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BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

PERIODIC REVIEW OF THE 1995 WATER QUALITY CONTROL PLAN FOR THE SAN FRANCISCO BAY/ SACRAMENTO-SAN JOAQUIN DELTA ESTUARY	Memorandum Supplementing Information And Providing Final Comments On The Materials Presented In The Workshop Regarding Consideration of Potential Amendments or Revisions of The 1995 Water Quality Control Plan For The San Francisco Bay/Sacramento-San Joaquin Delta Estuary

The San Luis & Delta-Mendota Water Authority ("Authority") submits this memorandum pursuant to (1) the revised notice of public workshop ("Revised Notice") issued by the State Water Resources Control Board ("Water Board" or "SWRCB") on September 17, 2004, and (2) the Water Board's April 29, 2005 letter extending the final comment deadline. This memorandum summarizes and supplements the information presented by the Authority at the workshop on the 1995 Water Quality Control Plan ("1995 Plan" or "1995 WQCP") for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary ("Delta" or "Bay-Delta Estuary"), and provides the Authority's comments on the issues addressed by other parties during that workshop. This memorandum is organized as follows:

I. Introduction 2
A. San Luis & Delta-Mendota Water Authority 2
B. Issue Before the State Water Resources Control Board 3

C. New Information For Consideration 3

II. Periodic Review 4
A. Background 4
B. Governing Law 5

III. Supplemental Information And Comments 10
A. Changes That Have Affected And Continue To Affect The Bay-Delta Estuary Since the Water Board Adopted the 1995 WQCP 10
B. Value of the Authority Service Area 15
C. Increased Human Population Levels 16
D. Delta Cross Channel Gates Closure, Delta Outflow and Exports 17
E. Chloride Objectives 41
F. River Flows – San Joaquin River: February – April 14 and May 16 – June; Program of Implementation 43
G. Dissolved Oxygen 50

IV. Conclusion 51

I. INTRODUCTION

A. San Luis & Delta-Mendota Water Authority

The Authority was formed in 1992 as a joint powers authority, and has its principal office in Los Banos, California. The Authority is comprised of 32 water agencies,[1] each of which contracts with the United States for water supplies stored, pumped, and conveyed by the Central Valley Project ("CVP"). The Authority's member agencies are entitled to approximately 2.5 million acre-feet of water for agricultural lands within the western San Joaquin Valley, San Benito and Santa Clara Counties, between 150,000 and 200,000 acre-feet of water for municipal and industrial uses principally within the Silicon Valley, and an additional 250,000 to 300,000 acre-feet of water for wildlife refuges for habitat enhancement and restoration activities. In addition, the Authority operates and maintains certain CVP facilities under contract with the United States Bureau of Reclamation ("Reclamation"). Two such facilities are the Tracy

[1] The Authority's member agencies are: Banta-Carbona Irrigation District; Broadview Water District; Central Calif. Irrigation District; Centinella Water District; City of Tracy; Columbia Canal Company; Del Puerto Water District; Eagle Field Water District; Firebaugh Canal Water District; Fresno Slough Water District; Grassland Water District; James Irrigation District; Laguna Water District; Mercy Springs Water District; Oro Loma Water District; Pacheco Water District; Pajaro Valley Water Mgmt. Agency; Panoche Water District; Patterson Water District; Plain View Water District; Pleasant Valley Water District; Reclamation District 1606; San Benito County Water District; San Luis Canal Company; San Luis Water District; Santa Clara Valley Water District; Tranquillity Irrigation District; Turner Island Water District; West Side Irrigation District; West Stanislaus Irrigation District; Westlands Water District; and Widren Water District.

Pumping Plant, located in the southern portion of the Delta, near the city of Tracy, and the Delta-Mendota Canal, which is used to deliver water from the Tracy Pumping Plant to the Authority's member agencies.

B. Issue Before the State Water Resources Control Board

As adopted by the Water Board in Resolution 2004-0062, the September 30, 2004 staff report entitled "Periodic Review of the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary" ("Staff Report"), concisely frames the issue before the Water Board. The Staff Report provides:

> The [SWRCB] is conducting a periodic review to evaluate new information for consideration of new water quality objectives or changes to the objectives specified in the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 Bay-Delta Plan or Plan).

(Staff Report at p. 8.) Presented in other words, the Water Board is conducting the review to determine if new information is available that shows new water quality objectives or changes to the existing objectives in the 1995 WQCP are required to ensure reasonable protection of beneficial uses and to prevent nuisance.

C. New Information For Consideration

There is important new information available to the Water Board; information that may affect the manner in which the Water Board sought to protect beneficial uses in the 1995 Plan. The new information will provide the SWRCB with a better understanding of whether the existing objectives protect beneficial uses of water, meet the demands being made and to be made on the waters of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, and balance between values involved, beneficial and detrimental, economic and social, tangible and intangible.

New information reflects that, since 1995, there have been and will continue to be significant investments to study, protection and restoration of the fish and wildlife resources; investments which have resulted in improved overall fishery conditions. It also shows that the Authority's member agencies have, through their use of water exported from the Delta, continued to provide significant value to the State of California and the United States. Against this

backdrop, information confirms that since 1995, the demand for water developed in the Bay-Delta Estuary has and is expected to increase and therefore, the competition for that water by all of the beneficial uses has and will likely continue to intensify.

As a result, the importance of using water efficiently is ever more important. As presented at the workshop and in written material submitted to the Water Board, the new information can be used to help achieve that goal. The information can be applied in analyses that would (1) provide a better understanding of the level of protection the Delta Cross Channel Gates, outflow, export, and possibly Rio Vista objectives provide to fish populations, and (2) allow for flexibility in the outflow, export and possibly Rio Vista objectives where, "undercompliance," at times, would not significantly affect the protection of fish and wildlife, but would result in potentially significant water savings for subsequent beneficial use. No other changes to the outflow and export objectives is supported by information presented to the Water Board.

New information also supports the addition of a compliance point in Old River, near Holland Tract. The current location of a compliance point, at the entrance to the Contra Canal at Pumping Plant No. 1, may be needed to protect municipal and industrial beneficial uses, but that location is at a point where water quality is affected by factors outside of the control of either Reclamation of DWR. The additional compliance point is needed to provide Reclamation and DWR with a point to which they can operate the CVP and SWP, respectively, to achieve the mandated chloride levels.

II. PERIODIC REVIEW

A. Background

The periodic review of the 1995 Plan commenced on December 10, 2003, when the Water Board issued a notice of public workshop. Based on the comments received at the workshop, the Staff Report recommended that the Water Board hold an additional workshop to receive more information. The Water Board adopted the Staff Report and, in its September 17, 2004 Revised Notice, the Water Board: (1) established a schedule and identified eleven key topics to be addressed at the workshop, (2) indicated that after the workshop Water Board staff would prepare

a revised plan or plan amendments, depending on the degree of changes necessary, and conduct appropriate environmental review thereof, and (3) indicated that the Water Board would hold, pursuant to Water Code section 13244, a hearing to consider the proposed revised plan or plan amendments, if any were proposed.

B. Governing Law

1. The Clean Water Act

Under the Clean Water Act, the United States Environmental Protection Agency ("USEPA") is responsible for developing water quality criteria and requires states to set water quality standards consistent with those criteria. The water quality criteria placed upon the states by the Clean Water Act extend to waters of the United States, which include:

i. Waters used in interstate commerce, including all waters subject to the tides;

ii. Interstate waters;

iii. Intrastate lakes, rivers, streams, wetlands, etc. which are (a) used by interstate travelers for recreation and other purposes, (b) sources of fish or shellfish sold in interstate commerce, or (c) utilized for industrial purposes by industries engaged in interstate commerce;

iv. Impoundments and tributaries of waters within these first three categories;

v. Wetlands adjacent to waters within these categories.

(40 C.F.R. § 122.2.)

States are required to base the water quality standards on the designated uses of the specific waters involved. These standards must protect the public health or welfare and the quality of water. In establishing the standards, states must consider the potential impact to public water supplies, propagation of fish and wildlife, recreational purposes, industrial and agricultural purposes, and navigation. (33 U.S.C. § 1313(c)(2)(A).) The Water Board is designated as the regulatory agency for all purposes stated in the Clean Water Act. (Water Code § 13160.)

2. Porter-Cologne Water Quality Control Act

In California, the Porter-Cologne Water Quality Control Act ("Porter-Cologne") is the primary statute governing water quality and, therein, the legislature grants the Water Board broad powers to protect water quality within California's boundaries. (Water Code § 13000 *et seq.*)

Under Porter-Cologne, the Water Board has authority to regulate activities that may affect the quality of waters to attain the highest water quality which is reasonable, considering all the demands made on the waters and the total values involved, i.e., beneficial and detrimental, economic and social, tangible and intangible. (Water Code § 13000.) The Water Board's authority under Porter-Cologne extends to all waters within the California's boundaries, thereby overlapping the Water Board's authority over those waters of the United States, granted under the Clean Water Act.

Under Porter-Cologne, the Water Board is authorized to adopt water quality control plans. (Water Code § 13170.) Such a plan:

> [C]onsists of a designation or establishment for the waters within a specified area of all of the following:
>
> (1) Beneficial uses to be protected.
>
> (2) Water quality objectives.
>
> (3) A program of implementation needed for achieving water quality objectives.

(Water Code § 13050(j).)

> "Water quality objectives" are the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

(*Id.* at § 13050(h).) For each water quality objective set by the Water Board, the Water Board must find that the water quality objective:

> [W]ill ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses.

(Water Code § 13241.)

> Factors to be considered by [the Water Board] in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:
>
> (a) Past, present, and probable future beneficial uses of water.
>
> (b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
>
> (c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

(d) Economic considerations.

(e) The need for developing housing within the region.

(f) The need to develop and use recycled water.

(*Id.*)

Objectives adopted by the Water Board, if they are also water quality standards within the meaning of the Clean Water Act, must be made available to the administrator of the USEPA, for review for compliance with the Clean Water Act. (33 U.S.C. § 1313(c).) If the administrator of the USEPA determines that the standards do not comply with the Clean Water Act, the administrator shall specify changes necessary to comply with the Clean Water Act. If the changes are not made, the administrator of the USEPA may prepare applicable water quality standards. (*Id.*) The Water Board developed the 1995 WQCP in accordance with the Clean Water Act and Porter-Cologne.

3. Changing An Existing WQCP

A significant concern with any change in existing standards, under the Clean Water Act, or objectives, under Porter-Cologne, is the potential degradation in the level of protection. There are federal and state policies that guide such actions.

a. Federal Policy on Water Quality Degradation

Under federal law, each state must adopt and implement an "antidegradation policy." (33 U.S.C. § 1251(a), 40 C.F.R. § 131.12.) The governing regulations specify the minimum requirements of each state's antidegradation policy:

> (1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> (2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the inter-governmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for non point source control.

> (3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.
>
> (4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the anti-degradation policy and implementing method shall be consistent with section 316 of the [Clean Water] Act.

(40 C.F.R. § 131.12(a).)

Thus, the federal antidegradation policy allows an action that would degrade surface water quality in those waters that have sufficient quality to support propagation of fish, shellfish, and wildlife and recreation in and on the water. However, in those areas, a state may allow an action that degrades or lowers water quality, provided: (1) "the State shall assure water quality adequate to protect existing uses fully," (2) "the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and cost effective and reasonable best management practices for non-point source control," and (3) the State find, "after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located." (40 C.F.R. § 131.12(a)(2).)

b. California Policy on Water Quality Degradation

California's water quality maintenance policy predates the federal "anti-degradation" policy described above and established in Section 131.21 of Title 40 to the Code of Federal Regulations. In Water Quality Resolution 68-16, issued on October 24, 1968 and entitled "Statement of Policy with Respect to Maintaining High Quality of Waters in California," the Water Board resolved:

> Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State than any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

(SWRCB WQ Res. 68-16 at p. 1.)

Resolution 68-16 has been adopted as part of California's policy for water quality control, and as a general objective in all water quality control plans adopted by the regional boards. (SWRCB Order No. WQ 86-17 (Nov. 10, 1986), 1986 WL 22526 at *8.) In its Order No. WQ 86-17, the Water Board recognized:

> Before approving any reduction in water quality, or any activity that would result in a reduction in water quality, the [State Water Board and any] Regional Board must first determine that the change in water quality would not be in violation of State Board Resolution No. 68-16 or the federal antidegradation policy.

