PUBLIC UTILITIES COMMISSION
CITY AND COUNTY OF SAN FRANCISCO

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General Manager

SAN FRANCISCO
MUNICIPAL RAILWAY

HETCH HETCHY
WATER AND POWER

SAN FRANCISCO
WATER DEPARTMENT

March 11, 1994

Mr. Patrick Wright
Bay/Delta Program Manager
Water Quality Standards Branch W-3
Water Management Division
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA. 94105

Re: Proposed Federal Water Quality Standards for the San Francisco Bay/Sacramento-San Joaquin River Delta

Dear Mr. Wright:

San Francisco and its 2.3 million water customers are concerned about the health of the Delta. The Delta is essential to the survival of much of California's fish and wildlife resources. At the same time, the Delta is an important component of the state's water supply system. Because of the importance of the Delta to a variety of beneficial uses, San Francisco supports the prompt development of water quality standards. To that end, San Francisco joins with other members of the California Urban Water Agencies (CUWA) to recommend an alternative to the EPA's proposed standards which will provide an equivalent or better level of protection than the EPA's proposed standard.

Accompanying this letter are San Francisco's comments to the EPA's proposed standards concerning estuarine habitat, salmon smolt survival and striped bass spawning habitat. In our view, there is scientific support for an estuarine habitat standard which correlates availability of habitat and fishery abundance. The correlation is not absolute as there are many other factors which affect the abundance of Delta fish and wildlife. As the habitat is moved downstream, west of Chipps Island, the correlation, and hence the scientific basis for the standard, deteriorates substantially. In fact, scientific analysis supports the conclusion that Delta fisheries will be provided better protection by focusing habitat in and about Suisun Bay. The CUWA proposal is designed to accomplish this goal and will have the added benefit of a lower water cost.

The CUWA analysis also reviewed the Fish Migration and Cold-Water Habitat Criteria (to protect salmon smolt survival) and the striped bass spawning standard, as proposed by the EPA. San Francisco supports CUWA's position that neither standard should be adopted at this time.

The salmon smolt survival criteria are not met by the EPA proposal, but are rather more appropriately addressed by a basin-wide management plan developed to control the full range of variables which affect salmon smolt survival.

Further, the striped bass spawning standard should not be set as proposed. Action to improve striped bass spawning habitat would be better managed in a multi-species planning effort and should be consistent with USF&WS and NMFS recovery plans for threatened and endangered species. Such action should also be consistent with the State's program to regulate and control agricultural drainage.

San Francisco also joins with CUWA in urging that now is the time for action on Delta protective standards. Standards should be promulgated this year through a state and federal partnership.

Very truly yours,

Anson B. Moran
General Manager
San Francisco Public Utilities Commission

COMMENTS OF THE

SAN FRANCISCO PUBLIC UTILITIES COMMISSION

REGARDING

ENVIRONMENTAL PROTECTION AGENCY'S PROPOSED RULE

FOR THE

PROTECTION OF THE WATER QUALITY OF THE

SAN FRANCISCO BAY DELTA ESTUARY

Federal Register, Volume 59, No. 4
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I. INTRODUCTION.

The City and County of San Francisco supports the establishment of standards to protect the Sacramento-San Joaquin Bay Delta Estuary (hereinafter referred to as "Delta"). As stated by the EPA, the Delta has been in a serious state of decline since the late 1970's. Federal Register Volume 59, No. 4 at 811, January 6, 1994. Several once thriving life forms have now become so decimated as to require protection under the federal Endangered Species Act. The principle causes for this decline are prolonged drought, large diversions of fresh water and dramatic increases in populations of introduced aquatic species. *Id.* at 844. To reverse this decline, the state or federal government must take the first step of issuing standards. Then, the State must develop an implementation program for protection and recovery which will protect all beneficial uses of Delta water. These beneficial uses include the protection of species and their habitat, the use of Delta and upstream supplies for human needs, recreation, and other beneficial uses.

San Francisco has and will continue to support the effort to protect the State's water supplies from further degradation. To this end, San Francisco has participated with the California Urban Water Agencies (CUWA) in analyzing the EPA's regulations and advocating a water quality standard for the Delta which will provide equivalent or better protection than the EPA's proposal for the many species which are found in the Delta. Further, San Francisco will continue to work with other water users to ensure that the standards are implemented in a rational manner allowing fulfillment of EPA's goals and allocation of responsibility among water users.

As a member of the California Urban Water Agencies (CUWA), San Francisco has joined with CUWA in conducting an analysis of the EPA's proposed regulations. CUWA has concluded that consistent with the EPA's proposed Estuarine Habitat Standard, there is, to some extent, a valid correlation between the amount of habitat provided and the abundance of fisheries. However, the EPA's standards, as originally proposed, do not adequately address the multiplicity of factors which affect the uses of Delta water. Further, the EPA has failed to consider alternatives for protecting beneficial uses of the Delta which would provide equivalent levels of protection, but would have less of a water impact on the human population that is reliant on the Delta for its water supply. The recommendations by CUWA will provide equivalent or better protection than the proposed EPA standard. Therefore, CUWA's recommendations are incorporated by reference into San Francisco's comments.

The alternative standard proposed by CUWA was the result of an independent review by experts, in a number of relevant disciplines, of the data used by the EPA to create the initially proposed standard. The CUWA effort cost its member agencies approximately $1 million and provides the most comprehensive analysis and scientific application of the data currently

available.[1] The experts have concluded that there is a correlation between the location of brackish water (the so called "entrapment zone") and the abundance of fisheries.

By more precisely defining the optimal location of the entrapment zone, i.e., in Suisun Bay, and by allowing for variation in its location by considering hydrologic conditions which naturally moves the entrapment zone upstream and downstream, the experts and CUWA have been able to create a standard which is more protective of the many species and uses that rely on Delta to survive.

In addition to the standards for location of the entrapment zone (referred to as the "X2" location), the EPA has also attempted to create standards to protect outmigrating salmon smolts and spawning habitat for striped bass. The EPA has admitted they have no scientific basis upon which to establish a standard for salmon smolt survival. The use of the salmon smolt survival index on the San Joaquin River relies entirely on the relationship between outflow and Delta exports and fails to consider the variety of other factors affecting survival. See, *e.g.* the Comprehensive Conservation and Management Plan, June, 1993 ("CCMP") at 10-11.

The striped bass salinity standard is also deficient, in that it proposes to 1) provide protection to a non-native species which is predator to the Delta smelt and chinook salmon; 2) move the striped bass upstream towards Vernalis to increase spawning habitat when the result will be to increase entrainment of eggs and larvae in the Delta pumps (cited as a very important factor in the decline of striped bass, CCMP at 11); 3) attempt to increase the spawning habitat for striped bass when the existing spawning habitat is not considered a limiting factor to their populations; and 4) require releases of fresh water used for consumption when the cause of salinity is pollution from agricultural return flows.

The EPA has recognized that it has no authority to implement its proposed water quality standards, and it should not suggest in its standards how this implementation should occur. The only federal authority readily available to protect uses of the Bay-Delta system is the Endangered Species Act (ESA).

However, San Francisco supports efforts by the EPA to work with the State to develop an implementation program that will successfully implement water quality protections using a multi-species approach and which will be applicable to all water users on a "rational basis."

The EPA will have at least two opportunities to work with the State on implementation. First, in the context of the Regulatory Impact Assessment, the EPA is in a position to comment on how alternative methods of implementation will affect the economic impact of its proposed regulations. Second, it is our understanding that the State is seeking to enter into a joint

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[1] All of the reports prepared by CUWA and its members are publicly available. The reports are in draft form and the entirety of the contents of the reports have not been formally accepted by CUWA.

cooperative arrangement with the EPA and/or "Club FED" in pursuit of a program of protection for the Bay Delta system. Through this activity, the EPA will be in a position to influence the State's development of an implementation program which will expeditiously implement the standards on a rational basis.

II. OVERVIEW OF SAN FRANCISCO'S WATER SUPPLY SYSTEM.

San Francisco supplies water to approximately 2.3 million residents of the Bay Area. Retail water service is provided to the City and County of San Francisco as well as certain individual commercial and industrial customers in the Bay Area. San Francisco provides wholesale water service to the 30 water agencies which comprise the Bay Area Waters Users Association, located in the counties of San Mateo, Santa Clara and Alameda. The service area includes the Silicon Valley, which is the heart of the high technology industry in California. The value of the economy in San Francisco's service area exceeds $30 billion in annual output.

San Francisco obtains 85% of its water from the Tuolumne River. The remainder comes from local Bay Area watersheds. For many customers within its service area, San Francisco is their sole supplier. A few customers have links for a portion of their supply to the State Water Project or the Santa Clara Valley Water District.

San Francisco's water impoundment facilities on the Tuolumne River were authorized pursuant to an act of Congress known as the Raker Act (38 Stat. 242), enacted in 1913. The Raker Act is a grant of federal rights-of-way, and San Francisco holds water rights on the Tuolumne River pursuant to California law.

Pursuant to the Raker Act, and in recognition of certain senior water rights held by the Modesto and Turlock Irrigation Districts ("Districts") on the Tuolumne River, San Francisco is required to meet downstream flow entitlements of the Districts. The Districts entitlements are to the natural flow of the Tuolumne River up to a maximum of 2,350 cubic feet per second (cfs), except for the 60 days following April 15, when their entitlement extends to 4,000 cfs. As a result of this entitlement structure, San Francisco is extremely reliant on large spring flows in the Tuolumne River. Since San Francisco is entirely dependent on the flood flows, it has constructed substantial carryover storage in its reservoir system which has enabled San Francisco to meet its customers' needs during extended drought, although the deliveries of the City to its customers have had to be severely reduced by mandatory rationing programs.

The high quality nature of San Francisco's Tuolumne River supply has allowed San Francisco to provide water without the need for filtration. Water from Hetch Hetchy Reservoir currently meets or exceeds all state and federal water quality requirements with only the addition of chlorine, as well as lime to reduce pipeline corrosion. This high quality water is beneficial to the health and welfare of the residents of San Francisco's service area. For the protection of human health, the use of high quality supplies is preferable to the use of filtration as a means to provide adequate water quality. WRINT S FRISCO, Exhibit No. 9 at pages 11-14, Appendix

B. In order to maintain this high quality supply, it is essential that San Francisco not take in large quantities of water from the Delta. *Id.* at 13-14.

Due to the operation of Raker Act flow entitlements on the Tuolumne River, during the recent 6 year drought San Francisco was only entitled to 16% of total runoff, as compared to normal year entitlements almost 42% of runoff. As a result, San Francisco was required to impose rationing of 25% in its service area and to import approximately 78,000 acre feet of water obtained by water transfer through the Delta. Any further impacts to San Francisco's water supply as a result of regulatory or other actions would cause additional shortage to the City's Bay Area customers. Conversely, further Delta restrictions will increase reliance on Hetch Hetchy by San Francisco's wholesale customers.

III. RESPONSES TO SPECIFIC QUESTIONS IN EPA STANDARDS.

San Francisco supports and joins in the comments of the California Urban Water Agencies (CUWA) in responding to the questions set forth in the proposed standards. In addition, San Francisco offers the following responses to EPA's specific requests for comments.

Question 5: San Francisco supports CUWA's comments recommending the use of the 1975 level of development within the system to be used as the milestone upon which to evaluate historical hydrologic conditions. However, San Francisco urges the EPA to assess the entire hydrologic history from 1922 to 1993 to determine the outflow conditions which existed during this period. Upstream reservoirs are particularly vulnerable to extended droughts and the 1940-1975 period fails to take into consideration the affect of extended droughts, such as occurred during the 1928-1934 period.

