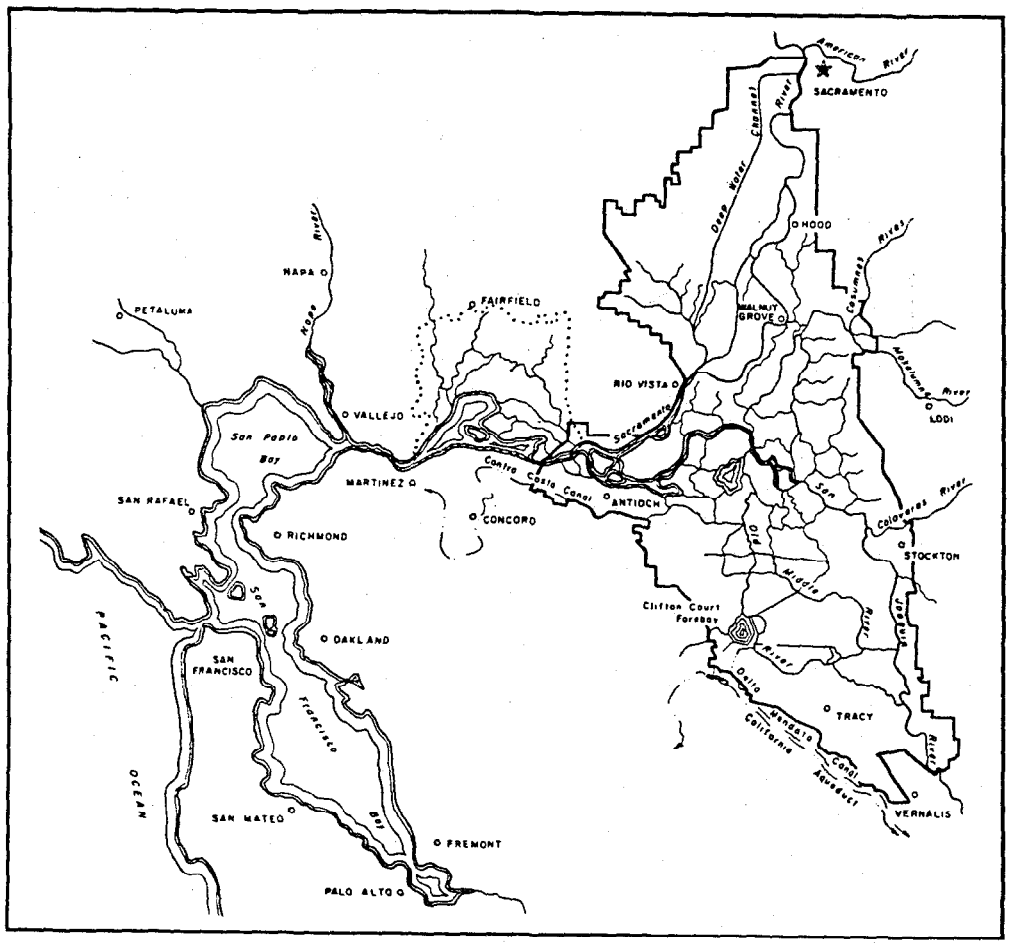

DRAFT

Water Right Decision 1630

SAN FRANCISCO BAY/ SACRAMENTO - SAN JOAQUIN DELTA ESTUARY

DECEMBER 1992

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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Pete Wilson, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
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STATE WATER RESOURCES CONTROL BOARD MEETING

NOTICE OF REVISED SCHEDULE FOR CONSIDERATION OF DRAFT WATER RIGHTS DECISION 1630 ESTABLISHING TERMS AND CONDITIONS FOR INTERIM PROTECTION OF THE PUBLIC TRUST USES OF THE SAN FRANCISCO BAY/SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

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The Board has received numerous requests to extend the time allowed for receipt of written comments on draft Decision 1630. The requests cite the complexity of the decision in asking for additional time to evaluate its impacts.

Director David Kennedy of the Department of Water Resources has requested an extension of at least one month, and has stated his opinion that the additional time would not foreclose any options for further regulatory action. The Director has also stated that 1993 water allocations will be made on a conservative basis in an effort not to prejudice further regulatory actions.

A letter submitted on behalf of Regional Director Roger Patterson of the U. S. Bureau of Reclamation requests that the comment period be extended to February 12. The Bureau advised that it is currently operating the Central Valley Project in conformance with the provisions of the reverse flow criteria contained in the draft decision as an interim action to protect the winter run salmon.

Notably, the Department of Fish and Game, by memorandum submitted on behalf of Director Boyd Gibbons, has stated that it has no objection to a 30-day time extension.

The Board considers the statements made by the two primary project operators to be compelling reasons to allow more time for analysis of the draft decision by the parties. Therefore, the period for receipt of written comments is extended to:

Tuesday, February 16, 5:00 p.m.

-- over --

and the Board meeting to consider adoption of the draft decision is rescheduled for:

Monday, March 1 -- 9:00 a.m.*
Monday, March 8 -- 9:00 a.m., if necessary
Tuesday, March 9-- 9:00 a.m., if necessary
First-Floor Auditorium
The Resources Building
1416 Ninth Street, Sacramento

Please note at the March 1 meeting time limitations on presentations of oral comments may be imposed. The State Board requests that oral comments be kept short. Also, please note that the evidentiary record is closed and parties should not attempt to introduce new evidence at this time.

The Board is currently compiling an errata package to correct discrepancies in the wording of the draft and to clarify the Board's intent in several instances. The errata package will be forwarded under separate cover within the next week.

Questions should be directed to Dave Beringer at (916) 657-2187 or Barbara Leidigh at (916) 657-2102

Maureen Marché
Administrative Assistant to the Board

Dated: January 12, 1993

* Please note the January 25, 28 and 29, 1993 meeting dates are cancelled.

November 17, 1992

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

D

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.	DECISION 1630

R

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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November 17, 1992

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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.	**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 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 water supply reliability.

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New Standards

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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 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 2,000 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 reliability of water supplies. (Section III.C.3.)*

10. *Mitigation and monitoring fees are established to fund additional mitigation measures and to distribute fairly the costs of monitoring. Up to 60 million dollars per year 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.)*

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. However, 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 the proportionate size of their reservoirs. 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. *During pulse flows direct diverters of 100 cubic feet per second or more are required to cease diversions for five days to avoid diverting fish that are being carried by the pulse flows.*

Effects of This Decision

1. *Compared with average water exports during the base period for estimating environmental effects (i.e., before the current drought altered water demands and deliveries (1984-1989)), the Board predicts, based on the use of Department of Water Resources' models, that under this decision, the average annual export of water during the base period would be 5.2 million acre-feet. The long-term average annual export during the 70-year period of record-keeping would be 5.6 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 average 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 may fall short of D-1485 estimates by 0.8 million acre-feet per year and in certain critical periods could be as high as 1.9 million acre-feet per year. 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 generally 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 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).

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

This decision also specifies initial responsibilities of other large water right holders whose storage, diversion and use of water affects the public trust uses of the Bay/Delta Estuary.[2]

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]

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.

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.

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.

D R A F T

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

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

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 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 hearing was held in June, July, and August 1992, commencing on June 22 and concluding on August 4, 1992. The issues for 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.

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 Committee 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 negotiating an agreement to establish a state policy that will protect urban, agricultural, and environmental interests in the waters of the Delta.

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

9. *The DWR is considering installation of a temporary barrier across Georgiana Slough to help guide outmigrating winter-run Chinook salmon toward the ocean.*

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.

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 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 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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¤ 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 California (MWD) projected total conservation savings of 542 thousand acre-feet (TAF) by 2000 and 831 TAF by 2010 compared to consumption which would otherwise have occurred without conservation. (WRINT-SWC-3b,6.) The City and County of San Francisco has a goal of 25 percent 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 by 2020 through conservation. (WRINT-EMBMUD-5,16.) These conservation 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

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

SERVICE AREA (Counties covered)	PRE-DROUGHT CONDITIONS (1)				CURRENT DROUGHT CONDITIONS (1)				PROJECTED 1998 CONDITIONS (1)				PRE-DROUGHT SUPPLY vs 1998 DEMANDS (2)		
WATER SOURCES	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 METROPOLITAN SERVICE AREA (MILLION ACRE–FEET)

Supplies

SERVICE AREA	1990 [1]	1991 [2]	1995 [3]	1998 [8]	2000 [3]	2010 [3]	Comments/References
SWP	1.46	0.415	1.58[3]	1.71	1.77	2.36	[1] WRINT–SWC–8, Fig. 1
L.A. Aqueduct	0.11	0.19	0.3[4]	0.3	0.3[4]	0.3[4]	[2] WRINT–SWC–8, Fig. 2
Local Supplies (Surface & G/w)	1.04	1.06	1.08	1.07	1.06	1.05	[3] WRINT–SWC–8, p. 32
Wastewater Reuse (Existing)	0.24	0.25	0.28	0.31	0.34	0.40	[4] Average annual dependable supply; WRINT–SWC–8, p. 17
Wastewater Reuse (New) [7]			0.04[9]	0.13	0.19[9]	0.28[9]	[5] Projected Delta Water demand under normal conditions and no additional reservoir carry over storage prior to 1995. WRINT–SWC–8, p.31
Colorado River	1.22	1.25	0.62[6]	0.62	0.62[6]	0.62[6]	[6] Includes water conservation program with IID, and land fallowing program PVID WRINT–SWC–8, p. 27
Drought Emergency Water Bank		0.215[10]					[7] WRINT–SWC–10, p.16
							[8] Estimated
							[9] WRINT–SWC–10, p.16
Total Supplies	4.07	3.36	3.90	4.14	4.26	5.01	[10] WRINT–SWC–8, p. 4

Demand

SERVICE AREA	1990 [2]	1991	1995 [6]	1998 [7]	2000 [6]	2010 [6]	Comments/References
							[1] WRINT–SWC–3B, Table 1
Urban	3.57	3.29[5]	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] Includes Conservation Savings WRINT–SWC–3b, p. 14
Net Water Balance Supply – Demand	0.07	<0.28>	0.04	0.14[8]	0.19	0.28	[5] WRINT–SWC–3b, p. 6
							[6] Projected for normal weather
Urban Per Capita [4] (GPCD)	214	193	192	192	192	195	[7] Estimated
Conservation Savings(MAF)	0.223[5]				0.306	0.397	[8] Assuming 1.71 MAF of SWP water
BMP's					0.235	0.434	[9] WRINT–SWP–3a, Table 2
CCSCE[10] Population Projection (Millions) (1992)[9]	14.9		16.3	17.1	17.6	20.3	[10] CCSCE: Center for Continuing Study of California Economy
Population Projection[9] SCAG[11] (1987) & SANDAG[12] (1986)	14.8		15.7	16.3	16.6	18.2	[11] SCAG: Southern California Association of Governments
							[12] SANDAG: San Diego Association of Governments

MWD Reasonable Demand Calculations – 1998 Level of Development

Assumptions	Population	= 16.3 million
	Urban Per Capita Consumption	= 192 gpcd
	Urban Demand	= 3.5 MAF/yr
	Ag Demand	= 0.34 MAF/yr
	Total Demand	= 3.84 MAF/yr
Estimated 1998 Supplies – Except SWP		2.43 MAF
Additional Supplies Required Including SWP	3.84 – 2.43	= 1.41 MAF

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

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 estimated the quantity of water reuse was 325 TAF in 1989 and is projected to be 474 TAF by 2000. (WRINT-DWR-13,96.) This projected estimate is conservative and is a minimum figure for reclamation potential. D R

- Waste water reclamation made up approximately 250 TAF of MWD's dependable water supply in 1991 and is expected to reach 400 TAF by 1992 and 680 TAF by 2010. (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.) A F

- 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 T

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 are 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 storage in ground water 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, up to nearly 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

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of the Delta; therefore, these options must be aggressively pursued.

3. Requirements

¤ Water right holders identified in this decision 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 uses of water.

Section 4.5 of the MOU (Exemptions) which provides a process for exempting water suppliers from the implementation of specific BMPs shall not apply to the following BMPs. (Numbered as in the MOU):

1. Interior and exterior water audits and incentive programs for multi-family residential and governmental/ institutional customers. (This requirement does not apply to single-family residential customers.)

2a. Enforcement of water conserving plumbing fixture standards including requirements for ultra low flush toilets in all new construction beginning one year from the date of this decision.

2c. Plumbing retrofit kits.

3. Distribution system water audits, leak detection, and repair.

4. Metering with commodity rates (bill by volume of use) for all new connections. (Section 4.5 of the MOU applies to the remaining portion of this BMP (retrofit of existing connections). The substantiation required in Section 4.5 to qualify for the exemption shall be sent to the Chief of the Division of Water Rights for the public record.)

5. Large landscape water audits and incentives.

6. Landscape water conservation requirements for new and existing commercial, industrial, institutional, governmental, and multi-family developments.

9. Commercial and industrial water conservation.

10. New commercial and industrial water use review.

11. Conservation pricing.

13. Water waste prohibition.

14. Water conservation coordinator.

16. Ultra low flush toilet replacement. (This BMP is mandatory only in export areas.[4] For areas within the Delta watershed, the substantiation required in Section 4.5 to qualify for the exemption shall be sent to the Chief of the Division of Water Rights for the public record.)

- During dry and critically dry years, as determined by DWR using the Sacramento Valley Hydrologic Year Classification System set forth in this decision, all urban water suppliers subject to this decision shall implement a price rate structure in which rates increase as the quantity of water used increases (tiered water pricing). This requirement shall be implemented by July 1994.

- The DWR shall monitor the progress of the major water right holders in implementing the MOU and shall provide the State Water Board with annual reports documenting this progress. The first report will be due on July 1, 1993.

4 *"Export areas" in this decision means areas receiving water by way of the Delta-Mendota Canal, California Aqueduct, South Bay Aqueduct, North Bay Aqueduct, Hetch Hetchy Aqueduct, Friant-Kern Canal, Contra Costa Canal, and the Mokelumne Aqueduct.*

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.

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.)

- 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 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.

- 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.

¤ 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.)

	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

¤ 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 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.)

- 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.)

- 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 is 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.)

- 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.)

- 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 contained a recommendation of a maximum deep percolation of 0.4 acre-feet per acre per year in the drainage problem areas.

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

  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

  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.

- 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.)

- 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 (MAD) 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.)

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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.

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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.

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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.

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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 from all water sources on irrigated lands identified in figures 1 to 4 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 become effective by March 1994.

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- 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.

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C. FISH AND WILDLIFE

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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. When the SWP and CVP export pumps in the south Delta are operating, the lower portions of Old and Middle Rivers (branches of the San Joaquin River in the south Delta) reverse their courses and flow south towards the 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 very high export rates with reduced inflow, the lower

San Joaquin River reverses its direction of flow, and water from the lower Sacramento River or Suisun Bay is pulled upstream around Sherman Island or through Threemile Slough. The upper mainstem of the San Joaquin River may also reverse flow due to low inflow and the drawdown in upper Old River towards the export pumps.