(*Id.*)

The Water Board has interpreted Resolution 68-16 to incorporate the federal antidegradation policy in situations where the federal policy is applicable. (SWRCB Order No. WQ 86-17, 1986 WL 22526 at *9.) However, "where the federal antidegradation policy does not apply, the State and Regional Boards have applied the general test set forth in State Board Resolution No. 68-16, without addressing the specific... test established by the federal antidegradation policy." (*Id.*) Finally, "[t]he federal antidegradation policy is part of the [USEPA's] water quality standards regulations, and has been incorporated into the state's water quality protection requirements." (*Id.* at *10.)

The Water Board has provided little guidance on the application of either Resolution 68-16 or the federal antidegradation policy. In October, 1987, William Attwater, then Chief Counsel to the State Board, prepared the most significant document on the issue - a memorandum discussing the application of the federal policy to actions by the State and Regional Boards. ("Attwater Memorandum" a copy of which is attached hereto.) Citing State Board Order No. WQ 86-17, the Attwater Memorandum notes that Resolution 68-16 incorporates the federal antidegradation policy. (Attwater Memorandum at 2.) The Memorandum notes further:

> The federal antidegradation policy serves as a "catchall" water quality standard, to be applied where other water quality standards are not specific enough for a particular water body or portion of that water body, or where other water quality standards to not address a particular pollutant. The test also serves to provide guidance for standard setting and for other regulatory decisions, to determine when additional control measures should be required to maintain instream beneficial uses or to maintain high quality waters.

(*Id.*) Citing a guidance document from USEPA, Region 9, the Attwater Memorandum

acknowledges that although the policy is ordinarily triggered by regulation of pollutant-discharging activities under the Clean Water Act,

> [t]he federal antidegradation policy will also apply to changes in water quality resulting from water diversions. [US]EPA guidance suggests that in the case of an irreconcilable conflict between a State's water quantity allocations and the federal antidegradation policy, the State's water rights law would prevail.

(*Id.* at 6.)

In fact, "State water rights law would prevail if achieving the requirements of the federal antidegradation policy would require a waste or unreasonable use of water." (*Id.*)

The Attwater Memorandum thus recognizes:

> The federal antidegradation policy emphasizes protection of instream beneficial uses, especially protection of aquatic organisms. In most cases, where instream beneficial uses will not be impaired and no outstanding National resources waters will be affected, the federal antidegradation policy is not an absolute bar to reductions in water quality. Rather, the policy requires that reductions in water quality be justified as necessary to accommodate important social and economic development. The outcome will often depend upon a balancing of competing interests, the decision resting in the sound judgment of the State and Regional Boards.

(*Id.* at 2-3.)

III. SUPPLEMENTAL INFORMATION AND COMMENTS[2]

A. Changes That Have Affected And Continue To Affect The Bay-Delta Estuary Since the Water Board Adopted the 1995 WQCP

There have been significant changes in the Bay-Delta Estuary since 1995. Those changes are physical and regulatory and reflect significant investments in the protection and restoration of fish and wildlife. During the time those changes were being made, the Authority's member agencies have through their use of water exported from the Delta continued to provide significant value to the State of California and the United States. During the time those changes were being made, there was also an increase in the demand for water; a demand which is expected to continue to increase. All of the changes underscore the importance of using water, whatever the beneficial use, efficiently.

[2] In addition to the information presented below, the Authority incorporates by reference herein the information it previously provided to the Water Board as part of the workshop.

1. Changed Physical Environment

Since 1995, through significant investments by federal, state and/or local agencies, the physical environment within the Delta has changed. The greatest impacts to the physical environment likely result from implementation of the CVPIA and the CALFED Program, impacts intended in large part to provide improved conditions for fish and wildlife.

a. The Central Valley Project Improvement Act

The CVPIA mandates changes in management of the CVP, particularly for the protection, restoration, and enhancement of fish and wildlife. The purposes of the CVPIA are:

> (a) to protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
>
> (b) to address impacts of the Central Valley Project on fish, wildlife, and associated habitats;
>
> (c) to improve the operational flexibility of the Central Valley Project;
>
> (d) to increase water-related benefits provided by the Central Valley Project to the State of California through expanded use of voluntary water transfers and improved water conservation;
>
> (e) to contribute to the State of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; and
>
> (f) to achieve a reasonable balance among competing demands for use of Central Valley Project water, including the requirements of fish and wildlife, agricultural, municipal and industrial, and power contractors.

(CVPIA, § 3402.) According to United States Department of the Interior ("Interior,") the CVPIA is responsible for the following activities:

> **Central Valley**
>
> • Up to 800,000 acre-feet of CVP water has been applied each year [in part through CVP export pumping curtailments] to improve streamflows for salmon, steelhead, and other fish on the Sacramento, American, and Stanislaus rivers and on Clear Creek.

(*See* SLDM-EXH-03B at p. 17.)[3]

> **Sacramento Valley**
>
> • The removal of 5 dams and 15 diversions improved access to more than 24

[3] A copy of the report can be found at http://www.usbr.gov/mp/cvpia/accomplishments/index.html.

miles of upstream spawning areas for and enhancing survival of juvenile out-migrants.

- More than 8,000 acres of riparian habitat has been acquired and more than 500 acres restored or enhanced along 30 miles of basin streams to provide cover and shade.

- More than 108,000 acre-feet of water have been acquired through purchase or exchange to improve fish habitat and passage, streamflows, and water temperatures.

- Approximately 156,000 tons of gravel have been added to streams to improve spawning success.

- More than 172 acres of riparian habitat has been acquired and more than 500 acres restored or enhanced along 8.7 miles of basin streams to provide cover and shade.

- Nineteen diversions with a total capacity of more than 6,700 cubic feet per second have been screened or otherwise modified to reduce entrainment of juvenile fishes. Approximately 70-75 percent of all water diverted from the mainstem Sacramento River is now taken in a fish-friendly manner.

- A temperature control device has been installed at Shasta Dam to provide water of suitable temperature for anadromous fish spawning and rearing.

- The Coleman National Fish Hatchery is being rehabilitated.

- Raceways have been improved and a new water treatment system installed to protect hatchery production.

- A new hatchery, the Livingston Stone National Fish Hatchery, has been constructed on the mainstem Sacramento River to assist in the management and recovery of winter-run chinook salmon, a listed endangered species.

- The Keswick Fish Trap has been modified and improved.

- More than 5,650 acres of upland and riparian habitat have been acquired with contributions from the CVPIA to benefit other species of wildlife affected by the CVP. More than 650 acres have been enhanced or restored, including habitat for species listed under the Endangered Species Act.

(*See* SLDM-EXH-03B at p. 17.)[4]

Delta

- Modification of the Delta Cross Channel Gates operation.

- Six diversions have been screened to protect juvenile fish.

- A barrier at the head of Old River has been seasonally installed to guide

[4] A copy of the report can be found at http://www.usbr.gov/mp/cvpia/accomplishments/index.html.

juvenile salmon and reduce the influence of the State and Federal pumping facilities during their spring time out-migration.

- CVPIA funds were used to acquire 1,200 acres of land in the Delta for protection and restoration of native habitats and populations of native species.

(*See* SLDM-EXH-03B at p. 18.)[5]

San Joaquin Valley

- More than 5.4 miles of stream channel has been enhanced as instream habitat for anadromous fish.

- More than 844,000 acre-feet of water have been acquired for restoration of fish friendly instream flows.

- Nearly 72,000 tons of gravel have been placed in San Joaquin River Basin streams to increase spawning habitat availability for native fishes.

- A barrier to fish migration on the Cosumnes River has been removed.

- CVPIA funds have contributed to the acquisition of more than 82,200 acres of habitat, including nearly 2,400 acres of riparian habitat, to benefit native species in the valley. Restoration and enhancement measures have been applied to an additional 456 acres.

- Nearly 8,800 acres of drainage-impaired lands have been acquired and retired from irrigated agriculture, resulting in a reduction in the amounts of agricultural drainage entering the San Joaquin River system. More than 2,200 acres of these lands have been treated to reduce the threat of contamination and to provide increased habitat for native wildlife species.

(*See* SLDM-EXH-03B at p. 18.)[6]

b. CALFED Program

The CALFED Program is intended to restore ecological health and improve water management for beneficial uses of the Bay-Delta Estuary. The CALFED Program underwent programmatic review, and on August 28, 2000, a record of decision was issued. That decision describes a plan for implementation. Components of the plan include: Governance, Ecosystem Restoration, Watersheds, Water Supply Reliability, Storage, Conveyance, Environmental Water Account, Water Use Efficiency (conservation and recycling), Water Quality, Water Transfers,

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[5] A copy of the report can be found at http://www.usbr.gov/mp/cvpia/accomplishments/index.html.

[6] A copy of the report can be found at http://www.usbr.gov/mp/cvpia/accomplishments/index.html.

Levees, and Science. In the first four years of implementation, approximately $2.9 billion have been invested, *see* Introduction, Statement of Progress & Accomplishments,[7] in actions that include more 300 ecosystem restoration projects. These projects are of the following types:

- Restoration of Multiple Habitats;
- Shallow-Water Tidal and Marsh Habitat;
- Floodplains and Bypasses;
- Riparian Habitat;
- Channel Dynamics and Sediment Transport;
- Uplands and Wildlife-Friendly Agriculture;
- Fish Screens and Passage;
- Fishery Assessments;
- Ecosystem Water and Sediment Quality;
- Environmental Water Management;
- Natural Flow Regimes;
- Nonnative Invasive Species;
- Special-Status Species;
- Local Watershed Stewardship; and
- Environmental Education

(*See, e.g.*, Program Objectives & Accomplishments, Ecosystem Restoration & Watershed Management.)[8]

2. Changed Regulatory Environment

The regulations effecting the Bay-Delta Estuary have also changed since 1995, again, actions that were intended to provide improved conditions for fish and wildlife. The following provides examples of some of the changes:

- Under federal ESA authority, the Delta Cross Channel Gates have been used, since 1999, to protect spring-run Chinook.

- Under federal ESA authority, emphasis has been placed, since 1999, on temperature conditions in streams with steelhead habitat, including the American, Feather, and Stanislaus Rivers.

- Under CVPIA Authority, refined implementation of section 3406(b)(2), which results in the dedication of up to 800,000 acre-feet of water each year.

- Under CVPIA authority, Trinity River annual flows have been increased to the current range of 368,600 to 815,000 acre-feet, [based on year type.] As a result, less Trinity water supply will be available for export to the Sacramento River to assist in meeting in-basin uses and exports.

- Under CALFED authority, an environmental water account program has

[7] A copy of the report can be found at calwater.ca.gov/AboutCalfed/AnnualReport2004.shtml.

[8] A copy of the report can be found at calwater.ca.gov/AboutCalfed/AnnualReport2004.shtml.

been used to acquire water thus allowing the EWA Agencies to prescribe actions modifying operations of CVP and/or SWP facilities to enhance fish protection and foster recovery of Delta-dependent species beyond the actions set forth in a "regulatory baseline," which includes the objectives established in the 1995 WQCP.

(*See, e.g.*, DOI-EXH-10 at pp. 2-5 to 2-8.)[9]

B. Value of the Authority Service Area

Since the adoption of the 1995 WQCP, and during these times of improved conditions for fish and wildlife, the Authority's member agencies have continued to provide extensive value to the State of California and the United States through, in part, their use of water exported from the Delta. They have provided benefits despite the fact that implementation of the 1995 WQCP and regulatory constraint have disproportionately reduced the available water supply to the Authority's member agencies.[10]

The service area for the Authority's member agencies includes two distinct economies, and each is affected by changes to the CVP water supply differently. The South Bay and Central Coast portion includes the most southern part of the San Francisco Bay urban area, and some less urban areas in San Benito and Santa Clara Counties. Most CVP water use in this region is for municipal and industrial ("M&I") purposes and the CVP water supply is a small but important share of all water use in the region. The west San Joaquin Valley portion is highly agricultural. There are no large cities or industries in the region to provide an alternative economic base. Most water use is for agriculture, although smaller amounts of water are used for M&I purposes and wildlife refuges and the CVP provides a large share of all water use in the region. Depending on water supply conditions, about 800,000 acres are partially or solely irrigated with CVP water.