Question 10: EPA has indicated that they do not have an adequate scientific basis upon which to propose criteria for the protection of salmon smolt. Therefore, EPA is proposing a surrogate to protect salmon smolt by using an index as a surrogate for survival. See comments submitted by CUWA, discussion contained in San Francisco's comments *infra*, and Appendix 1, attached hereto.

Question 12: San Francisco supports the comments submitted by CUWA. In addition, see discussion contained in San Francisco's comments *infra*, and Appendix 1, attached hereto.

Question 13: San Francisco supports the comments submitted by CUWA. In addition, see discussion contained in San Francisco's comments *infra*, and Appendix 1, attached hereto.

Question 17: San Francisco and the Modesto and Turlock Irrigation Districts are currently engaged in proceedings before the Federal Energy Regulatory Commission (FERC) concerning an increase in fish flows from New Don Pedro Reservoir. The proceeding is a result of a license reopener which required that after 20 years of project operation an assessment be made of the needs of the salmon fishery in the Tuolumne River. Several studies have been conducted, assessing the multiple factors influencing salmon migration and existence in the

Tuolumne Basin, including factors external to the Tuolumne River such as conditions in the Bay/Delta system. These documents have been filed with the Federal Energy Regulatory Commission under Project 2299-004.

The fisheries studies are particularly instructive regarding the potential for management to make frugal and efficient use of water to meet fisheries concerns. EPA should consider the proposal submitted in the Tuolumne proceeding by San Francisco's consultants, Dr. Peter Moyle and Dr. Ronald Yoshiyama, recommending a micro-management approach to the fishery needs on the Tuolumne River. As greater levels of understanding are achieved in the Delta, movement towards the management approach recommended by Drs. Moyle and Yoshiyama on the Tuolumne River may have applicability in the Delta.

IV. PROPOSED WATER QUALITY STANDARDS.

There are two broad issues associated with EPA's proposed water quality standards. Both of these issues are concisely summarized in Senator Feinstein's November 30, 1993, letter to Secretary of the Interior Bruce Babbitt. Senator Feinstein's letter points out that any water quality standard must apportion "responsibility on a rational basis for solutions to specific problems rather than simply increasing gross water outflows for environmental purposes."

This statement points out that in creating water quality standards, the solutions proposed must address the problems they seek to remedy with specific measures designed to influence the factors causing those problems. Second, the statement addresses the issue of implementing standards, admonishing the implementing agency to allocate responsibility for meeting water quality standards on a rational basis, without resorting to simplistic across the board formulas.

With these principles in mind, San Francisco submits the following comments to each of the standards proposed, and the issue of implementation of the standards.

A. Estuarine Habitat Standard.

San Francisco joins the comments of the California Urban Water Agencies (CUWA) regarding EPA's proposed Estuarine Habitat Standard. Those comments detail the findings of CUWA's technical analysis, concluding that:

- The relationship between X2 (the location of a 2ppt salinity level where fresh water outflows meet with tidal inflows) and fish abundance is less reliable when located further downstream at Roe Island, as proposed by EPA, and is more reliable when located further upstream at Chipps Island.

- The habitat of a majority of estuarine species is maximized and estuarine processes in Suisun Bay are enhanced when X2 is located at Chipps Island. When located at Roe Island as proposed by EPA, prime habitat (as defined by a 2-10 ppt range of salinity levels) is forced further downstream into less favorable channel conditions.

- The relationship between the location of X2 and fish abundance is less certain than indicated by preliminary analysis relied upon by EPA, suggesting that other factors, such as loss of habitat, pollution and exotic species, play a greater role in fish abundance than assumed by EPA.

As a result of its analysis, CUWA is able to conduct an independent study of the data and science underlying the EPA's proposed regulations. The experts concluded that there was a correlation between the location of the entrapment zone (X2) and fish abundance. However, there are many factors which affect the fisheries and the correlation becomes less reliable as the entrapment zone moves downstream.

In addition to the recommendations by San Francisco and CUWA, the Bay Delta Urban Coalition (BDUC) has also reviewed the analysis of the CUWA experts and has recommended that the EPA amend its proposed standards to include a narrative standard and other refinements. San Francisco suggests that the EPA consider BDUC's recommendations as well.

B. Fish Migration and Cold-Water Habitat Criteria

EPA has proposed criteria to establish a habitat that would be conducive to outmigration of chinook salmon. The proposed criteria are based on a smolt survival index that EPA believes "quantifies and predicts the survival of salmon migrating through the Delta." Federal Register Volume 59, No. 4 at 823.

San Francisco endorses CUWA's comments regarding EPA's proposed fish migration and cold-water habitat criteria. The proposed criteria are not the appropriate tool to accomplish EPA's stated objectives, primarily because the indices are not directly indicative of biological response and because the indices are not valid over a wide range of hydrologic, hydraulic and operational scenarios.

San Francisco believes that salmon smolt survival issues should continue to be addressed within the water and fisheries management programs that are currently being conducted and administered by the federal and state agencies. EPA's proposed criteria would severely constrain the ability of these programs to validate relationships between smolt survival and hydrologic and operational parameters, and would potentially cause significant water supply impacts without accomplishing EPA's stated goal of improving smolt survival.

Although San Francisco's concerns are primarily focused on the smolt survival index proposed for the San Joaquin River basin, San Francisco concurs with CUWA's comments regarding the apparent fundamental basis and mathematical problems associated with the Sacramento River basin index. Some of the data and computational problems identified for the Sacramento River basin index also apply to the San Joaquin River basin index.

Several potential problems exist with EPA's proposed criteria. From a physical Delta

channel configuration standpoint, EPA has proposed criteria for the San Joaquin River basin which assume the placement of a barrier in the upper Old River for the purpose of reducing diversion of smolts to the export pumps. While a barrier in Old River appears to provide significant benefits to the survival of salmon smolts, there is no certainty that a barrier will or can be installed each year.

Two problems exist with EPA's proposed criteria if the barrier is not installed. First, EPA's proposed criteria (specifically the index equation to estimate survival) is not appropriate for a no-barrier Delta channel configuration.[2] Second, the absolute index values stated by EPA may not be achievable with a no-barrier Delta configuration.

Regardless of the fact that the criteria do not address the potential different Delta channel configurations that may occur, the equations that EPA will or would apparently rely on to establish standards for salmon smolt survival are extremely "experimental" in nature and should not be used within a rule. Appendix 1 cites the FWS analyses that have established the index equations proposed by EPA. The reports of FWS are fraught with caveats that the survival relationships developed there are based on hypothesis, theories and adjustments. Regarding the EPA assumption that a barrier-in configuration is good, which leads to EPA's proposed index equation, FWS has described its results with the following statement:

> [I]t is quite apparent there is a need to measure survival under different conditions with the actual barrier in place to fully understand the benefits and costs of such a measure." (WRINT-USFWS-9)

From a compliance standpoint, EPA has not provided sufficient guidance for the application of the proposed criteria. EPA's proposed criteria provides an equation that requires knowledge of Delta exports and the San Joaquin River flow at Stockton. However, EPA does not provide guidance on the calculation of flow at Stockton.

Also, if EPA does go forward with a survival criteria, it must address the other possible Delta channel configurations that potentially may exist in the future. Recognizing the several adjustments used by FWS to develop an index value that appears to range between zero (0) and 1.0, San Francisco is uncertain whether or not the FWS survival indices for the barrier-in and no-barrier condition are directly comparable. If the "1.8" adjustment that is proposed for the barrier-in index is applied to the no-barrier survival relationship (cited in Appendix 1), it may be impossible to achieve the survival criteria proposed by EPA.

Compliance with EPA's proposed criteria for salmon smolt survival has only been partially addressed by the modeling performed at the direction of EPA by the Department of

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[2] Appendix 1, attached, is a draft report which briefly describes the development and application of the salmon smolt survival indices that were developed by the United States Fish and Wildlife Service (FWS) for the San Joaquin River.

Water Resources. At the heart of the modeling regarding the proposed criteria is a fundamental assumption for Delta exports (the index equation has two parameters that affect the result - Delta exports and San Joaquin River flow at Stockton). Essentially an infinite amount export and flow combinations could occur to achieve the proposed criteria, each with a different water supply impact. The full range of potential water supply impacts has not been identified. Further, the water supply impacts associated with other Delta channel configurations, e.g., a no-barrier configuration, have not been tested or identified.

Overall, EPA is proposing criteria that are based on relationships that are not supported by historical biological response. When testing the criteria, it is possible to develop hydraulic conditions that would obviously not benefit the survival of salmon smolt.

C. Fish Spawning Criteria.

EPA has proposed criteria to protect the historic spawning range of striped bass on the lower San Joaquin River. Its criteria proposes to require maintenance of water quality in the lower San Joaquin River (measured as the 14-day running average of the mean daily electrical conductivity) to be no more than 0.44 mmhos/cm for the period April 1 to May 31 of every year. The reach of river that the proposed criteria apply varies according to hydrologic conditions. For wet, above normal and below normal hydrologic years, the criteria will apply to the reach of river between Vernalis and Jersey Point. For dry and critical hydrologic years, the criteria will apply to the reach of river between Jersey Point and Prisoners Point.

EPA states that promulgation of criteria for striped bass spawning is "important to ensure the genetic diversity of the population as well as to increase the size of the overall striped bass population." Federal Register Volume 59, No. 4 at 826.

San Francisco recommends EPA consider the various data concerning striped bass habitat preferences and factors affecting survivability. Based on the available evidence, San Francisco concludes that spawning habitat is not generally considered as the limiting factor to striped bass populations.

Further, San Francisco recommends EPA carefully consider the potential conflict that could be caused by attempting to improve striped bass spawning numbers in the San Joaquin River. For example, striped bass are known predators of juvenile salmon. Improving conditions for striped bass in April and May will increase the likelihood that large striped bass will be present in the Delta and its tributaries at the same time that salmon smolts are outmigrating, subjecting the salmon to high rates of predation mortality. Thus, a striped bass standard will improve conditions for striped bass at the expense of other species. Additionally, moving the striped bass spawning area up into the San Joaquin towards Vernalis, as proposed by the EPA standard, would increase the likelihood of entrainment of striped bass eggs and larvae.

San Francisco incorporates herein a memorandum by Dr. Peter B. Moyle concerning several issues surrounding the proposed spawning criteria. Appendix 2. Dr. Moyle makes

several points regarding the criteria and EPA's rationale for the criteria:

- There is no reason to believe that there is a "genetic diversity" to protect, as there is likely no genetic distinction between Sacramento River and San Joaquin River spawning striped bass. Therefore, no special protection for the population of the San Joaquin River is required.

- Specific criteria to enhance the non-native striped bass population will increase predation pressures that currently adversely impact other species, such as the depressed San Joaquin stock of chinook salmon.

- Defer any specific additional protection to the striped bass until there has been significant recovery of the San Joaquin salmon populations. The question concerning the striped bass is a matter of <u>when</u> the population will recover, not <u>if</u>.

Significant evidence concerning striped bass habitat and survival was provided during the State Water Resources Control Board hearings for the review of Bay-Delta standards. San Francisco recommends EPA thoroughly review that evidence regarding the ability of striped bass to spawn in the San Joaquin River within salinity much greater than the level proposed by the EPA criteria. The evidence also highlights that habitat is not considered to be a limiting factor to the striped bass population. San Francisco suggests that EPA particularly review State Water Contractors' Exhibit No. 623 and the supporting testimony of Dr. Charles Hanson.