- 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[5] for the San Joaquin River Basin (60-20-20[6]) and the Sacramento River Basin (40-30-30[7]). 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

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5 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.

6 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 reservoir carryover storage from the previous water year (with a cap) (20 percent). Table II contains a more detailed description of this index.

7 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 reservoir carryover storage from the previous water year (with a cap) (30 percent). Table II contains a more detailed description of this index.

(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.)

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- The current drought is severe. The water year classification in the San Joaquin River Basin based on the 60-20-20 index has been critically dry for the last six years. The water year classification in the Sacramento Basin based on the 40-30-30 index has been critically dry for four years and dry for two years of the last six years.

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b. Public Trust Resources

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- *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 persistent low abundance levels; the 1985 population level was 80 percent lower than the 1967-1982 average population. (WRINT-DFG-9, 5.) Adult striped bass abundance was estimated to be about 3 million in the early 1960s, and 1.7 million in the late 1960s; the 1990 estimate of

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naturally produced adult fish was 590,000. (WRINT-DFG-2,3.) Abundances of shrimp and rotifers have declined between 67 percent and 90 percent from levels in the 1970s and 1980s. (WRINT-NHI-9,4.) 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.)

- 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-DWR-31,1; WRINT-USBR-10,8; WRINT-SWRCB-3,5-27.) The present drought has also been a contributing factor to these declines. (WRINT, T,III,248:23-249:21.)

- 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 minimal export rate during these months would help to reduce fish losses. It would not be reasonable 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 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

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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.)

- The Sacramento River fall-run Chinook salmon migrate through the lower Sacramento River and the Delta from 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 causes dessication of redds and the stranding of fry. (WRINT-DFG-14,12-3; WRINT-NMFS-4,9-10.)

- The U.S. Fish and Wildlife Service (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.)

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- 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 insure 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.

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- 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 State Water Contractors (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

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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 for the benefit of hatchery smolts, which will also benefit wild smolts and a broad range of estuarine species.

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 should be minimized during the middle of the pulse flow.

¤ *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 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.

¤ 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 which assumes there is no barrier at the head of Old River was developed in part using relationships between adult fall-run salmon escapement to the San Joaquin basin and flow at Vernalis during the spring months and exports 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. (WRINMT-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 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 presents this relationship with reservations. (WRINT-USFWS-7,54-59.)

¤ 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.)

- 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 depending on the water year type. (WRINT-USFWS-7,57.)

- 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 smolt and other 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 Slough. (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.)

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- An attraction flow for adult migrating Chinook salmon should occur during approximately the last

two weeks of October in the San Joaquin River and be measured at Vernalis. (WRINT-DFG-25,9.) The flow would attract the fish up the San Joaquin River and tributaries, provide some degree of temperature control in the upstream areas as well as the lower San Joaquin River, provide passage flows to the Hatchery on the Merced, reduce straying to Mud and Salt Sloughs and help alleviate the low dissolved oxygen problem in the lower San Joaquin River near Stockton. Flows in late October since 1989 (between 900 and 1300 cfs) were inadequate to attract adult salmon (WRINT-DFG-25,10), but flows of at least 2,000 cfs in seven years between 1979 and 1988 have appeared adequate for salmon attraction. Therefore, an interim standard for an attraction flow should be a minimum flow of 2,000 cfs, measured at Vernalis, with contributions from each of the tributaries. Monitoring of the adult escapement will provide information on the effectiveness of the magnitude, duration and timing of the attraction flow.

- *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 extensive effort, and because striped bass are assumed to be representative of a large group of estuarine resident fish species, it

has been used as an indicator of the overall condition of the Estuary. (I-SWRCB-14,III-2; WRINT-SFEP-3,ES-3.)

¤ 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.) Other factors, such as poaching, pesticides, and changes in food chains may also affect striped bass abundance, but there are no quantitative data available to measure these effects. (WRINT-SWC-1.)

¤ 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 the presence of pulses 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.)

¤ Low flows in the Sacramento River during striped bass spawning periods increase the mortality of eggs and young 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 flow of 13,000 cfs 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.) This flow will also benefit other estuarine species and migrating salmon smolts.

¤ 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.)

¤ 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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¤ 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.

- 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.

- A reverse flow limited to 1,000 cfs in July and 2,000 cfs from August 1 to January 31 (QWEST[8] calculation) will provide increased protection from entrainment for Estuary fish compared to present conditions.

- Improved habitat stability can be achieved by adopting standards with short averaging periods. Such standards should recognize the needs of the

8 QWEST is the calculated estimate from DAYFLOW of the net flow from the central Delta to the western Delta. It represents the sum of flows in the lower San Joaquin River, False River, and Dutch Slough; it does not include Threemile Slough. It is sometimes incorrectly called Jersey Point flow. Negative values mean "reverse flow", that is, net flow from the western Delta into the central Delta.

projects for operational flexibility and the inherent variations in large natural systems. DFG 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.)

- *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.

- 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.

- 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.)

- *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, 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.)

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.

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.

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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.

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3. **Requirements**

- The State Water Board will require compliance with the water quality objectives in the 1991 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

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9 The SWP and CVP water right permits contain terms and conditions adopted in 1985, which differ from the 1991 Bay/Delta Plan.

Water Board will require compliance with the minimum flow and maximum export rate requirements contained in D-1485 except as set forth herein. All flow and water quality standards are summarized in Table II.

- All flow and water quality standards in this order, including those retained from D-1485, are to be calculated on a 14-day running average, starting from the first day of the applicable standard, unless this decision specifies another averaging period or D-1485 specifies a shorter averaging period.

- 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.

- 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 shall be retained.

- There shall be no reverse flow for all year types on a 14-day running average in the western Delta (QWEST > 0 cfs, as calculated in DAYFLOW) between February 1 and June 30. In dry and critical dry years, the 14-day running average combined export rate for the Tracy, Banks, and Contra Costa pumping plants shall be less than or equal to 4,000 cfs between April 1 and

June 30. In wet, above normal and below normal year types, the 14-day running average combined export rate for the Tracy, Bank, and Contra Costa pumping plants shall be less than or equal to 6,000 cfs between April 1 and June 30. The reverse flow restrictions for all year types are relaxed when combined CVP and SWP exports are less than 2,000 cfs. The export pumping rate restriction is relaxed for all year types when Delta outflow exceeds 50,000 cfs, except for the export pumping restriction during the San Joaquin pulse period as discussed below. D

- The 14-day running average flow shall be greater than -1,000 cfs in the western Delta (QWEST > -1,000 cfs as calculated in DAYFLOW) between July 1 and July 31. The 14-day running average flow shall be greater than -2,000 cfs in the western Delta (QWEST > -2,000 cfs, as calculated in DAYFLOW) between August 1 and January 31. The reverse flow restrictions from July 1 through January 31 do not apply whenever the electrical conductivity at the Mallard Slough monitoring station is less than 3 mmhos per centimeter. R A

- All QWEST flow standards shall be calculated using a 14-day running average, starting with the first day of the applicable period of the standard. In addition, the 7-day running average of QWEST, also starting on the first day of the applicable period, shall not fall more than 1,000 cfs below the applicable 14-day running average. F T

- 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 or with 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.

- The 14-day running average flow in the Sacramento River at Freeport shall not be less than 13,000 cfs for a 42-day continuous period, with a minimum mean daily flow of not less than 9,000 cfs, when real-time monitoring indicates the presence of striped bass eggs and larvae in the Sacramento River below Colusa. DWR and USBR shall conduct continuous real-time 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.

- The average flow in the Sacramento River at Freeport shall be not less than 18,000 cfs for a 14-day

continuous period corresponding to the release of salmon smolts from the Coleman National Fish Hatchery. 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.

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- 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 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.

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- The average flow in the San Joaquin River at Vernalis shall be 2,000 cfs for a 14-day continuous period in the fall. The Executive Director, or his designee,

will consult with the directors of the DFG, DWR, USBR, and USFWS, or their designees to determine the most appropriate time when the 14-day period shall begin (usually in late October), prior to invoking this requirement. The amount of additional water specifically released to meet the two San Joaquin pulse flow requirements shall not exceed 150 TAF per year. When calculating the quantity of water required to achieve the two San Joaquin pulses, the USBR shall use the calendar year, and shall give the spring pulse flow priority if water supplies are inadequate to supply both pulse flows.

III. IMPLEMENTATION

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 present drought has 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 larvae 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 fisheries that 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 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.

The federal Reclamation Projects Authorization and Adjustment Act of 1992 (H.R. 429) 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. DWR's operations model indicates that the export, reverse flow, and pulse flow requirements in this decision will use this allocation in all but the wettest years. 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 use of this water in the future.

- 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 diversions, and a barrier at the head of Old River. (WRINT-SWC-1.)

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. Additionally, the CVP

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

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. 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. However, this decision does require them to pay mitigation fees for the adverse effects on fisheries caused by their diversions of water to storage.

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 export requirements would not be reasonable at this time, but additional protections can be achieved through the use of a mitigation fund.

3. **Requirements**

a. Water

- DWR and USBR shall continue to be jointly responsible for ensuring that all water quality and flow standards in this decision are met. The USBR, the DWR and other major water right holders with storage reservoirs are responsible for releasing or bypassing their share of pulse flows. (See Tables IV and V.) The relative responsibilities among storage

reservoirs to release or bypass water to meet pulse flow requirements will be based on the unimpaired flow in their respective tributaries, existing releases being made for public trust uses during pulse flow periods, and the storage capacity of their reservoirs. Other major water right holders with direct diversion rights are responsible for ceasing diversions during the middle of a pulse flow. (See Table I.)

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- DWR and USBR shall calculate the flows to be provided 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. The downstream storage reservoir on each tributary shall release these flows during the pulse flow period at the times and in the amounts specified by DWR and USBR.

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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. Relative responsibilities among reservoirs on a particular tributary to meet pulse flow requirements shall be based on the reservoir capacities specified in Tables IV and V. Upstream reservoirs shall be credited with any releases for public trust uses being made during pulse flow periods. The downstream reservoir operators shall request that repayment of water released during pulse flow periods be made within 180 days after the pulse flow release. Upstream reservoir operators shall provide the releases.

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- The availability of water for appropriation to storage by reservoirs responsible for pulse flows is subject to the release of water for pulse flows. The State Water Board will reserve continuing authority to require an alternative method of ensuring that pulse flows are released if for any reason the DWR and the USBR do not determine the flows that must be released from each tributary or if the downstream reservoir operators do not determine the flows that must be repaid by upstream reservoir operators.

- Authority is delegated to the Executive Director to establish such alternative method if necessary. Such alternative method may include requirements to bypass all or a percentage of reservoir inflow from each reservoir during a pulse flow.

- The USBR and/or the DWR shall make additional releases, if necessary, from their reservoirs to ensure that pulse flow requirements are actually achieved. If additional releases are necessary, DWR and USBR may request downstream reservoir operators to pay back their share of the additional releases based on the methodology described above. The downstream reservoir operators may, in turn, request upstream reservoir operators to pay back their share of the additional release. The pay back requests must be made within 60 days of the release, and the reservoir operators shall provide the requested flows within 180 days.

- In cases where there is an unresolved dispute over pulse flow requirements, the State Water Board retains continuing authority to resolve such a dispute.

- Major water right holders subject to this decision on the Mokelumne and Calaveras Rivers and their tributaries shall bypass a percentage of their inflows to storage during San Joaquin River pulse flows in years when reservoir releases are necessary to meet pulse flow requirements on the San Joaquin River. This percentage will be based on the average percentage expected to be bypassed from New Melones, New McClure, and New Don Pedro to meet the pulse flow requirements. The Executive Director or his designee will provide annual notification to the appropriate water right holders of the time bypasses must occur and the percentages to be bypassed.

- 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 diversion during a five-day period in the middle of the pulse flows on the Sacramento and San Joaquin rivers. The Executive Director, or his designee, will annually notify these water right holders of the dates when diversions should be curtailed.

b. Mitigation Fund

A fund is established for the duration of this decision to further mitigate the impacts of use of water from the Delta watershed on public trust uses. 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, whose customers will pay into a separate mitigation fund under the provisions of the federal Reclamation Projects Authorization and Adjustment Act

of 1992 (H.R. 429). 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.

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 markedly enhanced. 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 H.R. 429. Based on these considerations, approximately $60 million should be collected to the mitigation fund annually.

- Payments into the mitigation fund shall be divided into three categories: payments for surface water exported from its watershed of origin, payments for surface water diverted for consumption within its watershed, and payments for reservoirs whose purpose

is generation of hydropower exclusively. The mitigation fee for exported surface water shall be up to $10 per acre-foot.[10] The fee for surface water consumed within its watershed of origin shall be $5 per acre-foot. The first two categories will account for approximately 95 percent of the annual mitigation fund charges. The third category, hydropower projects, shall pay up to 5 percent of the total or about $3 million per year, apportioned according to their average annual storage in relation to other hydropower storage projects. The hydropower-only projects are assessed a low rate because, except for evaporation losses in the reservoir and incidental consumptive uses, hydropower generation is not a consumptive use and the water is returned to the watercourse. Hydropower projects do, however, affect public trust values because they change the timing of instream flows. Between the remaining two categories, payments for water exported from its watershed of origin shall be assessed at twice 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. These fees will be reviewed annually, and may be amended.

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

10 The exporters who will be required to pay up to $10 per acre-foot of exported water are the SWP, the City of San Francisco, and East Bay Municipal Utility District.

- Hydropower reservoir operators shall report their end-of-month storage over the previous twelve months by November 1 of each year commencing November 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 per acre-foot price paid for water from the DWR Water Bank, including carriage water losses, if applicable.

- 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., the protection of natural stocks and genetic diversity, and other fish and wildlife improvements. The State Water Board's costs of administering the fund will be paid from the mitigation fund. The fund will be disbursed on either a loan or grant basis. The State Water Board will hold public meetings to determine

the use of this fund and to decide which awards should be made. The State Water Board will determine at a future Board meeting the placement, custody, and use of the mitigation fund.

¤ This mitigation fund is established independently of the USBR mitigation fund. The State Water Board notes, however, that H.R. 429 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.

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 conduct the monitoring.

¤ Payments into the monitoring fund shall be divided into three categories. Exporters of Bay/Delta watershed water[11] shall be responsible for 75 percent of the monitoring fund; in-basin users shall be responsible for 22.5 percent; hydropower-only projects shall be responsible for 2.5 percent. Relative responsibilities among exporters will be based on annual water use. The combined

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

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 and hydropower projects will be based on annual water use and average annual water storage, respectively, as discussed in the mitigation fund section. The process described in the mitigation fund section of this decision will be used to assess and collect payments into the monitoring fund.

- The State Water Board will administer the collection and use of the monitoring fund. DWR and USBR shall submit an annual accounting of all Delta monitoring expenses to the State Water Board by November 1 of each year. These expenses will be partially reimbursed from the monitoring fund based on the percentage allocation described above. The State Water Board's costs of administering the fund will be paid from the monitoring fund. Payments into the monitoring fund will be adjusted annually based on estimated costs to be incurred by DWR and USBR and any carryover in the fund.

