern Caifornia (MWD) projects total conservation savings of 542 thousand acre-feet (TAF) per year by 2,000 and 831 TAF per year by 2010 compared to consumption which would otherwise occur without conservation. (WRINT-SWC-3b,6.) The City and County of San Francisco has a goal of 25 percent annual water use reduction from 1987 levels through both implementation of the MOU and mandatory rationing. (WRINT-SFRISCO-1,22.) East Bay Municipal Utility District (EBMUD) expects to save approximately 22 TAF per year by 2020 through conservation. (WRINT-EBMUD-5,16.) These conservation

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efforts will partially offset increases in demand caused by population growth.

- Compared to consumption which otherwise would have occurred, the City of Sacramento reduced summer water consumption by 18 percent in 1977 and 13 percent in 1990 through voluntary water conservation practices. (WRINT-SACTO-6,3.) During the 1977 drought EBMUD achieved approximately 39 percent conservation compared to 1975 use when EMBUD imposed a mandatory conservation program. (WRINT-EBMUD-5,7.)

- The Water Advisory Committee of Orange County recommends that, because of the wide acceptance of the BMPs in the MOU, the State Water Board should mandate the BMP process for all urban users of water from the Bay/Delta watershed. (WRINT-WACOC-5,4.)

- Tables A and B provide illustrative examples of urban supplies and demands over the interim period covered by this decision. These estimates indicate that, with reasonable water use, the water demands of these areas can be met if the drought does not continue. If dry conditions persist, water needs will have to be met with additional conservation, water transfers, acceptance of shortages, and other measures during the interim period.

- The Bay/Delta Reclamation Work Group prepared a report on the current and future potential of water reclamation and reuse titled "Water Recycling 2000: California's Plan for the Future". This report estimates that water reuse was 325 TAF in 1989 and is projected to be 474 TAF by 2000. (WRINT-DWR-13,96.)

TABLE A
MUNICIPAL & INDUSTRIAL WATER SUPPLIES AND DEMANDS – SAN FRANCISCO BAY REGION

SERVICE AREA (Counties covered) / WATER SOURCES	PRE-DROUGHT CONDITIONS (1)				CURRENT DROUGHT CONDITIONS (1)				PROJECTED 1998 CONDITIONS (1)				PRE-DROUGHT SUPPLY vs 1998 DEMANDS (2)		
	DEMAND (TAF/yr)	SUPPLY (TAF/yr)	POPULATION (thousand)	PER CAPITA USE (PCU) (gpcd)	DEMAND (TAF/yr)	SUPPLY (TAF/yr)	POPULATION (thousand)	PER CAPITA USE (PCU) (gpcd)	POPULATION (thousand)	DEMAND1 SELF-PROJ DEMAND (TAF/yr)	DEMAND2 @ CURRENT PCU (TAF/yr)	DEMAND3 @ AVERAGE OF CURRENT & PRE-DROUGHT PCU (TAF/yr)	DEMAND1 (TAF/yr)	DEMAND2 (TAF/yr)	DEMAND3 (TAF/yr)
EBMUD (Parts of Alameda and Contra Costa)	241	251	1130	190	194	177	1190	146	1230	260	201	231	-9	50	20
Supply from: Mokelumne River		240				177									
Local supply		11				0									
NO. BAY AQUEDUCT (Napa and Solano)	100	102	395	226	109	117	465	209	516	124	121	126	10	13	8
Supply from: SWP						32									
Ground water						13									
Solano Project (non-CVP)		47				42									
Others		55				30									
SO. BAY AQUEDUCT (Parts of Santa Clara and Alameda)	425	375	1700	223	405	382	1900	190	2050	493	437	475	-118	-62	-100
Supply from CVP, SWP, SFWD, ground water and local sources															
SFWD (City & Cnty SF, San Mateo, Santa Clara & Alameda)	306	308	2100	130	319	269	2300	124	2460	326	341	350	-18	-33	-42
Supply from local sources and Hetch Hetchy Project															
TOTAL	1072	1036	5325		1027	945	5855		6256	1203	1100	1182			
PCU in gpcd (Based on TOTALs)				180				157							
DIFFERENCE TAF/yr Pre-drought supply (+32TAF for NBA) vs 1998 demand													-135 (3)	-32 (4)	-144 (5)

(1) Pre-drought (1985 or 1986), current (1991 or estimated 1992) and projected 1998 conditions obtained directly or by extrapolation from evidence submitted during the 1987 Phase I or 1992 Interim Hearings.

(2) Differences between pre-drought supplies and projected 1998 demands; [for NORTH BAY, pre-drought supply + 32 TAF from SWP (134 TAF total) is used to compare with projected 1998 demands].

(3), (4), (5) Additional water required using pre-drought supply and projected 1998 demands as (3) self-projected demands; (4) projected demands at current PCU; (5) projected demands at average of pre-drought and current PCU.

FOR EBMUD: 95% of supply is from Mokelumne River [WRINT-EBMUD-6,12]; Demands [WRINT-EBMUD-5,56&73]; Pre-drought supply estimated as average Mokelumne diversion at Pardee Res & local runoff in normal years [T-WRINT,VIII,321:15-17] and [WRINT-EBMUD-6,14]; 1992 supply [WRINT-EBMUD-6,8] as net flow available to EBMUD customers from Mokelumne River; Populations [WRINT-EBMUD-5,38].

FOR NO. BAY AQUEDUCT: SWP supply was not available until 1987; 1985 data [I-SWC-152,2-6 & Fig 6]; 1991-92 data [WRINT-SWC-29,1-4,Fig 1,Tables 3&4] SWP supply is 1992 annual entitlement; 1998 population [WRINT-SWC-29]; 1998 self-projected demand [WRINT-SWC-29,Tables 1&2]; Pre-drought supply plus 32 TAF from SWP is used to compare with 1998 demand.

FOR SO. BAY AQUEDUCT: M&I supplies are estimated from total supplies using ratios of M&I demands to total demands; demands [WRINT-SWC-26,9,11]; supplies [WRINT-SWC-26,14]; 1985 population [I-SWC-101,7]; 1992 and 1998 populations [WRINT-SWC-26,2].

FOR SFWD: 1986 data [I-SFRISCO-12,31-32, Tables 1,6&7]; 1992 data [WRINT-SFRISCO-1,2,13]; 1998 population based on average 7% growth from EBMUD and No.&So. Bay for 1992 and 1998; 1998 self-proj demand [I-SFRISCO-12,42].

TABLE B

WATER BALANCE–SUPPLY & DEMAND FOR M W D SERVICE AREA (MILLION ACRE–FEET)

Supplies (Without SWP)

SERVICE AREA	1990 [1]	1991 [2]	1995 [3]	1998 [8]	2000 [3]	2010 [3]	Comments/References
L.A. Aqueduct	0.11	0.19	0.3 [4]	0.3	0.3 [4]	0.3 [4]	[1] WRINT–SWC–8, Fig. 1
Local Supplies (Surface & G/w)	1.04	1.06	1.08	1.07	1.06	1.05	[2] WRINT–SWC–8, Fig. 2
Wastewater Reuse (Existing)	0.24	0.25	0.28	0.31	0.34	0.40	[3] WRINT–SWC–8, p. 32
Wastewater Reuse (New) [7]			0.04[9]	0.13	0.19[9]	0.28[9]	[4] Average annual dependable supply; WRINT–SWC–8, p. 17
Colorado River	1.22	1.25	0.62 [6]	0.62	0.62 [6]	0.62 [6]	[5] Projected Delta Water demand under normal conditions and no additional reservoir carry over storage prior to 1995. WRINT–SWC–8, p.31
Drought Emergency Water Bank		0.215[10]					[6] Includes water conservation program with IID, and land fallowing program PVID WRINT–SWC–8, p. 27
							[7] WRINT–SWC–10, p.16
							[8] Estimated
							[9] WRINT–SWC–10, p.16
Total Supplies (without SWP)	2.61	2.96	2.32	2.43	2.51	2.65	[10] WRINT–SWC–8, p. 4

Demand[1]

SERVICE AREA	1990 [2]	1991	1995 [4]	1998[5]	2000 [4]	2010 [4]	Comments/References
							[1] WRINT–SWC–3B, Table 1
Urban	3.57	3.29[3]	3.51	3.66	3.76	4.43	[2] Above normal demand due to higher average temperature; WRINT–SWC–3b, Table 1
Agriculture	0.43	0.37	0.35	0.34	0.33	0.30	[3] Drought rationing about 17% for last 6 months of fiscal year; WRINT–SWC–3b, p. 4
Total Demand	4.00	3.66	3.86	4.00	4.09	4.73	[4] Projected for normal weather
Net Water Balance Supply (without SWP) – Demand	<1.39>	<0.7>	<1.54>	<1.57>	<1.58>	<2.08>	[5] Estimated

Historic SWP Deliveries

Historic SWP Deliveries to MWD
(Million Acre Feet)
(DWR Bulletin 132–91 and WRINT–SWC–8)

1985	1986	1987	1988	1989	1990	1991
0.68	0.70	0.71	0.90	1.15	1.46	0.41

This projected estimate is conservative and is a minimum figure for reclamation potential.

¤ Waste water reclamation made up approximately 250 TAF of MWD's service area supply in 1991 and is expected to reach at least 400 TAF per year by 2010. Under favorable conditions an additional 280 TAF per year may be developed by 2010 which would bring the total waste water reclamation level to 680 TAF per year. (WRINT-SWC-10,16.) EBMUD reports that approximately 9 TAF of potable water is saved as a result of waste water reclamation and reuse. The reclaimed water is used to irrigate golf courses and freeway medians and to provide refinery cooling water. (WRINT-EBMUD-5,28.) San Diego County Water Authority has created a Water Reclamation Department to foster development and use of reclaimed water in the region. (WRINT-SDIEGO-1,8.)

¤ Conjunctive use can be defined as the practice of deliberately storing surface water in ground water basins by spreading, injection, or in-lieu use of surface water supplies during periods of surface water availability and extracting it during periods of need. (WRINT-SWC-43,2.) Santa Clara Valley Water District provides an excellent example of a conjunctive use program that integrates surface and ground water storage. San Joaquin County has analyzed two conjunctive use alternatives using New Melones and Folsom South Canal supplies and has found both alternatives to be technically feasible and economically attractive under the assumed conditions. San Joaquin County, however, cautions that additional technical, economic, legal, and institutional work is needed. (WRINT-SJC-4,7-18.) Several of the Santa Ana

Watershed Project Authority (SAWPA) member agencies have agreements with MWD for use of ground water basins to store surplus imported water supplies. (WRINT-SAWPA-8,17.)

- Water exchanges and transfers from agriculture to urban uses are potential methods available to meet future water demands. For example, Arvin-Edison Water Storage District and MWD are proposing a water transfer for the State Water Board's approval where MWD would deliver a portion of its State Water Project entitlement, in years when available, to Arvin-Edison, either for underground storage or direct use by farmers in lieu of pumping. In return, MWD would take delivery of Arvin-Edison's CVP water through the California Aqueduct in subsequent years when there is a need. (WRINT-SWC-10,36.)

- MWD and Palo Verde Irrigation District are beginning to test land fallowing programs. Under agreements being executed with individual landowners and lessees, approximately 22,000 acres of agricultural land in the Palo Verde Valley will not be irrigated; instead, the saved water will be stored in Lake Mead and will be available to MWD. (WRINT-SWC-8,26.)

- MWD and Imperial Irrigation District are continuing implementation of an agricultural water conservation program initiated in 1990 in the Imperial Valley. Under this program, MWD funds water conservation efforts in the Imperial Irrigation District and the conserved water is available for use by MWD. (WRINT-SWC-8,13.)

- MWD is working with other southern California agencies to develop and implement the full range of options that exist to increase the quantity and reliability of its water supplies including conservation, ground water and surface water storage projects, waste water reuse projects, water exchanges, conjunctive use projects, ground water recovery projects, and system interconnections. (WRINT-SWC-10,2.)

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2. Conclusions

California urban water agencies have made commendable progress in implementing programs to increase their water supplies and supply reliability. These programs must continue and expand into the future in order to ensure an adequate urban water supply for the State.

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The requirements for the interim period covered by this order will allow larger water withdrawals from the Bay/Delta Estuary than occurred in recent historical periods in wetter years but not in dry years. If drought conditions continue, there will be shortages from projected demands; but if wet years occur, the demands should be met. The evidence presented at this hearing, however, indicates that there are opportunities for urban areas to manage water resources in order to meet their needs in the interim period. The management options with the most potential to aid urban areas in meeting their needs in the interim period are conservation and water transfers, particularly water transfers among users south of the Delta; therefore, these options must be aggressively pursued.

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3. Requirements

- Water right holders listed in Table I who deliver water for urban uses or who deliver water to any

entity which delivers water for urban uses shall implement or cause to be implemented the provisions of the urban MOU dated September 1991 (attached) within their places of use. During the State Water Board's workshops in November of each year, the CUWCC may request the State Water Board to consider amending this decision in accordance with recent changes in the MOU. The Executive Director is authorized to approve variances from this decision to accommodate changes in the MOU.

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- Section 4.5 of the MOU (Exemptions) which provides a process for exempting water suppliers from the implementation of specific BMPs shall not apply, except that a water right holder or its customer may apply to the Executive Director of the State Water Board or his delegate for an exemption from specific BMPs. Any proposal for exemption from BMPs, with the substantiation for the exemption, shall be submitted to the CUWCC for its recommendation and to the Executive Director of the State Water Board. Applications to continue existing exemptions shall be filed one year after the last annual substantiation and renewal of an exemption. The Executive Director shall approve or disapprove any exemption from BMPs within 90 days after receiving the application and substantiation, and shall consider any recommendations of the CUWCC.

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- The DWR shall monitor the progress of the water right holders in Table I in implementing the MOU and shall provide the State Water Board with annual reports documenting this progress. The water right holders shall provide DWR the information necessary to implement this requirement, using the format DWR

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specifies. If DWR concurs with annual reports prepared by CUWCC, DWR may submit the CUWCC reports to satisfy this requirement. The first report will be due on July 1, 1993.

B. AGRICULTURAL WATER USE

The Notice of Public Hearing for this proceeding requested information on requirements that should be placed on agricultural water users that receive water from the Bay/Delta watershed. Testimony was received on agricultural water use, water conservation, conjunctive use, and water transfers. The Board makes the following findings based on the evidence.

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1. Findings

- Approximately 27 MAF per year of California's developed water is used to produce crops. On average, approximately 13 percent of this agricultural use is provided by exports from the Delta. Overall throughout the State the demand for water for agricultural uses is not expected to significantly increase in the future. (I-DWR-707,16.)

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- The record contains four estimates of agricultural conservation potential in the western San Joaquin Valley. (WRINT-EDF-12,158; WRINT-DWR-11,5; 94; I-CVAWU-64A,vi; WRINT-NHI-15,99.) The best-supported estimate is provided in the report titled "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley" (San Joaquin Valley Drainage Program Report) (WRINT-EDF-12), which states that 154 TAF per year could be conserved on the westside of the San Joaquin Valley by the year 2000 and 307 TAF per year by the year 2040 through source control measures and reuse of drainage water.

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- Conservation in areas that overlie saline sinks results in more substantial water savings than conservation in areas not overlying saline sinks because water that percolates into a saline sink cannot be economically recovered. (WRINT-SWC-43,4.) There are benefits to conservation in nonsaline sink areas as well. Conservation in these areas may minimize evaporation losses, reduce transport of pollutants to downstream waters, and avoid water diversions for ground water recharge during critical fish migration periods. (WRINT-NHI-21,2.)

- Agricultural water conservation measures fall into two categories: those that can be implemented in the short-term without significant capital investment and those that take some time to implement and typically entail capital investment. In the short-term, growers can reduce pre-irrigation, improve irrigation scheduling, and shorten furrow lengths. Irrigation or water supply districts can encourage growers to conserve water through information dissemination, education and training seminars, guidebooks and manuals, field evaluations, and arranging for irrigation specialists to be available to growers. More expensive options that may take longer to implement include replacement of furrow systems with sprinkler or drip systems, construction of tailwater return systems, pre-irrigation with hand-moved sprinklers rather than by furrow, laser leveling of fields, enclosure of district distribution systems to prevent seepage from canals, and installation of meters to more precisely record water use.

- Water supply districts possess the required legal powers and authorities to undertake comprehensive

water conservation programs. Many districts are taking actions to increase water use efficiency. Districts have demonstrated that more efficient water use can be accomplished without threatening crop production. Westlands Water District's current Draft Water Conservation Plan, dated June 1992, (WRINT-CVPWA-4-2) is a good example of what a water district can accomplish in agricultural water conservation.

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¤ Two crops in Westlands Water District, cotton and processing tomatoes, cover more than 60 percent of Westlands' irrigable acreage. In 1988 and 1989 (full water supply years), average yields for cotton and tomato crops were about 20 percent above the California average. These high crop yields were achieved with less applied water than the average for the San Joaquin Valley (statewide applied water statistics are not available). Westlands' farmers apply 19 percent less water for cotton and 15 percent less for tomatoes, as shown in the table below. (WRINT-CVPWA-4-2,25.)

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	APPLIED WATER		YIELD PER AF	
CROP	SAN JOAQUIN VALLEY (AF/Ac)	WESTLANDS (AF/Ac)	SAN JOAQUIN VALLEY (lbs/AF)	WESTLANDS (lbs/AF)
Cotton	3.1	2.5	369	535
Tomato	2.7	2.3	24,444	31,304

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¤ Westlands Water District currently provides intensive irrigation improvement services to its farmers. In this program the District pays a portion of the farmer's cost to hire an independent irrigation consultant. The consultant evaluates irrigation system performance and management during the irrigation season and makes recommendations for

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improvement, including an evaluation of the benefits and costs. The consultant also provides irrigation scheduling services. (WRINT-SWC-43,13.)

- The San Luis Water District has a limited water supply of 2.4 acre-feet per acre per year. Although they do not have a formal conservation program, the District has undertaken a variety of water conservation measures, notably the metering of surface water deliveries, use of a buried pipeline delivery system, and requiring individual tailwater return systems. (WRINT-NHI-15,89.)

- Modesto and Turlock Irrigation Districts have implemented a water distribution improvement program to reduce seepage losses. Approximately 90 percent of the Districts' water transmission and distribution facilities are now either concrete-lined or piped. This program will continue into the future. (WRINT-MID/TID-2,14.)

- The agricultural industry in San Diego County Water Authority's service area is dominated by high-value permanent crops such as avocado, citrus, flowers, and nursery crops. Irrigation efficiencies are in the range of 80-85 percent which is considered near optimal. Such efficiencies are due to nearly universal use of drip and other micro-irrigation systems. (WRINT-SDIEGO-1,4.)

- There is a growing body of evidence, from the United States as well as other countries, that implementation of modern irrigation technologies increases crop yields. Modern irrigation technologies require higher capital costs and extra energy to maintain pressure

but may save labor costs and, when used to apply chemicals (fertilizers, pesticides), may reduce the application of these chemicals. Traditional technologies tend to have lower irrigation effectiveness (defined as the ratio of water used by the plant to applied water) than modern irrigation technologies. (WRINT-NHI-16,8.)

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- Several San Joaquin Valley water districts have successfully implemented tiered water pricing as a water conservation measure. The first year's results of Pacheco Water District's tiered pricing system were positive with an estimated reduced water application averaging 0.6 acre-feet per acre per year. (WRINT-NHI-15,91.) The Central Valley Project Water Association (CVPWA) reported that Broadview Water District initiated tiered water pricing with the goal of reducing the volume of agricultural drainage generated in the District and found it an effective tool. (WRINT-CVPWA-11,1-2.) Tiered water pricing works best as a conservation measure when the goal is clearly defined and the program is structured to achieve that goal. (WRINT,T,XV,22:8-23:3.)

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- Agricultural representatives are actively negotiating an agricultural water conservation memorandum of understanding to implement "Efficient Water Management Practices" (EWMPs) at the water supplier level under the direction of Water Code Section 10520 et seq. (AB 3616, Kelley, Chapter 739, Statutes of 1990). This effort was scheduled to be completed by the end of 1992. (WRINT-DWR-1,6.) This program is supported by agricultural organizations and water suppliers throughout the State. (WRINT-SWC-43,1.)

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- The San Diego County Water Authority recommended that BMPs for agricultural use be adopted for all regions benefiting from waters tributary to or diverted from the Delta. They recommended that such practices be adopted for specific crop types with allowances for unique soil or growing conditions. (WRINT-SDIEGO-1,14.)

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- An efficient water market can provide incentives for more water conservation by providing opportunities to sell excess or saved water at a cost to provide for improved management. Farmers may benefit from conserving water, ranging from not paying for water they do not use, to selling conserved water in a water market. (WRINT-CVPWA-11,5.)

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- Agriculture has options to better manage and reduce its use of surface water supplies. The management option with the most potential to save surface water in the interim period is conservation.

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- The San Joaquin Valley Drainage Program Report emphasized that the first, most cost-effective step in controlling subsurface agricultural drainage is to minimize the amount of contaminated drainage water created. This approach has two advantages: decreasing the loads of trace elements discharged to surface waters and conserving water. Two of the most effective methods to minimize the amount of drainage water are to increase irrigation efficiency and to cease irrigating selected lands.

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- The San Joaquin Valley Drainage Program Report reported that 0.3 acre-feet per acre per year is the minimum amount of deep percolation necessary to leach

salts from the soil, and varies from place to place. To allow for variations and for irrigation inefficiencies beyond the farmers' control, the plan recommended a design limit for regional deep percolation requiring management of 0.4 acre-feet per acre per year in the drainage problem areas (San Joaquin Valley Drainage Program Report, Table 23).

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- The San Joaquin Valley Drainage Program Report contains a partial program for drainage reduction and management. Recommendations include:

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  a. improvement of on-farm agricultural water conservation measures and source control on all irrigated lands in the Grasslands Subarea, Westlands Subarea, and Kern Subarea to reduce deep percolation by 0.35 acre-feet per acre per year on the average, and 0.2 acre-feet per acre per year in the Tulare Subarea by the year 2000, and

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  b. development of guidelines for retirement by the year 2040 of 75,000 acres of irrigated lands with poor drainage, high saline levels, and high selenium concentrations (greater than 50 ppb) in shallow ground water.

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- Agricultural drainage reduction in the San Joaquin Valley is a substantial challenge and requires actions beyond conservation.

- Conjunctive use of surface and ground water is widely recognized as an effective water management tool in the Central Valley. The State Water Contractors' (SWC) "Menu of EWMPs for Agricultural Water Management in California" includes conjunctive use of ground and surface waters. (WRINT-SWC-43,11-19.)

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- The CVPWA's testimony includes examples of current and proposed conjunctive use projects. Examples include the conjunctive use program in Westlands Water District's Draft Water Conservation Plan (WRINT-CVPWA-4-2,86-90), the Ricelands Wetlands Conjunctive Use Project (WRINT-CVPWA-6,3), the conjunctive use project of the Friant Division of the CVP (WRINT-CVPWA-7,2), and the Lower Tule River and Pixley Irrigation District's ground water recharge program. (WRINT-CVPWA-8,1.)

- Madera Irrigation District is using imported water from the Fresno River and the upper San Joaquin River for direct crop irrigation and for percolation to the ground water basin through natural channels and unlined distribution systems during periods when water availability exceeds demands. (WRINT-MAD-6,3.)

2. Conclusions

The State Water Board supports actions to increase agricultural water conservation. Conservation is particularly important in areas that overlie saline sinks, and this decision requires conservation in those areas.

The State Water Board supports management actions reasonably achievable within five years of the date of this decision proposed in the San Joaquin Valley Drainage Program Report for drainage reduction and management. This decision will implement water conservation recommendations contained in that report. Land retirement recommendations in the San Joaquin Valley Drainage Program Report have been enacted by recent state legislation, at Water Code Section 14900 et seq.

(SB 1669, Hill, Chapter 959, Statutes of 1992), and the State Water Board supports implementation of this legislation. The Regional Water Quality Control Board, Central Valley Region, is also implementing an agricultural drainage control program, and this effort should continue.

Effective use of the State's available water supply will require increased conjunctive use of ground and surface water supplies throughout the Central Valley and increased use of water transfers. The State Board is not requiring any particular actions in the interim period to implement these activities, but the State Water Board encourages all parties to continue or begin implementing these actions.

3. **Requirements**

- Water right holders affected by this decision who deliver water for agricultural uses or deliver water to any entity which delivers water for agricultural uses shall ensure that deep percolation requiring management, as defined in the San Joaquin Valley Drainage Program Report, on irrigated lands identified in Figures 1 to 4 of this decision does not exceed 0.4 acre-feet per acre per year on average. Water right holders shall submit a report by September 1, 1993 specifying how this requirement will be implemented. The deep percolation limit shall be met by March 1998. Each affected water right holder shall submit a report to the State Water Board documenting compliance with this requirement by March 1998. Interim progress reports shall be provided at the request of the Executive Director. Documentation of compliance with this requirement may consist of either a mass balance analysis, regionwide

implementation of adequate BMPs, or such other methods as the State Water Board deems acceptable.

- With respect to agricultural conservation measures on other lands that receive water from the Delta watershed, the State Water Board will review the final program established by Water Code Section 10520 et seq. (AB 3616, Kelley, Chapter 739, Statutes of 1990) and its implementation at a November 1993 Workshop. DWR is directed to report on this issue at that time.

C. FISH AND WILDLIFE

The Notice of Public Hearing for this proceeding requested information on interim requirements that should be placed on the CVP, SWP, and other water users in the Bay/Delta watershed to protect the public trust resources in the Bay/Delta Estuary. Testimony was received on the hydrology of the Estuary, the present condition of biological resources in the Estuary and recommendations for improving the condition of biological resources in the Estuary. The State Water Board makes the following findings based on the evidence.

1. Findings

a. Hydrology

- The Bay/Delta Estuary is highly modified from natural conditions. Substantial flows that under natural conditions would enter the Estuary as high, uncontrolled flows in winter and spring now enter as regulated flows at other times of the year. In addition, the total annual flow out of the Delta into the Bay has been reduced from the levels that existed before major dam construction

because of upstream storage diversions and exports out of the Basin.

¤ The Sacramento River naturally flows south into the Estuary, then turns west toward Suisun Bay. The San Joaquin River naturally flows north into the Estuary, then turns west toward Suisun Bay. A small portion of the Sacramento River naturally flows into the central Delta through Georgiana Slough. Delta channels change flow direction on each tidal cycle, and the net volume of the Delta changes during the spring-neap tide series. Despite these variations, the natural net direction of flow in the Delta channels is downstream towards Suisun Bay. However, when the SWP and CVP export pumps in the southern Delta are operating, the lower portions of Old and Middle Rivers (branches of the San Joaquin River in the southern Delta) experience a net reversal of flow upstream (south) towards the export pumps, drawing water from the central Delta. When the Delta Cross Channel gates are open, substantially greater amounts of Sacramento River water are diverted into the central Delta; much of this water can also flow to the export pumps. Under high export rates with reduced inflow, the lower San Joaquin River also experiences a net flow reversal, with a net movement of water from the lower Sacramento River or Suisun Bay upstream (east) into the central Delta. The upper mainstem of the San Joaquin River may also experience a net reverse flow upstream (south) to the head of Old River in the southern Delta, due to low inflow and the effects of the export pumps.

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- Water year classification is an essential tool in setting requirements for the Bay/Delta Estuary because different requirements are appropriate for different water year types. Water year indices were recently developed[4] for the San Joaquin River Basin (60-20-20[5]) and the Sacramento River Basin (40-30-30[6]). These indices account for the distinct differences in the hydrology of the two basins and the importance of carryover storage. (WRINT-DWR-15; WRINT-DWR-16.)

- The 40-30-30 Water Year Index for the Sacramento River is a better description of water availability than the index used in Decision 1485 (D-1485). Because appropriate weighting factors for April through July runoff and antecedent water conditions are included in the formula, it is unnecessary to use the D-1485 adjustments for "Year following Dry or Critical" or "Subnormal Snowmelt". (WRINT-SWRCB-3, 3-5 through 3-10.)

- The recent drought was severe. The water year classification in the San Joaquin River Basin

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4 The water year indices were developed by the Water Year Classification Work Group which was headed by DWR. The purpose of the work group was to develop consensus among interested parties on appropriate year classification systems.

5 The "60-20-20" represents the percentage weight given to the three variables in the formula for the index. The first variable is the forecasted unimpaired runoff from April through July (60 percent). The second variable is the forecasted unimpaired runoff from October through March (20 percent). The third variable is the previous year's index (with a cap) (20 percent). Table II contains a more detailed description of this index.

6 The "40-30-30" represents the percentage weight given to the three variables in the formula for the index. The first variable is the forecasted unimpaired runoff from April through July (40 percent). The second variable is the forecasted unimpaired runoff from October through March (30 percent). The third variable is the previous year's index (with a cap) (30 percent). Table II contains a more detailed description of this index.

based on the 60-20-20 index was critically dry for the last six years. The water year classification in the Sacramento Basin based on the 40-30-30 index was critically dry for four years and dry for two years of the last six years.

b. Public Trust Resources

¤ *General:* The public trust resources of the Estuary are in a state of decline. Adult fall-run Sacramento River salmon escapement was greater than 100,000 in the late 1960s; the 1991 escapement was less than 50,000. (WRINT-USFWS-7,5.) Adult spring-run Sacramento River salmon abundance is about 0.5 percent of the wild fish formerly seen in historic runs. (WRINT-NHI-9,6.) San Joaquin River fall-run salmon escapement was approximately 70,000 in 1985; the 1991 estimated escapement was 430. (WRINT-USFWS-7,7; WRINT-DFG-25,7.) Delta smelt have had a variable decline to their present low abundance levels; the 1985 population level was 80 percent lower than the 1967-1982 average population. (WRINT-DFG-9,5.) While the population estimates have recovered somewhat since 1985, its precarious situation has resulted in its listing as a threatened species by the United States Fish and Wildlife Service (USFWS) under the federal Endangered Species Act. Adult striped bass abundance was estimated to be about 3 million in the early 1960s; the 1990 estimate of naturally produced adult fish was 590,000. (WRINT-DFG-2-3.) Abundances of two shrimp species, Palaemon macrodactylus and Crangon franciscorum, have declined to about one-third of their abundance in 1980. (WRINT-NHI-9,3.) The density of rotifers in the upper Estuary are

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usually less than ten percent of their abundance in the early 1970s. (WRINT-NHI-9,2.) White catfish abundance has declined severely since the mid-1970s. (WRINT-DFG-4,2.) Overall fish abundance in Suisun Marsh has been reduced by 90 percent since 1980. (WRINT-NHI-9,4.)

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¤ The declines in fish populations relate strongly to the location, method, and timing of diversions of water from and upstream of the Delta. Export pumping in the southern Delta, because of the amounts of water being pumped, the rate of pumping during the spring, and the resulting reverse flows, is a major cause of the fish population declines. (WRINT-DFG-1; WRINT-DELTAWET-15,1-8; WRINT-DFG-2, ii-iii; WRINT-DFG-8,1-2; WRINT-SWC-1,1; WRINT-DFG-25, App. 2; WRINT-DWR-22,7; WRINT-USBR-10,8; WRINT-SWRCB-3,5-27.) DWR analysis has shown a significant inverse relationship between flow in the lower San Joaquin River and the number of young bass salvaged at DWR's Banks Pumping Plant in June and July; as flow in the lower San Joaquin River decreases, the catch of young bass at the pumps increases. (WRINT-DWR-30,7.) The recent drought has also been a contributing factor to these declines. (WRINT, T,III,248:23-249:21.)

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¤ High export rates from the Tracy and Banks pumping plants, especially during April, May, and June, are related to substantial losses of young fish. These losses are particularly high in dry and critical years when Delta inflows and outflows are reduced and demands are high. Therefore, a reduced export rate during these months would help to reduce fish losses. It would not be reasonable

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to eliminate all exports during this period because some consumptive needs south and west of the Delta (especially municipal and industrial) do not have significant offstream storage available. A combined Banks, Tracy, and Contra Costa pumping plants export rate of between approximately 1,500 cfs and 2,000 cfs is needed to meet these specific needs.

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- Net reverse flows caused by export pumping are adverse to fishery resources because they pull water and the young fish of various species from the western Delta into the central Delta. Young fish in the central Delta are exposed to entrainment by the CVP and SWP and by unscreened agricultural diversions within the Delta. (WRINT-USFWS-8,2.) Reduction of reverse flows would reduce entrainment of fish in the export pumps. (WRINT-USFWS-11,5; WRINT-USFWS-7,22.)

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- The eggs, larvae and juveniles of a variety of fish species, which are vulnerable to reverse flows and entrainment, are present in the Delta throughout the year, but especially between approximately February and July. During the February to July period, reverse flows should be avoided or minimized. (WRINT-DFG-2,10; WRINT-DFG-5,1; WRINT-DFG-28,1-3; WRINT-NHI-9,5; WRINT-USFWS-11,5; WRINT-USFWS-7,22.)

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- *Sacramento River Salmon:* The Sacramento River winter-run Chinook salmon is designated as a threatened species under the federal Endangered Species Act and an endangered species under the California Endangered Species Act. In the lower

Sacramento River and Delta, the most effective method of protecting winter-run Chinook salmon is to prevent the diversion of outmigrating juveniles from their migration route down the Sacramento River from February 1 to April 30. Diversion occurs at the Delta Cross Channel, Georgiana Slough, and when there are reverse flows on the lower San Joaquin River. The National Marine Fisheries Service's (NMFS) recommendations for protection of winter-run Chinook salmon include closure of the Delta Cross Channel, reduction or elimination of reverse flows in the lower San Joaquin River, and reduced exports. (WRINT-NMFS-2,7.) In the upper Sacramento River, protection of winter-run Chinook salmon requires the prevention of delays of upstream migrating adult salmon at the Red Bluff Diversion Dam and the maintenance of suitable water temperatures for spawning. (WRINT-NMFS-2,7.)

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- The Sacramento River fall-run Chinook salmon migrate through the lower Sacramento River and the Delta from approximately April 1 to June 30. The survival problems encountered by this species in the Delta and the methods available to reduce these problems are the same as those cited above for the winter-run Chinook salmon. The fall-run salmon encounter the additional problem of elevated temperatures in the Delta. (WRINT-USFWS-7,22 and 9,37 and 59; WRINT-DFG-8,7.) Upstream of the Delta during fall-run Chinook salmon spawning, the major concerns are high water temperatures and flow fluctuations after spawning which cause desiccation of redds and the stranding of fry. (WRINT-DFG-14,12-3; WRINT-NMFS-4,9-10.)

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- The USFWS has developed a Sacramento River fall-run Chinook salmon smolt survival model based on mark-recapture experiments of coded wire tagged smolts. (WQCP-USFWS-1,6-11; WRINT-USFWS7,48.) The model is a compilation of multiple linear regression equations correlating environmental conditions in the Delta to smolt mortality. (WRINT-USFWS-1,12.) In the Sacramento River, smolt survival is influenced by three factors: water temperature at Freeport, percent of Sacramento River flow diverted down the Delta Cross Channel and Georgiana Slough, and the combined exports of the CVP and SWP. (WQCP-USFWS-1,42.)

- On the Sacramento River, flow objectives at Rio Vista were recommended for fall-run Chinook salmon smolt outmigration. The USFWS recommended a range of 2,500 to 6,000 cfs, depending on the level of protection, from April 1 to June 30 in all year types. (WRINT-USFWS-7,57.) The USFWS recommended the objective to ensure that flow conditions in the Sacramento River do not get any lower than have historically occurred. Flows required in the Sacramento River for winter-run Chinook salmon were not specifically identified.

- Pulse flows on the Sacramento River were provided from 1985 to 1989 to aid the downstream migration of fall-run Chinook salmon smolts released from the Coleman Fish Hatchery. Limited water resources caused cancellation of the pulse flows in the last three years. (WRINT-USBR-10,6.) The SWC recommended a pulse flow on the Sacramento

River to a level of 12,000 cfs from a base of 6,000-9,000 cfs during May for a six-day period. The pulse flow should be coordinated with release of salmon from the Coleman Fish Hatchery and closure of the Delta Cross Channel. (WRINT-SWC-1,18-19.) The Department of Fish and Game (DFG) recommended that 40 TAF be reserved for pulse flows on the Sacramento River when carryover storage in Shasta is greater than 1.9 MAF and 80 TAF when carryover storage exceeds 2.8 MAF. DFG characterized these pulse flows as experimental. (WRINT-DFG-14,13.) This decision requires pulse flows on the Sacramento River which will be coordinated with the release of hatchery smolts. The pulse flow should also benefit wild smolts and a broad range of estuarine species. Monitoring of smolt outmigration is necessary to evaluate the benefits of the pulse flows.

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- During pulse flows, large numbers of salmon smolts can be expected in the Sacramento River. To avoid diverting smolts during their expected peak density in the river and to maximize the benefits of the pulse flows, direct diversions from the river and its tributaries below the most downstream reservoirs releasing pulse flows should be minimized during the middle of the pulse flow.

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- *San Joaquin River Salmon:* Fall-run Chinook salmon stocks in the San Joaquin Basin have declined. Increases in storage in the San Joaquin tributary basins (New Melones, New Don Pedro, Lake McClure) since 1970, in combination with increased export pumping in the Delta, have reduced the resilience of this population. Recovery under existing water

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operations will likely be slower even with a series of better water years. (WRINT-DFG-25,6.) The factors with the greatest influence on San Joaquin River smolt survival in the Delta are inflow at Vernalis, export pumping rates, and the amount of flow diverted into upper Old River.

- Poor water quality in the lower San Joaquin River and the Delta could also significantly influence San Joaquin River smolt survival. (WRINT-USFWS-12.)

- The USFWS has developed two San Joaquin River fall-run Chinook salmon smolt survival models (with and without a barrier at the head of Old River). The models indicate that smolt survival is dependent on flow at Vernalis and combined CVP and SWP exports. Due to the lack of coded wire tag data for a variety of flow and export conditions, the model that does not include a barrier at the head of Old River was developed using a multiple regression relationship between an index of adult fall-run salmon production in the San Joaquin basin and flow at Vernalis and exports during the spring months two and one half years earlier. The relationship used to predict smolt survival when a full barrier is in place at the head of Old River is based on survival data from coded wire tag releases downstream of the junction with upper Old River from 1982, 1985-1987 and 1989-1990. (WRINT-USFWS-7,49.) Although using the export factor does not improve the regression analysis with the barrier in place, the export factor is included because even with a barrier at the head of Old River USFWS believes

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smolts would be exposed to negative impacts associated with the draft of water to the export facilities. Because the relationship with a barrier depicts relatively high survival at very low flows, the USFWS presented this relationship with reservations. (WRINT-USFWS-7,54-59.)

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- The greatest opportunity for interim improvements for San Joaquin Chinook salmon will come from additional tributary and mainstem San Joaquin River pulse flows during fall and spring migrations, coinciding with and directly linked to physical and operational measures in the Delta. (WRINT-DFG-25,7.) Increased flow at Vernalis during the spring outmigration, in conjunction with export reduction, is the most effective way of improving smolt survival, and is highly correlated with the number of adults returning two and one half years later. (WRINT-USFWS-7,34; WRINT-USFWS-9,75; I-DFG-15,34-36; WRINT-DFG-25,15.)

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- DFG trawl catches at Mossdale on the San Joaquin River indicate that San Joaquin Chinook salmon smolt migrations into the Delta generally peak one week before or after May 1. Significant proportions of season-total catch each year occur between April 15 and May 14. (WRINT-DFG-25, 12-13.) The agencies recommend flows at Vernalis from 1,500 to 10,000 cfs during this migration period. The agencies recommend flows at Vernalis for periods ranging from 14 days to 3 months during this migration season. (WRINT-USFWS-7,57.)

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- A three-week minimum daily pulse flow ranging from 2,000 to 10,000 cfs measured at Vernalis from approximately April 20 to May 10, with concurrent reduction in exports to 1,500 cfs, will provide protection to the fall-run Chinook salmon of San Joaquin River origin during the peak of smolt outmigration. Monitoring of the outmigration will provide information as to whether this measure is effective in increasing smolt survival through the Delta. This pulse flow and export reduction will also benefit a wide range of estuarine species.

- The barrier at the head of Old River is recommended by the fishery agencies to reduce the mortality of smolts of San Joaquin River origin attributable to the export pumps. (WRINT-DFG-8,7-12; WRINT-USFWS-7,57; WRINT-DFG-25,29.) The placement of a barrier at the head of Old River during the spring would prevent San Joaquin River Chinook salmon smolts from being diverted down Old River towards the export pumps. (WRINT-DFG-8, 8-12.) However, if export rates are unchanged from present conditions, such a barrier would result in increased reverse flows in lower Old and Middle Rivers, and could adversely affect smolts and estuarine fish species. (WRINT-USFWS-9,61,67 and 75; WRINT-USFWS-7,54; WRINT-DFG-25,31.) The placement of a barrier at the head of Old River during the fall (September 1 through November 30) may improve temperature and dissolved oxygen conditions for adult Chinook salmon in the San Joaquin River near Stockton. (WRINT-DFG-25,10-11.)

