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and CALIFORNIA SPORTFISHING
PROTECTION ALLIANCE

**UNITED STATES DISTRICT COURT**

**EASTERN DISTRICT OF CALIFORNIA**

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|---|---|
| AQUALLIANCE, a non-profit corporation, and CALIFORNIA SPORTFISHING PROTECTION ALLIANCE, a non-profit corporation,<br><br>Plaintiffs,<br>v.<br><br>UNITED STATES BUREAU OF RECLAMATION, a federal agency, RICHARD J. WOODLEY, in his official capacity, LOWELL PIMLEY, in his official capacity, and DAVID MURILLO, in his official capacity,<br><br>Defendants. | Case No.:<br><br>DECLARATION OF TOM CANNON IN SUPPORT OF MOTION FOR PRELIMINARY INJUNCTION<br><br>(National Environmental Policy Act, 42 U.S.C. § 4321 *et seq.*; Administrative Procedure Act, 5 U.S.C. §§ 701 *et seq.*) |

I, Tom Cannon, declare:

1. I am a specialist in assessing environmental effects on fish and their aquatic habitats. I have over 40 years of experience in this field along with degrees in fisheries, biology, and biostatistics. A true and correct record of my qualifications is attached hereto as Exhibit 1.

2. I have been retained by the Law Offices of Thomas N. Lippe to provide consulting and expert witness testimony regarding the potential effects on Delta smelt of the 2014 San Luis & Delta-Mendota Water Authority Water Transfers for which the Bureau of Reclamation has approved a Finding of No Significant Impact under the National Environmental Policy Act ("NEPA").

3. My professional career has focused on estuarine fisheries ecology with experience in East Coast and West Coast estuaries including 25 years since 1977 relating to the Sacramento-San Joaquin Delta Estuary. From 1977-1980 I was project director of Bay-Delta ecological studies for PG&E's Bay-Delta power plants effects studies. From 1980-82, I was a consultant to the State Water Contractors, the National Marine Fisheries Service, and State Water Resources Control Board ("State Board") determining the effectiveness of the 1978 Bay-Delta Water Quality Standards in protecting the Bay-Delta ecosystem and striped bass population. From 1986-1987, I was a consultant to the State Water Contractors and Bureau of Reclamation during the State Board hearings on water quality standards. From 1994-1995, I was a consultant to the State Water Contractors and the California Urban Water Agencies, working on the 1995 Bay-Delta Water Quality Standards and how the new standards would affect the Bay-Delta ecosystem and its fish populations. From 1995-2003 I was a consultant to the CALFED Bay-Delta Program where I worked on various teams assessing the effects of alternative Delta operations and water supply infrastructure. From 2002-2010, I was involved in activities related to the Striped Bass Stamp Program, Salmon Hatchery Program, and Delta fish surveys funded by the US Fish and Wildlife Service to assess the effects on Delta fish and habitats. In the past decade I have worked closely with the Fishery Foundation of California, the California Striped Bass Association, and the

California Sportfishing Protection Alliance ("CSPA") on Delta science related issues including water quality standards and the Bay Delta Conservation Plan ("BDCP"). Most recently I have reviewed the effects of the various drought-related orders of the State Water Board and the potential effects of the State's 2014 Drought Plan on the Bay-Delta Estuary's fish populations and habitats. I obtained a Master's Degree in Biology from Northern Michigan University in 1971 and a Masters of Public Health degree in Biostatistics from the University of Michigan in1972.

4. In 2013 I prepared an analysis of the effects of OCAP operations on Delta smelt for the CSPA. A true and correct copy of that analysis is attached hereto as Exhibit 2.

5. In May, 2014, I prepared, for Thomas Lippe, an attorney representing CSPA and AquAlliance, an analysis of the effects of OCAP operations with the addition of the Bureau of Reclamations' 2014 San Luis & Delta-Mendota Water Authority Water Transfers (2014 Transfers) in combination with the State Water Resources Control Board's May 2, 2014 relaxation of standards that govern Delta flow and water quality pursuant to Order D-1641. A true and correct copy of that analysis is attached hereto as Exhibit 3.

6. On June 9, 2014, I prepared, for Thomas Lippe, an analysis of the degree to which Delta outflow as measured and regulated by the state and federal agencies that govern Delta OCAP operations, grossly overestimates actual Delta outflow, with severe consequences for Delta smelt. A true and correct copy of that analysis is attached hereto as Exhibit 4.

7. The analyses contained in Exhibits 2, 3, and 4 represent my best professional judgment regarding the matters described therein, and the opinions expressed in these reports represent my current professional opinions.

8. Delta smelt occupy the area of the Delta known as the "low-salinity zone" ("LSZ"). The LSZ is located where fresh water flowing toward San Francisco Bay mixes with salt or brackish water. The LSZ is generally centered around the areas where salinity values equal 2 parts per thousand, a value

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known as X2. In the summer months in normal or wet water years, normal Delta outflows keep the LSZ, and the Delta smelt population that lives in the LSZ, in the Western Delta, where water temperatures are suitable for Delta smelt and where they are far from the water export pumps located in the South Delta.

9. In my 2013 analysis (Exhibit 2), I conclude that (1) low Delta outflows caused the LSZ (and its population of Delta smelt) to move upstream into the Central and Southern Delta, where water temperatures are significantly higher than the Western Delta; (2) releases of warm water from reservoirs upstream of the Delta (primarily Lake Shasta) in late June caused water temperatures in July in the LSZ to reach temperatures lethal to smelt; and (3) as a result, Delta smelt suffered significant mortality.

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10. In my May 2014 analysis (Exhibit 3), I conclude that the 2014 Transfers, in combination with the SWRCB's May 2, 2014 relaxation of standards that govern Delta flow and water quality will exacerbate a similar increase in Delta smelt mortality because, once again: (1) low Delta outflows will cause the LSZ (and its population of Delta smelt) to move upstream into the Central and Southern Delta, where water temperatures are significantly higher than the Western Delta, and where they are more vulnerable to entrainment in the export pumps; (2) releases of warm water for the Transfers from reservoirs upstream of the Delta (primarily Lake Shasta) in the transfer period (July through September) will cause water temperatures in the transfer period in the LSZ to reach temperatures lethal to smelt; (3) will cause or increase reverse OMR flows making it more likely that any surviving smelt will be entrained in the export pumps; and (4) as a result, Delta smelt will suffer significant mortality.

11. In my June 9, 2014, letter (Exhibit 4), I conclude that Delta outflows this summer will be much lower than expected or considered in the Bureau's environmental assessment for the 2014 Transfers because the standard governing Delta outflows (i.e., minimum 3,000 cfs Net Delta Outflow Index ("NDOI") for the transfer period) grossly overestimates actual Delta net outflow. As a result,

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actual outflows will be close to zero or even negative. This has severe consequences for Delta smelt, because such low outflows exacerbate the conditions that make the standard of 3,000 cfs harmful. 42

12. The Bureau of Reclamation responded to my May 2014 analysis by letter dated May 30, 2014, which included comments provided from Ms. Frances Brewster, a hydrologist, and Dr. Erwin Van Nieuwenhuyse, a biologist. (A true and correct copy of this letter is attached hereto as Exhibit 5.)

13. These reviewers fail to address my main points: that transfers under relaxed standards increase the already high risk from low outflow and exports in summer of critical years when "all" smelt are in the Delta. The main risk is degrading critical habitat by increasing already high water temperatures. My analysis shows that already-critical water temperature will increase in critical habitat habitats of smelt with transfers. All locations in the LSZ will increase in water temperature to near or above critical levels. Thus, while the temperature increases may be small in relative terms, they are critical because temperatures will be near or at lethal levels even without the transfers and relaxation of standards. 43

14. The analysis of impacts of Delta water management operations on Delta smelt involves a number of causes of impacts that must be assessed in combination with each other, not in isolation, including reduced outflow and higher flow through the Delta from transfers. There are also a number of impacts on smelt habitat from these causes, all of which interact with each other. These include higher water temperature, reverse OMR flows, more upstream location of the LSZ, and reduced food availability. My analysis includes all of these variables. 44

15. Ms. Brewster, in contrast, selects four values that are not germane to my analysis, and discusses each one in isolation, rather than in combination. Therefore, her conclusions are non-responsive.

16. **Temperature.** Ms. Brewster presents data showing that average temperature in the entire three-month transfer period is .5 degrees F higher in the Sacramento River at Rio Vista than at 45

Emmaton. This is the wrong metric for purposes of analyzing the Transfers' impact on Delta smelt. The issue is not whether the transfers under relaxed outflow standards will cause a large average difference, over a 3 month time period, between temperatures at Emmaton and Rio Vista. The issue is whether the transfers under relaxed outflow standards will cause a large enough difference in temperature to kill smelt at any time as compared to either not doing the transfers or doing them under normal outflow standards.[1] 45

17. The U.S. Fish and Wildlife Service determination that Delta smelt warrant designation as "endangered" states: "Delta smelt tolerate temperatures ranging from 7.5 C to 25.4 C (45 to 78 F) in the laboratory (Swanson et al. 2000, p. 386, Table 1) ...." (Federal Register, Vol 75, No. 66., p. 17668.) Bennet's peer reviewed study states: "Water temperatures over about 25°C [77°F] are also lethal, and can constrain delta smelt habitat especially during summer and early fall (Swanson and others 2000). Overall, the majority of juveniles and adults in the TNS and MWT have been caught at water temperatures less than 22°C [71.6°F] (Figure 5)." ("Critical assessment of the delta smelt population in the San Francisco Estuary, California" (2005), William A. Bennet, John Muir Institute of the Environment, Bodega Marine Laboratory, University of California, Davis.) Among biologists, seventy-seven (77) degrees F is a commonly accepted lethal temperature for smelt. In my opinion, prolonged exposure to temperatures above seventy-five (75) degrees F is stressful to smelt. 46

18. In my 2013 analysis, I reported that temperatures in late June and July of 2013 reached lethal levels around July 5 in some locations and near-lethal temperatures for a prolonged period of time in many locations. The following table summarizes the data I presented in my 2013 report. 47

[1] As the U.S. Fish and Wildlife Service has explained, ""Since 1978, delta smelt have become increasingly rare in summer and fall surveys of the San Joaquin region of the San Francisco Bay–Delta (Nobriga et al. 2008, p. 9). The primary reason appears to be the comparatively high water clarity in the region, although high water temperatures are also likely a contributing factor (Nobriga et al. 2008, pp. 8, 9)." (Federal Register, Vol 75, No. 66., p. 17669.)

| Location | Temperature above 75°F | Temperature above 77°F |
|---|---|---|
| Emmaton | June 30- July 11 | peaked at 76.9 on July 4 |
| San Joaquin River at Antioch | July 1- 7 | peaked at 76.69 on July 2 |
| San Joaquin River at Jersey Point | June 30- July 11 | peaked at 76.75 on July 5 |
| Three Mile Slough at Joaquin River | July 1- 11 | July 5 |
| False River | June 30- July 7 | July 3-5 |
| Bacon Island at Old River | June 27- July 17 | June 29-July 14 |
| Clifton Court Forebay | June 27- July 31 | June 29-July 15 |
| Middle River at Middle River | June 27- July 31 | June 29-July 17, July 24-27 |
| Staten Island | June 27- July 15 | July 1- July 10 |

This data shows that a half-degree increase in temperature is potentially very significant because temperatures are likely to be in the near-lethal to lethal ranges in the LSZ even without transfers and/or relaxed standards. This data also shows that using the small (but potentially significant) difference in the three month average temperature at Emmaton and Rio Vista as a metric for the Transfers' harm to smelt is not useful for predicting impacts on smelt. 47

19. **Entrainment.** Ms. Brewster argues that the 2008 Smelt BO does not have OMR reverse flow limits in the transfer period and that reverse OMR flows can be as high as -8000 cfs in a "typical year." These facts are irrelevant to what is happening in the summer months of dry and critically dry years (*i.e.*, 2013 and 2014) because, in a typical year, the LSZ is in the Western Delta, where water temperatures are suitable for Delta smelt and where they are far from the water export pumps located in the South Delta. One of my key points is that the 2008 Smelt BO fails to address what is happening in 48

the summer months of dry and critically dry years, especially under relaxed D-1641 outflow conditions. Indeed, the USFWS has conceded this point.[2] 48

20. **Smelt Food.** Ms. Brewster does not disagree with my opinion that "transfer flows will displace plankton rich, higher turbidity water with plankton poor, low turbidity water." Instead, she asks how this phenomenon differs from normal Delta operations. The USFWS has found that "normal" Delta operations are a significant reason Delta smelt are a "threatened" species and that the "endangered" designation is warranted.[3] Ms. Brewster looks at this variable in isolation, rather than in combination with other effects of the transfers under relaxed D-1641 standards. Specifically, doing the transfers under relaxed outflow standards will cause the LSZ where smelt live to be closer to the pumps than they would be in a "normal" year. 49

21. **LSZ Area**. Ms. Brewster argues that the area of LSZ is "essentially the same" whether X2 is at Emmaton or Three-mile Slough. This is a red herring, because my opinions are primarily based on the changed *location* of the LSZ, not its smaller areal extent. 50

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[2] "Although *the proposed departure from D-1641 was not anticipated in the Project Description of the BiOp, or the modeling in the biological assessment*, the proposed relaxations, based on the provisions provided in the TUC Order, as amended, and existing hydrologic and biological conditions for the months of April and May appear to be within the range of effects previously analyzed in the 2008 BiOp. The Service, therefore, concurs with Reclamation's determination that the proposed modifications for April and May will have no additional adverse effects on delta smelt or its critical habitat. ¶ The Service cannot, however, concur at this time with Reclamation's determination that the proposed Plan will have no additional adverse effects on delta smelt or its critical habitat for the remainder of the project time period, June 1 through November 15, 2014." (USFWS, April 8, 2014, p. 8, attached hereto as Exhibit 2 (emphasis added)].)