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.

- 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.)

- 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.)

- 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 requires such data.

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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

- DWR and USBR shall continue D-1485 monitoring until a revised program is approved. These agencies 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.

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.

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.

- The DWR and USBR shall implement a program to develop real-time estimates of Delta consumptive use for use in the calculation of reverse flow and Delta outflow under this decision. This program shall be coordinated under the auspices of the Interagency Ecological Study Program (IESP) and implemented by January 1, 1994. The methodology shall be submitted to the Chief of the Division of Water Rights for his approval. The methods used shall be updated periodically to improve the estimate and take advantage of new technology.

- USBR shall annually account for the additional water it uses to meet the requirements in this decision in comparison to the requirements in D-1485. The USBR shall report its annual accounting to the State Water Board by October 15 of each year.

- 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 quantity and

the dates of pulse flow releases during that calendar year. Diverters 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 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.

- 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. WATER SUPPLY RELIABILITY

1. Findings

- During this persistent drought period, water stored in some reservoirs has been drawn down under the assumption that the drought might not persist. This resulted in reduced amounts of stored water available to meet the following year's water needs. Low reservoir carryover storage decreases water supply reliability. Low reservoir carryover storage can result in increased water temperatures. Elevated water temperatures threaten downstream fish spawning and incubating. (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 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.)

- 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 has used a more conservative 90-percent exceedance level. (WRINT-USBR-24,105; T-WRINT-IV,266:19-267:14.) Because of contractual arrangements, delivery commitments on February 15 of each year may be increased, but never decreased, by USBR based on changing conditions as the water year progresses. USBR's water allocation adjustments are based on runoff forecasts with probabilities of exceedance between 50 percent and 90 percent. (T-WRINT, IV,267:18-21.)

2. Conclusions

Increased carryover storage will result in increased water supply reliability. 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 shall continue to use its present method to determine initial and revised minimum water delivery commitments. Initial delivery allocations shall be based on at least a 90-percent probability of exceedance forecast. Monthly updates of initial delivery allocations shall be based on a 99-percent probability of exceedance forecast.

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- USBR shall use a 95-percent probability of exceedance forecast in setting its February 15 water delivery commitments. Subsequent updates of water delivery commitments shall be based on a 99-percent probability of exceedance forecast.

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- DWR and USBR shall analyze existing operations planning procedures for alternatives which will: (1) minimize water supply shortages during droughts, and (2) dedicate a portion of reservoir inflow to increased carryover storage. DWR and USBR shall report on the results of their analysis at the November 1993 Workshop discussed in the next section of this decision.

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- DWR and USBR shall hold an annual public workshop each February 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 SWP and the CVP are currently participating in formal consultation under these acts with the DFG and the NMFS regarding the operations of the two projects.

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 three separate processes.

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.

- Second, fishery requirements in this decision may be amended on an annual basis at the request of DWR and USBR. 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.

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

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. GENERALLY

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 growning 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, better and

more fish screening including improved or new screening where feasible of all major diversions that have significant impacts on fish.

- 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. D

- 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. R A

- *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 protecting natural stocks and maintaining genetic diversity. F

- *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 T

decisions on instream flow needs will be coordinated with the this decision.

C. WATER SUPPLY MANAGEMENT MEASURES

- *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.

  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.

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

- *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) to use potable water where nonpotable water is available and suitable.

- *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.

- *SWP 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 fishery populations and water supplies.

1. Effect on Fishery Populations

Without construction of facilities, the methods available to enhance public trust uses 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.

This decision reduces exports and eliminates reverse flows on the lower San Joaquin River during the spring and limits reverse flows during the rest of the year. A

consequence of the reverse flow and export restrictions is that export of uncontrolled flows in the spring is reduced, and outflows consequently increased. Reverse flows on the lower San Joaquin River 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. 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 which is a better rearing habitat than in the central Delta.

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This decision requires real-time operation of the Delta Cross Channel gates during the late winter and spring. These gates must be closed when real-time monitoring indicates the presence of significant numbers of salmon smolts or striped bass eggs and larvae. 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 young fish, eggs, and larvae moving down the rivers to Suisun Bay and the ocean. The pulse flows will be timed to coincide with the migration and transport of fish, eggs, and larvae based on real-time monitoring. 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 in advance of their implementation. Consequently, in order to ensure that the goal of stopping the decline and improving public trust uses is achieved, a workshop will be convened in November of each year to review the biological response in the Delta and amend these conditions where appropriate.

The following section discusses 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 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 a DWRSIM model run with 7.1 MAF demand over 70 years of historic hydrology. The operations model also includes substantial assumptions. Therefore, the biological response predicted by the combination of the regression equations and the operations model should be viewed with caution.

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 plus fall-run survival should be further improved by the two concurrent 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. D

The fall-run Chinook salmon smolt survival model results are summarized on Table C. These results project improved survival over conditions that would exist in the future under D-1485. The results for R the Sacramento River salmon smolts may well be conservative in their estimation of survival under these new requirements because the pulse flows may reduce water temperature in the Sacramento River; this reduced temperature is not included in the smolt A model temperature factor which is based on historical temperatures.

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

b. Striped Bass

The extensive data base on striped bass indicates that the adult population has declined primarily T 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 to keep eggs and young suspended in the water column,

TABLE C

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
D-1630	0.42	0.34	0.32	0.29	0.27	0.34

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
D-1630	0.24	0.22	0.21	0.22	0.22	0.22

SAN JOAQUIN RIVER WITH BARRIER

CRITERIA / WY	WET	AN	BN	DRY	CRIT	MEAN
D-1485	0.35	0.21	0.17	0.15	0.17	0.23
D-1630	0.40	0.29	0.25	0.22	0.21	0.29

NOTES

* Survival index values are based on USFWS Delta Smolt Model (WRINT-USFWS-7)

* D-1485 and D-1630 are from DWRSIM model runs using 7.1 MAF demand

* Barrier located at the head of Upper Old River

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 for 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 also reduce losses of young-of-the-year (YOY) striped bass.

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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 results of the DFG striped bass model suggest that the proposed standards should stop the decline of striped bass and maintain the wild population at approximately 820,000 fish. This population is greater than that predicted under D-1485 conditions with existing demand. These results are graphically represented in Figure A.

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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

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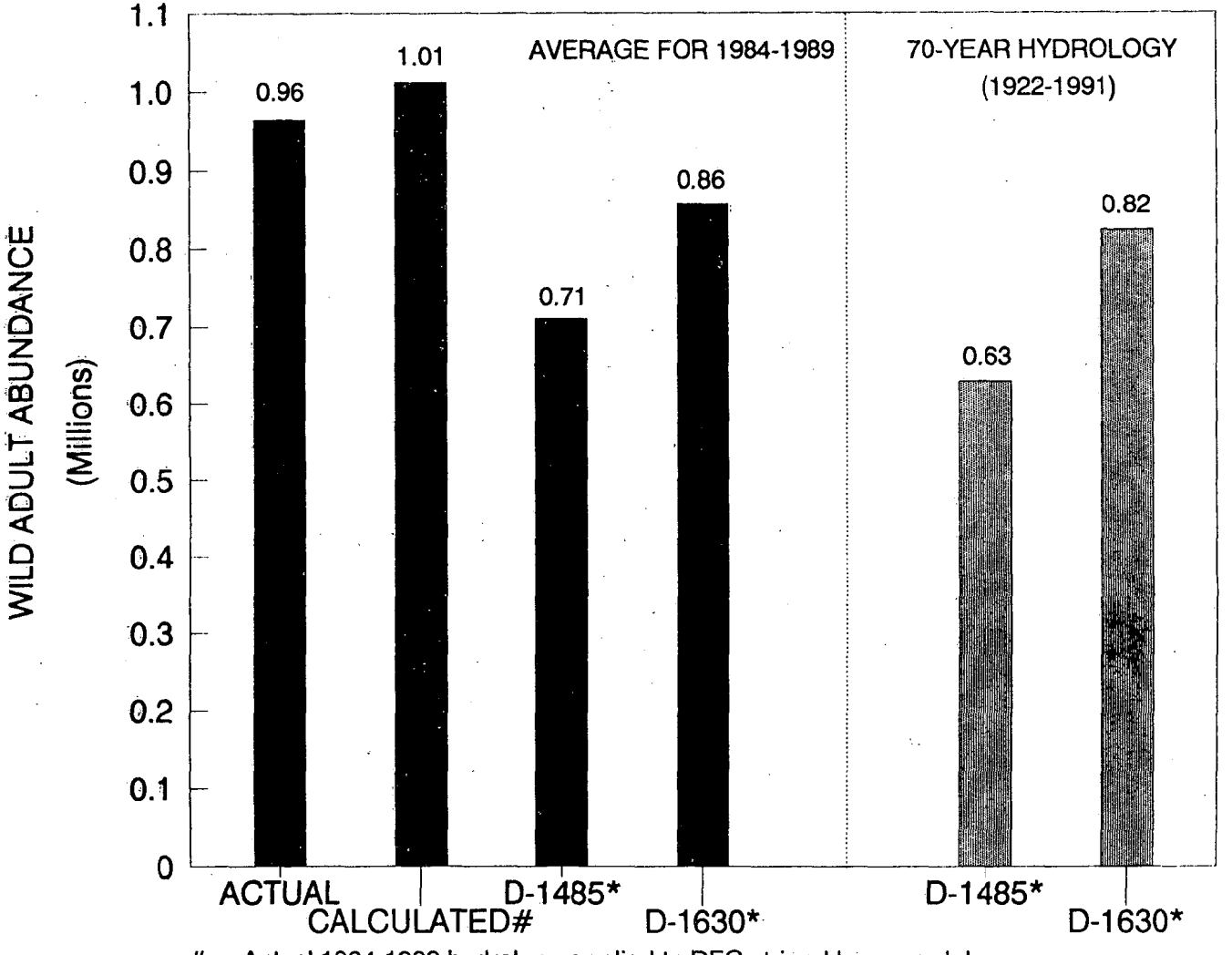
FIGURE A

STRIPED BASS WILD ADULT COMPARISON



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

* = DFG striped bass model run with 7.1 MAF demand

standards compared to present and future conditions under D-1485 requirements.

The model results of the proposed standards present a hopeful picture for striped bass compared to present conditions. However, this interpretation, as for 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.

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. This decision restricts exports to below recent historical levels during the critical spring spawning period (April through July); therefore, there is hope that recovery of striped bass and other Delta species will occur. In any event, additional measures may be needed. Intensive monitoring and analysis will be required to evaluate the effectiveness of these actions.

c. Other Estuarine Species

Although for many estuarine species there is no identified relationship between abundance and exports

or outflow, 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.

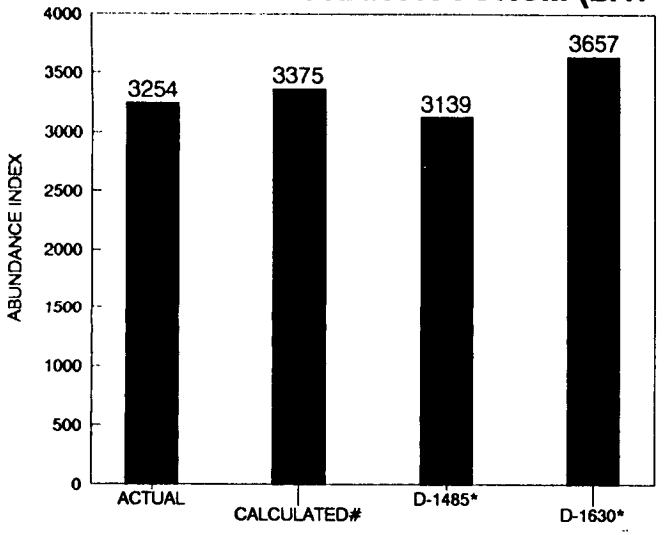
All three species have declined in recent years, at least in part because of the continuing drought. This decision may help stabilize these populations with the additional flows it provides. Figure B graphically represents recent populations and the results of application of the regression equations to actual recent conditions, and projected conditions under D-1485 and this decision with a 7.1 MAF demand.

2. Effect on Water Supply

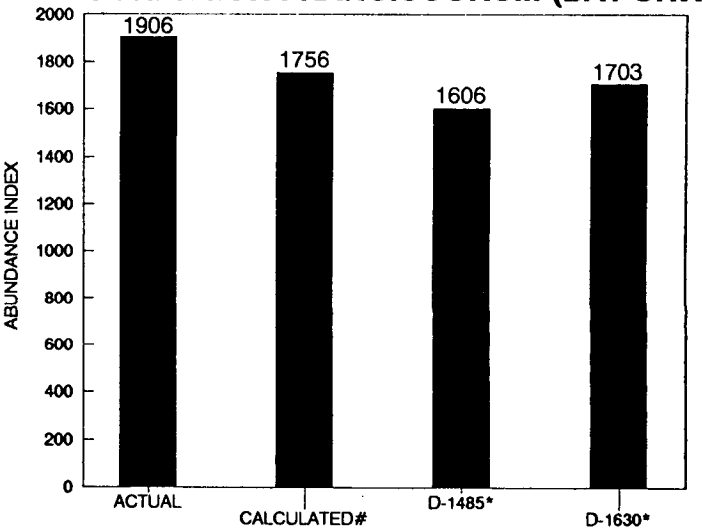
The estimated impacts on exports of this decision were obtained by use of DWRSIM, a computer model designed to simulate the operation of CVP and SWP project reservoirs and conveyance facilities. The operations studies are based on a monthly time step and use the historical 70-year hydrologic sequence 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

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

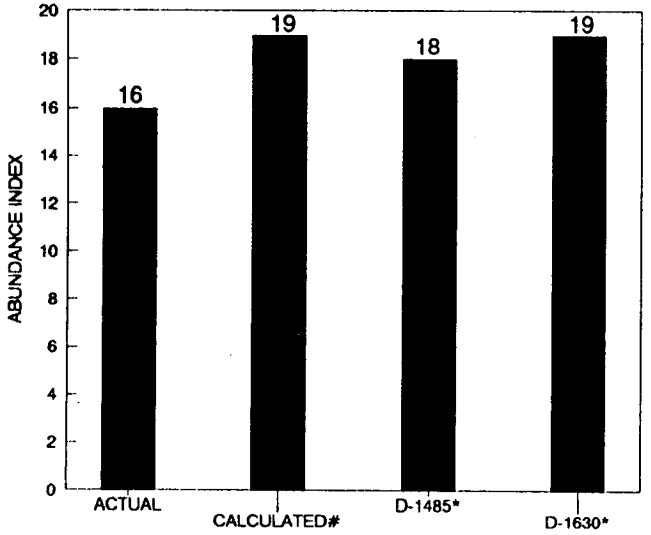
IMMATURE CRANGON FRANCISCORUM (BAY SHRIMP)