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- DFG identified a need for attraction flows for adult upstream migrants in the San Joaquin River basin during the fall months. Escapement to the Merced River has been lost due to straying of adults into Mud and Salt Sloughs. (WRINT-DFG-25,9-11.) Returns to the Merced Fish Hatchery have been delayed approximately three weeks due to low flows in the fall. High adult mortality or subsequent egg mortality due to high water temperatures was the result. The magnitude of this straying and subsequent loss represented approximately 30 percent of the entire basin escapement in 1990 and 1991. (WRINT-DFG-25,10.)

- A fall attraction flow for adult migrating Chinook salmon should occur during approximately the last two weeks of October in the San Joaquin, Calaveras, and Mokelumne Rivers, and should be measured at Vernalis. (WRINT-DFG-25,9.) The flow would attract the adult salmon upstream into the mainstem San Joaquin River and tributaries, up to and including the Merced River. The flow augmentation helps the salmon locate the mouth of their river or tributary. To prevent the straying of adults from major tributaries, no flow augmentation should originate from the San Joaquin River upstream of the confluence of the Merced.

- Attraction flows help reduce high water temperature barriers to adult salmonids, provide some degree of temperature control in the upstream areas as well as the lower San Joaquin River, minimize delays in migration and spawning, provide passage flows to the hatchery on the Merced River, reduce straying to Mud and Salt Sloughs, and help

alleviate the low dissolved oxygen problem in the lower San Joaquin River near Stockton. DFG indicated that low flows in 1989, 1990, and 1991 have delayed the migration of adult salmon returning to the Merced River spawning trap. (WRINT-DFG-25,9.) The average flows for the last two weeks in October at Vernalis in these three years were less than 1,500 cfs. Flows were less than 100 cfs near the mouth of the Merced River. In the last two weeks of October from 1979-1988 (period after implementation of D-1485 and before the period identified by DFG), flows at Vernalis averaged 4,400 cfs. In 7 of the 9 years, flows were greater than 2,000 cfs. During this same period, flows at the mouth of the Merced River were consistently higher than 100 cfs. Some flow rates greater than 1,500 cfs at Vernalis and 100 cfs at the mouth of the Merced River appear to be necessary to attract the adult salmon into the San Joaquin River and upstream. Therefore, in the interim while additional information on the specific flows required are developed, flows up to 2,000 cfs at Vernalis during approximately the last two weeks in October should be required. No export reduction during the attraction flow is necessary because the benefits of the attraction flow will be realized before the water reaches the export pumps.

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¤ *Estuarine Species:* Remedies for the maintenance and restoration of estuarine organisms must not be limited to isolated species but must address the habitat impairments that account for the widespread declines in aquatic resources. (WRINT-

DFG-8,2-4; WRINT-NMFS-2,2-3; WRINT-SFEP-3,202; WRINT-USFWS-10,1.)

¤ Striped bass have been intensively studied and monitored in the Estuary. (WRINT-DFG-2,ii.) Because of this effort, and because striped bass are assumed to be representative of a large group of estuarine resident fish species, they have been used as an indicator of the overall condition of the Estuary. (I-SWRCB-14,III-2; WRINT-SFEP-3,ES-3.)

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¤ DFG has developed a striped bass mathematical model which correlates the young-of-the-year (YOY) abundance and adult abundance with three factors: numbers of spawning adults, Delta outflow, and Delta exports. This model is able to explain approximately 80 percent of the observed variability in adult abundance since 1969. The YOY abundance is correlated with number of eggs, April-July average Delta outflow, and April-July average exports. Recruitment to the adult population three years later is correlated with the YOY abundance, August-December average outflow, and August-March average exports. The model suggests that protection of striped bass YOY in the spring months alone is not sufficient to protect the species. Additional protection is needed in other months to limit losses at the export pumps. (WRINT-DFG-3.) Some testimony questioned the use of the model for predictive purposes because it was based on extrapolations beyond the data upon which the model was calibrated. (T,WRINT,IV,84:2-13; T,WRINT,IV, 130:3-131:18.)

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- Other factors, such as poaching, pesticides, and changes in food chains may also affect striped bass. While some estimates of poaching losses are available (WRINT-DWR-30,34), there are no quantitative data on whether these rates have changed over the past thirty years (T,WRINT,V,187:4-8), and so would have been a new factor in the recent decline in striped bass. Information on the toxic effects of rice herbicide on young striped bass is also available. (WRINT-DWR-202.) However, there are questions about the calculation methods and assumptions associated with this analysis, and the YOY index has continued to be very low despite a significant reduction in pesticide levels in recent years in the Sacramento River. (WRINT-DFG-2,52-55.)

- Survival rates are reduced for striped bass eggs and young that move from the Sacramento River through the Delta Cross Channel and Georgiana Slough into the central Delta because the eggs and young are more susceptible to entrainment in the export pumps or Delta agricultural diversions, higher predation, and longer separation from their food supply. (WRINT-USBR-1,10-12.) The Delta Cross Channel should be closed when real-time monitoring detects significant numbers of striped bass eggs and larvae in the Sacramento River upstream of the Delta Cross Channel in order to reduce diversion of eggs and larvae into the central Delta. (WRINT-SWC-1,12.)

- DFG reported that their data indicate a relationship between reduced survival of the egg

and 6mm larval stage of striped bass and low flows in the Sacramento River. DFG suggests that low flows may increase the mortality because the eggs and larvae may settle to the bottom and die, the larvae may be delayed in reaching their first food supply, there may be a longer period of exposure to toxic substances entering the river, and there is a greater susceptibility to diversion into the central Delta. (WRINT-DFG-2,13.) A minimum average flow of 13,000 cfs in wet, above normal, and below normal years with a daily minimum of 9,000 cfs for all years should be maintained in the Sacramento River at Sacramento from April 15 through May 31 to keep striped bass eggs and larvae suspended in the water column. (WRINT-DFG-2,13; WRINT-DFG-8,20.) These flows will also benefit other estuarine species and migrating salmon smolts.

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- In order to keep striped bass eggs and larvae suspended in the water column, to improve survival of out-migrating salmon smolts, and to attract in-migrating adult Chinook salmon, minimum flow rates with additional "pulse" flows are needed in the Sacramento and San Joaquin Rivers. (WRINT-DFG-25,17-18,33,37-35; WRINT-SWC-1,7,table 1.)

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- The water quality objectives in the Bay/Delta Plan, which are enforced by this decision, require salinity protection for striped bass spawning on the San Joaquin River at Antioch and at Prisoners Point. These standards, combined with the 0.45 mmhos/cm agricultural standard at Jersey Point, provide a reach between Jersey Point and Prisoners Point in which striped bass can spawn at an EC

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level of about 0.44 mmhos/cm or better in almost all years. These salinity standards are an improvement over the 1978 Delta Plan standards requiring 0.55 mmhos/cm at Prisoners Point. The United States Environmental Protection Agency (EPA) recommends that the Board adopt EC standards of 0.44 mmhos/cm on the San Joaquin River for the entire reach between Jersey Point and Vernalis during the striped bass spawning season, a longer reach. Maintaining the additional spawning reach between Prisoners Point and Vernalis would require a substantial amount of water in dry and critical years. Under the current regulatory scheme, this water would have to come from New Melones Reservoir, which already is heavily committed to supplying water for salinity protection and pulse flows in the southern Delta.

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- Salinity between Vernalis and Prisoners Point is influenced primarily by discharges of salty agricultural return flows, not by intruding ocean salinity.[7] Thus, water supplied to dilute the salinity in this reach would primarily be used to dilute pollutants. If the State Water Board is to assure the maximum beneficial use of the State's water supplies, it should not require releases of water supply for the purpose of diluting pollutants except when those water quality standards cannot be achieved solely by controlling waste discharges. To protect spawning habitat during the spawning period, the appropriate way to regulate salinity caused by agricultural

7 Salinity and water movement downstream of Vernalis in the southern Delta are also affected by export pumping, with greater effects closer to the pumps.

discharges in this reach is by regulating the discharges.

¤ DFG has been studying variations in abundances of estuarine species. For many species, no pattern of abundance has been observed which can be related to variations in Delta outflow or other obvious factors (salinity, temperature, etc.). However, strong correlations have been observed between variations in outflow and abundance of three species. The abundance of immature shrimp, Crangon franciscorum, correlates with average March-May Delta outflow, and the abundance of mature C. franciscorum correlates with average March-May Delta outflow of the previous spring. Significant correlations for other species of shrimp were not found. DFG also found a significant correlation between average February-May Delta outflow and the abundance of longfin smelt, Spirinchus thaleichthys. Likewise, DFG found a significant correlation between the abundance of one-year-old starry flounder, Platichthys stellatus, and the average March-June Delta outflow of the previous spring. Shrimp and longfin smelt are important forage species, and starry flounder have been an important fishery in the Estuary. All three species have declined in recent years, at least in part because of the continuing drought. However, DFG expressed concern that increased freshwater consumption and export could result in a higher frequency of low-flow years, and thus make it more difficult for these species to recover. (WRINT-DFG-6.)

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- The EPA proposed three alternative standards of 2 parts per thousand (ppt) total dissolved solids (TDS). Two of the alternatives would establish the standard at Chipps Island in below normal, dry, and critical years, and at Roe Island in wet and above normal years, from February through June. The third alternative would establish the standard at different distances upstream from the Golden Gate Bridge, varying with month and year type. The purpose of the 2 ppt TDS standard would be to provide low-salinity habitat in Suisun Bay to benefit longfin smelt, Sacramento splittail, striped bass, Delta smelt, bay shrimp, and other estuarine species. The 2 ppt TDS standard could be met only by adjusting Delta outflow.

- The record shows a scientific controversy as to whether a 2 ppt TDS standard is beneficial because of the salinity level or because the flow needed to achieve the 2 ppt TDS standard will keep the protected fish away from entrainment in pumping facilities. The evidence clearly demonstrates the importance of avoiding entrainment, but the evidence is not adequate to establish that the fish need a 2 ppt TDS in Suisun Bay in order to prosper.

- The effects of water supply of the 2 ppt TDS standard depend on how the water systems are operated. For purposes of analysis, it is assumed that the 2 ppt TDS standard will be achieved only by export reductions, but it is more likely that other systemwide adjustments in storage and deliveries will be made. On the average during the 70-year period of record, assuming a 7.1 MAF

export demand, the three EPA alternative standards are predicted to cause CVP and SWP export reductions of 550 TAF to 1.12 MAF more than the predicted effects of this decision. However, the effects under various hydrologic conditions are predicted to vary widely. The maximum export reductions under EPA's three sets of proposed standards is predicted to range from 2.5 MAF to 3.5 MAF more than the predicted effects of this decision.

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- Assuming that the CVP and SWP operated the water systems to maximize water deliveries to their customers under the 2 ppt TDS standard, both bypasses of inflow and releases of stored water likely would be necessary. Bypasses and releases would directly impact water storage, impacting water supply for exports, upstream water use, and water for instream habitat requirements. Substantial storage reductions could occur, making the water supply less reliable for all uses, including the uses intended to be protected by the 2 ppt standard. Low storage levels would cause warming of the water in the reservoirs, eliminating or severely restricting cold water reserves for salmon spawning and severely reducing the habitat for lake fisheries in the reservoirs. In the absence of substantial evidence in the record to support the hypothesis that certain species require 2 ppt TDS at Chipps Island or the conditions that would be caused by a 2 ppt level, these impacts are not justifiable.

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- Reverse flows should not occur in the San Joaquin and Sacramento Rivers during the Delta smelt

spawning period in order to transport the larvae to appropriate habitat and to keep them there. (WRINT-USFWS-19.) The Delta smelt reproduction season is from January to June but the spawning peak occurs in February and March. (WRINT-DFG-9,3; WRINT-USFWS-11,4; WRINT-USFWS-18,68.)

- It is unnecessary to restrict Delta exports when outflows are very large. (WRINT-DFG-8,23.) When outflows exceed 50,000 cfs it is reasonable to lift export restrictions.

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- If outflow is high enough between July 1 and January 31 to cause the 14-day mean surface electrical conductivity at the monitoring station at Mallard Slough to be less than 3.0 mmhos per centimeter, young fish in Suisun Bay will be kept sufficiently downstream to remain out of reach of the influence of the export pumps, and many of the young fish moving down the Sacramento River will also be transported into Suisun Bay.

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- Limiting net reverse flow in the western Delta (QWEST[8] calculation) to 1,000 cfs in July and 3,000 cfs in August through January will provide reasonable protection from entrainment of fish at the CVP and SWP facilities.

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- Improved habitat stability can be achieved by adopting standards with short averaging periods. Such standards should recognize the needs of the projects for operational flexibility and the inherent variations in large natural systems. DFG

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8 *QWEST is defined in footnote 9 to Table II of the appendix.*

and USFWS addressed this need by proposing standards with shorter averaging periods (daily or 14-day running average) than those contained in D-1485. (WRINT-DFG-8; WRINT-USFWS-7.)

- D-1485 contained operational criteria for the John F. Skinner Fish Protective Facility at the SWP pumps and the Tracy Fish Protective Facility at the CVP pumps. Changes in facilities, operational parameters, and monitoring procedures, plus extensive facilities testing, have occurred since adoption of D-1485. Therefore, a need exists to update operational criteria contained in D-1485 for the fish protective facilities. (WRINT-DFG-8,26-29.) There is insufficient information in the record at this time, however, to establish new criteria.

- *Suisun Marsh:* Upstream water diversion and use reduces outflow from the Delta, thus increasing salinity in Suisun Marsh. (I-DWR-506B; WRINT-DWR-33,2.) Waterfowl habitat requiring lower salinity levels on the Channel Islands (Roe, Ryer, Freeman, and Snag) is, therefore, degraded by the impacts of upstream diversions. (I-DWR-507B,1.)

- Numerous rare, threatened, and endangered species of plants and animals inhabit Suisun Marsh and the tidal marshes along the south shore of Suisun Bay. Salinity levels are of concern for the marshes. Most of the legally-designated Suisun Marsh consists of managed marshes where controlled flooding and draining promotes waterfowl food production.

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- Water quality objectives for the managed marshes were set in the Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh (1978 Delta Plan) and were implemented through D-1485, both adopted in August 1978. Changes in the implementation of the 1978 Delta Plan were made when D-1485 was amended in December 1985. The 1991 Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay/Delta Plan) did not change the water quality objectives in the 1978 Delta Plan.

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- DWR has requested that the State Water Board change the present Suisun Marsh water quality objectives to those in the Suisun Marsh Preservation Agreement (negotiated between the DWR, USBR, DFG, and the Suisun Resource Conservation District, and signed in 1987.) To support this request, DWR is preparing a biological assessment of the effects of the proposed water quality objectives on the tidal marshes around Suisun Bay. (WRINT-DWR-1,18; WRINT-DWR-33,3; WRINT-DWR-34.)

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- *Nonwater Measures:* Nonwater intensive measures proposed to improve conditions in the Delta and upstream include, among others, the following: real-time monitoring of the movement of striped bass eggs and larvae in the Sacramento River, screening of all diversions in the Delta and the rest of the Central Valley, construction of a barrier at the head of Old River, replacement of spawning gravels, Red Bluff Diversion Dam migration passage improvements, increased enforcement of anti-poaching regulations,

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additional short-term reliance on hatcheries for fall and winter-run Chinook salmon and striped bass, and a predator control program for CVP and SWP intakes. (WRINT-CVPWA-2,8-9.) In addition, numerous other proposals for studies, evaluations, model analyses and other activities were proposed, both for short-term and long-term activities. (WRINT-SWC-1, Table 1.)

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2. **Conclusions**

Protections for public trust resources beyond those provided in D-1485 are necessary to stop the decline of public trust uses during the interim period covered by this decision. This protection will be provided primarily through pulse flows, Delta Cross Channel gate closure, restrictions on reverse flows in the lower San Joaquin River and new requirements on export pumping. These new requirements will vary according to water year classification and time of year.

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The new 40-30-30 water year index for the Sacramento River provides a better description of water availability than the index used in D-1485.

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The pulse flow requirements are not intended to resolve all the fishery concerns in the upstream tributary areas. Separate ongoing proceedings before the State Water Board are addressing the upstream fishery concerns including instream flow requirements.

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The effects of a spring barrier at the head of Old River on interior Delta flow patterns and on the entrainment of fishes other than out-migrating Chinook salmon smolts should be investigated. The results will be evaluated during the State Water Board's annual reviews. The

results of placing a fall barrier at the head of Old River should be evaluated to determine its effects on interior Delta flow patterns and whether it traps in-migrating adult Chinook salmon.

With the current water demands and facilities, a 2 ppt TDS standard in Suisun Bay as recommended by the EPA would have an unreasonable effect on the water supply for salmon spawning, lake fishery habitat, municipal and industrial uses, and agriculture. Therefore, this decision does not require such a standard. This decision should prevent further declines in fishery resources caused by water project operations in the Bay/Delta Estuary without requiring the substantial dedication of precious water supplies.

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Under current circumstances, control of salinity for striped bass spawning in the reach from Vernalis to Prisoners Point cannot be fully and reasonably achieved by regulating only water rights. Therefore, this decision does not require that the water right holders affected by this decision meet a 0.44 mmhos/cm standard in the reach between Vernalis and Prisoners Point. Nevertheless, this salinity level will be achieved in this reach during parts of the spawning period except in critically dry years because of other requirements in this decision. The DWR and USBR have begun and should continue to work with other agencies to improve water quality in this vicinity so that any operational measures they provide will be more effective.

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Revised standards for Suisun Marsh will be considered when DWR completes its biological assessment of proposed objectives in the Suisun Marsh Preservation Agreement.

The DWR and the USBR are not able reasonably to control fully either the temperatures in the Delta for Chinook salmon or the dissolved oxygen level in the San Joaquin River between Turner Cut and Stockton for Chinook salmon. Therefore, they should be responsible for meeting these standards only to the extent they have reasonable control over temperature and dissolved oxygen. Often DWR and USBR have been able to achieve reasonable control over dissolved oxygen levels through operational measures which should be continued. At other times these parameters are controlled by factors outside the reasonable control of the DWR and the USBR.

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3. **Requirements**

- The State Water Board will require compliance with the water quality objectives in the Bay/Delta Plan for salinity except that the State Water Board will carry over the current Suisun Marsh standards in the water right permits of the SWP and CVP.[9] The State Water Board will require compliance with the minimum flow and maximum export rate requirements carried over from D-1485 except as set forth herein. Standards are specified in Table II.

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- All flow and water quality standards in this order are to be calculated on a 14-day running average unless this decision specifies another averaging period. The averaging period starts on the first day of the applicable standard. For example, if a 14-day running average standard is specified from April 1 to April 30, compliance with the standard cannot be determined until April 14. However, if the standard is violated on the fourteenth day, the days of violation will be calculated from the first day.

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9 The SWP and CVP water right permits contain terms and conditions adopted in 1985, which differ from the Bay/Delta Plan.

- The 40-30-30 Water Year Index shall be used for calculating the water year classification for the Sacramento River Basin.

- The 60-20-20 Water Year Index shall be used for calculating the water year classification for the San Joaquin River Basin.

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- The 14-day running average flow on the Sacramento River at Rio Vista shall be no less than 2,500 cfs between February 1 and June 30 except during critically dry years when the 14-day running average flow shall be no less than 2,000 cfs. Higher minimum flow requirements for some year types at this location contained in D-1485 have been retained.

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- The 14-day running average net flow shall be greater than zero cfs in the western Delta (QWEST $\geq$ 0 cfs as calculated using the DAYFLOW methodology) between February 1 and June 30. The 14-day running average net flow in the western Delta shall be greater than -1,000 cfs (QWEST $\geq$ -1,000 cfs as calculated using the DAYFLOW methodology) between July 1 and July 31. The 14-day running average net flow in the western Delta shall be greater than -3,000 cfs (QWEST $\geq$ -3,000 cfs as calculated using the DAYFLOW methodology) between August 1 and January 31. The QWEST restrictions do not apply when either combined CVP and SWP exports are less than 2,000 cfs or Delta outflow exceeds 50,000 cfs. The July through January QWEST restrictions do not apply when the 14-day running average specific conductance is less than three mmhos/cm at Mallard Slough. The last 500 cfs of QWEST capacity from August through January (-2,500 to -3,000 cfs) is reserved for water transfers from the

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Sacramento Basin. The CVP and SWP may use this capacity if no water transfers are being made. For purposes of this requirement, water transfers do not include (1) water appropriated under permits or licenses held by the DWR or the USBR, or (2) water that would not have been consumptively used or stored by the water right holder in the absence of the transfer.[10]

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- In wet, above normal and below normal year types, the maximum 14-day running average combined export rate for the Tracy, Banks and Contra Costa pumping plants shall be 6,000 cfs between April 1 and June 30. In dry and critically dry year types, the maximum 14-day running average combined export rate for the Tracy, Banks and Contra Costa pumping plants shall be 4,000 cfs between April 1 and June 30. The maximum 14-day running average combined export rate for the Tracy, Banks and Contra Costa pumps shall be 9,200 cfs in July. The export pumping rate restrictions cited above do not apply when Delta outflow exceeds 50,000 cfs. The 4,000 cfs export restrictions in dry and critically dry year types may be raised to 6,000 cfs in years when San Luis Reservoir storage is less than 1.5 MAF on March 31. In these years the State Water Board will review the water supply situation at its April workshop and possibly during subsequent workshops or meetings to decide whether the change from 4,000 to 6,000 cfs should continue through the end of June.

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10 For purposes of this requirement, "consumptively used" means the amount of water which has been consumed through use by evapotranspiration, has percolated underground, or has been otherwise removed from use in the downstream water supply as a result of direct diversion.

- All QWEST flow standards shall be calculated using a 14-day running average. In addition, the 7-day running average of QWEST shall not fall more than 1,000 cfs below the applicable 14-day running average.

- The Delta Cross Channel gates shall be operated between February 1 and June 30 based on the results of real-time monitoring. DWR and USBR shall be responsible for ensuring that continuous real-time monitoring is conducted during this period either through contract with or advice from DFG. The results of this monitoring shall be reported to the Executive Director or his designee. When this monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are not present and are not suspected to be present, the Executive Director or his designee shall allow the USBR to open the gates. When monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are present or are suspected to be present, the Executive Director or his designee shall order the USBR to close the gates. The Executive Director, with advice from other agencies, will develop specific monitoring and density criteria for closing and opening the gates.

- In wet, above normal and below normal water year types, the 14-day running average flow in the Sacramento River at Freeport should not be less than 13,000 cfs for a 42-day continuous period. In all year types the minimum mean daily flow should not be less than 9,000 cfs during the 42-day period. This requirement will begin at the direction of the Executive Director when real-time monitoring indicates the presence or suspected presence of substantial numbers of striped bass eggs and larvae in the

Sacramento River below Colusa. Individual water right holders on Tables IV and V shall be deemed to have complied with these requirements if the water right holders release or bypass the flows from their reservoirs at the times and in the amounts specified by the Executive Director.

- DWR and USBR shall conduct continuous real-time biological monitoring during this period and report the results to the Executive Director. The Executive Director, or his designee, will review the monitoring data provided by DWR and USBR, and will seek the advice of the directors of the DFG, DWR, and USBR, or their designees, prior to determining when the 42-day period shall begin. This period should begin in late April or early May in most years.

- In wet, above normal and below normal water year types the average flow in the Sacramento River at Freeport should not be less than 18,000 cfs for a 14-day period. In dry and critically dry water year types the average flow during this 14-day period should not be less than 13,000 cfs. The period shall correspond approximately to the release of salmon smolts from the Coleman Fish Hatchery. Individual water right holders on Tables IV and V shall be deemed to have complied with these requirements if the water right holders release or bypass the flows from their reservoirs at the times and in the amounts specified by the Executive Director. The Executive Director, or his designee, will consult with the USFWS, Coleman Fish Hatchery, to confirm that the smolts are ready for release (generally in late April or early May), prior to invoking this requirement. If no fish are released from the Coleman Fish Hatchery, the Executive Director

shall determine the appropriate timing of this pulse flow with advice from DFG.

¤ The average flow in the San Joaquin River at Vernalis shall be not less than 10,000 cfs, 8,000 cfs, 6,000 cfs, 4,000 cfs, or 2,000 cfs, based on the San Joaquin Valley Index in wet, above normal, below normal, dry, or critically dry years, respectively, for a 21-day continuous period during the early spring (approximately April to May). The Executive Director, or his designee, will seek advice from the directors of the DFG, DWR, USFWS and USBR, or their designees, to determine when the three-week period will begin (usually between April 20 and May 10, depending upon the beginning of salmon smolt out-migration from the San Joaquin Basin) prior to invoking this requirement. During this three-week period, the average combined export pumping by the Tracy, Banks, and Contra Costa pumping plants shall not exceed 1,500 cfs. The 14-day running average combined export rate calculation for determining compliance with the April and May export standards shall be based on only those days not included in the 1,500 cfs restriction period.

¤ To help attract adult salmon into the San Joaquin River and its tributaries, the average flow in the San Joaquin River at Vernalis shall be at least 2,000 cfs for a 14-day continuous period in the fall. The Executive Director will set the 14-day period after seeking the advice of the DFG, DWR, USFWS, and USBR.

¤ The amount of additional water specifically released to meet the two San Joaquin River pulse flow requirements shall not exceed 150 TAF per year. If there is insufficient water to provide both pulse

flows, the spring pulse flow shall receive priority on a calendar year basis. If there is insufficient water to provide the entire spring pulse flow, the full 21-day pulse flow will be provided, but the average flow will be decreased. The Executive Director will determine when this condition applies and the average pulse flow requirement. D

- The minimum dissolved oxygen level in the San Joaquin River between Turner Cut and Stockton shall be 6.0 mg/l in all years between September 1 and November 30, and shall be met by the DWR and USBR whenever this parameter can reasonably be controlled by operational means. R

- DWR and USBR shall operate their fish protective facilities at Banks and Tracy pumping plants, respectively, as closely as reasonably possible to the operating criteria in Table II, which are carried over from D-1485. Mandatory monitoring requirements remain in effect. DWR and USBR, in consultation with DFG and USFWS, shall provide an evaluation of the current facilities, monitoring requirements, and operating criteria, and shall recommend to the State Water Board modifications to these criteria by November 1, 1993. A F

III. IMPLEMENTATION

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A. WATER, MITIGATION AND MONITORING FUNDS

1. Findings

- Delta exports have adversely affected the Bay/Delta Estuary's valuable resources. (WRINT-USBR-10,8; WRINT-DWR-22,7; WRINT-DWR-30,1; WRINT-DFG-25,APPENDIX 2.) Direct and indirect impacts of export

operations are significant causes of the Bay/Delta Estuary's decline. (WRINT-SWC-1,1;WRINT-NHI-9,1,14-15; WRINT-NHI-10.) SWP and CVP impacts on fish and wildlife are discussed in Section II.C., Fish and Wildlife. The recent drought also contributed to recent fishery declines. (WRINT,T,III,248:23-249:21)

- Storage capacity of major downstream reservoirs (Shasta, Oroville, New Bullards Bar, Folsom, Camanche, New Don Pedro, New Melones, Lake McClure and Millerton) on rivers that support substantial salmon runs in the Central Valley totals approximately 16.5 MAF. Storage capacity in CVP and SWP reservoirs constitutes approximately 73 percent of this amount of which 71 and 29 percent are owned by the CVP and SWP, respectively.

- The CVP has direct diversion water rights for consumptive uses and reservoir storage capacities totalling approximately 62,200 cfs and 13.7 MAF, respectively, including Trinity River imports. The SWP has direct diversion water rights for consumptive uses and reservoir storage capacities totalling approximately 23,500 cfs and 3.7 MAF, respectively. The other major water users subject to this decision have direct diversion water right claims for consumptive uses and reservoir storage capacities totalling approximately 107,000 cfs and 10.9 MAF, respectively. (WRINT-SWRCB-1a,2a.) Some duplication of water rights for the same water exists, e.g., for nonconsumptive and consumptive rights; for permits or licenses duplicating pre-1914 rights. Further, not all pre-1914 claims are verified and not all permits are pursued to full development. Therefore, the

actual total rights are less than these figures indicate.

- Water development projects, other than the SWP and CVP, in the Bay/Delta watershed have also adversely affected fisheries. (WRINT-DFG-30,3.) These diversions contribute to the decline of the Estuary's biota through habitat loss, flow reductions, and larval and fish entrainment. Upstream exports from the watershed adversely affect public trust resources more than in-basin uses because upstream exports irretrievably divert flow from the watershed and the Delta.

- Hydropower water storage projects with insignificant consumptive water uses upstream from major water storage projects store water seasonally for hydropower generation later in the water year. As the projects generate power, the water is returned to the stream and will reach the major storage reservoirs in the normal course of operation of the hydropower projects.

- Hydropower water storage projects upstream from major water storage projects, even though they return all their water diversions to the stream, have adverse effects on fish species that live in or pass through the Bay/Delta Estuary. Both hydropower reservoirs and other reservoirs increase evaporation losses and prevent or lessen natural pulses of water that otherwise might be spilled from downstream reservoirs to provide natural spawning attraction flows and flows that stimulate migration of salmonid smolts.

- The purposes of the salmon pulse flows in the spring are both to stimulate the juvenile smolts to emigrate

and to increase their survival during emigration. Survival is increased during pulse flows, possibly because of decreased migration time and water temperatures. Diversions should be minimized during pulse flows because the benefits of the pulse are diminished if the pulse is partially diverted downstream.

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- The federal Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575) allocated up to 800 TAF per year of CVP yield for protection of public trust uses in the Bay/Delta Estuary and its watershed. This allocation is reduced to between 600 TAF and 800 TAF in years when CVP customers are required to take deficiencies in water deliveries. The State Water Board intends that the water set aside by this federal legislation shall be used to meet the requirements in this decision. The State Water Board has continuing authority over the USBR's water rights, under which it can set additional requirements for the diversion and use of CVP water in the future.

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- SWP and CVP export reductions required by this decision are primarily due to either the April through July maximum export standards or the QWEST standards. These export reductions should be equitably shared between the SWP and CVP. The maximum combined export pumping rates for April through July should be equally shared. The export reductions due to the QWEST standards should be proportionately shared on a daily basis.

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- The adverse effects on public trust resources of water diversions can be partially mitigated using mitigation fees to implement projects that do not require

additional water. Examples of such projects include temperature control devices at major reservoirs, spawning gravel restoration, short-term hatchery production, screening of diversions, and a barrier at the head of Old River. (WRINT-SWC-1; WRINT-NHI-19,3.) Several water users recommended that fees be levied to pay for these projects in lieu of requiring water. (WRINT,T,XII, 139:22-140:5; WRINT,T,X,86:15-87:23.) D

2. **Conclusions**

All major water users of water from the Bay/Delta watershed share a measure of responsibility for the biological decline of the Bay/Delta Estuary; therefore, they share responsibility for mitigating the impacts of their water diversion and storage. Upstream and Delta export of water from the watershed of the Estuary, however, has adverse effects on the public trust uses of the Estuary beyond those caused by in-basin use. Upstream exports (City of San Francisco, EBMUD, Friant-Kern) reduce flows to the Bay/Delta Estuary and its tributaries. The effects of these exports are more severe than diversions for use within the Bay/Delta Estuary watershed because a portion of the latter water returns to the rivers. These return flows benefit fish and wildlife. Delta exports (DWR and USBR) cause reverse flows and entrainment within the Bay/Delta Estuary. Because they cause the greatest impacts, the exporters bear the largest responsibility. R A F

The CVP and SWP have a demonstrated ability to manage the flow of water through the Bay/Delta Estuary. T

Hydropower water storage projects with insignificant consumptive uses as a matter of course return the water they store to the stream, effectively releasing it to the

downstream reservoirs. Because of the decision in Sayles Hydro Association, et al. v. W. Don Maughan, et al., United States Court of Appeals, Ninth Circuit No. 91-15934 (Feburary 1, 1993), this decision does not require power projects with insignificant consumptive uses to provide water for a share of the pulse flows required by this decision. Nor does this decision require them to pay mitigation fees for the adverse effects on fisheries caused by their diversions of water to storage.

Together with use of the mitigation fees, the standards in this interim decision provide reasonable yet limited protection to the public trust resources in the Bay/Delta Estuary. Additional measures may be necessary to protect the public trust uses of the Bay/Delta Estuary from the impacts of water diversion over the long term. The State Water Board recognizes that the water supply in California is limited and new water delivery facilities that will meet future export demands and reduce the effects on public trust uses are not yet in place. Therefore, further mandatory water release and export requirements would not be reasonable at this time, but reasonable public trust protections can be achieved through the combination of use of a mitigation fund and the standards.

3. Requirements

The water right holders listed in Table I all have combined water rights of 100 cfs or more by direct diversion or 100 TAF of storage. Any water right holder on Table I whose total water rights are reduced permanently below these amounts through amendments to their water rights shall not be required to contribute fees or pulse flows unless this decision is amended to require contributions of fees or pulse flows from water

right holders with smaller water rights. Whenever a water right holder on Table I is relieved of an obligation to contribute fees or pulse flows, the obligations of the relieved water right holder will be divided among the remaining water right holders on Table I.

a. Water

- DWR and USBR shall be jointly and severally responsible for ensuring that all water quality requirements in this decision are met except as specified below. USBR is solely responsible for the salinity standards in the San Joaquin River at Vernalis and Brandt Bridge. DWR and USBR are responsible for the dissolved oxygen standard at Stockton and the temperature standard at Freeport and Vernalis only to the extent that they have reasonable control over these parameters.

- DWR and USBR shall be jointly and severally responsible for ensuring that all flow and export requirements in this decision are met except for the pulse flows at Freeport and Vernalis. The USBR, the DWR and other water right holders in Table I with storage reservoirs are responsible for releasing or bypassing their share of pulse flows. (See Tables IV and V.) Compliance with the pulse flow requirements at Freeport and Vernalis by DWR, USBR and other downstream reservoir operators on Tables IV and V shall be achieved by releasing water at the times and rates of flow specified by the Executive Director. If a downstream reservoir operator fails to meet its pulse flow responsibility, DWR and USBR shall provide the flow not released by the reservoir

operator. The State Water Board will seek prompt repayment of this water to DWR and USBR. If necessary, the Executive Director is authorized to approve any reasonable variance from the requirements in this decision to ensure that DWR and USBR can beneficially use repayment water in a timely fashion.

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- DWR and USBR shall provide the Executive Director with their estimates, including calculation methods, of the flows needed from each tributary to achieve the pulse flow requirements at the downstream control points. Relative responsibilities among the tributaries shall be based on the percentage of tributary unimpaired flows specified in Tables IV and V.

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- At the request of the Executive Director, water right holders listed in Table I shall provide any information needed to calculate the relative pulse flow responsibilities among the tributaries.

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- Downstream reservoir operators on each tributary shall calculate the quantity of water to be provided by all reservoirs subject to this decision on the tributary. Upstream reservoirs shall be credited with any releases for public trust uses made during pulse flow periods. Relative responsibility among reservoirs on a particular tributary to meet pulse flow requirements shall be based on the diversion of tributary flows to storage and the annual diversion of unstored water out of the watershed of the tributary upstream of the Delta. Storage projections shall be based on the difference

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between October 1 storage levels and the maximum storage level (discounting for encroachment into required flood control space) obtained during the water year. By April 1 of each year projections of annual diversions for the water year (based on most probable forecasts) shall be made by each reservoir operator on Tables IV and V and provided to the other reservoir operators on the tributary and the Executive Director. The report of actual diversions shall be made no later than October 15. Initial responsibilities for pulse flows shall be based on the April 1 forecasts and shall be refined based on the final report. Any difference between the actual amount of pulse flow released and projected responsibility shall be made up during the next year. Reservoir operators on a tributary shall share information needed to calculate pulse flow responsibilities, such as refill agreements, projected diversions, and operational histories. Authority is delegated to the Executive Director to estimate pulse flow responsibilities if adequate reports of information are not provided.

D R A F T

- Within 60 days after release of a pulse flow, each downstream reservoir operator shall request repayment of water attributable to upstream reservoirs. Downstream reservoir operators may require upstream reservoir operators to release their shares of the pulse flow during the pulse flow period. Other repayment arrangements can be made if agreeable to both parties. Repayment shall be made within 180 days after the pulse flow release. Upstream reservoir operators shall provide the pulse flow releases at the times and

rates of flow agreeable to the downstream reservoir operators.

- The State Water Board has retained continuing authority to resolve disputes over pulse flow requirements. The State Water Board also has reserved continuing authority to require any reasonable method of ensuring that pulse flows are released, downstream reservoir operators are repaid, and pulse flow requirements are met. This decision delegates to the Executive Director authority to establish reasonable methods for meeting pulse flow requirements and to amend the methodology required to calculate pulse flow requirements. Such methods may include requirements to bypass all or a percentage of reservoir inflow from each reservoir during a pulse flow.

- This decision does not preclude water right holders on Tables IV or V on tributaries of the Sacramento or San Joaquin Rivers from making arrangements with other water right holders on Table IV or V on the same tributary to provide their share of the pulse flow from the tributary. For example, if a water right holder listed in Table IV or V has rights in an upstream reservoir but receives water deliveries from the downstream reservoir releasing the pulse flow, the upstream water right holder may satisfy its pulse flow requirements by making arrangements for the downstream reservoir operator to release the upstream water right holder's share of the pulse flow and deduct that quantity of water from the deliveries to the upstream water right holder.

- Water right holders on Table I who divert water from one tributary of either the San Joaquin River or the Sacramento River to another tributary of the same river may request authorization to discharge their share of each pulse flow to the receiving tributary. Requests for authorization of such a change shall be supported by substantial evidence. This decision authorizes the Executive Director to approve these changes.

- Any water right holder on Table I who, because of extreme hardship, cannot provide its share of pulse flows from the tributary where it has water rights, may petition the State Water Board to allow an arrangement in which the water right holder provides water from another tributary. Water may not be exchanged between the Sacramento and San Joaquin River watersheds under this provision. This decision delegates authority to the Executive Director to act upon petitions to provide water from another tributary.

- No releases for pulse flows are required by this decision either from the west side of the Sacramento Valley or from Friant Dam on the upper San Joaquin River. Nor does this decision require that the USBR release water from Friant Dam for salinity control. The west side streams produce only minor amounts of water during the pulse flow periods, and additional evidence is needed before determining whether flows should be released from Friant Dam. Other ongoing proceedings are addressing the need for flows from Friant Dam. The pulse flow requirements on the San Joaquin

River have been reduced to reflect the deletion of the upper San Joaquin River from pulse flow responsibilities. If the upper San Joaquin River were required to contribute to the pulse flow requirement, the duration of the pulse flows might be increased, and the annual cap would be approximately 200 TAF.

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- The combined maximum export pumping rates at the Banks, Tracy and Contra Costa pumping plants in April through July shall be equally shared between the CVP and SWP. During August through March, export pumping rate reductions at the Banks, Tracy and Contra Costa pumping plants required to meet the QWEST standard shall be shared on an equal percentage basis between the CVP and SWP from a base of 6,680 cfs for the SWP and 4,600 cfs for the CVP. During April through July, the reductions in export pumping due to QWEST standards shall be shared equally by the CVP and SWP from a base of the maximum allowed export rates in those months.

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- Water right holders subject to this decision with storage reservoirs greater than 100 TAF on the Mokelumne and Calaveras Rivers and their tributaries, excluding hydropower-only projects, shall release or bypass water at or near the time of the San Joaquin River pulse flows. For the spring pulse flow, the percentage of the forecasted water-year unimpaired runoff from the Mokelumne and Calaveras watersheds that shall be released or bypassed for public trust uses will be based on the average percentage of forecasted water-year unimpaired runoff that will be released

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or bypassed from the Stanislaus, Tuolumne and Merced watersheds to meet pulse flow requirements on the San Joaquin River. The same calculation will be used for the fall pulse period to determine the flows that shall be released or bypassed except that the unimpaired flow from the water year just completed will be used in the calculation. The Executive Director or his designee will provide annual notification to the affected water right holders of the time releases or bypasses must occur and the quantity of water to be released or bypassed for public trust uses during the pulse periods. This requirement may be revised for the Mokelumne River as a result of ongoing proceedings before the State Water Board.

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¤ The water right holders in the Sacramento and San Joaquin watersheds subject to this decision with direct diversion rights other than the DWR and the USBR diversions in the Delta shall cease all direct diversion[11] downstream of reservoirs releasing pulse flows during a five-day period in the middle of the pulse flows for salmon migration. The Executive Director, or his designee, will annually notify these water right holders of the dates when diversions shall be curtailed. This requirement will be effective commencing in 1994. A further hearing of the State Water Board will be conducted during July of 1993 to develop specific implementation procedures.