Appendix 1 illustrates various historical data regarding water quality in the lower San Joaquin River, and also provides the finding of the SWRCB regarding the adverse impact that agricultural drainage has on water quality in the river. The historical data suggests that the water quality objectives of EPA will be incidentally met much of the time within the central Delta. However, compliance with the proposed EPA criteria for the river reach between San Andreas Landing and Vernalis may be difficult or impossible in certain circumstances given the degradation of water quality at Vernalis due to agricultural return flows and the regulatory constraints put on the cross-Delta conveyance of flows due to endangered and threatened species.

The water impact analyses used by EPA did not include an assessment of operations required to comply with the proposed EPA spawning criteria. This fact was recognized in correspondence between EPA and the Department of Water Resources. While compliance with the proposed criteria may regularly occur incidental to compliance with other Bay-Delta and instream flow requirements, this outcome is definitely not the rule. Appendix 1 illustrates an example of the adverse impact to water supply that could occur even in a "wet" year on the San Joaquin River. Additional water releases from San Joaquin River tributaries were made during 1993 for the purpose of enhancing the outmigration of salmon smolt. Even with these supplemental flows (which appear to have approximated the magnitude of flows suggested by the EPA proposed salmon smolt survival criteria), significant additional releases would have been required to dilute poor water quality in the lower river during EPA's proposed compliance

period (April through May). This type of water supply impact, or the impact of drier year compliance, has not yet been considered by EPA.

San Francisco recommends that the proposed EPA criteria for striped bass spawning habitat be deferred until such time as it is coordinated with recovery plans for other species including the recovery of the San Joaquin River stock of chinook salmon, and that specific enhancement of spawning habitat in the lower San Joaquin River only be provided if it is shown to be required for the recovery of the striped bass population.

V. IMPLEMENTATION OF EPA STANDARDS.

EPA should not make any formal recommendation to the State Water Resources Control Board regarding how Clean Water Act standards should be implemented. All suggestions concerning implementation should be eliminated from the EPA's discussion of the standard.

San Francisco recognizes that the EPA will have a role to play in working with the State of California to establish protections and a program of implementation for the Delta. It is our understanding that Club FED and the State are currently discussing the terms of an agreement which will result in a joint process of state and federal cooperation for Delta protection. San Francisco encourages the EPA and other members of Club FED to work with the State in establishing adequate protection for the broad range of beneficial uses of the Delta and an implementation program which assigns responsibility on a "rational basis." The implementation program must recognize the basic water rights tenets of California water law, the ability to implement protection without simply taking water, and the importance of eco-system management. It must also address the public policy issues concerning economic impacts and how best to avoid those impacts as well as other factors, several of which are expanded upon below.

While recognizing that every use of water within the Bay-Delta Estuary watershed has some impact on the Delta, an arbitrary formula for spreading responsibility for Delta water quality standards is not appropriate. Any merely proportional relationship formula fails to address the causes of the conditions that are central to the Delta's problems, including the actual impact of diversions, entrainment (both in the Delta and in upstream diversions), pollutant loading (from both point and non-point source discharges), increased water temperatures caused by agricultural return flows, habitat degradation in the Delta and its tributaries, and other factors.

Any Delta water quality solution must incorporate the following elements:

- Respect for the primacy of State law governing water rights to allocate responsibility for meeting water quality standards, including seniority of rights and legal preferences for municipal use.

- Allocation of responsibility for water quality standards in relationship to actual

impact on Delta conditions, and not based upon arbitrary or easy to implement solutions.

- Adoption of a water supply impact ceiling (cap) on the amount of water that may be required from water users to be applied to meeting the standards.

- Use of a restoration fund to purchase any water needed to meet environmental standards above the water supply impact threshold. The restoration fund should also be used to provide funding to monitor Delta fisheries to assess the effects of adopted standards, and to study and improve fishery habitat on tributary streams.

- Allocation of a portion of the 800,000 acre-feet to be used for environmental purposes under the CVPIA to help meet Delta standards.

- Facilitation of water transfers in order to allow parties to supplement water supplies expended towards meeting Delta standards.

- Institution of a mitigation credits program which will allow for the substitution of alternative water, money, or environmentally beneficial projects in lieu of an otherwise required contribution to Delta flows.

VI. LEGAL COMMENTS.

A. The Clean Water Act is Designed to Regulate Discharges of Pollutants Into Navigable Water from Point Sources.

The purpose of the Clean Water Act, 33 U.S.C. 1251, *et. seq.* ("Act"), is to protect water quality for beneficial uses by regulating the discharge of pollutants into navigable waterways from point source discharges. The Act prohibits the "discharge of any pollutant by any person" except in accordance with its permitting provisions. 33 U.S.C. § 1311(a). The "discharge of pollutants" is defined in the Act to mean "any addition of any pollutant to navigable waters from any point source." 33 U.S.C. § 1362(12) (emphasis added). Section 402 of the Act sets forth comprehensive permitting provisions to regulate point source discharges. 33 U.S.C. § 1342. The Act is directed at the regulation of point source discharges of pollutants, and does not regulate water diversions.

1. The Proposed Estuarine Habitat Standard Is Not Within EPA's Authority to Regulate Point Source Discharges under the Clean Water Act.

EPA's proposed Estuarine Habitat Standard purports to maintain specified salinity levels at particular locations in the Delta. The Delta salinity subject to the proposed standard is largely a function of tidal action in relationship to Delta outflow. *Effects of the Central Valley Project and State Water Project on Delta Smelt*, Biological Assessment prepared for the U.S. Fish &

Wildlife Service by the California Department of Water Resources, at 64-65; *Delta Estuary, California's Inland Coast, A Public Trust Report*, May, 1991, at 26, prepared for the State Lands Commission. Salinity created by tidal intrusion is entirely unrelated to point source discharges. Delta outflow is influenced by rainfall, snowmelt and water diversions from the Delta watershed.

The only factors in the Delta salinity equation that can be influenced by human effort are saline discharges and water diversions. EPA does have the power to regulate saline discharges; however, saline discharges are not a significant element in the salinity levels that EPA seeks to establish in its proposed estuarine habitat rule. Thus, EPA's clear intention is to meet the Estuarine Habitat Standard through regulation of outflow by increasing reservoir releases and decreasing diversion pumping. This approach is beyond EPA's authority under the Clean Water Act.

The Act does not provide EPA with any direct authority over the control of salt water intrusion. Instead, Section 208 of the Act includes "salt water intrusion . . . resulting from reduction of fresh water flow from any cause, including . . . diversion" as one of the elements of nonpoint source pollution that is to be addressed through State created areawide waste treatment plans. 33 U.S.C. § 1288(b)(2)(I). The EPA's authority under the Act is limited to approval those State plans. The EPA does not have any authority to impose regulatory requirements governing salinity intrusion apart from the State.

Prior to the enactment of § 208, the legislative history shows that Congress did not consider salinity intrusion caused by reduction in fresh water outflows to be within the purview of the Act. Senate Report on S. 2770, SR 92-414; A Legislative History of the Water Pollution Control Act, Vol. 2, p. 1458. When the Act was amended to include salinity intrusion within its terms, Congress made the express decision to make it an element of water quality subject to State control under § 208, rather than including it within EPA's federal authority. For an extensive discussion of the legislative history of congressional intent in enacting § 208, establishing that Congress drafted the terms of that section to avoid federal control of saltwater intrusion in order to address State concerns about losing control of water rights, and that Congress reaffirmed State control over water quality issues caused by salinity intrusion in the 1977 amendments to the Clean Water Act, see comments of the Bay Delta Urban Coalition to EPA's proposed water quality standards.

Primary state authority over water quality issues associated with salinity intrusion was reaffirmed in the 1987 amendments to the Clean Water Act, when § 319 was enacted, requiring states to develop management plans for salt water intrusion and other nonpoint sources of pollution. EPA has authority under that section to approve those State plans, but has no independent authority to develop water quality standards for nonpoint source elements of water quality associated with those plans. 33 U.S.C. § 1329.

Federal courts have affirmed this interpretation of § 208. See generally, *National Wildlife Federation v. Gorsuch* (D.C. Cir. 1982) 693 F.2d 156; *U.S. ex rel. TVA v. Tennessee*

Water Quality Control Board (6th Cir. 1983) 717 F.2d 992; *Shanty Town Associates v. EPA* (4th Cir. 1988) 843 F.2d 782.

2. The Proposed Estuarine Habitat Standard Interferes with State Authority to Allocate Water Quantity Rights Under State Law.

EPA's attempt to regulate water quality associated with salinity intrusion is not related to point source discharges, and so is beyond the scope of federal authority under the Clean Water Act. As the Estuarine Habitat Standard relies upon water releases from dams and decreased diversions of water for compliance with its terms, it also violates the prohibitions in the Clean Water Act against interference with State allocated water rights.

The Clean Water Act contains many references to congressional intent that its provisions not interfere with the traditional authority of the states to allocate their water resources. Sections 101(b), 101(g) and 510 all declare Congress's clear intent that "the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is the further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State." 33 U.S.C. § 1251(g). EPA's own water quality standard promulgation regulations incorporate this limitation. 40 C.F.R. § 131.4(a).

EPA's Estuarine Habitat Standard expressly envisions compliance through releases of substantial quantities of water: "EPA expects that the State Board would implement these salinity criteria by making appropriate revisions to operational requirements included in water rights permits issued by the State Board." Federal Register Volume 59, No. 4 at 821, January 6, 1994.

By implementing a water quality standard that can only be met through releases of quantities of water, EPA has exceeded its regulatory authority and intruded on the area of water allocation, reserved exclusively to the States under the Clean Water Act.

B. The Proposed Smolt Survival Index Is Not an Appropriate Water Quality Criteria Under the Clean Water Act.

1. Water Quality Standards Must Be Supported by Adequate Scientific Justification.

EPA proposed a salmon smolt survival index as a water quality criteria because "at this time EPA has not developed an adequate scientific basis for precise temperature criteria."

Water quality criteria, "must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." 40 C.F.R. § 131.11(a)(1). In this case, the proposed survival index suffers from a number of flaws in the data used to support it. As noted above, the indices representing the proposed criterion are not directly

indicative of biological response. There are serious questions about the accuracy of the mathematical formula used to derive the indices. In addition, the indices are not valid over a wide range of hydrologic, hydraulic and operational scenarios. In short, EPA's purported "water quality criteria" expressed by a salmon smolt survival index is not supported by scientific evidence.

2. Fish Survival Indices are not "Water Quality Criteria" Under the Clean Water Act.

Water quality standards are made up of designated uses for a water body and water quality criteria to protect those uses. 40 C.F.R. § 131.3(i). Water quality "criteria" are defined as elements of water quality standards, "expressed as constituent concentrations, levels or narrative statements, representing a quality of water that supports a particular use." 40 C.F.R. § 131.3(b).

Salmon smolt survival indices are inappropriate water quality criteria, since they do not reflect a quality of water. Nor is there any basis to conclude that the use of this survival index will lead to level of water quality that will protect the designated uses of the water body. There are many other factors outside of the scope of EPA's regulatory authority that affect salmon smolt survival besides the chemical constituents of the water body.