According to the studies, in the service area of the Authority's member agencies, CVP M&I contract supplies are associated with about $16.5 billion of personal income, involving around 481,000 persons living in the service area, about 324,000 full-time and part-time jobs.

[9] A copy of the CVP-OCAP can be found at www.usbr.gov/mp/cvo/ocap_page.html.

[10] Regulation of the CVP reallocated approximately 1.2 million acre-feet from Authority member agencies water supply for agriculture and municipal and industrial uses to the environment: 800,000 acre-feet pursuant to section 3406(b)(2) of the CVPIA and approximately 400,000 acre-feet for wildlife refuges.

CVP agricultural contract supplies are associated with about $2.69 billion in total on-farm and indirect economic value. Of that amount, total annual on-farm and indirect wages and salaries total approximately $525 million, and involve around 37,465 persons employed through on-farm and indirect employment. Although the M&I water supplies appear to be associated with much more income and employment than the agricultural water supplies, the dependency of economic activity on CVP M&I water is not as strong as the dependency of agricultural economic activity on CVP agricultural supplies. For example, in 1999, approximately 70 percent of the agricultural supply in the Authority's service area came from CVP contracts. When CVP supplies are short, CVP M&I users are willing and able to pay for substitute supplies. The willingness and ability of agricultural users to pay for substitute supplies, which consist primarily of groundwater or water purchased through short-term transfers, is substantially less. Therefore, in periods of shortage, more of the associated agricultural economic activity will actually be lost than would be for the M&I activity.[11]

C. **Increased Human Population Levels**

The demand for water, including water developed within the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, has increased and is expected to continue to increase significantly due to increased population levels. The United States Census Bureau reported California's population in 1990 at 29,760,021,[12] and estimated California's population to be 31,589,000 in 1995 and to have increased to 34,441,000 by the end of this year.[13] The United

[11] A more detailed analysis of economic activity associated with west-side water supply is attached hereto as Exhibit 1. Exhibit 1 is a copy of the October 2003 draft West Side Integrated Resources Management Plan. Although that document is in draft form, as is the information presented in this section, the document is attached and the section is included because they provide information of the types and levels of contribution made by the Authority's member agencies. More recent data, not yet available for presentation, indicates that the value provided by the Authority member agencies is equal to or greater then that presented herein. Indeed, more recent data, albeit limited to farm gate value of crops, is attached hereto as Exhibit 2. Those data are representative. They do not include information from all of the Authority's member agencies and excludes information on cattle, sheep, aviary, dairy and specialty crops.

[12] *See* www.census.gov/prod/cen1990/cp1/cp-1.html (providing 1990 Census of Population General Population Characteristics (CP-1) -- California (CP-1-6), Section 3, Table 1).

[13] *See* www.census.gov/population/projections/state/stpjpop.txt (providing projections of the total population of states, 1995 to 2025).

States Census Bureau projects California's population to reach more than 41,000,000 within the next ten years.[14]

D. Delta Cross Channel Gates Closure, Delta Outflow and Exports

1. Summary of Issues

The Revised Notice presented the issues as follows:

> Is new information available regarding the effects of operation of the Delta cross channel gates?
>
> Should the SWRCB amend the Delta cross channel gates closure objective in the water quality objectives for fish and wildlife beneficial uses (Table 3 of the 1995 Plan)? How should the objective be modified and what are the scientific and legal arguments in support of and against such modifications?
>
> Should the SWRCB amend the Delta Outflow Objective in the Water Quality Objectives for Fish and Wildlife Beneficial Uses (Table 3 of the 1995 Plan) by adding flexibility to the value of the objective or by modifying footnote 14 to allow alternative methods to meet the objective? How should the value or footnote 14 be modified and what are the scientific and legal arguments in support of and against such modifications?
>
> Should the SWRCB amend the export limits objective in the water quality objectives for fish and wildlife beneficial uses (Table 3 of the 1995 Plan)? How should the objectives be modified and what are the scientific and legal arguments in support of and against modification?
>
> Should the SWRCB modify: (1) footnote 23 to increase the flexibility in selecting the accounting standard to follow when determining export/import ratio, (2) the manner in which in-Delta releases are accounted for by the export/import accounting standard, and (3) the export limits contained in footnote 22? How should the footnotes or accounting procedures be modified and what are the scientific and legal arguments in support of and against such modification?

2. New Science Shows That At Times, Meeting the Delta Cross Channel Gate Closure, Delta Outflow and/or Export, and Possible Rio Vista Objectives Is Not Necessary to Provide The Level Of Protection The Objectives Were Developed To Provide

As noted above, in the ten years since the Water Board adopted the 1995 WQCP, Federal, State and local interests have invested millions of dollars and thousands of hours studying the Delta and in particular the impacts of changes in Cross-Channel Gate operations, outflow, and exports on fish and wildlife. Those investments generated significant amounts of data; data that show at times the objectives do not provide the level of protection they were thought in 1995, and

[14] *See* www.census.gov/population/projections/state/stpjpop.txt (providing projections of the total population of states, 1995 to 2025).

that to provide there could be a level of under-compliance for the outflow, export and possibly Rio Vista objectives without significant impact to the level of protection for fish and wildlife but with a significant savings of water that would be available for beneficial uses.

a. New Understanding of Outflow (X2)

In 1995, X2 was thought of as a "habitat indictor." The principal, if not sole, basis for that thought were relationships between X2 and phytoplankton, neomysis, crangon shrimp, mollusses, striped bass (survival), starry flounder, longfin smelt and striped bass (abundance – commonly referred to as the X2 species). It was thought that (1) "the ability of X2 to act as a surrogate for the effects of net Delta outflow and the hydrodynamic variables" was refuted in the statistical significance of the relationships between X2 and the organisms listed previously and (2) the wide variety of trophic levels involved. (*See* Managing Freshwater Discharge to the San Francisco Bay-Delta Estuary: The Scientific Basis for an Estuarine Standard, a copy of which is attached as Exhibit 3, at B-6.) Since 1995, new information has caused a change in the scientific community's thoughts. The principal changes are the following:

- The abundance-X2 relationships have been updated to reflect the influence of the invasive Asian clam.

- Two additional species have been found to have abundance-X2 relationships, splittail and American shad.

- Analyses of these relationships have been carried out to assess how sensitive changes in abundance are to changes in Delta outflow, analyses that reveal that when outflows are relatively high, very large changes in outflow (100s KAF) are associated with very small changes (less than 5%) in abundance.

- There is now a general recognition that the abundance-X2 relationships for two of the adult species, American Shad and Splittail, are actually relationships between abundance and inflow and are probably related to the area of flooded vegetation. This distinction is important because exports affect outflow and X2, but not inflow, at least not directly. For the remaining relationships between species abundance and X2, only three pertain to adult species, none of which are listed species. The others apply to lower life stages. For those, there is no relationship between abundance of these lower life stages (or larval survival in the case of striped bass) and adult abundance.

b. The View of Other Stakeholders Regarding X2

TBI argues that the scientific basis for the February - June Delta outflow objective is strong and statistically significant, and that any further reductions in outflow would adversely

impact estuarine habitat and aquatic organisms. (BAY - EXH - 04. *See also* BAY - EXH - 05.) The Authority does not dispute that the scientific basis for the February - June Delta outflow objective continues to be strong and statistically significant. The objection by the Authority to TBI's position is that it is misleading and fails to appreciate the limited water resource of the State of California.

TBI's position is misleading because it ignores the changes in understanding outlined above, and fails to appreciate that the aquatic organisms that are protected by outflow are either for adult species, none of which is listed as threatened or endangered (longfin smelt, crangon shrimp, and starry flounder), or are for earlier life stages, none of which are correlated with abundance of the corresponding adults (i.e., larval survival of striped bass). TBI also fails to appreciate the limited nature of water resources of California, because it opposes flexibility of the outflow objective. Flexibility during the February-June period would allow for a relatively minor change in outflow, when the impacts of a change to the aquatic organisms protected by outflow would be relatively small, while the potential benefit from the use of the "saved" water would be great.[15]

As to the general estuarine habitat and aquatic organism argument, if changes in outflow caused impacts to the general ecosystem, those impacts should be manifested as changes in abundance of species near the top of the food chain, namely, the X2 species. Therefore, the abundance-X2 relationships are evidence (the only evidence) that changes in outflow "impact estuarine habitat and aquatic organisms." However, these relationships also indicate that at higher outflows, these "impacts" are small and are associated with a large water cost.

The California Department of Fish & Game ("DFG") make an argument similar to TBI's, stating that the outflow objective continues to serve to ensure the broad ecological benefits associated with robust outflow levels. (DFG - EXH - 03. *See also* DFG - EXH - 04.) Again, the

[15] For example, as explained in more detail below, when Delta outflow is at 29,000 cfs, the amount of water that places X2 at Roe Island, a reduction in outflow that would cause a 4.5% reduction in longfin smelt abundance would allow 360,000 acre-feet of water to remain in storage. The reduction in abundance would be less for other adult species with an abundance-X2 relationship.

Authority does not dispute that at times, the outflow objective benefit the ecosystem where the Authority takes issue is with DFG's blanket, unsupported statement of general benefits. Indeed, one might assert that "broad ecological benefits" occur, but without evidence, one might equally assert that "broad ecological benefits" do not occur. The adult abundance-X2 relationships for three unlisted species are the only evidence of "broad ecological benefits." Again, these relationships indicate that at higher outflows, these "broad ecological benefits" are small and are associated with a lot of water. DFG is therefore arguing to spend a lot to gain only a little.

Finally, the USEPA states that the existing outflow objective has been reinforced by data gathered since the 1995 WQCP was adopted. (EPA - EXH - 02. *See also* EPA - EXH – 03.) The Authority recognizes that the objective has been "reinforced," in the sense that the relationships are still statistically significant after considering recent data. However, as noted above, there is general acceptance that two of the five adult abundance-X2 relationships are actually not relationships with X2 but, rather, with Delta inflow, and that all but three of the abundance-X2 relationships are actually with abundance or survival of early life stages of species whose adult abundance is not correlated with abundance or survival of early life stages and, therefore, not with outflow either.

c. New Understanding of Exports

Considerable new information is now available on the effects of exports on the abundance of important fish species, in particular on salmon and delta smelt. This information falls into two categories:

- Information showing that effects on abundance are small or nonexistent (in the statistical sense—i.e., showing no statistically significant relationship between exports and abundance)

- Information providing a plausible explanation for why effects on abundance are small or nonexistent.

(1) Information Regarding The Small or Non-Existent Effects of CVP and SWP Exports On Abundance Of Salmon

Over the years, hundreds of experiments have been carried out to see what happens to small salmon as they move through the Delta. Generally, those experiments involved thousands of salmon, which were grown in hatcheries, and in which small coded wires were inserted in each

of them. In each experiment, groups of these "coded wire tagged" salmon were released just upstream of or in the Delta. Some of these fish were salvaged at the CVP and SWP export pumping plants in the Delta,[16] and trucked downstream and released back into the Delta. Others were captured in nets just downstream of the Delta. The experiments allow for the development of relationships between the number of salvaged fish to (1) the number of fish that were at the CVP and SWP export pumping plants, and (2) the number of fish that died at or were "exported" by the CVP and SWP.

Specifically, based on data developed for each group of coded wire tagged salmon, an estimate can be made of the number of that group that died at the CVP and SWP export pumps. This is referred to as "direct mortality," that is, the mortality directly attributed to CVP and SWP export pumping. Because the number of released fish for each group is known, the percentage dying at the CVP and SWP pumps can be estimated. This analysis demonstrates that although direct mortality at the CVP and SWP pumps may appear large in absolute numbers of fish, when all the data from coded wire tagged experiments over the years are considered, direct mortality is typically less than 1% of the total population. (*See* Exhibit 4 attached hereto.) In other words, the data show that, on a population level basis, direct mortality is typically very small. That is the case for both Sacramento River salmon and San Joaquin River salmon when there is a barrier at the head of Old River.[17]

Another kind of mortality has also been attributed to CVP and SWP export pumping. It is called "indirect mortality." This is the mortality that occurs outside of the CVP and SWP export facilities, but is nonetheless attributed to CVP and SWP exports or other water project operations in the Delta. Indirect mortality can be estimated from the same coded wire tagged experiments mentioned above. Most of these experiments also involve the fish caught in nets just downstream of the Delta, to see how many fish survived passage through the Delta and how many did not.