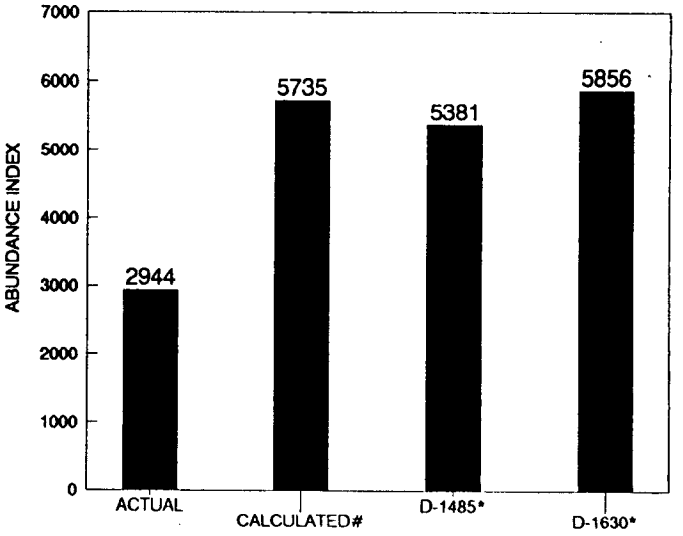
MATURE CRANGON FRANCISCORUM (BAY SHRIMP)



STARRY FLOUNDER



LONGFIN SMELT



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

* = DFG estuarine species models run with 7.1 MAF demand

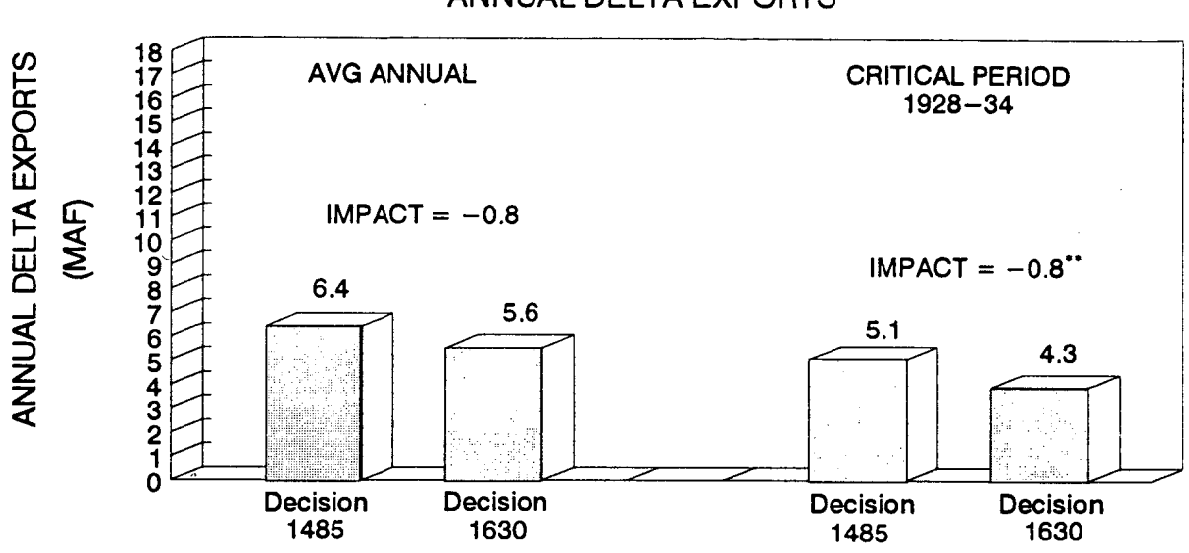
that Delta Cross Channel gates are closed in February, March, and April and open 50 percent of the time in May and June. Actual Delta Cross Channel gate operation between February and June will be based on real-time monitoring. The Board ran two additional operations studies with different gate operations to estimate the water supply impact of alternative assumptions. The approximate difference in exports between opening the gates 50 percent of the time from February to June and closing them completely averages approximately 170 TAF under the conditions in this decision.

The estimated water supply impacts of this decision are summarized in Figures C and D. Figure C compares the average estimated impacts of the standards in this decision with the impacts that might occur under D-1485 over both the 70-year period of record and the critically dry period of 1928-1934 assuming a 7.1 MAF export demand. This figure indicates that this decision could reduce average annual CVP and SWP exports by 800 TAF over both of these periods. The impacts in individual years range from 6 TAF to 1.9 MAF. The water year type in which this decision has the greatest impact on exports over the 70-year period of record is dry years, based on the Sacramento River Basin water year classification system, with an average annual export reduction of 1.2 MAF. The distribution of the export reductions between the CVP and SWP is not certain at this time. Under the assumptions in the DWRSIM operations model, the average annual reductions in exports for the CVP and SWP over the 70-year period of record are approximately 570 TAF and 230 TAF, respectively, with a maximum reduction of 1.1 MAF and 980 TAF (in different years), respectively. In general, reductions in exports appear as increased outflows.

FIGURE C

DECISION 1630
ESTIMATED WATER SUPPLY IMPACTS*

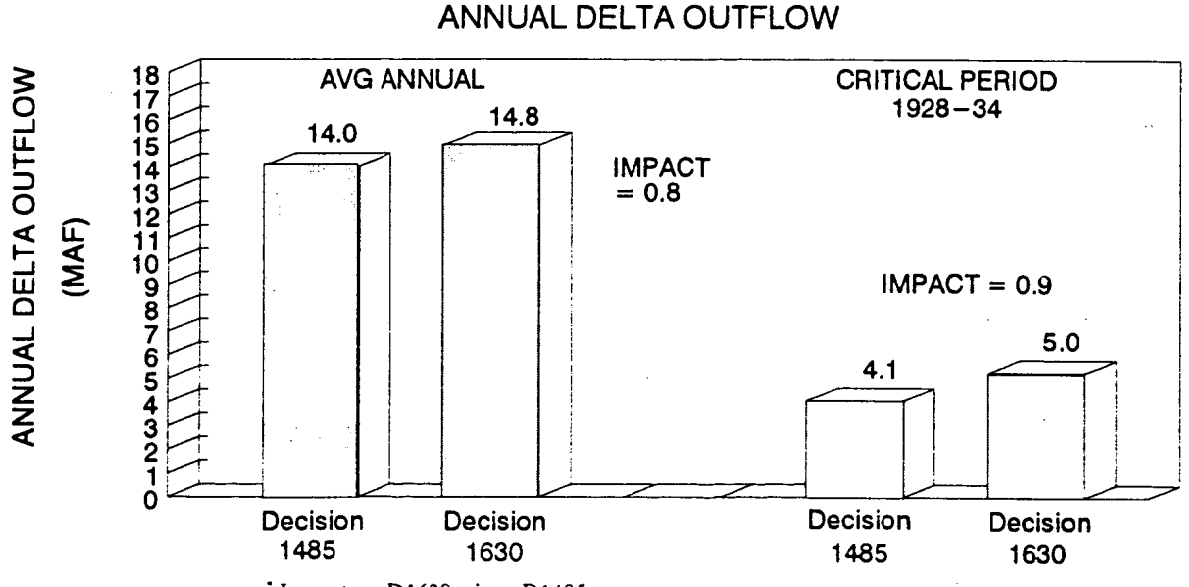
7.1 MAF DEMAND (1922–91 HYDROLOGY)



* Impacts = D1630 minus D1485

** Annual water supply impact = −0.9 MAF

Annual water supply impact includes combined changes in exports and reservoir storage



* Impacts = D1630 minus D1485

FIGURE D

HISTORICAL AND ESTIMATED 1984-1991 DELTA EXPORTS

D-1485 AND D-1630 VALUES OBTAINED FROM OPERATIONS STUDIES WITH 7.1 MAF DEMAND

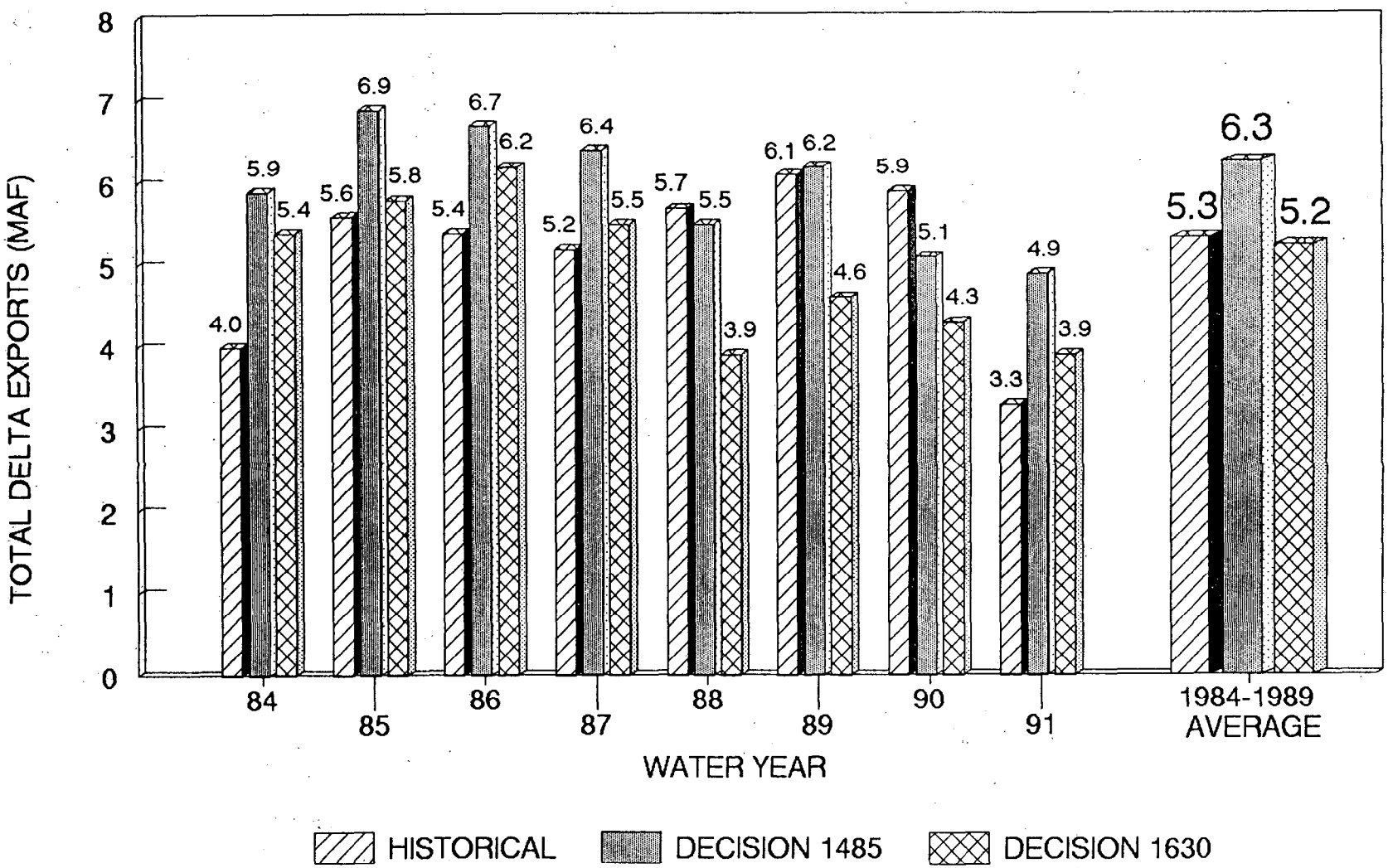


Figure D compares the estimated impacts of this decision on exports with the impacts that might occur under D-1485 in individual years in the recent past assuming a 7.1 MAF demand. Actual exports are included in Figure D to show the base case for illustrating existing conditions. The period 1984 to 1989 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 conditions and projected conditions under this decision in individual years between 1984 and 1989 but the average exports over this period are similar.

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Actual exports in recent years differ from the exports estimated by this model because demands are different. Additionally, Figure D indicates that exports would have been greater in 1991 under this decision than the exports that actually occurred. This apparent discrepancy is because there is a difference in the initial storage levels in the reservoirs between the operations studies and what actually existed. Therefore, deliveries were different.

A

Figures C and D provide estimates of the impacts of the standards in this decision on CVP and SWP exports but they do not represent limits on total export pumping. Pumping capacity for additional water transfer exports exists and can be used without violating the standards. Figure E summarizes the quantities of additional export pumping allowed but does not analyze the availability of water for transfers or the ability to use it. The additional exports can be divided into two categories: additional exports when the QWEST standard (reverse flow standard) is not at maximum levels and additional exports when the QWEST standard is at the limit. The latter category allows approximately 30 percent of water

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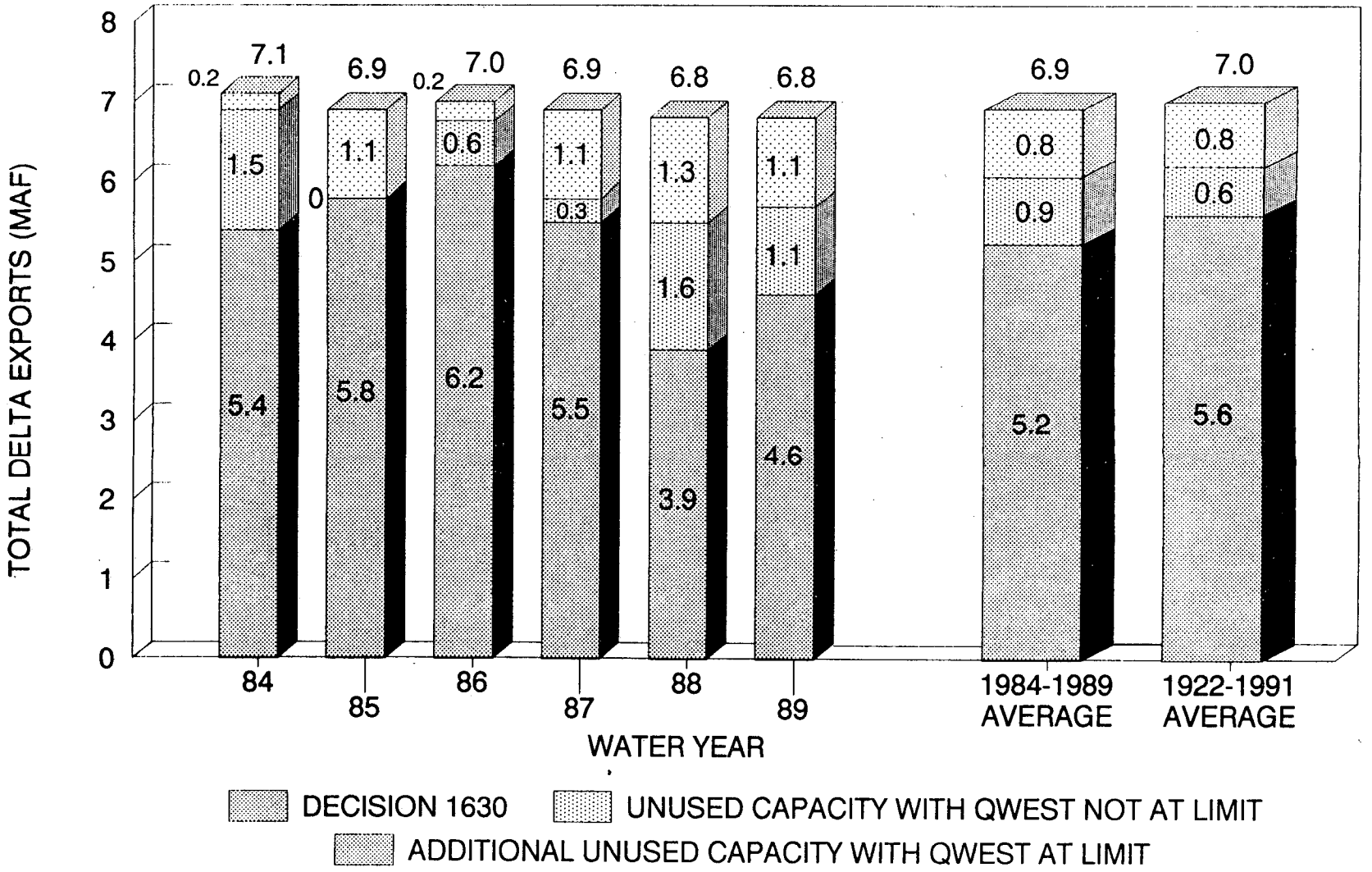
FIGURE E

UNUSED PUMPING CAPACITY AT BANKS AND TRACY PPS

VALUES FROM 7.1 MAF EXPORT DEMAND OPERATIONS STUDIES



NOTE: The presence of unused capacity does not imply that water is available for transfer.

released for transfers from the Sacramento Basin to be exported (assuming the Delta Cross Channel gates are open). The remaining 70 percent must be allowed to flow to the ocean in order to avoid violating the QWEST restriction. This restriction would not apply to water transfers from the San Joaquin Basin. While additional exports by transfers are possible, such exports will have variable adverse effects on the habitat in the central Delta depending on the source and timing of the water transferred.