C. Striped Bass Standard.

EPA's electroconductivity (EC) criteria to protect striped bass spawning in the San Joaquin River is explicitly directed at remedying salinity levels associated with agricultural discharge. Federal Register, Vol. 59, No. 4 at page 827, January 6, 1992 ("Migrating bass seeking the warmer waters encounter excessive upstream salinity caused primarily by runoff.") The San Joaquin EC standard is intended to be implemented by diluting those pollutants with freshwater flows. *Id.* ("EPA expects that the State Board would implement these criteria by making appropriate revisions to operational requirements included in water rights permits issued by the State Board.") Indeed, the only way EPA's EC standard could be achieved is by diluting saline pollutants with fresh water flows or controlling existing levels of agricultural run off. Neither mechanism is within EPA's authority under the Clean Water Act.

It is inappropriate under the Clean Water Act to promulgate a standard that attempts to improve water quality through dilution of pollutants in the water body. This point is clearly made in EPA's own interpretation of various aspects of the Act. For example, EPA's regulations under the Act provide that in setting designated uses for a water body: "In no case shall a State adopt waste transport or waste assimilation as a designated use for any waters of the United States." 40 C.F.R. § 131.10(a). Yet this is precisely what the EPA would be requiring the State to do by promulgating a standard that can only be achieved by applying a substantial portion of the State's fresh water supplies in the San Joaquin basin to the sole purpose of diluting pollutants primarily derived from agricultural return flows.

Further, EPA's interpretation of the relationship between the Act's antidegradation policy, § 101(g), and State's water rights laws explains EPA's approach where water quantity is implicated by a Clean Water Act standard. It provides that the proper means to implement Clean Water Act standards related to water diversions is to impose suitable conditions to any § 404 permit associated with the diversion, "and/or additional nonpoint and/or point source controls should be imposed to compensate." *Questions and Answers on: Antidegradation*, EPA, August, 1985, at page 11. Again, EPA's own policies mandate the control of nonpoint source pollution through nonpoint source controls, particularly when the alternative is interference with State created water quantity allocations.

The same antidegradation policy also notes that EPA's water quality regulations may properly have an incidental effect on water rights. However, it is important to recognize that while there have not been precise estimates of the water supply impact that would be imposed by the striped bass standard, it is certain to be more than "incidental." EPA recognizes that the cases interpreting the relationship between State water rights and EPA's authority under the Clean Water Act provide that "if there is a way to reconcile water quality needs and water quantity allocations, such accommodation should be pursued. In other words, where there are alternate ways to meet the water quality requirements of the Act, the one with the least disruption to water quantity allocations should be chosen."[3] Thus, alternative means of attaining the goals which the standards are designed to achieve, such as source controls on the actual cause of the pollution problem, must be pursued before taking regulatory actions under the Clean Water Act that devote water quantities allocated under State law to remedy the problem.

In addressing striped bass spawning habitat, the State Water Resources Control Board has also recognized that dilution is not an acceptable use of the State's scarce water resources:

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

Draft Decision 1630, at 44-45 (footnote omitted).

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[3] The cases supporting EPA's statement were primarily concerned with § 404 permits for point source discharges of pollutants into navigable waters, not regulation of nonpoint source pollutant problems.

The Clean Water Act is intended to protect water quality through a permitting system designed to control point source discharges. The Act provides protection for state water rights throughout its provisions. This EC standard to protect striped bass spawning habitat, as well as the Estuarine Habitat standard, runs counter to those central principles by attempting to regulate pollutants through reallocation of State water rights. The standard has the additional shortcoming of violating EPA's own mandate under the Act that dilution of pollutants is not a proper beneficial use of water, a principle that, in the context of the very issues addressed by the proposed EC standard, is shared by the State agency responsible for the allocation of water in California.

VII. CONCLUSION.

San Francisco requests EPA to take action consistent with the recommendations contained in these comments and the comments submitted by CUWA in adopting water quality standards for the Bay/Delta. San Francisco recommends adoption of CUWA's alternative estuarine habitat standard. San Francisco also recommends that the EPA consider the alternative submitted by the Bay Delta Urban Coalition. Because of serious legal and technical deficiencies inherent in the smolt survival and fish spawning criteria, San Francisco recommends that EPA abandon those proposals in favor of a basin-wide management plan incorporating the full range of variables affecting salmon smolt survival. Finally, San Francisco urges EPA to work closely with the State to implement water quality standards that will achieve the best possible results for the many uses of the waters of the Bay/Delta system.

Reference No. 12

DRAFT

REVIEW AND ANALYSIS OF EPA PROPOSED SAN JOAQUIN RIVER SALMON SMOLT SURVIVAL CRITERIA AND STRIPED BASS SALINITY CRITERIA

Prepared for

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The City and County of San Francisco Public Utilities Commission

March 7, 1994

Notice

This draft report was prepared as a technical document for reference use by California Urban Water Agencies and others in preparing their comments to the US Environmental Protection Agency on "Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California, January 6, 1994." This draft technical report is not part of the CUWA formal comment to EPA.

Table of Contents

This report was prepared for the California Urban Water Agencies (CUWA) as a part of a CUWA review of the Environmental Protection Agency's "Water Quality Standards for Surface Waters of the Sacramento River, San Joaquin River, and San Francisco Bay and Delta of the State of California (40 CFR Part 131). This report addresses the following questions:

- How are the criteria for salmon smolt survival and striped bass spawning in the San Joaquin River defined, and compliance measured?
- How do the proposed criteria reflect upon the biological objectives sought by EPA?
- Do the salmon smolt survival criteria consider a wide range of flow and export operations, and different Delta channel configurations?
- Have the water supply impacts associated with the proposed criteria been adequately assessed?

REVIEW AND ANALYSIS OF EPA PROPOSED SAN JOAQUIN RIVER SALMON SMOLT SURVIVAL CRITERIA AND STRIPED BASS SALINITY CRITERIA

This report discusses the proposed criteria for salmon smolt survival and striped bass spawning within the San Joaquin River portion of the Sacramento-San Joaquin River Delta. The discussion summarizes the Environmental Protection Agency's (EPA) proposed criteria, the cited basis for each criteria, and the manner by which EPA assumes that the criteria will be implemented. Comments, conclusions and recommendations are also provided regarding the proposed criteria.

PROPOSED CRITERIA

EPA is proposing two criteria that specifically focus on the hydrologic/hydraulic and biological conditions of the San Joaquin River. Proposed are criteria concerning chinook salmon smolt survival and striped bass spawning.

Proposed Salmon Smolt Survival Criteria

EPA proposes a quantitative criteria for the protection of fall-run chinook salmon smolt which is measured in terms of a numeric index.

> "Because at this time EPA has not developed an adequate scientific basis for precise temperature criteria, EPA is proposing 'smolt survival criteria' to protect the Fish Migration and Cold Fresh-Water Habitat designated uses in the Bay/Delta estuary. These criteria are based on a smolt survival index that quantifies and predicts the survival of salmon migrating through the Delta." (EPA1993, pages 68-69)

Specifically, the criteria require the achievement of the following smolt survival indices (as determined by a mathematical model).

Proposed Salmon Smolt Criteria
San Joaquin River

Water Year Type	Index Value
Wet	0.46
Above Normal	0.30
Below Normal	0.26
Dry	0.23
Critical	0.20

The smolt survival indices are to be determined by mathematical models developed and described by Kjelson et al. (1989), and the United States Fish and Wildlife Service (USFWS) (WRINT-USFWS-7)(WRINT-USFWS-9). "The San Joaquin model is based on experimental data, and

relies on the relationship between salmon smolt survival and river flows, diversions into Old River, and export rates." (EPA1993). Underlying the proposed index values is the assumption that a barrier will be in place at the head of Old River during the peak emigration season (April-May).

To compute the salmon smolt survival index on the San Joaquin River, EPA proposes the following formula:

$$SJSI = (0.341271 - 0.000025E + 0.000067F) \div 1.8$$

where

SJSI is the San Joaquin River Salmon Index value;

E is the average Central Valley Project plus State Water Project exports measured in cfs;

F is the mean daily flow in cfs in the San Joaquin River at Stockton, calculated as Old River flow subtracted from San Joaquin River flow at Mossdale. Old River flow is calculated from ratio of Brandt Bridge flow to exports.

The index is to be computed at least monthly, weighted by the proportion of smolt migrating during each month (or shorter time period) and summed to estimate survival for the water year. "Total survival for the entire fall-run migration period shall either use monitoring information collected during each water year's outmigration to determine the specific pattern of migration for the water year, or shall assume monthly migration to be 45% in April and 55% in May." (EPA1993, page 137). The criteria does not definitively state whether the San Joaquin Valley Index or the Sacramento River Basin Index will be used to establish the water year type for the salmon smolt survival index. However, the cited literature suggests that the San Joaquin Valley Index is assumed.

Cited Basis for Salmon Smolt Survival Criteria

EPA states that it developed the "goals or target index values" for its proposal primarily relying on the goal of restoring habitat conditions to those existing in the late 1960's and early 1970's (EPA1993, pages 70-71), citing consistency with the recommendations of the Interagency Statement of Principles. The historical, calculated San Joaquin River salmon smolt survival indices for various historical periods are shown below.

	Water Year Type					
	Wet	Above Normal	Below Normal	Dry	Critical	Mean of Year Types
1940 Level of Development	.58	.50	.52	.47	.39	.49
1956-70 Historical	.61	*.25	.18	.17	*.15	.27
1960-88 Historical	.43	.12	.17	.13	.12	.19
1978-90 Historical	.48	*.15	*.09	.06	.07	.17
* Interpolated: there were no water years in these categories during the relevant historical period. Source: USFWS (WRINT-USFWS-7)						

Source: (EPA1993, page 72)

EPA argues that strict adherence to the late 1960's and early 1970's target is inappropriate. Its rationale is that salmon fisheries on the San Joaquin River were already somewhat degraded during that historical period, and particularly more severe during drier years. Therefore, to protect salmon from falling to dangerously low population levels, and "more nearly mimic the natural historical response of smolts migrating through the Delta," EPA is proposing "more protective target values in drier years and less in wetter years." (EPA1993, pages 72-73)

The proposed San Joaquin River salmon smolt survival indices correspond to the recommendations of the Five Agency Chinook Salmon Committee. EPA specifically states that the criteria provides better protection than the 1956-1970 historical level, and indicate that the criteria "should provide more consistent smolt survival and help avoid situations where extraordinary measures are necessary to preserve runs..." (EPA1993, page 77)

Identified Implementation Measures

The salmon smolt survival index criteria can be met by a range of various operations. The nature of the mathematical model that determines the San Joaquin River index leaves the decision of meeting the criteria as a matter of manipulating San Joaquin River flow at Vernalis, Delta exports, and the installation of a barrier at the head of Old River. EPA states that it "expects that the State Board would implement these criteria by making appropriate revisions to operational requirements included in water rights permits issued by the State Board." (EPA1993, page 78)

To achieve the criteria, EPA cites that "the USFWS recommended a series of implementation measures (based on the Five Agency Chinook Salmon Committee proposals) to achieve the smolt survival indices..." The measures for the San Joaquin River were:

- Requiring a range of flows from 2,000 to 10,000 cfs at Vernalis from April 15 to May 15;
- Requiring minimum flows of 1,000 cfs at Jersey Point from April through June, except from April 15 to May 15, when higher flows from 1,000 to 3,000 cfs would be required;
- Placing a full barrier in upper Old River from April through May;