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11 For purposes of this decision, direct diversion means diversion directly to beneficial use of uncontrolled flows, without intermediate storage.

b. Mitigation Fund

A fund is established for a period commencing with the 1994 water year (October 1, 1993) to further mitigate the impacts of use of water from the Delta watershed on public trust uses. This fund will continue until it has accrued $300 million dollars. Water users listed in Table I who either export water from the Delta watershed or use water within the watershed shall pay into the fund with the exception of USBR and its customers who pay into a separate mitigation fund under the provisions of the federal Reclamation Projects Authorization and Adjustment Act of 1992 (P.L. 102-575). The USBR or its customers shall pay into this fund for water it diverts and delivers to CVP customers who do not pay into a separate federal mitigation fund under P.L. 102-575 for some or all of their water. Direct diverters who are unable to cease diversion in the middle of pulse flow periods shall pay an additional amount into the mitigation fund subject to certain conditions.

D R A F T

The export and in-basin use of surface water from the Delta watershed inevitably impacts public trust values, but such uses are necessary to support the population of the State. The impacts can be partially mitigated by implementation of projects that enhance public trust values and do not require additional water.

The State Water Contractors and other parties proposed numerous mitigation projects during the hearings for this proceeding. The costs of many of the mitigation projects are uncertain, but large mitigation expenditures are necessary if public trust values are to be improved. In selecting an

appropriate annual sum for the mitigation fund, the State Water Board has weighed the large need for mitigation projects, the capacity of exporters and in-basin users to pay into the fund, the average amount of water used each year, the administrative requirements to manage the fund and the monetary resources available for mitigation under the provisions of P.L. 102-575. Based on ~~these~~ considerations, approximately $300 million should be collected to the mitigation fund.

- The mitigation fee for exported surface water shall be up to $15 per acre-foot for municipal and industrial use. The mitigation fee for exported surface water for agricultural users shall be up to $3 per acre-foot.[12] The mitigation fee for surface water diverted for municipal use within its watershed of origin shall be up to $10 per acre-foot. The mitigation fee for surface water diverted for use within its watershed of origin for agricultural use shall be up to $2 per acre-foot. The fees will be reviewed annually, and may be amended.

- A lower mitigation fee will be charged to agricultural users than to municipal and industrial users because agriculture requires a relatively high volume of water use which would result in a disproportionate increase in water

12 The exporters who will be required to pay up to $15 per acre-foot of exported water for municipal use or $3 per acre-foot of exported water for agricultural use are the SWP, CVP, the City of San Francisco, and East Bay Municipal Utility District. CVP customers who receive water from the CVP in exchange for water they could divert under their own rights for agricultural use shall pay the $2 per acre-foot inbasin fee if they are not subject to the mitigation fund under P.L. 102-575.

costs compared with the economic return on the water costs.

- Payments for water exported from its watershed of origin shall be assessed at one and one-half the per acre-foot charge assessed for diversions for uses within the watersheds of origin because exports have a more severe effect on public trust resources than uses within the watersheds of origin. The amount of the fee for exported water takes into account the cost of other ongoing mitigation measures for the effects of exporting water.

- Water diverted primarily for enhancement of the environment shall be exempt from payment of these fees. Examples are water diverted for state and federal wildlife refuges, for hatcheries and for fall flooding of rice lands to provide waterfowl habitat and accelerate rice straw decomposition.

- Water right holders listed in Table I, with the exception of hydropower projects with only incidental consumptive uses of water, shall report the volume of their exports from the watershed and direct diversions and rediversions from the previous water year to the State Water Board by November 1 of each year. This requirement will begin on November 1, 1993.

- The Executive Director will prepare a standard form which shall be used for reporting by the water right holders. Payments to the mitigation fund will be calculated based on these reports and the criteria set forth above. Bills for mitigation fees will be sent to the water right

holders by January 1 of each year, and payments will be due by March 1 of each year.

- A water right holder subject to the restrictions on direct diversions during pulse flows may pay for the right to divert during this period if there is a compelling reason and the State Water Board concurs. Monetary contributions to the mitigation fund to pay for water diverted during a pulse flow shall be equal to the last price per acre-foot charged for water from the DWR Water Bank but in no case less than $72, which is the lowest price the DWR water bank has charged to date.

- Parties for whom the mitigation fee would present a demonstrable hardship may file requests for hardship exemptions. The State Water Board will consider such requests on a case-by-case basis.

- This fund will be used to mitigate the effects of water storage, direct diversions and exports. Such mitigation may include improving instream habitat; providing water supplies for increased instream flows; improving fish hatchery operations with emphasis on facilities such as screens, deflectors, barriers, temperature control devices, etc.; protecting natural stocks and genetic diversity; and providing other fish and wildlife improvements. Potential mitigation projects and their approximate costs are set forth in Table C. The State Water Board will decide whether to fund these projects or similar projects when appropriate applications for funding have been filed with the State Water Board.

TABLE C

POTENTIAL MITIGATION PROJECTS
ESTIMATED COSTS

SACRAMENTO RIVER PROJECTS	CAPITAL COST $	FEDERAL SHARE	%	STATE SHARE	%	ANNUAL COST OVER 5 YRS.	FEDERAL SHARE/YR	STATE SHARE/YR
Shasta Temperature Control Device	50,000,000	37,500,000	75	12,500,000	25	10,000,000	7,500,000	2,500,000
Red Bluff Diversion Dam	52,000,000	39,000,000	75	13,000,000	25	10,400,000	7,800,000	2,600,000
*Coleman Fish Hatchery	22,000,000	11,000,000	50	11,000,000	50	4,400,000	2,200,000	2,200,000
*Steelhead Rearing Program	10,000,000	0	0	10,000,000	100	2,000,000	0	2,000,000
Clear Creek Fish Passage/Habitat	250,000	125,000	50	125,000	50	50,000	25,000	25,000
*Restoration of Tributary Passage/Habitat	12,000,000	0	0	12,000,000	100	2,400,000	0	2,400,000
Resoration of Spawning Gravels	26,000,000	19,500,000	75	6,500,000	25	5,200,000	3,900,000	1,300,000
Meander Belts and Riparian Vegetation	88,000,000	66,000,000	75	22,000,000	25	17,600,000	13,200,000	4,400,000
ACID Diversion Dam Fish Passage	4,000,000	2,000,000	50	2,000,000	50	800,000	400,000	400,000
GCID Pumping Plant Entrainment	45,000,000	33,750,000	75	11,250,000	25	9,000,000	6,750,000	2,250,000
Screen Diversions	20,000,000	10,000,000	50	10,000,000	50	4,000,000	2,000,000	2,000,000
SACRAMENTO RIVER TOTAL	**$329,250,000**	**$218,875,000**		**$110,375,000**		**$65,850,000**	**$43,775,000**	**$22,075,000**

SAN JOAQUIN RIVER PROJECTS	CAPITAL COST $	FEDERAL SHARE	%	STATE SHARE	%	ANNUAL COST OVER 5 YRS.	FEDERAL SHARE/YR	STATE SHARE/YR
Restoration of Spawning Gravels	13,000,000	9,750,000	75	3,250,000	25	2,600,000	1,950,000	650,000
Screen Diversions	15,000,000	7,500,000	50	7,500,000	50	3,000,000	1,500,000	1,500,000
Water Distribution Facilities to Wetlands	28,000,000	21,000,000	75	7,000,000	25	5,600,000	4,200,000	1,400,000
*Expand Merced Hatchery Facility	5,000,000	0	0	5,000,000	100	1,000,000	0	1,000,000
*Construct Hatchery in San Joaquin System	35,000,000	0	0	35,000,000	100	7,000,000	0	7,000,000
*Fish Barriers	3,000,000	0	0	3,000,000	100	600,000	0	600,000
*Replace Mendota Dam	4,000,000	3,000,000	75	1,000,000	25	800,000	600,000	200,000
*Construct Montgomery Reservoir	12,000,000	6,000,000	50	6,000,000	50	2,400,000	1,200,000	1,200,000
*Line canals	1,500,000	0	0	1,500,000	100	300,000	0	300,000
*Water Hyacinth Eradication	2,000,000	0	0	2,000,000	100	400,000	0	400,000
*Water System Construction and Rehabilitation	1,500,000	0	0	1,500,000	100	300,000	0	300,000
*Water Quality Real-time Monitoring Network	4,000,000	0	0	4,000,000	100	800,000	0	800,000
Meander Belts and Riparian Vegetation	5,000,000	2,500,000	50	2,500,000	50	1,000,000	500,000	500,000
SAN JOAQUIN RIVER TOTAL	**$129,000,000**	**$49,750,000**		**$79,250,000**		**$25,800,000**	**$9,950,000**	**$15,850,000**

DELTA PROJECTS	CAPITAL COST $	FEDERAL SHARE	%	STATE SHARE	%	ANNUAL COST OVER 5 YRS.	FEDERAL SHARE/YR	STATE SHARE/YR
*Improve Screening Efficiency and Fish Handling: SWP	10,000,000	0	0	10,000,000	100	2,000,000	0	2,000,000
*Predator Management Progam: SWP	4,000,000	0	0	4,000,000	100	800,000	0	800,000
*Increased Enforcement	4,000,000	0	0	4,000,000	100	800,000	0	800,000
*Wildlife Habitat Restoration	28,000,000	0	0	28,000,000	100	5,600,000	0	5,600,000
Tracy Pumping Plant Mitigation	50,000,000	37,500,000	75	12,500,000	25	10,000,000	7,500,000	2,500,000
Contra Costa Pumping Plant Mitigation	10,000,000	7,500,000	75	2,500,000	25	2,000,000	1,500,000	500,000
Delta Cross Channel Control Structure	30,000,000	22,500,000	75	7,500,000	25	6,000,000	4,500,000	1,500,000
Georgiana Slough Control Structure	30,000,000	22,500,000	75	7,500,000	25	6,000,000	4,500,000	1,500,000
Old River Barrier	750,000	562,500	75	187,500	25	150,000	112,500	37,500
Screen Diversions in Delta	40,000,000	20,000,000	50	20,000,000	50	8,000,000	4,000,000	4,000,000
Screen Diversions in Suisun Marsh	20,000,000	10,000,000	50	10,000,000	50	4,000,000	2,000,000	2,000,000
Striped Bass Restoration	8,500,000	4,250,000	50	4,250,000	50	1,700,000	850,000	850,000
DELTA TOTAL	**$235,250,000**	**$124,812,500**		**$110,437,500**		**$47,050,000**	**$24,962,500**	**$22,087,500**
* Not specifically identified in PL102-575								
OVERALL TOTAL	**$693,500,000**	**$393,437,500**		**$300,062,500**		**$138,700,000**	**$78,687,500**	**$60,012,500**

- The fund will be disbursed on either a loan or grant basis. The State Water Board will hold public meetings to determine the specific projects to be funded and to decide which awards should be made. The mitigation fund will accrue commencing on October 1, 1993 and continuing through September 30, 1998 or until $300 million has been collected for the mitigation fund. The State Water Board will determine the placement, custody, use, and allocation of the mitigation fees after a hearing to be held in July 1993. The State Water Board's costs of administering the mitigation fund will be paid from the mitigation fund. D R

- This mitigation fund is established independently of the USBR mitigation fund. The State Water Board notes, however, that P.L. 102-575 requires a state match for several projects partially funded with the federal mitigation fund. The mitigation fund established under this decision may be used in part to provide the required state match. A

c. Monitoring Fund

All water right holders listed in Table I shall pay fees to fund a monitoring program for the Bay/Delta Estuary. Historically, DWR and USBR have been held responsible, as conditions of their water right permits, for funding and conducting all water quality monitoring in the Estuary. This decision ensures that other major users of Delta inflow water assist in funding environmental monitoring activities in the Estuary. However, DWR and USBR will continue to be responsible for the monitoring. F T

- Payments into the monitoring fund shall be divided into two categories. Exporters of Bay/Delta watershed water[13] shall be responsible for 75 percent of the monitoring fund; in-basin users shall be responsible for 25 percent. Relative responsibilities among exporters will be based on annual exports. The combined responsibility of DWR and USBR will be treated as a single amount and the distribution of this responsibility should be resolved by DWR and USBR. Relative responsibilities among in-basin users will be based on annual water diversions for consumptive use.

- The State Water Board will oversee the collection and use of the monitoring fund. DWR and USBR shall submit an annual accounting to the State Water Board by October 15 of each year of both projected monitoring expenses associated with this decision in that state fiscal year and of actual monitoring expenses in the previous state fiscal year. The State Water Board will review these expenses at its annual November workshop. The allowable expenses will be partially reimbursed from the monitoring fund at the percentage allocation described above based on water exported or diverted in the previous water year. The State Water Board will mail bills to the water right holders listed in Table I by January 1 of each year. The bills will be adjusted annually based on estimated costs to be incurred by DWR and USBR and any carryover or deficit in the fund. Payments will be made directly to DWR which will

13 *USBR, DWR, East Bay Municipal Utility District and City of San Francisco.*

reimburse USBR for its share of monitoring costs. DWR shall report to the State Water Board on the financial status of the monitoring fund and the payment record of the water right holders by November 1 of each year. The State Water Board's costs of overseeing the monitoring fund will be paid from the mitigation fund. D

B. MONITORING AND REPORTING PROGRAM

1. Findings

- There is a need for a revised baseline monitoring program. (WRINT-USBR-29,4; WRINT-DWR-32.) This revised baseline monitoring program should be prepared with input from the scientific community and interested parties. R

- There is a need for a comprehensive summary of all relevant biological surveys of the Bay/Delta Estuary. (WRINT-DFG-1,-2,-4,-5,-6,-9,-27, & 28; WRINT-USFWS-9,-16,-17,-22,-23,-24, & 25; WRINT-USBR-4,-12, & 27.) A

- There is a need for a real-time monitoring program in the Bay/Delta Estuary. (WRINT-DFG-6 & 25; WRINT-CVPWA-2,8-9; WRINT-SWC-1; WRINT-USBR-5,-6,-12, & 29; WRINT-NDWA-1,24; WRINT-USFWS-9,74-79.) F

- The direct diversions subject to this decision along the San Joaquin River affect the flow in the River. Data on the magnitude and timing of these diversions are not available on a real-time basis. Efficient management of the San Joaquin River system to meet water quality flow standards may require such data. T

2. Conclusions

The existing baseline monitoring program established under D-1485 should be revised. Biological monitoring should be incorporated into the required monitoring program to track biological trends in the Estuary and provide information for real-time management. Additionally, there is a need for all parties releasing pulse flows or curtailing diversions during pulse flows to report on their compliance with these requirements.

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3. Requirements

¤ Under Condition 16.b. of the order and Table III, DWR and USBR shall continue D-1485 monitoring until a revised program is approved. These agencies, in close consultation with the Interagency Ecological Study Program (IESP), shall evaluate existing monitoring and submit, for the approval of the Chief of the Division of Water Rights, a proposal for a revised monitoring program by November 1993. The proposed monitoring program shall include the following elements.

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a. A baseline monitoring program with new locations and updated equipment for measurement of physical and chemical parameters. The revised baseline program should be sufficient to establish compliance with this decision.

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b. An updated, comprehensive summary of all relevant biological surveys that describe trends in the Estuary's resources and recommendations for which biological surveys should be incorporated into a required monitoring program.

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c. A program that will provide sufficient information to manage the Estuary on a real-time basis. This

program should include descriptions of locations, equipment, and the coordination that is needed among agencies.

d. A data management program that allows ready access to physical, chemical and biological monitoring data through electronic media by the participants in the IESP, other agencies, and the public.

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¤ DWR and USBR shall implement a program to develop real-time estimates of Delta diversions and return flows, Delta precipitation, and all significant Delta inflows for use in the calculation of QWEST and Delta Outflow Index under this decision. This program shall be coordinated under the auspices of the IESP. The methodology for these calculations and the schedule for implementation shall be submitted to the Chief of the Division of Water Rights by October 15, 1993, for his approval. The methods used shall be updated periodically to improve the estimates and take advantage of new technology.

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¤ Operators of reservoirs listed in Tables IV and V shall report to the Chief of the Division of Water Rights by December 31 of each year the quantities and the dates of pulse flow releases during that calendar year. Water right holders listed in Table I that are subject to the five-day cessation of diversion during pulse flow events under this decision shall report to the Chief of the Division of Water Rights by December 31 of each year the dates the diversion was ceased. These reports shall be signed under penalty of perjury by the holder of the water right or its authorized representative. The Executive Director or his designee will determine the form of these reports.

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- The Executive Director will determine if additional information is required from water users subject to this decision to implement the requirements in this decision. The water users shall provide the additional information upon the request of the Executive Director.

C. CARRYOVER STORAGE

1. Findings

- During the recent extended drought period, water stored in some reservoirs was drawn down under the assumption that the drought might not persist. This action resulted in reduced amounts of stored water available to meet the following year's water needs. Low reservoir carryover storage decreases future water supply reliability. Low reservoir carryover storage can result in increased water temperatures. Elevated water temperatures threaten downstream fish spawning and incubation. (T,WRINT,III,119:12-123:12.)

- Water availability forecasts are currently being used by both DWR and USBR early in each water year to estimate the water deliveries that can be made to their respective water contractors.

- As part of its annual Water Delivery Risk Analysis, DWR uses the Sacramento River Index to develop water runoff forecasts in the Sacramento, Feather, Yuba and American Rivers. The SWP's initial delivery allocations are based on water runoff forecasts with 90 percent probabilities of exceedance. (T,WRINT,IV, 266:19-267:14.) A 90 percent probability of exceedance forecast means that there is a 90 percent probability that runoff will be at least as great as

the amount estimated. At the beginning of each succeeding month, updates of the initial delivery allocations are determined using updated runoff forecasts with 99 percent probabilities of exceedance. DWR approves increases in deliveries as runoff forecasts are updated. If runoff forecasts indicate that deliveries should be decreased, delivery schedules are not revised downward until the March 1 forecast, or thereafter. (WRINT-DWR-9A.)

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- USBR's runoff forecasts are based on historical precipitation, snow water content, and runoff data. Historically, USBR has used median forecasts with 50-percent probabilities of exceedance to establish initial water allocations. During dry conditions, as during water years 1989 through 1992, USBR used a more conservative 90 percent exceedance level. (WRINT-USBR-24,105; T,WRINT,IV,266:19-267:14.) USBR notifies its three categories of contractors (exchange, settlement and water service) of their initial water allocations by February 15 of each year. After this date USBR can increase or decrease allocations to water service contractors based on changing conditions as the water year progresses, but allocations for the exchange contractors and water rights settlement contractors can only be increased.

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2. **Conclusions**

DWR and USBR should use conservative water availability forecasts when setting initial, revised, and final water delivery commitments in order to increase carryover storage.

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3. Requirements

- DWR and USBR shall use a 90 percent probability of exceedance forecast in setting their initial water delivery allocations. Subsequent updates of water delivery allocations shall be based on a 99 percent probability of exceedance forecast. This requirement does not apply to the Friant unit of the CVP. For purposes of meeting this requirement, DWR and USBR can use the same probabilities of exceedance cited above in determining the water year classification used in their projections.

- DWR and USBR shall hold an annual public workshop between February 1 and February 15 to describe their projected operations during the next year.

D. MODIFICATION PROCESSES

1. Findings

- The management of the Bay/Delta Estuary should be based on an integrated, real-time set of guidelines. (WRINT-SWC-1; WRINT-USBR-1; WRINT-SFEP-6,49-56.)

- There is a need for maximum flexibility in managing the Estuary's water. (WRINT-DWR-1,16.)

- The winter-run salmon is an endangered species under the state Endangered Species Act and a threatened species under the federal Endangered Species Act. The NMFS on February 12, 1993 issued a long-term Reasonable and Prudent Alternative regarding the operations of the CVP and the SWP.

- Because of statewide growth, the urban and agricultural sectors affected by this decision may be able to implement only enough conservation and

conjunctive use practices to avoid hardships during the next five years. After that, increasing population pressures and economic growth may require a change in water management. Within five years, the Governor's Bay-Delta Oversight Council (B-DOC) is expected to propose new facilities and other water management changes to make it possible to divert and use more water without harm to the fisheries and wildlife. As part of its charge, the B-DOC will prepare environmental documentation for the changes it will propose for the Bay-Delta Estuary.

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2. Conclusions

Management of the Estuary requires flexibility to respond to changing hydrological and biological conditions. Over the last few years the Estuary has experienced a severe drought and the decline of several aquatic species. Fishery agencies and the projects have responded to these problems by negotiating appropriate Estuary management measures. The State Water Board supports these efforts, and it is the State Water Board's intent in this decision to provide the flexibility necessary to respond to changing conditions. This flexibility will be provided through four separate processes.

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3. Requirements

- First, as provided in Section II.C of this decision, Delta Cross Channel closures and pulse flows will be based on the results of real-time monitoring for the presence of salmon smolts and striped bass eggs and larvae.

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- Second, fishery requirements in this decision may be amended on an annual basis at the request of DWR, USBR, DFG, USFWS, or NMFS. The Executive Director may

grant a variance after making a finding that the change will enhance beneficial uses without significant adverse effect on the environment. The advice of the DFG, USFWS, NMFS, DWR and USBR will be considered in evaluating the variance request. The Executive Director will approve or disapprove the request. If the request is approved, the variance will replace the applicable standards for not more than one year.

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- Third, the State Water Board will convene an annual workshop in November to review project operations and the status of the biological resources during the previous hydrologic year. Recommendations for changes in this decision will be considered at that time.

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- Fourth, in July of 1993, and at other times, the State Water Board will convene focused evidentiary hearings to consider specific issues regarding the provisions in Decision 1630. The July 1993 hearing will be used to fine-tune requirements for the mitigation fees, including amounts and hardship criteria, and the 5-day bypass during the pulse flows. The future hearings will address the fishery requirements in the Delta and the effects of Decision 1630. After each hearing, the State Water Board will make any necessary changes in this decision to ensure that its effect remains in compliance with the public trust and reasonable within the meaning of Cal. Const. Art. X, Section 2. Parties may petition the State Water Board to consider additional specific issues during each of these hearings.

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The Board will review any environmental documentation prepared by the B-DOC and will prepare any additional

or supplemental documents necessary for consideration of a long-term water right decision which addresses the effects of alternative long-term protections for the Bay-Delta Estuary. The State Water Board will notice a hearing on a long-term water right decision for the Bay-Delta Estuary not later than April 1, 1997. After the 1997 hearing, the State Water Board will consider adopting a long-term water right decision for the Bay-Delta Estuary.

In the event that projects are proposed that the State Water Board finds will advance the environmental purposes of this decision and lessen the water supply impacts of this decision, the State Water Board has authority to reopen on its own motion provisions of this decision to consider making such changes and modifications as the State Water Board may find are appropriate to advance the purposes of this decision.

IV. LONG-TERM GOALS

The economic vitality and environmental health of California depend on a reliable water supply adequate to meet the needs of the three principal water uses in California: agriculture, the environment, and urban. Currently, the State's developed water supply is not adequate to meet these needs in dry periods.

The State Water Board is a regulatory agency. It does not construct water facilities. State Water Board actions can and do, however, affect the way that operational agencies implement solutions to water problems.

The State Water Board's long-term goals are to:

- Take actions which will enable the development of a reliable water supply of good quality for the agricultural, fish and wildlife, and urban needs of California.

- Have self-sustaining fishery populations in the Bay/Delta Estuary at the highest levels that reasonably can be achieved. Habitat protections will be necessary to achieve this goal. While limitations in knowledge allow only representative species to be monitored, all species must be protected.

- Encourage operational water supply agencies to:

  - Manage available water supplies in the most efficient manner to optimize their utility for beneficial uses and minimize the need for additional supplies.

  - Construct the additional facilities, nonconventional and conventional, necessary to develop the additional water supplies necessary to meet California's present and future needs.

  - Guarantee protection of public trust resources.

Measures to accomplish these goals include:

A. GENERAL

Equitably allocate water supplies among urban, agricultural, and fish and wildlife uses in dry periods; improve regulation of water supplies in normal and wet years to restore fish and wildlife resources, maintain agricultural supplies, and meet growing urban needs.

B. FISHERY MANAGEMENT MEASURES

- *Physical Measures:* Facilitate necessary physical changes in the Delta including appropriate gates and barriers, changes in methods and locations of diversions, and better and more fish screening including improved or new screening where feasible of all major diversions that have significant impacts on fish.

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- Facilitate physical measures and require operational measures to ensure that instream flows through the Delta will transport young fish and eggs beyond the reach of diversion pumping.

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- Considering the adverse effects on the fisheries caused by the SWP and CVP export diversions and rediversions in the southern Delta, and considering the need for export of water for consumptive uses, the exclusive use of diversion points in the southern Delta for diverting water which originates primarily in the Sacramento River necessitates further study. The DWR and the USBR should continue to review the physical configuration of the Delta and develop recommendations for any water right permit changes. This may include the consideration of an isolated Delta facility.

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- *Hatcheries:* Use temporary hatcheries to boost the populations of particular species where necessary. The DFG should explore the use of such temporary hatcheries for this purpose with the goal of restoring natural stocks and maintaining genetic diversity.

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- *Upstream Measures:* Improve upstream conditions such as cold water releases and instream flows to ensure the survival of salmon eggs, fry, and juveniles. Adequate

screening, deflectors, or other methods of avoiding the diversion of substantial numbers of fish should be provided for large diversions. Upstream fishery needs are being reviewed in other water right proceedings, and decisions on instream flow needs will be coordinated with this decision.

C. WATER SUPPLY MANAGEMENT MEASURES

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- *Reliability:* Water supply reliability must be improved. Basic uses must become less dependent upon variations in annual precipitation. Steps must be taken to ensure a constant or reliable water supply, taking into consideration the inherent variability of precipitation in California. Increased conjunctive use of surface and ground water will be important. Greater attention should be paid to carryover reservoir storage requirements.

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Water agencies must develop programs to increase their operational flexibility and water supply reliability. Municipal and industrial water users should establish contingency plans for supplying or conserving water during dry and critically dry years.

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- *Conservation:* Urban and agricultural water agencies should implement all practical conservation measures. Agricultural water users should achieve the highest practical irrigation efficiency.

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- *Pricing:* Water purveyors should develop water pricing schedules for their customers that make it increasingly expensive to (1) obtain water in amounts in excess of what the local water agency considers necessary, or (2) use potable water where nonpotable water is available and suitable.

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- *Ground Water Management and Conjunctive Use:* Where practicable, local agencies must develop conjunctive use programs for ground and surface water. If necessary, they should seek ground water management authority. Local agencies should manage conjunctive use programs to maximize use of ground water during dry periods and recharge the ground water during wet periods.

- *Water Recycling:* Wherever practicable, all local water agencies should reduce water demands by maximizing water reclamation and reuse. Urban water agencies should require the installation of nonpotable water distribution pipelines to use reclaimed water for irrigation of parks, greenbelts, golf courses, and other landscaping irrigation in new developments.

- *Drainage Reduction:* In the San Joaquin Valley, the recommendations of the San Joaquin Valley Drainage Program should be implemented to the extent feasible.

- *Water Transfers:* Mechanisms for rapid implementation of water transfers must be established to provide water for essential purposes in droughts.

- *Contingency Funds:* Municipal and industrial water users receiving water exported from the watershed of the Bay/Delta Estuary should establish a fund or funds to help protect the reliability of their water supplies. Such a fund could be used to pay for water transfers, increased public education, and conservation measures when water supplies are low.

D. WATER SUPPLY DEVELOPMENT

- *Offstream Storage:* Proposals should be developed and implemented for additional offstream storage facilities

both upstream and downstream of the Delta and in export areas.

Completion of the environmental review of the proposed Los Banos Grandes Reservoir should be pursued vigorously to ensure a timely review of its feasibility and its effects.

- *Alternative Projects:* Wastewater recycling plants and distribution systems, saline and seawater desalination plants, and other alternative water supply projects should be developed and implemented where feasible.

- *Conjunctive Use:* Conjunctive use of the Sacramento Valley ground water basin and conjunctive use of New Melones Reservoir with agencies in Stanislaus and Calaveras Counties should be analyzed and implemented, if feasible.

V. EFFECTS OF THIS DECISION

A. PROJECTED EFFECTS OF STANDARDS AND IMPLEMENTATION

The hearing notice for this proceeding states that the immediate goal of this decision is to halt the decline and increase the protection of public trust resources where reasonable. It is the State Water Board's intent that the requirements in this decision accomplish that goal.

The following analysis describes the effects of this decision on water supplies and fishery populations.

1. Effect on Water Supply

The estimated impacts on exports of this decision were obtained by modification of a DWRSIM model output. DWRSIM is a computer model designed to simulate the operation of CVP and SWP reservoirs and conveyance

facilities. The operations studies are based on a monthly time step and use the historical 70-year hydrologic sequence of flows from water years 1922 through 1991. These studies account for system operational objectives, physical constraints, statutes and agreements. A major assumption in the studies is that Delta Cross Channel gates will be closed in February, March and April and open 50 percent of the time in May and June. Actual Delta Cross Channel gate operation between February and June will be based on real-time monitoring. The State Water Board ran two additional operations studies with different gate operations to estimate the water supply impact of alternative assumptions. The approximate difference in exports between opening the gates 50 percent of the time in February through June and closing them completely averages approximately 170 TAF under the conditions in this decision.

D R A F T

The DWRSIM output used in this analysis is designated DWRSIM 1630-3 and was released by DWR on February 2, 1993. D-1630-3 assumes a 7.1 MAF export demand. The export/outflow output from this operations study was modified by State Water Board staff to include four changes in the standards. First, the export cap of 4,000 cfs in April through June of dry years was raised to 5,000 cfs. Second, the export caps of 5,000 cfs in April through June in dry years and 4,000 cfs in critically dry years were raised to 6,000 cfs if San Luis Reservoir storage is less than 1.5 MAF on March 31. Third, the Sacramento River pulse flow requirement in dry and critically dry years was changed from 18,000 cfs for two weeks and 13,000 cfs for six weeks to 13,000 cfs for two weeks and 9,000 cfs for six weeks. Fourth, the QWEST limit of -2,000 cfs from August to January was changed to -3,000 cfs. This modification of the D-1630-3 output

estimates the water supply impact of this decision on the SWP and CVP and is designated D-1630-P.

State Water Board staff further modified the DWRSIM output to account for the potential effects of water transfers. This was accomplished by assuming that in August, September and October export pumping for transfers from the Sacramento Basin will cause QWEST to decrease to -3,000 cfs when pumping capacity is available. Pumping was increased only in these months because NMFS recently restricted QWEST to greater than -2,000 cfs from November through January. This modified DWRSIM output provides an estimate of the potential water supply impact of this decision with transfers assuming that areas downstream of the Delta can find Sacramento Valley water to buy. This modified DWRSIM output is designated D-1630-T. There is more transfer water capacity available than is indicated by D-1630-T, but the transfer would have to either occur at a less convenient time of the year, have a prohibitive carriage water requirement of 70 percent because of the QWEST limit, or originate in the San Joaquin basin. The State Water Board believes that the export levels predicted under D-1630-T are unlikely to be exceeded over the next five years. Therefore, the impact of the decision on exports will be somewhere between D-1630-P and D-1630-T, depending on the demand for and availability of water transfers.

The estimated range of export impacts of this decision are summarized on Figures A and B. Figure A compares the range of average estimated exports under this decision with the exports that might occur under D-1485 in wet (W), above normal (AN), below normal (BN), dry (D) and critically dry (C) year types. The range of export

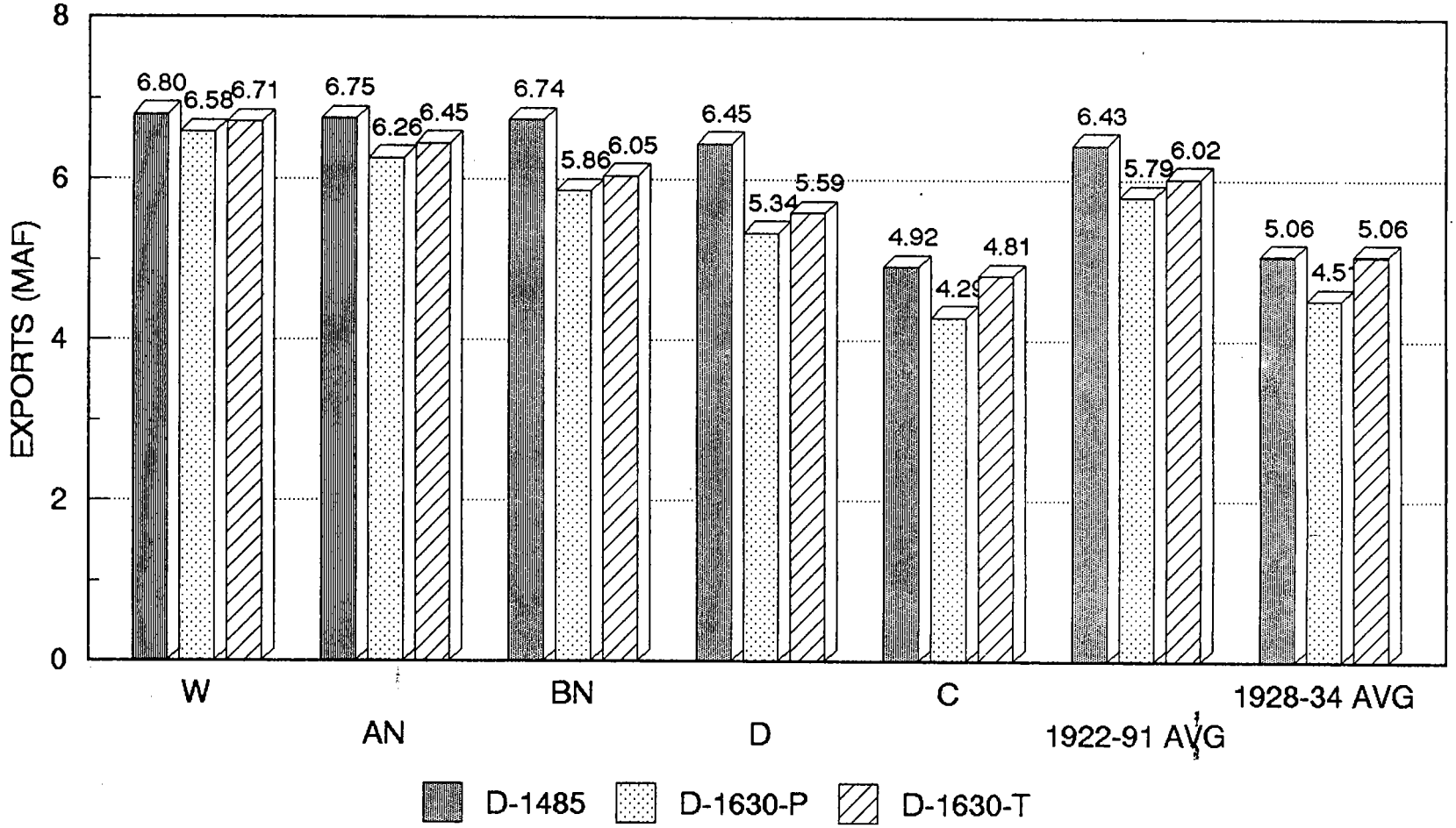
impacts is also provided over both the 70 years of hydrology and the critically dry period of May 1928 to October 1934. This figure indicates that the decision could reduce average annual combined CVP and SWP exports by 640 TAF over the 70 years of hydrology and by 550 TAF over the critically dry period compared to predicted export levels under D-1485. In general, average outflows increase under this decision compared to D-1485 by approximately the magnitude of the export reduction plus 100 TAF. The factor of 100 TAF arises because of pulse flow releases on the San Joaquin River.

Figure B compares the estimated exports under this decision with the exports that might occur under D-1485 in individual years if the hydrology of the recent past reoccurred and assuming a 7.1 MAF demand. Actual exports are included in Figure B to show the base case for existing conditions. The period 1984 to 1989 was selected as the base case because it includes several water year types, and the CVP and SWP did not take drought-induced deficiencies during this period. There are large differences between actual exports and expected exports under this decision in individual years between 1984 and 1989 but the average exports for the CVP and SWP over this period are the same. Additional exports are possible through water transfers. Care should be taken in comparing actual exports in individual recent years with model results in individual years because initial conditions in reservoirs and demands are different.

Figures A and B provide estimates of the range of impacts on exports of this decision, but they do not provide a complete picture of the water supply impact because changes in reservoir storage levels are not included. A DWRSIM operations study (D-1630-3) was used to estimate

FIGURE A

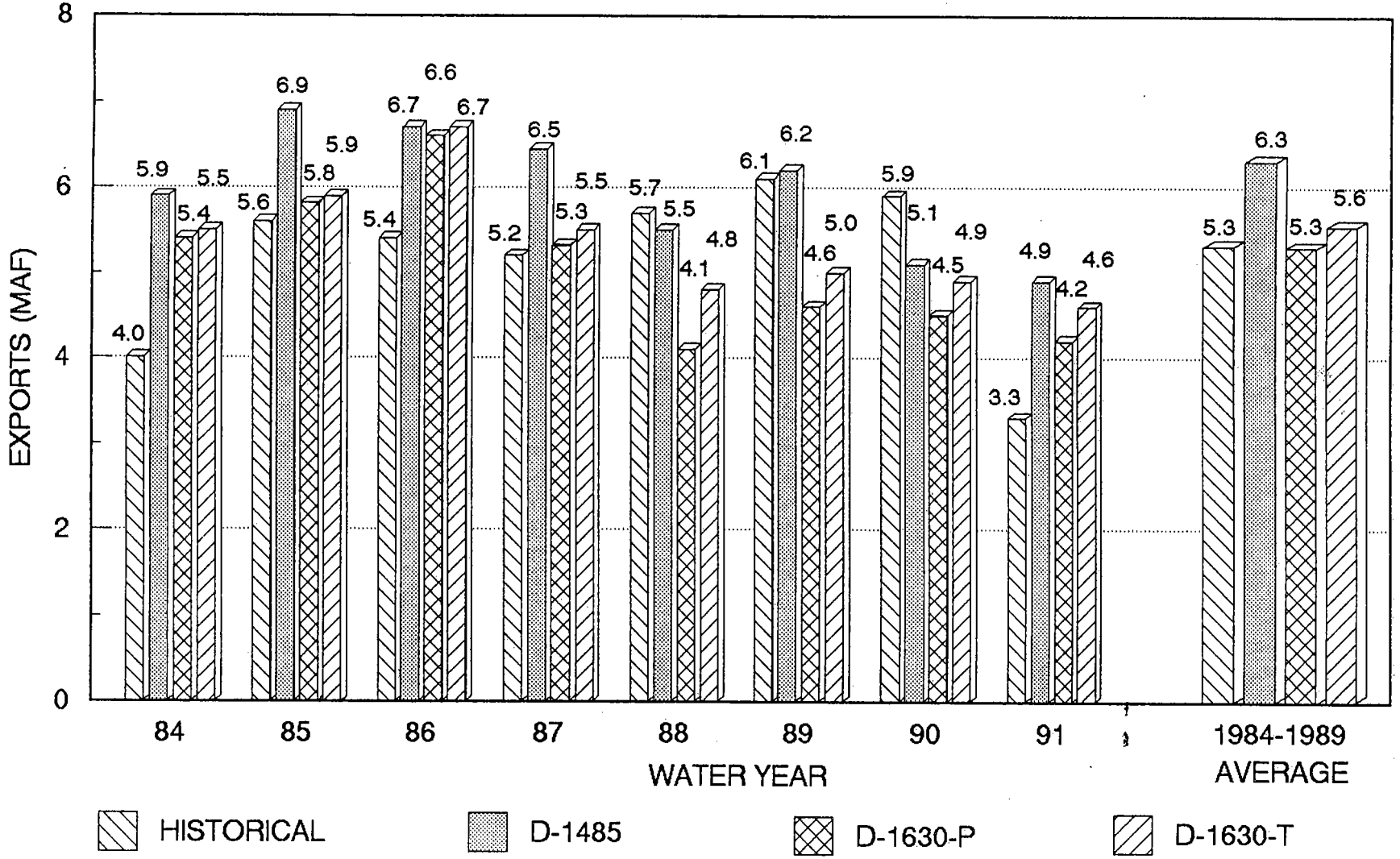
EXPORT IMPACTS OF D-1630 COMPARED TO D-1485 OVER 70-YEAR HYDROLOGY



Operations Under 7.1 MAF Export Demand
1928-34 Avg Calculated as May 1928-Oct 1934 Avg

FIGURE B

EXPORT IMPACTS OF D-1630 COMPARED TO D-1485 AND HISTORICAL DATA OVER 1984-89 HYDROLOGY



Operations Under 7.1 MAF Export Demand

impacts of this decision on upstream reservoirs. Under the assumptions in D-1630-3, the change in average SWP and CVP Sacramento Basin reservoir storage levels without transfers over the 70 years of historic hydrology is plus 219 TAF. This change constitutes plus 1.7 percent of the reservoir capacities subject to this decision (see Table IV) in the Sacramento Basin. The modified standards should not significantly change this result.

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A DWRSIM operations study (D-1630-3) was also used to estimate reservoir impacts in the San Joaquin Basin. Under the assumptions in D-1630-3, New Melones storage decreased by an average of 82 TAF and an additional 94 TAF of San Joaquin River inflow above the Stanislaus River is required annually on the average over the 70 years of hydrology. The water supply impacts in the San Joaquin Basin are due to the San Joaquin River pulse flow requirement.