[3] "Based on a review of the best scientific and commercial information available, we find that destruction, modification, or curtailment of habitat poses a current and future threat to delta smelt. Operation of upstream reservoirs, increased water exports, and upstream water diversions have altered the location and extent of the low salinity zone, concentrating smelt in an area with competing fish species. Upstream reservoirs and the increased presence of Egeria densa have also reduced turbidity levels in rearing habitat, which may reduce foraging efficiency." (Federal Register, Vol 75, No. 66., p. 17669.)

22. Nevertheless, since Ms. Brewster has focused attention on this value, it is worth noting that using her "Figure B-1," it appears that when X2 moves from Emmaton (at about mile point 90 on the x-axis) to Three-mile Slough (at about mile point 93 on the x-axis), the LSZ loses about 10% of its area (i.e., about 500 of 4,500 hectares). Ms. Brewster suggests no reason, and certainly no biological reason, that 4,000 hectares is "essentially the same" as 4,500 hectares for purposes of assessing impacts on smelt. 50

23. Dr. Nieuwenhuyse apparently agrees with me that in the coming summer months the LSZ is going to be uninhabitable by smelt due to high temperatures and lack of food. Dr. Nieuwenhuyse suggests that this new state of affairs will not cause harm to smelt because they can find temperature and food refuge in the Sacramento Deepwater ship channel upstream of Rio Vista. I am aware of no scientific basis for this assertion. The U.S. Fish and Wildlife Service's 2008 Smelt Biological Opinion does not suggest that the Sacramento Deepwater ship channel upstream of Rio Vista provides a viable temperature and food refuge for Delta smelt when their only recognized habitat – the LSZ in the Delta – has been rendered unsuitable for their survival by the Bureau's water management decisions. 51

24. In my opinion, the effect of Delta operations this summer of confining smelt to the Sacramento Deepwater ship channel upstream of Rio Vista due to adverse environmental conditions in the LSZ that will be exacerbated by the Transfers, both with and without relaxed outflow standards, with no evidence that they can emerge from the ship channel in the fall to produce another generation of smelt, is significant new information showing that the Transfers will have significant adverse impacts on Delta smelt. 52

I declare under penalty of perjury that the forgoing is true and correct of my personal knowledge. Executed this 10th day of June, 2014, in Fair Oaks, California,

Tom Cannon

# EXHIBIT 1

# Resume of Thomas C. Cannon

Aquatic Ecologist
5161 Oak Shade Way
Fair Oaks, CA 95628
916-988-1291 home
916-952-6576 cell
tccannon@comcast.net

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**EDUCATION:**

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University of Michigan
Fall 1965 – Summer 1969
School of Natural Resources
Major:  Fisheries and Aquatic Ecology
B.S. in Fisheries

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Northern Michigan University
Fall 1969 – Spring 1971
Biology Department
Majors: Biology and statistics.
M.A. in Biology

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University of Michigan
Fall 1971 – Spring 1972
School of Public Health
Majors: Biostatistics and Environmental/Public Health
Masters of Public Health in Biostatistics

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**AFFILIATIONS:**

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American Fisheries Society (AFS)
CAL-NEVA Division of AFS
Fishery Foundation of California
California Sportfishing Protection Alliance

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**<u>Relevant Experience:</u>**

- **Hudson River Power Plant NPDES Permit Projects – Hudson River Utilities New York (1972-1977)**

Early in my career I participated in some of the earliest projects developed under NEPA. Most notably I participated in studies related to the continuing operations of Hudson River power plants as related to environmental impacts to Hudson River biota with emphasis on fish and water quality. I managed projects and staff, and designed and

carried out studies, analyzed data, assessed impacts, and prepared reports and NPDES permits for all major power plant complexes on the Hudson River. I participated in the related NEPA process for licensing of the Indian Point Nuclear Power Plant for the Atomic Energy Commission and Federal Power Commission.

- **Great Lakes Power Plants NPDES Permits – Detroit Edison (1976-1977)**

I managed a project preparing NPDES permit applications for all of Detroit Edison's electric generating stations on the Great Lakes.

- **PG&E Delta Power Plant NPDES Permit Project – PG&E (1977-1980)**

I managed a project preparing NPDES permit applications for all of PG&E's steam-electric generating stations in California. The project included extensive surveys of the Bay-Delta and power plant impacts on the environment. Studies were coordinated closely with the DFG and federal agencies. Studies were coordinated with the NMFS (Tiburon Office), USFWS, and the Regional Water Quality Control Boards. One of my primary responsibilities was coordination with resource and regulatory agencies.

- **Striped Bass Project – SWRCB (1981-1982)**

I was a member of the State Board's Striped Bass Project team in the early 1980's investigating the failure of the water quality control plans in halting the precipitous decline in the striped bass and other fishes of the Bay-Delta. Our chief objective was to determine whether Delta and other diversions were directly causing loss of fish through entrainment or whether there was a fundamental shift in ecosystem productivity and habitat quality that was the cause of the declines in fish populations. We identified in our report to the State Board that regardless of the cause, the D-1485 Delta standards were inadequate to protect the Bay-Delta ecosystem and important fish populations including salmon and striped bass.

- **Importance of Bay-Delta as Nursery Area for Chinook Salmon – NMFS (1981-1982)**

As a consultant to the NMFS, I conducted a review of the importance of the Bay-Delta as a nursery area for Chinook salmon and other anadromous fishes including striped bass.

- **South Fork of the American River (SOFAR) Project (1981-1982)**

As a consultant to the project developer, my engineering firm was involved in the design of the SOFAR projects. My role included preliminary permitting and agency interaction.

- **Forest Management and Timber Harvest Plan – Hoopa Indian Reservation for BIA (1982)**

As a consultant to the BIA, I participated in the development of a Forestry Management Plan for the Hoopa Indian Reservation in northern California. I evaluated potential effects of all forest management activities on salmon and steelhead and their habitat in the Klamath and Trinity Rivers, and in tributaries to those rivers on tribal lands affected by forest management activities. I spent two weeks on the reservation with reservation and BIA staff observing potentially effected habitats and planned timber management activities. During that time I became acutely aware of the growing conflict between BIA

managers and the tribes over control over reservation resources. I developed portions of the plan outlining protections to salmon and their habitat from forest management activities.

- **Alaska Oilfields Environmental Studies – ARCO/USACE (1982-1986)**

As project manager of NEPA mandated environmental programs for oil companies and the Alaska District USACE, I coordinated environmental studies that addressed environmental impacts of oil field operation on the tundra and coastal river, estuarine, and marine ecosystems. Major focus was on effects to anadromous fish and their habitat from environmental impacts allowed under USACE permits. I worked closely under the direction of an interagency oversight team to evaluate impacts, conduct monitoring programs, and to define mitigation measures for North Slope oil operations. I also coordinated with North Slope native organizations from Point Barrow to the McKenzie River in Canada. I prepared for and presided over dozens of interagency and stakeholder meetings and technical workshops, and prepared reports and scientific papers.

- **Effects of Delta Pumping Plants on Bay-Delta Ecosystem – State Water Contractors and MWD – (1981-1987)**

As a consultant to the State Water Contractors and the Metropolitan Water District, I evaluated potential effects water projects in the Central Valley. My assignments included evaluating effects of CVP operations on the American River including review of early Instream Flow Incremental Methodology studies. I participated in many interagency reviews and worked closely with DWR and DFG staff working on a Draft Two-Agency Agreement for the State Water Project. I also worked with the USBR on testimony for the 1986 Water Quality Control Plan hearings with the State Water Resources Control Board.

- **Columbia River Data Development Project – BPA (1981-1984)**

As a consultant to the Bonneville Power Authority, I participated in a comprehensive study of the Columbia River estuary. My role was as an estuarine ecologist with emphasis on fish populations and the food chain. Working with agency and university biologist, our team developed baseline information on the Columbia River Estuary and its role in salmon ecology.

- **Susitna Hydroelectric Project – Alaska Power Authority (1984-1985)**

As a consultant to the Alaska Power Authority, I participated in the process of obtaining a FERC license for a hydroelectric dam on the Susitna River in south-central Alaska. Large scale changes in river flow, sediment and water temperature regimes, and geomorphology of the river from the proposed dam indicated to all involved that major impacts to the many salmon populations of the river could be expected if the dam were built. Eventually a lack of need for power killed the project. The project allowed me for to work with engineers, hydrologists, geomorphologists, groundwater, sediment, and water quality specialists to evaluate proposed effects of development on an ecosystem scale.

- **FERC Snake River Projects (1986-1989)**

As a consultant to Federal Energy Regulatory Commission (FERC), I participated in the NEPA process and preparation of federal EIS's relating to the licensing and relicensing of hydroelectric projects on the Snake River in Idaho. My role was to develop sections on aquatic species and habitats, and to coordinate Section 7 consultations with federal and state agencies review teams. Protected species at the time included bald eagles and several aquatic snail species. Rare and isolated populations of cutthroat trout were also addressed. I was responsible for addressing state and local land use laws and plans. Instream flow requirements for the Snake River were fundamental issues. This was one of several major FERC projects in which I was involved where state water law and the ESA were in direct conflict.

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- **USFS/FERC Skagit-Nooksack Project (1988-1989)**

Working as a consultant to the US Forest Service, I participated in the NEPA process for multiple hydropower licensing and relicensing projects for the Forest Service and FERC. Actions evaluated included changes to flow and stream habitats. Effects considered included those on sockeye salmon and bull trout, as well as Coho and Chinook salmon and steelhead populations of the Skagit and Nooksack rivers.

- **FERC Elwha Project (1988-1990)**

I participated in the NEPA process relating to the relicensing or termination of FERC licenses for two dams on the Elwha River in Washington. I evaluated the potential impacts and benefits to salmon, steelhead, and bull trout populations from various alternatives including dam removal.

- **BPA Cowlitz Falls Project (1988-1990)**

I participated in the environmental documentation for the Cowlitz Falls Project of the City of Tacoma Washington for BPA. Actions included reintroduction of anadromous salmon and steelhead to the Cowlitz River and its tributaries above existing large hydroelectric project dams and reservoirs. Concepts and alternatives developed and evaluated including trucking adult salmon and trout above reservoirs and capturing young salmon and steelhead on their downstream migration before they reached the reservoirs, and transporting them below the lower dam on the Cowlitz River. The project is one of the most successful attempts at reintroducing anadromous fish to headwaters of dammed river.

- **FERC Salt Caves Project (1989-1991)**

As a consultant to FERC, I participated in the FERC licensing project for the Salt Caves Project on the Klamath River on the border of California and Oregon. I evaluated environmental effects of alternative hydropower generation facilities on resident trout, endangered suckers, and other aquatic life of the Klamath River. The evaluation included potential effects to anadromous salmon and steelhead of the project in the event that passage was restored past downstream dams (Irongate and Copco 1 and 2). I participated in Section 7 consultations relating to bald eagle and endangered suckers. I reviewed recovery plans and actions relating to the project that could impact or benefit these

species. The primary laws and regulations governing potential project operations were those of the state of Oregon. The project was eventually not licensed by FERC because it failed to meet state water quality standards. I helped coordinate and conduct public meetings in Klamath Falls.

- **FERC Platte River Project (1990-1992)**

As a consultant to FERC, I participated in FERC licensing and related NEPA process for the Platte River Project in Nebraska. I evaluated potential effects to resident fishes, as well as special status species including paddlefish, sturgeon, whooping cranes, Arctic terns, and piping plovers - fish and birds that would be potentially affected by flow and habitat changes relating to the relicensing of the hydropower project. The Platte River Project supplied much of the agricultural water supply of central Nebraska. FERC jurisdiction and endangered species protection mandates brought project water supply objectives into direct conflict with ESA. On this and other FERC projects my team served as an extension of the FERC staff and often operated as "FERC staff" in coordinating with federal, state, and local entities, in conducting public meetings, and in preparing documentation. I presided over public meetings and technical coordinating meetings with federal, state, and local agencies, as well as stakeholders including environmental groups. Working with engineering staff I helped develop water supply and hydrology models of the Platte River. Key technical issues including land use, stream flows, and water supply were discussed and agreements worked out.

- **USACE Missouri River Master Manual Review (1991-1994)**

As a consultant to the Missouri River Division of the USACE, I spent several years developing and evaluating alternatives and preparing an EIS on alternative Master Manual Operation regimes for the Missouri River dam-reservoir system from eastern Montana to the mouth of the Missouri River. My role focused on developing alternatives and assessing effects on environmental and cultural resources including special status species such as sturgeon and paddlefish. Effects considered were to reservoir water levels, stream flows, and related effects on water quality. The project included coordination with the many tribes along the Missouri River. Many of the tribes had keen interests in recreation, water supply, cultural, and water quality issues. I prepared for and presided over public meetings and technical workshops.