- Total water exports would be curtailed to a range from 6,000 cfs in wet years to 2,000 cfs in critically dry years from April 15 to May 15. (EPA1993, pages 78-79)

Proposed Fish Spawning Criteria

EPA has proposed to establish water quality criteria to protect the historic spawning range of striped bass on the lower San Joaquin River. The proposed criteria are stated to "reflec[t] the natural variability in salinity levels in different water year types." (EPA1993, page 87). Specifically, the criteria are stated as follows:

> "The 14-day running average of the mean daily EC shall not be more than 0.44 mmhos/cm for the period April 1 to May 31 in wet, above normal, and below normal years at the following stations: Jersey Point, San Andreas Landing, Prisoners Point, Buckley Cove, Rough and Ready Island, Brandt Bridge, Mossdale, and Vernalis. In dry and critical water years, the criteria are required only in the reach between Jersey Point and Prisoners Point, as measured at Jersey Point, San Andreas Landing, and Prisoners Point." (EPA1993, page 87)

Cited Basis for Spawning Criteria

EPA states that its objective is to protect spawning in both the Sacramento and San Joaquin river systems to "ensure the genetic diversity of the population as well as increase the size of the overall striped bass population." (EPA1993, page 83). EPA cites literature that states that adults spawn by migrating upstream, with the location and time of spawning apparently controlled by temperature and salinity conditions. The literature was cited to state that "striped bass spawn successfully only in freshwater with electrical conductivity less than 0.44 mmhos per centimeter electroconductivity (mmhos/cm EC), and prefer to spawn in waters with conductivities below 0.33 mmhos/cm. Conductivities greater than 0.55 mmhos/cm appear to block the upstream migration of adult spawners." (EPA1993, page 83)

EPA cites the work of others and summizes that in the San Joaquin River the earlier occurrence of warm temperatures cause the spawning period to occur earlier than in the Sacramento River, with the San Joaquin spawning peak occurring in April or May. EPA recognizes that migrating bass seeking warmer waters encounter excessive upstream salinity caused primarily by runoff, with the migration potentially blocked by salinity. Subsequent mortality of eggs is stated to also occur due to high salinity.

Identified Implementation Measures

The criteria are stated as specific quantitative salinity requirements. EPA expects that the State Board will implement the criteria by making appropriate revisions to the operational requirements included in water rights permits issued by the State Board.

COMMENTS

Salmon Smolt Survival Criteria

The basic development of the San Joaquin River salmon smolt survival index equation was developed by integrating several approaches and adjustments. The mixed approach was due to apparent limitations of experimental data over a diverse range of operating conditions. For instance, the proposed equation (assuming a barrier exists at Old River) is based on limited coded wire tagged data (8 data points) and is extended from several theories that are not currently verified by experimental data. Figure 1 below illustrates the flow, export and survival relationship developed by USFWS for a barrier-in condition. To relate the graphical depiction to the proposed survival index, the results for survival shown in the graphic must be divided by a factor of 1.8.

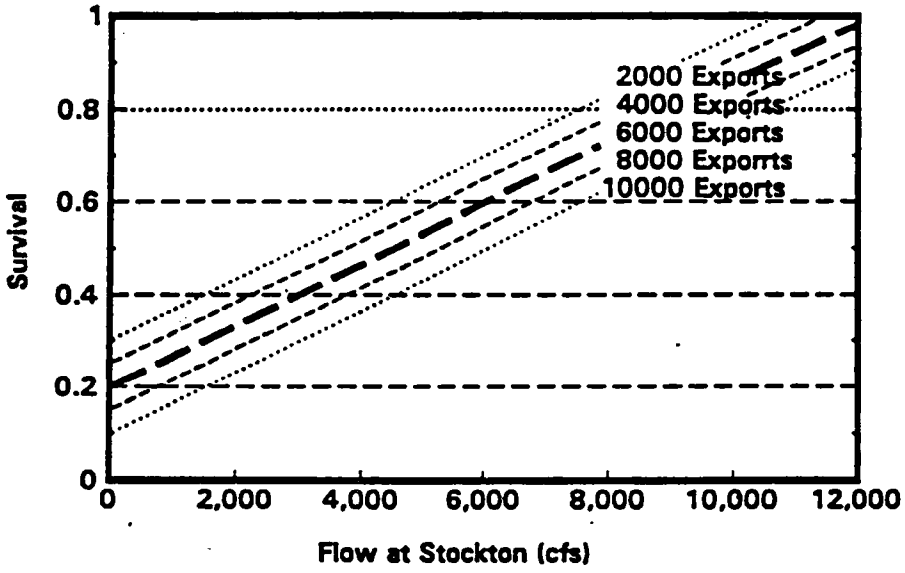


Figure 1
Barrier-in Condition
(Source: WRINT-USFWS-7)

USFWS describes in WRINT-USFWS-7 the numerous steps it used to develop a predictive tool for smolt survival assuming a barrier at Old River. USFWS states that including exports in the regression analysis did not improve the equation; however, exports were added to the equation based on the opinion of USFWS that the effect of exports on smolt survival under a no-barrier configuration would have similar effects under a barrier-in condition. A family of lines was developed that relates smolt survival, flow and exports. USFWS indicated reservation with its relationship based on the "relatively high survival it provides at very low flow." (WRINT-USFWS-7, page 54)

The foundation of the equation and its supporting theories appear questionable. Achievement of the proposed criteria by simply manipulating the flows within the Delta will likely not guarantee the biological response intended by the criteria. On face value, the proposed

equation suggests that with zero exports, a Stockton flow of only 280 cfs will result in a survival index of 0.20 (critical year required index). The historical data will not support the calculated result. Additional research and experimentation must be performed to refine and validate a relationship for smolt survival.

As a question of complying with the EPA proposed criteria, additional information must be provided by EPA concerning the calculation of the salmon smolt survival index. The equation proposed by EPA currently includes a variable for flow at Stockton. Flow at Stockton is not measured, and reportedly is determined by a San Joaquin River flow and Delta export relationship. No specific criteria (equation) was provided by EPA to determine the flow at Stockton which is necessary to determine the salmon smolt survival index in a barrier-in condition.

The EPA criteria were cited to the proposal of Alternative D described in WRINT-USFWS-7. In order to achieve the proposed San Joaquin River smolt survival criteria the following operational measures were assumed (additional operational assumptions were assumed that affect the Sacramento River smolt survival index):

Year Type	Close Cross Channel	Close Georgiana	Max Total Exports	Full Barrier Old River	Minimum Vernalis	Salmon Survival Index
			4/15 - 5/15		4/15 - 5/15	
Wet	April 1 - June 30	April 15 - June 15	6,000 cfs	April - May	10,000 cfs	0.46
Ab Norm	all years	all years	5,000 cfs	&	8,000 cfs	0.30
Bl Norm			4,000 cfs	Sept - Nov	6,000 cfs	0.26
Dry			3,000 cfs	all years	4,000 cfs	0.23
Critical			2,000 cfs		2,000 cfs	0.20

Although the nature of the smolt survival index allows the achievement of the criteria through variance of Vernalis (Stockton) flow and/or exports, the manipulation of the parameters of this equation to achieve the proposed survival index will not necessarily provide the desired biological response.

Paramount to achieving the criteria is the assumption that the barrier at Old River will be installed. Due to concerns that the barrier could adversely impact the use of the water course for other needs, there is no certainty that a barrier will be installed during the period anticipated by EPA. If an equation is to be used to surrogate smolt survival, then additional compliance measurement criteria must be included to capture the array of physical channel configurations within the Delta that may occur. The equation proposed in the EPA criteria is only associated with a barrier-in condition.

USFWS has previously described its methodology to determine smolt survival under a no-barrier configuration. (WRINT-USFWS-7) Questions again arise regarding the validity of the USFWS index equation for the no-barrier configuration. USFWS states that due to the lack of coded wire tagged data, the relationship relied in part on adult fall-run salmon escapement data. Figure 2 below illustrates the flow, export and survival relationship previously developed by USFWS for a no-barrier condition. Assuming consistency between the graphical depiction of the barrier-in

survival relationship and the no-barrier survival relationship, the survival values shown in Figure 2 would be divided by a factor of 1.8 to relate to the EPA proposed criteria.

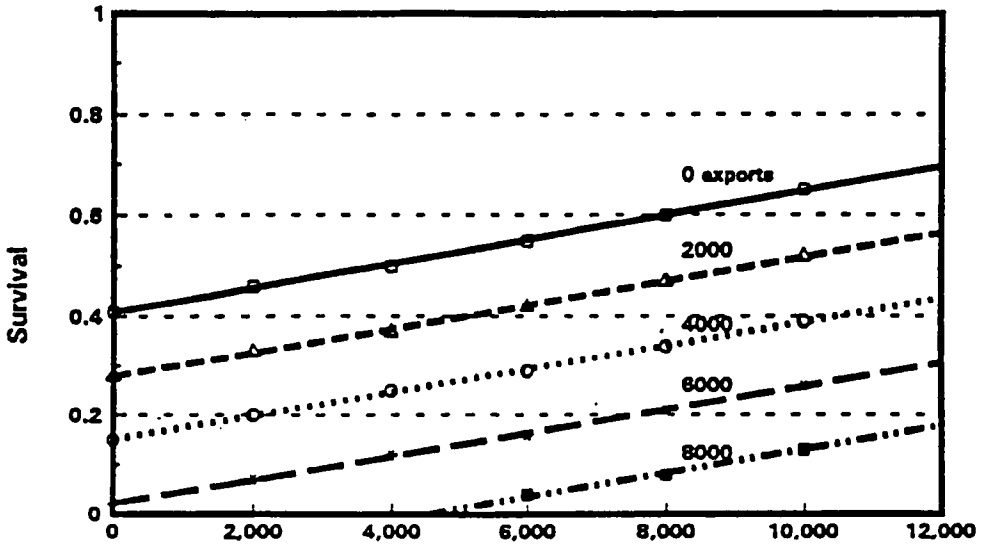


Figure 2
No-Barrier Condition
(Source: WRINT-USFWS-7)

To compute the salmon smolt survival on the San Joaquin River in a no-barrier condition, USFWS suggests (WRINT-USFWS-9, page 50) the following equation:

$$Y = (4.90106 + 0.000286F - 0.000774E) \div 12$$

where

Y is the San Joaquin River salmon survival;

F is the mean daily flow at Vernalis; and,

E is the average Central Valley Project plus State Water Project exports measured in cfs.

Consistent with the methodology suggested by USFWS for the barrier-in condition, the results of the above equation would be divided by a factor of 1.8 to result in the San Joaquin River salmon smolt survival index (see WRINT-USFWS-9, page 72).

Similar to the barrier-in equation, this equation suggests that significant survival can occur with minimal, if not zero flow at Vernalis if exports are reduced to zero. Recent, past year survival data indicate that the no-barrier index relationship is far from accurate. Therefore, a biological response is not necessarily guaranteed by simply complying with EPA's proposed criteria.