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[16] Salvaged fish are ones that were diverted by screens into holding (salvage) tanks.

[17] There are cases when direct mortality is not insignificantly small. Those cases are rare and unpredictable, and exports should be managed to prevent them when they occur. Tools currently exist outside of the 1995 WQCP are available to address those circumstances.

Each such experiment is actually measuring the combined effect of direct and indirect mortality, along with mortality caused by all other factors, such as predation and toxic contamination. Also, each experiment was done under different conditions of exports, river flow, water temperature, etc. So, it should be possible to analyze results from many of these experiments and see which factors (especially CVP and SWP exports) were affecting salmon survival through the Delta. In fact, that analysis has been done.

Pat Brandes of USFWS organized a number of the experiments mentioned above into 81 pairs of releases, each pair consisting of an upstream and a downstream release,[18] and each release consisting of 40,000 to 120,000 hatchery-grown, coded wire tagged smolts. Use of pairs allows for normalizing of results with respect to several confounding factors such as tides, gear, etc.

Professor Ken Newman, University of Idaho, analyzed these pairs of releases to see if he could identify the factors affecting survival through the Delta. *See* Modeling Paired Release-Recovery Data in the Presence of Survival and Capture Heterogeneity with Application to Marked Juvenile Salmon, January 16, 2003, Ken B. Newman, attached as Exhibit 5.) Newman found that water temperature had a strong effect, and concluded that the effect of exports was questionable. The Authority sent Newman's analysis to Dr. Bryan Manly, one of the world's preeminent ecological statisticians. Dr. Manly confirmed that CVP and SWP export effects were questionable. Specifically, Manly said: ". . . I suggest that a reasonable point of view at this point is that the estimates of [Delta Cross Channel Gate] and [CVP and SWP] export effects available so far are questionable, and the data need more study." Incidentally, when the Authority sent Brandes' data, presented to the Water Board in this periodic review on Cross Channel Gate closure effects on survival, to Manly, Manly also concluded that those effects were questionable. (*See*, e.g., Review of Papers Pertaining to Salmon Survival in Relationship to the Closing of the Delta Cross Channel Gates and Export Pumping, attached as Exhibit 6.)

Biologist Steve Cramer, working on the winter run population model for California Urban

[18] Some of the downstream releases were paired with more than one upstream release, so there were less that 162 releases.

Water Agencies ("CUWA") in cooperation with the fish agencies and others, used Newman's analysis to estimate effects.[19] The CUWA winter run model uses Newman's analysis, despite its questionable nature, because it is the only model available to account for Delta effects. Nevertheless, preliminary results from the winter run model showed that Delta factors (including CVP and SWP exports) had a very small effect on adult populations (about 1%). Dr. Wim Kimmerer, the CALFED Environmental Water Account Science Advisor, presented an independent analysis of factors affecting winter run populations to the Water Board in this periodic review earlier this year. His analysis is consistent with the results from the CUWA model.

In summary, when it concerns CVP and SWP exports, despite years of data and experiments involving hundreds of thousands of fish, data show that the effects of the CVP and SWP export pumps are very small and questionable.

(2) Information Providing A Plausible Explanation For Why Effects Of CVP And SWP Exports On Abundance Of Salmon Are Small Or Nonexistent

CVP and SWP exports have long been a focus of investigations concerning salmon. How can this be, that the many years of data show that both direct and indirect effects of CVP and SWP exports on salmon survival through the Delta are very small and questionable? The answer can be found in two kinds of data. The first kind is the data showing the number of outmigrants caught in traps upstream of the Delta, the salvage data at the CVP and SWP pumps, and the catch of smolts at Chipps Island, at the western boundary of the Delta. (*See* Exhibit 7, attached hereto.) These counts of salmon at different locations show when they move past different locations and, taken together, indicate two important things:

- There is typically a period of weeks between the time the peak migration enters the Delta and the time it leaves the Delta.

- The peak migration out of the Delta tends to coincide with the peak in salvage at the export pumps.

[19] The data that formed that basis for Newman's analyses were for fall run salmon. Smolts of this race are smaller when they enter the Delta than smolts of the other races, and should thus be more vulnerable to export effects than other races. Therefore, Cramer's use of Newman's model for winter run is environmentally conservative.

In other words, salmon enter the Delta and are capable of hanging out there for weeks. When they start to migrate, some of them (typically, very few, relatively speaking, as discussed above) show up at the CVP and SWP export pumps. The idea advanced by some that salmon smolts are "drawn to the pumps" where they do not want to go, is preposterous on the face of it. If small salmon are "drawn to the pumps" from all over the Delta, there would be no fish in any of the world's streams and rivers.[20]

This brings us to the second kind of data, the results of recent experiments on smolts passing the Delta Cross Channel and Georgiana Slough. These smolts had small radio transmitters inserted in them. Boats with receivers tracked their signals. These data show salmon migrating down the Sacramento River. They move more or less with the tides, sort of a three-steps-downstream-two-steps-upstream progression with each ebb-flood cycle. They are moving toward salt water because they are physiologically compelled to do so. They appear to be quite efficient at it. However, if they pass the Cross Channel on the flood tide with the gates open, almost all of them are swept into the Cross Channel because that is where all the water is going. If they pass on the ebb, almost all of them move on down the Sacramento River.

In other words, salmon can be swept off the main stem rivers into side channels by tidal sweeping flows if they happen to reach a junction at the "wrong" tidal phase. Once swept off the main stem, they can be further diverted into other side channels. Once off the main stem rivers, their progression to the ocean takes longer. They are more susceptible to predation and other life-threatening events.

So, for salmon migrating through the Delta, which is tidal throughout, it is a roll of the dice, so to speak, at every junction. The more junctions there are, the higher the chance of getting swept off the main stem. There are a lot more junctions to be unlucky at for San Joaquin salmon than for Sacramento salmon. Maybe that is one reason why survival for San Joaquin smolts is lower than for Sacramento smolts.

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[20] If the pumping by the CVP and SWP could draw fish, then certainly outflow of a river, which is many times greater in magnitude than the rate of CVP and SWP pumping, would certainly have at least the same effect. Outflow would "flush" all fish downstream into the ocean leaving no fish in any stream or river.

Note that smolts are not susceptible to these tidal sweeping flows at junctions if they are not migrating. Also, if they are migrating, some of them will be very unlucky and eventually swept into the southeastern Delta, close enough to the CVP and SWP export pumps that they will be "drawn to the pumps." That is consistent with the data showing that peak migration out of the Delta tends to coincide with peak salvage at the CVP and SWP export pumps.

Finally, the percentage of salmon, albeit small, that shows up at the pumps, is not predictable. Sometimes it is 0%, sometimes 0.5%, occasionally higher than 1%. Currently, as far as the Authority can tell, it appears to be random. That randomness is also consistent with the idea that reaching the CVP and SWP export pumps is the result of being "unlucky" at a series of junctions.

It appears that tidal sweeping at junctions is a primary, albeit indirect, cause of mortality for outmigrating smolts. If CVP and SWP exports are to affect that survival, exports must affect tidal sweeping flows. However, tidal sweeping flows are large, and the junctions tend to be some distance from the CVP and SWP export pumps. For most junctions, exports have very small effects on tidal sweeping flows. This would explain why the coded wire tagged data show small or nonexistent and uncertain effects of CVP and SWP exports on smolt survival. CVP and SWP exports may be important to net, tidally averaged, flows, but not to the much larger tidal sweeping flows that exist throughout most of the Delta and are critical in determining whether smolts are diverted off the main stem river migration paths to the ocean.

(3) Information Regarding the Small Or Non-Existent Effects of CVP and SWP Exports On Abundance Of Delta Smelt

There is no correlation between the fall midwater trawl (FMWT) index of sub-adult smelt abundance (the "official" index) and the summer townet (STN) abundance index. (*See* Exhibit 8, attached hereto.)[21] Entrainment of both adult and larval/juvenile (hereinafter referred to as "juvenile") occurs prior to the STN index. There is no correlation between any measure of adult

[21] There actually is a correlation if you include all years' data, but those years cover some radically different ecological conditions, so the correlation is likely the result of common factors affecting both the STN and FMWT, rather than the STN affecting the FMWT. There is no correlation for the "post-decline" period, after 1980.

or juvenile entrainment and the STN index. (*See* Exhibits 9, 10, 11 and 12, attached hereto.) Therefore, there can be no correlation between entrainment and the FMWT index, and there is not.

There is, however, a correlation between the STN index and the previous FMWT index, *See* Exhibit 13, attached hereto, that is, between the abundance of juvenile offspring and abundance of their parents. This means that the STN is good enough data to show a correlation, over several life stages and one generation, between the STN and previous FMWT (juvenile offspring to parents). If so, it ought to be good enough to show a correlation between the subsequent FMWT and STN (subsequent adults to juveniles) if one existed. It does not show a correlation. This analysis suggests that within the year that effects occur it is important to the effect upon the overall population.

(4) Information Providing A Plausible Explanation For Why Entrainment Is Not Correlated With Abundance

How is this possible, that entrainment of adults and juveniles is not correlated with subsequent abundance and that even juvenile abundance in the summer does not correlate with sub-adult abundance in the fall? Dr. Bill Bennett first suggested the answer. (*See* 2005 CALFED Delta Smelt White Paper prepared by Dr. Bill Bennett.) Bennett analyzed a number of smelt from 1999 and found that many were starving in the late summer. Smelt primarily eat two zooplankton, Eurytemora (either native or, maybe, introduced decades ago) and Pseudodiaptomus (introduced in 1986).

Keying on Bennett's findings, the Authority analyzed the co-occurrence of delta smelt with both of these zooplankton in July for the last 20 years. The Authority found a highly significant correlation between this July co-occurrence and the subsequent FMWT index. (*See* Exhibit 14, attached hereto.) The primary area of co-occurrence was the lower Sacramento River and, in some years, nearby areas. (*See* Exhibit 15, attached hereto.) That is, if you have relatively high smelt abundance and a high density of food in the same place (lower Sacramento River or nearby) in the late summer, the subsequent FMWT index of abundance will probably be high. If you have few smelt or, more likely, low food density, or both, the FMWT abundance

index will probably be low.

There is no correlation between Pseudodiaptomus density and lower Sacramento River flow in July. (*See* Exhibit 16, attached hereto.) A correlation with flow would suggest some relationship with exports, but no such correlation exists. However, there is a strong downward trend in Pseudodiaptomus density in the lower Sacramento River with time, approaching zero last year. (*See* Exhibits 17, 18 and 19, attached hereto.) It appears that Pseudodiaptomus density in the lower Sacramento River and nearby areas in the late summer is the primary determinant of delta smelt abundance in the fall. If so, and if there is no relationship with river flow, the only way exports could be affecting the FMWT is by entraining (or otherwise affecting) smelt or Pseudodiaptomus that would otherwise have found their way to the lower Sacramento River in the late summer.

Maybe this happens in some years, say, years when spring Delta outflow is low and higher fractions of smelt are near the CVP and SWP export pumps. It clearly does not happen in all years. However, even in drier years, it is not clear that the smelt that otherwise would have been entrained would have migrated downstream and significantly contributed to the abundance of smelt in the lower Sacramento River or nearby in the late summer. This would explain the lack of correlation between the FMWT and entrainment described above. Maybe there is an effect, but it is likely to occur only in years with dry springs, and it may be small even in those years. This means that smelt entrainment should be managed in some years. In other years, it means little.

d. The Method For Analyzing The Data

(1) Understanding Effects Of Changes In Operations on Estuarine Species (Generally)

Three species show a relationship between adult abundance and the springtime average X2 (the distance from the Golden Gate of the location of the 2 ppt salinity): crangon shrimp, starry flounder (age 1), and longfin smelt. The location of X2 is controlled primarily by Delta outflow, so these species also show a relationship with Delta outflow. Two more species, splittail and American shad, show a relationship between adult abundance and X2, but Bay-Delta scientists now believe that this is actually a reflection of a relationship with Delta inflow, not

outflow. Other species show a relationship between early life stage abundance or survival and X2, but none of these early life stage measures of abundance or survival are correlated with adult abundance of those species.