- **USACE/BPA Columbia/Snake Operations Review (1992-1994)**

I participated in the Columbia/Snake Operations Review for the USACE Walla Walla District, BPA, and USBR. I worked on elements of the EIS and potential effects to project alternatives to salmon and steelhead populations of the Columbia and Snake River systems.

- **BPA/Clearwater Indian Nation Clearwater River Study (1993-1994)**

I participated in IFIM and hydrology studies on the Clearwater River to evaluate changes in flow on salmon and steelhead and their habitat on the Clearwater River in southwestern Idaho. We worked through the tribes who received grants from BPA.

- **Bay/Delta Ecosystem Effects Studies – MWD (1994-1995); CUWA (1996)**

As a consultant to the Metropolitan Water District of Southern California and the California Urban Water Agencies, I was part of a team planning development of a multispecies habitat conservation plan for the State Water Project. I was also assigned to evaluate and help improve the IEP Monitoring Program in the Bay-Delta working closely with DFG, DWR, and USBR staff. I participated in many interagency review meetings and technical workshops on the operations of the state and federal water projects.

- **PG&E Delta Power Plants HCP and EA (1997-1999)**

As a third-party consultant funded by PG&E and representing the USFWS and NMFS, I participated in the preparation of an HCP and EA for a Section 10 application to take winter-run Chinook salmon and delta smelt at two Delta power plant complexes. I evaluated the long-term effects of the facilities and future operations on Delta and anadromous fish populations. I helped prepare the HCP and EA submitted by PG&E. I met with state and federal ESA agency staff on numerous occasions to discuss conservation measures and the effects of the facilities. I also evaluated potential conflicts between the NPDES and Section 10 permits for the facilities, as well as potential for greater diversions and higher temperature thermal plumes from the plants under the new ownership and ISO/IPO system being implemented by the California Energy Commission.

- **Delta Wetlands Project – BA and ER (1996-1998)**

As a third-party consultant funded by Delta Wetlands and representing the State Board and USACE, I participated in the development of alternatives and their environmental impact evaluations for the Delta Wetlands Project in the Sacramento-San Joaquin River Delta. I participated in the evaluation of potential effects of new water diversions on Delta outflow and evaluated implications to salmon, steelhead, and delta smelt populations. I also evaluated the potential to violate water quality criteria in the Delta from island storage releases. I participated in Section 7 consultations for the project with State and federal agencies while representing the applicant, the State Board, and USACE.

- **Montezuma Wetlands Project – BA and EIR/EIS (1996-1998)**

As part of a third-party consulting team funded by the applicant and representing Solano County and the USACE, I participated in the NEPA process related to the Montezuma Wetlands Project in Suisun Marsh near Collinsville. My roles included preparation of EIS sections on potential effects and benefits to fish and their habitat in the Bay-Delta, including winter run chinook salmon and delta smelt. Our team worked with the San Francisco District of the USACE and Solano County to ensure we met the needs of these permitting agencies.

- **Lower Butte Creek Study Program – Nature Conservancy and Ducks Unlimited (CVPIA program) (1997-1999)**

As a consultant to the Nature Conservancy and Ducks Unlimited I participated in the Lower Butte Creek Study Program to evaluate potential means for improving salmon and steelhead passage through the Butte Creek system. My role was to evaluate potential fish passage problems and help to identify and promote solutions through working with local

stakeholders. I identified passage solutions and previously unforeseen problems facing downstream salmon and steelhead juveniles migrating from spawning areas in the upper watershed. The Butte Creek system has tremendous obstacles to downstream migration of young salmonids particularly in drier years – most of these problems have yet to be resolved. My activities brought me in contact with local stakeholder groups, primarily farmers, but also federal and state refuge managers who also depend on water and land for their waterfowl and wetland programs.

- **Butte Creek Parrot-Phelan Dam Project – Butte County (1998-1999)**

As a consultant to Butte County I evaluated the final facilities constructed to replace facilities lost at the Parrot-Phelan diversion site from devastating floods. The facilities were constructed under emergency authorities and Butte County asked me to review the project to ensure it was constructed appropriately under their laws and responsibilities. I noted that the screen and ladder were well designed and worked well. I noted potential problems with the flood flow bypass and associated problems for upstream passage under high flows.

- **CVPIA and CALFED EIR/EIS's – USBR/CALFED (1995-1999)**

I participated in the preparation of the EIR/EIS's for the CVPIA and CALFED programs for the USBR and CALFED. The EIS's covered many actions under the CVPIA and CALFED programs including alternatives development and evaluation. I worked on the water management strategies for both programs including the Environmental Water Account. I have worked extensively on all elements of the CALFED program and many elements of the CVPIA program. This experience has made me acutely aware of water management in the Central Valley. My previous experience with problems relating from D-1485 water quality standards, proposed D-1630 standards, and the 1995 Accord and Standards fits in well with my recent experiences dealing with conservation and recovery of fish populations in the Central Valley. I also with the Anadromous Fish Restoration Program in the evaluation of the AFRP flow recommendations for the lower American River.

- **CALFED Ecosystem Restoration Program Plan – CALFED (1995-2000)**

As a consultant to CALFED, I was one of the original designers and authors of the Ecosystem Restoration Program Plan (ERPP). I prepared individual sections on actions to be considered for specific watersheds and resources including special status fish species. One of the major features of the ERPP is its links to other ecosystem restoration programs. I participated in various watershed reviews including the American River and was the author of the draft vision for the American River. I participated in the planning and conduct of many of the CALFED meetings and workshops.

- **CALFED Conservation Strategy - (1998-2000)**

I participated in the early design and development of the CALFED Conservation Strategy developed in consultation with a team of consulting scientists. I prepared early drafts of CALFED's Adaptive Management philosophy. I worked extensively on CALFED's Multi-Species Conservation Strategy. I was the principal author of appendix plans that

included many prescriptions for conservation and recovery of all special status fish species in the Central Valley. I reviewed listing documents and recovery plans and incorporated elements into the conservation actions. I reviewed all salmon conservation and recovery actions for the Central Valley and Pacific Coast and made recommendations for modifying and adding to the overall recovery program. I also developed conservation schemes and measures for potential effects of each of the CALFED Program elements and associated actions that could affect special status fish species.

- **Delta Fish Facility Advisory and Technical Teams – CALFED/ CVP (1999-2001)**

I participated as a consultant to Delta fish facilities teams evaluating intake and fish protection facilities at the Delta Cross Channel, proposed Hood diversion, Clifton Court Forebay, and Tracy Fish Protection Facilities. As a consultant to the CALFED Delta Entrainment Effects Team, I helped in evaluating the potential effects of many options for water diversion from the Delta, including potential effects to salmon and steelhead. I prepared papers on factors affecting salvage numbers of salmon and steelhead at the state and federal pumping plants in the South Delta.

- **CVPIA Comprehensive Assessment and Monitoring Program (CAMP) – (1995-1996)**

I was an original member of the CAMP consulting team. We developed a monitoring and assessment program to evaluate whether objectives of the CVPIA would be met, particularly goals to double salmon and steelhead runs in the Central Valley. I promoted development of monitoring and assessment techniques to estimate production of wild smolts as well as adult escapement.

- **CALFED Water Management Strategy and Environmental Water Account – (1998-2001)**

I participated in CALFED's development of a water management strategy including the Environmental Water Account that would protect and enhance survival of salmon. The water management evaluation included detailed review of operations of the American River Project on flows of the American River and Delta inflow. I participated in the inter-agency gaming exercise to evaluate alternative operations of the water projects in combination with CVP and CALFED water accounts. During two years of extensive exercises I became very familiar with water project operations in the Central Valley.

- **CALFED Delta Entrainment Effects Team – (1998-2000)**

I participated as an analyst on the CALFED DEFT team to evaluate the effects of water diversions on Bay-Delta fish populations.

- **CALFED DCC-TDF – (2000-2002)**

I participated in CALFED's Delta Cross Channel and Through Delta Facility team as an analyst to evaluate the benefits and adverse effects of different operations of the Delta Cross Channel and the proposed Through Delta Facility.

- **Water Forum/EBMUD – (1997-2000)**

As a consultant to the Water Forum (EBMUD) and SAFCA I participated in the evaluation of the alternatives for American River flow and flood management and river restoration. I also helped prepare Lower American River Floodway Management Plan for SAFCA. I participated in numerous Lower American River Task Force meetings and other related meetings including the Lower American River Operations Group and Management Group. I participated in the preparation of the EIR for EBMUD's and Sacramento County's water diversion from the lower American River (since moved to Freeport on the Sacramento River). I worked on SAFCA restoration projects along the lower river and participated in temperature studies from Lake Natomas downstream through the river. As a consultant to the East Bay Municipal Utility District, I attended Water Forum public meetings and advised EBMUD on issues relating to water and habitat that would affect salmon and steelhead of the lower American River prior to the Water Forum Agreement of 2000. I participated in teams evaluating potential salmon habitat conservation and improvement projects for the lower American River. I was the principal author of SAFCA's fish habitat section of the Lower American River Floodway Management Plan. As part of that project I evaluated numerous options for conserving and improving salmon and steelhead habitat throughout the lower American River. I consulted with EBMUD to evaluate proposed conservation and habitat improvement measures of the Water Forum for the lower American. I prepared and submitted grant proposals to CALFED on behalf of SAFCA for specific habitat improvements to the lower American River. I evaluated effects of operations of USBR on the lower American River salmon and steelhead habitat and populations.

- **GCID Sacramento River Project – USACE (1999)**

I participated in the design of a monitoring program to evaluate the effectiveness of mitigation measures and project fish protection elements for the new GCID intake facility on the Sacramento River.

- **Battle Creek Hatchery Screening Project – USBR (2000)**

I participated in the design of a monitoring program to evaluate the effectiveness of new fish screens at the Battle Creek hatchery intake system on Battle Creek.

- **Yolo Bypass Ecosystem Restoration Strategy Development Project - Yolo Basin Foundation (1999)**

Working with the Yolo Basin Foundation, I prepared a grant application for local stakeholders to develop a restoration strategy to restore wildlife and fish habitat and improve salmon survival through the Yolo Bypass. I spent many hours in the bypass from the Fremont Weir in the North to the exit of the bypass on Cache Slough observing habitat conditions, land use patterns, and potential obstructions to salmon upstream and downstream passage. I identified many potential problems and opportunities to improve habitat and passage for Sacramento River salmonids. I met with individual stakeholders (including DWR and PG&E Properties) and helped obtain their support for the project. The project was funded and has begun.

- **Upper Yuba River Studies Program – CALFED (2000-2001)**

As a consultant to CALFED, I participated in the Upper Yuba River Studies Program. I prepared a monitoring program design to collect information necessary to determine if the upper watershed above Englebright Dam has habitats adequate for anadromous salmon and steelhead. I participated in CALFED workshops with participating stakeholders and the general public.

- **Lower Yuba River Studies Program – YRTWG (2000-2001)**

I have supported the Yuba River Technical Working Group in the preparation of grant applications to study fish passage problems in the lower Yuba River at Daguerre Dam. I supported the Working Group in reviewing the USACE preliminary study of Daguerre Dam. Options being evaluated are dam removal and ladder improvements.

- **Yuba River Watershed Assessment – Yuba Watershed Council, South Yuba River Citizens League (2000-2002)**

I have supported Yuba River watershed stakeholder groups in preparing grant applications for federal and state funding for watershed assessment and restoration activities. I have attended meetings with the Yuba Watershed Council and the South Yuba Citizens League. I have taken many field trips to the watershed and have identified problems including high sediment loads that threaten production of salmon and steelhead in the lower river.

- **Mokelumne River Watershed Assessment – Sierra Pacific Industries (2000-2001)**

As a consultant to Sierra Pacific Industries, I participated in the development of a watershed assessment for the upper Mokelumne River watershed properties of Sierra Pacific. The assessment focused on potential risks to water quality, sediment/erosion, and water supply from timber harvest in the watershed. We identified sub-watersheds that had the greatest potential impacts from timber harvest and identified measures to reduce environmental damage.

Ā

**Recent Employment**

- **Jones and Stokes Associates – Sacramento (1995-1999)**

At JSA I participated in numerous local and regional projects including those identified above for this time period. I also received considerable management training as well as environmental training and classes on CEQA/NEPA and CESA/ESA. I managed JSA's contracts with CALFED and participated in CALFED's consulting team.

- **Foster Wheeler Environmental – Sacramento (1999-2002)**

At Foster Wheeler I as was primarily responsible for developing environmental business in northern California, Idaho, Washington, and Alaska, in addition to the pursuit of local projects identified above.

- **Fishery Foundation of California (2002-present)**

As the executive director (2002-2003) and principal investigator of the non-profit Fishery Foundation of California I helped conduct a striped bass tagging study, striped bass pen

rearing program, and hatchery salmon acclimation program, and conducted a monitoring study of Delta fish habitat at Kimball Island near Antioch. I coordinated numerous activities with California Striped Bass Association and other sportfishing groups. I managed development and implementation of monitoring surveys of SAFCA habitat restoration projects in the LAR. I was the principal investigator of CVPIA monitoring surveys of the LAR that involved determining the habitat requirements of salmon and steelhead. I coordinated with stakeholder and agency groups and participated in workshops and projects including the Lower American River Corridor Management Plan. I have become intimately familiar with the river's hydrology, water temperature regime, salmon and steelhead populations, spawning and rearing habitat, and recreational fisheries. I was project manager and principal investigator on a grant from CVPIA to study water supply opportunities for the Cosumnes River. I was a consultant to Lake Wildwood Homeowners Association in proceedings with the Regional Water Quality Control Board and DFG Region 2 on water quality control plan violations in the Deer Creek watershed, a tributary to the lower Yuba River.