The Department of Water Resources (DWR) has attempted to model water supply impacts associated with compliance to the several EPA proposed criteria. Concerning compliance with the San Joaquin River smolt survival criteria, DWR appears to be assuming compliance is met through the implementation of the following operation:

> "Total exports not above 1500 cfs for 4 weeks, April 15 - May 15. Total exports for the rest of April through June not above 4000 cfs. Minimum flows at Vernalis for four weeks (April 15 - May 15) as follows: W 10,000 cfs; AN 8,000 cfs; BN 6,000 cfs; D 4,000 cfs; C 2,000 cfs." (by direction of EPA by letter dated August 12, 1993 from Susan Hatfield to George Barnes, DWR1993)

The operation conditions suggested by EPA, and the proposed rule itself, suggest that the water supply impact modeling has been performed assuming a barrier-in condition. Therefore, the water supply impact analysis completed thus far by DWR does not include an assessment for the cost of water supply associated with the San Joaquin River salmon smolt survival index criteria under other potential physical configurations, particularly the no-barrier condition.

Regardless of the validity of the objectives associated with the absolute index values incorporated in the criteria, additional water supply costs will occur if the proposed criteria are applied to a no-barrier configuration. This consequence has not been recognized by proposed rule or the RIA. To maintain the same water supply impacts between a barrier-in and no-barrier configuration would require a relaxation of the absolute smolt survival values.

As a closing comment on the salmon smolt survival index, the proposed criteria are explicitly tied to two flow quantities - flow in the San Joaquin River and exports from the Delta. Neither of these two hydrologic factors are directly relatable to water quality requirements of salmon smolt - the criteria are flow requirements.

Fish Spawning Criteria

EPA states that it disapproved earlier State Board salinity objectives for various reasons. Cited were the State Board's 1991 Bay/Delta Plan that established 1.5 mmhos/cm EC at Antioch and 0.44 mmhos/cm EC at Prisoners Point in April and May. EPA states that it disapproved these objectives, in part, because they were considered inadequate to protect spawning habitat in the upper reach of the San Joaquin River between Prisoners Point and Vernalis.

During the development of the 1991 Bay/Delta Plan, the State Board framed several alternative water quality standards that could have extended the protection of the spawning conditions upstream of Prisoners Point. EPA states that the State Board chose not to adopt such standards upstream of Prisoners Point "... apparently because of concern that improved spawning conditions would lead to greater losses of young to entrainment at the State and Federal pumping plants." (EPA1993, page 85) EPA also states that it disapproved the proposed State Board standards because they were not based on sound science. EPA's concern apparently was founded on the issue of the State Board attempting to provide protection to an upstream location through the

establishment of a salinity standard downstream (e.g., establish a 1.5 mmhos/cm EC standard at Antioch to protect conditions at Jersey Point).

The State Board addressed EPA's recommendation to maintain spawning conditions in the entire stream reach between Jersey Point and Vernalis. (SWRCB1993) In its draft Decision 1630, the State Board stated:

> "Maintaining the additional spawning reach between Prisoners Point and Vernalis would require a substantial amount of water in dry and critical years. Under the current regulatory scheme, this water would have to come from New Melones Reservoir, which already is heavily committed to supplying water from salinity protection and pulse flows in the southern Delta."

While EPA has proposed a rule that is now cognizant of "dry" and "critical" year conditions (i.e., the proposed rule does not require the spawning criteria for the upper reach of the San Joaquin River during dry and critical years), meeting the criteria during better years is not certain without the potential of significant water supply impacts. Whether proposing an "all years" rule or not for the reach, EPA has not adequately addressed the causes of salinity degradation in the southern Delta, and has instead set an objective which causes compliance through "dilution" measures rather than through source correction.

The State Board stated in draft Decision 1630:

> "Salinity between Vernalis and Prisoners Point is influenced primarily by discharges of salty agricultural return flows, not by intruding ocean salinity (footnote omitted). Thus, water supplied to dilute the salinity in this reach would primarily be used to dilute pollutants. If the State Water Board is to assure the maximum beneficial use of the State's water supplies, it should not require releases of water supply for the purpose of diluting pollutants except when those water quality standards cannot be achieved solely by controlling waste discharges. To protect spawning habitat during the spawning period, the appropriate way to regulate salinity caused by agricultural discharges in this reach is by regulating the discharges." (SWRCB1993, pp. 44-45)

When considering EPA's proposed rule for salmon smolt survival and Suisun Bay salinity, in combination with the State Board's Decision 1485, EPA's proposed rule for spawning conditions may incidentally be met much of the time.

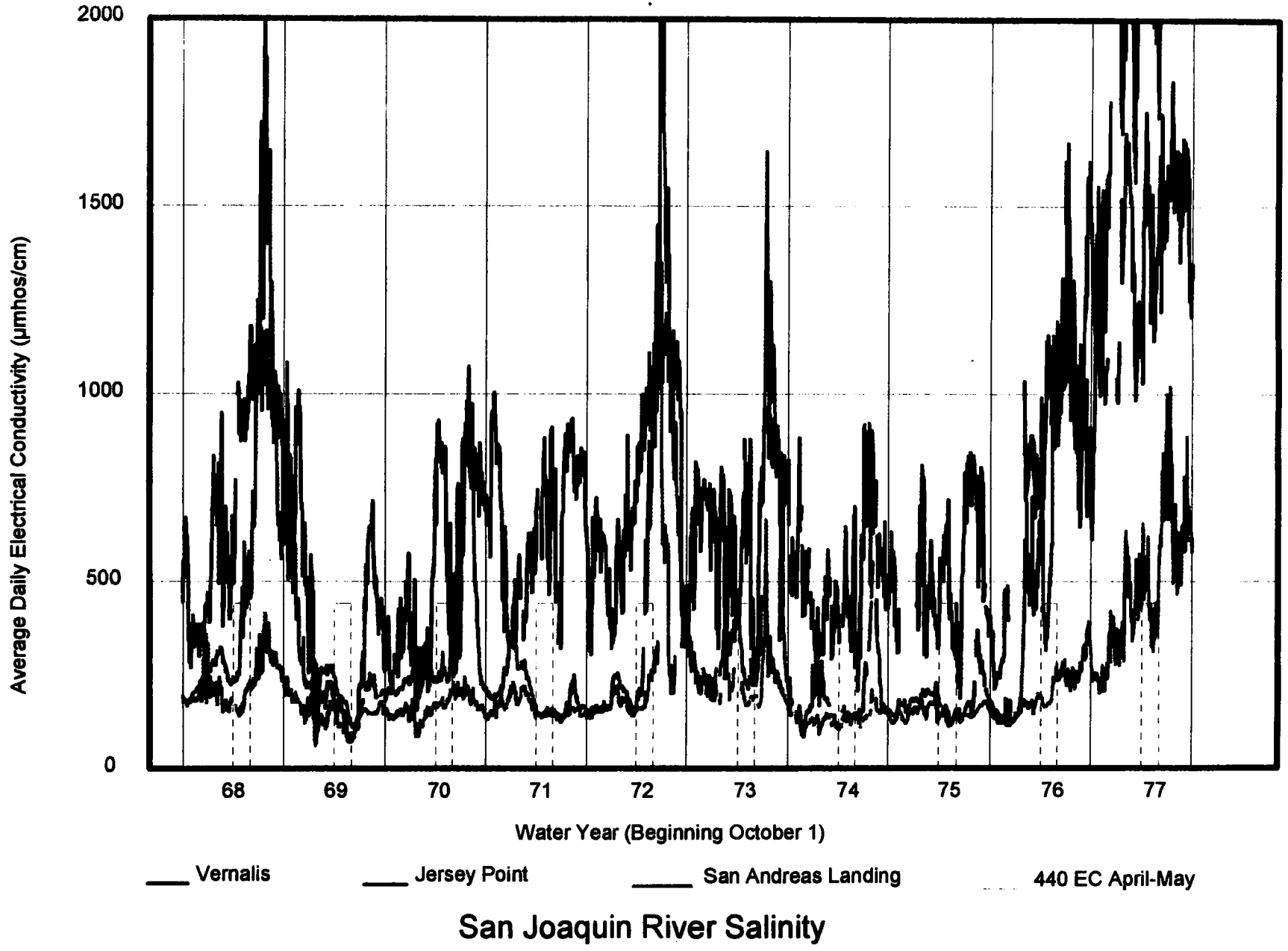
By eliminating the Prisoners Point to Vernalis criteria, the proposed EPA rule will effectively result in the striped bass spawning criteria proposed by draft Decision 1630. Exceptions to this comparison are that draft Decision 1630: (1) allowed a relaxation of the Prisoners Point salinity requirement to 0.55 mmhos/cm EC during periods when Antioch spawning criteria were relaxed; and, (2) Jersey Point to Prisoners Point criteria are not specifically stated for spawning, but instead occur incidentally to other criteria. These other criteria are assumed to be less stringent than the proposed EPA Suisun Bay salinity criteria.

In evaluating its proposal concerning maintenance of the EPA-recommended salinity level of 0.44 mmhos/cm EC between Vernalis and Jersey Point, the State Board found:

> "[t]he decision (draft Decision 1630) will protect striped bass spawning at the EPA-recommended salinity level of 0.44 mmhos/cm EC in the reach from Vernalis to Jersey Point during a substantial part of the spawning period in wet, above normal, and below normal water years. During some parts of the spawning period this salinity will not be met in the entire reach. In dry years Vernalis salinity will probably be on average slightly higher, at 0.46 during the pulse flow, and somewhat higher yet during the rest of the spawning period. The dry year regime likely will not significantly impair spawning success. In critically dry years, 0.44 mmhos/cm EC is not expected to be met between Prisoners Point and Vernalis. While the entire spawning reach will not be protected during the entire spawning period each year, this decision will substantially improve spawning habitat over the levels that could occur under D-1485. This decision will provide water quality in the reach between Vernalis and Jersey Point which is comparable to or better than the levels which existed in or before 1975, the base date for the antidegradation policy under the federal Clean Water Act." (SWRCB1993, page 105)