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D-1630-3 also estimates the relative water supply impacts on the CVP and SWP. Under the assumptions in D-1630-3, the CVP would bear 75 percent of the shortage and the SWP would bear 25 percent. The State Water Board believes that this distribution of impacts is reasonable because of the relative sizes of the projects and recent federal legislation, P.L. 102-575, which dedicates 600 TAF to 800 TAF of the CVP yield for the enhancement of fish and wildlife resources depending on hydrologic conditions. The State Water Board intends that the water dedicated by P.L. 102-575 be used to meet the requirements in this decision.

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The State Water Board acknowledges that estimates of the water supply impacts of this decision could be improved.

Therefore, the State Water Board encourages interested parties to review the water supply impacts through the Operations Workgroup directed by DWR. The State Water Board will consider the most up-to-date water supply impact estimates at its November workshop. The State Water Board will hold a hearing to consider amending this decision if the water supply impacts or their relative split between the CVP and SWP are substantially different than is estimated here.

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2. **Effect on Fishery Populations**

Without construction of facilities, the methods available to protect or enhance public trust uses in the Delta include changing operation of the Delta Cross Channel gates and changing the timing and amounts of exports, inflows, outflows, and reverse flows. All of these methods are incorporated into this decision.

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This decision reduces exports and eliminates reverse flows on the lower San Joaquin River during the spring and limits reverse flow during the rest of the year. Reverse flows on the lower San Joaquin River can draw aquatic organisms into the central Delta where they are exposed to the CVP and SWP export pumps. Young fish living in or migrating through the central Delta after the spring spawning season are particularly vulnerable to entrainment to the export pumps during high export periods. A consequence of the reverse flow and export restrictions is that export of uncontrolled flows in the spring is reduced, and outflows increased. Some estuarine fish are known to respond positively to increased outflows, particularly in the late winter and spring. The higher outflows transport estuarine fish into Suisun Bay and San Pablo Bay which are farther from

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the effects of exports and a better rearing habitat for these species.

This decision requires real-time operation of the Delta Cross Channel gates from February through June. These gates must be closed when real-time monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are present or suspected to be present. Closure of the Delta Cross Channel gates reduces the transport of smolts, eggs, and larvae from the Sacramento River into the central Delta.

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This decision requires pulse flows in the spring on the Sacramento and San Joaquin rivers to assist the movement of young fish, eggs, and larvae down these rivers to the Delta and Suisun Bay. Real-time monitoring will be used (1) to optimize the timing of the pulse flows and (2) to operate the Delta Cross Channel gates to provide additional protection. Direct diverters will be required to cease diversions for five days during the pulse flows. SWP and CVP exports will be reduced to 1500 cfs during the San Joaquin spring pulse flow. During the pulse flow period the Delta Cross Channel gates will be closed and exports will be reduced to a minimum level.

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This combination of flows, export restrictions, and physical controls should improve conditions for the biota in the Delta over that provided by D-1485. The Bay/Delta Estuary is a complex ecosystem, however, and it is not possible to quantify the biological response to these control measures with a high degree of certainty in advance of their implementation. Consequently, in order to ensure that the goal of stopping the decline and

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improving public trust uses is achieved, the State Water Board will meet each year in November to review the biological response in the Delta and initiate amendment of these conditions where appropriate.

The following discussion explains which requirements will benefit particular species. Salmon, striped bass, and some estuarine species in the Delta have ~~been~~ studied more extensively than others. Statistical analyses have been performed which indicate that survival or abundance of these species correlate with physical parameters in the Delta. These regression equations have limited predictive ability if the conditions under which they are applied differ significantly from those under which they were developed, but they are discussed in the following section to illustrate possible effects of this decision. The exports and outflows used in the regression equations are obtained from the modified DWRSIM output with 7.1 MAF demand over 70 years of historic hydrology. The modified DWRSIM output also includes substantial assumptions. Therefore, the biological response predicted by the combination of the regression equations and the modified output should be viewed with caution.

D R A F T

a. Salmon

The requirements in this decision should improve survival of Chinook salmon smolts migrating downstream and through the Delta. In the Sacramento River, winter-run Chinook salmon smolt survival should be improved by reductions in exports during spring months, restrictions on reverse flows in spring months and real-time operation of the Delta Cross Channel gates. The same types of requirements

during the spring should improve survival of Sacramento River fall-run Chinook salmon smolts; fall-run survival should be further improved by the two spring pulses. In the San Joaquin River, Chinook salmon smolt survival should be improved by the three-week spring pulse, the two-week fall pulse, reverse flow restrictions, and export restrictions in the spring, including the export reduction to 1,500 cfs during the spring pulse.

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The fall-run Chinook salmon smolt survival model results are summarized in Table D. These results predict improved survival over recent historical conditions and over conditions that would exist in the future under D-1485. The predicted fall-run survival is the same under D-1630-P and D-1630-T conditions because fall-run smolt survival is dependent on conditions in April, May and June and conditions during these months are the same in the two modified model outputs.

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While the estimated survival indices for salmon smolts from the Sacramento and San Joaquin rivers are less than recommended by the EPA and the USFWS (0.38 for Sacramento River smolts and 0.31 for San Joaquin River smolts), the predicted indices are comparable or better than the levels which existed in or before 1975, the base date for the antidegradation policy under the federal Clean Water Act. Using the current salmon model of USFWS, the calculated mean survival index estimated for the Sacramento River salmon smolts under this decision is 0.34. This is slightly higher than the calculated mean survival of salmon smolts during the period from 1960 through 1975 (0.33).

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TABLE D

CALCULATED SMOLT SURVIVAL INDEX
FALL–RUN CHINOOK SALMON

SACRAMENTO RIVER

STANDARD / WY	WET	AN	BN	DRY	CRIT	MEAN
D–1485	0.39	0.27	0.24	0.20	0.19	0.27
1984–1989	0.23	–	–	0.21	0.16	0.20
D–1630–P	0.41	0.34	0.32	0.29	0.26	0.34
D–1630–T	0.41	0.34	0.32	0.29	0.26	0.34

SAN JOAQUIN RIVER WITH BARRIER

STANDARD / WY	WET	AN	BN	DRY	CRIT	MEAN
D–1485	0.35	0.21	0.17	0.15	0.17	0.23
D–1630–P	0.41	0.30	0.25	0.23	0.21	0.29
D–1630–T	0.41	0.30	0.25	0.23	0.21	0.29

SAN JOAQUIN RIVER WITHOUT BARRIER

STANDARD / WY	WET	AN	BN	DRY	CRIT	MEAN
D–1485	0.13	0.07	0.06	0.05	0.12	0.09
1984–1989	0.26	–	–	0.03	0.07	0.11
D–1630–P	0.24	0.23	0.21	0.22	0.19	0.22
D–1630–T	0.24	0.23	0.21	0.22	0.19	0.22

NOTES

* Survival index values are based on USFWS Delta Smolt Model (WRINT–USFWS–7).
* D–1485 conditions were estimated using DWRSIM with a 7.1 MAF demand.
* 1984–1989 conditions were taken from DAYFLOW; no barrier was in place from 1984–1989.
* D–1630–P and D–1630–T conditions were estimated using a modified DWRSIM output with a 7.1 MAF demand.
* Barrier located at the head of Upper Old River

For San Joaquin River salmon smolts, the estimated mean survival index under this decision is 0.22 if a barrier is not constructed at the head of Old River, and 0.29 if a barrier is constructed. EPA's recommended salmon smolt survival index of 0.31 assumed construction of the barrier. The calculated mean survival of San Joaquin River salmon smolts during the period from 1960 through 1975 was 0.29. Construction of a barrier is within the discretion of the DWR.

These models only predict salmon smolt survival in the Delta. The adult salmon populations depend on a number of other factors including upstream habitat conditions and ocean fishing.

b. Striped Bass

The extensive data base on striped bass indicates that the adult population has declined primarily because of three factors: reduced Delta outflow, increased Delta exports, and fewer eggs available to replenish the population. The measures proposed in this decision seek to address these factors.

On the Sacramento River, increased minimum flows in wet, above normal, and below normal years to keep eggs and young suspended in the water column, combined with real-time monitoring to close the Delta Cross Channel gates, should increase survival of young bass. On the San Joaquin River, limitations on exports, combined with reverse flow restrictions, should improve survival of striped bass young in the central and western Delta. On both rivers, the pulse flows and export restrictions targeted for salmon

smolt outmigration protection should also provide additional protection for young bass. In addition, the pulse flows and reverse flow restrictions may improve spawning conditions for striped bass by reducing salinity in the Delta. Restrictions on reverse flows later in the summer and fall should limit losses of young-of-the-year (YOY) striped bass.

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This decision will protect striped bass spawning at the EPA-recommended salinity level of 0.44 mmhos/cm EC in the reach from Vernalis to Jersey Point during a substantial part of the spawning period in wet, above normal, and below normal water years. During some parts of the spawning period this salinity will not be met in the entire reach. In dry years Vernalis salinity probably will be on average slightly higher, at 0.46 mmhos/cm EC during the pulse flow, and somewhat higher yet during the rest of the spawning period. The dry year regime likely will not significantly impair spawning success. In critically dry years, 0.44 mmhos/cm EC is not expected to be met between Prisoners Point and Vernalis. While the entire spawning reach will not be protected during the entire spawning period each year, this decision will substantially improve spawning habitat over the levels that could occur under D-1485. This decision will provide water quality in the reach between Vernalis and Jersey Point which is comparable to or better than the levels which existed in or before 1975, the base date for the antidegradation policy under the federal Clean Water Act.

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The average wild adult striped bass population during the recent historical period (1984-1989) was approximately 1,000,000 fish. The 1990 estimate was

about 600,000 fish. The DFG striped bass model predicts that the proposed standards should stop the decline of striped bass and maintain the wild population at approximately 730,000 adults if transfers do not occur (D-1630-P). The wild population could fall to 710,000 adults if transfers are maximized (D-1630-T). These results are graphically represented in Figure C.

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The present adult abundance may continue to decline for the next several years because the effects of the last three years of drought (1990-1992) have not yet been reflected in the adult population statistics. This smaller population may respond more slowly to the improved conditions. The YOY index, however, should increase in response to the proposed standards compared to present and future conditions under D-1485 requirements. The YOY index should not change even if transfers occur because transfers will occur after July and the YOY index is usually set by that time.

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The model results of the proposed standards present an improved picture for striped bass. However, this interpretation, like all model results, should be viewed with appropriate caution for several reasons. The DFG model relationship is based on data from more than twenty years. Only a few data points are included which correspond to the levels of exports recently seen, and which are expected to be present in many wetter years in the future. The accuracy of the predictions of the DFG model at the extreme end of its range is limited.

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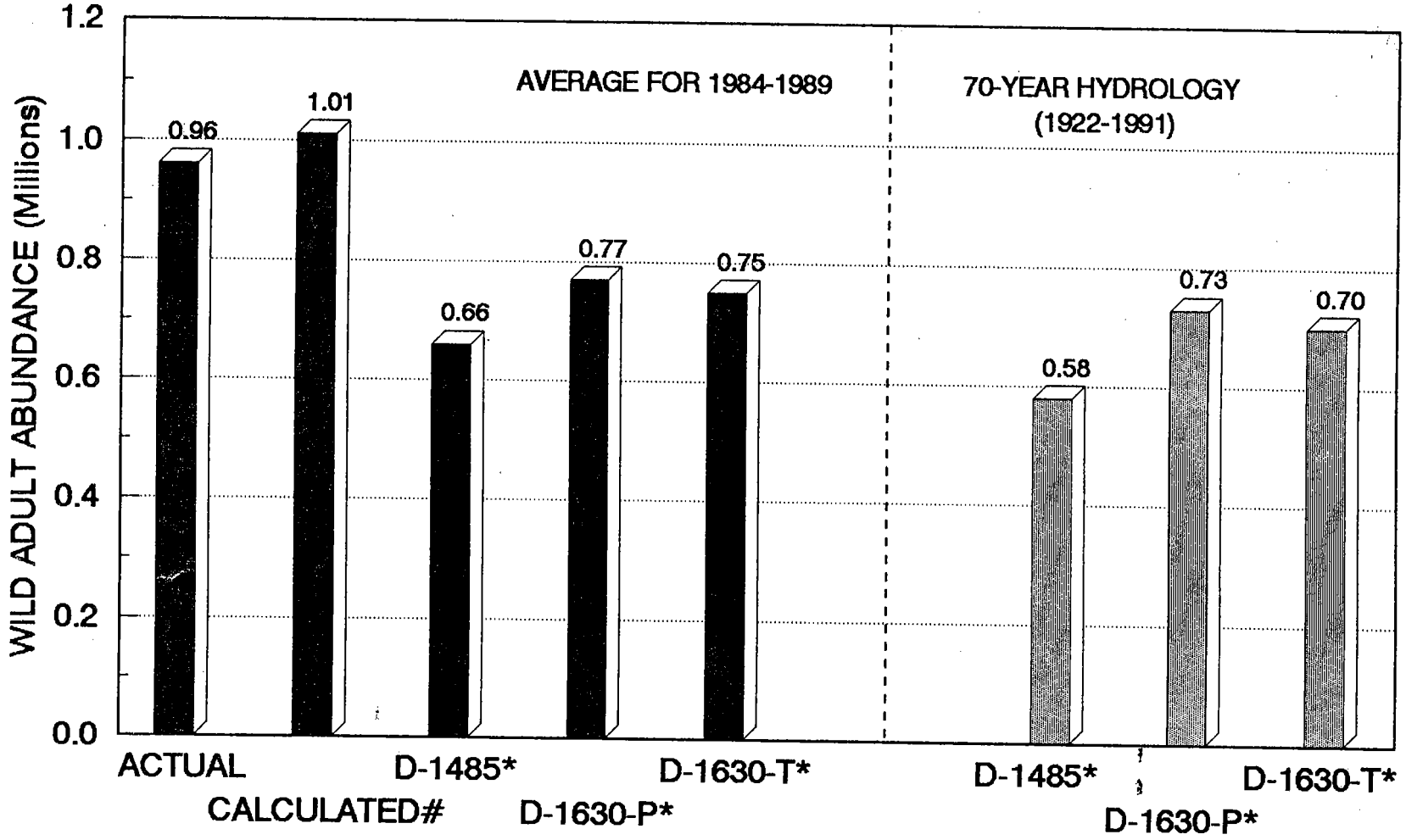
FIGURE C

STRIPED BASS WILD ADULT COMPARISON



= Historical 1984-1989 hydrology applied to DFG striped bass model

* = DFG striped bass model run with 7.1 MAF demand

Finally, the decline of striped bass abundance began to be seen at least two decades ago, when the wild population was three to four times as large as at present, and Delta exports were about one-half as large. There is concern whether the decline can be halted, even with the measures proposed here, when the average annual level of exports are expected to continue at near recent historical levels. However, this decision restricts exports to below recent historical levels during the critical spring spawning period (April through July). In any event, additional measures may be needed. Intensive monitoring and analysis will be required to evaluate the effectiveness of these actions.

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c. Other Estuarine Species

Although there is no identified relationship between abundance and exports or outflow for many estuarine species, DFG has observed statistically significant correlations between abundance and outflow for three species. The abundance of immature Crangon franciscorum, an important forage shrimp, increases as the average March through May outflow increases; the abundance of mature C. franciscorum similarly increases when the same period of the previous spring had increases in outflow. For longfin smelt, another important forage species, DFG found significant increases in abundance when the average February through May outflows increased. Likewise, there were significant increases in starry flounder, a commercial fishery species, when there were increases in Delta outflow during the previous spring period of March through June.

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All three species have declined in recent years, at least in part because of the continuing drought. This decision may help stabilize these populations with the additional flows it provides in the spring. Figure D graphically compares recent populations with predicted populations estimated by application of the regression equations to actual recent conditions, and projected conditions under D-1485 and this decision with a 7.1 MAF demand. The predicted population levels under D-1630-P and D-1630-T conditions are the same because spring outflows are not changed by water transfers in August through October.

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B. CATEGORICAL EXEMPTION FROM CALIFORNIA ENVIRONMENTAL QUALITY ACT

1. Exemption

- This decision is categorically exempt from the requirements of the California Environmental Quality Act (CEQA) under the provisions of Title 14, California Code of Regulations (Cal. Code Regs.), Sections 15321(a), 15307, 15308, and 15301(i).

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- This is an action initiated by the State Water Board to enforce the requirements of Cal. Const. Art. X, Section 2, Water Code Sections 100 and 275, and the common law public trust doctrine with respect to the diversion and use of the waters of the Bay/Delta Estuary. Because this type of action enforces reasonableness and public trust requirements on existing water rights, it is distinct from the type of water right action in which the State Water Board considers approving petitions and applications advanced by water right applicants or holders. In the latter cases, applicants and petitioners seek State

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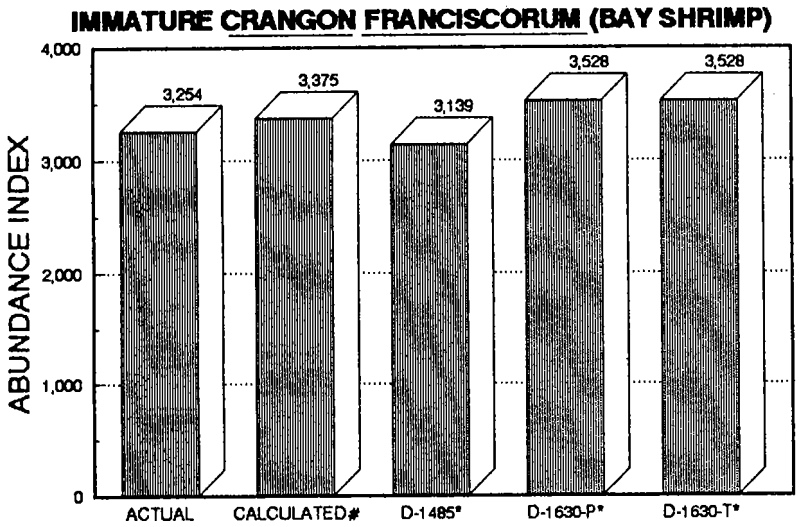
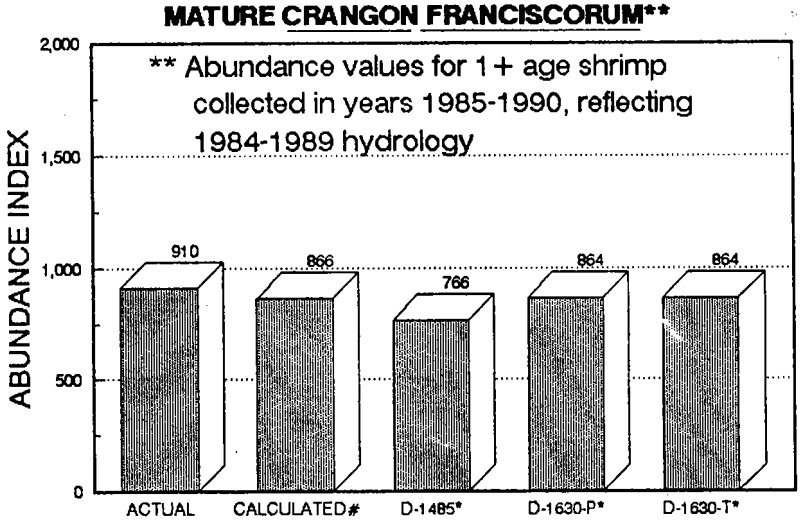
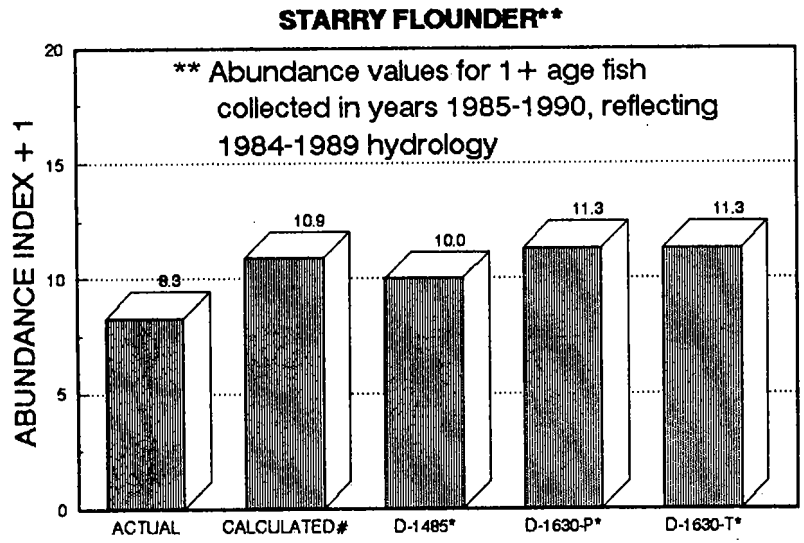
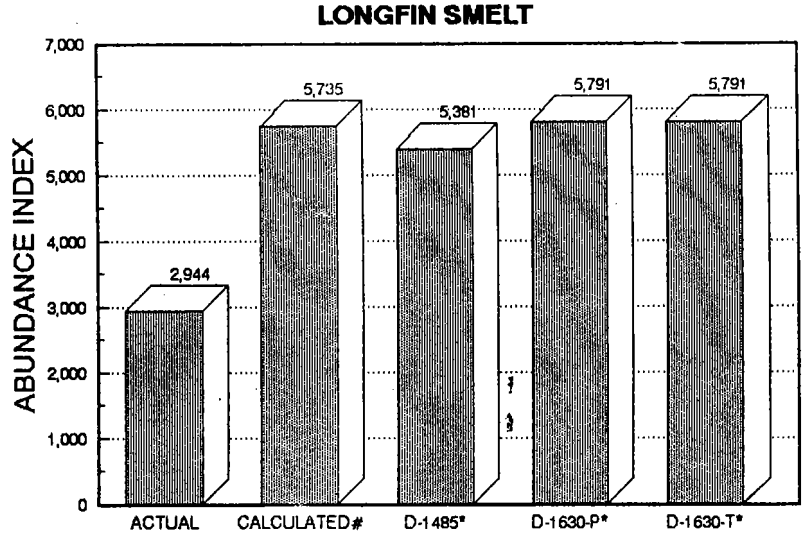
FIGURE D. ESTUARINE SPECIES ABUNDANCE COMPARISONS
Averages for 1984-1989









= Historical 1984-1989 hydrology applied to DFG estuarine species models

* = DFG estuarine species models run with 7.1 MAF demand

Water Board approval for new projects or changes in projects which usually require environmental documentation. The State Water Board has initiated this proceeding as part of the Board's duty of continuing supervision over water rights. Under that duty, the Board has broad substantive authority to reconsider existing water rights and bring them into compliance with the current dictates of the reasonableness doctrine and the public trust doctrine. National Audubon Society v. Superior Court (1983) 189 Cal.Rptr. 346, 362-363, 33 Cal.3d 419; California Trout, Inc. v. State Water Resources Control Board (1989) 255 Cal.Rptr. 184, 207 Cal.App.3d 585; United States v. State Water Resources Control Board (1986) 227 Cal.Rptr. 161, 182 Cal.App.3d 82.

- As explained in Part VI of this decision, what is appropriate under the reasonableness doctrine and under the public trust doctrine is a question of fact and changes with changing facts. The ecological and water diversion situations in the estuary have changed rapidly in the past few years, and the changes have been accelerated by the ongoing drought. Increasing proportions of the water supply have been taken for consumptive uses without incorporating adequate protections for the fisheries. The result has been declining fishery populations and general harm to the ecosystem.

- This decision enforces the public trust doctrine and the reasonableness doctrine in response to current conditions. It will provide reasonable protection for the public trust uses of the water while maximizing the reasonable and beneficial use of the water for all purposes, within the constraints of the current

III. EFFECTS OF THIS DECISION

physical facilities and channel configurations in the Delta.

- Meeting these additional requirements is intended to (1) move young fish through the Delta and into areas away from the influence of pumping faster than currently, (2) avoid substantial entrainment of young fish during the most critical periods, (3) minimize adverse effects to fish in the estuary as a result of reverse flows, and (4) improve salinity conditions in the Delta for the fisheries. These changes may also improve the quality of water for municipal and agricultural users.

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It is urgent that this decision be put in place immediately, to protect the fisheries in the Bay/Delta Estuary until a long-term decision can be formulated. Without this decision, additional species could become endangered or threatened, and protection of these species could cause unreasonable effects on the water supplies for areas south of the Delta. While this decision causes some limits on exports, it is a stopgap measure, and will be replaced before any shortages in water supplies could not be accommodated through conservation, conjunctive use, and reclamation methods. The State Water Board estimates that a long-term decision cannot be put in place for about five years, because it will be necessary to have additional studies and documentation, and plans for permanent facilities that will enable water to be exported from the Delta while protecting the fish and wildlife in the Bay/Delta Estuary.

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For the reasons stated in the following discussion, an EIR may not be legally required for a long-term water

rights decision, and clearly is not required for this interim decision. Nevertheless, the State Water Board has already commenced preparing an EIR for a long-term water right decision for the Bay/Delta Estuary. While preparation of the long-term EIR was temporarily interrupted when the Board commenced the proceeding leading to this interim decision, it will be resumed and will be coordinated with the EIR being prepared by B-DOC.

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- Section 15321(a) of Title 14, Cal. Code Regs., exempts "enforcement of a law, general rule, standard or objective administered or adopted by the regulatory agency". Such enforcement includes but is not limited to "the adoption of an administrative decision or order ... enforcing the general rule, standard, or objective." Because this decision enforces the public trust doctrine and the reasonableness doctrine that are administered by the State Water Board, both of which are general rules, Section 15321(a) exempts this action.

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- Section 15307 exempts:

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> "... actions taken by regulatory agencies as authorized by state law ... to assure the maintenance, restoration, or enhancement of a natural resource where the regulatory process involves procedures for protection of the environment".

- Similarly, Section 15308 exempts:

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> "... actions taken by regulatory agencies as authorized by state law ... to assure the maintenance, restoration, or enhancement of the environment where the regulatory process involves procedures for protection of the environment".

- Because the purpose of this decision is to protect public trust uses, which encompass the environment and the natural resources of the fisheries of the Bay/Delta Estuary, and because this decision requires procedures for protection of the environment, Sections 15307 and 15308 exempt this action.

- Section 15301 exempts:

> "... the operation ... of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that previously existing, including but not limited to:
>
> * * *
>
> "... (i) Maintenance of ... streamflows ... to protect fish and wildlife resources...."

Because under this action existing facilities will be operated at approximately the same level of use as before, to maintain streamflows that will reasonably protect fish and wildlife resources, Section 15301(i) exempts this action. Concurrently under this action, urban and agricultural exports will be maintained at approximately the same average level of use as during the 1984-1989 period.

2. Exception to Exemption

- Under 14 Cal. Code Regs. Section 15300.2(c) a categorical exemption cannot be used for an activity where there is a reasonable possibility that the activity will have a significant adverse effect on the environment due to unusual circumstances. Based on the following discussion, no fair argument can be made

for the reasonable possibility that this decision may have a significant adverse effect on the environment.

- Effects of this decision in three geographic areas must be examined to determine whether environmental effects could occur because of this decision. These areas are the estuary, export areas, and upstream areas. There is no reasonable possibility that this decision will have a significant adverse effect on the environment in any of these areas.

- *Base for Comparison of Effects:* The State Water Board has carefully considered how to estimate the export rate that most closely coincides with the existing levels of beneficial uses supported by Bay/Delta waters. Recommendations include current estimated demand, the most recent export rate, the highest export rate to date, individual export rates for different year types, the maximum export rate under D-1485, and an average of recent export rates. None is a perfect tool for describing existing conditions.

  Current estimated demand does not accurately predict the export rate that represents existing physical conditions, because (1) the estuarine ecosystem has never experienced the hydrological conditions that would exist if the current estimated demand were satisfied; (2) supplies and facilities may not be large enough to meet estimated demands, and (3) estimates are based on the maximum use by each end user. Using the maximum future export rate under D-1485 has essentially the same problems.

  Using the most recent export rate would not represent existing physical conditions because export rates have

been increasing since 1968, export rates vary with differing year types, and current population levels of many biota in the Estuary are the result of export rates that existed two or more years ago.

The highest export rate to date, in 1989, was during the third year of a drought, and reflects the higher water uses which typically exist during a drought if water is available. Early in the drought water deliveries substantially exceeded new supplies, seriously reducing storage levels in SWP and CVP reservoirs upstream of the Delta. No deficiencies in water supply requests were imposed on either the CVP or the SWP customers through 1989. In 1990 through 1992, SWP and CVP exports were reduced below the levels that would have occurred in these drought years if deliveries in the previous low runoff years had not substantially reduced the stored water. Consequently, exports of CVP and SWP water were less than would be expected under this decision. During 1990 through 1992 CVP and SWP exports would have been smaller if they had not been supplemented by water transfers.

If the Board were to use separate export rates to represent existing physical conditions in each of the five different year types, it would disregard the effects of previous years on the estuarine biota and would not adequately account for the effects on export rates of recent statewide population growth because not all year types have occurred recently.

This decision uses a 5.3 MAF export rate to represent existing physical conditions for all beneficial uses of Bay/Delta waters. This is the approximate average annual export rate from 1984 through 1989. These

years include representatives of all year types except above normal and below normal years. The 1984 through 1989 period is the most recent period before the drought seriously reduced exports. The period from 1984-89 includes the largest export to date, in 1989. While the 1989 export of 6.1 MAF (5.9 MAF of the exported water was delivered) may have been high because of drought demands, it also probably reflects the increasing populations in the export areas. Finally, this average export rate is based on a recent enough period to approximate existing physical conditions.

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¤ This decision uses the 1984-89 period as a base for comparison to determine whether there is a reasonable possibility that this decision will have a significant adverse effect on the environment. However, it should be noted that the National Marine Fisheries Service on February 12, 1993 released its biological opinion for the operation of the CVP and the SWP, to protect the threatened Sacramento River winter-run Chinook salmon. It can be argued that the Biological Opinion changed the base for comparison of this decision's effects on the environment because it requires implementation of a reasonable and prudent alternative that is more stringent and more costly to export yields than the similar requirements in this decision. It requires the following operational measures which will decrease export yields: (1) absolute closure of the Delta Cross Channel gates from February 1 through April 30; (2) real-time operation of the Delta Cross Channel gates from October 1 through January 31 to minimize diversion of juvenile winter-run Chinook salmon; (3) on a 14-day average, no reverse flow in the western Delta from February 1 through April 30;

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(4) average flows in the western Delta from November 1 through January 31 no less than -2,000 cfs; (5) minimum carryover storage of 1.9 MAF in Shasta Reservoir in most years; and (6) no provision for relaxation of reverse flow limits during high Delta outflow periods. While the biological opinion may be revised in the future after its effects on restoring the fishery are known, it is designed to remain in place over the long term.

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¤ *Effects in the Estuary:* The State Water Board expects this decision to halt the decline of fishery populations in the estuary, by stopping further degradation of the fishery habitat because of water diversions. While this level of interim protection is less protective than the levels during the late-1960s' to early 1970s' that some of the parties advocated, it nevertheless should maintain the estuarine environment at current levels or better.

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¤ The record does not show by substantial evidence that any of the specific actions taken in this decision, or the decision as a whole, may have a significant adverse effect on the estuarine environment. While some parties argued that any effect on the environment, beneficial or detrimental, would defeat a categorical exemption, the holding they relied upon in Wildlife Alive v. Chickering (1976) 18 Cal.3d 190, 204-205, was reversed by the adoption of Public Resources Code Section 21068, which defines "significant effect" as being an "adverse change".

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¤ This decision does not mandate any construction in the Bay/Delta Estuary. Construction could have adverse environmental effects. To the extent that

construction is contemplated, the agency doing the construction will have to decide after appropriate environmental review whether to construct the various projects that have been recommended for the Bay/Delta Estuary.

- *Effects in Export Areas:* There is no substantial evidence of a reasonable possibility that this decision will have a significant adverse effect on the environment in export areas. Based on the comparisons discussed in Part V.A.1 above, this decision will not significantly reduce exports below recent average annual levels. This decision will allow exports in addition to those that have occurred to date in wetter years. While exports will be less than would be expected in the future under D-1485, the proper base for comparison to determine environmental effects is actual current conditions.

- The record does not contain substantial evidence that this decision will deprive endangered species that now receive reclaimed water, deprive riparian vegetation, or reduce recreational opportunities in reservoirs.

- For there to be an adverse environmental effect, this decision would have to cause a change in the existing physical conditions.

- It is speculative whether the adverse environmental effects alleged by parties in the export areas will occur, and it is highly unlikely that they will occur during the interim period covered by this decision. Whether adverse environmental effects occur will depend upon natural conditions beyond the control of the Board, local water supplies, and the decisions of

water purveyors who must decide how to manage their water supplies in response to this decision and who will determine any effect on these environmental values. Many options are available for maintaining adequate water uses for all purposes with a limited water supply, including conservation, reclamation, development of alternative water sources, conjunctive use of ground water supplies during drier years, and transfers of water supplies between users. Many of these options already are being implemented, and much more can be done to improve water use efficiency.

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- No evidence has been presented that water managers in any export areas would be forced to deprive the environment of needed water if exports remain on the average at current levels for the next five years. Water purveyors have options for avoiding adverse environmental effects. If water purveyors make decisions that have adverse environmental effects including adverse effects on endangered species, they must accept responsibility for their decisions.

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- Under this decision, exports in a year like 1989 would be lower than actually occurred in 1989. However, some other annual exports under this decision would not be as low as they would be under D-1485, because of required changes in reservoir carryover storage. This decision will not significantly change average annual export rates compared to the 1984-1989 actual average export rate, but export rates usually will be less than projected under D-1485 if the projects were operated to satisfy all predicted demands. Considering the natural variability in water supply, the availability of water transfers, conservation requirements, the limited term of this decision, and

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the flexibility available to local decisionmakers in responding to this decision, the State Water Board finds that this decision will have no significant adverse effect on the existing environment supported by exports.[14]

- Furthermore, if the National Marine Fisheries Service Biological Opinion were used as the base for comparison to determine the effects of this decision on the environment in export areas, the effect of this decision on the environment in export areas would be insignificant within the meaning of CEQA.

- *Effects in the Watersheds:* Finally, this decision will not cause any significant environmental effect in the watersheds of the Bay/Delta Estuary. This decision requires upstream water users to share responsibility with the SWP and the CVP for bypassing or releasing some water during fish migrations to provide pulse flows. The spring pulse flows will move outmigrating salmon through the estuary rapidly, minimizing the effects of high temperatures that often exist in the Delta during outmigration periods. A fall pulse flow in the San Joaquin River will attract anadromous fish to their spawning grounds.

- Bypassing or releasing the pulse flows will help mitigate the effects of upstream diversions on anadromous fisheries while requiring a relatively small amount of water from each affected water right holder. As explained in Part V.A.1 above, average

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14 Maintenance of current export levels will in the interim help prevent further adverse environmental effects on the Delta and on upstream areas which have suffered reductions in beneficial uses in recent years while exports have increased.

reservoir storage levels in the Sacramento River watershed will be increased by this decision. The small decrease in New Melones storage and increased inflow to the Delta from the San Joaquin River will benefit the fisheries in the San Joaquin River watershed without a significant adverse effect on the environment.

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C. MITIGATION

- While this decision does not reduce average exports below recent average levels, water demands are increasing and additional water supplies are needed. Water transfers and the water conservation requirements set forth in this decision will help offset any adverse effect of reduced water supplies from Delta inflow waters. With water transfers and conservation requirements, along with existing and planned reclamation and conjunctive use actions by water purveyors, any arguably potential adverse environmental effects of this interim decision on the environment in the export areas will be mitigated during the interim period.

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VI. AUTHORITY TO ACT AND LEGAL OBLIGATIONS OF THE PARTIES

A. AUTHORITY TO ACT

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The State Water Board has several sources of authority for the various parts of this decision.

- Some of the water right permits subject to this decision include reservations of jurisdiction under Water Code Section 1394. Section 1394 authorizes the State Water Board to include a specific reservation of jurisdiction in a permit when issues relating to protection of vested rights, protection of the public interest, and coordination with other projects cannot be resolved when the application is approved. Section 1394 allows a permit

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to be issued before certain issues are resolved and studies completed. By requiring the bypass or release of pulse flows, this decision invokes a reservation of jurisdiction contained in permits issued since the mid-1960s (known as standard permit term 80), to ensure that appropriators divert water only when water is available under their rights.

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This decision also invokes reservations of jurisdiction in the permits held by the DWR and the USBR for the SWP and the CVP. Most of the SWP and CVP permits were issued subject to reservations of jurisdiction to formulate or revise terms and conditions concerning salinity control and fish and wildlife protection in the Delta and to coordinate terms and conditions with those of other permits held by the SWP and the CVP.

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¤ Pursuant to Water Code Section 1258, the State Water Board may subject appropriations to such terms and conditions as it finds are necessary to enforce water quality control plans. Under Section 1258, and in accordance with the State Water Board's authority under the reasonableness doctrine and the public trust doctrine (see below), this decision enforces the water quality objectives in the Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay/Delta Plan) adopted in May 1991.

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¤ The State Water Board has continuing authority under Water Code Sections 100 and 275 to enforce the requirements of Cal. Const. Art. X, Section 2 with respect to all water right holders. Article X, Section 2 directs in pertinent part that:

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> "... the water resources of the State be put to beneficial use to the fullest extent of

> which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water." (Emphasis added.)

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These principles are also set forth in Water Code Section 100. Under Water Code Sections 275 and 1050, the State Water Board has continuing authority to enforce the provisions of Article X, Section 2 and Section 100. See U.S. v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, 227 Cal.Rptr. 161, 187. Accordingly, the State Water Board includes in every permit and license it issues a reservation of continuing authority, the current text of which is set forth at 23 Cal. Code Regs. Section 780(a). Pre-1914 appropriators and riparian water right holders are subject to the reasonableness doctrine by operation of Article X, Section 2, and the State Water Board may make determinations with respect to their rights under Water Code Section 275.

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This decision enforces the prohibitions quoted above against waste, unreasonable use, and unreasonable method of use of water and the requirement that water rights be limited to such water as is reasonably required for the beneficial use. These provisions establish basic rules against which the diversion and use of water must be measured, but whether or not a practice complies with these provisions depends upon the facts taking into

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account all of the circumstances. See People ex rel. State Water Resources Control Board v. Forni (1976) 54 Cal.App.3d 743, 126 Cal.Rptr. 851. A specific determination of what use or method of use or diversion is reasonable may change over time as the circumstances change. Practices which were reasonable when there were fewer demands on the water supply may no longer be reasonable:

> "What constitutes reasonable water use is dependent upon not only the entire circumstances presented but varies as the current situation changes." Environmental Defense Fund v. East Bay Mun. Utility Dist. (1980) 26 Cal.3d 183, 194, 161 Cal.Rptr. 466, 471 (EDF II).

Likewise:

> "What may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time." Tulare Dist. v. Lindsay-Strathmore Dist. (1935) 3 Cal.2d 489, 567, 45 P.2d 972, 1007.

As the Court of Appeal noted in U.S. v. State Water Resources Control Board (1986) 182 Cal.App.3d 82, 227 Cal.Rptr. 161, 187, the State Water Board in D-1485 determined that changed circumstances revealed in new information about the adverse effects of the projects upon the Delta necessitated revised water quality standards. The Court of Appeal concluded that if changed circumstances necessitated new requirements, the State Water Board had authority to modify the permits of the SWP and the CVP.

- The procedures in 23 Cal. Code Regs. Section 855 et seq. and in 23 Cal. Code Regs. Section 4007 et seq. are not a limitation or constraint on the State Water Board's authority to prevent the misuse of water. See 23 Cal.Code Regs. Section 4007. These sections establish procedures for investigations of alleged misuse of water by a specific water user. These sections are inapplicable to this decision. This decision reviews the overall adequacy of conditions under which diversion and use of water is authorized, based on the State Water Board's duty of continuing supervision of water rights. This decision does not address specific water right permit and license violations.

- The State Water Board's regulation at 23 Cal. Code Regs. Section 784 describes the State Water Board's authority to require release of stored water. Subdivision (b) recognizes some constraints on the Board's authority, but provides that these constraints:

> "... shall not apply to the continuing authority of the Board to regulate appropriations of water so as to conform with Section 780 of [23 Cal. Code Regs.]...."

Section 780(a) sets forth the State Water Board's standard permit term reserving continuing authority. This term describes how the State Water Board might exercise its continuing authority under Water Code Sections 100 and 275, under Cal. Const. Art. X, Section 2, and under the common law public trust doctrine. Because this decision is adopted pursuant to the State Water Board's continuing authority, the State Water Board has authority to require in this decision releases of stored water.

- The State Water Board has continuing authority over all water rights under the common law public trust doctrine to protect public trust uses. See National Audubon Society v. Superior Court of Alpine County (1983) 33 Cal.3d 419, 189 Cal.Rptr. 346. The standard permit term for continuing authority at Section 780(a) of Cal. Code Regs., Title 23, is based in part on the public trust doctrine.