The water supply impacts of this decision are mitigated by recent federal legislation, H.R. 429, which dedicates from 600 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 this water be used to meet the requirements in this decision.

B. CATEGORICAL EXEMPTION FROM CALIFORNIA ENVIRONMENTAL QUALITY ACT

1. Exemption

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

- 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 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 currrent 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 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.

- 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.

- Section 15307 exempts:

> "... 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:

> "... 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 levels of many biota in the Estuary are still reacting to 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 since 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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¤ *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 late-1960s' to early 1970s' levels 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".

T

- 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 barriers 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.2 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.

- 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 deprive environmental uses including endangered species of water, they must accept responsibility for their decisions.

- Under this decision, exports in a year like 1989 would be lower than actually occurred in 1989. However, subsequent drought-period exports under this decision would not be as low as they were in 1991-1992 if such conditions were repeated. This decision will not significantly reduce average annual export rates below the 1984-1989 actual average export rate, but export rates 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 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.[12]

- *Effects in the Watersheds:* Finally, this decision will not cause any significant environmental effect inthe watersheds of the Bay/Delta Estuary. This decision requires upstream water users to share responsibility with the SWP and the CVP for bypassing some water during fish migrations to provide pulse flows. The spring pulse flows will move outmigrating salmon and steelhead trout 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 the pulse flows will help mitigate the effects of upstream diversions on anadromous fisheries and will require a small amount of water from each affected water right holder. Compared with the annual variations in precipitation in the watershed of the Bay/Delta Estuary and the total supply available to the affected users, this contribution is insignificant to the water supply and to the uses that are dependent upon it.

C. MITIGATION

- While this decision does not reduce average exports below recent average levels, water demands are increasing and

12 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.

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.

VI. AUTHORITY TO ACT AND LEGAL OBLIGATIONS OF THE PARTIES

A. AUTHORITY TO ACT

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 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.

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.

- 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.

- 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:

> "... 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.)

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.

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 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.

B. LEGAL RESPONSIBILITIES OF PARTIES

- In this decision, the State Water Board is addressing only specified water rights to store 100,000 acre-feet (af) or more, or to directly divert 100 cubic feet per second (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.

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.

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.

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.

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, we 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.

¤ 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. It is unresolved whether the federal preemption recognized in Rock Creek is a "conflict" preemption or an "occupation of the field" preemption. The State Water Board considers it a "conflict" preemption.

So far as the State Water Board is aware, the mitigation fees this decision imposes on hydropower-only storage projects to mitigate for their effects on instream flows, fishery survival, and loss of spawning gravel replenishment do not conflict with any requirements of the licenses issued by the FERC for hydropower generation. Nor does the Board have any evidence that payment of these fees will in any way interfere with the generation of hydropower by these projects or make these projects infeasible. Under these circumstances, no conflict exists between this decision and the FERC licenses of the power-only projects.

The Rock Creek case does not insulate multi-purpose projects from state regulation of their consumptive use water rights. The Rock Creek case addressed a single purpose power-only project, in which the only water right permit 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 affected by this decision. This decision in no way interferes with the ability or feasibility of the multipurpose projects to generate power rights in conjunction with their consumptive water rights. Nor does it interfere in any way with the rights of the multipurpose projects to generate power.

ORDER

IT IS HEREBY ORDERED that:

1. 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 standards set forth in the attached Table II entitled "Decision 1630, Water Quality Objectives and Flow Requirements", except that the USBR shall maintain the standards in Table II for pulse flows in the San Joaquin River at Vernalis.

2. 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 spring and fall pulse flows in the San Joaquin River in the amounts and at the times specified in Table II. Responsibility for the pulse flows shall be apportioned in accordance with Table V.

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

   b. One week before a pulse flow release, the USBR shall calculate the pulse flows to be released or bypassed from each tributary and shall tell the operators of New Melones, Lake McClure, and New Don Pedro reservoirs how much water to release or bypass.

   c. Within 60 days after a pulse flow release, the downstream reservoir operators shall calculate the amount of water to be repaid by the upstream reservoirs 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 requested by the downstream reservoir operators, within 180 days after the pulse flow release.

d. Relative responsibilities among the tributaries shall be based on the percentage of tributary unimpaired flows specified in Table V. The relative responsibilities among reservoirs on a particular tributary to meet pulse flow requirements shall be based on the reservoir capacities specified in Table V. Upstream reservoirs shall be credited with any releases for public trust uses being made during pulse flow periods. D

e. During the pulse flows at Vernalis, all water right holders except the DWR and the USBR with direct diversion rights listed in Table I in the San Joaquin Basin shall cease all direct diversions for a five-day period during the middle of the pulse flow. The Executive Director or his designee will notify the appropriate water right holders when to cease direct diversions. R

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. A

3. Water right holders listed in Table I on the Mokelumne and Calaveras Rivers and their tributaries shall bypass a percentage of their inflows to storage when reservoir releases or bypasses are necessary to meet pulse flow requirements on the San Joaquin River. This percentage will be equal to the average percentage expected to be released or bypassed from New Melones, Lake McClure, and New Don Pedro to meet the pulse flow requirements. The Executive Director or his designee will notify the Mokelumne and Calaveras water right holders listed in Table I of the times bypasses must occur and the percentages to be bypassed. F T

4. 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 13,000 cfs and 18,000 cfs pulse flows specified in Table II.

   a. The USBR and the DWR shall account for the storage releases and bypasses for pulse flows. One week before the pulse flows commence the USBR and the DWR 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.

   b. Within 60 days after a pulse flow release, the downstream reservoir operators shall calculate the amount of water to be repaid by the upstream reservoirs 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 requested by the downstream reservoir operators, within 180 days after the pulse flow release.

   c. The relative responsibilities among the tributaries shall be based on the percentage of tributary unimpaired flows specified in Table IV. The relative responsibilities among reservoirs on a particular tributary to meet pulse flow requirements shall be based on the reservoir capacities specifed in Table IV. Upstream reservoirs shall be credited with any releases for public trust uses being made during pulse flow periods.

   d. During the two-week 18,000 cfs pulse flow at Freeport, all water right holders, except the CVP and SWP at their diversion points in the Delta, listed in Table I with direct diversion rights in the Sacramento River watershed shall cease all direct diversions for a five-day period

during the middle of the pulse flow. The Executive Director or his designee will notify the appropriate water right holders when to cease direct diversions.

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. a. Repayment for pulse flows on the Sacramento and San Joaquin Rivers shall be made in the form of water unless the parties agree on an alternative arrangement. The State Water Resources Control Board (State Water Board) retains continuing authority to resolve disputes over repayment, including authority to authorize repayment in dollars rather than water. Continuing authority is reserved to require an alternative method of ensuring that pulse flows are released if for any reason the DWR and the USBR do not determine the flows that must be released from each tributary or if the downstream reservoir operators do not determine the flows that must be repaid by upstream reservoir operators. Authority is delegated to the Executive Director to exercise this continuing authority.

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 quantity 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. The reports 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.

c. The USBR shall annually account for the additional water it uses to meet the requirements in this decision, compared with the requirements in D-1485. The USBR shall report its annual accounting to the State Water Board by October 15 of each year.

d. If the DWR or USBR must release water in addition to their tributaries' shares during pulse flow periods to ensure that the pulse flows are met at Freeport and at Vernalis, the DWR and the USBR may request the other downstream reservoir operators to pay back their tributaries' share of the additional releases. The other downstream reservoir operators may in turn request upstream reservoir operators to pay back their share of the additional release. Repayment requests shall be made within 60 days after the release, and the requested flows shall be provided within 180 days after the pulse flow release. The parties shall use the repayment methods described in this condition and in conditions 2 and 4 of this order.

6. 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:

a. The provisions of the Memorandum of Understanding Regarding Urban Water Conservation in California dated September 1991 (MOU) (Attachment A). The following 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 the exemption under the procedures in Section 4.5 of the MOU unless noted below:

(1) Interior and exterior water audits and incentive programs for residential and governmental/ institutional customers (BMP 1) (This requirement does not apply to single-family residential customers.);

(2) Water conserving plumbing fixture standards, effective beginning one year from the date of this decision (BMP 2a);

(3) Plumbing retrofit kits (BMP 2c.);

(4) Distribution system water audits, leak detection and repair (BMP 3);

(5) Metering with commodity rates (bill by volume of use) for all new connections (BMP 4) (Retrofit of existing connections may be exempted under Section 4.5 of the MOU. Any such exemption shall be sent to the Chief of the Division of Water Rights with the full substantiation required to justify the exemption.);

(6) Large landscape water audits and incentives (BMP 5);

(7) Landscape water conservation requirements for new and existing commercial, industrial, institutional, governmental, and multi-family developments (BMP 6);

(8) Commercial and industrial water conservation (BMP 9);

(9) New commercial and industrial water use review (BMP 10);

(10) Conservation pricing (BMP 11);

(11) Water waste prohibition (BMP 13);

(12) Water conservation coordinator (BMP 14);

(13) Ultra low flush toilet replacement (BMP 16) (This BMP is mandatory only in areas which receive water exported from the Bay/Delta Estuary or its watershed. The requirements of this BMP may be exempted under Section 4.5 of the MOU in areas which do not receive exported water. Any such exemption and the full substantiation required by Section 4.5 of the MOU to justify the exemption shall be sent to the Chief of the Division of Water Rights.).

b. Price rate structures shall be implemented during dry and critically dry years, in which rates increase as the quantity of water used increases. DWR shall determine dry and critically dry years using the Sacramento Valley Hydrologic Year Classification System set forth in this decision. These price rate structures shall be implemented no later than July 1994.

The DWR shall monitor the progress of the water right holders affected by this decision in implementing this condition. DWR shall report annually on July 1 of each year commencing in 1993 to the State Water Board documenting this progress.

7. Water right holders listed in Table I who deliver water for agricultural uses or who deliver water to any entity which delivers water for agricultural uses shall ensure that deep percolation of applied irrigation water from all sources does not exceed an average of 0.4 acre-feet per acre per year of irrigated land after March 1, 1994. This restriction shall apply to water deliveries to the areas delineated on Figures 1-4. Water right holders listed in Table I who deliver water to the areas delineated on Figures 1-4 shall submit a report to the State Water Board by September 1, 1993 specifying how this condition will be implemented.

8. a. When it determines all water delivery commitments, the USBR shall use runoff forecasts with no less than 95-percent probabilities of exceedance. DWR may use runoff forecasts with no less than 90-percent probabilities of exceedance when it determines initial delivery commitments. When it determines revised water delivery commitments, DWR shall use runoff forecasts with no less than 99-percent probabilities of exceedance.

   b. USBR and DWR shall develop alternatives to their existing operations planning procedures that will (1) minimize water supply shortages during droughts and (2) dedicate a portion of reservoir inflow to increased carryover storage. DWR and USBR shall report on these alternatives at the State Water Board's November 1993 workshop.

   c. During February of each year, DWR and USBR shall hold a public workshop to describe their projected operations during the calendar year.

9. 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, except for the USBR and its customers who pay into the CVP mitigation fund created by H.R. 429 of 1992 for all of their water use. CVP customers listed in Table I shall pay a mitigation fee of no more than $5 per acre-foot for water they obtain under their own rights and for CVP water that they obtain in lieu of water under their own rights without paying into the CVP mitigation fund.

c. All water right holders listed in Table I shall report the volume of their exports from the watershed and in-basin diversions from the previous water year to the State Water Board by November 1 of each year, commencing on November 1, 1993. Hydropower reservoir operators shall report their end-of-month storage over the previous twelve months by November 1 of each year commencing November 1, 1993. Reports shall be filed on a form supplied by the Executive Director.

d. Payments for water exported from the watershed and payments for in-basin consumptive uses shall account for approximately 95 percent of the annual mitigation fund charges. The mitigation fee for exported surface water shall be no more than $10 per acre-foot, and the mitigation fee for surface water consumed within the watershed or origin shall be no more than $5 per acre-foot. Actual fees shall be determined annually, to provide approximately $60 million.

e. Hydropower-only projects shall pay 5 percent of the total mitigation charge, to be divided among the hydropower projects listed in Table I according to their average annual storage amounts in relation to other hydropower storage projects.

f. 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. The State Water Board will consider requests for hardship exemptions from this requirement.

g. 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 times the latest price for water from the DWR Water Bank.

h. 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.

10. 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 except the DWR and the USBR shall pay a fee equal to their share of the cost of conducting the Delta monitoring program.

c. On November 1 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 monitoring costs. Each of the other water right holders shall pay their proportionate contributions to the State Water Board's Delta Monitoring Fund. Exporters of Bay/Delta watershed water shall be responsible for 75 percent of the monitoring fund; in-basin users shall be responsible for 22.5 percent;

hydropower-only projects shall be responsible for 2.5 percent. The process described in Term 9 will be used to assess and collect payments into the monitoring fund. The State Water Board thereafter will reimburse DWR and USBR for the monitoring costs attributable to the other water right holders, less fund administration costs.