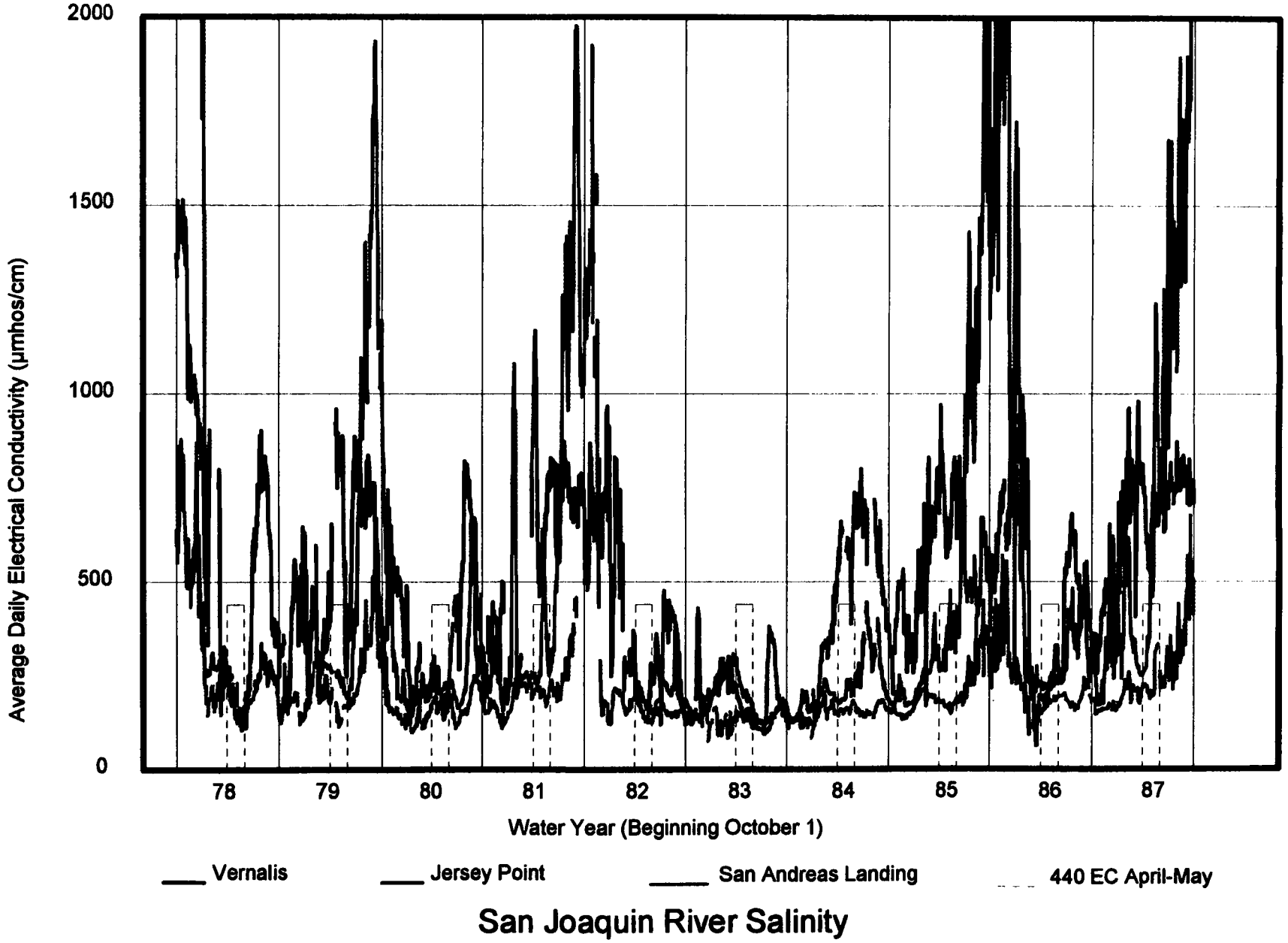
State Board staff has specifically commented on the proposed EPA criteria for striped bass spawning (SWRCB1993a). Interpretation of their analysis and findings leads to a conclusion that EPA's proposed criteria for the striped bass would be establishing a water quality condition in the San Joaquin River which greatly exceeds the condition that existed during the period 1964 to 1976, which is stated to be EPA's assumption for antidegradation regulation.

Figure 3 through Figure 5 illustrate historical average daily salinity levels within the San Joaquin River during the period water year 1968 through water year 1992. The data are provided for three locations: Vernalis, San Andreas Landing and Jersey Point. Also depicted in the figures is the proposed .44 mmhos/cm EC salinity requirement for the April through May period. Readily observed in the figures is the frequency of high salinity levels at Vernalis. The frequency of which the proposed EPA criteria would have been met incidentally by historical operations is summarized by Table 1. It is assumed that non-compliance occurs if the criteria is not met on any day during the April through May period.



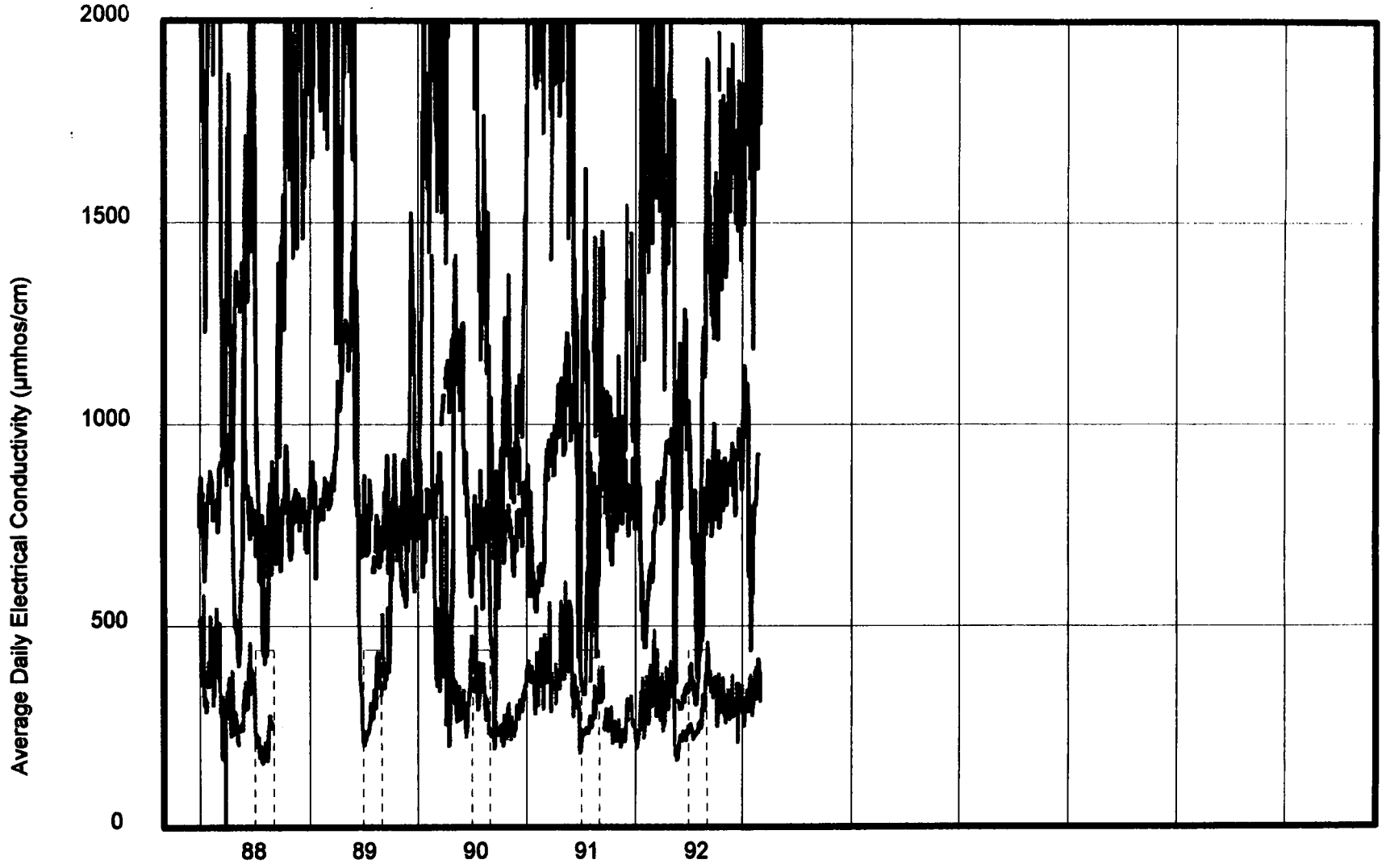
San Joaquin River Salinity

Figure 3



San Joaquin River Salinity

Figure 4



San Joaquin River Salinity

Figure 5

Table 1
Compliance to Proposed EPA Striped Bass Criteria at Selected Locations Incidentally to Historical Operations

Water Year	Year Type	Jersey Point	San Andreas Landing	Vernalis	Water Year	Year Type	Jersey Point	San Andreas Landing	Vernalis
1968	D	NO	YES	NR	1981	D	NO	YES	NR
1969	W	YES	YES	YES	1982	W	YES	YES	YES
1970	AN	YES	YES	NO	1983	W	YES	YES	YES
1971	BN	YES	YES	NO	1984	AN	YES	YES	NO
1972	D	NO	YES	NR	1985	D	NO	YES	NR
1973	AN	YES	YES	NO	1986	W	YES	YES	YES
1974	W	YES	YES	NO	1987	C	NO	YES	NR
1975	W	YES	YES	NO	1988	C	NO	YES	NR
1976	C	NO	YES	NR	1989	C	YES	YES	NR
1977	C	NO	NO	NR	1990	C	NO	YES	NR
1978	W	YES	YES	YES	1991	C	NO	YES	NR
1979	AN	YES	YES	NO	1992	C	NO	YES	NR
1980	W	YES	YES	YES	1993	W	YES	YES	NO

NR means the criteria are not required during this year type.

In correspondence between EPA and the Department of Water Resources (DWR1993) it has been recognized that no attempt has yet been made to quantify the operations required to fully comply with the proposed criteria during dry and critical years. Given this knowledge, EPA still has proposed the criteria therefore making the results of the RIA incomplete. Further, there has not yet been adequate review of the modeling results prepared by EPA and the Department of Water Resources to verify the compliance of the proposed criteria during below normal, above normal, and wet years for the reach between Prisoners Point and Vernalis.

The proposed criteria may at times be incidentally met during wet, above normal and below normal years due to the proposed salmon smolt survival criteria for a portion of the April - May period; however, the salmon smolt survival criteria may only incidentally meet the spawning criteria approximately one half of the period during which the spawning criteria apply. For dry and critical years, DWR has noted that a flow versus salinity relationship does not currently exist for Prisoners Point; therefore, the additional water cost associated with the spawning criteria have not yet been fully determined.

A review of recent 1993 operations of the San Joaquin River and its tributaries further illustrates the potential difficulty in meeting the proposed spawning criteria, even in a year classified as wet. Figure 6 and Figure 7 depict several flow and water quality conditions in the San Joaquin River basin during the spring of 1993. Figure 6 depicts the water quality in the San Joaquin River at

Vernalis, San Andreas Landing, Jersey Point and the Stanislaus River at Ripon. Also illustrated in Figure 6 is the proposed .44 mmhos/cm EC requirement during April and May for 1993 (classified as a wet year). Figure 7 depicts the flow operations for the San Joaquin River and its tributaries during the same period. These operations included water releases for water quality (Stanislaus River) and pulse flows (Stanislaus, Tuolumne and Merced rivers) for migration of salmon smolt. Supplemental releases during this period amounted to over 100,000 acre-feet.

Figure 6 illustrates that water quality at Vernalis during the primary period of the pulse flows improved to a level that would comply with EPA's wet year criteria at Vernalis. However, both prior and after the pulse flow period the proposed criteria at Vernalis were not met. The amount of additional supplemental water that would have been required to comply with the proposed criteria at Vernalis during 1993 was estimated to exceed 150,000 acre-feet. This type of additional water supply impact is not currently included in DWR's water supply impact analysis or the RIA.

The objective of increasing the population of striped bass could be contrary to the goal of providing recovery to endangered and threatened species. Two separate adverse consequences occur by enhancing the environment associated with striped bass: (1) improvement of the striped bass population will increase predation of endangered and threatened species and competition for food and environment; and (2) water supplies required to comply with the spawning criteria will be in direct competition with the supplies that are necessary to comply with other objectives for the other species.

CONCLUSIONS

The proposed criteria and method of compliance measurement for salmon smolt survival are based on mathematical relationships that appear to be invalid for a wide range of potential export and flow operations.