- **HDR Engineering – Folsom (2003-2004)**

At HDR I was primarily responsible for developing environmental business in northern and southern California, in addition to the pursuit of local projects identified above. I also participated in water resources projects in Alaska and Nebraska. I was project manager for regional indefinite deliverable contracts I helped procure for HDR with CALTRANS. I participated in many local and regional HDR projects working closely with the water resources engineering department.

- **Wildlands Inc. - Rocklin (2004-2010)**

As manager of aquatic programs at Wildlands during the past decade I developed habitat restoration programs for Central Valley rivers under federal and state mitigation banking programs. I have worked closely with DFG, NMFS, USFWS, DWR, and SAFCA in defining opportunities for riparian and floodplain restoration. I have participated in Lower American River meetings and workshops. I have worked closely with NMFS in the development of a Conservation Banking Program in the Central Valley for listed salmonid fishes. I developed longfin smelt and Delta smelt conservation banks in the Delta and Suisun Marsh.

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- **Consultant (semi-retired) (2010-present)**

Consultant on fishery ecosystem assessment programs relating to California resource management. Consultant to Karuk Tribe, Quartz Valley Indian Reservation, California Sport Fishing Protection Alliance, Cal Trout, Klamath River Keeper, Westerveld Inc, Fishery Foundation of California, and others. Participate in various workgroups and committees of these planning entities. Subjects include ecosystem restoration, Yolo Bypass, fisheries enhancement, aquatic habitat assessment, water rights, water resources development, groundwater and surface water management - review, management, reports, assessments, and analyses.

# EXHIBIT 2

# SUMMER 2013

## The demise of Delta smelt under D-1641 Delta Water Quality Standards

Thomas Cannon

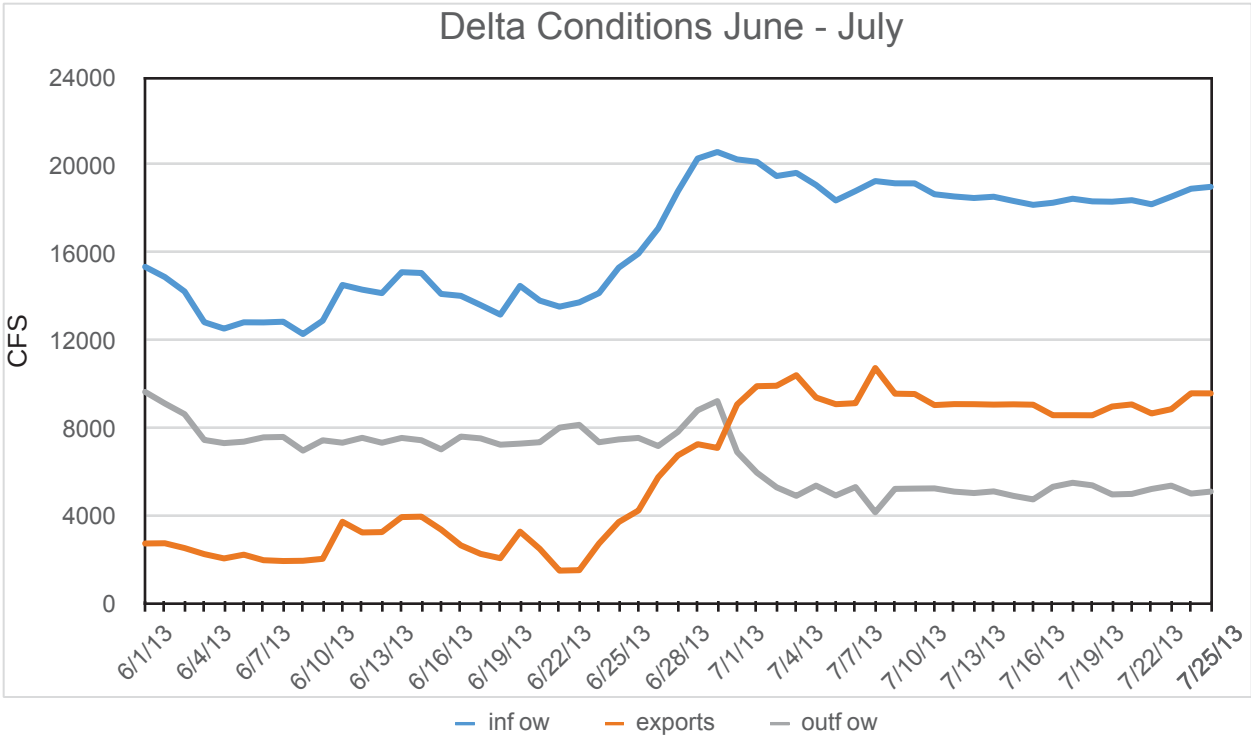
Consultant

Representing

California Sportfishing Protection Alliance

August 2013

# Summer 2013




## Dry Year Standards Relaxed?

Despite near record low precipitation in the Central Valley in the spring of 2013, the water year remained classified as "dry," pursuant to D-1641. The "dry year" standards for EC at Emmaton were violated in April, May and June and the EC standard at Jersey Point was violated in June. These standards were established to protect agricultural beneficial uses in the Delta.

The Department of Water Resources and the Bureau of Reclamation, fearing that water exports from the State and Federal Water Projects (Projects) would lead to violations of Delta outflow and western Delta EC standards and depletion of cold water storage in Shasta Reservoir, asked the State Water Resources Control Board on 24 May to reclassify the water year to "critically dry" and requested permission to move the temperature compliance point on the Sacramento River upstream from Red Bluff to Anderson to save the cold-water pool supply in Shasta Reservoir. The Department of Fish and Wildlife, NOAA Fisheries and US Fish and Wildlife Service submitted letters supporting the request.

While the State Board had no authority to arbitrary change a water year classification, it informed the agencies that it "will not object or take any action if the Bureau and Department operate to meet critically dry year salinity objectives for Western and interior Delta."

On or about June 22, the Projects began substantially increasing exports and Delta inflows, and shortly thereafter significantly reducing Delta outflow per the Delta Standards.

The D-1641 standards for a dry year (Figure 1) already allowed salinity to encroach into the West Delta at Emmaton and Jersey Point. Earlier violations of those standards in the spring had already exacerbated conditions by summer (it should also be noted that South Delta EC standards were also violated in June and July through August 15).

This report reviews conditions in the summer of 2013, the inadequacy of D-1641 dry year standards and the adverse impacts to Delta smelt caused by violation of those already inadequate standards.

**TABLE 3 (continued)**
**WATER QUALITY OBJECTIVES FOR FISH AND WILDLIFE BENEFICIAL USES**

| COMPLIANCE LOCATION | INTERAGENCY STATION NUMBER(RKI1[]) | PARAMETER | DESCRIPTION (UNIT) [2] | WATER YEAR TYPE [3] | TIME PERIOD | VALUE |
|---|---|---|---|---|---|---|
| ***DELTA OUTFLOW*** | | | | | | |
| | | *Net Delta Outflow Index (NDOI) [7]* | *Minimum monthly average [8] NDOI (cfs)* | *All* | *Jan* | *4,500 [9]* |
| | | | | *All* | *Feb-Jun* | *[10]* |
| | | | | *W,AN* | *Jul* | *8,000* |
| | | | | *BN* | | *6,500* |
| | | | | *D* | | *5,000* |
| | | | | *C* | | *4,000* |
| | | | | *W,AN,BN* | *Aug* | *4,000* |
| | | | | *D* | | *3,500* |
| | | | | *C* | | *3,000* |
| | | | | *All* | *Sep* | *3,000* |
| | | | | *W,AN,BN,D* | *Oct* | *4,000* |
| | | | | *C* | | *3,000* |
| | | | | *W,AN,BN,D* | *Nov-Dec* | *4,500* |
| | | | | *C* | | *3,500* |
| ***RIVER FLOWS*** | | | | | | |
| *Sacramento River at Rio Vista* | *D-24 (RSAC101)* | *Flow rate* | *Minimum monthly average [11] flow rate (cfs)* | *All* | *Sep* | *3,000* |
| | | | | *W,AN,BN,D* | *Oct* | *4,000* |
| | | | | *C* | | *3,000* |
| | | | | *W,AN,BN,D* | *Nove-Dec* | *4,500* |
| | | | | *C* | | *3,500* |
| *San Joaquin River at Airport Way Bridge, Vernalis* | *C-10 (RSAN112)* | *Flow rate* | *Minimum monthly average [12] flow rate (cfs) [13]* | *W,AN* | *Feb-Apr 14* | *2,130 or 3,420* |
| | | | | *BN,D* | *and* | *1,420 or 2,280* |
| | | | | *C* | *May 16-Jun* | *710 or 1,140* |
| | | | | *W* | *Apr 15-* | *7,330 or 8,620* |
| | | | | *AN* | *May 15 [14]* | *5,730 or 7,020* |
| | | | | *BN* | | *4,620 or 5,480* |
| | | | | *D* | | *4,020 or 4,880* |
| | | | | *C* | | *3,110 or 3,540* |
| | | | | *All* | *Oct* | *1,000 [15]* |