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 Water Right Decision 1485 until the Chief of the Division of Water Rights approves new monitoring and reporting requirements.

e. The DWR and the USBR shall evaluate the monitoring program required by Water Right Decision 1485 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:

(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.

(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.

f. The DWR and the USBR shall develop and implement a program to make real-time estimates of Delta consumptive use. These estimates shall be used in calculating reverse flow and Delta outflow to comply with this order. The program shall be developed under the auspices of the Interagency Ecological Study Program. The methodology for the program, and periodic updates to improve the estimates and take advantage of new technology, shall be submitted to the Chief of the Division of Water Rights for approval. The DWR and the USBR shall present the program at the State Water Board workshop in November 1993, and shall implement it by January 1, 1994.

11. 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.

12. The DWR and the USBR may request the Executive Director or his designee to vary the fishery standards in this decision. The Executive Director or his designee may grant a variance after making a finding that the variance will have no significant adverse effect on the environment. The advice of the California Department of Fish and Game, United States Fish and Wildlife Service, and National Marine Fisheries Service 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. The

DWR and the USBR shall give notice to all parties who request notice, whenever DWR and the USBR request a variance. 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.

13. 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 results of the monitoring shall be reported daily to the Executive Director or his designee. 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 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.

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14. Conditions 2 and 8 of Decision 1485 are rescinded. Conditions 4 and 5 of Decision 1485 shall remain in effect until such time as the Executive Director approves a new monitoring program in accordance with condition 9 above. All other terms and conditions in Decision 1485 shall remain in effect.

D

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

R

AYE:

NO:

A

ABSENT:

ABSTAIN:

Maureen Marché
Administrative Assistant
to the Board

F

T

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	A016952 A017512 A005629 A005630 A014443 A014444 A014445A A016950 A016951 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
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

TABLE I: Major Water Right Holders in the Bay-Delta Watershed (continued)

Water Right Holder(s)	Statement/Application Numbers
Meridian Farms Water Company	A0010748 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 A008180 A020017 A020072 A024983 A027132 A027559
North San Joaquin Water Conservation District	A012842
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 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
Sacramento Municipal Utility District, et al	A012323 A012624
Sacramento Municipal Utility District	A026768
San Luis Canal Company	S001074

TABLE I: Major Water Right Holders in the Bay-Delta Watershed (continued)

Water Right Holder(s)	Statement/Application Numbers
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	A001232 A001233 A003648 A006711 A009997 A014126 A014127 S13848 S13849
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 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 pre-1914 statement is preceded by an "S".

2. The number of an application for an appropriative water right is preceded by an "A".

TABLE II : DECISION 1630 WATER QUALITY OBJECTIVES AND FLOW REQUIREMENTS

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 - or - San Joaquin River at Antioch Water Works Intake	C-5 CHCCC06 D-12(near) RSAN007	Chloride (Cl-)	Maximum mean daily 150 mg/l chloride 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.[1]	W AN BN D C	No. of days each Water Year < 150 mg/l Cl- 240 (66%) 190 (52%) 175 (48%) 165 (45%) 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[2] -and/or- Barker Sl. at North Bay Aqueduct Intake	C-19 SLCCH16 - SLBAR3	Chloride (Cl-) Chloride (Cl-)	Maximum mean daily, in mg/l Maximum mean daily, in mg/l	N/A N/A	All All	*Oct-Sep* *Oct-Sep*	250 250

B) AGRICULTURAL USES BY AREA

1) WESTERN DELTA

Salinity:

Sacramento River at Emmaton	D-22 RSAC092	Electrical Conductivity (EC)	Maximum 14-day running average of mean daily, in mmhos/cm²	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*[3]
					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/cm²	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*[3]
					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 OBJECTIVES AND FLOW 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/cm²	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*[3]
					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/cm²	Sac. R.		*0.45 EC April 1 to Date Shown*	*EC from Date Shown to Aug. 15*[3]
					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 30–day running average of mean daily EC, in mmhos/cm²	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 30–day running average of mean daily EC, in mmhos/cm²	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 OBJECTIVES AND FLOW 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 monthly average of mean daily, in mmhos/cm^2	N/A	All	*Oct – Sep*	1.0

C) FISH AND WILDLIFE BY HABITAT/SPECIES

CHINOOK SALMON

Dissolved Oxygen:							
San Joaquin River between Turner Cut & Stockton	RSAN050–RSAN061	Dissolved oxygen (DO)	Minimum dissolved oxygen, in mg/l	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[4] 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*	
Sacramento River at Freeport	RSAC155	Temperature, in °F	The daily average water temperature shall not be elevated by controllable factors[4] above 66°F in the reach from the I Street Bridge to Freeport on the Sacramento River.	N/A	All	*Jan 1 – March 31*	
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.)	Minimum daily flow, in cfs, for 21–day continuous period. Start date depends upon beginning of chinook salmon smolt out–migration from San Joaquin Basin	S–J R.[5]	W AN BN D C	*Apr 20 – May 10*[6] " " " "	10,000 8000 6000 4000 2000
			During this time, water right holders on Mokelumne & Calaveras rivers shall bypass all inflows for 5 consecutive days.				
			Daily mean combined export pumping by the Tracy, Banks, and Contra Costa pumping plants shall be ≤1500 cfs. All pumping restrictions are to be split equally between the CVP and the SWP.				
			Minimum daily flow, in cfs, for 14–day continuous period. Start date depends upon beginning of chinook salmon adult spawning migration. Attraction flow shall be provided only if water is available from the 150 TAF alloted for the two salmon flows.	N/A	All	*Oct 18 – 31*[6]	≥ 2000
			During this time, water right holders on Mokelumne & Calaveras rivers shall bypass all inflows for 5 consecutive days.				

TABLE II: DECISION 1630 WATER QUALITY OBJECTIVES AND FLOW 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
CHINOOK SALMON (continued)							
Flow (continued):							
Sacramento River at Freeport	RSAC155	Flow Rate	Minimum daily flow, in cfs, for 14–day continuous period.	N/A	All	*Apr 20 – May 4*[6]	≥ 18,000
Sacramento River at Rio Vista	D–24	Flow Rate	14–day running average of minimum daily flow, 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/cm²	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 (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/cm², not more than value shown corresponding to deficiencies in firm supplies declared by the CVP and SWP[7]	Sac. R.			

Total Annual Imposed Deficiency (MAF)	*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/cm²	Sac. R.	All	*Apr 1–May 31* (or until spawning has ended)	0.44

TABLE II: DECISION 1630 WATER QUALITY OBJECTIVES AND FLOW 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/cm². 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, flow, in cfs, shall be as follows:	N/A	All	*April 16 - May 31*[6]	
						14-day running average	≥ 13,000
						and minimum mean daily flow	≥ 9,000
Sacramento River at Chipps Island	D-10 RSAC075	Delta outflow index (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:							
Mallard Slough		Electrical conductivity (EC)	14-day running average of EC, in mmhos/cm²	N/A	All	*July 1 - 31* ≤3.0	*Aug 1 - Jan 31* ≤3.0
-or-							
Reverse flow in western Delta (QWEST), in effect if EC at Mallard Slough >3.0		QWEST, as calculated in DAYFLOW	14-day running average of QWEST, in cfs	N/A	All	*July 1 - 31* ≥ -1000	*Aug 1 - Jan 31* ≥ -2000
Flow:							
Reverse flow in western Delta (QWEST)		QWEST, as calculated in DAYFLOW	14-day running average of QWEST, in cfs Simultaneously, 7-day running average, if negative, shall be withing 1000 cfs of the applicable 14-day running average.	Sac. R.		*February 1 - June 30* / *July 1 - July 31*	
					W	≥0 / ≥ -1000	
					AN	≥0 / ≥ -1000	
					BN	≥0 / ≥ -1000	
					D	≥0 / ≥ -1000	
					C	≥0 / ≥ -1000	
			14-day running average of QWEST, in cfs. Simultaneously, 7-day running average, if negative, shall be within 1000 cfs of the applicable 14-day running average.		All	*Aug 1 - Jan 31*	≥ -2000
Relaxation provision - Reverse flow standards in western Delta do not apply when the combined total CVP & SWP exports drop below 2000 cfs.		QWEST, as calculated in DAYFLOW	14-day running average of QWEST, in cfs. Simultaneously, 7-day running average, if negative, shall be withing 1000 cfs of the applicable 14-day running average.	Sac. R.		*Feb 1 - Mar 31* / *Apr 1 - Jun 30* / *Jul 1 - Jul 31*	
					D	-- / ≥0 / ≥ -1000	
					C	-- / ≥0 / ≥ -1000	

TABLE II: DECISION 1630 WATER QUALITY OBJECTIVES AND FLOW 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 Collinsville	C–2 RSAC081	Electrical conductivity (EC)	Monthly average of both daily high tide values not to exceed the values shown, in mmhos/cm² (or demonstrate that equivalent or better protection will be provided at the location).	N/A	All by Oct 1,1988	*Oct* *Nov* *Dec*	19.0 15.5 15.5
Montezuma Slough at National Steel	S–64 SLMZU25	Electrical conductivity (EC)			All by Oct 1,1988	*Jan* *Feb* *Mar*	12.5 8.0 8.0
Montezuma Slough near Beldon's Landing	S–49 SLMZU11	Electrical conductivity (EC)			All by Oct 1,1988	*Apr* *May*	11.0 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 south 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	Delta outflow index (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 BN	*Jan – Apr* *Jan – Apr*	12000 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)
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 the value shown. April & May 14–day running average based only on those days not included in the 1500 cfs restriction period. All reductions in exports to be equally shared between the CVP & SWP.	Sac. R.			

	April	*May*	*June*	*July*
W	6000	6000	6000	9200
AN	6000	6000	6000	9200
BN	6000	6000	6000	9200
D	4000	4000	4000	9200
C	4000	4000	4000	9200

TABLE II: DECISION 1630 WATER QUALITY OBJECTIVES AND FLOW 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)							
Flow (continued):							
Sacramento River at Chipps Island	D-10 RSAC075	Delta outflow index (DOI)	All export pumping restrictions are removed whenever DOI ≥ 50,000 cfs except during April-May and October pulse flow periods.				
Other:							
Delta Cross-Channel at Walnut Grove		Closure of gates	Gates closed whenever 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*	

FOOTNOTES

1. Sac. R.: Sacramento Valley Water Year Hydrologic Classification -- described on following sheet.
2. The Cache Slough objective to be effective only when water is being diverted from this location.
3. When no date is shown, EC limit continues from April 1.
4. 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.
5. S-J R.: San Joaquin Valley Water Year Hydrologic Classification -- described on following sheet.
6. 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 DFG, the United States Fish & Wildlife Service (USFWS), DWR and USBR, whichever agency(ies) is(are) appropriate.
7. For the purpose of this provision, firm supplies of the Bureau 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 Department 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.

TABLE II
Sacramento Valley
Water Year Hydrologic Classification

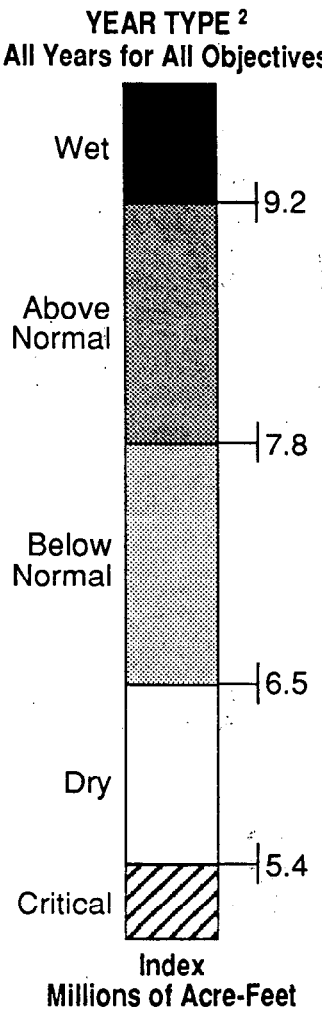
Year classification shall be determined by computation of the following equation:

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

TABLE II
San Joaquin Valley
Water Year Hydrologic Classification

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

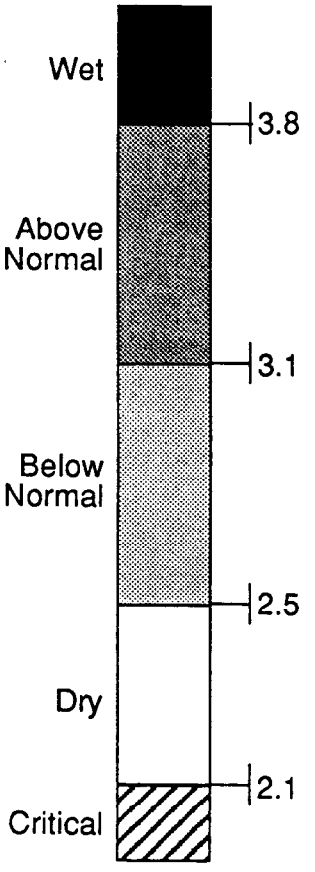
INDEX = 0.6 * X + 0.2 * Y + 0.2 * Z

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 0.9 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.