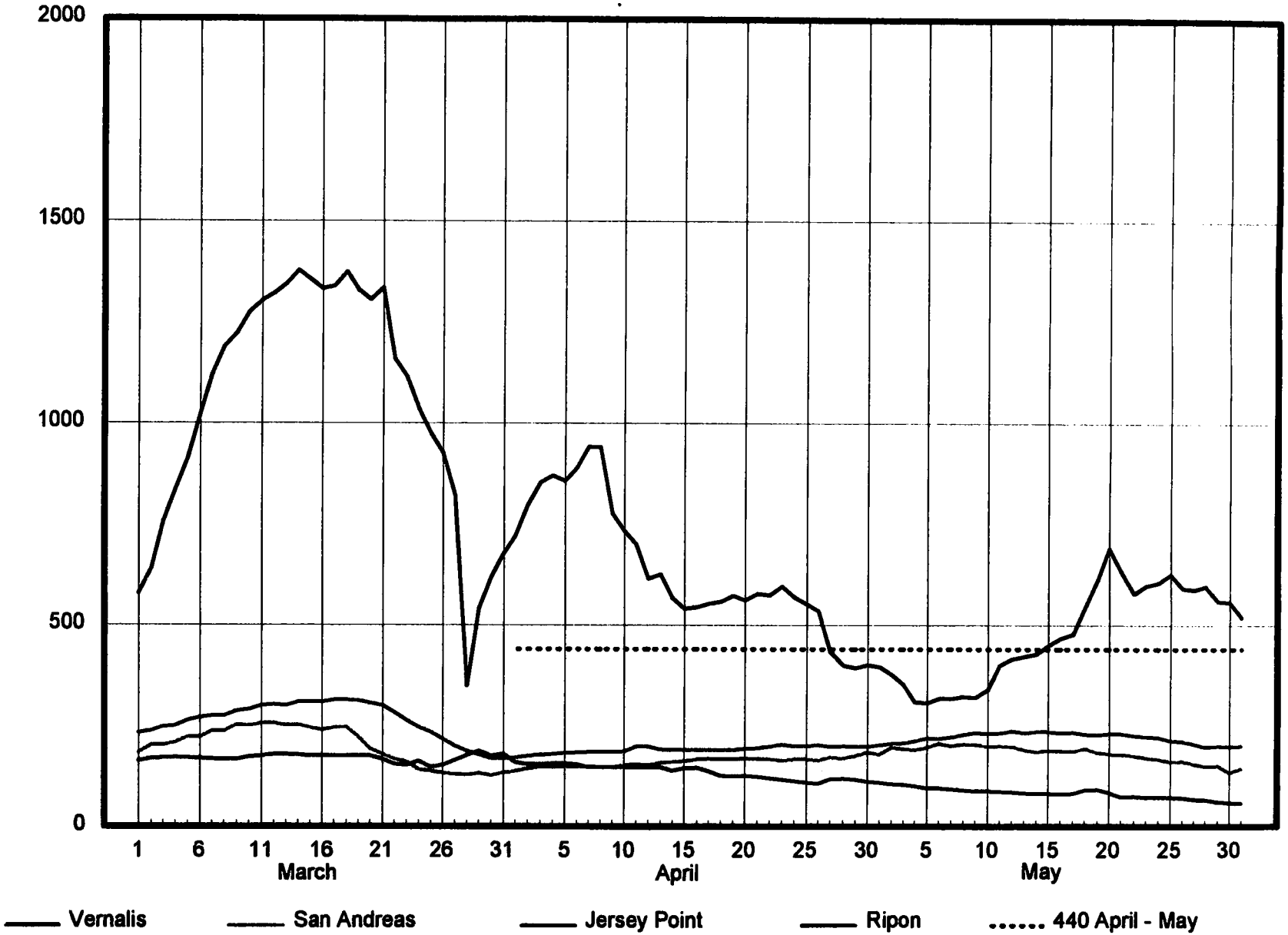
The proposed criteria does not provide sufficient guidance as to the calculation of the salmon smolt survival index; specifically, the quantification of flow at Stockton is not defined.

The proposed criteria does not include a compliance measurement tool for delta channel configurations other than a barrier-in condition for Old River.

Water supply impacts have not been determined assuming any delta channel configuration other than a barrier-in condition.

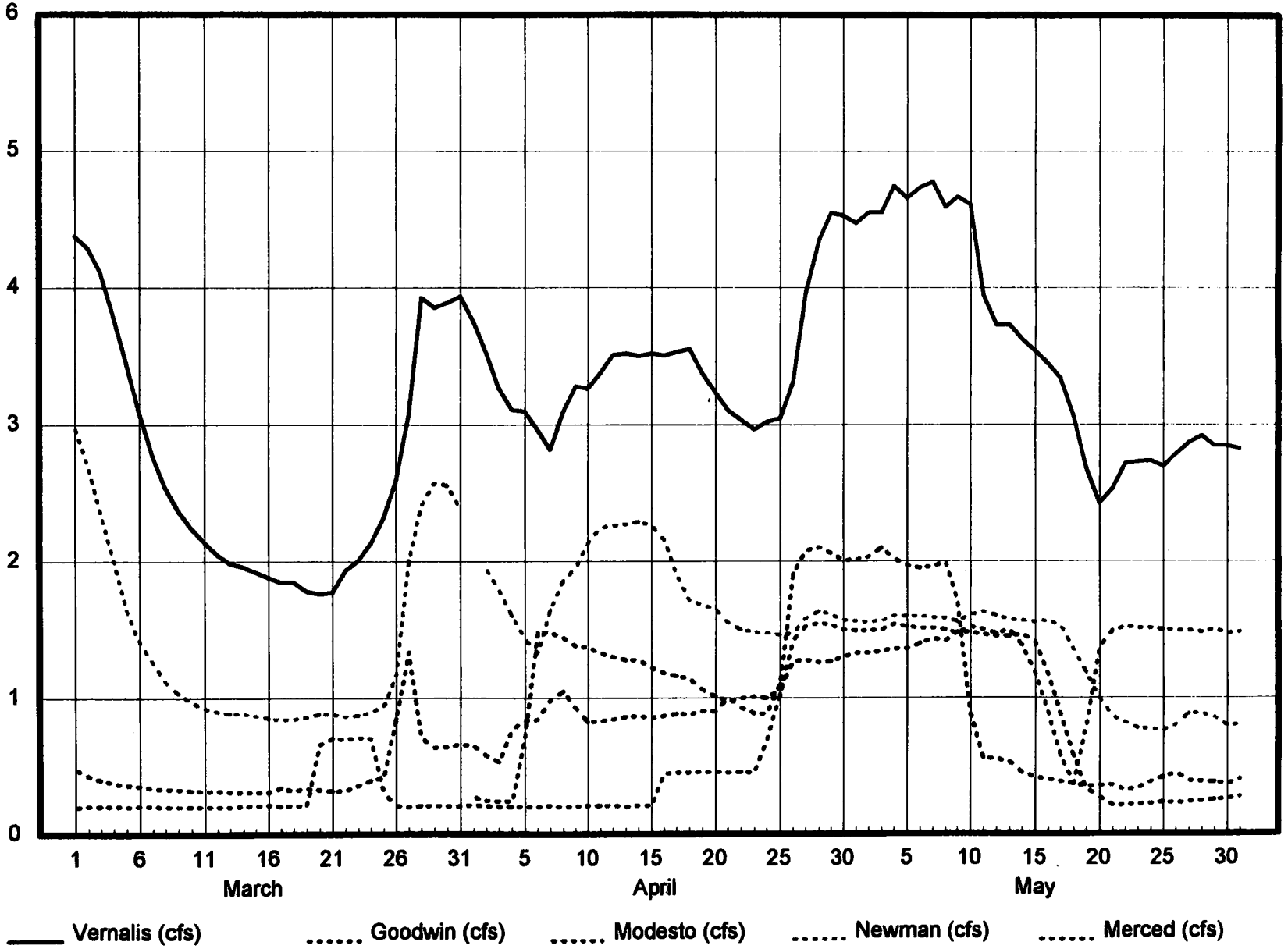
The salmon smolt survival index criteria is a flow requirement.

The striped bass spawning criteria will provide quality which exceeds the level of quality which occurred in the San Joaquin River during the 1964-1976 period.



San Joaquin River and Tributary Water Quality - 1993

Figure 6



San Joaquin River and Tributary Flows - 1993

Figure 7

Releases of water for the spawning criteria will actually be diluting agricultural drainage flows of the San Joaquin River.

Incidentally to the other criteria proposed by EPA, or criteria which already currently exists, the striped bass spawning criteria will be substantially met much of the time.

The full water supply impacts of the proposed spawning criteria have knowingly not been assessed and incorporated into the proposed rule or RIA.

Provision of flows for the spawning criteria could at times be in competition for flows which are necessary to protect endangered and threatened species.

Citations

Environmental Protection Agency. Proposed Rule on Bay/Delta Standards. December 15, 1993. (EPA1993)

United States Fish and Wildlife Service. Measures to Improve the Protection of Chinook Salmon in the Sacramento/San Joaquin River Delta. July 6, 1992. (WRINT-USFWS-7)

United States Fish and Wildlife Service. Abundance and Survival of Juvenile Chinook Salmon in the Sacramento-San Joaquin Estuary, 1991 Annual Progress Report. June, 1992. (WRINT-USFWS-9)

Department of Water Resources. Letter to George Barnes from EPA (Hatfield) regarding modeling assumptions. August 12, 1993. (DWR1993)

State Water Resources Control Board. Draft Water Right Decision 1630. April 1993. (SWRCB1993)

State Water Resources Control Board. Letter to Harry Seraydarian (EPA) from State Board staff (Pettit) regarding proposed EPA criteria. November 15, 1993. (SWRCB1993a)

MEMORANDUM

TO: Christiane Hayashi
Office of the City Attorney
City Hall, Room 206
San Francisco, CA 94102-4682

FROM: Peter B. Moyle

RE: EPA Striped Bass EC Standards.

DATE: 29 January 1994

I am writing in response to your request for my opinion regarding the striped bass standards proposed by EPA in the January 6, 1994, Federal Register. The criteria are founded on levels of salinity based on striped bass preference for spawning.

The criteria are based on the concept of two spawning populations of striped bass, one that spawns in the Sacramento River in May and June, and one that spawns in the San Joaquin River in April and May. The earlier spawning of the San Joaquin populations is the result of lower flows down the San Joaquin River and resulting higher temperatures. EC standards are recommended for San Joaquin striped bass spawning because of saline pollutants coming down the river, which is not a significant problem in the Sacramento River. Besides the general problem stated above, I take issue with a number of other problems with this standard:

1. Striped bass are an introduced species, so do not merit the same attention as native species, especially the depleted San Joaquin fall-run chinook salmon. There is little reason to think that in the 120 years that bass have been in California that two genetically distinct populations have evolved. Therefore, there is little reason to give special protection to the San Joaquin population.

2. Improving conditions for striped bass in April and May will increase the probability that large striped bass will be present in the San Joaquin when juvenile salmon are moving downstream, significantly increasing predation pressure on depleted salmon.

3. Improving conditions for spawning of striped bass may enhance striped bass numbers faster than salmon numbers. Striped bass can become salmon predators in less than 2 years.

4. Although the EPA indicates that its standards are designed for ecosystem enhancement, this particular standard will uniquely benefit striped bass, perhaps at the expense of other species. It can be argued that the standard will reduce the effects of pollution but as a pollution control measure it is a band-aid, not a solution.

5. If additional flows are needed from the San Joaquin, they should go to protect salmon or other native fishes, not striped bass. The quantity of water available for ecosystem enhancement is not unlimited.

6. I would prefer that criteria to protect striped bass not be adopted until there has been significant recovery of the San Joaquin salmon populations. I am not worried about striped bass; they will recover to fishable populations as the estuary becomes a less degraded ecosystem through the implementation of other protective measures. The question for striped bass recovery is mainly <u>when</u> the population will recover, not <u>if</u>.

Call me if you have any questions.

Peter B. Moyle