*Figure 1a. D-1641 EC Water Quality Objectives Table 2.*

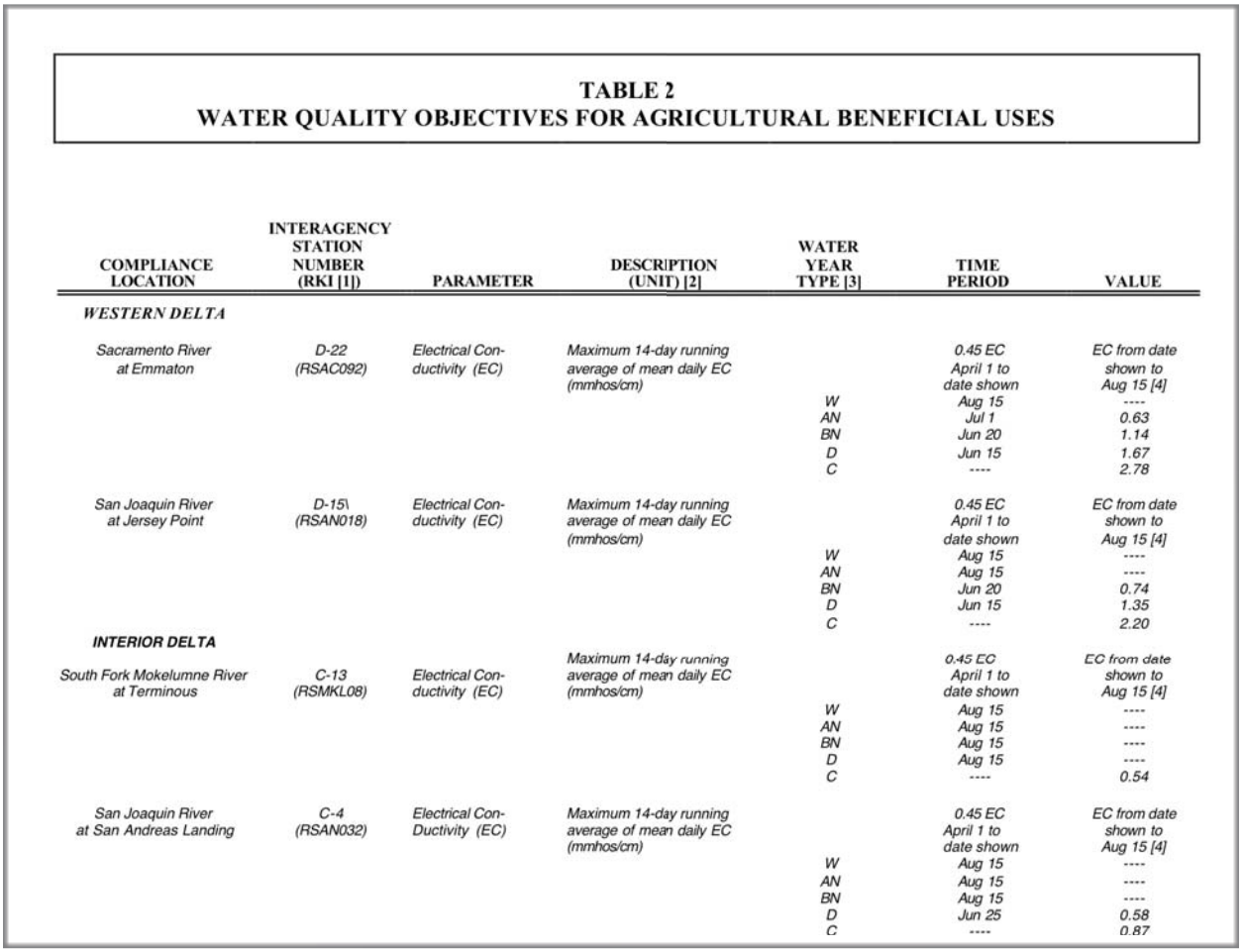


**TABLE 2**
**WATER QUALITY OBJECTIVES FOR AGRICULTURAL BENEFICIAL USES**

| COMPLIANCE LOCATION | INTERAGENCY STATION NUMBER (RKI [1]) | PARAMETER | DESCRIPTION (UNIT) [2] | WATER YEAR TYPE [3] | TIME PERIOD | VALUE |
|---|---|---|---|---|---|---|
| ***WESTERN DELTA*** | | | | | | |
| *Sacramento River at Emmaton* | *D-22 (RSAC092)* | *Electrical Conductivity (EC)* | *Maximum 14-day running average of mean daily EC (mmhos/cm)* | | *0.45 EC April 1 to date shown* | *EC from date shown to Aug 15 [4]* |
| | | | | *W* | *Aug 15* | *----* |
| | | | | *AN* | *Jul 1* | *0.63* |
| | | | | *BN* | *Jun 20* | *1.14* |
| | | | | *D* | *Jun 15* | *1.67* |
| | | | | *C* | *----* | *2.78* |
| *San Joaquin River at Jersey Point* | *D-15\ (RSAN018)* | *Electrical Conductivity (EC)* | *Maximum 14-day running average of mean daily EC (mmhos/cm)* | | *0.45 EC April 1 to date shown* | *EC from date shown to Aug 15 [4]* |
| | | | | *W* | *Aug 15* | *----* |
| | | | | *AN* | *Aug 15* | *----* |
| | | | | *BN* | *Jun 20* | *0.74* |
| | | | | *D* | *Jun 15* | *1.35* |
| | | | | *C* | *----* | *2.20* |
| ***INTERIOR DELTA*** | | | | | | |
| *South Fork Mokelumne River at Terminous* | *C-13 (RSMKL08)* | *Electrical Conductivity (EC)* | *Maximum 14-day running average of mean daily EC (mmhos/cm)* | | *0.45 EC April 1 to date shown* | *EC from date shown to Aug 15 [4]* |
| | | | | *W* | *Aug 15* | *----* |
| | | | | *AN* | *Aug 15* | *----* |
| | | | | *BN* | *Aug 15* | *----* |
| | | | | *D* | *Aug 15* | *----* |
| | | | | *C* | *----* | *0.54* |
| *San Joaquin River at San Andreas Landing* | *C-4 (RSAN032)* | *Electrical Conductivity (EC)* | *Maximum 14-day running average of mean daily EC (mmhos/cm)* | | *0.45 EC April 1 to date shown* | *EC from date shown to Aug 15 [4]* |
| | | | | *W* | *Aug 15* | *----* |
| | | | | *AN* | *Aug 15* | *----* |
| | | | | *BN* | *Aug 15* | *----* |
| | | | | *D* | *Jun 25* | *0.58* |
| | | | | *C* | *----* | *0.87* |

*Figure 1b. D-1641 Flow Water Quality Objectives Table 3.*

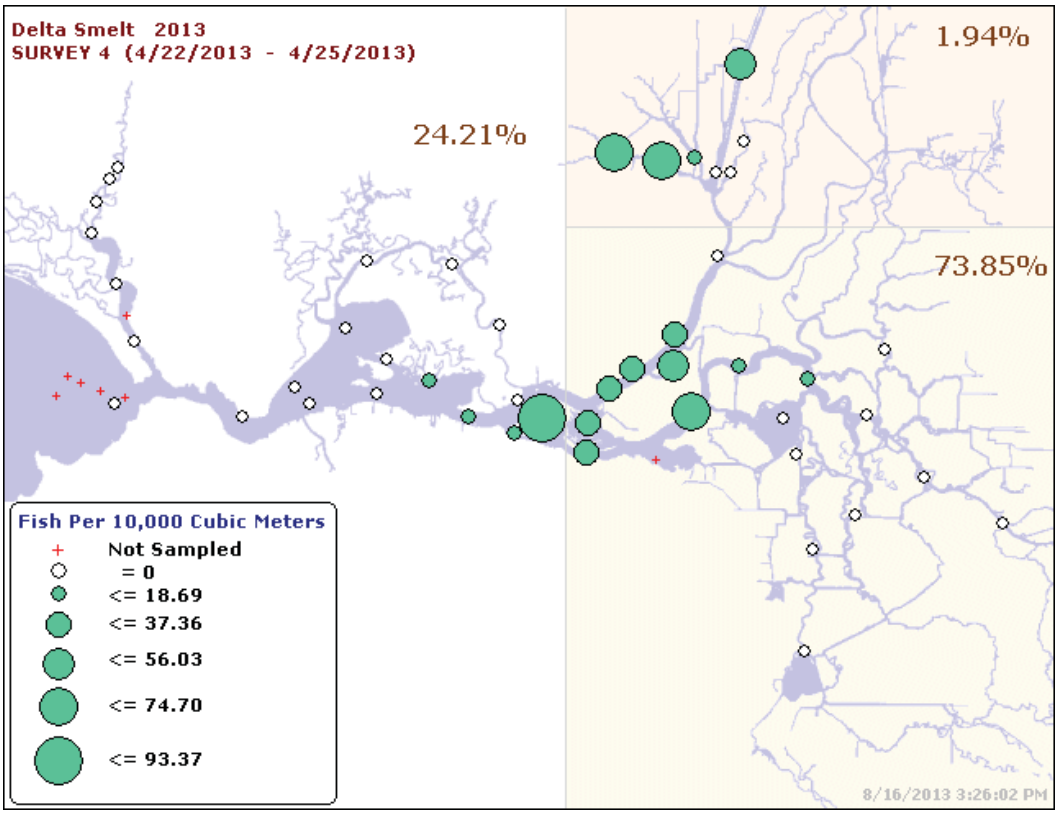



Figure 2. Late-April 2013, 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)

# Delta Smelt in April

Although not the subject of this report, spring conditions set the stage for summer. April 2013 was a tough time for smelt. Sacramento River inflow to the Delta dropped to only 6,000 cfs, San Joaquin inflows were 1500-3000 cfs, exports were up to 2,500-3,000 cfs, and outflow was as low as 6,000 cfs. Old and Middle River OMR flows were -1000 to -4000 cfs. The Delta Cross Channel was closed.

Over the past 20 years, the late April – early May period had been under the protection of VAMP (Vernalis Adaptive Management Program) experiment, but these protections ended in 2010. This year, without these protections, late April exports climbed to 2,500-3,000 cfs reaching 4,000 cfs in early May (from 1500 cfs cap under VAMP). This increase in exports without the VAMP export cap occurred under lower inflows, outflows, and negative OMR flows. Nearly three quarters of the Delta smelt population was in the Central and Western Delta (20-mm survey, Fig. 2) and thus subject to being exported (especially with negative OMRs with the DCC closed). Most of the smelt were not of salvageable size (they were only 10-25 mm), so they were entrained in the export water likely in large numbers (hundreds of thousands per day were moving into Old River toward pumps).

Despite these horrible conditions many still survived in the western Delta under the modest outflows and thus became subject to summer conditions.

# Delta Smelt in Mid June

In mid June 2013 the small remnant population of delta smelt surviving in the San Francisco Bay-Delta after the below-normal water year of 2012 and poor spring conditions described above were spread through their usual dry-year habitats in the western Delta, eastern Suisun Bay, Montezuma Slough, and the Cache Slough/Bypass/Ship Channel complex in the north Delta (Figure 3).

Other than the north Delta group, most of the smelt were in their summer low-salinity zone (LSZ) home where salinities are low (0.5-5 ppt) and water temperature optimal (about 20C). With the protective dry-year EC standard of 0.45 through June 15, the LSZ was in eastern Suisun Bay west of the Delta.

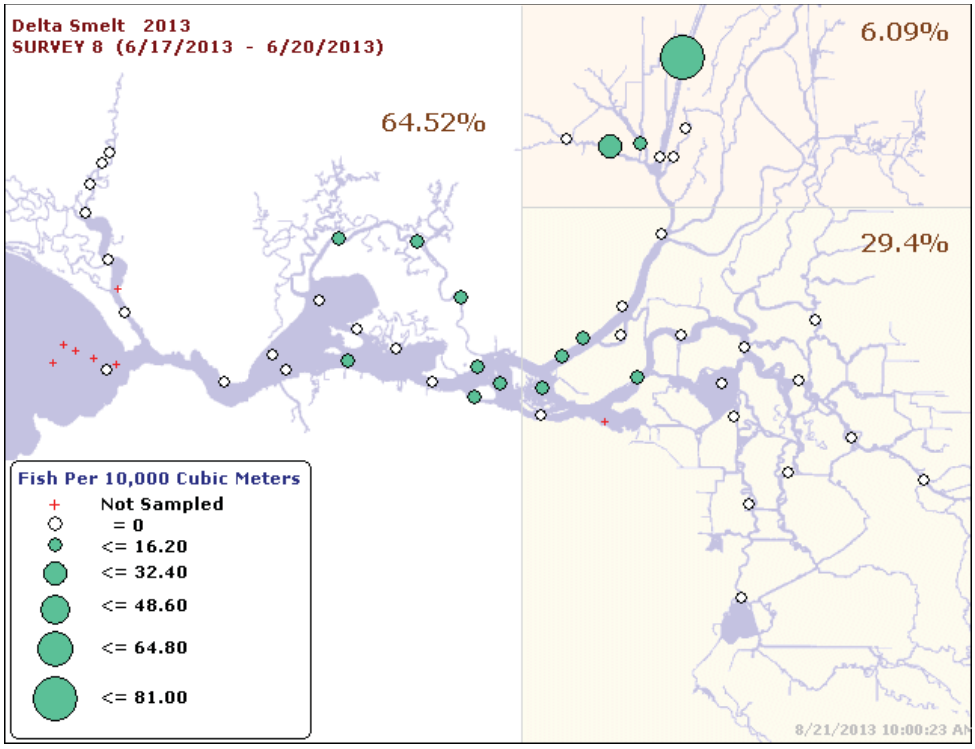



*Figure 3. Mid-June 2013, 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)*

# Summer Flow and Salinity Conditions

Beginning in the third week in June, inflow increase from the 12,000-14,000 cfs level to 20,000 cfs and exports increased from 2,000 to 10,000 cfs (Figure 4). A week later Delta outflow was reduced to 5,000 cfs.

## West Delta

The effect is seen in the EC patterns at Emmaton and Jersey Point in the west Delta (Figures 5a and 5b). As outflow declines, salinities (EC) increase. The LSZ with its 500-6000 EC signature moved upstream into the West Delta with each incoming tide. In contrast, in wet year 2011, outflow was maintained at 8000 cfs and the LSZ did not move upstream into the Delta (Figure 5c).

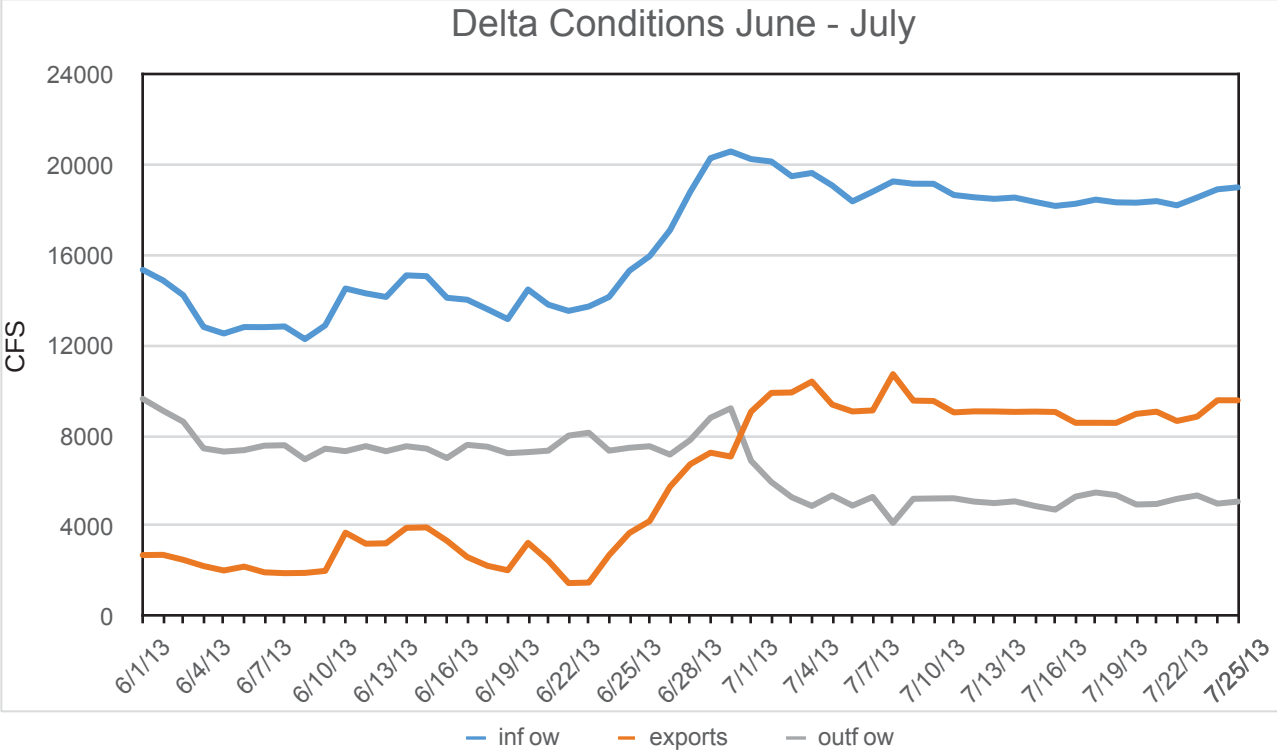



*Figure 4. June through July 2013 Delta inflow, outflow, and exports. Summer EC standards kick in after mid June.*