All of these relationships are of the form: LOG(abundance) = a + bLOG(outflow or inflow). The relationship between X2 and outflow is of the form: X2 = m + nLOG(outflow). Therefore, for crangon shrimp, starry flounder (age 1), or longfin smelt, a graph of abundance vs. LOG(outflow) or abundance vs. X2 shows a relationship that is roughly a straight line. Similarly, for splittail and American shad, a graph of abundance vs. LOG(inflow) shows a roughly straight line relationship.

These relationships can be used to estimate the change in abundance for any given change in outflow (or X2) or inflow. For example, consider longfin smelt. Its relationship with outflow is as follows:

Longfin smelt abundance = 0.0015*(Jan-Jun avg. outflow)^1.31[22]

This relationship is simply the LOG(abundance) = a + bLOG(outflow) equation, solved for abundance. Consider a change in outflow, say, one produced by flexing the X2 objective. If initial outflow is "Oi," final outflow is "Of," initial abundance is "Ai," and final abundance is "Af," the following equation can be established A = 0.0015*O^1.31. Also, the percentage change in abundance is simple 100% times the change in abundance divided by the initial abundance or 100%*(Af.- Ai)/ Ai. Substituting the initial and final conditions into this equation yields the following equation for estimating the percentage change in abundance for any given change in average January-June Delta outflow:

% change in abundance = 100%*(Of/Oi)^1.31 – 1

As an example, consider a change in average January-June Delta outflow from 29,000 cfs to 28,000 cfs. This amounts to about 360,000 acre-feet of water (1,000 cfs * 181 days * 1.98 AF/cfsday). The change in longfin smelt abundance associated with this outflow change would be a decrease of about 4%. This example demonstrates that population level changes in

[22] Outflow is in cubic feet per second (cfs) and the "^" symbol indicates a power.

abundance of the three "X2 species" resulting from changes in Delta outflow can be estimated and that, at higher outflows, the changes can be relatively small, but the water savings significantly large. Similar estimates could be made for splittail and American shad population effects from changes in Delta inflow.

(2) Understanding Effects Of Changes In Operations On The Delta Smelt (Specifically)

Recall that no statistically significant relationships have been found between entrainment of adult or larval/juvenile (hereinafter referred to as "juvenile") delta smelt and subsequent abundance. The reason for the lack of relationships is described above and relates to the dominance of delta smelt and prey co-occurrence in the late summer in controlling future abundance.

However, delta smelt are listed as a threatened species under both the state and federal Endangered Species Acts, and, for this reason, their take (entrainment) must be managed even though the population level effects of this management may be insignificant. The attached figure shows the lack of relationship between juvenile smelt abundance (the summer townet abundance index) or sub-adult abundance (the fall midwater trawl index) and relative salvage of adult delta smelt. Relative salvage is adult salvage (a measure of entrainment) divided by the previous year's FMWT index (a measure of the total number of adults, of which some were salvaged).

It is possible that a relationship between adult entrainment and subsequent abundance exists, but the measure of adult entrainment (salvage/previous FMWT) is too poor an estimate of entrainment to reveal the relationship. The Authority offers two comments in this regard: First, the Authority notes that adult salvage/previous FMWT is the measure of adult entrainment used in the Delta Smelt Risk Assessment Matrix, the basis for export curtailments to manage entrainment. Second, the Authority notes that the importance of delta smelt and prey co-occurrence in the late summer is consistent with the lack of relationship between relative adult salvage and subsequent abundance.

Juvenile entrainment cannot be measured by salvage. Delta smelt are not counted at the CVP and SWP export facilities until they reach 20 mm in length. Entrainment of smaller smelt is

not measured. The Authority developed a method for estimating the percentage of juvenile smelt entrained at the CVP and SWP export pumps. The Authority used the results of 20 mm surveys (from 1995 through 2004) to estimate the distribution of smelt (i.e., the fraction of delta smelt at each sampled station throughout the estuary), and the Authority used DWR's Particle Tracking Model to estimate the chance of being entrained from each station during the approximate two weeks between 20 mm surveys.[23] The product of the fraction of smelt at a station and the chance of being entrained from that station by the time of the next survey, summed over all stations, is an estimate of the fraction of the hatched population entrained from that survey to the next. (*See* IEP Newsletter, Summer, 2004.)

Spawning of delta smelt is largely dependent on water temperature. Souza reports that spawning begins when water temperatures rise to about 12 degrees C. Hatching occurs about 12 days later. Eggs are attached to underwater plants and other substrate and cannot be sampled or entrained. Different parts of the Delta warm up at different times. Generally, the southeastern Delta warms up early. Therefore, even though most smelt may spawn elsewhere, the progeny of smelt that spawned near the CVP and SWP export pumps may, in fact, show up first in the 20 mm surveys, leading to the incorrect conclusion that most of the population was near the export pumps and susceptible to entrainment.

The Authority estimated the fraction of smelt that had spawned by the time of each survey. The Authority corrected the fraction of the hatched population entrained by the temperature-based estimates of the fraction hatched by the time of each survey. Repeating this process for all eight surveys each year produces an estimate of the total annual juvenile entrainment.

The Authority then attempted to find a relationship between these estimates of annual juvenile entrainment and subsequent abundance. The Authority tried to correlate subsequent abundance (STN and FMWT indices) with percentage juvenile entrainment. The Authority also

[23] For purposes of its method for estimating the percentage of juvenile smelt entrainment, the Authority accepted the general presumption that Delta smelt are thought to behave as neutrally buoyant particles. For larger smelt that can migrate, the assumption of neutral buoyancy would tend to overestimate entrainment.

tried to correlate percentage juvenile entrainment with the residuals of the STN versus previous FMWT correlation and with these residuals and the relative adult salvage estimates. The Authority found no relationship between percentage juvenile entrainment and subsequent delta smelt abundance.

Nevertheless, the Authority cannot rule out the possibility that juvenile entrainment may affect subsequent abundance in years when two conditions occur: (1) when juvenile entrainment was high, or (2) when smelt that were entrained would otherwise have constituted a significant fraction of the population in the lower Sacramento River and nearby in the late summer. Whether this is occurring or not, the Authority would not expect a relationship for all ten years' data between percentage juvenile entrainment and subsequent abundance.

Note also that if percentage juvenile entrainment significantly affects subsequent FMWT abundance, it would be because the product of the percentage entrainment and the fraction of entrained smelt that otherwise would have reached the lower Sacramento River in the late summer is significant. It could be that both are occurring but neither is high enough to be significant. The data relating subsequent FMWT and percentage juvenile entrainment (*See* previous exhibits) suggest that if percentage juvenile entrainment is less than about 20%, subsequent high FMWT indices are not ruled out. Nor are they guaranteed.

The Authority found an excellent, general (i.e., over all 20 mm surveys each year) relationship between the percentage of juvenile entrainment (hatched and unhatched) in the southeastern Delta and the average Delta outflow from mid-March to mid-April. (*See* Exhibit 20, attached hereto.) The Authority also found a general relationship between the annual percentage juvenile entrainment and the product of the percentage in the southeaster Delta and the average export rate in April and May. (*See* Exhibit 21, attached hereto.) These two relationships can be used to estimate a target export rate in April and May given the average mid-March to mid-April Delta outflow and a target annual percentage juvenile entrainment. The attached table, Exhibit 22, shows the target export rate for April and May related to the Delta outflow and target percentage juvenile entrainment. As described above, the "default" target percentage juvenile entrainment should probably be 20%. As can be seen from the table, this would produce target

export rates considerably higher than those occurring in the recent past. Recall, as described above, there is no general relationship between percentage juvenile entrainment and subsequent abundance.

(3) Understanding Effects Of Changes In Operations On Salmon

As described in the Authority's "Memorandum Supplementing Information And Providing Additional Comments On The Delta Cross Channel Gates Operations and Salmon Protection Objective," evaluations are either available or may be performed that correlate environmental effects (e.g., change smolt survival through the Delta) to a given change in operation (e.g., increasing export rate); correlations that can and should be used to evaluate the efficacy of each action undertaken through comparative estimates of population level effects of the existing course of action versus a proposed change in the action.

For example, existing data can be used to answer the question: how much does the population of smolts reaching Chipps Island change for a given change in operation. In layman's terms, the answer to that question amounts to estimating the effect with and without the action, and comparing the difference. In algebraic terms, the answer to that question amounts to taking the partial first derivative of the correlation equation relating the desired effect to the action.

Applying these algebraic terms, assuming there is a statistically significant relationship between smolt survival and export rate, it is possible to estimate the survival for any export curtailment using the following formula:

F = (N*S2 - N*S1)/N*S1

F = Fractional Change in the population surviving to Chipps Island
N = Number of smolts
E1 = Initial export rate
E2 = Rate after the curtailment
S1 = Survival of smolts through the Delta for export rate E1
S2 = Survival of smolts through the Delta for export rate E2.

In other words, if **N** smolts enter the Delta, then **N*S1** of them will survive with exports at **E1**, and **N*S2** of them will survive with exports at **E2**. The fractional change in the population surviving to Chipps Island will be the difference in the population divided by the original

population. Note that when the formula is applied, the number of smolts (**N**) cancels out, leaving the fractional change in population as **(S2-S1)/S1**. Therefore, it is not necessary to know the population size to estimate the fractional change in population for a given change in action. This position is not held by the Authority alone.

Dr. Kimmerer recognizes that fractional change in population of the affected life stage is the currency by which actions can be compared, provided that populations of successive life stages are proportional to each other. (WK-EXH-01.) Indeed, as discussed previously by the Authority, Dr. Kimmerer presented such comparisons to the Water Board, concluding that the actions that made a difference in the winter run decline and subsequent partial recovery were upstream and ocean actions, not actions in the Delta (i.e., Delta Cross Channel gate closures or export curtailments). (*See* WK– EXH – 01.)

3. Potential Flexible Implementation of Those Objectives is Needed During Those Times When Changes In The Outflow Objective or Exports Objective Would Cause Little Or No Change In the Level Of Protection For The Fish and Wildlife

The Authority proposes the following process to ensure that water is not wasted during those times when relatively small changes to the outflow or export limit objective could be made with little or no change in the level of protection for fish and wildlife and with significant water savings. The process reflects the new understanding of the effect of changes in operations on estuarine species, including delta smelt, and salmon.

Initially, to guide the process, the Water Board should articulate the following principles: (1) flexible implementation of the objectives is needed to more accurately reflect the real-time location of fish in the estuary, the effect of in-Delta actions on upstream fishery needs, and the balance between the water resources expended and fishery benefits derived, and (2) flexible implementation of the objectives must result in improvements in the water resources available for all beneficial uses of water developed in the Delta.

Pursuant to those guidelines, the Water Board should then authorize the flexible application of the outflow and export limits objectives, consistent with the following protocols for

the initiation, evaluation, and selection of flexing proposals:[24]

Consultation: A consultation process between Reclamation, DWR, USFWS, NOAA Fisheries, CF&G and the SWRCB will be initiated to assess appropriateness of flex when: (a) Delta is in balance and (b) immediately before an objective begins controlling Delta operations.

Trigger for Consideration of Flex: Flexing alternatives will be considered if requested by any one of the consulting agencies either (a) during a consultation, or (b) during the time a particular objective is controlling Delta operations if there is a change in the fishery or hydrologic conditions that existed at the time the objective became controlling.

Process for Consideration of Flex:

(a) Describe alternatives – ways in which the objective could flex,

(b) For each alternative, describe how the saved water should be subsequently used for fishery, water supply, and water quality purposes (saved water would be shared (i.e., 50% for water supply/water quality purposes and 50% for environmental purposes).)

(c) For each alternative, provide a science-based evaluation, including (1) quantified estimates of population level effects on fishery resources, (2) quantitative estimates of effects on water supply and water quality and (3) quantified estimates of uncertainty (i.e., comparison of no flex with flex alternatives to determine relative impacts).