CHA0041R6

TABLE III. DECISION 1630 – MONITORING STATIONS

A. Compliance Monitoring Stations[1]

Station Number	Station Location	Water Quality	Flow	Effective Date[2]
C2	Sacramento River at Collinsville	EC	No	
C4	San Joaquin River at San Andreas Landing	EC	No	
C5	Contra Costa Canal at Pumping Plant #1	Cl^-	No	
C6	San Joaquin River at site of Brandt Bridge	EC	No	December 31, 1994
C8	Old River near Middle River	EC	No	December 31, 1996
C9	West Canal at mouth/intake to Clifton Court Forebay	Cl^-, EC	No	
C10	San Joaquin River near Vernalis	TDS, Temp.	Yes	
C10	San Joaquin River near Vernalis	EC	No	December 31, 1994
C13	Mokelumne River at Terminous	EC	No	
C19 NBA	Cache Slough at City of Vallejo Intake or Barker Slough at North Bay Aqueduct Intake	Cl^-	No	
D10	Sacramento River at Chipps Island	No	DOI	
D12	San Joaquin River at Antioch Water Works	Cl^-, EC	No	
D15	San Joaquin River at Jersey Point	EC	No	
D22	Sacramento River at Emmaton	EC	No	
D24	Sacramento River below Rio Vista Bridge	No	Yes	
–	Sacramento River at Freeport (RSAC155)	Temp.	Yes	
	Sacramento River at Colusa	No	Yes	
D29	San Joaquin River at Prisoners Point	EC	No	
DMC–1	Delta Mendota Canal	Cl^-, EC	No	
–	San Joaquin River between Turner Cut and Stockton (RSAN050 – RSAN061)	D.O.	No	
P12	Old River at Tracy Road Bridge	EC	No	December 31, 1996
S21	Chadbourne Slough at Chadbourne Road	EC, Tidal gauge	No	October 1, 1993
S33	Cordelia Slough, 550 feet west of Southern Pacific crossing at Cygnus	EC, Tidal gauge	No	
S35	Goodyear Slough at Morrow Island Clubhouse	EC, Tidal gauge	No	
S42	Suisun Slough 300 feet south of Volanti Slough	EC, Tidal gauge	No	October 1, 1997
S49	Montezuma Slough near Beldon's Landing	EC, Tidal gauge	No	
S64	Montezuma Slough at National Steel	EC, Tidal gauge	No	
S75	Goodyear Slough 1.3 miles south of Morrow Island [Drainage] Ditch	EC, Tidal gauge	No	October 1, 1994
S97	Cordelia Slough at Cordelia – Goodyear Ditch (proposed)	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
--	Sacramento River at Coleman Fish Hatchery	Release of chinook salmon smolts from Coleman Fish Hatchery	Minimum daily flow at Colusa for 14-day period
--	Sacramento River upstream of Freeport[4]	Detection of striped bass eggs and larvae	Flow requirements at Colusa and Freeport
--	Delta Cross-Channel Gates at Walnut Grove	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
D10	Chipps Island	Delta Outflow Index (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
C3	Sacramento River at Greens Landing	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
C4	San Joaquin River at San Andreas Landing	EC	Continuous
C7	San Joaquin River at Mossdale	EC	Continuous
		Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
C9	West Canal at mouth/intake to Clifton Court Forebay	TDS (calculated from EC measurement)	Continuous
		Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
C10	San Joaquin River near Vernalis	EC, Temperature	Continuous
		Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D4	Sacramento River above Point Sacramento	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D6	Suisun Bay at Bulls Head Point near Martinez	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
D7	Grizzly Bay at Dolphin near Suisun Slough	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi-annually
D8	Suisun Bay off Middle Point near Nichols	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D9	Honker Bay near Wheeler Point	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D10	Sacramento River at Chipps Island	EC, Flow	Continuous
		Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D11	Sherman Lake near Antioch	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D12	San Joaquin River at Antioch Ship Canal	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides	Semi-annually
D14A	Big Break near Oakley	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D15	San Joaquin River at Jersey Point	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D16	San Joaquin River at Twitchell Island	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D19	Franks Tract near Russo's Landing	Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D22	Sacramento River at Emmaton	EC	Continuous
		Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D24	Sacramento River below Rio Vista Bridge	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D26	San Joaquin River at Potato Point	Base parameters, Phytoplankton	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
D28A	Old River near Rancho Del Rio	EC	Continuous
		Base parameters	Semi-monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Heavy metals & pesticides, Benthos	Semi-annually
D42	San Pablo Bay near Rodeo	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
MD6	Sycamore Slough near Mouth	Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi–annually
MD7	South Fork Mokelumne River below Sycamore Slough	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
		Benthos	Semi–annually
MD10	Disappointment Slough at Bishop Cut	Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
–	Turner Cut at Light 26 (RSAN050)	EC	Continuous
–	San Joaquin River at mouth of Fourteen–mile Slough (RSAN052)	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
P8	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)
P10	Middle River at Borden Highway	EC, Tidal Gauge Height	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
P11	Middle River at Howard Road Bridge	EC, Tidal Gauge Height	Continuous
P12	Old River at Tracy Road Bridge	EC	Continuous
		Base parameters	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
S36	Suisun Slough near Mouth	EC, Tidal Gauge Height	Continuous
S42	Suisun Slough 300 feet south of Volanti Slough	EC, Tidal Gauge Height	Continuous
		Base parameters, Phytoplankton	Semi–monthly & monthly (seasonal)
		P,TDS, & Cl^-	Monthly
S54	Montezuma Slough at Hunter's Cut	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.

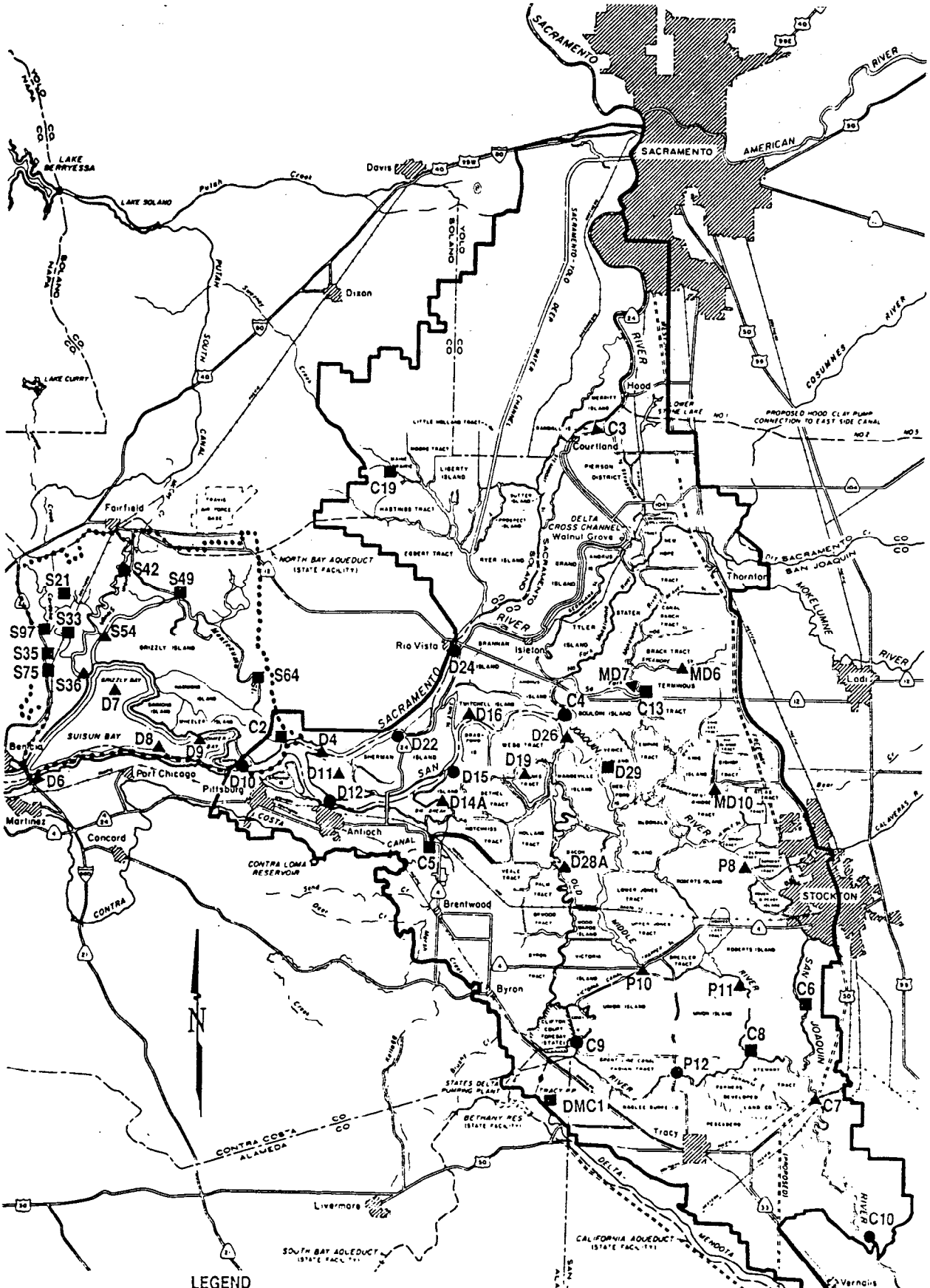
[7] Identification and enumeration to the species level where possible.

[8] Includes orthophosphate and total phosphorus.

[9] Includes arsenic, cadmium, chromiun (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 TO BASIN UIF (%)	ENCLOSURE 2 MAJOR WATER USERS BY TRIBUTARY FOR ALL WATER RIGHTS OWNER	RESERVOIR CAPACITY (AF)	% RESPONSIBILITY BY TRIBUTARY [1] (%)
FEATHER	24.6	OROVILLE/WYANDOTTE	163,920	3.08
		DWR	3,764,197	70.75
		YUBA CO & OWI	93,643	1.76
		PG & E	1,298,466	24.41
			5,320,226	
YUBA RIVER	12.9	NEVADA ID	212,850	15.37
		PG & E	140,536	10.15
		YUBA CO WA	1,031,674	74.49
			1,385,060	
BEAR RIVER	1.8	NEVADA ID	75,270	42.22
		SOUTH SUTTER WD	103,000	57.78
			178,270	
AMERICAN	14.7	SACTO	83,745	5.71
		PLACER CO WD	344,037	23.44
		PG & E	13,317	0.91
		USBR	1,026,400	69.94
			1,467,499	
SACRAMENTO	46.0	USBR	4,585,620	100.0
			4,585,620	
TOTALS	100		12,936,675	

[1] PERCENTAGE IS DETERMINED BY DIVIDING OWNER'S RESERVOIR CAPACITY BY TOTAL TRIBUTARY RESERVOIR CAPACITY

TABLE V RESPONSIBILITY FOR PULSE FLOW REQUIREMENTS IN THE SAN JOAQUIN BASIN

TRIBUTARY	TRIBUTARY UIF TO BASIN UIF [1] (%)	ENCLOSURE 2 MAJOR WATER USERS BY TRIBUTARY FOR ALL WATER RIGHTS OWNER	RESERVOIR CAPACITIES (AF)	% RESPONSIBILITY BY TRIBUTARY [2] (%)
STANISLAUS	28.7	PG&E	33,864	1.19
		CALAVERAS COUNTY W.D.	185,025	6.49
		OAKDALE & S. SAN JOAQUIN	231,920	8.14
		USBR	2,400,000	84.19
			2,850,809	
TUOLUMNE	46.7	TID/MID	2,119,500	85.45
		SFRISCO	361,020	14.55
			2,480,520	
MERCED	24.6	MERCED IRRIGATION DIST	1,041,650	100.00
			1,041,650	
TOTALS	100		6,372,979	

[1] BASIN UNIMPAIRED FLOW IS THE SUM OF THE TABLE'S THREE TRIBUTARY UNIMPAIRED FLOWS
[2] PERCENTAGE IS DETERMINED BY DIVIDING OWNER'S RESERVOIR CAPACITY BY TOTAL TRIBUTARY RESERVOIR CAPACITY