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B. LEGAL RESPONSIBILITIES OF PARTIES

- In this decision, the State Water Board is addressing only the rights of specified water right holders with combined rights either to store 100 TAF or more or to directly divert 100 cfs or more. (See Table I.) The affected water rights range from the most senior to very junior. Many parties with senior water rights argued that the State Water Board could not modify their water rights without first cutting off the diversions of junior appropriators. Based on the following discussion, the Board believes that following the order of seniority would not be feasible or reasonable in this case.

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This decision requires operational changes which will not in every year affect the ability to divert the full amount of water within every water right. These changes help to define when and how much water is currently available under the affected water rights by adding conditions to those rights which are best situated to mitigate their effects on the Estuary. This decision does not reallocate existing water rights, but rather identifies and enforces the public trust requirements and implements the existing water quality control plans.

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The flow responsibilities of upstream water rights assigned by this decision are feasible and help mitigate for the effects of these upstream diversions on the public

trust uses including water quality in the estuary. These mitigation measures will not have an unreasonable effect on the diversion and use of water under the affected water rights. The State Water Board will determine in the next few years whether similar requirements on the smaller water rights would provide a significant further benefit for the estuarine public trust uses, or would be too small to provide a benefit. There would be little or no difference in the public trust responsibilities of these water rights if they were required to respond in their order of priority rather than in a group. When natural flows are present, there generally is enough for all water rights to divert at once, but natural flows diminish quickly when precipitation or snowmelt ceases, making natural flow available to only a very few rights. The quantity of water from intervening water rights is small and will not have a significant effect on the availability of water under this decision.

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Further, the State Water Board believes that each water right holder should be responsible for the effects caused by its own diversion. The responsibilities set forth in this order are set proportionally, according to the amount of water needed from each of the several watersheds that contribute to the estuary. These responsibilities belong to the parties whose rights are affected by this decision, and do not represent the full responsibility of all of the water users in the watersheds.

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Cutting off diversions in the order of priority would allow a few water right holders to entirely escape their public trust obligations at the expense of many other diverters. Such a massive cutoff while leaving others to divert public trust water at will would not be in the public interest. Additionally, cutting off diversions in

the order of priority up to a specified seniority level would not ensure that the foregone flows reached the Estuary. Absent bypass obligations, large senior water right holders downstream of a water right holder who was bypassing flows could divert the pulse flows.

The assignment of responsibilities for the effects of water diversion outside the priority system is not unique to this decision. In D-1485 State Water Board assigned the DWR and the USBR joint and several responsibility for meeting the water quality standards in the Delta and Suisun Marsh, notwithstanding the relative seniorities of their various water rights. In Water Right Decision 1594, the State Water Board established different methods for determining water availability for small and large water right holders in the watersheds of the Estuary. In the Coordinated Operations Agreement between the DWR and the USBR, the two parties recognized that it is not practical to allocate the water that enters the Estuary along water right seniority lines, and they instead devised a simpler allocation based on a formula. The Coordinated Operations Agreement has been approved by Congress.

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¤ In addition to requiring limited changes in water diversions and use, this decision requires the affected water right holders to pay a mitigation fee that will fund projects to help protect public trust resources that are affected by water diversions. Measures in addition to the required changes in water diversions and use are needed to adequately mitigate the water diversions' adverse effects on the public trust resources and to ensure that the diversion and use of water is reasonable. Projects such as construction of facilities will help maximize the benefit to be derived from the water that is used to protect public trust resources, but few of the water right

holders affected by this decision could be expected to fund a complete project. Without mitigation projects, it would be necessary to require additional, more costly, changes in water diversions and use to mitigate the water diversions' adverse effects on public trust resources.

The mitigation fee is based on the cost of additional measures to help mitigate the adverse effects of water diversions. The State Water Board's authority to require payment of the mitigation fee is based on its continuing authorities to prevent the unreasonable use of water and to protect the public trust uses of water. By requiring both the use of a mitigation fee and the changes in water diversions and use, this decision provides a physical solution that will ensure that the diversion and use of water during the interim period of this decision will be reasonable. Under Article X, Section 2 of the California Constitution, the right to the use of water does not extend to unreasonable uses, unreasonable methods of use, or unreasonable diversions of water.

¤ Some water right holders who have licenses from the Federal Energy Regulatory Commission (FERC) argued based on California v. Federal Energy Regulatory Commission (1990) 110 S.Ct. 2024 (hereinafter referred to as the Rock Creek case), that the State Water Board is preempted from imposing requirements on them. Two types of water right holders assert this protection from meeting their water right responsibilities: those which divert and use water solely to generate hydropower, and those which divert and use water for multiple purposes including various consumptive uses such as irrigation and municipal uses. In Sayles Hydro Association, cited above, the Court of Appeals decided that the federal preemption recognized in Rock Creek is an "occupation of the field" preemption.

¤ The Rock Creek case and the Sayles Hydro Association case do not insulate multi-purpose projects from state regulation of their consumptive use water rights. These two cases addressed a single purpose power-only project, in which the only water right permit or application was for hydropower. Likewise, its predecessor First Iowa Hydro-Electric Cooperative v. Federal Power Commission (1946) 328 U.S. 152, 66 S.Ct. 906 involved a power-only project. Rock Creek construed Section 27 of the Federal Power Act, which reserves to the states the right to regulate the control, appropriation, use, or distribution of water for irrigation, municipal, or other uses. Rock Creek recognized this reservation to the states.

Any water diversion project which has both significant hydropower and consumptive use components is issued separate water right permits or licenses for hydropower use and consumptive uses. Only the consumptive use water rights of the multipurpose projects are amended by this decision. This decision in no way interferes with the ability or feasibility of the multipurpose projects to generate hydroelectric power in conjunction with their consumptive water rights. Nor does it interfere in any way with the rights of the multipurpose projects to generate power.

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ORDER

IT IS HEREBY ORDERED that:

1. *Water Quality, Flow, and Operational Requirements:* As a joint and several obligation, the United States Bureau of Reclamation (USBR) and the California Department of Water

Resources (DWR), under their water rights listed in Table I, attached, shall maintain, by reduction of diversion at the pumps in the southern Delta, by release of natural flow or water in storage, by operation of the Delta Cross Channel gates, or by other measures or combinations of these and other measures, water quality conditions and flow rates in the channels of the Delta and Suisun Marsh equal to or better than the requirements set forth in the attached Table II entitled "Decision 1630, Water Quality, Flow, and Operational Requirements", except that (1) USBR shall maintain the requirements in Table II in the San Joaquin River at Vernalis and Brandt Bridge and (2) each water right holder responsible for releasing or bypassing pulse flows shall be responsible for its own share of the pulse flow. Additionally, DWR and USBR are responsible for the dissolved oxygen requirement in the San Joaquin River only to the extent that they have reasonable control over this parameter.

2. *San Joaquin River Watershed Pulse Flow Responsibilities and 5-Day Bypasses:* The diversion and use of water from the watershed of the San Joaquin River by each of the water right holders listed in Table V is subject to the existence in the San Joaquin River at Vernalis of the spring and fall pulse flows specified in Table II.

   a. Storage releases and bypasses of inflow made solely to meet pulse flows at Vernalis shall not exceed 150 TAF per year.

   b. Two weeks before a pulse flow release, the USBR shall provide to the Executive Director both an estimate of the rate of flow that should be released or bypassed from each tributary and calculation methods. The Executive Director shall tell the operators of New Melones, Lake McClure, and New Don Pedro reservoirs how much water to

release or bypass from the Stanislaus, Merced, and Tuolumne Rivers, respectively. The Executive Director may require staggered timing of releases or bypasses. Relative responsibilities among these three tributaries of the San Joaquin River shall be based on the unimpaired flow percentages in Table V. At the request of the Executive Director, water right holders listed in Table I shall provide any information needed to calculate the relative pulse flow responsibilities. D

c. The pulse flows from each reservoir shall be the individual responsibility of each of the water right holders on each tributary. Within 60 days after a pulse flow release, the downstream reservoir operators bypassing or releasing the pulse flow shall calculate the amount of water to be repaid by each upstream reservoir listed in Table V, and shall request repayment of the water. Upstream reservoir operators shall provide the releases at the times and rates of flow agreeable to the downstream reservoir operators during, or within 180 days after, the pulse flow release. R A

d. The responsibility of each water right holder on Table V with a reservoir on a particular tributary to meet pulse flow requirements shall be based on the percentage of tributary flows diverted to storage and diverted from unstored flows out of the tributary watershed by the water right holder during the water year. Credit against a water right holder's pulse flow responsibility shall be provided for releases for public trust uses during the pulse flow periods. Storage estimates shall be based on the differences between October 1 storage levels and the maximum storage levels (discounting for encroachment into required flood control space) attained during the water year. By April 1 of each year each reservoir operator on F T

Table V shall make a projection of annual diversions to storage and out of the watershed for the water year (based on most probable forecasts) and provide it to the other reservoir operators on that tributary. Each reservoir operator shall report actual diversions no later than October 15. Initial responsibility for pulse flows shall be based on the April 1 forecast and shall be refined based on the final report. Any difference between the actual amount of pulse flow released and the final responsibility shall be made up during the next year. D

The reservoir operators on a tributary shall share information needed to calculate pulse flow responsibilities, such as refill agreements, projected diversions, and operational histories, with other reservoir operators upon request of the operators. Reservoir operators shall provide this information to the Executive Director upon request. Authority is delegated to the Executive Director to estimate pulse flow responsibilities if the parties do not agree on these responsibilities. R A

e. During the spring pulse flow at Vernalis, each water right holder with direct diversion rights listed in Table I in the San Joaquin Basin except the DWR and the USBR at their diversion points in the southern Delta, shall cease each direct diversion downstream of migration barriers specified in Table V for a five-day period during the middle of the pulse flow. This requirement will be effective commencing in 1994. The Executive Director or his designee will notify the appropriate water right holders when to cease direct diversions and may stagger cessation of direct diversions. Water right holders may petition the State Water Board to pay a fee F T

in lieu of the 5-day bypass as set forth in paragraph 10(f). The Executive Director is delegated authority to act upon these requests.

f. The requirements in this condition to bypass direct diversions during pulse flows and to repay water to downstream reservoir operators after pulse flows shall not apply to hydropower water right holders with insignificant consumptive water uses.

3. *Mokelumne and Calaveras Rivers Pulse Flow Responsibilities and 5-Day Bypass:* Water right holders listed in Table I with storage reservoirs greater than 100 TAF on the Mokelumne and Calaveras Rivers and their tributaries, excluding hydropower projects with only incidental consumptive uses, shall release or bypass water at or near the time of the San Joaquin River pulse flows. The quantity of water for the pulse flows from each of these watersheds shall be based on the average percentage of annual unimpaired flow that will be released or bypassed from the Stanislaus, Tuolumne and Merced watersheds to meet pulse flow requirements on the San Joaquin River. The Executive Director or his designee will provide annual notification to the affected water right holders of the time releases or bypasses must occur and the percentage of unimpaired flow to be released or bypassed. The Executive Director may require staggered timing of releases or bypasses.

During the pulse flows on the Calaveras and Mokelumne Rivers, each water right holder with direct diversion rights listed in Table I below New Hogan Reservoir and Camanche Reservoir shall cease each direct diversion for a 5-day period during the middle of each pulse flow. This requirement will be effective commencing in 1994. The Executive Director or his designee will notify the appropriate water right holders when

to cease direct diversions, and may stagger cessation of direct diversion. Water right holders may petition the State Water Board to pay a fee in lieu of the 5-day bypass as set forth in paragraph 10(f) of this order. The Executive Director is delegated authority to act upon these requests.

4. *Sacramento River Watershed Pulse Flow Responsibility and 5-Day Bypass:* The diversion and use of water from the watershed of the Sacramento River by each of the water right holders listed in Table IV is subject to the existence in the Sacramento River at Freeport of the pulse flows specified in Table II.

   a. Two weeks before the pulse flows commence the USBR and the DWR shall provide to the Executive Director both an estimate of the rate of flow that should be released or bypassed from each tributary and calculation methods. The Executive Director shall tell the operators of Lake Oroville, Lake Shasta, Folsom Lake, Camp Far West Reservoir, and New Bullards Bar Reservoir how much water to release or bypass from their respective tributaries. The Executive Director may require staggered timing of releases or bypasses. Relative responsibilities among the tributaries shall be based on the unimpaired flow percentages specified in Table IV. At the request of the Executive Director, water right holders listed in Table I shall provide any information needed to calculate the relative pulse flow responsibilities.

   b. The pulse flows from each reservoir shall be the individual responsibility of each of the water right holders on each tributary. Within 60 days after a pulse flow release, the downstream reservoir operators bypassing or releasing the pulse flows shall calculate the amount of water to be repaid by each upstream

reservoir listed in Table IV, and shall request repayment of the water. Upstream reservoir operators shall provide the releases at the times and rates of flow agreeable to the downstream reservoir operators during, or within 180 days after, the pulse flow release.

c. The responsibility of each water right holder on Table IV with a reservoir on a particular tributary to meet pulse flow requirements shall be based on the percentage of tributary flows diverted to storage and diverted from unstored flows out of the tributary watershed by the water right holder during the water year. Credit against a water right holder's pulse flow responsibility shall be provided for releases for public trust uses during the pulse flow periods. Storage estimates shall be based on the difference between October 1 storage levels and the maximum storage level (discounting for encroachment into required flood control space) attained during the water year. By April 1 of each year each reservoir operator on Table IV shall make a projection of annual diversions to storage and out of the watershed for the water year (based on most probable forecasts) and provide it to the other reservoir operators on that tributary. Each reservoir operator shall report actual diversions no later than October 15. Initial responsibility for pulse flows shall be based on the April 1 forecast and shall be refined based on the final report. Any difference between the actual amount of pulse flow released and the final responsibility shall be made up during the next year.

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The reservoir operators on a tributary shall share information needed to calculate pulse flow responsibilities, such as refill agreements, projected diversions, and operational histories, with other

reservoir operators upon request of the operators. Reservoir operators shall provide this information to the Executive Director upon request. Authority is delegated to the Executive Director to estimate pulse flow responsibilities if the parties do not agree on these responsibilties.

d. During the two-week pulse flow at Freeport, each water right holder listed in Table I with direct diversion rights in the Sacramento River watershed, except the CVP and SWP at their diversion points in the Delta, shall cease each direct diversion downstream of migration barriers specified in Table IV for a five-day period during the middle of the pulse flow. This requirement will be effective commencing in 1994. The Executive Director or his designee will notify the appropriate water right holders when to cease direct diversions, and may stagger cessation of direct diversion. Water right holders may petition the State Water Board to pay a fee in lieu of the 5-day bypass as set forth in paragraph 10(f). The Executive Director is delegated authority to act upon these requests.

e. The requirements in this condition to bypass direct diversions during pulse flows and to repay water to downstream reservoir operators after pulse flows shall not apply to hydropower water right holders with insignificant consumptive water uses.

5. *Pulse Flow Repayment, Reporting, and Compliance:*

a. Pulse flow obligations on the Sacramento and San Joaquin Rivers shall be met in the form of water. The State Water Resources Control Board (State Water Board) retains continuing authority to resolve disputes over release of the flows. Continuing authority is reserved to require

an alternative method of ensuring that pulse flows are released, and to approve requests to provide pulse flows (1) by water right holders in Table V from other tributaries within the San Joaquin River watershed or (2) by water right holders in Table IV from other tributaries within the Sacramento River watershed to meet pulse flow responsibilities. Requests to provide water from tributaries other than those in which the affected water right is located shall be supported by substantial evidence demonstrating that the water right holder cannot reasonably supply water from its own tributary for the pulse flow. Authority is delegated to the Executive Director of the State Water Board to exercise these continuing authorities.

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b. Operators of reservoirs listed in Tables IV and V shall report to the Chief of the Division of Water Rights by December 31 of each year the quantities and dates of pulse flow releases during that calendar year. Diverters who are required by this order to cease diverting for five-day periods during pulse flows shall report to the Chief of the Division of Water Rights by December 31 each year the dates when they ceased and recommenced diversions. Each report shall be signed under penalty of perjury by the water right holder or the district manager. The Chief of the Division of Water Rights will determine the form of the reports.

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c. If a downstream reservoir operator fails to release the pulse flow specified by the Executive Director, DWR or USBR shall provide the flow not released by the downstream reservoir operator. If the DWR or USBR releases water in addition to their tributaries' shares during pulse flow periods to ensure that the pulse flow releases are made, the State Water Board will seek prompt

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repayment from the downstream reservoir operators. The Executive Director is authorized to approve any reasonable variance from the requirements of this decision to ensure that the DWR or USBR can beneficially use repayment water in a timely fashion.

d. Individual parties listed in Tables IV and V shall be deemed to have complied with pulse flow requirements at Freeport and Vernalis if they release or bypass the flows at the times and in the amounts specified by the Executive Director.

6. *Transfers:* DWR and USBR shall reserve the last 500 cfs of QWEST capacity from August through January (-2500 to -3000 cfs) for water transfers from the Sacramento Basin. The CVP and SWP may use any of this capacity that is not used by water transfers. For purposes of this requirement, water transfers do not include (1) water appropriated under permits or licenses held by the DWR or the USBR, or (2) water that would not have been consumptively used or stored by the water right holder in the absence of the transfer.[15]

7. *Municipal and Industrial Water Use:*

a. The diversion and use of water for urban uses by each of the water right holders listed in Table I who deliver water for urban uses or who deliver water to any entity which delivers water for urban uses is subject to the water right holders implementing or requiring the implementation of the provisions of the Memorandum of

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15 For purposes of this requirement, "consumptively used" means the amount of water which has been consumed through use by evaportranspiration, has percolated underground, or has been otherwise removed from use in the downstream water supply as a result of direct diversion.

Understanding Regarding Urban Water Conservation in California dated September 1991 (MOU) (Attachment A).

b. The Best Management Practices (BMP) set forth in attachment A of the MOU shall be implemented as specified in the MOU and shall not be subject to exemption under the procedures in Section 4.5 of the MOU, except that a water right holder or an entity which buys water appropriated by the water right holder may apply to the Executive Director of the State Water Board or his delegate for an exemption from specific BMPs. Any application for exemption from BMPs, with the substantiation for the exemption, shall be submitted to the CUWCC for its recommendation and to the Executive Director of the State Water Board. Applications to continue existing exemptions shall be filed two years after the last annual substantiation of the exemption. The Executive Director is delegated authority to approve or disapprove any exemption from BMPs within 90 days after receiving the application and substantiation, and shall consider any recommendation of the CUWCC.

c. During the State Water Board's workshops each November, the CUWCC may request the State Water Board to consider amending this decision in accordance with recent changes in the MOU. The Executive Director is authorized to approve uncontested variances from this decision to accommodate changes in the MOU.

d. The DWR in its capacity as the state agency responsible for water supply planning shall monitor the progress of the water right holders listed in Table I in implementing this condition. DWR shall report annually on July 1 of each year commencing in 1994 to the State Water Board documenting this progress. The water right holders in

Table I shall provide DWR the information necessary to implement this requirement, using the format DWR specifies. If DWR concurs with annual reports prepared by CUWCC, DWR may submit the CUWCC reports to the State Water Board to satisfy this requirement.

8. *Agricultural Water Use:* Water right holders listed in Table I who deliver water for agricultural uses or deliver water to any entity which delivers water for agricultural uses within the areas delineated on Figures 1-4 shall ensure that deep percolation of applied irrigation water requiring management, as defined in the San Joaquin Valley Drainage Program Report, does not exceed an average of 0.4 acre-feet per acre of irrigated land each year after March 1, 1998. Affected water right holders listed in Table I shall submit a report to the State Water Board by September 1, 1993 specifying how this condition will be implemented. Each affected water right holder shall submit a report to the State Water Board documenting compliance with this requirement by March 1998. Interim progress reports shall be provided at the request of the Executive Director. Water right holders listed on Table I may document compliance with this requirement using a mass balance analysis, regionwide implementation of adequate BMPs, or such other methods as the State Water Board deems acceptable.

9. *Water Supply Forecasts:*

   a. DWR and USBR shall use a 90 percent probability of exceedance forecast in setting their initial water delivery allocations. Subsequent updates of water delivery allocations shall be based on a 99 percent probability of exceedance forecast. This requirement does not apply to the Friant unit of the CVP. For purposes of meeting this requirement, DWR and USBR can

use the same probabilities of exceedance required in this condition to determine the water year classification.

b. DWR and USBR shall hold an annual workshop between February 1 and February 15 to describe their projected operations during the next year.

10. *Mitigation Fund:*

a. The Bay/Delta Estuary Water Project Mitigation Fund is established for the purpose of improving fish and wildlife conditions in the Bay/Delta Estuary and in its watershed.

b. All water right holders listed in Table I shall pay a mitigation fee for their water diversions, except for the USBR and its customers who pay into the CVP mitigation fund created by P.L. 102-575 of 1992 for all of their water use. Provided, however, that water stored for hydropower, with only incidental consumptive uses being served, shall not be subject to a mitigation fee. CVP customers listed in Table I shall pay a mitigation fee for water they obtain under their own rights and for CVP water that they obtain in lieu of water under their own rights if they are not required to pay into the CVP mitigation fund for the water received from the CVP. The mitigation fee for water they receive in lieu of water diverted under their own rights shall be no more than $10 per acre-foot for municipal and industrial uses and $2 per acre-foot for agricultural uses.

c. Water right holders listed in Table I, with the exception of hydropower projects with only incidental consumptive uses of water, shall report the volume of their exports from the watershed and direct diversions and rediversions from the previous water year to the State Water Board by

November 1 of each year. This requirement will begin on November 1, 1993. Reports shall be filed on forms supplied by the Executive Director.

d. Except as specified in b. above, the mitigation fee for exported surface water shall be no more than $15 per acre-foot for municipal and industrial use, and shall be no more than $3 per acre-foot for agricultural use. The mitigation fee for direct diversion or rediversion of surface water within the surface watershed of origin shall be no more than $10 per acre-foot for municipal and industrial use, and shall be no more than $2 per acre-foot for agricultural use. Actual fees shall be determined annually, and shall continue until $300 million has accrued to the mitigation fund. Water diverted primarily for enhancement of the environment shall not be subject to a mitigation fee.

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e. Bills for mitigation fees shall be sent to the water right holders by January 1 of each year, and payments shall be due by March 1 of each year, commencing March 1, 1995. Mitigation fees shall accrue on a water year basis, commencing on October 1, 1993. The State Water Board will consider requests for hardship exemptions and other changes in this requirement at a hearing in July 1993. This requirement shall remain in effect until $300 million has accrued to the mitigation fund.

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f. If the State Water Board approves a request, a water right holder who is required to bypass direct diversions during pulse flows may instead pay a fee to divert water during the five-day bypass period. The fee shall be calculated by multiplying the number of acre-feet diverted directly times the last price for water from the

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DWR Water Bank but in no case less than $72 per acre-foot.

g. Monies in the Bay/Delta Estuary Water Project Mitigation Fund shall be used for loans and grants to pay for activities and projects that will help mitigate the effects of water diversion and storage projects on survival of fisheries that live in or pass through the Bay/Delta Estuary. Monies in this fund also shall be used to pay for the costs of administering this fund.

11. *Monitoring and Monitoring Fund:*

a. The DWR and the USBR shall conduct all monitoring in the Bay/Delta Estuary required by this decision.

b. All water right holders listed in Table I shall pay a fee equal to their share of the cost of conducting the Delta monitoring program.

c. On October 15 of each year commencing in 1993, DWR and USBR shall submit to the State Water Board and to the other water right holders listed in Table I, annual reports of their projected monitoring costs in the current state fiscal year and their actual monitoring costs in the previous state fiscal year. The State Water Board will review these reports for approval at its annual November workshop. Each water right holder shall pay its proportionate share of monitoring costs based on the amount of water projected to be exported, diverted or stored in the current state fiscal year. Exporters of Bay/Delta watershed water shall be responsible for 75 percent of the monitoring fund; in-basin users shall be responsible for 25 percent. The State Water Board will mail bills to the water right holders listed in Table I by January 1 of each year. The bills will be

adjusted annually based on estimated costs to be incurred by DWR and USBR and any carryover or deficit in the fund. Payments shall be made directly to DWR which will reimburse USBR for its share of monitoring costs. DWR shall report to the State Water Board on the financial status of the monitoring fund and the repayment record of the water right holders by November 1 of each year. The State Water Board's costs of overseeing the monitoring fund will be paid from the mitigation fund. D

d. The DWR and the USBR shall conduct such monitoring and reporting as shall be required by the Chief of the Division of Water Rights to ensure compliance with this decision. DWR and USBR shall continue to conduct monitoring pursuant to the provisions in paragraph 16.b. of this order until the Chief of the Division of Water Rights approves new monitoring and reporting requirements. R A

e. The DWR and the USBR in close consultation with the Interagency Ecological Study Program shall evaluate the monitoring program required by paragraph 16.b. of this order and shall propose at a State Water Board workshop to be held in November 1993 a revised monitoring program which shall include the following elements: F

(1) A baseline monitoring program with new locations and updated equipment for measuring salinity, temperature and chemical constituents. The revised monitoring program shall be sufficient to establish whether there is compliance with this decision. T

(2) Biological surveys to be used in monitoring the presence of outmigrating salmon smolts, striped bass eggs and young, and other young fish of concern.

(3) A real-time monitoring program that will provide sufficient information to manage the Bay/Delta Estuary on a real-time basis, including descriptions of locations, equipment, and required coordination between agencies.

(4) A data management program that allows ready access to physical, chemical and biological monitoring data through electronic media by the participants in the IESP, other agencies and the public. D

f. DWR and the USBR shall develop and implement a program to make real-time estimates of Delta consumptive use, Delta diversions, Delta precipitation and all significant Delta inflows. These estimates shall be used in calculating QWEST and the Delta Outflow Index to comply with this order. The program shall be developed under the auspices of the Interagency Ecological Study Program. The methodology for the calculations and the schedule of implementation shall be submitted to the Chief of the Division of Water Rights by October 15, 1993. R A

12. *General Reporting Requirements:* The Executive Director will determine if additional information is required from water right holders listed in Table I to implement the requirements in this order. The water right holders shall provide the additional information upon the request of the Executive Director. F

13. *Modification of Fishery Requirements:* The DWR, the USBR, the California Department of Fish and Game (DFG), the United States Fish and Wildlife Service (USFWS), or National Marine Fisheries Service (NMFS) may request the Executive Director or his designee to vary the fishery requirements in this T

decision or to authorize either the DWR or the USBR to use the other's point of diversion and rediversion in the southern Delta. The Executive Director or his designee may grant either type of variance after making a finding that the variance will have no significant adverse effect on the environment. The advice of the DFG, USFWS, and NMFS shall be considered in determining whether the variance will have no significant adverse effect on the environment. Any request for a variance shall be submitted to the Executive Director or his designee, and shall include a statement of the reasons for the variance and any environmental information necessary to demonstrate that the variance will have no adverse effect on the environment. Any agency requesting a variance shall immediately give notice to all parties who request notice. The Executive Director shall approve, disapprove, or approve subject to terms and conditions, the request for a variance. Any variance shall remain in effect for a period not to exceed one year.

D R A

14. *Delta Cross Channel Operation:* Between February 1 and June 30, the DWR and the USBR shall ensure that continuous real-time monitoring is conducted to detect the presence of salmon smolts and striped bass eggs and larvae in the Sacramento River upstream of the Delta Cross Channel gates. Such monitoring shall be accomplished either through contract with DFG or in consultation with DFG. The daily results of the monitoring shall be reported weekly to the Executive Director or his designee unless smolts, eggs, or larvae are detected, and then shall be reported daily. The USBR shall be allowed to open or shall close the Delta Cross Channel gates during this period at the direction of the Executive Director or his designee. Authority is delegated to the Executive Director or his designee to authorize the USBR to open the Delta Cross Channel gates when the monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are not present and are not

F T

suspected to be present, and to close the Delta Cross Channel gates when the monitoring indicates that significant numbers of salmon smolts or striped bass eggs and larvae are present or suspected to be present. The Executive Director or his designee, with advice from state and federal fisheries agencies, shall establish specific monitoring, density, or other criteria to assist in deciding when to close and open the gates. D

15. *Operation of Fish Protective Facilities:* DWR and USBR shall operate their fish protective facilities at their Banks and Tracy pumping plants, respectively, as closely as reasonably possible to the operating criteria in Table II and shall comply with the mandatory monitoring requirements. By November 1, 1993, DWR and USBR, in consultation with DFG and USFWS, shall provide an evaluation of the current facilities, monitoring requirements, and operating criteria, and shall recommend to the State Water Board modifications to these criteria. R A

16. *Continuing Authority and Reserved Jurisdiction:* Pursuant to California Water Code Sections 100 and 275 and the common law public trust doctrine, the State Water Board retains continuing authority over all of the water rights listed in Table I relative to flows to be maintained in the Bay/Delta Estuary for the protection of fish and wildlife, salinity control in the Bay/Delta Estuary, water conservation, and coordination of the diversion and use of water. No action will be taken pursuant to this paragraph unless the State Water Board determines, after notice to affected parties and opportunity for hearing, that such action is consistent with California Constitution Article X, Section 2; is consistent with the public interest; and is necessary to preserve or restore the uses protected by the public trust. F T

The State Water Board also continues the reservations of jurisdiction in the permits issued pursuant to Applications 5625, 5626, 5627, 5628, 5629, 5630, 9363, 9364, 9365, 9366, 9367, 9368, 13370, 13371, 13372, 14443, 14444, 14445A, 14662, 15374, 15375, 15376, 15764, 16767, 16768, 17374, 17512, 17514A, 18721, 18723, 21542, 21636, 21637, and 22316 to formulate terms and conditions relative to flows to be maintained in the Bay/Delta Estuary for the protection of fish and wildlife, salinity control in the Bay/Delta Estuary, and coordination of terms and conditions of these permits with other permits issued to the DWR and the USBR.

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17. *Carryover and Update of D-1485 Conditions:* Conditions 1, 2, 5, 6, 7, and 8 of Water Rights Decision 1485 are rescinded. Conditions 3, 4, 9, 10, and 11 of Water Rights Decision 1485 are amended to read as follows and adopted as conditions of this decision.

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a. *D-1485 Condition 3.* To the extent that this decision or other fishery requirements constrain CVP or SWP exports, USBR and DWR shall be allowed through coordinated operations to make up such deficiencies within the 12 months immediately following the deficiency by direct diversion or by rediversion of releases of stored water through each other's facilities.

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b. *D-1485 Condition 4.* To ensure compliance with existing water quality standards, to identify meaningful changes in any significant water quality parameters potentially related to operations of the CVP and the SWP and to reveal trends in ecological changes potentially related to project operations, permittees shall independently or in cooperation with other agencies or individuals:

T

(1) Operate and maintain continuous electrical conductivity recorders at the stations indicated in the attached Table III entitled "Decision 1630 - Monitoring Stations" and shown on the attached Plate I entitled "Decision 1630 Monitoring Stations" to report mean daily water quality conditions representative of each location. D

(2) Conduct the discrete sampling program shown in Table III and on Plate I. The sampling frequency may vary as appropriate. When the monthly Delta outflow index is projected to average greater than 10,000 cfs, the program operators may reduce the sampling frequency of base parameters not specified in Table II to once each month. When the outflow is below 10,000 cfs the sampling frequency of base parameters shall be increased to at least twice a month if necessary to achieve the monitoring goals. R A

(3) Conduct water quality profiles in the main navigation channels between Carquinez Strait on the west and Stockton and Rio Vista on the east, using a boat-mounted continuous recorder for the following parameters: water temperature, electrical conductivity, pH, dissolved oxygen, turbidity, and in vivo chlorophyll. F

(4) Establish continuous recorders at representative stations in the Delta and Suisun Bay to collect information on air and water temperature, wind velocity and direction, pH, dissolved oxygen, turbidity, and, where feasible, in vivo chlorophyll. These data shall be evaluated and correlated with conditions as they exist in the adjacent main channels. T

(5) Conduct ongoing and future monitoring surveys as recommended by California Department of Fish and Game and concurred in by the State Water Board concerning food chain relationships and fisheries impacts as they are affected by CVP and SWP operations in the Delta and Suisun Marsh.

D

(6) Permittees shall make available to the State Water Board and other interested agencies upon request results of the above monitoring as soon as practicable following the month during which the monitoring was accomplished. A report summarizing the previous calendar year's findings and future study plans shall be submitted to the State Water Board by April 1 of each year. Detailed reports containing the previous year's monitoring results shall be submitted by October 1 of each year.

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c. *D-1485 Condition 9.* DWR and USBR shall report to the State Water Board annually by January 15 both on the methods to be used in determining Delta channel flows, Delta outflow and QWEST, and on future studies to improve such methods. DWR and USBR shall also report annually on methods for making more precise projections of salinity and particulate distribution in the Delta under varying inflow, outflow and export conditions.

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d. *D-1485 Condition 10.* To develop a better understanding of the hydrodynamics, water quality, productivity and significant ecological interactions of the Delta and Suisun Marsh so that more accurate predictions of environmental impacts related to operations of the CVP and SWP can be made, permittees shall, independently or in cooperation with other agencies or individuals:

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(1) Conduct special studies to meet specific needs and to take advantage of particular circumstances where the data obtained are of significant value. Such studies include, but are not limited to, fish population and zooplankton measurements, waterfowl food plant production measurements, intensive phytoplankton studies, tissue analysis of selected biota, photosynthesis rates, sediment profile and composition, and water velocity. D

(2) Develop and improve water quality and biological predictive tools with emphasis on improving the understanding of flow/salinity/phytoplankton relationships in the western Delta, and improve hydraulic characteristics in existing models to represent more closely true channel characteristics, for the following areas of the estuary: R

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(a) Western Delta and Suisun Bay area, including Suisun Marsh.

(b) San Francisco Bay to Golden Gate Bridge.

(c) Interior Delta. F

(3) Participate in research studies to determine:

(a) Outflow needs in San Francisco Bay, including ecological benefits of unrelated outflows and salinity gradients established by them. T

(b) The need for flows for long-term protection of striped bass and other aquatic organisms in the Delta.

e. *D-1485 Condition 11.* Conditions relating to salinity control and protection of fish and wildlife in the Delta in Decisions D 1275, D 1291 and 1379 are rescinded.

18. *Interpretation of This Decision:*

a. Water right holders listed in Table I whose combined water rights are permanently reduced under an amendment to their water rights, to an amount less than 100 cfs by direct diversion and less than 100,000 acre-feet of storage, will be removed from Table I unless and until this decision is amended to include water right holders who have rights to divert and use water in quantities at or above the amended direct diversion or storage rights.

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b. If, as a result of judicial or administrative proceedings any water right holder listed in Table I is relieved of the obligation to provide fees or pulse flows in accordance with this order, the fees or pulse flows not provided by such party shall be provided by dividing the amount of fees or pulse flows among the remaining water right holders on Table I.

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c. Nothing in this order authorizes any water right holder in Table I to violate existing or future requirements imposed under either the federal Endangered Species Act (16 U.S.C.A. Sections 1531 to 1544) or the California Endangered Species Act (Fish and Game Code Sections 2050 to 2098).

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d. If as a result of judicial proceedings any term or condition in this order is stayed, enjoined, or remanded to the State Water Board for further proceedings, all other terms and conditions in this order shall remain in full force and effect until the State Water Board

replaces this order in whole or in part with a future order.

19. *Review of Delegated Decisions:* Action will be taken to make a discretionary change in the requirements of this order only after notice to interested parties and opportunity for hearing. Discretionary changes in the requirements of this order that are delegated to the Executive Director or the Chief of the Division of Water Rights in paragraphs 2.d., 2.e., 3, 4.c., 4.d., 5.a., 5.c., 7.b., 7.c., 11.d., and 13, shall be subject to review by the State Water Board upon the request of any interested party. Any decision delegated in these paragraphs shall remain in effect no longer than 30 days after a request for review, unless the State Water Board affirms it. Notice and an opportunity for hearing shall not be required before administrative decisions such as operation of the Delta Cross Channel gates, calculation of pulse flow releases and bypasses from downstream reservoirs on a tributary, annual notifications, and reporting requirements.

D R A F T

CERTIFICATION

The undersigned, Administrative Assistant to the State Board, does hereby certify that the foregoing is a full, true, and correct copy of a decision duly and regularly adopted at a meeting of the State Water Resources Control Board held on

AYE:

NO:

ABSENT:

ABSTAIN:

Maureen Marché
Administrative Assistant
to the Board

TABLE I: MAJOR WATER RIGHT HOLDERS IN BAY-DELTA WATERSHED

Water Right Holder	*Statement[1]/Application[2] Numbers*
Anderson-Cottonwood Irrigation District	S012206 A12-916
Banta-Carbona Irrigation District	S000495 A001933 A005248
Byron-Bethany Irrigation District	S-BBID1 (letter of correspondence claiming water rights)
Calaveras County Water District	S004695 A011792A A011792B A012910 A012911 A013091 A013092 A013093 A013093A A018728 A019148 A019149
California Department of Water Resources	A005629 A005630 A014443 A014444 A014445A A016950 A016951 A016952 A017512 A017514A A018844 A020117 A021443
Central California Irrigation District	S000477
Chowchilla Water District	A011047 A013175
City of Sacramento	A001743 A012140 A012321 A012622 A016060
Columbia Canal Company	S001073
Conaway Conservancy Group	A001199 A001588 A012073 A026695
East Bay Municipal Utility District	A004228 A004768 A005128 A013156 A015201 A025056
East Contra Costa Irrigation District	S000404
Feather Water District	A014803
Firebaugh Canal Company	S001098
Gallo Glass Company	S007710 S007711 S007712 S007713
Georgetown Divide Public Utility District	A005644A A012421 A016212 A016688
Glenn-Colusa Irrigation District	S007367 S007368 A000018 A001554 A001624 A012125
Hallwood Irrigation Company	A009899
Hetch Hetchy Water & Power (City and County of San Francisco)	S002635 S002636 S002637 S002638
Jackson Valley Irrigation District	A005648B A012342A A017605
Joint Water Districts Board	S000480
Horace G. Kelsey	S001496 S002055

TABLE I: MAJOR WATER RIGHT HOLDERS IN THE BAY-DELTA WATERSHED (continued)

Water Right Holder(s)	*Statement/Application Numbers*
Los Molinos Mutual Water Company	S002908 S002909 S002910
Los Rios Farms, Inc.	S013275 S013276 S013278
M & T Incorporated	A005109 A008188
Madera Irrigation District	S004978 S012547
Carl Martellaro	S007400
Maxwell Irrigation District	A008631 A011955 A011957 A011958 A013919
Merced Irrigation District	S004718 S004719 A001222 A001224 A010572 A016186 A016187
Meridian Farms Water Company	A001074B A009737
Natomas Central Mutual Water, *et al*	A000534 A001056 A001203 A001413 A015572 A022309 A025727
Nevada Irrigation District	S004716 S004717 S010794 S012950 S012951 S012952 S012953 S013330 A001270 A001614 A001615 A002275 A002276 A002372 A002652A A002652B A005193 A006229 A006702 A008177 A008180 A020017 A020072 A024983 A027132 A027559
Oakdale Irrigation District & South San Joaquin Irrigation District	S004683 A001081 A003091 A010872 A010978 A011105 A012490 A012614 A012873 A013310
Olive Percy Davis Trust, *et al*	A001659
Oroville-Wyandotte Irrigation District	A001651 A002142 A002778 A002979
Pacific Gas & Electric Company	S000830 S000831 S000843 S000855 S000886 S000888 S000890 S000892 S000922 S000923 S000924 S000926 S000934 S000935 S000936 S000937 S000938 S000939 S000940 S000941 S000942 S000943 S000944 S000945 S000946 S000948 S000949 S000950 S000951 S000952 S000954 S000956 S000957 S000960 S000961 S000968 S000972 S000973 S000974 S000975 S000976 S000977 S000978 S000979 S000980 S000981 S000982 S000983 S000984 S000985 S000992 S000993 S000995 S000998 S000999 S001002 S001003 S001004 S001013 S001014 S001251 S004705 S004708 S006264 S009032 S009033 S009034 S009035 S009036 S009978 S009979 S009980 S009981 S009982 A000077A A000654 A001441 A001463

TABLE I: MAJOR WATER RIGHT HOLDERS IN THE BAY-DELTA WATERSHED (continued)

Water Right Holder(s)	*Statement/Application Numbers*
Pacific Gas & Electric Company (continued)	A002100 A002186 A002195 A002460 A002534 A002750 A002751 A002755 A003550 A003889 A004441 A004453 A004851 A005161 A005240 A006032 A006129 A006130 A008794 A014743 A014785 A015407 A015717 A015719
Parrott Ranch Company	S009896 S009897 S009898 A005110 A008187
Patterson Water District	S009320
Placer County Water Agency	A018084 A018085 A018086 A018087
Princeton-Codora-Glenn Irrigation District	A000244 A000770 A017066
Provident Irrigation District	A000462 A000640 A000892
Reclamation District #108	A000576 A000763 A001589 A011899
Reclamation District #999	A001666 A004100 A004101
Reclamation District #1004	A000027 A023201
Reclamation District #2068	A002318 A019229 A024961
Richvale Irrigation District	S000378 S000379
San Luis Canal Company	S001074
South Sutter Water District	A010221 A014804 A022102 A023690 A024621 A026162
Stanford Vina Ranch Irrigation Company	S000729 S000730
Stevinson Water District, *et al*	A001885 A005724 A006111 A007012
Sutter Extension Water	A010529 A014588 A014665 A015177 A015178 A015179 A015587
Sutter Mutual Water Company, *et al*	A000581 A000878 A000879 A000880A A001160 A009760 A012470
The Prudential Insurance Company	S008508 S013267 S013268 S013270 S013271 S013272 S013273
Turlock Irrigation District & Modesto Irrigation District	S013848 S013849 A001232 A001233 A003648 A006711 A009997 A014126 A014127

TABLE I: MAJOR WATER RIGHT HOLDERS IN THE BAY-DELTA WATERSHED (continued)

Water Right Holder(s)	*Statement/Application Numbers*
United States Bureau of Reclamation	S004518 S006353 S006354 A000023 A000234 A001465 A002270 A005625 A005626 A005627 A005628 A005638 A005645A A009363 A009364 A009365 A009366 A009367 A009368 A010588 A011199 A012578 A012716 A013103 A013370 A013371 A013372 A013629 A014165 A014515 A014662 A014858A A014858B A014859 A015374 A015375 A015376 A015424 A015764 A016767 A016768 A017374 A017375 A017376 A018115 A018714 A018721 A018723 A018733 A018812 A019303 A019304 A019934 A020011 A021009 A021189 A021542 A021636 A021637 A021945 A022316 A027319 A027321
United States Fish & Wildlife Service	A013540 A017862 A020288 A022227
Western Canal Water District	S000925
West Stanislaus Irrigation District	A001987
Wild Goose Club	S000550
Woodbridge Irrigation District, *et al*	A005807 A010240 A012648
Yolo County Flood Control & Water Conservation District	S000608 S000609 A011389 A015975 A026469
Yuba County Water Agency	A002197 A003026 A005004 A005631 A005632 A010282 A015204 A015205 A015563 A015574
Yuba County Water District & Oroville-Wyandotte Irrigation District	A013676 A013956 A013957 A014113
Zumwalt Farms, Inc.	A011028 A011314

Endnotes:

1. The number of a "Statement of Water Diversion and Use" is preceded by an "S".
2. The number of a "Permitted/Licensed Application to Appropriate Water" is preceded by an "A".