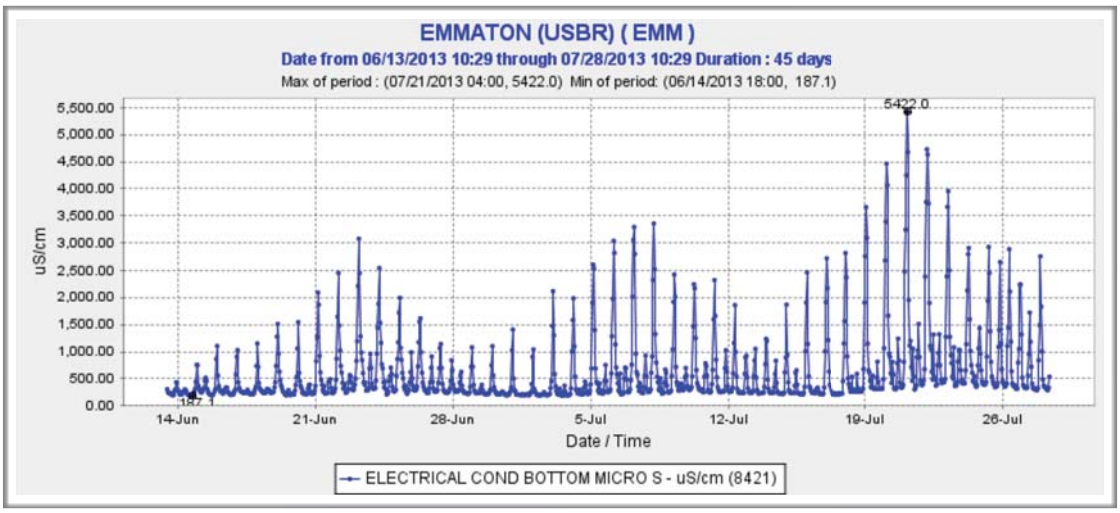



*Figure 5a. Conductivity (EC ) at Emmaton on lower Sacramento River in West Delta after mid June 2013. (Source: CDEC)*

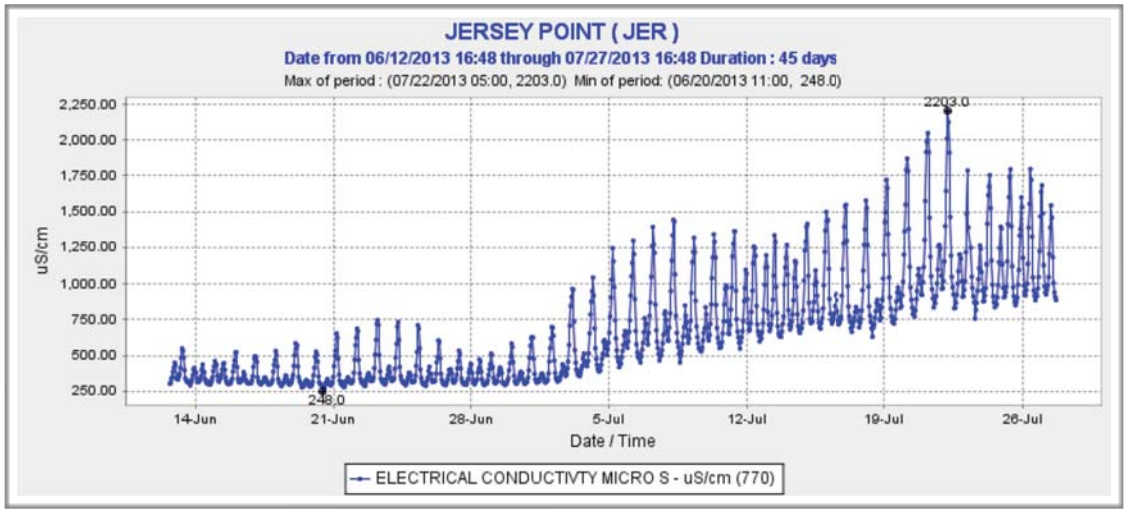



*Figure 5b. Conductivity (EC ) at Jersey Point on lower San Joaquin River in West Delta after mid June 2013. (Source: CDEC)*

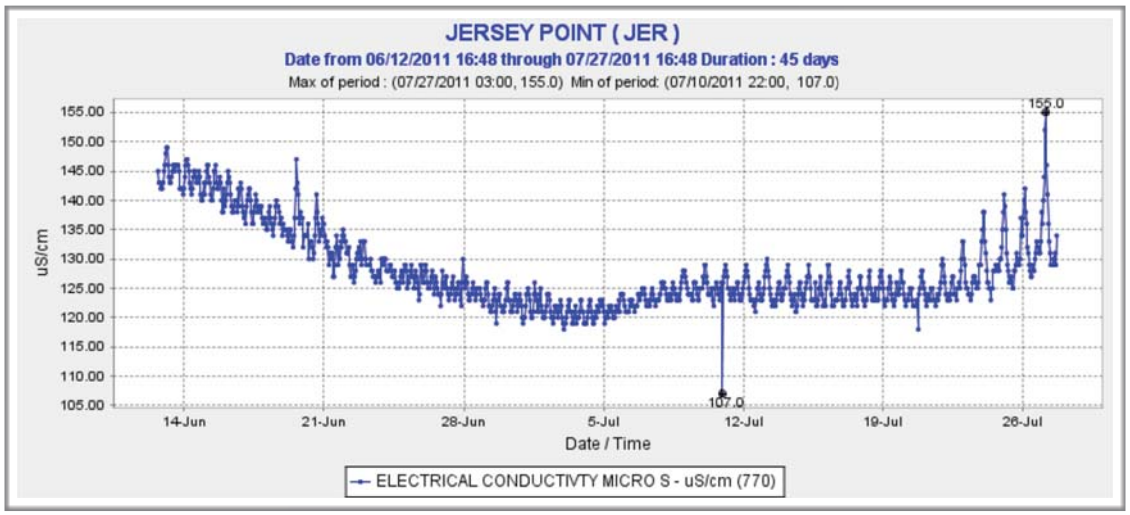



*Figure 5c. Conductivity (EC ) at Jersey Point on lower San Joaquin River in West Delta after mid June 2011. (Source: CDEC)*

## Eastern Suisun Bay

Salinity (EC) in Eastern Suisun Bay at Collinsville on the north and Pittsburg on the south also increased at the beginning of July with the decrease in outflow (Figures 6 and 7). At high tide the LSZ was well upstream of the two locations by early July. The lower end of the LSZ did extend downstream to these locations during low tides through July.

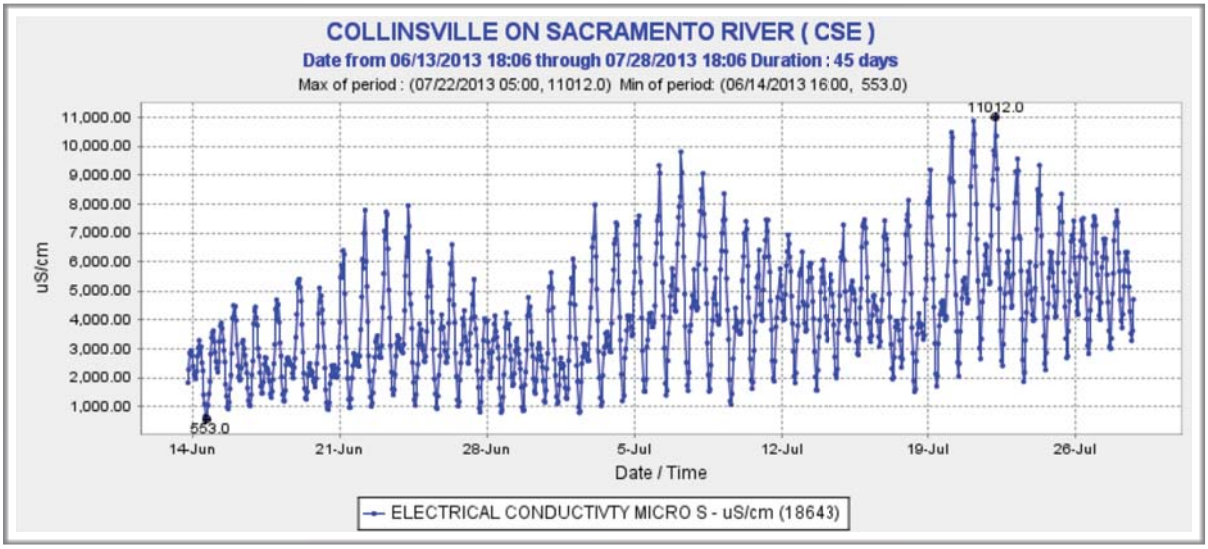



*Figure 6. Conductivity (EC ) at Collinsville in Eastern Suisun Bay after mid June 2013. (Source: CDEC)*

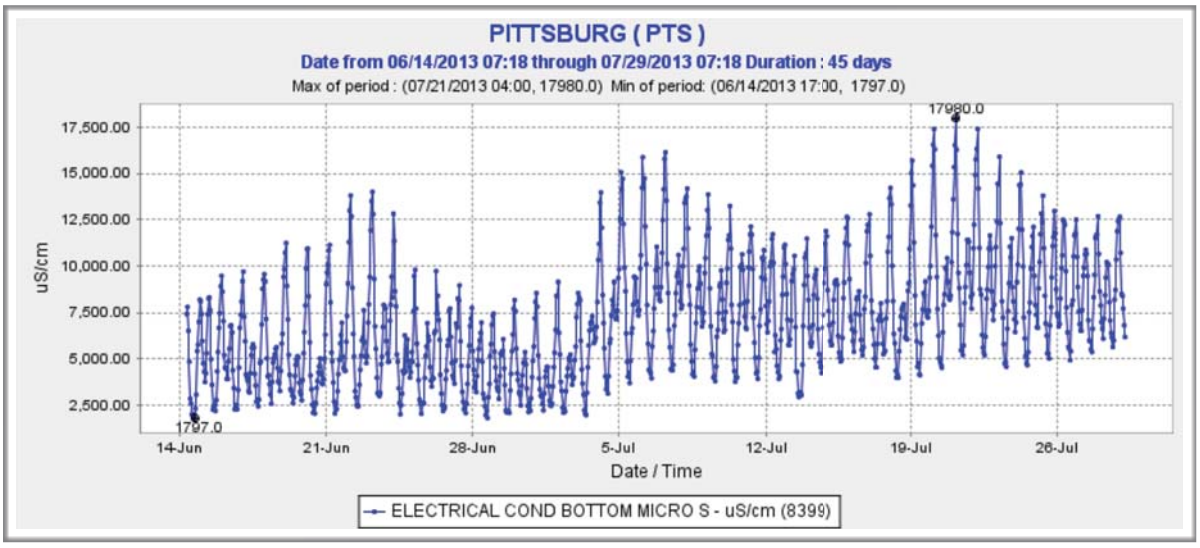



*Figure 7. Conductivity (EC ) at Pittsburg in Eastern Suisun Bay after mid June 2013. (Source: CDEC)*

## Central Delta

Central Delta EC as measured Threemile Slough on the San Joaquin River (Figure 8) and False River (Figure 9) also shows the movement of the LSZ upstream coincident with the reduction in Delta outflow at the beginning of July.