Figure 1
GRASSLANDS SUBAREA
Ground - Water Quality Zones

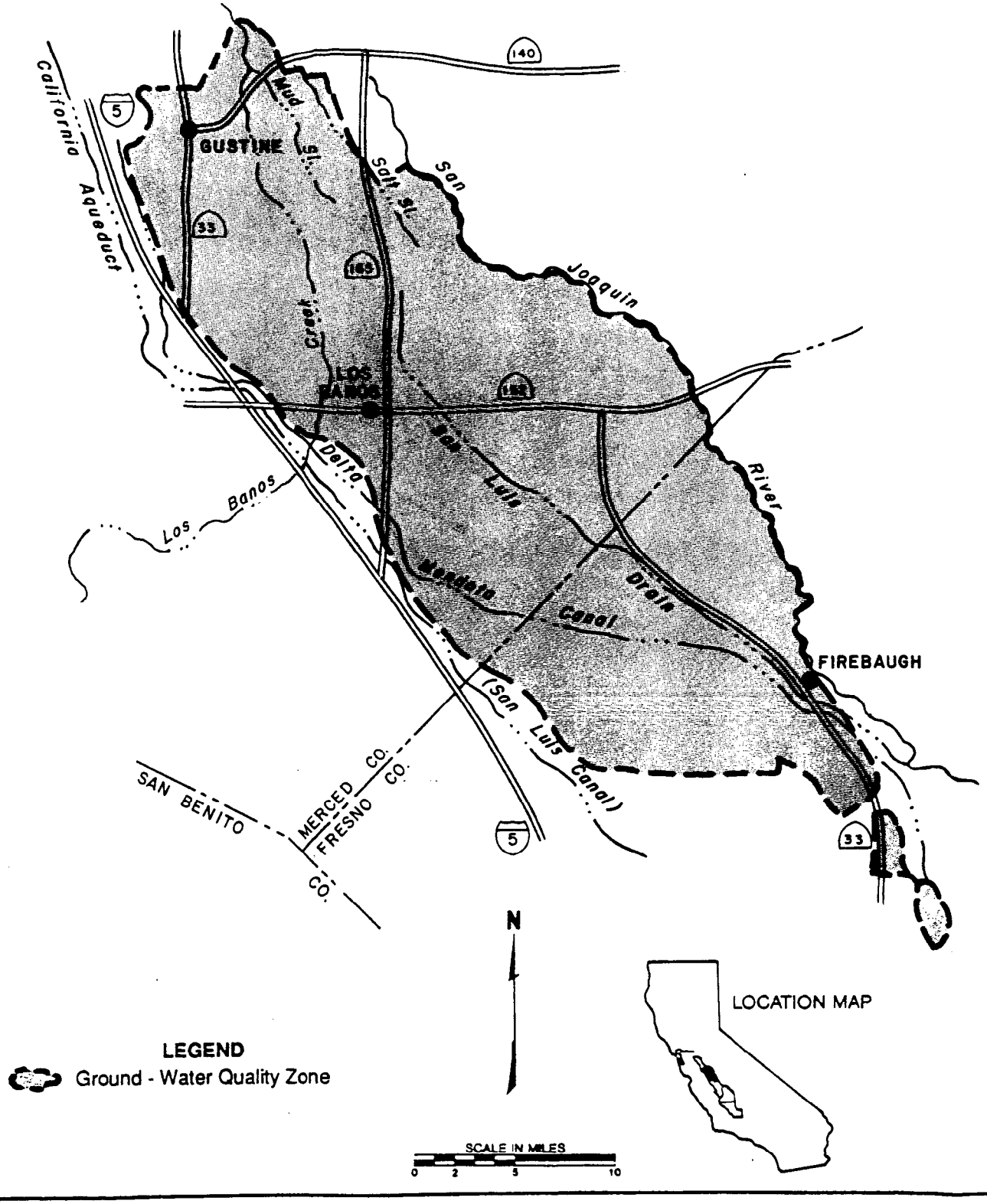


Figure 2
WESTLANDS SUBAREA
Ground - Water Quality Zones

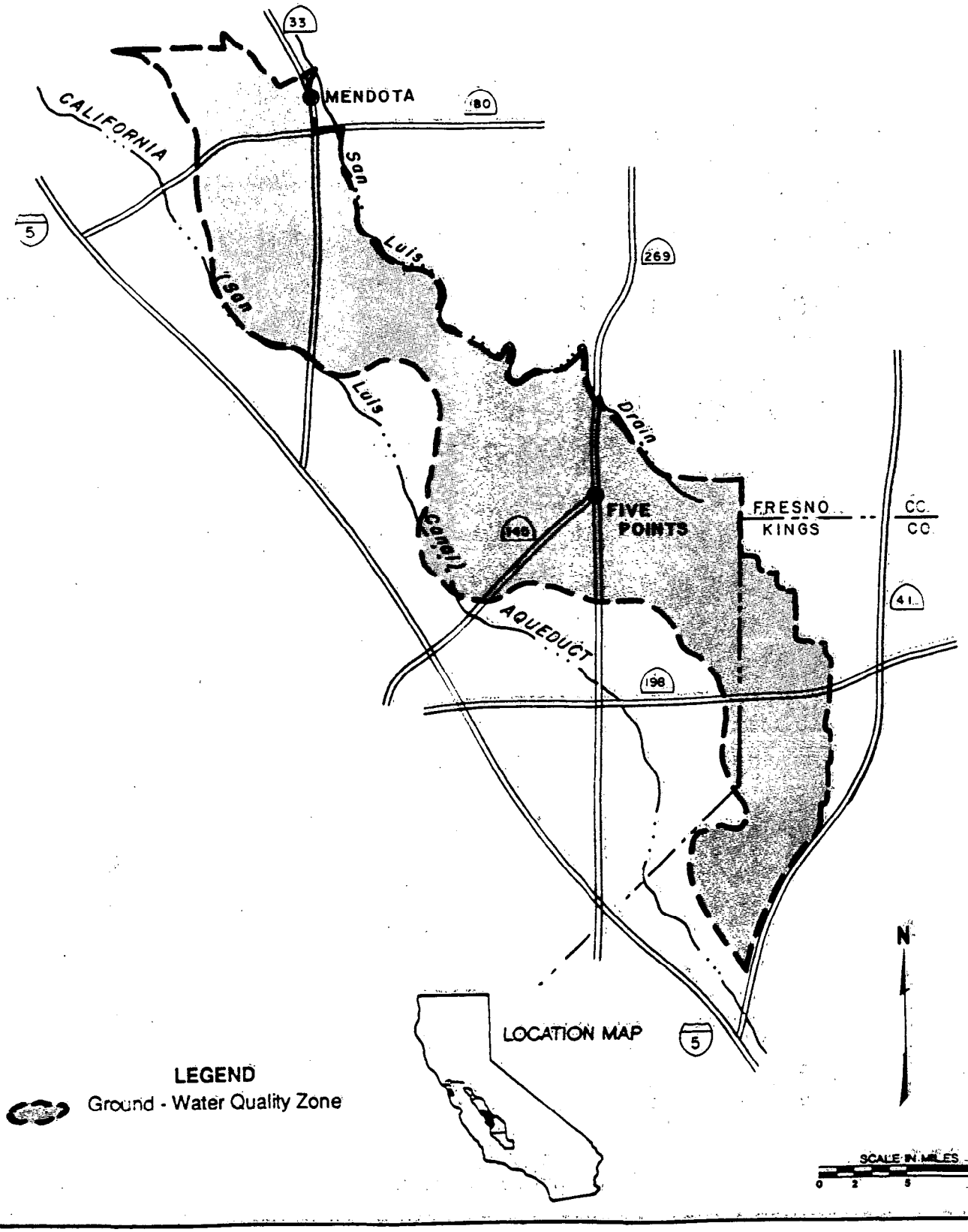


Figure 3
KERN SUBAREA
Ground - Water Quality Zones

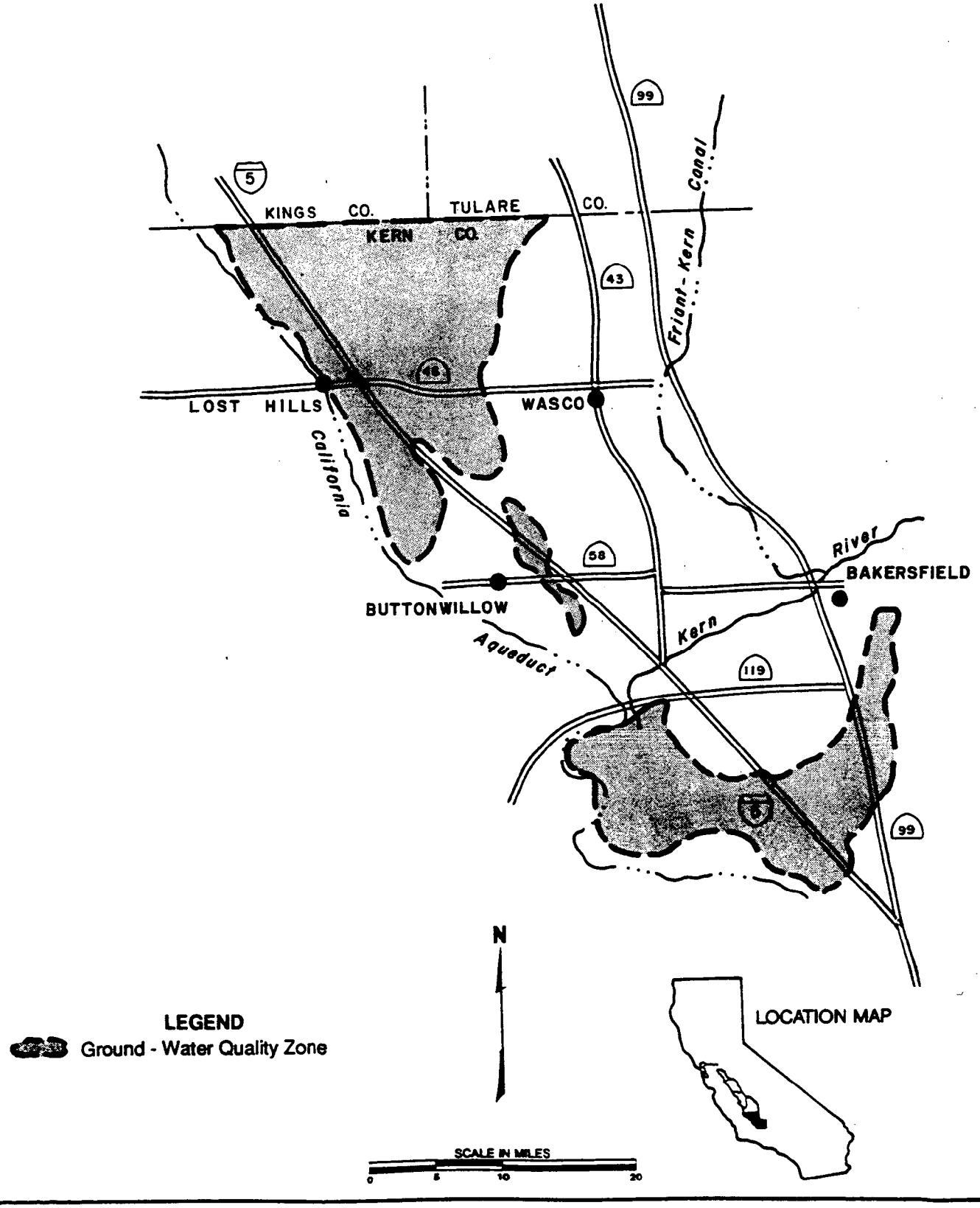
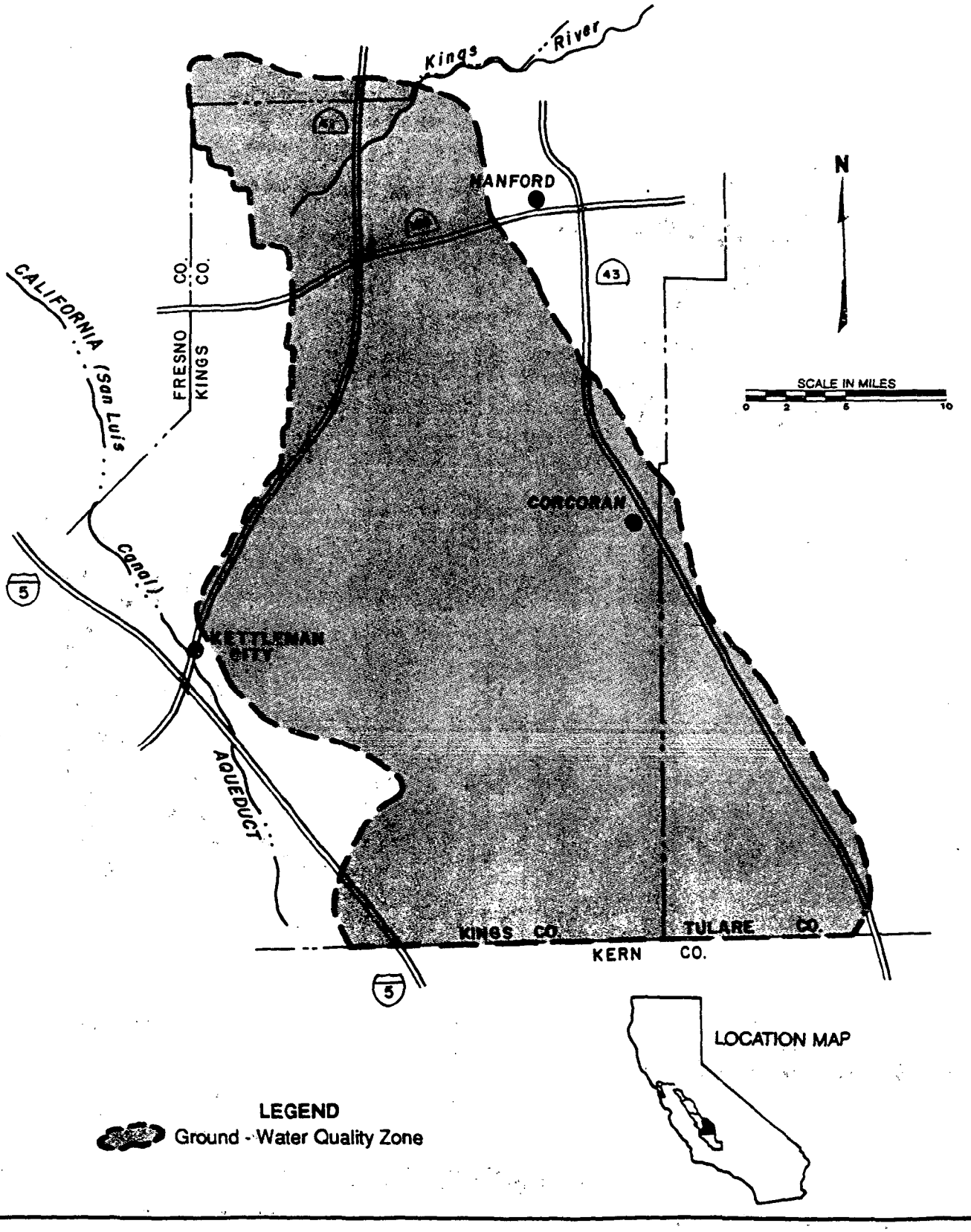


Figure 4
TULARE SUBAREA
Ground - Water Quality Zones



6/11/91

MEMORANDUM OF UNDERSTANDING REGARDING

URBAN WATER CONSERVATION IN CALIFORNIA

September 1991

TABLE OF CONTENTS

EXHIBITS

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

3.	**Distribution System Water Audits, Leak Detection and Repair**	FACTOR
	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.

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
215 Fremont Street
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
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Other Modifications to MOU or Exhibits

VI. Recent Developments

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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

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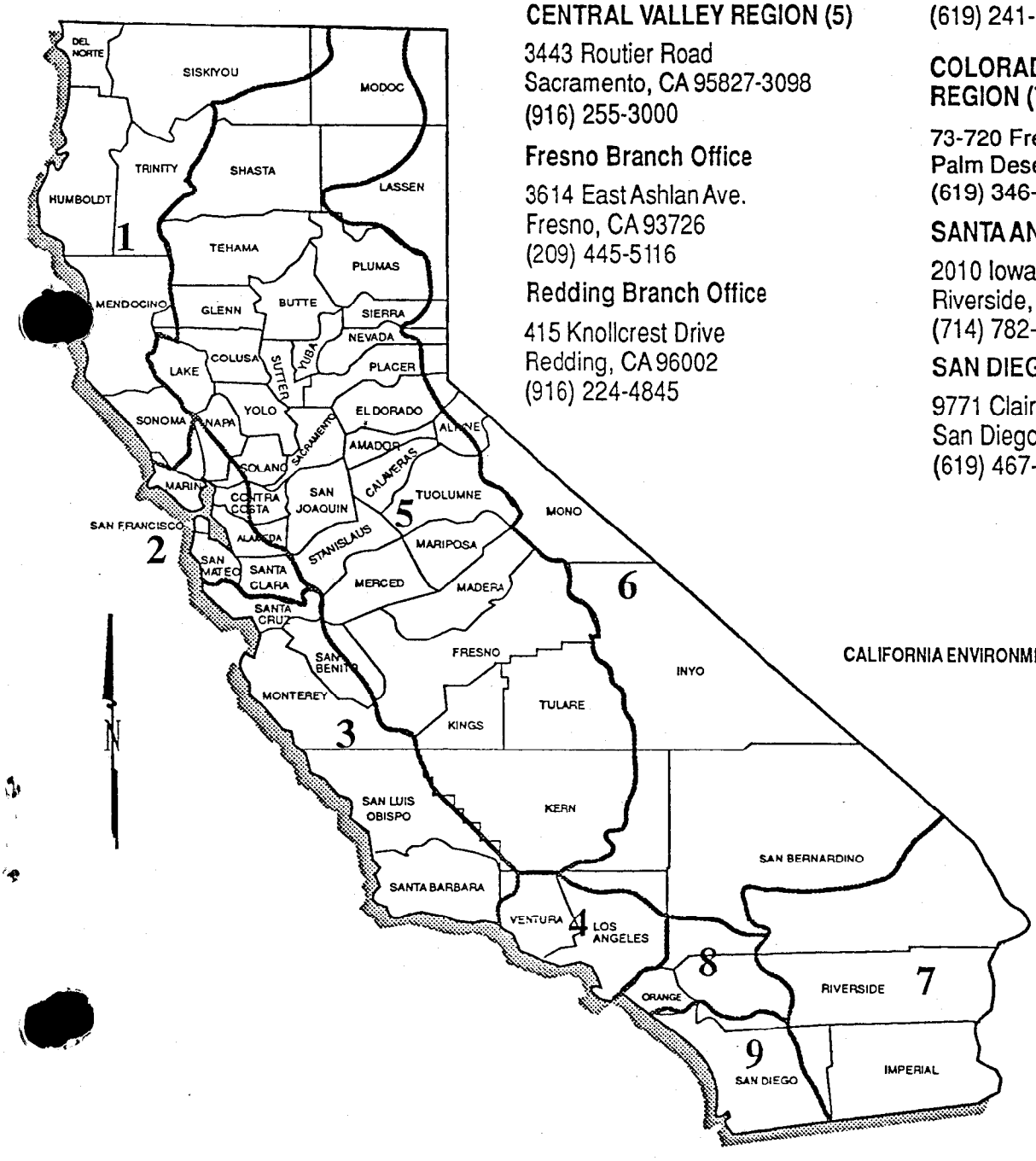

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