TABLE II : DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS[1]

A) MUNICIPAL AND INDUSTRIAL USES

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
Salinity:							
Contra Costa Canal at Pumping Plant #1	C-5 CHCCC06	Chloride (Cl^-)	Maximum mean daily, in mg/l	N/A	All	*Oct-Sep*	250
Contra Costa Canal at Pumping Plant #1	C-5 CHCCC06	Chloride (Cl^-)	Maximum mean daily 150 mg/l Cl^- for at least the number of days shown during the Water Year. Must be provided in intervals of not less than two weeks duration. (Percentage of Water Year shown in parenthesis).	Sac. R.[2]		No. of days each Water Year ≤ 150 mg/l Cl^-	
– or –					W		240 (66%)
San Joaquin River at Antioch Water Works Intake	D-12(near) RSAN007				AN		190 (52%)
					BN		175 (48%)
					D		165 (45%)
					C		155 (42%)
West Canal at mouth of Clifton Court Forebay	C-9 CHWST0	Chloride (Cl^-)	Maximum mean daily, in mg/l	N/A	All	*Oct-Sep*	250
Delta Mendota Canal at Tracy Pumping Plant	DMC-1 CHDMC004	Chloride (Cl^-)	Maximum mean daily, in mg/l	N/A	All	*Oct-Sep*	250
Cache Slough at City of Vallejo Intake[3]	C-19 SLCCH16	Chloride (Cl^-)	Maximum mean daily, in mg/l	N/A	All	*Oct-Sep*	250
-and/or-							
Barker Sl. at North Bay Aqueduct Intake	SLBAR3	Chloride (Cl^-)	Maximum mean daily, in mg/l	N/A	All	*Oct-Sep*	250

B) AGRICULTURAL USES BY AREA

1) WESTERN DELTA

Salinity:							
Sacramento River at Emmaton	D-22 RSAC092	Electrical Conductivity (EC)	Maximum 14-day running average[4] of mean daily, in mmhos/cm	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*[5]
					W	*Aug. 15*	--
					AN	*July 1*	0.63
					BN	*June 20*	1.14
					D	*June 15*	1.67
					C	--	2.78
San Joaquin River at Jersey Point	D-15 RSAN018	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily, in mmhos/cm	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*
					W	*Aug. 15*	--
					AN	*Aug. 15*	--
					BN	*June 20*	0.74
					D	*June 15*	1.35
					C	--	2.20

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

B) AGRICULTURAL USES BY AREA (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
2) INTERIOR DELTA							
Salinity:							
South Fork Mokelumne River at Terminous	C-13 RSMKL08	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily, in mmhos/cm	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*
					W	*Aug. 15*	--
					AN	*Aug. 15*	--
					BN	*Aug. 15*	--
					D	*Aug. 15*	--
					C	--	0.54
San Joaquin River at San Andreas Landing	C-4 RSAN032	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily, in mmhos/cm	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*
					W	*Aug. 15*	--
					AN	*Aug. 15*	--
					BN	*Aug. 15*	--
					D	*Jun. 25*	0.58
					C	--	0.87
3) SOUTH DELTA							
Salinity:							
			Stage 1 to be implemented upon adoption of this Order:				
San Joaquin River at Airport Way Bridge, Vernalis	C-10 RSAN112	Total Dissolved Solids (TDS)	Mean monthly average, in mg/l	N/A	All	*All year*	500
			Stage 2 to be implemented by December 31, 1994				
San Joaquin River at Airport Way Bridge, Vernalis	C-10 RSAN112	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC, in mmhos/cm	N/A	All	*Apr 1-Aug 31*	0.7
						Sep 1 - Mar 31	1.0
San Joaquin River at Brandt Bridge [site]	C-6 RSAN073						
			Final stage to be implemented by December 31, 1996				
San Joaquin River at Airport Way Bridge, Vernalis	C-10 RSAN112	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily EC, in mmhos/cm	N/A	All	*Apr 1-Aug 31*	0.7
						Sep 1 - Mar 31	1.0
Old River near Middle River	C-8 ROLD69		or				
			If a three-party contract has been implemented among DWR, USBR, and the SDWA, that contract will be reviewed prior to implementation of the above, and, after also considering the needs of other beneficial uses, revisions will be made to the objectives and compliance/monitoring locations noted above, as appropriate.				
Old River at Tracy Road Bridge	P-12 ROLD59						
San Joaquin River at Brandt Bridge [site]	C-6 RSAN073						

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

B) AGRICULTURAL USES BY AREA (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
4) EXPORT							
Salinity:							
West Canal at mouth of Clifton Court Forebay & Delta Mendota Canal at Tracy Pumping Plant	C-9 CHWST0 DMC-1 CHDMC004	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily in mmhos/cm	N/A	All	*Oct - Sep*	1.0

C) FISH AND WILDLIFE BY HABITAT/SPECIES

CHINOOK SALMON

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
Dissolved Oxygen:							
San Joaquin River between Turner Cut & Stockton	RSAN050-RSAN061	Dissolved oxygen (DO)	Minimum DO, in mg/l DWR and USBR shall meet this standard whenever it can be reasonably controlled by operational means.	N/A	All	*Sep 1-Nov 30*	6.0
Temperature:							
Sacramento River at Freeport -and- San Joaquin River at Airport Way Bridge, Vernalis	RSAC155 C-10 RSAN112	Temperature, in °F	The daily average water temperature shall not be elevated by controllable factors[6] above 68°F in the reach from the I Street Bridge to Freeport on the Sacramento River and at Vernalis on the San Joaquin River.	N/A	All	*Apr 1-Jun 30* *Sep 1-Nov 30*	68°F 68°F
Sacramento River at Freeport	RSAC155	Temperature, in °F	The daily average water temperature shall not be elevated by controllable factors above 66°F in the reach from the I Street Bridge to Freeport on the Sacramento River.	N/A	All	*Jan 1 - March 31*	66°F
Flow:							
San Joaquin River at Airport Way Bridge, Vernalis	C-10 RSAN112	Flow Rate (Total annual maximum of 150 TAF for the two salmon flows from the San Joaquin Basin reservoirs.)	Average flow, in cfs, for 21-day continuous period. The starting date depends upon the timing of Chinook salmon smolt out-migration from the San Joaquin Basin. If there is insufficient water to provide the 21-day pulse flow, the Executive Director may reduce these average flows in order to maintain the pulse for 21 days.	S-J R.[7]	W AN BN D C	*Apr 20 - May 10*[8] " " " "	10000 8000 6000 4000 2000
			Daily mean combined export pumping by the Tracy, Banks, and Contra Costa pumping plants shall be ≤1500 cfs. Available pumping rates are to be split equally between the CVP and the SWP.				
			Average flow, in cfs, for 14-day continuous period. Start date depends upon timing of Chinook salmon adult spawning migration. The attraction flow is subject to the 150 TAF annual maximum, with the spring pulse having priority.	N/A	All	*Oct 18 - 31*[8]	≥ 2000

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)[1]

C) FISH AND WILDLIFE BY HABITAT/SPECIES (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
CHINOOK SALMON (continued)							
Flow (continued):							
Sacramento River at Freeport	RSAC155	Flow Rate	Average flow, in cfs, for 14-day continuous period. Starting date depends upon timing of release of Chinook salmon juveniles from Coleman National Fish Hatchery.	Sac. R.	W,AN,BN	*Apr 20 – May 3*[5]	≥ 18000
					D,C	"	≥ 13000
Sacramento River at Rio Vista	D-24 RSAC101	Flow Rate	14-day running average of minimum daily flow[4], in cfs	Sac. R.			

	Jan	*Feb 1 – Mar 15*	*Mar 16 – Jun 30*
W	2500	3000	5000
AN	2500	2500	3000
BN	2500	2500	3000
D	1500	2500	2500
C	1500	2000	2000

	Jul	*Aug*	*Sep 1 – Dec 31*
W	3000	1000	5000
AN	2000	1000	2500
BN	2000	1000	2500
D	1000	1000	1500
C	1000	1000	1500

STRIPED BASS: 1. ANTIOCH - SPAWNING

Salinity:							
San Joaquin River at Antioch Water Works Intake	D-12 (near) RSAN007	Electrical Conductivity (EC)	14-day running average of mean daily for the period not more than value shown, in mmhos/cm	N/A	All	*Apr 15 – May 31* (or until spawning has ended)	1.5
Flow:							
Sacramento River at Chipps Island	D-10 RSAC075	Delta outflow index[9] (DOI)	Average for the period not less than the value shown, in cfs	N/A	All	*Apr 1 – 14*	6700

STRIPED BASS: 2. ANTIOCH - SPAWNING - RELAXATION PROVISION

Salinity:							
San Joaquin River at Antioch Water Works Intake	D-12 (near) RSAN007	Electrical Conductivity (EC)	14-day running average of mean daily EC in mmhos/cm, not more than value shown corresponding to deficiencies in firm supplies declared by the CVP and SWP[10]	Sac. R.			

Total Annual Imposed Deficiency (MAF)[7]	*Apr 1 – May 31* Dry	Critical
0.0	1.5	1.5
0.5	1.8	1.9
1.0	1.8	2.5
1.5	1.8	3.4
≥ 2.0	1.8	3.7

This relaxation provision replaces the above Antioch and Chipps Island standards whenever the representative projects impose deficiencies in firm supplies.

Linear interpolation is to be used to determine values between those shown.

STRIPED BASS: 3. PRISONERS POINT - SPAWNING

Salinity:							
San Joaquin River at Prisoners Point	D-29 RSAN038	Electrical Conductivity (EC)	14-day running average of mean daily for the period not more than value shown, in mmhos/cm	Sac. R.	All	*Apr 1 – May 31* (or until spawning has ended)	0.44

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

C) FISH AND WILDLIFE BY HABITAT/SPECIES (continued)

LOCATION	SAMPLING SITE NOs. (I–A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
STRIPED BASS: 4. PRISONERS POINT–SPAWNING–RELAXATION PROVISION							
Salinity:							
San Joaquin River at Prisoners Point	D–29 RSAN038	Electrical Conductivity (EC)	14–day running average of mean daily for the period not more than value shown, in mmhos/cm This replaces the above Prisoners Point standard when the relaxation provision for Antioch spawning protection is in effect.	Sac. R.	D & C	*Apr 1–May 31* (or until spawning has ended)	0.55
STRIPED BASS: 5. GENERAL							
Flow:							
Sacramento River at Freeport	RSAC155	Flow Rate	For a 42–day continuous period, exact starting date to be dependent upon detection of striped bass eggs and larvae between Colusa and Freeport, flow, in cfs	Sac. R.	W,AN,BN	*Apr 16 – May 31*[8] 14–day running average flow	≥ 13000
					All	minimum mean daily flow	≥ 9000
Sacramento River at Chipps Island	D–10 RSAC075	DOI	Average for the period not less than the value shown, in cfs	Sac. R.		*May 6–31*	*Jun* / *Jul*
					W	14000	14000 / 10000
					AN	14000	10700 / 7700
					BN	11400	9500 / 6500
					D	4300	3600 / 3200
					C	3300	3100 / 2900
FISHERIES HABITAT							
Protection from entrainment for young fish:							
Reverse flow in western Delta (QWEST)[9]		QWEST	14–day running average[4] of QWEST, in cfs Simultaneously, the 7–day running average, if negative, shall be within 1000 cfs of the applicable 14–day running average.	N/A	All	*Feb 1 – Jun 30* *Jul 1 – Jul 31* *Aug 1 – Jan 31*	≥ 0 ≥ – 1000 ≥ – 3000
Export pumping rate reductions necessary to meet the QWEST standard shall be shared on an equal percentage basis between the CVP and SWP from a base of 6680 cfs for the SWP and 4600 cfs for the CVP in August through March. The reductions in exports due to QWEST from April through July shall be equally shared by the CVP and SWP from a base of the maximum export rates specified under OPERATIONAL REQUIREMENTS in this Table. The last 500 cfs of the QWEST capacity from August 1 to January 31 (–2500 to –3000) is reserved for water transfers. The CVP and SWP may use this capacity if no water transfers are requested.							
Relaxation provisions:							
Sacramento River at Mallard Slough: reverse flow standards not in effect if given EC occurs	RSAC075	Electrical conductivity (EC)	14–day running average[4] of EC, in mmhos/cm	N/A	All	*July 1 – Jan 31*	≤3.0
Reverse flow standards in western Delta do not apply when the combined total CVP & SWP exports drop below 2000 cfs or when the DOI exceeds 50000 cfs.				N/A	All	*February 1 – January 31*	

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

C) FISH AND WILDLIFE BY HABITAT/SPECIES (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
SUISUN MARSH							
Salinity:							
Sacramento River at Mallard Slough (replaces "Chipps Island, O&A Ferry Landing")[11]	RSAC075	Electrical conductivity (EC)	Maximum 28-day running average of mean daily EC, in mmhos/cm	Sac. R.		*Jan 1 – May 31*	*Oct. 1 – Dec. 31*
					W,AN,BN	12.5	12.5
					D,C	12.5	15.6
			(The 15.6 mmhos/cm standard applies only when CVP and SWP water users are taking deficiencies in scheduled[12] water supplies, otherwise the 12.5 mmhos/cm standard remains in effect.)				
Sacramento River at Collinsville	C-2 RSAC081	Electrical conductivity (EC)	Monthly average of both daily high tide values not to exceed the values shown, in mmhos/cm (or demonstrate that equivalent or better protection will be provided at the location)	N/A	All	*Oct*	19.0
						Nov	15.5
						Dec	15.5
Montezuma Slough at National Steel	S-64 SLMZU25	Electrical conductivity (EC)			All	*Jan*	12.5
						Feb	8.0
						Mar	8.0
Montezuma Slough near Beldons Landing	S-49 SLMZU11	Electrical conductivity (EC)			All	*Apr*	11.0
						May	11.0
Chadbourne Slough at Chadbourne Road	S-21 SLCBN1	Electrical conductivity (EC)			All by Oct 1,1993		
Cordelia Slough at Cordelia-Goodyear Ditch	S-97 SLCRD06	Electrical conductivity (EC)			All by Oct 1,1993		
Goodyear Slough, 1.3 mile S of Morrow Island [Drainage] Ditch at Pierce	S-75 SLGYR04	Electrical conductivity (EC)			All by Oct 1,1994		
Suisun Slough, 300 ft S of Volanti Slough	S-42 SLSUS12	Electrical conductivity (EC)			All by Oct 1,1997		
Water Supply Intakes for Waterfowl Management Areas on Van Sickle and Chipps Islands		Electrical conductivity (EC)					
Flow:							
Sacramento River at Chipps Island	D-10 RSAC075	DOI	Average of daily DOI for each month, not less than value shown, in cfs	Sac. R.	W	*Feb – May*	10000
			Minimum daily DOI for 60 consecutive days in the period, in cfs	Sac. R.	AN	*Jan – Apr*	12000
					BN	*Jan – Apr*	12000
			Average of daily DOI for each month, not less than value shown, in cfs; applies whenever storage is at or above minimum level in flood control reservation envelope at 2 of the following--Shasta Reservoir, Oroville Reservoir, and CVP storage on the American River.	N/A	All	*Jan – May*	6600 (if greater flow not required by other standards)

TABLE II. DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

C) FISH AND WILDLIFE BY HABITAT/SPECIES (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
OPERATIONAL REQUIREMENTS							
Flow:							
Harvey O. Banks Pumping Plant (SWP), Tracy Pumping Plant (CVP), and Contra Costa Pumping Plant (CVP)		Combined export rate	Maximum combined 14-day running average export rate, in cfs, not to exceed value shown	Sac. R.		*April*	*May*	*June*	*July*
					W	6000	6000	6000	9200
					AN	6000	6000	6000	9200
			April & May 14-day running averages[4] are based only on those days not included in the 1500 cfs restriction period.		BN	6000	6000	6000	9200
					D	5000	5000	5000	9200
					C	4000	4000	4000	9200
			If, on March 31, the San Luis Reservoir contains less than 1.5 MAF, the combined export rates may be increased to the values shown.		D	6000	6000	6000	
					C	6000	6000	6000	
			These specified combined export pumping rates for April through July are to be equally shared between the CVP and SWP.						
			All export pumping restrictions are removed whenever DOI ≥ 50000 cfs except during the April-May San Joaquin River pulse flow period.						
Other facilities:							
Delta Cross-Channel at Walnut Grove	CHDLC1	Closure of gates	Gates closed if daily DOI > 12000 cfs	N/A	All	*January 1 – 31*			
			Gates operated at the direction of the Executive Director of the State Water Board.	N/A	All	*February 1 – June 30*			
Fish protective facilities:							
Harvey O. Banks Pumping Plant (SWP) and Tracy Pumping Plant (CVP)		Maintain appropriate records of the numbers, sizes, and kinds of fish salvaged, and of water export rates and fish facility operations.							
John E. Skinner Fish Protective Facility (SWP)		This facility is to be operated to meet the following standards to the extent that they are compatible with water export rates: A. Chinook salmon – from November 1 through May 14, standards shall be as follows: 1. Approach velocity: 3.0 to 3.5 feet per second. 2. Bypass ratio: maintain 1.2:1.0 to 1.6:1.0 ratios in both primary and secondary channels. 3. Primary bay: not critical but use Bay B as first choice. 4. Screened water system: the velocity of water exiting from the screened water system is not to exceed the secondary channel approach velocity. The system may be turned off at the discretion of the operators. B. Striped bass and white catfish – from May 15 through October 31, standards shall be as follows: 1. Approach velocity: in both the primary and secondary channels, maintain a velocity as close to 1.0 feet per second as is possible. 2. Bypass ratios: i. When only Bay A (with center wall) is in operation maintain a 1.2:1.0 ratio. ii. When both primary bays are in operation and the approach velocity is less than 2.5 feet per second, the bypas ration should be 1.5:1.0. iii. When only Bay B is operating the bypass ratio should be 1.2:1.0. iv. Secondary channel bypass ratio should be 1.2:1.0 for all approach velocities. 3. Primary channel: use Bay A (with center wall) in preference to Bay B. 4. Screened water ratio: if the use of screened water is necessary, the velocity of water exiting the screened water system is not to exceed the secondary channel approach velocity. 5. Clifton Court Forebay water level: maintain at the highest practical level.						

TABLE II: DECISION 1630 WATER QUALITY, FLOW, & OPERATIONAL REQUIREMENTS (continued)

C) FISH AND WILDLIFE BY HABITAT/SPECIES (continued)

LOCATION	SAMPLING SITE NOs. (I-A/RKI)	PARAMETER	DESCRIPTION	INDEX TYPE	YEAR TYPE	DATES	VALUES
OPERATIONAL REQUIREMENTS (continued)							
Fish protective facilities (continued):							
Tracy Fish Protective Facility (CVP)			The secondary system is to be operated to meet the following standards, to the extent that they are compatible with water export rates: A. The secondary velocity should be maintained at 3.0 to 3.5 feet per second whenever possible from February 1 through May 1 while salmon are present. B. To the extent possible, the secondary velocity should not exceed 2.5 feet per second and preferably 1.5 feet per second between June 1 and August 31, to increase the efficiency for striped bass, catfish, shad, and other fish. Secondary velocities should be reduced even even at the expense of bypass ratios in the primary, but the ration should not be reduced below 1:1.0. C. The screened water discharge should be kept at the lowest possible level consistent with its purpose of minimizing debris in the holding tanks. D. The bypass ratio in the secondary should be operated to prevent excessive velocities in the holding tanks, but in no case should the bypass velocity be less than the secondary approach velocity.				

FOOTNOTES

1. Except for flow, all values are for surface zone measurements and all mean daily values are based on at least hourly measurements. Electrical Conductivity (EC) values are mmhos/cm at 25°C. All dates are inclusive. All standards that contain running averages shall begin the averaging on the first day of the period.
2. Sac. R.: Sacramento Valley Water Year Hydrologic Classification -- described on following sheet.
3. The Cache Slough objective to be effective only when water is being diverted from this location.
4. Determination of compliance with a standard having a 14-day running average begins on the 14th day. If the standard is not met on the 14th day, all 14 days shall be considered out of compliance. Calculation of the 14-day running average may be continued after interruption of the period by other controlling standards. For example, if from March 1 through 10th the QWEST standard is in control, then from March 11-13 the DOI exceeds 50,000 cfs (thus removing the QWEST requirement), then March 14th would be considered the 11th day of the 14-day averaging period.
5. When no date is shown, EC limit continues from April 1.
6. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board, or the Regional Water Quality Control Boards, and that may be reasonably controlled. Based on the record in these proceedings, controlling temperature in the Delta utilizing reservoir releases does not appear to be reasonable, due to the distance of the Delta downstream of reservoirs and uncontrollable factors such as ambient air temperature, water temperatures in the reservoir releases, etc. For these reasons, the State Water Board considers reservoir releases to control water temperatures in the Delta a waste of water; therefore, the State Water Board will require a test of reasonableness before considering reservoir releases for such a purpose.
7. S-J R.: San Joaquin Valley Water Year Hydrologic Classification -- described on following sheet.
8. The effective dates of the pulse flow period will be set each year by the Executive Director of the State Water Board after conferring with the California Department of Fish & Game, the United States Fish & Wildlife Service, California Department of Water Resources, and United States Bureau of Reclamation, whichever agency(ies) is(are) appropriate.
9. The DOI and flow in western Delta (QWEST) are described on a following sheet. These definitions differ from those used in DAYFLOW.
10. For the purpose of this provision, firm supplies of the United States Bureau of Reclamation shall be any water the Bureau is legally obligated to deliver under any CVP contract of 10 years or more duration, excluding the Friant Division of the CVP, subject only to dry and critical year deficiencies. Firm supplies of the California Department of Water Resources shall be any water the Department would have delivered under Table A entitlements of water supply contracts and under prior right settlements had deficiencies not been imposed in that dry or critical year.
11. The "Chipps Island at O&A Ferry Landing" station was replaced by an equivalent station on the Sacramento River at the mouth of Mallard Slough. The replacement site is on the south side of the Sacramento River directly across the river from Chipps Island.
12. Scheduled water supplies shall be firm supplies for the United States Bureau of Reclamation and the California Department of Water Resources plus additional water ordered from the California Department of Water Resources by a contractor the previous September, and which does not exceed the ultimate annual entitlement for said contractor.

DECISION 1630 TABLE II: Footnote 2

SACRAMENTO VALLEY
WATER YEAR HYDROLOGIC CLASSIFICATION

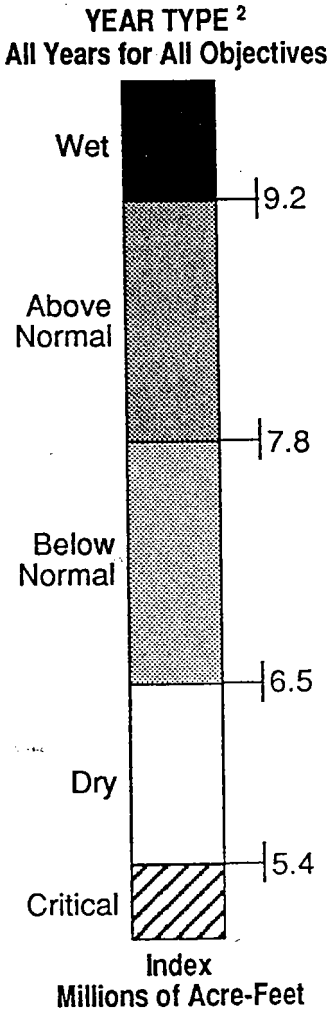
Year classification shall be determined by computation of the following equation:

INDEX = 0.4 * X + 0.3 * Y + 0.3 * Z

Where:
- X = Current years April – July Sacramento Valley unimpaired runoff
- Y = Current October – March Sacramento Valley unimpaired runoff
- Z = Previous years index [1]

The Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) as published in California Department of Water Resources Bulletin 120 is a forecast of the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

Classification	Index Millions of Acre-Feet
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8 and less than 9.2
Below Normal	Equal to or less than 7.8 and greater than 6.5
Dry	Equal to or less than 6.5 and greater than 5.4
Critical	Equal to or less than 5.4



[1] A cap of 10.0 MAF is put on the previous years index (Z) to account for required flood control reservoir releases during wet years.

[2] The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

CHA0040R4

DECISION 1630 TABLE II: Footnote 7

SAN JOAQUIN VALLEY
WATER YEAR HYDROLOGIC CLASSIFICATION

Year classification shall be determined by computation of the following equation:

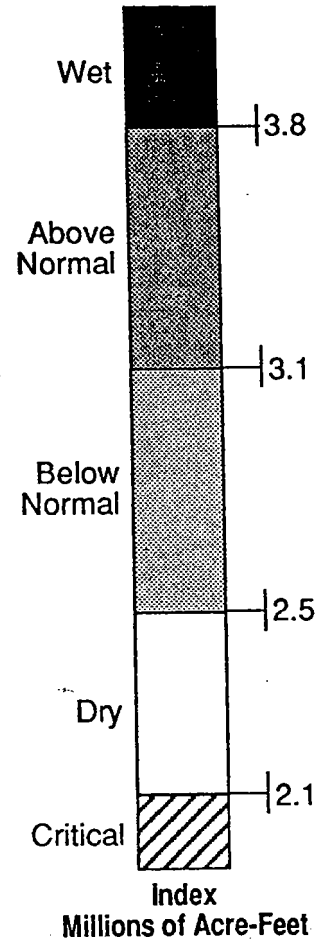
INDEX = 0.6 * X + 0.2 * Y + 0.2 * Z

Where:
- X = Current years April – July San Joaquin Valley unimpaired runoff
- Y = Current October – March San Joaquin Valley unimpaired runoff
- Z = Previous years index [1]

The San Joaquin Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) as published in California Department of Water Resources Bulletin 120 is a forecast of the sum of the following locations: Stanislaus River, total flow to New Melones Reservoir; Tuolumne River, total inflow to Don Pedro Reservoir; Merced River, total flow to Exchequer Reservoir; San Joaquin River, total inflow to Millerton Lake. Preliminary determinations of year classification shall be made in February, March, and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

Classification	Index Millions of Acre-Feet
Wet	Equal to or greater than 3.8
Above Normal	Greater than 3.1 and less than 3.8
Below Normal	Equal to or less than 3.1 and greater than 2.5
Dry	Equal to or less than 2.5 and greater than 2.1
Critical	Equal to or less than 2.1

YEAR TYPE [2]
All Years for All Objectives



1 A cap of 4.5 MAF is placed on the previous years index (Z) to account for required flood control reservoir releases during wet years.

2 The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

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DECISION 1630 TABLE II: Footnote 9

DELTA FLOW INDICES[1]

The Delta Outflow Index (*DOI*) and San Joaquin River Flow Index (*QWEST*), as revised in this footnote, shall be computed daily by the California Department of Water Resources and the United States Bureau of Reclamation using the following formulas (all flows are in cubic feet per second [cfs]):

DOI = DELTA INFLOW - NET DELTA CONSUMPTIVE USE - DELTA EXPORTS

QWEST = CENTRAL DELTA INFLOW - 0.65×NET DELTA CONSUMPTIVE USE - DELTA EXPORTS

where ***DELTA INFLOW = SAC + SRTP + YOLO + EAST + MISC + SJR*** and

where ***CENTRAL DELTA INFLOW = XGEO + EAST + MISC + SJR***

SAC = Sacramento River at Freeport mean daily flow for the previous day; the 25-hour tidal cycle measurements from 12:00 midnight to 1:00 a.m. may be used instead.

SRTP = Sacramento Regional Treatment Plant average daily discharge for the previous week.

YOLO = Yolo Bypass mean daily flow for the previous day, which is equal to the flows from the Sacramento Weir, Fremont Weir, Cache Creek at Rumsey and the South Fork of Putah Creek.

XGEO = Combined mean daily flow for the previous day through the Delta Cross Channel and Georgiana Slough, as defined in the DAYFLOW documentation.

EAST = Eastside Streams mean daily flow for the previous day from the Mokelumne River at Woodbridge, Cosumnes River at Michigan Bar, and Calaveras River at Bellota[2].

MISC = Combined mean daily flow for the previous day of Bear Creek, Dry Creek, Stockton Diverting Canal, French Camp Slough, Marsh Creek, and Morrison Creek.

SJR = San Joaquin River flow at Vernalis, mean daily flow for the previous day.

where ***NET DELTA CONSUMPTIVE USE = GDEPL - PREC***

GDEPL = Delta gross channel depletion[3] for the previous day based on water-year type using the Department's latest Delta land use study[4].

PREC = Real-time Delta precipitation runoff for the previous day estimated from stations within the Delta.

and where ***DELTA EXPORTS = CCF + TPP + CCC***

CCF = Clifton Court Forebay inflow for the current day.

TPP = Tracy Pumping Plant pumping for the current day.

CCC = Contra Costa Canal pumping for the current day.

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[1] Not all of the Delta tributary streams are gaged and telemetered. Where appropriate, other methods of estimating stream flows, such as correlations with precipitation or runoff from nearby streams, may be used instead.

[2] Calaveras River has been moved from the MISC parameter in DAYFLOW to the EAST parameter in this DOI.

[3] In the QWEST formula, a factor of "0.65" is included since about 65% of the Delta channel depletion occurs in the central and south Delta areas.

[4] The Department is currently developing new channel depletion estimates. If these new estimates are not available, the DAYFLOW Table 4 channel depletion estimates shall be used.

TABLE III. DECISION 1630 – MONITORING STATIONS

A. Compliance Monitoring Stations[1]

Station Number	Station Location	Water Quality	Flow	Effective Date[2]
C–2	Sacramento River at Collinsville (RSAC081)	EC	No	
C–4	San Joaquin River at San Andreas Landing (RSAN032)	EC	No	
C–5	Contra Costa Canal at Pumping Plant #1 (CHCCC06)	Cl^-	No	
C–6	San Joaquin River at Brandt Bridge [site] (RSAN073)	EC	No	December 31, 1994
C–8	Old River near Middle River (ROLD69)	EC	No	December 31, 1996
C–9	West Canal at mouth of Clifton Court Forebay (CHWST0)	Cl^-, EC	No	
C–10	San Joaquin River at Airport Way Bridge, Vernalis (RSAN112)	TDS, Temp.	Yes	
C–10	San Joaquin River at Airport Way Bridge, Vernalis (RSAN112)	EC	No	December 31, 1994
C–13	Mokelumne River at Terminous (RSMKL08)	EC	No	
C–19 NBA	Cache Slough at City of Vallejo Intake (SLCCH16) or Barker Slough at North Bay Aqueduct Intake (SLBAR3)	Cl^-	No	
D–10	Sacramento River at Chipps Island (RSAC075)	No	Revised Delta Outflow Index (Revised DOI)	
–	Sacramento River at Mallard Slough (RSAC075)	EC	No	
D–12(near)	San Joaquin River at Antioch Water Works Intake (RSAN007)	Cl^-, EC	No	
D–15	San Joaquin River at Jersey Point (RSAN018)	EC	No	
D–22	Sacramento River at Emmaton (RSAC092)	EC	No	
D–24	Sacramento River at Rio Vista (RSAC101)	No	Yes	
–	Sacramento River at Freeport (RSAC155)	Temp.	Yes	
–	Sacramento River at Colusa (RSAC313)	No	Yes	
D–29	San Joaquin River at Prisoners Point (RSAN038)	EC	No	
DMC–1	Delta Mendota Canal at Tracy Pumping Plant (CHDMC004)	Cl^-, EC	No	
–	San Joaquin River between Turner Cut and Stockton (RSAN050 – RSAN061)	D.O.	No	
P–12	Old River at Tracy Road Bridge (ROLD59)	EC	No	December 31, 1996
S–21	Chadbourne Slough at Chadbourne Road (SLCBN1)	EC, Tidal gauge	No	October 1, 1993
S–33	Cordelia Slough, 500 feet W of Southern Pacific crossing at Cygnus (SLCRD04)	EC, Tidal gauge	No	
S–35	Goodyear Slough at Morrow Island Clubhouse (SLGYR03)	EC, Tidal gauge	No	
S–42	Suisun Slough 300 feet S of Volanti Slough (SLSUS12)	EC, Tidal gauge	No	October 1, 1997
S–49	Montezuma Slough near Beldons Landing (SLMZU11)	EC, Tidal gauge	No	
S–64	Montezuma Slough at National Steel (SLMZU25)	EC, Tidal gauge	No	
S–75	Goodyear Slough 1.3 miles S of Morrow Island [Drainage] Ditch at Pierce (SLGYR04)	EC, Tidal gauge	No	October 1, 1994
S–97	Cordelia Slough at Cordelia–Goodyear Ditch (proposed) (SLCRD06)	EC, Tidal gauge	No	October 1, 1993
–	Water supply intake locations on Van Sickle Island and Chipps Island	EC, Tidal gauge	No	October 1, 1997

[1] See Table II for detailed descriptions of water quality objectives and flow requirements

[2] If later than date of adoption of Decision 1630

TABLE III: DECISION 1630 – MONITORING STATIONS (continued)

B. Real–time Monitoring Stations

Station Number	Station Location	Parameter Measured[3]	Resulting Action(s)[3]
--	San Joaquin River Basin upstream of Vernalis[4]	Beginning of chinook salmon smolt out–migration	a. Minimum daily flow at Vernalis b. Limits on export pumping c. Bypass of inflows on Cosumnes, Mokelumne, & Calaveras rivers
--	San Joaquin River Delta[4]	Beginning of chinook salmon adult spawning migration	a. Minimum daily flow at Vernalis b. Bypass of inflows on Cosumnes, Mokelumne, & Calaveras rivers
--	Battle Creek, tributary to Sacramento River, at Coleman Fish Hatchery	Release of chinook salmon smolts from Coleman Fish Hatchery	Minimum daily flow at Freeport for 14-day period
--	Sacramento River upstream of Freeport[4]	Detection of striped bass eggs and larvae between Colusa and Freeport	Flow requirements at Freeport
--	Delta Cross–Channel at Walnut Grove (CHDLC1)	Detection of striped bass eggs and larvae and chinook salmon smolts in low enough density[5] at Freeport	Delta Cross–Channel Gates may be opened
D–10	Sacramento River at Chipps Island (RSAC075)	Revised DOI	Gates closed

[3] See Table II for detailed description(s)
[4] Exact monitoring stations to be developed by USBR and DWR with agreements from DFG and USFWS and with final approval by State Water Board
[5] Executive Director or designee shall develop specific criteria

C. Baseline Monitoring Stations

	Station Location	Parameter(s) Measured	Frequency
C–3	Sacramento River at Greens Landing (RSAC139)	Electrical Conductivity (EC)	Continuous
		Base parameters[6], Phytoplankton[7]	Semi–monthly & monthly (seasonal)
		Phosphorus[8], Total Dissolved Solids, & Chlorides (P,TDS, & Cl^-)	Monthly
		Heavy metals[9] & pesticides[10], Benthos[11]	Semi–annually
C–4	San Joaquin River at San Andreas Landing (RSAN032)	EC	Continuous
C–7	San Joaquin River at Mossdale Bridge (RSAN087)	EC	Continuous
		Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
C–9	West Canal at mouth of Clifton Court Forebay (CHWST0)	TDS (calculated from EC measurement)	Continuous
		Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
C–10	San Joaquin River at Airport Way Bridge, Vernalis (RSAN112)	EC, Temperature	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–4	Sacramento River above Point Sacramento (RSAC084)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–6	Suisun Bay at Bulls Head Point near Martinez (RSAC056)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually

TABLE III DECISION 1630 – MONITORING STATIONS (continued)

C. Baseline Monitoring Stations (continued)

	Station Location	Parameter(s) Measured	Frequency
D–7	Grizzly Bay at Dolphin near Suisun Slough (LSBB11)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi–annually
D–8	Suisun Bay off Middle Point near Nichols (RSAC068)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–9	Honker Bay near Wheeler Point (LSBB22)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–10	Sacramento River at Chipps Island (RSAC075)	Flow	Continuous
–	Sacramento River at Mallard Slough (RSAC075)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–11	Sherman Lake near Antioch (LSHL1)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–12	San Joaquin River at Antioch Ship Canal (RSAN007)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides	Semi–annually
D–14A	Big Break near Oakley (LBGB3)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–15	San Joaquin River at Jersey Point (RSAN018)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–16	San Joaquin River at Twitchell Island (RSAN024)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–19	Franks Tract near Russo's Landing (LFKT3)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–22	Sacramento River at Emmaton (RSAC092)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–24	Sacramento River at Rio Vista (RSAC101)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–26	San Joaquin River at Potato Point (RSAN035)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D–28A	Old River near Rancho Del Rio (ROLD21)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
D–42	San Pablo Bay near Rodeo (RSAC040)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly

TABLE III. DECISION 1630 – MONITORING STATIONS (continued)

C. Baseline Monitoring Stations (continued)

	Station Location	Parameter(s) Measured	Frequency
MD–6	Sycamore Slough 4 km. E of mouth (SLSYC4)	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi–annually
MD–7	South Fork Mokelumne River 1 km. N of Terminous (RSMLK09)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi–annually
MD–10	Disappointment Slough at Bishop Cut (SLDPT07)	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
–	San Joaquin River at Turner Cut at Light 26 (RSAN050)	EC	Continuous
–	San Joaquin River at mouth of Fourteenmile Slough (RSAN052)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
P–8	San Joaquin River 1.5 Kilometers NW of Rough & Ready Island at Light 40 (Buckley Cove) (RSAN056)	EC	Continuous
		Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi–annually
–	San Joaquin River at Country Club Landing at Light 43 (RSAN059)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
–	San Joaquin River at Rough & Ready Island (RSAN062)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
P–10	Middle River at Borden Highway (RMID23)	EC, Tidal Gauge Height	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
P–11	Middle River at Howard Road Bridge (RMID34)	EC, Tidal Gauge Height	Continuous
P–12	Old River at Tracy Road Bridge (ROLD59)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
S–36	Suisun Slough near Mouth (SLSUS00)	EC, Tidal Gauge Height	Continuous
S–42	Suisun Slough 300 feet S of Volanti Slough (SLSUS12)	EC, Tidal Gauge Height	Continuous
		Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
S–54	Montezuma Slough at Hunter Cut (SLMZU03)	EC, Tidal Gauge Height	Continuous

[6] Base Parameters: Air and water temperature, electrical conductivity, pH, dissolved oxygen, turbidity, water depth to 1% light intensity, Secchi disc depth, volatile and non–volatile suspended solids, nitrate,nitrite, ammonia, total organic nitrogen, chlorophyll a, silica.