Sideboards: Establish numerical "sideboards" (limits on flexing). For example:[25]

(a) For the E/I Ratio – A sliding scale based on the prior year's delta smelt fall midwater trawl index, with no flex greater than 10%.

(b) For X2 – Flex would only be considered when the Roe Island location is triggered. No flex would allow Delta outflow to fall below 15,000 cfs. No flex would be permitted to move the February though June average location of X2 by more than one kilometer.

SWRCB Involvement: If Reclamation, DWR, USFWS, NOAA Fisheries and CF&G jointly agree on a flex option, the proposed flex will be transmitted to the Executive Officer of the SWRCB who will have the authority to veto the proposal.

Public Review: When a possible flex is considered, opportunities for public review and comment on the evaluation methods and flex options must be provided, to the extent consistent with the timeline required for decision making.

Per Flex Consideration Reporting: Whether or not flexing is authorized, each time a consideration of flex is tiggered, the Reclamation, DWR, USFWS, NOAA Fisheries and CF&G will prepare and submit to the

[24] The specific proposal presented herein focuses on flexibility for the outflow and exports objectives. The proposal could apply to other objectives – i.e., Rio Vista although appropriate sideboards would need to be developed.

[25] Sideboards should be set forth in a document, outside the revised water quality control plan, such that the sideboards could be easily amended if and when necessary.

SWRCB a report describing the proposal and the decision, including all factors required under the "process" section and the reasons the decision was made. The SWRCB shall make the report available for public review.

Annual Reporting: At the end of each year, Reclamation, DWR, USFWS, NOAA Fisheries and CF&G shall prepare and submit to the SWRCB an additional report summarizing flexing activities, accounting for the changed water use, and estimating the effects on beneficial uses of flexing that occurred or resulted over the course of the year. The SWRCB shall also make this second, annual report available for public review.

4. The Only Other Existing Proposal For Adaptive Management Of The Outflow Objective Is Significantly Deficient

For the outflow objective, the Water Forum proposes a three-step process that would also allow for adaptive management of the outflow objective:

Step 1: The Management Agencies (USFWS, NOAA Fisheries, CF&G) determine if lower-American River salmonids will be at risk, and if so whether American River water is available through the environmental water account or pursuant to section 3406(b)(2) of the CVPIA for use instream, to avoid the anticipated impacts,

Step 2: If American River water is not available for use, Reclamation and DWR determine if an alternative compliance strategy is feasible, including alternatives that would result in compliance through (a) reductions in CVP/SWP exports (use of water available through the environmental water account or pursuant to section 3406(b)(2) of the CVPIA) and concurrent releases from Shasta and/or Oroville Reservoirs, (b) reductions in CVP/SWP exports (use of water available through the environmental water account or pursuant to section 3406(b)(2) of the CVPIA) following a runoff event to achieve early compliance, and/or (c) increases in Delta inflow from Folsom to achieve early compliance, and

Step 3: If nothing else works, allow flexing of objective.

(*See* WF - EXH – 02. *See also* WF - EXH – 01.) The proposal is improper and arbitrary.

First, the proposal is improper because it appears to exceed the scope of the issue before the Water Board, in violation of the ruling in *United States of America v. State Water Resources Control Board*, 182 Cal.App.3d 82 (1986). That is accomplished by confusing the actions properly part of the water quality review with those that must be part of a water rights proceeding. The Water Forum seeks to impose on Reclamation and DWR, through its proposed Steps 1 and 2, a requirement to reoperate the CVP and SWP (i.e., take action to achieve a level of protection) before consideration is given to the level of protection. The issue before the Water Board, however, is what changes need to be made to the 1995 WQCP to ensure reasonable protection of the beneficial uses and to prevent nuisance. Once that issue is addressed, the Water Board will

have to determine who is responsible for achieving the level of protection.[26]

Second, the Water Forum's proposal is arbitrary because it ignores important, new information, and looks in "Step 2" at solely reducing CVP and SWP exports. New information shows that at times the water costs for meeting the outflow objective are high and those costs could be significantly reduced with limited or without any the risk to fish species simply by allowing a level of flexibility in the outflow objective. In other words, because of our new understanding of the science – the effect of changes in outflow on fish and water resources – the Water Board should look first to flexibility in the objectives that would result in an avoidance of potential risks to lower American River salmonids, potentially significant water savings, with only a small or with no impact to "X2 species." Further, while reductions in CVP and SWP exports may be one possible "last resort" responsive action, another could be reductions in exports by those who divert water directly from the American River. The Water Forum proposal arbitrarily places the potential burden of reconciling the conflict between upstream and downstream fishery resources on the CVP and SWP. It should not do that.

5. No Information Was Presented That Supports An Amendment Of The Delta Cross Channel Gates Closure, Delta Outflow Exports Objectives That Would Justify The Water Board Making Them More Restrictive

Several stakeholders suggested increased (1) days of available Delta Cross Channel Gate closure, (2) increased Delta Outflow, and (3) increased restrictions on exports. Specifically,

- TBI asks the Water Board to include up to an additional 15 days of Delta Cross Channel Gate closure. (BAY – EXH – 01. *See also* BAY - EXH – 02.)
- TBI asks the Water Board to modify "the February – June Delta outflow objective to maintain flows and X2 location assuming a 1956-68 Level of Development." (BAY - EXH – 04. *See also* BAY - EXH – 05.)
- TBI asks the Water Board to adopt new export limits for the March 15-June 15 period, because of an asserted need to "protect estuarine habitat and San Joaquin Basin Chinook salmon outmigration." (BAY - EXH – 06.)

[26] Not only does the proposal presuppose that Reclamation and DWR will be responsible for meeting the objective, but it may also be objectionable because it seeks to limit the discretion of Reclamation and DWR by requiring them to meet the objective through specific operations. If they are assigned responsibility, Reclamation and DWR should maintain the discretion as to the manner in which they comply.

- SDWA seeks to change in the export objective to limit exports during the spring pulse flow and to preclude pumping that result in null zones or reverse flows. (SDWA - EXH – 02.)

- TBI and California Striped Bass Association seeks limits on exports, at least until fish protection facilities "upgraded." (BAY-EXH-06; CSBA - EXH – 01.)

None of the limited information presented in an attempt to support the requests warrants an amendment objectives.

a. There Is No Need For Up To An Additional 15 Days Of Delta Cross Channel Gate Closure

TBI requested reconsideration and an amendment that would allow the Delta Cross Channel gates to be closed for up to 15 additional days. (*See* BAY-EXH-01 at p. 2.) The request was based upon a belief that the additional days are needed to "improve survival of winter-run Chinook salmon and other juvenile fish in the Delta [and] allow for more complete protection throughout December and January, when risks to juveniles are likely to be higher." (BAY-EXH-01 at p. 2.) That statement is simply not true.

As the Authority explained in its Memorandum Supplementing Information And Providing Additional Comments On The Delta Cross Channel Gates Operations and Salmon Protection Objective:

> (1) The science does not support a finding by the Water Board that the availability of up to 15 more days of closure during the November 1 through January 31 period would provide significant, if any, additional benefits to fish,
>
> (2) Even if science provided strong support for increasing the number of days of closure, there is no demonstrated need that those additional days demand an amendment to the existing objective, as the gates have never been closed during the November-January period for 45 or more days to benefit fish and wildlife since the CVP and SWP began operating to meet the objectives set forth in the 1995 WQCP, and
>
> (3) Even if up to 15 more days of closure would benefit fish, authority exists under state and federal law (outside of the regulations of the 1995 WQCP) to close the Delta Cross Channel gates for more then 45 days during the November 1 through January 31, if needed.

Because of the potential for significant redirected impacts, if the Water Board accommodates TBI's request and authorizes additional days of closure during the November 1 through January 31 period, the Authority requests that it do so with a condition that the additional days of closure

can occur only if there would be no adverse impacts to water quality or water supplies.

b. It Would Be Inappropriate To Modify The February – June Delta Outflow Objective To Maintain Flows And X2 Location Assuming A 1956-68 Level Of Development

TBI requests that the Delta Outflow objective be revised to maintain February-June flows and X2 values assuming a 1956-1968 Level of Development. (BAY-EXH-04 at p. 4.) The basis for this request is limited. TBI appears to argue that the 1956-1968 Level of Development assumption is needed to provide increased protection for the Bay-Delta Estuary. (*See id.* at pp. 4-7.) Simply put, the proposal by TBI is significantly deficient. TBI provides no credible information to support a change in the outflow objective to maintain February-June flows and X2 values assuming a 1956-1968 Level of Development.

Level of Development is a factor in the formula used to determine the number of days when maximum daily average electrical conductivity of 2.64 mmhos/cm must be maintained at either Chipps Island or Port Chicago. For the 1995 WQCP, the Level of Development assumed was the average from 1968 to 1975 (1971.5), and footnote 14 for table 3 reflects the number of days required to meet the outflow objective. TBI seeks to have the Level of Development changed to assume a 1956-1968 Level of Development. That change may have significant impacts on other beneficial uses of water from the Bay-Delta Estuary.

Attached as Exhibits 23, 24, and 25 are several tables portraying the existing X2 requirement and comparing the required number of days to what would be required by TBI's proposed increase. Exhibit 23, marked as Table A, is a reproduction of the table in D-641 which portrays the required number of days for X2 compliance at the Port Chicago and Chipps Island. Exhibit 24, marked as Table B, computes the increased number of days that would be required if the proposal by TBI were required. The values shown in this table were computed based on the equation and assumptions shown in CCWD-EXH-12. Exhibit 25, marked as Table C, portrays the differences in the required number of days at the compliance locations between the existing D-641 requirement and TBI's proposal.

To thoroughly explore the water supply implications of the new proposed requirement, it would be necessary to perform a detailed modeling analysis. While time limitations preclude

such modeling, it is apparent from cursory consideration that the additional number of days indicated in Table C would require more water than is currently utilized to comply with X2 and will exacerbate the conflicts and difficulties that have surfaced in recent years. Based on the potential additional outflows that could be required in the TBI's proposal, the additional volume of water that would be required for a given month could be as much as 400,000 acre-feet. Despite the clear potential for significant water costs, TBI presents no information suggesting the types of improvement it expects to see in the level of protection for the Bay-Delta Estuary, if the Level of Development is changed to the 1956-1968 period. Simply put, TBI does not present the information needed that would justify the change it requests, particularly given the risk to other beneficial uses.

c. The Water Board Must Deny The Request By TBI to Adopt New Export Limits For The March 15-June 15 Period, Because Of An Asserted Need To "Protect Estuarine Habitat And San Joaquin Basin Chinook Salmon Outmigation"

TBI requests that the March 15-June 15 export limit should be revised. (BAY-EXH-06 at p. 1.) The information presented to support that recommendation is again limited. TBI apparently makes the request based on a general assertion that the change is needed to "more adequately protect estuarine habitat and San Joaquin chinook salmon outmigration." (*See id.* at pp. 1-4.) The information presented provides no basis for the proposed change. Unfortunately, TBI seems to have formulated its recommendations based on its long-standing policies rather than on analysis of data collected since 1995.

As described previously, data collected to date show the following:

> Entrainment losses at the pumps for salmon are typically trivial, less than 1% of outmigrants. That is true for Sacramento runs and San Joaquin fall run with a barrier at the head of Old River. Estimates of indirect mortality, that is, mortality occurring outside the export facilities but associated with exports, indicates that export mortality is small or insignificant and uncertain. (*See* WK - EXH - 01).
>
> TBI also fails to mention the lack of correlation between export rate and San Joaquin smolt survival during the VAMP experiments. (*See* VAMP annual reports).[27]

[27] The reports can be found at: http://www.sjrg.org/technicalreport/default.htm.

There is no correlation between delta smelt entrainment and subsequent abundance of juvenile (summer townet) or sub-adult (fall midwater trawl) smelt. In fact, there is no correlation between juvenile abundance (measured after most entrainment occurs) and subsequent sub-adult abundance. Food limitation in the late summer largely determines sub-adult abundance in the fall. So far, no connection has be established between exports and either delta smelt abundance or food density in critical areas in the late summer. (*See* the Authority's exhibit on direct mortality).