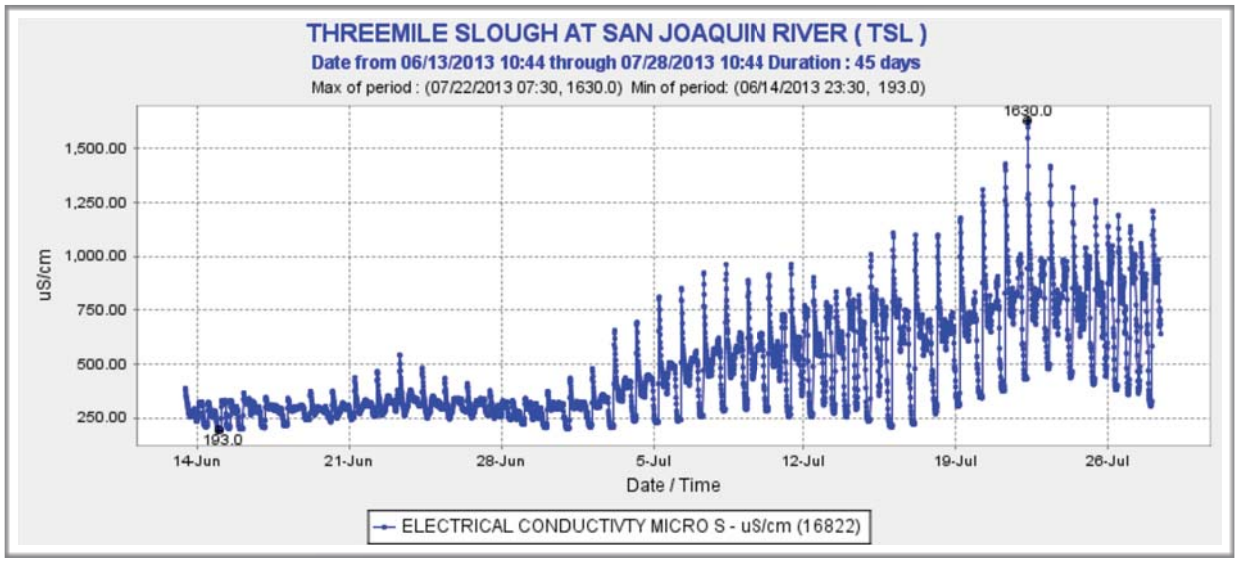



*Figure 8. Conductivity (EC ) at Threemile Slough in the Central Delta after mid June 2013. (Source: CDEC)*

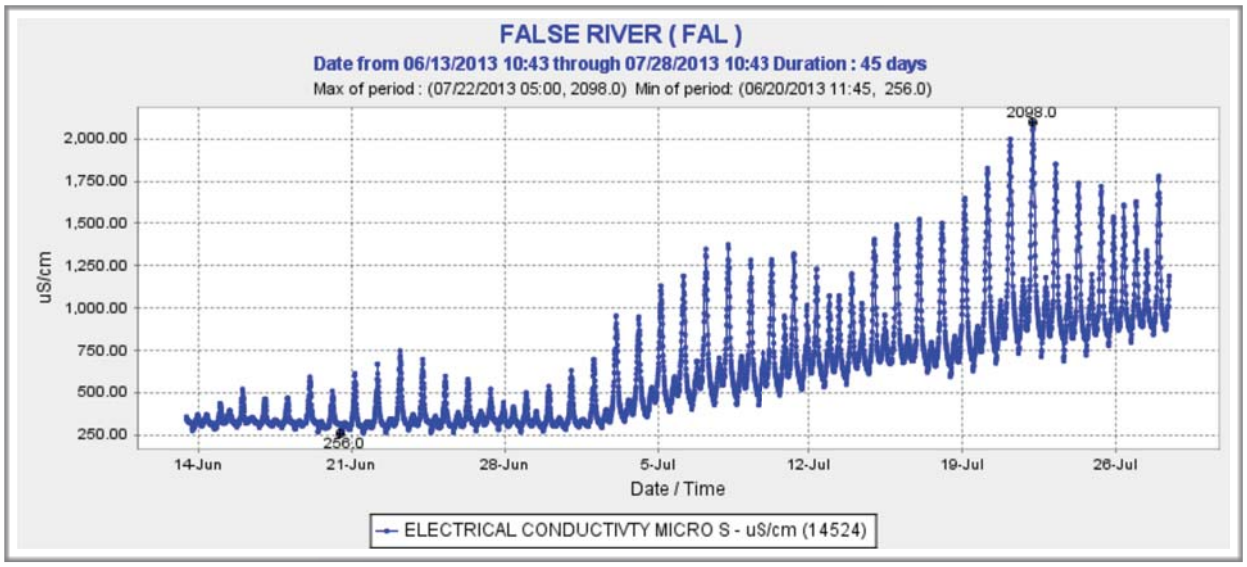



*Figure 9. Conductivity (EC ) at False River in the Central Delta at Franks Tract after mid June 2013. (Source: CDEC)*

## South Delta

South Delta EC also increased as the upper portion of the LSZ was mixed with cross Delta moving freshwater Sacramento River on the way to the export pumps. Salinity gradually increased in Old River as the head of the LSZ actually moved into the South Delta toward the export pumps (Figure 10).

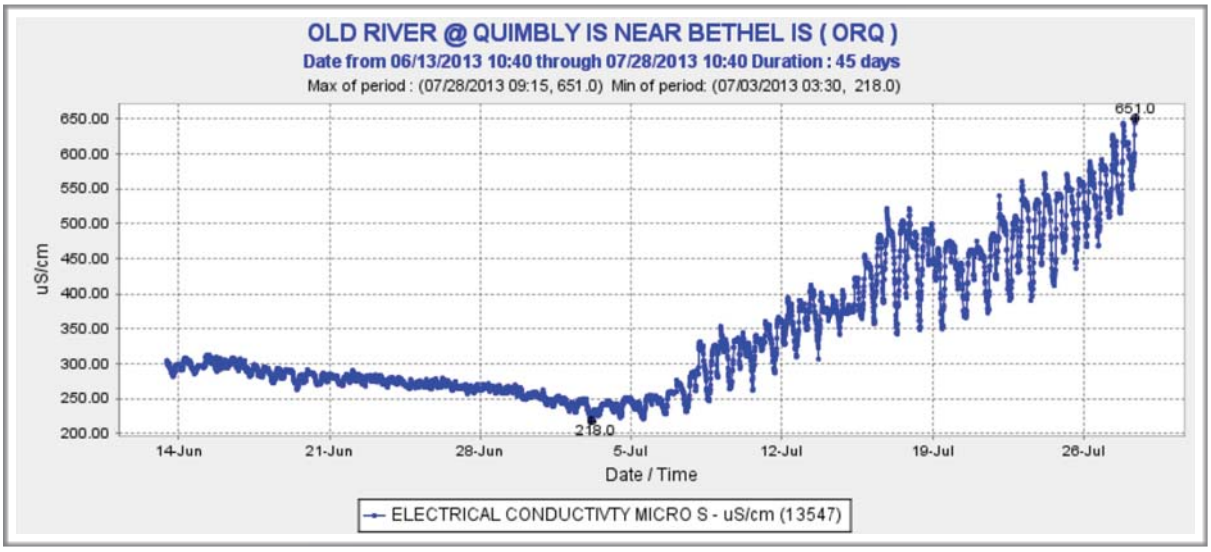



*Figure 10. Conductivity (EC ) in Old River in the Central Delta near Bethel Is after mid June 2013. (Source: CDEC)*

Salinity in Clifton Court Forebay was slightly less as Forebay water is a mixture of Old River, Middle River, and East Delta waters of lower salinity (Figure11).

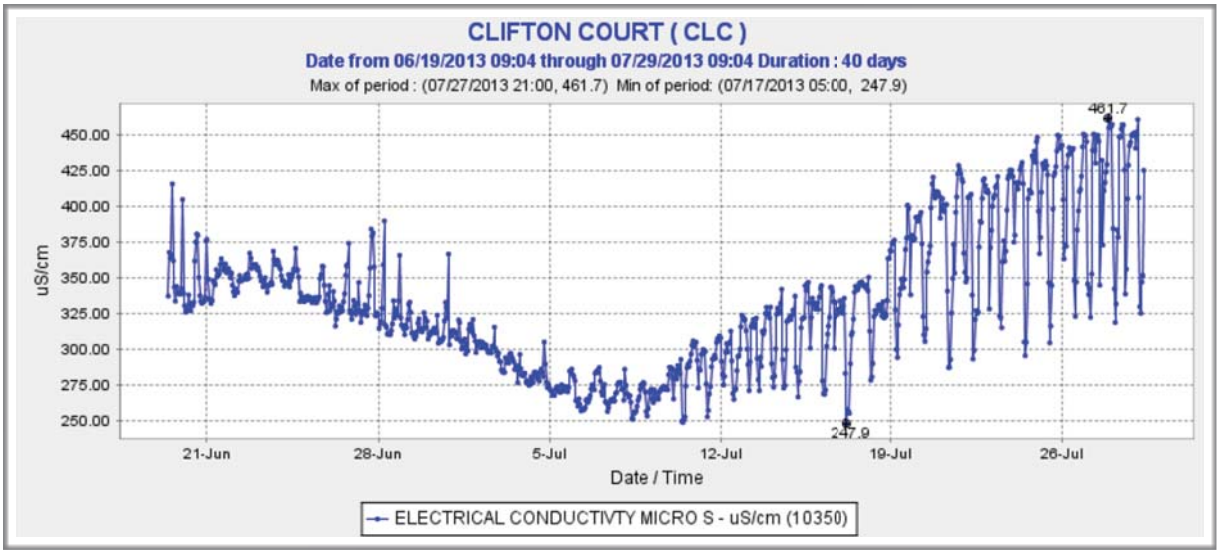



*Figure 11. Conductivity (EC ) in Clifton Court Forebay after mid June 2013. (Source: CDEC)*

# Summer Water Temperatures

## Western Delta

Water temperatures reached near lethal levels for smelt (75-77F) in the western Delta by the beginning of July (Figures 12-14). Water temperatures rose sharply in late June due to the combination of warm air temperatures and sharply higher Delta inflows. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving upstream from Suisun Bay with lower outflows.

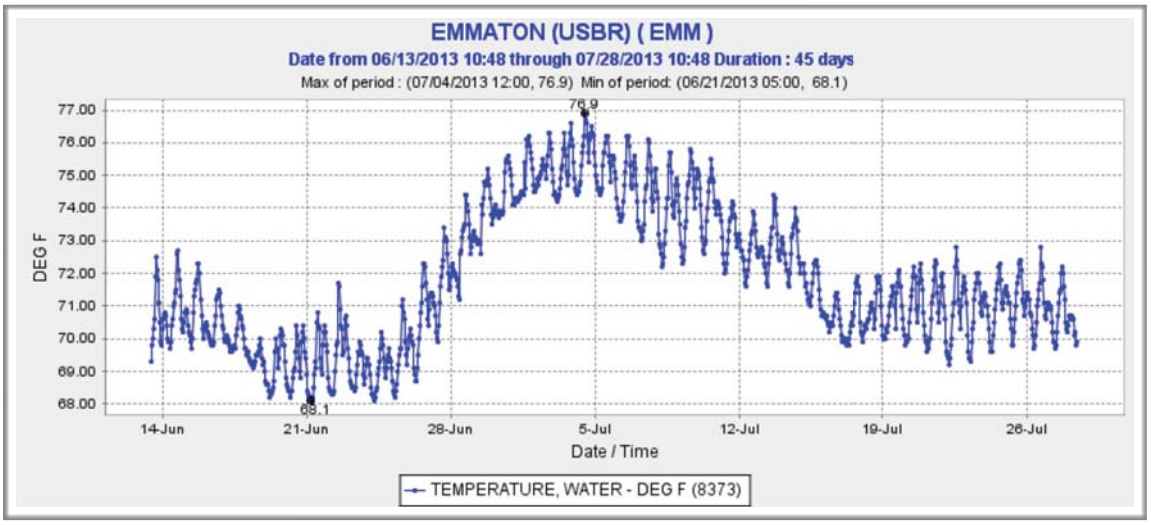



*Figure 12. Water temperature at Emmaton mid June through July 2013. (Source: CDEC)*

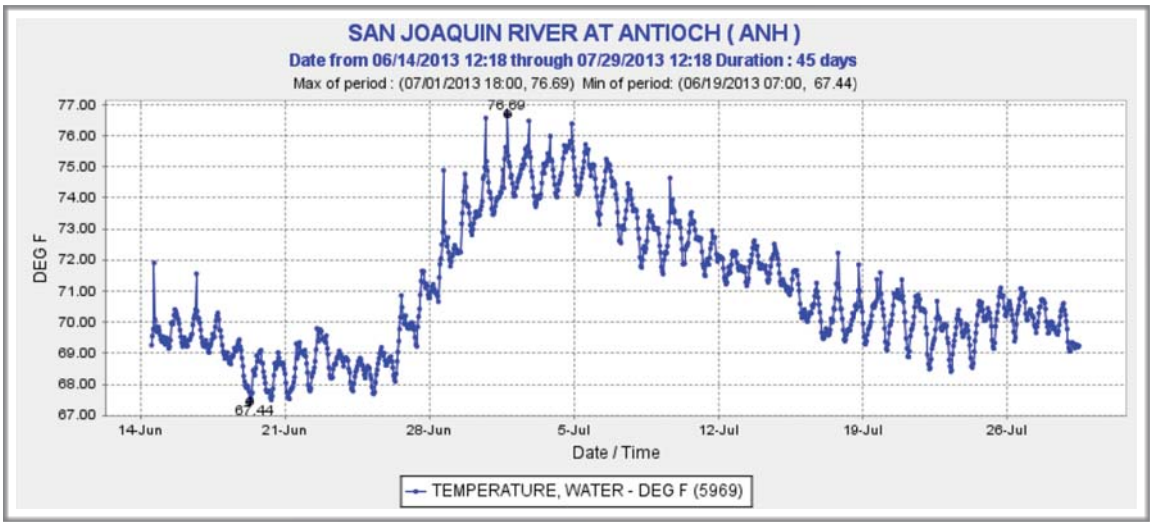



*Figure 13. Water temperature at Antioch mid June through July 2013. (Source: CDEC)*