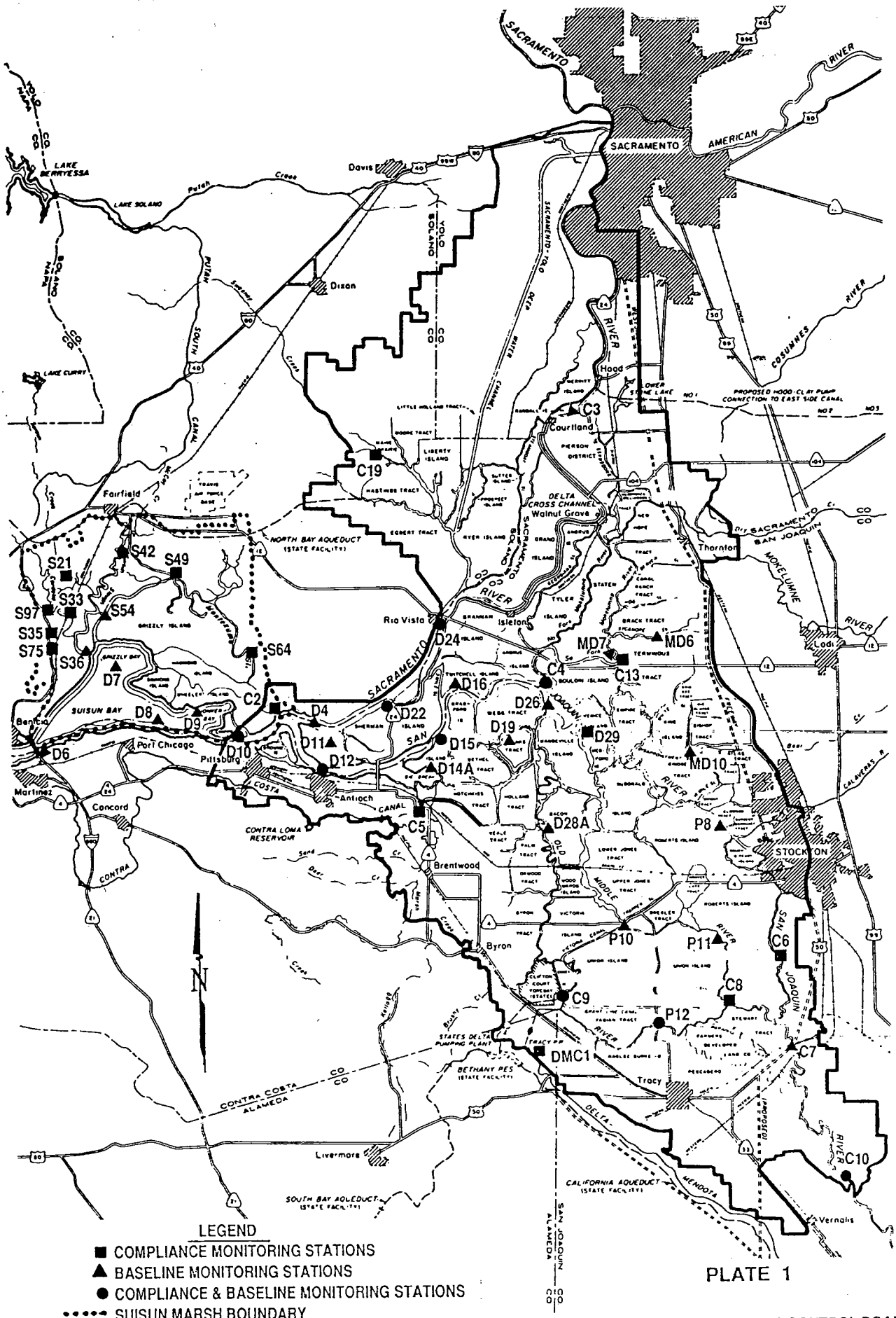
[7] Identification and enumeration to the species level where possible.

[8] Includes orthophosphate and total phosphorus.

[9] Includes arsenic, cadmium, chromium (all valences), copper, iron, lead, manganese, mercury, zinc.

[10] Chlorinated hydrocarbons to include: Aldrin, Atrazine, BHC, Chlordane, Dacthal, DDD, DDE, DDT, Dieldrin, Endrin, Endosulfan, Heptachlor, Kelthane, Lindane, Methoxychlor, Simazine, Toxaphene, PCBs.
Sampling to take place in water column and bottom sediments. Sediment samples are to be taken in transects across the channel.

[11] Benthic samples are to include identification and enumeration to the lowest taxonomic level possible. Samples to be taken in transects across the channel. Continuation of this part of the monitoring program will be reevaluated annually.



LEGEND

- ■ COMPLIANCE MONITORING STATIONS
- ▲ BASELINE MONITORING STATIONS
- ● COMPLIANCE & BASELINE MONITORING STATIONS
- SUISUN MARSH BOUNDARY
- LEGAL DELTA BOUNDARY

PLATE 1

STATE WATER RESOURCES CONTROL BOARD

DECISION 1630

MONITORING STATIONS

DWG NO. 3459

TABLE IV

RESPONSIBILITY FOR PULSE FLOW REQUIREMENTS IN THE SACRAMENTO BASIN

TRIBUTARY	TRIBUTARY UIF [1] TO BASIN UIF (%)	OWNER[2] WITH DIVERSION TO STORAGE	RESERVOIR NAME	RESERVOIR CAPACITY (AF) [3]
FEATHER	24.6	OROVILLE/WYANDOTTE	LITTLE GRASS VLY	93,000
			NY FLAT/SLY CRK	65,000
		DWR	LAKE DAVIS	84,400
			THERMALITO FRBY	11,768
FISHERY BARRIER: THERMALITO DIVERSION DAM			THERMALITO AFTBY	61,144
			LAKE OROVILLE	3,537,577
			THERMALITO DIV	13,328
			ANTELOPE	22,566
			FRENCHMAN	55,400
		PG & E	BUTT VALLEY	49,897
			BUCKS LAKE	105,605
			LAKE ALMANOR	1,142,964
YUBA RIVER	12.9	NEVADA ID	BOWMAN	68,510
			FRENCH LAKE	13,840
			SCOTTS FLAT	48,547
FISHERY BARRIER: ENGLEBRIGHT DAM			JACKSON MEADOWS	69,200
		PG & E	LAKE FORDYCE	49,903
			LAKE SPAULDING	74,773
		YUBA CO WA	BULLARDS BAR	961,300
BEAR RIVER	1.8	NEVADA ID	ROLLINS	65,988
FISHERY BARRIER: S. SUTTER DIVERSION DAM		SOUTH SUTTER WD	CAMP FAR WEST	103,000
AMERICAN RIVER	14.7	PLACER CO WD	FRENCH MEADOWS	136,405
			HELL HOLE	207,590
		CITY OF SACRAMENTO	LOON LAKE	78,200
			UNION VALLEY	277,300
			ICE HOUSE	45,960
			SLAB CREEK	16,600
FISHERY BARRIER: NIMBUS DAM		USBR	FOLSOM LAKE	1,010,300
SACRAMENTO	46.0	USBR	SHASTA LAKE	4,552,000
			KESWICK	23,800
FISHERY BARRIER: KESWICK DAM				
BASIN TOTALS	100			13,045,865

[1] THE SOURCE OF UNIMPAIRED FLOW DATA IS EXHIBIT: I DWR-26

[2] FOR RESERVOIRS WITH MULTIPLE OWNERS OR USERS, ONLY THE ENTITY WITH THE LARGEST WATER RIGHT STORAGE AMOUNT IS LISTED. THE RESERVOIR'S OTHER OWNERS/USERS, IF LISTED IN TABLE I, ARE ALSO RESPONSIBLE FOR THEIR SHARE OF THE PULSE FLOW REQUIREMENTS.

[3] RESERVOIR CAPACITIES ARE LISTED FOR COMPARISON AND WERE TAKEN FROM THE FOLLOWING EXHIBITS: I SWRCB-6, WRINT SWRCB-1A, AND WRINT SWRCB-2A

TABLE V

RESPONSIBILITY FOR PULSE FLOW REQUIREMENTS IN THE SAN JOAQUIN BASIN

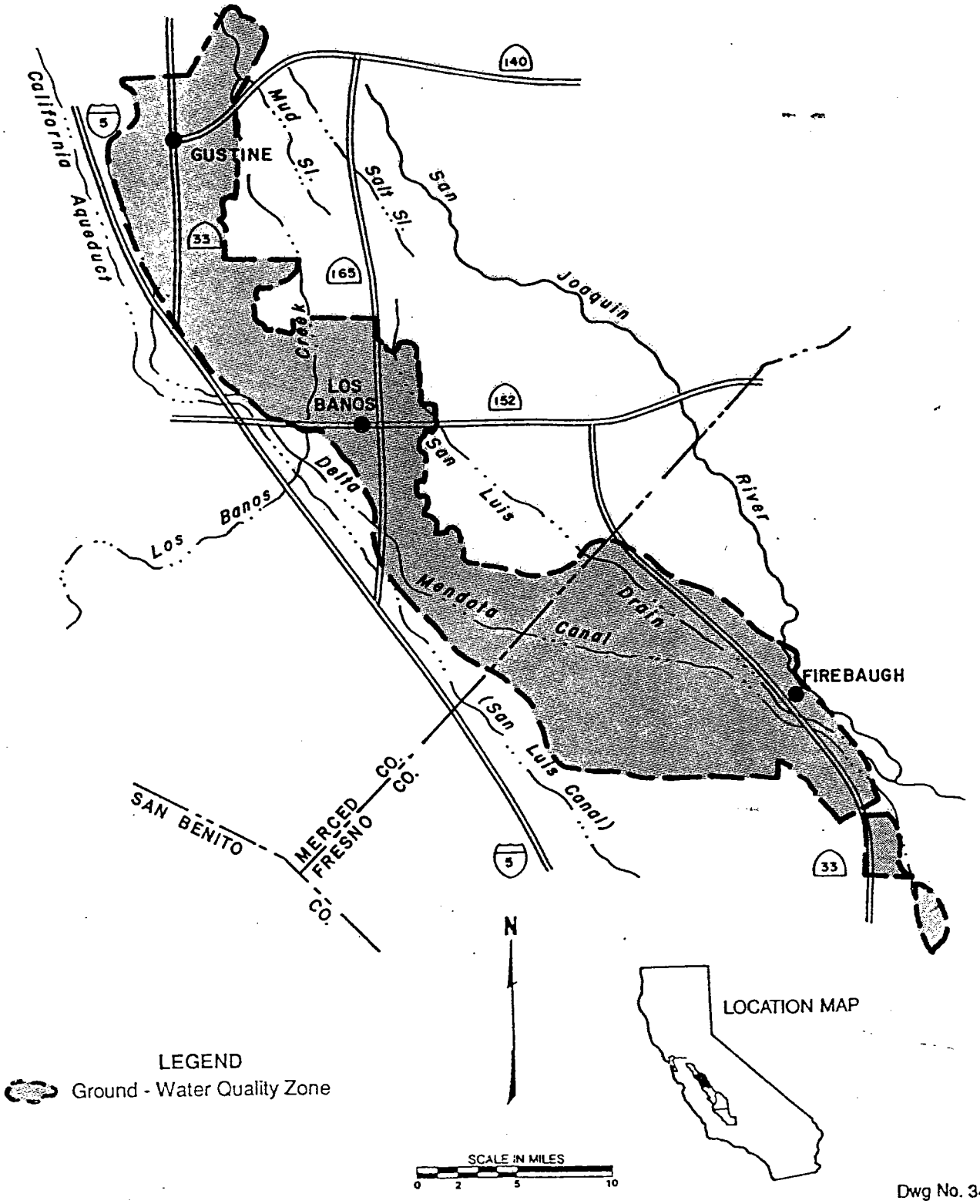
TRIBUTARY	TRIBUTARY UIF TO BASIN UIF [1] (%)	OWNER[2] WITH DIVERSION TO STORAGE	RESERVOIR NAME	RESERVOIR CAPACITY (AF)[3]
STANISLAUS	28.2	CALAVERAS COUNTY W.D.	SPICER MDWS	184,300
		OAKDALE & S. SAN JOAQUIN	DONNELLS LAKE	64,700
			TULLOCH	68,400
FISHERY BARRIER: GOODWIN DAM			BEARDSLEY	98,500
		PG&E	STRAWBERRY	18,300
		USBR	NEW MELONES	2,400,000
TUOLUMNE	47.2	TID/MID	NEW DON PEDRO	2,030,000
			TURLOCK LAKE	45,000
			MODESTO LAKE	28,000
FISHERY BARRIER: LA GRANGE DAM		SFRISCO	LAKE LLOYD	268,000
			HETCH HETCHY	360,400
			LAKE ELEANOR	26,100
MERCED	24.6	MERCED IRRIGATION DIST	LAKE McCLURE	1,024,000
FISHERY BARRIER: CROCKER DIVERSION DAM				
BASIN TOTALS	100			6,615,700

[1] BASIN UNIMPAIRED FLOW IS THE SUM OF THE TABLE'S THREE TRIBUTARY UNIMPAIRED FLOWS FROM EXHIBIT I DWR-26

[2] FOR RESERVOIRS WITH MULTIPLE OWNERS OR USERS, ONLY THE ENTITY WITH THE LARGEST WATER RIGHT STORAGE AMOUNT IS LISTED. THE RESERVOIR'S OTHER OWNERS/USERS, IF LISTED IN TABLE I, ARE ALSO RESPONSIBLE FOR THEIR SHARE OF THE PULSE FLOW REQUIREMENTS.

[3] RESERVOIR CAPACITIES ARE LISTED FOR COMPARISON AND WERE TAKEN FROM THE FOLLOWING EXHIBITS: I SWRCB-6, WRINT SWRCB-1A, WRINT SWRCB-2A, AND WRINT TID/MID-7

Figure 1
GRASSLANDS SUBAREA
Ground - Water Quality Zones



Dwg No. 3467

Figure 2
WESTLANDS SUBAREA
Ground - Water Quality Zones

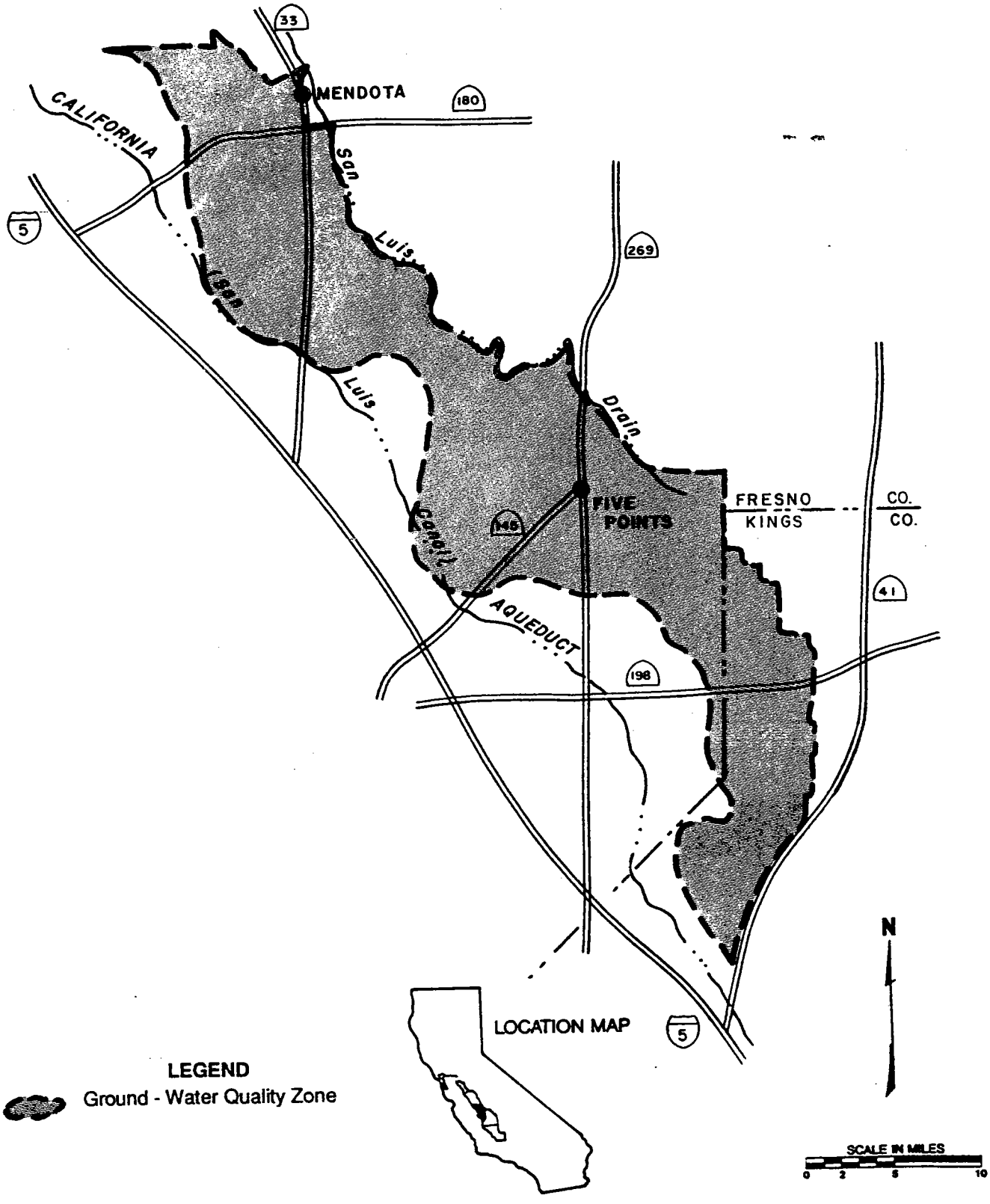


Figure 3
KERN SUBAREA
Ground - Water Quality Zones

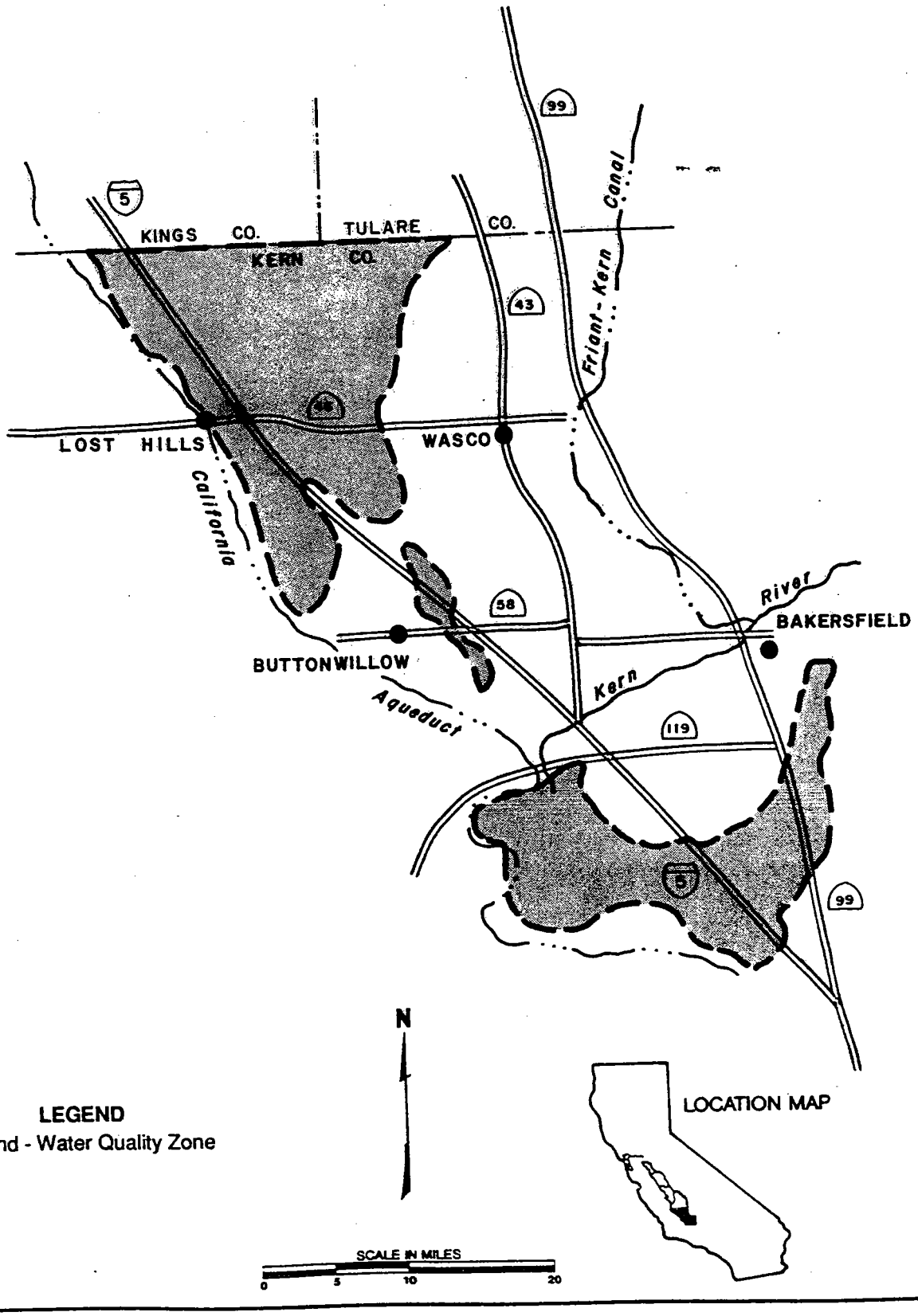
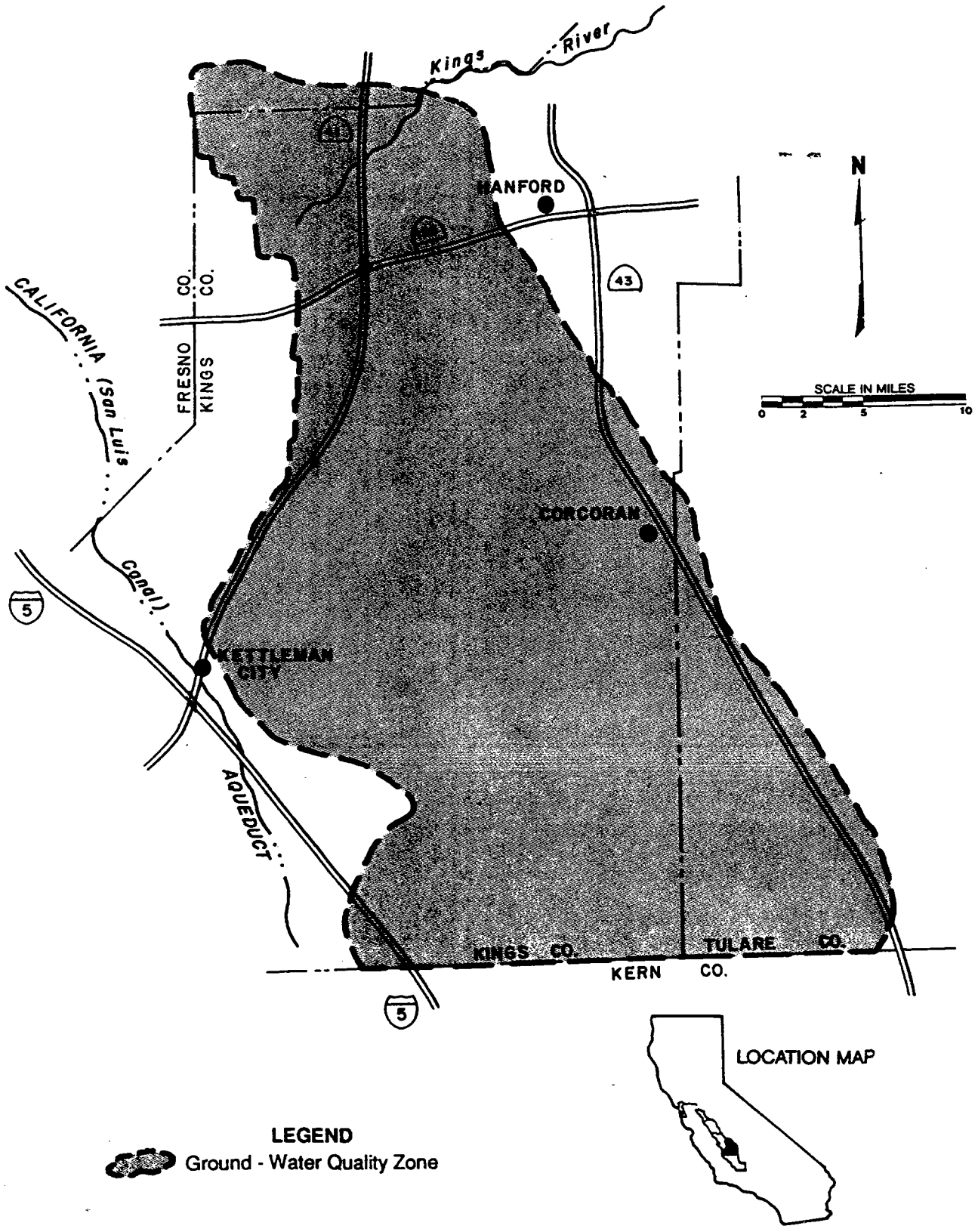


Figure 4
TULARE SUBAREA
Ground - Water Quality Zones



6/11/91

MEMORANDUM OF UNDERSTANDING REGARDING URBAN WATER CONSERVATION IN CALIFORNIA

September 1991

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EXHIBITS

1. EXHIBIT 1: Best Management Practices, Implementation Schedules, Assumptions, and Potential Best Management Practices for Urban Water Conservation in California

2. EXHIBIT 2: California Urban Water Conservation Council

3. EXHIBIT 3: Principles to Guide the Performance of BMP Economic (Cost-Effectiveness) Analyses

4. EXHIBIT 4: Form of Letter to State Water Resources Control Board

5. EXHIBIT 5: Urban Water Conservation Annual Report Outline

MEMORANDUM OF UNDERSTANDING REGARDING URBAN WATER CONSERVATION IN CALIFORNIA

This MEMORANDUM OF UNDERSTANDING REGARDING URBAN WATER CONSERVATION IN CALIFORNIA ("MOU") is made and entered into on the dates set forth below among the undersigned parties ("signatories"). The signatories represent urban water suppliers, public advocacy organizations and other interested groups as defined in Section 1 of this MOU.

RECITALS

A. The signatories to this MOU recognize that California's economy, quality of life and environment depend in large part upon the water resources of the State. The signatories also recognize the need to provide reliable urban water supplies and to protect the environment. Increasing demands for urban, agricultural and environmental water uses call for conservation and the elimination of waste as important elements in the overall management of water resources. Many organizations and groups in California have an interest in urban water conservation, and this MOU is intended to gain much needed consensus on a complex issue.

B. The urban water conservation practices included in this MOU (referred to as "Best Management Practices" or "BMPs") are intended to reduce long-term urban demands from what they would have been without implementation of these practices and are in addition to programs which may be instituted during occasional water supply shortages.

C. The combination of BMPs and urban growth, unless properly accounted for in water management planning, could make reductions in urban demands during short-term emergencies such as droughts or earthquakes more difficult to achieve. However, notwithstanding such difficulties, the signatory water suppliers will carry out the urban water conservation BMP process as described in this MOU.

D. The signatories recognize that means other than urban water conservation may be needed to provide long-term reliability for urban water suppliers and long-term protection of the environment. However, the signatories may have differing views on what additional measures might be appropriate to provide for these needs. Accordingly, this MOU is not intended to address these issues.

E. A major benefit of this MOU is to conserve water which could be used for the protection of streams, wetlands and estuaries and/or urban water supply reliability. This MOU leaves to other forums the issue of how conserved water will be used.

F. It is the intent of this MOU that individual signatory water suppliers (1) develop comprehensive conservation BMP programs using sound economic criteria and (2) consider water conservation on an equal basis with other water management options.

G. It is recognized that present urban water use throughout the State varies according to many factors including, but not limited to, climate, types of housing and landscaping, amounts and kinds of commercial, industrial and recreational development, and the extent to which conservation measures have already been implemented. It is further recognized that many of the BMPs identified in Exhibit 1 to this MOU have already been implemented in some areas and that even with broader employment of BMPs, future urban water use will continue to vary from area to area. Therefore, this MOU is not intended to establish uniform per capita water use allotments throughout the urban areas of the State. This MOU is also not intended to limit the amount or types of conservation a water supplier can pursue or to limit a water supplier's more rapid implementation of BMPs.

H. It is recognized that projections of future water demand should include estimates of anticipated demand reductions due to changes in the real price of water.

TERMS

SECTION 1

DEFINITIONS

For purposes of this MOU, the following definitions apply:

1.1 Best Management Practices. A Best Management Practice ("BMP") means a policy, program, practice, rule, regulation or ordinance or the use of devices, equipment or facilities which meets either of the following criteria:

(a) An established and generally accepted practice among water suppliers that results in more efficient use or conservation of water;

(b) A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

Although the term "Best Management Practices" has been used in various statutes and regulations, the definitions and interpretations of that term in those statutes and regulations do not apply to this MOU. The term "Best Management Practices" or "BMPs" has an independent and special meaning in this MOU and is to be applied for purposes of this MOU only as defined above.

1.2 Implementation. "Implementation" means achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in the descriptions of the various BMPs and to satisfy the commitment by the signatories to use good faith efforts to optimize savings from implementing BMPs as described in Section 4.4 of this MOU. Section B of Exhibit 1 to this MOU establishes the schedule for initial implementation of BMPs.

1.3 Signatory Groups. For purposes of this MOU, signatories will be divided into three groups as follows:

(a) Group 1 will consist of water suppliers. A "water supplier" is defined as any entity, including a city, which delivers or supplies water for urban use at the wholesale or retail level.

(b) Group 2 will consist of public advocacy organizations. A "public advocacy organization" is defined as a non profit organization:

(i) whose primary function is not the representation of trade, industrial, or utility entities, and

(ii) whose prime mission is the protection of the environment or who has a clear interest in advancing the BMP process.

(c) Group 3 will consist of other interested groups. "Other interested groups" is defined as any other group which does not fall into one of the two groups above.

1.4 California Urban Water Conservation Council. The California Urban Water Conservation Council or "Council" will have responsibility for monitoring the implementation of this MOU and will be comprised of signatories to this MOU grouped according to the definitions in Section 1.3 above. The duties of the Council are set forth in Section 6 and in Exhibit 2 to this MOU.

SECTION 2

PURPOSES

2.1 This MOU has two primary purposes: (1) to expedite implementation of reasonable water conservation measures in urban areas; and (2) pursuant to Section 5 of this MOU, to establish assumptions for use in calculating estimates of reliable future water conservation savings resulting from proven and reasonable conservation measures. Estimates of reliable savings are the water conservation savings which can be achieved with a high degree of confidence in a given service area. The signatories have agreed upon the initial assumptions to be used in calculating estimates of reliable savings. These assumptions are included in Exhibit 1 to this MOU. It is probable that average savings achieved by water suppliers will exceed the estimates of reliable savings.

SECTION 3

LIMITS TO APPLICABILITY OF MOU

3.1 Relationship Between Water Suppliers. No rights, obligations or authorities between wholesale suppliers, retail agencies, cities or other water suppliers are created or expanded by this MOU. Moreover, wholesale water suppliers are not obligated to implement BMPs at the retail customer level except within their own retail service area, if any.

3.2 Agriculture. This MOU is intended to apply only to the delivery of water for domestic, municipal and industrial uses. This MOU is not intended to apply directly or indirectly to the use of water for irrigated agriculture.

3.3 Reclamation. The signatory water suppliers support the reclamation and reuse of wastewater wherever technically and economically reasonable and not environmentally or socially unacceptable, and agree to prepare feasibility studies on water reclamation for their respective service areas. However, this MOU does not apply to that aspect of water management, except where the use of reclaimed water may otherwise qualify as a BMP as defined above.

3.4 Land Use Planning. This MOU does not deal with the question of growth management. However, each signatory water supplier will inform all relevant land planning agencies at least annually of the impacts that planning decisions involving projected growth would have upon the reliability of its water supplies for the water supplier's service area and other areas being considered for annexation.

3.5 Use of Conserved Water. A major benefit of this MOU is to conserve water which could be used for the protection of streams, wetlands and estuaries and/or urban water supply reliability. This MOU leaves to other forums the issue of how conserved water will be used.

SECTION 4

IMPLEMENTATION OF BEST MANAGEMENT PRACTICES

4.1 The Best Management Practices List, Schedule of Implementation and Assumptions. Exhibit 1 to this MOU contains:

(a) In Section A: A list identifying those practices which the signatories believe presently meet the definition of a BMP as set forth in Section 1.1 of this MOU.

(b) In Section B: A schedule for implementing the BMPs to be followed by signatory water suppliers unless exempted under Section 4.5 of this MOU or an alternative schedule is prepared pursuant to Section 4.6 of this MOU.

(c) In Section C: Assumptions for use in developing estimates of reliable savings from the implementation of BMPs. Estimates of reliable savings are the water conservation savings which can be achieved with a high degree of confidence in a given service area. The estimate of reliable savings for each BMP depends upon the nature of the BMP and upon the amount of data available to evaluate potential savings. For some BMPs (e.g., public information) estimates of reliable savings may never be generated. For others, additional data may lead to significant changes in the estimate of reliable savings. It is probable that average savings achieved by water suppliers will exceed the estimates of reliable savings.

(d) In Section D: A list of "Potential Best Management Practices" ("PBMPs"). PBMPs are possible conservation practices which have not been promoted to the BMP list.

4.2 Initial BMPs, PBMPs, Schedules, and Estimates of Reliable Savings. The initial position of conservation practices on the BMP and PBMP lists, the initial schedule of implementation and study for the BMP list, the initial schedule of study for the PBMP list, and the initial estimates of reliable savings represent compromises by the signatories to move the process forward both for purposes of the present Bay/Delta proceedings as defined in Section 5 and to promote water conservation generally. The signatories agree that as more and better data are collected in the future, the lists, the schedules, and the estimates of reliable savings will be refined and revised based upon the most objective criteria available. However, the signatories agree that the measures included as initial BMPs in Section A of Exhibit 1 are economically justified on a statewide basis.

4.3 Future Revision of BMPs, PBMPs, Schedules, and Estimates of Reliable Savings. After the beginning of the initial term of the MOU as provided in Section 7.1, the California Urban Water Conservation Council ("Council") will, pursuant to Section 6 of this MOU and Exhibit 2, alter the composition of the BMP and PBMP lists, redefine individual BMPs, alter the schedules of implementation, and update the assumptions of reliable savings as more data becomes available. This dynamic BMP assessment process includes the following specific commitments:

(a) The assumptions of reliable savings will be updated at least every 3 years.

(b) The economic reasonableness of a BMP or PBMP will be assessed by the Council using the economic principles in Sections 3 and 4 of Exhibit 3.

(c) A BMP will be removed from the BMP list if, after review of data developed during implementation, the Council determines that the BMP cannot be made economically reasonable or determines that the BMP otherwise fails to conform to the definition of BMPs in Section 1.1.

(d) A PBMP will be moved to the BMP list and assigned a schedule of implementation if, after review of data developed during research, and/or demonstration projects, the Council determines that the PBMP is economically reasonable and otherwise conforms to the definition of BMPs in Section 1.1.

4.4 Good Faith Effort. While specific BMPs and results may differ because of varying local conditions among the areas served by the signatory water suppliers, a good faith effort to implement BMPs will be required of all signatory water suppliers. The following are included within the meaning of "good faith effort to implement BMPs":

(a) The proactive use by a signatory water supplier of legal authorities and administrative prerogatives available to the water supplier as necessary and reasonable for the implementation of BMPs.

(b) Where implementation of a particular BMP is not within the legal authority of a signatory water supplier, encouraging timely implementation of the BMP by other entities that have the legal authority to carry out the BMP within that water supplier's service area pursuant to existing legal authority. This encouragement may include, but is not limited to, financial incentives as appropriate.

(c) Cooperating with and encouraging cooperation between other water suppliers and other relevant entities whenever possible and within existing legal authority to promote the implementation of BMPS.

(d) Optimizing savings from implementing BMPs.

(e) For each signatory water supplier and all signatory public advocacy organizations, encouraging the removal of institutional barriers to the implementation of BMPs within that water supplier's service area. Examples of good faith efforts to remove institutional barriers include formal presentations and/or written requests to entities requesting approval of, or amendment to, local ordinances, administrative policies or legislation which will promote BMP implementation.

4.5 Exemptions. A signatory water supplier will be exempt from the implementation of specific BMPs for as long as the supplier annually substantiates that based upon then prevailing local conditions, one or more of the following findings applies:

(a) A full cost-benefit analysis, performed in accordance with the principles set forth in Exhibit 3, demonstrates that either the program (i) is not cost-effective overall when total program benefits and costs are considered; OR (ii) is not cost-effective to the individual water supplier even after the water supplier has made a good faith effort to share costs with other program beneficiaries.

(b) Adequate funds are not and cannot reasonably be made available from sources accessible to the water supplier including funds from other entities. However, this exemption cannot be used if a new, less cost-effective water management option would be implemented instead of the BMP for which the water supplier is seeking this exemption.

(c) Implementation of the BMP is (i) not within the legal authority of the water supplier; and (ii) the water supplier has made a good faith effort to work with other entities that have the legal authority to carry out the BMP; and (iii) the water supplier has made a good faith effort to work with other relevant entities to encourage the removal of institutional barriers to the implementation of BMPs within its service area.

4.6 Schedule of Implementation. The schedule of implementation for BMPs is set forth in Section B of Exhibit 1 to this MOU. However, it is recognized by the signatories that deviations from this schedule by water suppliers may be necessary. Therefore, a water supplier may modify, to the minimum extent necessary, the schedule for implementation of BMPs if the water supplier substantiates one or more of the following findings:

(a) That after a good faith effort to implement the BMP within the time prescribed, implementation is not feasible pursuant to the schedule. However, implementation of this BMP is still required as soon as feasible within the initial term of this MOU as defined in Section 7.1.

(b) That implementation of one or more BMPs prior to other BMPs will have a more positive effect on conservation or water supplies than will adherence to the schedule.

(c) That implementation of one or more Potential BMPs or other conservation measures prior to one or more BMPs will have a more positive effect on conservation or water supplies than will adherence to the schedule.

SECTION 5

BAY/DELTA PROCEEDINGS

5.1 Use of MOU for Bay/Delta Proceedings. The BMPs, the estimates of reliable savings and the processes established by this MOU are agreed to by the signatories for purposes of the present proceedings on the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Bay/Delta") and in order to move the water conservation process forward. "Present Bay/Delta proceedings" is intended to mean those Bay/Delta proceedings presently underway and those conducted until a final water rights decision is reached by the State Water Resources Control Board ("State Board"). The willingness of the signatories to enter into this MOU for purposes of the present Bay/Delta proceedings in no way limits the signatories' ability to propose different conservation practices, different estimates of savings, or different processes in a forum other than the present Bay/Delta proceedings, or for non-urban water suppliers or for other water management issues. By signing this MOU, public advocacy organization signatories are not agreeing to use the initial assumptions of reliable conservation savings in proceedings other than the present Bay/Delta proceedings. The signatories may present other assumptions of reliable conservation savings for non-signatory water suppliers in the present Bay/Delta proceedings, provided that such assumptions could not have adverse impacts upon the water supplies of any signatory water supplier. Furthermore, the signatories retain the right to advocate any particular level of protection for the Bay/Delta Estuary, including levels of freshwater flows, and do not necessarily agree on population projections for California. This MOU is not intended to address any authority or obligation of the State Board to establish freshwater flow protections or set water quality objectives for the Estuary, or to address any authority of the Environmental Protection Agency.

5.2 Recommendations for Bay/Delta Proceedings. The signatories will make the following recommendations to the State Board in conjunction with the present Bay/Delta proceedings and to the EPA to the extent the EPA concerns itself with the proceedings:

(a) That for purposes of the present Bay/Delta proceedings, implementation of the BMP process set forth in this MOU represents a sufficient long-term water conservation program by the signatory water suppliers, recognizing that additional programs may be required during occasional water supply shortages;

(b) That for purposes of the present Bay/Delta proceedings only, the State Board and EPA should base their estimates of future urban water conservation savings on the implementation of all of the BMPs included in Section A of Exhibit 1 to this MOU for the entire service area of

the signatory water suppliers and only on those BMPs, except for (i) the conservation potential for water supplied by urban agencies for agricultural purposes, or (ii) in cases where higher levels of conservation have been mandated;

(c) That for the purposes of the present Bay/Delta proceedings, the State Board and EPA should make their estimates of future urban water conservation savings by employing the reliable savings assumptions associated with those BMPs set forth in Section C of Exhibit 1 to this MOU;

(d) That the State Board should include a policy statement in the water rights phase of the Bay/Delta proceedings supporting the BMP process described in this MOU and that the BMP process should be considered in any documents prepared by the State Board pursuant to the California Environmental Quality Act as part of the present Bay/Delta proceedings.

5.3 Letter to State Board. Within 30 days of signing this MOU, each signatory will jointly or individually convey the principles set forth in Sections 5.1 and 5.2 above by sending a letter to the State Board, copied to the EPA, in the form attached to this MOU as Exhibit 4.

5.4 Withdrawal from MOU. If during the present Bay/Delta proceedings, the State Board or EPA uses future urban water conservation savings that are inconsistent with the use of BMPs as provided in this MOU, any signatory shall have the right to withdraw from the MOU by providing written notice to the Council as described in Section 7.4(a)(i) below.