Export reductions to increase Delta outflow can require large amounts of water and produce small increases in abundance (less than 5%) for only three unlisted species if Delta outflows are relatively high. Water requirements for export reductions are more reasonable if Delta outflows are low, but the only benefits that have been quantified are to three unlisted species, crangon shrimp, starry flounder, and longfin smelt.

TBI continually refers to "improved estuarine conditions" or similar language. If improved estuarine conditions result from any action, such as an export curtailment, these improvements, if significant, should be manifested as increases in the population of species near the top of the food chain. Otherwise, one can conclude that the improvements simply weren't that important. The only evidence for "improved estuarine conditions" is the abundance-X2 relationships or reductions in entrainment. The X2 relationships show that small effects on only three unlisted species can require very large amounts of outflow and, as discussed above, there is no evidence that entrainment has population level effects for salmon or delta smelt.

TBI also fails to mention the extremely poor survival of San Joaquin River smolts in the VAMP experiments, under conditions of augmented river flow, a barrier at the head of Old River, and exports at the lowest practical level of about 1,500 cfs from mid-April to mid-May. Survivals averaged about 15% until last year when they were even lower. Typical survivals of smolts entrained at the Tracy Pumping Plant and trucked downstream are about 30%, roughly double that in the Delta portion of the San Joaquin River. Therefore, TBI's are so misguided as to actually constitute conditions that would decrease smolt survival through the Delta.

For these reasons, TBI fails to present information showing or even suggesting how fish and wildlife could benefit from additional CVP and SWP export curtailments. Once again, this is particularly disturbing because while modeling has not been performed, it is apparent from just preliminary analysis that the proposed change could result in losses of hundreds of thousands of acre-feet of water in any given year. Such a presentation must be rejected.

d. The Requests That The Water Quality Control Plan Limit Exports Until Fish Protection Facilities Are Upgraded Or When Null Zones Or Reverse Flows Are Seen In The South Delta Must Be Dismissed

TBI and the California Striped Bass Association request that the Water Board review the status of efforts to upgrade the CVP and SWP fish protection facilities. (BAY-EXH-06 at p. 1; CSBA-EXH-01.) SDWA requests that the footnotes applicable to the export objective be

modified to preclude exports by the CVP and SWP that result in changes to flows in the South Delta which cause null zones or reverse flows which adversely affect water dissolved oxygen levels or impair other beneficial uses. (SDWA-EX-02 at p. 3. SDWA-EX-02 at p. 2.) Notwithstanding the substantive objections the Authority has with these recommendations, they must be dismissed because they are outside the scope of the issues before the Water Board. The proposals do not address what is the reasonable water quality needed to protect beneficial uses. They seek to address concerns that either (1) are being addressed through a forum beyond the direct authority of the Water Board, or (2) could be addressed through the Water Board's water rights proceeding that will follow the periodic review (i.e., how the objectives may be achieved).

E. Chloride Objectives

1. Summary of Issues

The Revised Notice presented the issues as follows:

> Should the SWRCB amend the value or description of the 150 mg/l chloride objective in the water quality objectives for municipal and industrial beneficial uses (Table 1 of the 1995 Plan)? How should the value or description be modified and what are the scientific and legal arguments in support of and against such modifications?
>
> Should the SWRCB amend compliance location C-5 (CHCCC06) in the water quality objectives for municipal and industrial beneficial uses (Table 1 of the 1995 Plan)? This location is at the entrance to the Contra Costa Canal at Pumping Plant No. 1. How should the location be modified and what are the scientific and legal arguments in support of and against such a modification?
>
> Should the SWRCB adopt new water quality objectives for the municipal and industrial beneficial uses (Table 1 of the 1995 Plan) for constituents such as bromides and total organic carbons or other precursors of disinfection byproducts? What are the scientific and legal arguments in support of and against the adoption of such objectives?

2. The Only Change The SWRCB Should Make To The Water Quality Objectives For Municipal And Industrial Beneficial Uses Is How The Objective Is Measured

As the Authority explained in its Memorandum Supplementing Information and Providing Additional Comments on the Chloride Objectives, Compliance Location at Contra Costa Canal at Pumping Plant No. 1, and Potential New Objectives, the only amendments the SWRCB should make to the objectives for municipal and industrial beneficial uses is the addition of a compliance location. The SWRCB should neither (1) change the value or description of the 150 mg/l chloride

objective in the water quality objectives for municipal and industrial beneficial uses, nor (2) adopt new water quality objectives for the municipal and industrial beneficial uses for constituents such as bromides and total organic carbons or other precursors of disinfection byproducts.

a. The SWRCB Was Presented With Information That Support An Additional Compliance Location In The Water Quality Objectives For The Municipal And Industrial Beneficial Uses

The parties presented undisputed requests and information in support for an additional compliance location. Interior, DWR, and CCWD each requests that the Water Board establish an additional compliance point in Old River, near Holland Tract. The changes are needed to provide Reclamation and DWR with a point to which they can operate the CVP and SWP, respectively, to achieve the mandated chloride levels.

b. Parameters Should Be Set To Control When (1) The Compliance Location Changes From The Existing Location To A New Location And (2) The Objectives That Should Exist At That New Compliance Point

The compliance location should change from the existing location at Pumping Plant No. 1 to the new location in Old River, near Holland Tract when the three-day pumping average at Pumping Plant No. 1 falls below 125 cfs and the objective at that location is not being achieved. That rate should be used because when Pumping Plant No. 1 operates at that level there is a strong correlation between water quality in Old River, near Holland Tract and water quality at Pumping Plant No. 1. (*See* attachments 5 and 6 to DWR-EXH-13, CCWD-EXH-07.) Finally, if the Water Board designates a compliance point in Old River, near Holland Tract, the Water Board should set the objective at 1.0 mS/cm when the 250 mg/L chloride objective and 0.7 mS/cm when the 150 mg/L chloride objective would have otherwise controlled.[28] (*See* attachment 8 to DWR-EXH-13.)

[28] If accepted by the Water Board, a day would count towards the 150 mg/L objective if (1) CCWD is pumping at Pumping Plant No. 1 below 125 cfs (70 cfs if accepting the recommendation of Reclamation and DWR or 20 cfs if accepting the recommendation of CCWD), (2) the water quality at Pumping Plant No. 1 is below 150 mg/L, and (3) the electric conductivity in Old River, near Holland Tract is at or below 0.7 mS/cm (0.56 mS/cm if accepting the recommendation of CCDW).

c. The SWRCB Has Not Been Presented With Any Information To Support The Adoption Of A New Water Quality Objective For The Municipal And Industrial Beneficial Uses For Constituents Such As Bromides And Total Organic Carbons Or Other Precursors Of Disinfection By–Products

Various parties, including CCWD, the California Urban Water Agencies (CUWA), DWR, and Reclamation have discussed the potential for adopting specific water quality objectives for bromide and total organic carbon. However, only CCWD has suggested if not recommended that the Water Board include a specific water quality objective of 50 μg/l of bromide and 3.0 mg/L of total organic carbon, as measured at Clifton Court Forebay and other Southern Delta drinking water intakes. Such objectives are infeasible with existing facilities, and even if the CVP, SWP and other project could operate to meet such objectives, use of water for that purpose would be a waste. Moreover, and possibly more important, to protect beneficial uses, there is no need to include in an amended or a revised water quality control plan a discussion of the efforts to improve the level of bromide or total organic carbons in Delta waters. Such a discussion will provide nothing except for confusion. In particular, the Authority is concerned that such a discussion could be improperly used to support a claim that a "narrative" objective exists. The existing objectives protect water quality for municipal and industrial uses. The CALFED program should maintain the role of improving water quality, beyond the protections afforded to municipal and industrial uses under the 1995 WQCP.

F. <u>River Flows – San Joaquin River: February – April 14 and May 16 – June; Program of Implementation</u>

1. Summary of Issues

The Revised Notice presented the issues as follows:

> Should the SWRCB amend the flow objectives for the San Joaquin River at Airport Way Bridge, Vernalis, for February through April 14 and May 16 through June and the water quality objectives for fish and wildlife life beneficial uses (Table 3 of the 1995 Plan)? How should the objectives be modified and what are the scientific and legal arguments in support of and against modification?
>
> Should the SWRCB change the methodology for determining the applicable San Joaquin River flow objectives that currently are determined by reference to the required Delta outflow objective? How should the methodology for determining required flows be modified and what are the scientific and legal arguments in support of and against modification?

> Should the SWRCB amend the Program of Implementation for the 1995 Plan to account for changes in the regulatory environment and existing law or recent actions taken to improve habitat and meet water quality objectives? What modifications should the SWRCB make to the Program of Implementation, and what are the scientific and legal arguments in support of and against such modifications?
>
> For each of the amendments that a party proposes that the SWRCV make to Tables 1,2, 3, 4 of the 1995 Plan, how should the Program of Implementation be updated and what are the scientific and legal arguments in support of and against such modifications?

2. The Water Board Must Deny TBI's Request To Link Maximum Delta Export Rates To Flow Levels At Vernalis

TBI suggests that the flow objective based, in part, on a criterion that:

> Required flow levels should be linked to maximum Delta export rates to provide an average Vernalis flow: export ratio for the March-June period that is greater than or equal to 1.0.

(BAY EXH 8, p. 9) That suggestion is make without any serious consideration of the need for such a criterion to protect fish or the impacts of the criterion on other beneficial uses. Presumably, the suggestion is made in that manner because when one considers the effect the suggestion has on beneficial uses, it is beyond reasonable debate that the suggestion must not be accepted.

TBI recommends limiting exports by using the ratio of river flow at Vernalis to exports. The Authority notes that there is no justification other than historical precedence for using such a ratio as a basis for limiting exports. No reasonable person would expect the same conditions to prevail for river flow and exports of 7,000 cfs (a ratio of 1:1) and a river flow and exports of 1,500 cfs (also a ratio of 1:1). There is no reason to link river flow and exports by use of a ratio. These two factors can easily be delinked in any analysis of effects of each (using, for example, multiple regression analysis).

This is especially true now that there are several years of completed VAMP experiments and, those data, in combination with data from previous years, have shown that there is no correlation between smolt survival and exports. On the other hand, there is a correlation between survival and river flow. In other words, survival is associated with river flow (in the statistical sense) but not with exports. So, if river flow is divided by exports, this ratio may show (and, in

fact, does show) a correlation with survival. This does not mean that exports are associated with survival any more than a correlation of survival with the ratio of river flow to the springtime NASDAQ average would mean that NASDAQ was affecting survival. As for TBI's limits on exports, the Authority recalls the above discussion on exports.[29]

As discussed above, yet again TBI makes a suggestion - to link CVP and SWP pumping to Vernalis flows - without any consideration of water supply impacts. If accepted, in addition to the limited, if any, biological protection the suggestion would cause, the linkage proposed would have significant impacts on water supplies. A cursory calculation of potential impacts of TBI's suggestion indicates that impacts to CVP and SWP water supplies could be more then 500,00 acre-feet of water in a given year. Because a reasonable level of protection will be afforded fish even if the suggestion is not accepted, and because the suggestion by TBI has the potential to cause significant adverse impacts to other beneficial uses, it must be denied.

3. The Water Board Must Reject The Proposal By Deltakeeper To Utilize The Periodic Review To Mandate Massive Land Retirement And Rewrite Water Rights Permits For The Central Valley Project

Under the guise of the River Flows and Program of Implementation issues, Deltakeeper proposes that the use of water in the San Luis Unit of the CVP and other areas on the Westside of the San Joaquin Valley should be curtailed through sweeping retirement of all potentially drainage-impaired lands, and that any resulting water "savings" should be sent through the Cross Valley Canal to serve water users in the Friant-Kern Canal service area. (DK - EXH - 24.) According to Deltakeeper, these changes would allow for more water to be released from Friant Dam into the San Joaquin River for water quality purposes. (*Id.*) Deltakeeper would have the Water Board utilize the periodic review to re-write not only CVP water rights permits, but the very purposes and operations of the CVP, all without consideration of the enormous policy and legal issues involved. Further, this bold proposal to gut huge areas of the CVP and the farm economy of the State is based upon inaccurate and often misleading characterizations of ongoing

[29] Even if there were a benefit to fish, that benefit could be achieved through the installation of a permanent barrier at the Head of Old River; a facility that removes any "link" between the CVP and SWP pumps and the San Joaquin River.

efforts to resolve Westside drainage problems. It is beyond the scope of this periodic review, and the Water Board should reject Deltakeeper's proposal outright.

a. Drainage Is Not A Precondition To CVP Deliveries To The San Luis Unit

On behalf of Deltakeeper, Tom Stokely of the Trinity County Planning Department stated that the San Luis Act, (PL 86-488, 74 Stat. 156), requires that drainage be provided before water can be delivered to lands within the San Luis Unit. (DK – EXH – 24.) This interpretation has been rejected by the federal District Court in *Firebaugh Canal Company and Central California Irrigation District v. United States,* CIV-F-91-048 OWW (consolidated with CIV-F-88-634-022), where Judge Wanger expressly held that the San Luis Act does not require drainage as a precondition to delivery of water to the San Luis Unit.[30]

b. Deltakeeper Misstates D-1641

Deltakeeper cites portions of Water Board Decision 1641 ("D-1641") to support Deltakeeper's argument that the irrigation of lands in the San Luis Unit causes the San Joaquin River salinity problems. (DK – EXH – 24.) In D-1641, the Water Board concluded "that the actions of the CVP are the principal cause of the salinity concentrations exceeding the objectives at Vernalis." (D-1641 at 83.) However, the Water Board did not attempt to determine the relative contributions of saline discharges from irrigated agriculture in and around the San Luis

[30] Deltakeeper's assertion misinterprets the San Luis Act. Section 1(a) of the Act provides in part that construction of the San Luis Unit could not commence until either the Secretary of the Interior "received satisfactory assurance from the State of California that it will make provision for a master drainage outlet and disposal channel" pursuant to the California Water Plan (Bulletin No. 3), or the Secretary "has made provision for constructing the San Luis interceptor drain" as described in the December 17, 1956 report entitled "San Luis Unit, Central Valley Project." (San Luis Act §1(a).) After the San Luis Act was passed, the State of California provided the necessary assurance to Interior that it would construct a master drainage outlet. Based on this assurance, Interior began construction of the water delivery components of the San Luis Unit. Not long thereafter, however, the State reversed its decision, and Interior decided to construct the San Luis Drain on its own. As the Ninth Circuit concluded in *Firebaugh Canal Co. v. United States*, 203 F.3d 568, 578 (9th Cir. 2000), when Interior decided to construct the rest of the San Luis Unit, it assumed the ultimate responsibility to provide for the necessary drainage, for which it is currently conducting the environmental review process. However, as Judge Wanger has ruled, that responsibility does not prevent Interior from delivering CVP water to the San Luis Unit before drainage is provided.

Unit, and from low flows in the river due to diversions at Friant dam. Instead, the Water Board merely noted that the Vernalis salinity problems are the result of some combination of saline discharges and low flows. (*Id.*) Further, information developed since the Water Board workshop on salinity provided by the San Joaquin River Water Quality Management Group in conjunction with Reclamation, DWR and others indicates that the Vernalis objective is currently being met and that ongoing existing programs are likely to assure that objectives will be met in all water year types. As pointed out by Deltakeeper, in D-1641, the Water Board notes that the drainage problems exist in and around the San Luis Unit. In addition, the Water Board notes that some parties argue that the drainage problems close to the river are exacerbated by the application of water to "upslope" lands farther away. (D-1641 at 82.) However, the Water Board did not make any express findings on these matters, and the question of the relative contributions of "upslope" and "downslope" lands remains disputed, is highly controversial and has not been determined either by the Water Board or in pending litigation. *Firebaugh Canal Co. and Central California Irrigation District v. United States, CIV-F-91-048 OWW* (consolidated with *CIV-F-88-634-022*).

c. Delta-Keeper's Massive Land Retirement Proposal Is Not Supported By Factual Evidence

Deltakeeper states that the proposed drainage options for the San Luis Drainage Feature Re-Evaluation do not include land retirement as a potential component. (DK – EXH – 24.) While it is true that Interior's December 2002 Plan Formulation Report did not include land retirement as a drainage option, Interior's February 2004 *Amended Plan of Action* announced that it would "begin formulating and evaluating [drainage] alternatives that include land retirement." (Amended Plan at 1.)[31] Interior's decision to include land retirement in the Feature Re-evaluation process arose largely from the work done by water districts within and surrounding the San Luis Unit in developing the May 2003 "Westside Regional Drainage Plan," which included land retirement as a key component in certain areas. (*Id.*)

Interior published a Scoping Report and an Addendum to the Plan Formulation Report in

[31] For information on Reclamation's efforts regarding San Luis drainage, including those reflected in documents cited herein, *see* www.usbr.gov/mp/sccao/sld/index.html.

July 2004. According to Interior's 2004 Addendum to the Plan Formulation Report, land retirement will be examined as a component of the ultimate drainage solution, but not necessarily as the only component. (Addendum at E-2.) The Plan Formulation Report identified four other alternatives, including completion of one of two possible drains north to the Delta, a drain west to the ocean, and an in-valley disposal alternative. (*Id.*) The in-valley disposal alternative is also being developed in the Westside Regional Drainage Plan. Interior has not yet completed the environmental analysis of these options, but it is almost certain that a combination of alternatives, including some amount of land retirement, will be adopted to provide drainage service to drainage-impaired lands.[32] It is therefore factually incorrect to assert that Reclamation is not considering any land retirement alternative, and it is premature to summarily require retirement of all drainage-impacted land.

Additionally, Deltakeeper cites inconsistent figures and appears to overestimate the number of acres that require drainage service in the region. At one point in their presentation, Deltakeeper cites a report from the early 1990's which concluded that, by 2050, approximately 950,000 acres would need drainage service. (DK – EXH – 24.) Later in their presentation, while citing the Draft Trinity River Fishery Restoration Supplemental Environmental Impact Report, Deltakeeper notes that approximately 376,751 acres require drainage service in the region served by the Delta-Mendota Canal. (*Id.*) These numbers are significantly higher than the calculations made by Interior in the 2004 Plan Formulation Report Addendum, which are also now outdated by various voluntary land retirement decisions and alternative drainage management techniques.

d. Deltakeeper's Proposal To Prohibit Water Deliveries To Drainage Impacted Lands Is Draconian And Unjustifiable

A key element of Deltakeeper's land retirement proposal is that water deliveries to districts (those in and near the San Luis Unit) must be reduced by the percentage of any particular

[32] Interior released its Draft Environmental Impact Statement for the San Luis Drainage Feature Re-evaluation for public review on June 2, 2005. (70 Fed. Reg. 32370-32371.) Although the Authority did not have an opportunity to fully review the Draft EIS prior to submitting these comments, it appears that Interior has included land retirement as a component in each of the alternatives analyzed therein.

district's lands that require drainage service. (DK – EXH – 24.) Deltakeeper's idea is that if one-half of a district's lands require drainage service, all of those lands should be retired. (*See id.*) If all of a district's lands require drainage service, Deltakeeper proposes to retire the entire district. (*Id.*)

Deltakeeper provides no factual support to justify its simplistic proposal to seize the lifeblood of a huge farming area. Reclamation is completing the process for drainage service, and drainage service is currently being provided through local programs, including the Grassland Bypass Project. As described elsewhere in these comments, the economy of the Westside region is heavily dependent on CVP water supplies for irrigation. The actual supply is scant, in many cases less than 2.5 acre-feet of water per acre. Further, even in wet years, most districts in the region do not receive their full CVP contract delivery amounts due to legal and regulatory constraints unrelated to the drainage issue. Thus, growers rely on fallowing of some land or on regional transfers of CVP water to accumulate sufficient water for their crops. Mandating retirement of specified acres and stripping the water from retired lands or mandating its transfer to certain favored regions therefore will compound an already inadequate regional water supply, endangering the economic viability of the unretired lands on top of the lost productivity from ground that will likely be retired under Reclamation's alternatives for drainage service and ongoing supply adjustments.

Finally, given the continued shortage of water south of the Delta, land management of areas identified as drainage impacted is changing. For example, some districts have assigned their CVP supplies to other water-short areas and are managed by dry farming, developed into habitat areas, or utilized for alternate cropping for drainage reuse. In sum, the Authority urges the Water Board not to reject Deltakeeper's effort to effect broad public policy changes like mandating land retirement, regardless of progress towards resolving any water quality impacts from drainage discharges.

e. Deltakeeper's Proposal To Transfer Westside Water To The Eastside Is Beyond The Scope Of This Periodic Review And Ignores Numerous Technical And Legal Obstacles

The crux of Deltakeeper's proposal is that the water "savings" realized by reducing CVP

contract deliveries can and should be sent through the Cross Valley Canal to supplement the supplies of lands served by the Friant-Kern Canal, so that more Friant water can be released to the San Joaquin River for water quality purposes. (DK – EXH – 24.) Deltakeeper offers no evidence that such a scheme is technically feasible, that enough water could ever be "saved" through Westside land retirement to justify reduced Friant deliveries to Friant-Kern Canal water users, that such reallocation would result in increased releases from Friant Dam, or even whether such releases, if made, would in result in meeting San Joaquin River and Southern Delta water quality objectives for salinity and other constituents.

Even more outrageously, Deltakeeper ignores the public policy implications of simply putting hundreds of thousands of acres of productive farmland—with its workers, owners, local communities, dependent businesses, supported counties—out of business with no public review, no balancing, no consideration of environmental impacts. It also ignores numerous legal issues, including those relating to the federal preemption, appropriate scope of the periodic review, the statutory and constitutional requirements for alteration of water rights permits, and federal statutory authorities controlling authorization, cost-recovery, contracting and operational requirements for the CVP. For all of the reasons stated above, the Water Board must reject the Deltakeeper proposal.

G. Dissolved Oxygen

Deltakeepers, through numerous submissions, (*see, e.g.*, DK - EXH – 2-4, 8-15,) suggest that action must be taken on the Dissolved Oxygen ("DO") objective to protect beneficial use for fish and wildlife. Notwithstanding disagreements the Authority may have on substantive grounds, the information is outside of the scope of the workshop and must therefore be dismissed.

In its September 8, 2004 letter to the Water Board regarding the Draft Staff Report for the Periodic Review of the 1995 Water Quality Control Plan, South Delta Water Agency commented that implementation of the DO objective contained in the 1995 Plan should be amended. Central Delta Water Agency in its September 7, 2004 letter to the Water Board on the same subject makes a similar suggestion.

The Staff Report responded to those comments and concluded: "No parties presented

information suggesting that the DO objective should be changed." (Staff Report at p. 37.) The Staff Report explained:

> Both SDWA's and CDWA's comments address potential changes to the implementation of the DO objective. Currently, the CVRWQCB is in the process of considering the adoption of a proposed TMDL intended to implement the existing DO objective. Once any TMDL is adopted by the CVRWQCB, the TMDL must then be approved by the SWRCB. Therefore, staff concludes that a review of the DO objective or the implementation recommendations during the current periodic review process would be duplicative of the existing TDML process and premature at this time. Accordingly, staff recommends that the DO objective not be reviewed during the current periodic review. If additional information regarding the DO objective or its implementation is developed in the future, the SWRCB may address this information in future water right or water quality proceedings.

(*Id.*) Through Resolution 2004 – 0062, the Water Board adopted the staff's recommendation. For that reason, the issue of what changes, if any, should be made to the DO objective is not before the Water Board. The information presented on that issue must be dismissed.

IV. CONCLUSION

For the reasons stated in the oral presentations made and all of the written materials submitted on behalf of the Authority, the Authority respectfully requests that the Water Board allow, at times, for flexibility in the outflow, export and possibly Rio Vista objectives and adopt the process for flexing presented in this memorandum. Such a process should facilitate more efficient use of California water resources while maintaining a reasonable level of protection for the beneficial uses of Bay-Delta waters. No other changes should be made to those objectives. Specifically, no information was presented that would support making more restrictive the outflow or export objectives.

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The Authority also respectfully requests that the Water Board add a compliance point in Old River, near Holland Tract. Presuming Reclamation and DWR will remain responsible, at least in part, for achieving the salinity objective, the additional compliance point is needed to provide Reclamation and DWR with a point to which they can operate the CVP and SWP, respectively, to achieve the mandated chloride levels.

Dated: June 3, 2005

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