SECTION 6

CALIFORNIA URBAN WATER CONSERVATION COUNCIL

6.1 Organization. The California Urban Water Conservation Council ("Council") will be comprised of all signatories to this MOU grouped according to the definition in Section 1. The signatories agree to the necessary organization and duties of the Council as specified in Exhibit 2 to this MOU. Within 30 days of the effective date of this MOU, the Council will hold its first meeting.

6.2 Annual Reports. The signatory water suppliers will submit standardized reports annually to the Council providing sufficient information to inform the Council on the progress being made towards implementing the BMP process. The Council will also make annual reports to the State Board. An outline for the Council's annual report to the State Board is attached as Exhibit 5 to this MOU.

SECTION 7

GENERAL PROVISIONS

7.1 Initial Term of MOU. The initial term of this MOU shall be for a period of 10 years. This initial term shall commence on September 1, 1991.

7.2 Signatories. Signatories shall consist of three groups: water suppliers, public advocacy organizations and other interested groups, arranged according to the definition in Section 1.3. Such arrangement will be made by a Council membership committee comprised of three representatives from the water suppliers' group and three representatives from the public advocacy organizations' group.

7.3 Renewal of MOU. The MOU shall be automatically renewed after the initial term of 10 years on an annual basis as to all signatories unless a signatory withdraws as described below in Section 7.4.

7.4 Withdrawal from MOU. Signatories to the MOU may withdraw from the MOU in three separate ways as described in sections (a), (b) and (c) below.

(a) Withdrawal prior to expiration of initial term. Before the expiration of the initial term of 10 years, a signatory may withdraw by providing written notice to the Council declaring its intent to withdraw. This written notice must include a substantiated finding that one of the two provisions (i) or (ii) below applies:

(i) During the present Bay/Delta proceedings, the State Board or EPA used future urban water conservation savings that are inconsistent with the use of BMPs as provided in this MOU; OR

(ii) After a period of 5 years from the commencement of the initial term of the MOU:

(A) Specific signatory water suppliers representing more than 10 percent of the population included within the combined service areas of the signatory water suppliers have failed to act in good faith pursuant to Section 4.4 of the MOU; and

(B) The signatory wishing to withdraw has attached findings to its past two annual reports to the Council beginning no earlier than the fourth annual report identifying these same signatory water suppliers and giving evidence based upon the information required to be submitted in the annual reports to the Council to support the allegations of failure to act in good faith; and

(C) The State Board has failed to require conservation efforts by the specific water suppliers adequate to satisfy the requirements of this MOU; and

(D) Discussions between the signatory wishing to withdraw and the specific signatories named have failed to satisfy the objections of the signatory wishing to withdraw.

After a signatory declares an intent to withdraw under Section 7.4(a), the MOU shall remain in effect as to that signatory for 180 days.

(b) Withdrawal after expiration of initial term. After the initial term of 10 years, any signatory may declare its intent to withdraw from the MOU unconditionally by providing written notice to the Council. After a signatory has declared its intent to withdraw as provided in this section, the MOU will remain in effect as to that signatory for 180 days.

(c) Immediate withdrawal. Any signatory who does not sign a modification to the MOU requiring a 2/3 vote as described in Exhibit 2 of this MOU may withdraw from the MOU by providing written notice to the Council. The withdrawing signatory's duties under this MOU will be terminated effective immediately upon providing such written notice.

If a signatory withdraws from the MOU under any of the above methods, the MOU shall remain in effect as to all other signatories.

7.5 Additional Parties. Additional parties may sign the MOU after September 1, 1991 by providing written notice to and upon approval by the Council. Additional parties

will be assigned by the Council to one of the three signatory groups defined in Section 1.3 before entry into the Council. All additional signatory water suppliers shall be subject to the schedule of implementation provided in Exhibit 1.

7.6 Legal Authority. Nothing in this MOU is intended to give any signatory, agency, entity or organization expansion of any existing authority. No organization formed pursuant to this MOU has authority beyond that specified in this MOU.

7.7 Non-Contractual Agreement. This MOU is intended to embody general principles agreed upon between and among the signatories and is not intended to create contractual relationships, rights, obligations, duties or remedies in a court of law between or among the signatories.

7.8 Modifications. The signatories agree that this writing constitutes the entire understanding between and among the signatories. The general manager, chief executive officer or executive director of each signatory or their designee shall have the authority to vote on any modifications to this MOU and its exhibits. Any modifications to the MOU itself and to its exhibits shall be made by the Council as described in Exhibit 2.

EXHIBIT 1

BEST MANAGEMENT PRACTICES, IMPLEMENTATION SCHEDULES, ASSUMPTIONS AND POTENTIAL BEST MANAGEMENT PRACTICES FOR URBAN WATER CONSERVATION IN CALIFORNIA

SECTION A. BEST MANAGEMENT PRACTICES

This section contains those Best Management Practices ("BMPs") that signatory water suppliers commit to implementing. Suppliers' water needs estimates will be adjusted to reflect estimates of reliable savings from this category of BMPs. For some BMPs, no estimate of savings is made.

It is recognized by all parties that a single implementation method for a BMP would not be appropriate for all water suppliers. In fact, it is likely that as the process moves forward, water suppliers will find new implementation methods even more effective than those described. Any implementation method used should be at least as effective as the methods described below.

1. INTERIOR AND EXTERIOR WATER AUDITS AND INCENTIVE PROGRAMS FOR SINGLE FAMILY RESIDENTIAL, MULTI-FAMILY RESIDENTIAL, AND GOVERNMENTAL/INSTITUTIONAL CUSTOMERS.

   Implementation methods shall be at least as effective as identifying the top 20% of water users in each sector, directly contacting them (e.g., by mail and/or telephone) and offering the service on a repeating cycle; providing incentives sufficient to achieve customer implementation (e.g., free showerheads, hose end sprinkler timers, adjustment to high water use bills if customers implement water conservation measures, etc.). This could be a cooperative program among organizations that would benefit from its implementation.

2. PLUMBING, NEW AND RETROFIT.

   a. ENFORCEMENT OF WATER CONSERVING PLUMBING FIXTURE STANDARDS INCLUDING REQUIREMENT FOR ULTRA LOW FLUSH ("ULF") TOILETS IN ALL NEW CONSTRUCTION BEGINNING JANUARY 1, 1992.

Implementation methods shall be at least as effective as contacting the local building departments and providing information to the inspectors; and contacting major developers and plumbing supply outlets to inform them of the requirement.

b. SUPPORT OF STATE AND FEDERAL LEGISLATION PROHIBITING SALE OF TOILETS USING MORE THAN 1.6 GALLONS PER FLUSH.

c. PLUMBING RETROFIT.

Implementation methods shall be at least as effective as delivering retrofit kits including high quality low-flow showerheads to pre-1980 homes that do not have them and toilet displacement devices or other devices to reduce flush volume for each home that does not already have ULF toilets; offering to install the devices; and following up at least three times.

3. DISTRIBUTION SYSTEM WATER AUDITS, LEAK DETECTION AND REPAIR.

Implementation methods shall be at least as effective as at least once every three years completing a water audit of the water supplier's distribution system using methodology such as that described in the American Water Works Association's "Manual of Water Supply Practices, Water Audits and Leak Detection;" advising customers whenever it appears possible that leaks exist on the customers' side of the meter; and performing distribution system leak detection and repair whenever the audit reveals that it would be cost effective.

4. METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS.

Implementation methods shall be requiring meters for all new connections and billing by volume of use; and establishing a program for retrofitting any existing unmetered connections and billing by volume of use; for example, through a requirement that all connections be retrofitted at or within six months of resale of the property or retrofitted by neighborhood.

5. LARGE LANDSCAPE WATER AUDITS AND INCENTIVES.

Implementation methods shall be at least as effective as identifying all irrigators of large (at least 3 acres) landscapes (e.g., golf courses, green belts, common areas, multi-family housing landscapes, schools, business parks,

cemeteries, parks and publicly owned landscapes on or adjacent to road rights-of-way); contacting them directly (by mail and/or telephone); offering landscape audits using methodology such as that described in the Landscape Water Management Handbook prepared for the California Department of Water Resources; and cost-effective incentives sufficient to achieve customer implementation; providing follow-up audits at least once every five years; and providing multi-lingual training and information necessary for implementation.

6. LANDSCAPE WATER CONSERVATION REQUIREMENTS FOR NEW AND EXISTING COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, GOVERNMENTAL, AND MULTI-FAMILY DEVELOPMENTS.

Implementation methods shall be enacting and implementing landscape water conservation ordinances, or if the supplier does not have the authority to enact ordinances, cooperating with cities, counties and the green industry in the service area to develop and implement landscape water conservation ordinances pursuant to the "Water Conservation in Landscaping Act" ("Act") (California Government Code §§ 65590 et seq.). The ordinance shall be at least as effective as the Model Water Efficient Landscape Ordinance being developed by the Department of Water Resources. A study of the effectiveness of this BMP will be initiated within two years of the date local agencies must adopt ordinances under the Act.

7. PUBLIC INFORMATION.

Implementation methods shall be at least as effective as ongoing programs promoting water conservation and conservation related benefits including providing speakers to community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills showing use in gallons per day for the last billing period compared to the same period the year before; providing public information to promote other water conservation practices; and coordinating with other governmental agencies, industry groups and public interest groups.

8. SCHOOL EDUCATION.

Implementation methods shall be at least as effective as ongoing programs promoting water conservation and conservation related benefits including working with the school districts in the water supplier's service area to provide educational materials and instructional assistance.

9. COMMERCIAL AND INDUSTRIAL WATER CONSERVATION.

Implementation methods shall be at least as effective as identifying and contacting the top 10% of the industrial and commercial customers directly (by mail and/or telephone); offering audits and incentives sufficient to achieve customer implementation; and providing follow-up audits at least once every five years if necessary.

10. NEW COMMERCIAL AND INDUSTRIAL WATER USE REVIEW.

Implementation methods shall be at least as effective as assuring the review of proposed water uses for new commercial and industrial water service and making recommendations for improved water use efficiency before completion of the building permit process.

11. CONSERVATION PRICING.

Implementation methods shall be at least as effective as eliminating nonconserving pricing and adopting conserving pricing. For signatories supplying both water and sewer service, this BMP applies to pricing of both water and sewer service. Signatories that supply water but not sewer service shall make good faith efforts to work with sewer agencies so that those sewer agencies adopt conservation pricing for sewer service.

Nonconserving pricing provides no incentives to customers to reduce use. Such pricing is characterized by one or more of the following components:

a. Rates in which the unit price decreases as the quantity used increases (declining block rates);

b. Rates that involve charging customers a fixed amount per billing cycle regardless of the quantity used;

c. Pricing in which the typical bill is determined by high fixed charges and low commodity charges.

Conservation pricing provides incentives to customers to reduce average or peak use, or both. Such pricing includes:

a. Rates designed to recover the cost of providing service; and

b. Billing for water and sewer service based on metered water use.

Conservation pricing is also characterized by one or more of the following components:

c. Rates in which the unit rate is constant regardless of the quantity used (uniform rates) or increases as the quantity used increases (increasing block rates);

d. Seasonal rates or excess-use surcharges to reduce peak demands during summer months;

e. Rates based upon the long-run marginal cost or the cost of adding the next unit of capacity to the system;

f. Lifeline rates.

12. LANDSCAPE WATER CONSERVATION FOR NEW AND EXISTING SINGLE FAMILY HOMES.

Implementation methods shall be at least as effective as providing guidelines, information and incentives for installation of more efficient landscapes and water saving practices (e.g., encouraging local nurseries to promote sales and use of low water using plants, providing landscape water conservation materials in new home owner packets and water bills, sponsoring demonstration gardens); and enacting and implementing landscape water conservation ordinances or, if the supplier does not have the authority to enact ordinances, cooperating with cities, counties, and the green industry in the service area to develop and implement landscape water conservation ordinances pursuant to the "Water Conservation in Landscaping Act ("Act") (California Government Code §§ 65590 et seq.). The ordinance shall be at least as effective as the Model Water Efficient Landscape Ordinance being developed by the Department of Water Resources.

13. WATER WASTE PROHIBITION.

Implementation methods shall be enacting and enforcing measures prohibiting gutter flooding, sales of automatic (self-regenerating) water softeners, single pass cooling systems in new connections, nonrecirculating systems in all new conveyer car wash and commercial laundry systems, and nonrecycling decorative water fountains.

14. WATER CONSERVATION COORDINATOR.

Implementation methods shall be at least as effective as designating a water conservation coordinator responsible for preparing the conservation plan, managing its implementation, and evaluating the results. For very small water suppliers, this might be a part-time responsibility. For larger suppliers this would be a full-time responsibility with additional staff as appropriate. This work should be coordinated with the supplier's operations and planning staff.

15. FINANCIAL INCENTIVES.

Implementation methods shall be at least as effective as:

a. Offering financial incentives to facilitate implementation of conservation programs. Initial recommendations for such incentives will be developed by the Council within two years of the initial signing of the MOU, including incentives to improve the efficiency of landscape water use; and

b. Financial incentives offered by wholesale water suppliers to their customers to achieve conservation.

16. ULTRA LOW FLUSH TOILET REPLACEMENT.

Water suppliers agree to implement programs for replacement of existing high-water-using toilets with ultra-low-flush toilets (1.6 gallons or less) in residential, commercial, and industrial buildings. Such programs will be at least as effective as offering rebates of up to $100 for each replacement that would not have occurred without the rebate, or requiring replacement at the time of resale, or requiring replacement at the time of change of service. This level of implementation will be reviewed by the Council after development of the assumptions included in the following two paragraphs using the economic principles included in paragraphs 3 and 4 of Exhibit 3.

a. Assumptions for determining estimates of reliable savings from installation of ultra-low-flush toilets in both existing and new residential, commercial, and industrial structures will be recommended by the Council to the State Water Resources Control Board ("State Board") by December 31, 1991 for use in the present Bay/Delta proceedings.

b. Should the Council not agree on the above assumptions, a panel will be formed by December 31, 1991 to develop such assumptions. The panel shall consist of one member appointed from the signatory public advocacy group; one member appointed from the signatory water supplier group; and one member mutually agreed to by the two appointed members. The assumptions to be used for this BMP will be determined by a majority vote of the panel by February 15, 1992 using the criteria for determining estimates of reliable savings included in this MOU. The decision of the panel will be adopted by the Council and forwarded to the State Board by March 1, 1992.

SECTION B. IMPLEMENTATION SCHEDULES

Best Management Practices will be implemented by signatory water suppliers according to the schedule set forth below. "Implementation" means achieving and maintaining the staffing, funding, and in general, the priority levels necessary to achieve the level of activity called for in the descriptions of the various BMPs and to satisfy the commitment by the signatories to use good faith efforts to optimize savings from implementing BMPs as described in section 4.4 of the MOU. BMPs will be implemented at a level of effort projected to achieve at least the coverages specified in Section C of this Exhibit within the initial ten year term of the MOU.

This schedule sets forth the latest dates by which implementation of BMPs will be underway. It is recognized that some signatories are already implementing some BMPs, and that this schedule does not prohibit signatories from implementing BMPs sooner than required.

The following BMPs will be implemented by the end of the first year of the initial term (numbers correspond to those in the list set forth in Section A above):

2a. ENFORCEMENT OF WATER CONSERVING PLUMBING FIXTURE STANDARDS INCLUDING REQUIREMENT FOR ULTRA LOW FLUSH TOILETS IN ALL NEW CONSTRUCTION BEGINNING JANUARY 1, 1992.

2b. SUPPORT OF STATE AND FEDERAL LEGISLATION PROHIBITING SALE OF TOILETS USING MORE THAN 1.6 GALLONS PER FLUSH.

3. DISTRIBUTION SYSTEM WATER AUDITS. (LEAK DETECTION AND REPAIR to be implemented by end of second year.)

7. PUBLIC INFORMATION.

8. SCHOOL EDUCATION.

13. WATER WASTE PROHIBITION.

14. WATER CONSERVATION COORDINATOR.

The following BMPs will be implemented by the end of the second year of the initial term:

2c. PLUMBING RETROFIT.

3. LEAK DETECTION AND REPAIR. (DISTRIBUTION SYSTEM WATER AUDITS to be implemented by end of first year.)

4. METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS.

6. LANDSCAPE WATER CONSERVATION REQUIREMENTS FOR NEW AND EXISTING COMMERCIAL, INDUSTRIAL, INSTITUTIONAL, GOVERNMENTAL, AND MULTI-FAMILY DEVELOPMENTS.

11. CONSERVATION PRICING. (All components except billing for sewer service based on metered water use.)

12. LANDSCAPE WATER CONSERVATION FOR NEW AND EXISTING SINGLE FAMILY HOMES.

16. ULTRA LOW FLUSH TOILET REPLACEMENT.

The following BMPs will be implemented by the end of the third year of the initial term:

1. INTERIOR AND EXTERIOR WATER AUDITS AND INCENTIVE PROGRAMS FOR SINGLE FAMILY RESIDENTIAL, MULTI-FAMILY RESIDENTIAL, AND GOVERNMENTAL/INSTITUTIONAL CUSTOMERS.

5. LARGE LANDSCAPE WATER AUDITS AND INCENTIVES.

9. COMMERCIAL AND INDUSTRIAL WATER CONSERVATION.

10. NEW COMMERCIAL AND INDUSTRIAL WATER USE REVIEW.

11. CONSERVATION PRICING. (Billing for sewer service based on metered water use.)

15. FINANCIAL INCENTIVES.

SECTION C: ASSUMPTIONS FOR ESTIMATING RELIABLE SAVINGS FROM BEST MANAGEMENT PRACTICES

Best Management Practice	Estimated Water Savings	
	Pre-1980 Construction	Post-1980 Construction
1. Interior and Exterior Water Audits and Incentive Programs for Single Family Residential, Multi-family Residential and Governmental/Institutional Customers		
Single Family and Multi-family		
Reduction factors		
Low-flow showerhead	7.2 gcd	2.9 gcd
Toilet retrofit[a]	1.3 gcd	0
Leak repair	0.5 gcd	0.5 gcd
Landscape audit, percent outdoor use	10%	10%
Coverage factor		
Target, top percent of users	20%	20%
Accept audit	20%	20%
Governmental/Institutional		
Reduction Factors		
Interior retrofit, percent indoor use	5%	0
Landscape audit, percent outdoor use	10%	10%
Coverage Factor		
Target, top percent of users	20%	20%
Accept audit	70%	70%

2. Plumbing, New and Retrofit		
a. Enforcement of Water Conserving Plumbing Fixture Standards Including Requirement for Ultra Low Flush Toilets in All New Construction Beginning January 1, 1992		
Reduction factor	b	b
Coverage factor		
All new homes and buildings built after January 1992	N/A	N/A
b. Support state and federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush		
Reduction factor	b	b
Coverage factor	NQ	NQ
c. Plumbing Retrofit		
Single family canvass		
Reduction factors		
Toilet retrofit[a]	1.3 gcd	N/A
Low-flow showerhead	7.2 gcd	N/A
Coverage factor		
Installation Rate	75%	N/A
Multi-family owner contact		
Reduction factors		
Toilet retrofit	1.3 gcd	N/A
Low-flow showerhead	7.2 gcd	N/A
Coverage factor		
Installation rate	80%	N/A

	FACTOR
3. Distribution System Water Audits, Leak Detection and Repair	
Reduction factor Lower unaccounted for water to no more than percent total use (All other utilities remain at current levels)	10%
Coverage factor Total number of utilities participating in audits	100%
Utilities participating in leak detection and repair	varies based on cost-effectiveness analysis
4. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	
Reduction factor Unmetered portion of utility, percent of applied water	20%
Coverage factor Unmetered customers	100%
5. Large Landscape Water Audits and Incentives	
Reduction factor Landscape audit for multi-family, commercial, industrial, institutional, and public users, with 3 acres of landscaping or more, percent of irrigation water use	15%
Coverage factor Applies to all sites three acres or more	

6. Landscape Water Conservation Requirements for New and Existing Commercial, Industrial, Institutional, Governmental, and Multi-family Developments	
Reduction factor Reduced landscape water use, percent of new irrigation use	20%
Coverage factor All new landscape areas	
7. Public Information	
Reduction factor	NQ
Coverage factor	NQ
8. School Education	
Reduction factor	NQ
Coverage factor	NQ
9. Commercial and Industrial Water Conservation	
Commercial water reduction results from Best Management Practices such as Interior and Landscape Water Audits, Plumbing Codes, and Other Factors but exclude Ultra Low Flush Toilet Replacement. Estimated reduction in gallons per employee per day in year 2000 use occurring over the period 1980-2000.	12%[c]
Industrial water reduction results from Best Management Practices, Waste Discharge Fees, New Technology, Water Audits, Plumbing Codes and Other Factors, but exclude Ultra Low Flush Toilet Replacement. Estimated reduction in gallons per employee per day in year 2000 use over the period 1980-2000.	15%[c]
10. New Commercial and Industrial Water Use Review	
Reduction factor	NQ
Coverage factor	NQ

11.	**Conservation Pricing**	
	Reduction factor	NQ
	Coverage factor	NQ
12.	**Landscape Water Conservation for New and Existing Single Family Homes**	
	Reduction factor	NQ
	Coverage factor	NQ
13.	**Water Waste Prohibition**	
	Reduction factor	NQ
	Coverage factor	NQ
14.	**Water Conservation Coordinator**	
	Reduction factor	NQ
	Coverage factor	NQ
15.	**Financial Incentives**	
	Reduction factor	NQ
	Coverage factor	NQ
16.	**Ultra Low Flush Toilet Replacement Programs**	
	Reduction factor	b
	Coverage factor	b

NOTES AND DEFINITION OF TERMS

a five year life (toilet retrofit)

b refer to paragraphs (a) and (b) of Best Management Practice No. 16

c includes savings accounted for in other Best Management Practices

gcd = gallons per capita per day

Reduction factor = unit water savings

Coverage factor = installation and/or compliance rate

Low flow showerhead = 2.5 gallons per minute maximum flow

Ultra low flush toilet = 1.6 gallons per flush maximum

Unaccounted for water = authorized (unmetered uses), leakage and meter error

Outdoor use = summer - winter use, on an average annual basis

Irrigation use = water used solely for irrigating, excluding cooling water use

Target = customers offered an incentive or audit

N/A = not applicable

NQ = not quantified at this time

SECTION D. POTENTIAL BEST MANAGEMENT PRACTICES

This Section contains Potential Best Management Practices ("PBMPs") that will be studied. Where appropriate, demonstration projects will be carried out to determine if the practices meet the criteria to be designated as BMPs. Within one year of the initial signing of this MOU, the Council will develop and adopt a schedule for studies of these PBMPs.

1. RATE STRUCTURES AND OTHER ECONOMIC INCENTIVES AND DISINCENTIVES TO ENCOURAGE WATER CONSERVATION. This is the top priority PBMP to be studied. Such studies should include seasonal rates; increasing block rates; connection fee discounts; grant or loan programs to help finance conservation projects; financial incentives to change landscapes; variable hookup fees tied to landscaping; and interruptible water service to large industrial, commercial or public customers. Studies on this PBMP will be initiated within 12 months from the initial signing of the MOU. At least one of these studies will include a pilot project on incentives to encouarage landscape water conservation.

2. EFFICIENCY STANDARDS FOR WATER USING APPLIANCES AND IRRIGATION DEVICES.

3. REPLACEMENT OF EXISTING WATER USING APPLIANCES (EXCEPT TOILETS AND SHOWERHEADS WHOSE REPLACEMENTS ARE INCORPORATED AS BEST MANAGEMENT PRACTICES) AND IRRIGATION DEVICES.

4. RETROFIT OF EXISTING CAR WASHES.

5. GRAYWATER USE.

6. DISTRIBUTION SYSTEM PRESSURE REGULATION.

7. WATER SUPPLIER BILLING RECORDS BROKEN DOWN BY CUSTOMER CLASS (E.G., RESIDENTIAL, COMMERCIAL, INDUSTRIAL).

8. SWIMMING POOL AND SPA CONSERVATION INCLUDING COVERS TO REDUCE EVAPORATION.

9. RESTRICTIONS OR PROHIBITIONS ON DEVICES THAT USE EVAPORATION TO COOL EXTERIOR SPACES.

10. POINT-OF-USE WATER HEATERS, RECIRCULATING HOT WATER SYSTEMS AND HOT WATER PIPE INSULATION.

11. EFFICIENCY STANDARDS FOR NEW INDUSTRIAL AND COMMERCIAL PROCESSES.

EXHIBIT 2

CALIFORNIA URBAN WATER CONSERVATION COUNCIL

1. The California Urban Water Conservation Council (the "Council") will be comprised of a representative of each of the signatories to the MOU.

2. The Council will be housed by California Urban Water Agencies ("CUWA"). The Council will act independently of CUWA on all technical and policy issues. CUWA will be responsible for the initial funding and ensuring that the Council's administrative and general office needs are met. CUWA will retain the right to withdraw from this relationship at any time upon 180 days written notice to the Council. The Council recognizes that its funding requirements may exceed what CUWA is prepared to contribute and that alternative funding may be needed.

3. The Council's responsibilities and authorities include:

(a) Recommending study methodologies for Best Management Practices ("BMPs"), including procedures for assessing the effectiveness and reliability of urban water conservation measures.

(b) Developing guidelines including discount rate to be used by all signatories in computing BMP benefits and costs pursuant to Exhibit 3.

(c) Reviewing and modifying the economic principles set forth in Exhibit 3.

(d) Collecting and summarizing information on implementation of BMPs and Potential Best Management Practices ("PBMPs").

(e) Adopting or modifying BMPs and PBMPs lists.

(f) Adopting or modifying reliable water conservation savings data for BMPs.

(g) Adopting or modifying the schedules of implementation for existing and new BMPs.

(h) Adopting or modifying the schedules for research and demonstration projects for BMPs and PBMPs.

(i) Coordinating and/or making recommendations regarding BMPs study and demonstration projects.

(j) Accepting or denying requests for additional parties to join the MOU and assigning additional parties to one of the three signatory groups as described in Section 1.3 of the MOU.

(k) Reviewing and modifying report formats.

(l) Making annual reports to the State Water Resources Control Board and the Council Members on the above items based on the format described in Exhibit 5.

(m) Within two years of the initial signing of this MOU, developing and implementing procedures and a funding mechanism for independent evaluation of the MOU process at the Council and signatory levels.

(n) Undertaking such additional responsibilities as the Members may agree upon.

4. The Council will make formal reports to the State Water Resources Control Board and to the governing bodies of all Council Members. Such reports shall include a formal annual written report. Other reports such as status reports and periodic updates may be prepared as deemed appropriate by the Council. Any Member of the Council will be entitled to review draft reports and comment on all reports. Such comments shall be included in any final report at the Member's request.

5. It is anticipated that the Council will develop a committee structure, which will include a Membership Committee as described in Section 7.2 of the MOU. A Steering Committee and one or more technical committees may also be needed.

6. For purposes of the Council, signatories will be divided into three groups: water suppliers ("Group 1"), public advocacy organizations ("Group 2") and other interested groups ("Group 3") as those terms are defined in Section 1 of the MOU. Members of Groups 1 and 2 shall be members of the Council and shall possess all voting rights. Members of Group 3 shall not have voting rights, but shall act in an advisory capacity to the Council.

7. Decisions by the Council to undertake additional responsibilities; to modify the MOU itself; or to modify Exhibits 2 or 3 require the following:

(a) The Council will provide notice to all signatories giving the text of the proposed action or modification at least 60 days in advance of the vote by the Council.

(b) To pass the action or modification, there must be a vote in favor of the action or modification by at least 2/3 of the members of Group 1 voting,

including votes made in person or in writing, and a vote in favor of the action or modification by at least 2/3 of the members of Group 2 voting, including votes made in person or in writing.

8. All other modifications and Council actions shall be undertaken as follows: There must be a vote in favor of the modification or action by a simple majority of the members of Group 1 voting, including votes made in person or in writing, and a vote in favor of the modification or action by a simple majority of the members of Group 2 voting, including votes made in person or in writing.

EXHIBIT 3

PRINCIPLES TO GUIDE THE PERFORMANCE OF BMP ECONOMIC (COST-EFFECTIVENESS) ANALYSES

1. The total cost-effectiveness of a conservation measure will be measured by comparing the present value of the benefits of the measure listed in paragraph 3 below to the present value of the costs listed in paragraph 4. The measure will be cost-effective if the present value of the benefits exceeds the present value of the costs.

2. The cost-effectiveness of a conservation measure to the water supplier will be measured by comparing the present value of the benefits described in paragraph 5 to the present value of the costs described in paragraph 6. The measure will be cost-effective if the present value of the benefits exceeds the present value of the costs.

3. Total benefits exclude financial incentives received by water suppliers or by retail customers. These benefits include:

   (a) avoided capital costs of production, transport, storage, treatment, wastewater treatment and distribution capacity

   (b) avoided operating costs, including but not limited to, energy and labor

   (c) environmental benefits and avoided environmental costs

   (d) avoided costs to other water suppliers, including those associated with making surplus water available to other suppliers

   (e) benefits to retail customers, including benefits to customers of other suppliers associated with making surplus water available to these suppliers

4. Total program costs are those costs associated with the planning, design, and implementation of the particular BMP, excluding financial incentives paid either to other water suppliers or to retail customers. These costs include:

   (a) capital expenditures for equipment or conservation devices

   (b) operating expenses for staff or contractors to plan, design, or implement the program

   (c) costs to other water suppliers

(d) costs to the environment

(e) costs to retail customers

5. Program benefits to the water supplier include:

(a) costs avoided by the water supplier of constructing production, transport, storage, treatment, distribution capacity, and wastewater treatment facilities, if any.

(b) operating costs avoided by the water supplier, including but not limited to, energy and labor associated with the water deliveries that no longer must be made

(c) avoided costs of water purchases by the water supplier

(d) environmental benefits and avoided environmental costs

(e) revenues from other entities, including but not limited to revenue from the sale of water made available by the conservation measure and financial incentives received from other entities

6. Program costs to the water supplier include:

(a) capital expenditures incurred by the water supplier for equipment or conservation devices

(b) financial incentives to other water suppliers or retail customers

(c) operating expenses for staff or contractors to plan, design, or implement the program

(d) costs to the environment

7. The California Urban Water Conservation Council ("Council") will be responsible for developing guidelines that will be used by all water suppliers in computing BMP benefits and costs. These guidelines will include, but will not be limited to, the following issues:

(a) analytical frameworks

(b) avoided environmental costs

(c) other impacts on the supply system that may be common to many water suppliers

(d) time horizons and discount rates

(e) avoided costs to non-water supply agencies

(f) benefits and costs to retail customers

(g) benefits of water made available to other entities as a result of conservation efforts

These guidelines will recognize the uniqueness of individual water suppliers and will therefore not impose excessive uniformity.

8. Within these guidelines, each water supplier will be responsible for analyses of the cost-effectiveness of particular BMPs on its system. These analyses will be reviewed by the Council.

9. The Council will also be responsible for periodically reviewing the overall framework set forth in this Exhibit.

EXHIBIT 4

[Date]

W. Don Maughan, Chairman, and Members
State Water Resources Control Board
901 "P" Street
Sacramento, California 95801

Subject: Bay/Delta Proceedings:
Urban Water Conservation

Dear Chairman Maughan and Members:

We are pleased to forward to you a copy of a "Memorandum of Understanding Regarding Urban Water Conservation in California" recently entered into by many urban water suppliers, public advocacy organizations, and other interested groups.

This Memorandum of Understanding was developed over a period of many months of fact-gathering and intensive negotiations. It commits the signatory water suppliers to good faith implementation of a program of water conservation which embodies a series of "Best Management Practices" for California's urban areas. It also commits all of the signatories to an ongoing, structured process of data collection through which other conservation measures, not yet in general use, can be evaluated as to whether they should be added to the list of Best Management Practices. Finally, it commits all signatories to recommending to this Board that the Best Management Practices identified in this Memorandum of Understanding be taken as the benchmark for estimating reliable savings for urban areas which utilize waters affected by the Bay/Delta proceedings. An important part of this program is the signatories' recognition of the need to provide long-term reliability for urban water suppliers and long-term protection of the environment.

To carry out these commitments, please be advised that each of the signatories has endorsed making the following recommendations to this Board:

1. That for purposes of the present Bay/Delta proceedings, implementation of the Best Management Practices process set forth in the Memorandum of Understanding represents a sufficient long-term water conservation program by the signatory water suppliers, recognizing that additional programs may be required during occasional water supply shortages.

2. That for purposes of the present Bay/Delta proceedings only, the Board should base its estimates of future urban water conservation savings on implementation of all of the Best Management Practices included in Section A of Exhibit 1 to the Memorandum of Understanding for the entire service area of the signatory water suppliers and only on those Best Management Practices, except for (a) the conservation potential for water supplied by urban agencies for agricultural purposes, or (b) in cases where higher levels of conservation have been mandated.

3. That for purposes of the present Bay/Delta proceedings, the Board should make its estimates of future urban water conservation savings by employing the reliable savings assumptions associated with those Best Management Practices set forth in Section C of Exhibit 1 to the Memorandum of Understanding. Measures for which reliable savings assumptions are not yet available should not be employed in estimating future urban water use.

4. That the Board should include a policy statement in the water rights phase of the present Bay/Delta proceedings supporting the Best Management Practices process described in the Memorandum of Understanding and should also consider that process in any documents it prepares pursuant to the California Environmental Quality Act as part of the present Bay/Delta proceedings.

It should be emphasized that the Memorandum of Understanding does not contain projections of population for California and, accordingly, none of the signatories to the Memorandum of Understanding are agreeing to recommend that any specific population levels be used by the Board in estimating future water demands. Furthermore, it should be noted that the signatories have retained the right to advocate any particular level of protection for the Bay/Delta Estuary, including levels of freshwater flows, and that the Memorandum of Understanding is not intended to address any authority or obligation of the Board to establish freshwater flow protections or to set water quality objectives for the Estuary. The Memorandum of Understanding is also not intended to address any authority of the Environmental Protection Agency.

Finally, as described in Section 5.1 of the MOU, the signatories have not limited their ability to propose different conservation practices, different estimates of savings or different processes in a forum other than the present Bay/Delta proceedings or for non-urban water suppliers or for other water management issues. Public advocacy organization signatories have not agreed to use the initial assumptions of reliable conservation savings in proceedings other than the present Bay/Delta proceedings. The signatories may present other assumptions of reliable conservation savings for non-signatory water suppliers in the Bay/Delta proceedings,

provided that such assumptions could not adversely impact the water supplies of signatory water suppliers.

The Memorandum of Understanding establishes an ongoing process for study and research in the field of urban water conservation and an organizational structure to support this effort, which is described in Exhibit 2 to the Memorandum of Understanding. The process is dynamic and contemplates periodic revisions to the list of Best Management Practices, as well as refinements to the savings assumptions based on continuing field studies. The California Urban Water Conservation Council will forward updated lists of Best Management Practices and updated savings assumptions to the Board as they become available. However, for the present Bay/Delta proceedings, the measures and savings assumptions listed on Exhibit 1 should be used as described above.

The Memorandum of Understanding is a significant accomplishment and one of which all the parties are proud. We hope it will be of value to the Board in the complex and important Bay/Delta proceedings. By copy of this letter, we are forwarding these recommendations to the Environmental Protection Agency.

Very Truly Yours,

Name of Signatory

By:_____

cc: Administrator
U.S. Environmental Protection Agency
401 "M" Street, SW
Washington, D.C. 20460

Regional Administrator, Region IX
U.S. Environmental Protection Agency
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San Francisco, California 94105

EXHIBIT 5

URBAN WATER CONSERVATION ANNUAL REPORT OUTLINE

I. Executive Summary

II. Implementation Assessment

Water Suppliers' Report
- Findings
- Comments
- Progress

Public Advocacy Organizations' Report
- Findings
- Comments
- Progress

III. Survey Results for 199X

Summary of Survey Responses
- Table ___. Per Capita Usage [by region]
- Table ___. Status of BMP Implementation [by supplier]
- Table ___. Proposed Implementation Schedules

Interpretation of Survey Responses
- Lack of Data
- Climatic Influences
- Implementation Difficulties

Evaluation of Results

IV. Trend Analysis

Comparison with Prior Years
- Table ___. Per Capita Usage [by region]

Projected Conservation
- Table ___. Schedule of Implementation

Updated Estimates of Future Savings [by region]

Evaluation of Progress

V. Studies of Best Management Practices

Assessment of Current BMPs
Table ___. Evaluation of Effectiveness [by measure and region]

Assessment of Potential BMPs
Status of Current Studies
Proposed Future Studies

Revision of Lists of Current and Potential BMPs
Additions and Deletions

Other Modifications to MOU or Exhibits

VI. Recent Developments

Legislative Update
Program Funding

Case Studies
Residential Conservation
Industrial Conservation
Irrigation Efficiency
Legal Actions

National Practices

Technical Advances

Publications

VII. Council Committee Activities

VIII. Funding Levels

IX. Staffing Levels

X. Substantiated Findings by Signatory Water Supplier in Support of Use of Exemptions

XI. Substantiated Findings in Support of Use of Alternative Schedule of Implementation

Appendices

List of Signatories [subcommittee members noted]
Key Correspondence and Comments

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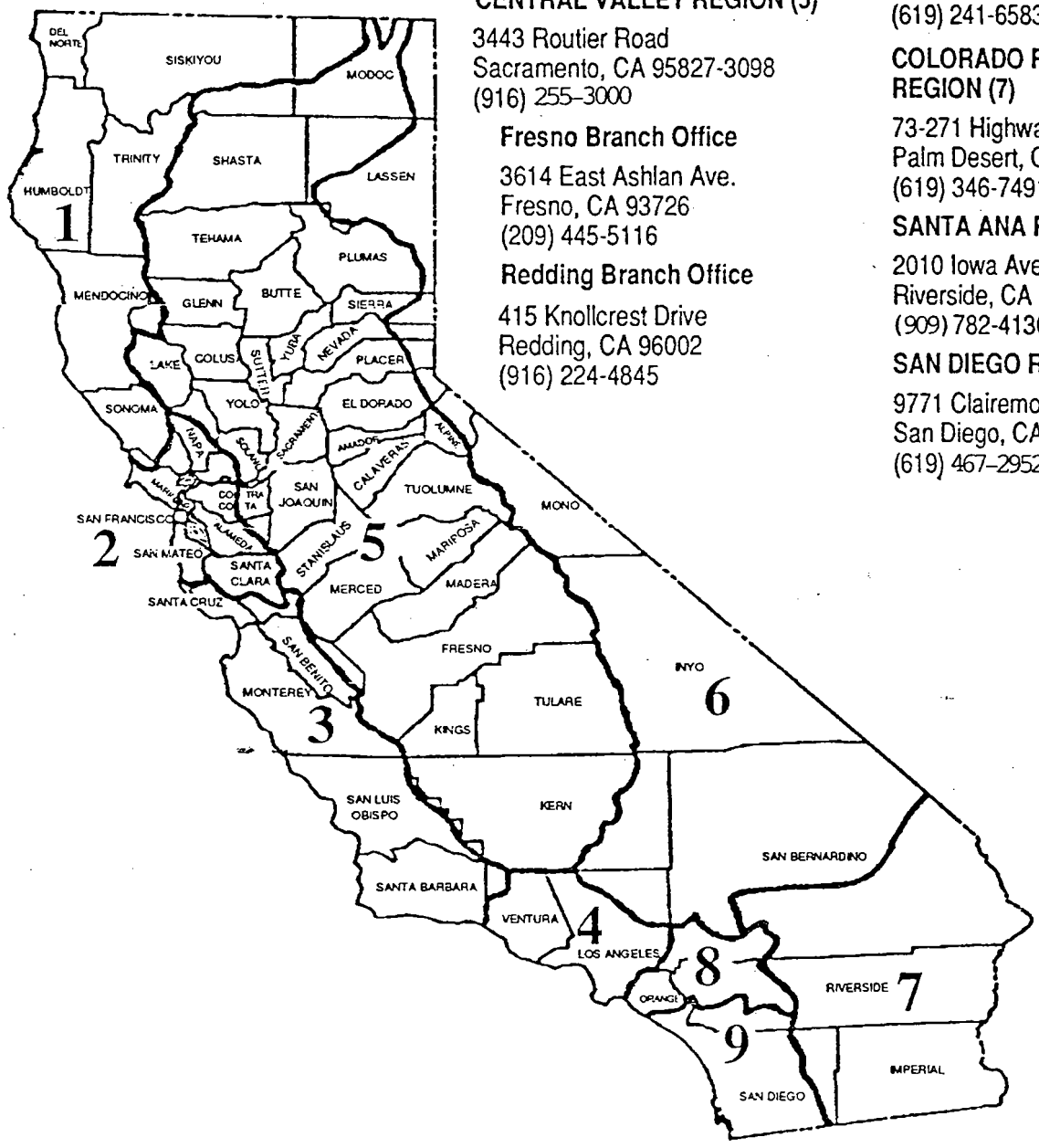

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