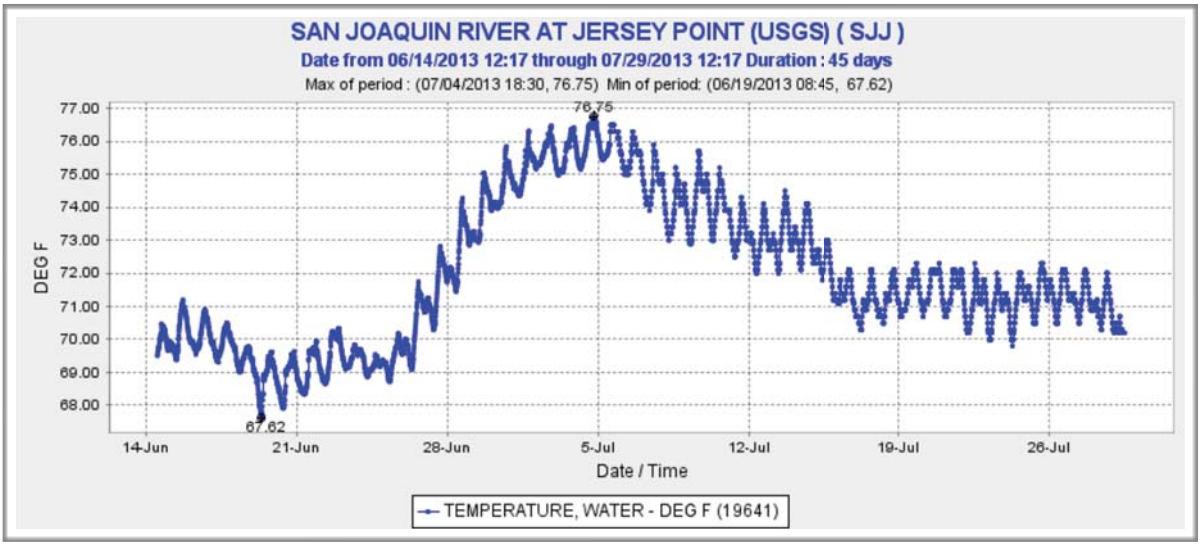



*Figure 14. Water temperature at Jersey Point mid June through July 2013. (Source: CDEC)*

## Central Delta

Water temperatures reached near lethal levels for smelt (75-77F) in the Central Delta by the beginning of July (Figures 15 and 16). Water temperatures rose sharply in late June due to the combination of warm air temperatures and sharply higher Delta inflows. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving upstream from The West Delta with lower outflows.

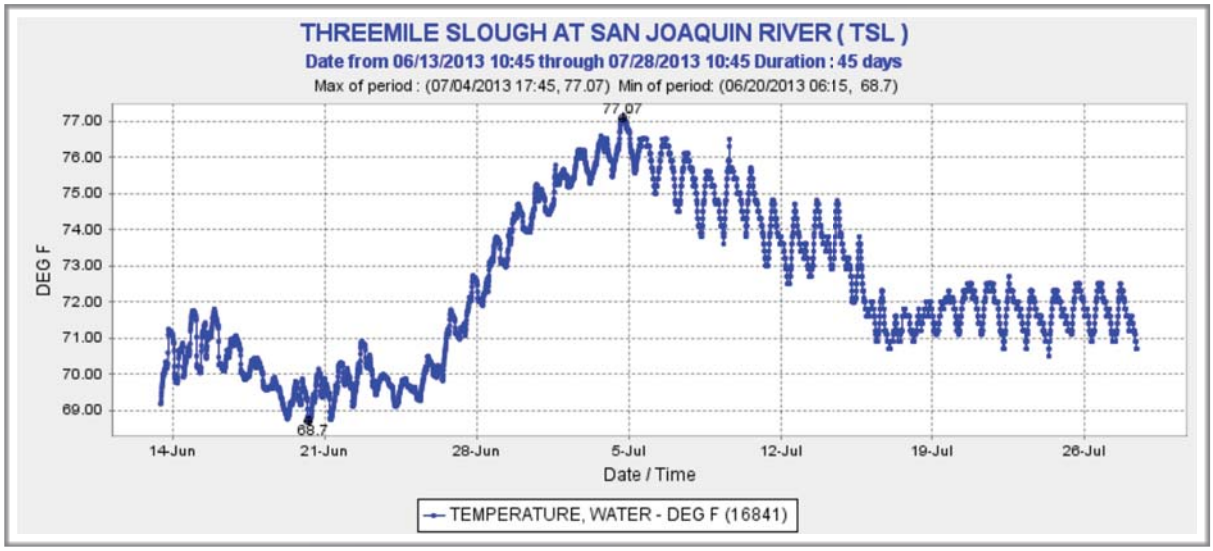



*Figure 15. Water temperature at Threemile Slough mid June through July 2013. (Source: CDEC)*

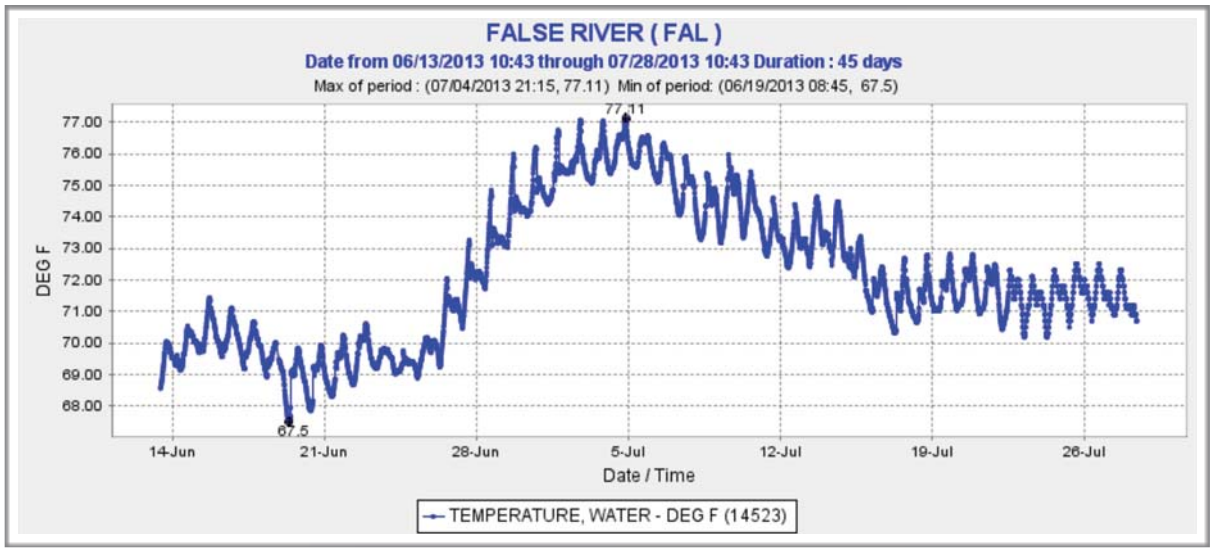



*Figure 16. Water temperature at False River mid June through July 2013. (Source: CDEC)*

## South Delta

Water temperatures reached lethal levels for smelt (78-80F) in the South Delta by the beginning of July (Figures 17-18). Water temperatures rose sharply in late June due to the combination of warm air temperatures, sharply higher Delta inflows, and higher exports drawing warm water into the South Delta. Water temperatures declined thereafter through mid July with lower air temperatures, lower Delta inflows, and cooler waters moving into the South Delta from the western and central Delta with lower outflows.

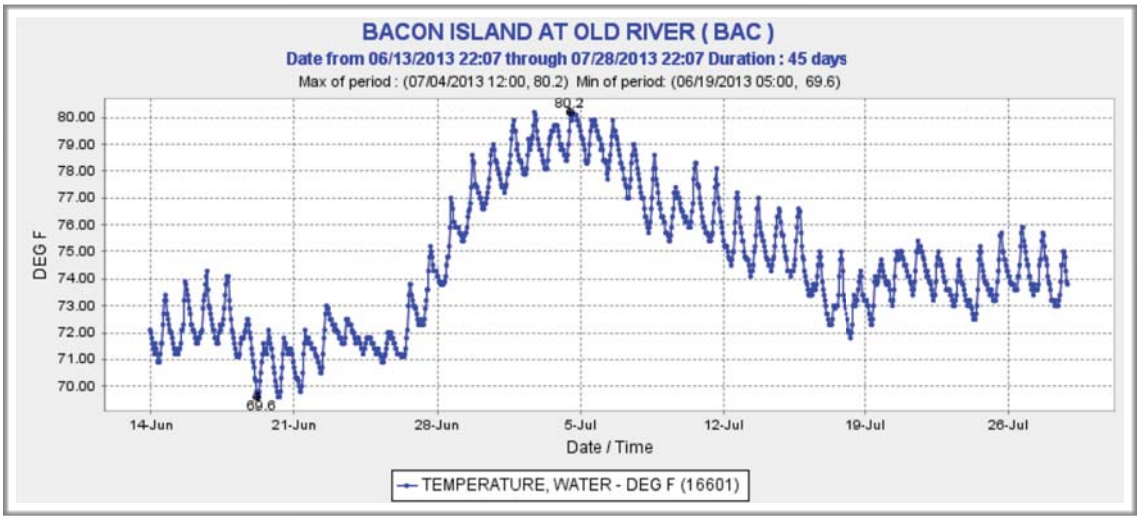



*Figure 17. Water temperature in Old River near Bacon Is mid June through July 2013. (Source: CDEC)*

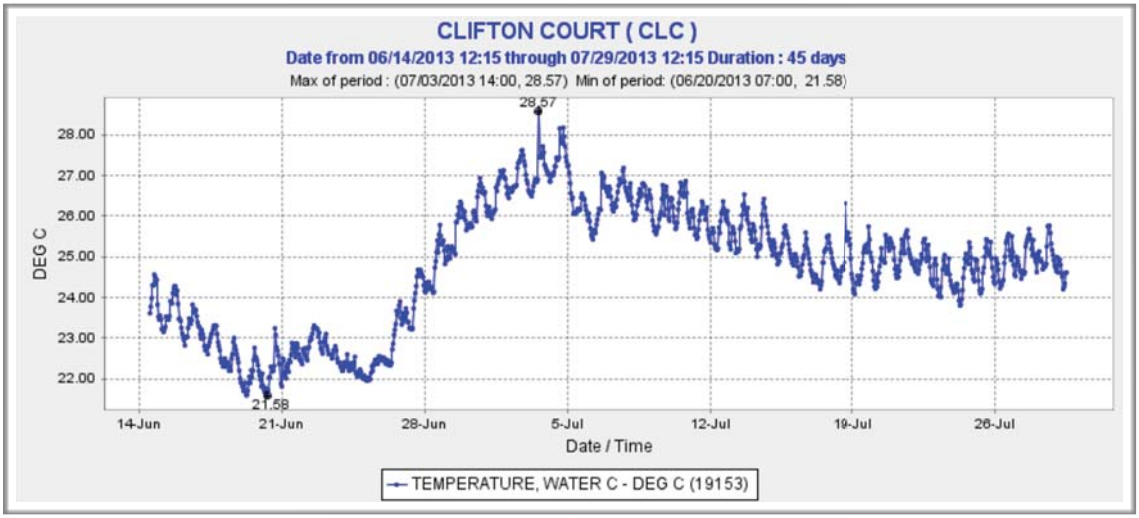
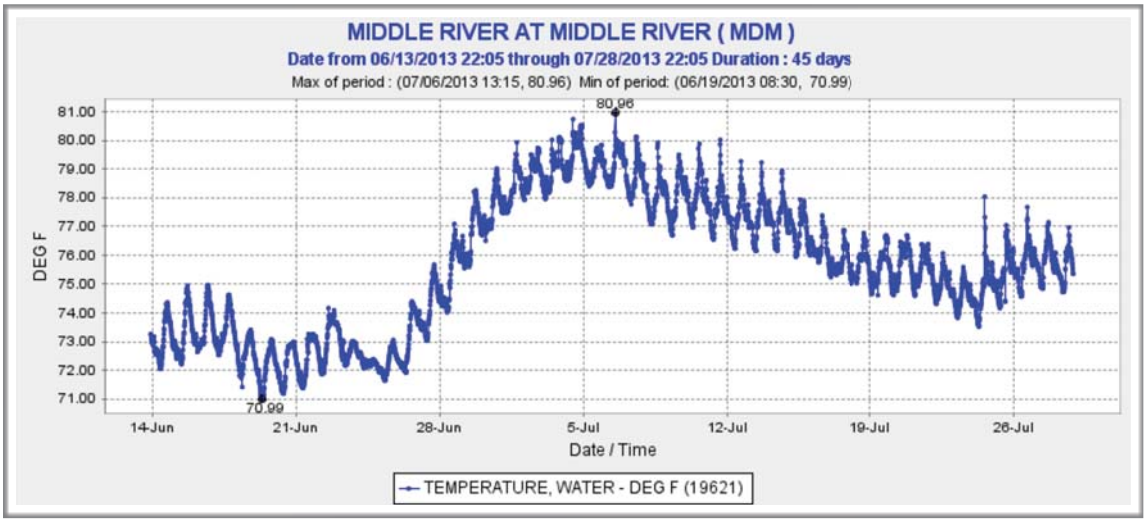



*Figure 18. Water temperature in Clifton Court Forebay near Byron mid June through July 2013. (Source: CDEC)*

## Eastern Delta

Water temperatures in the eastern Delta also reached lethal levels of 80-81F (Figures 19 and 20).

*Figure 19. Water temperature in Middle River mid June through July 2013. (Source: CDEC)*



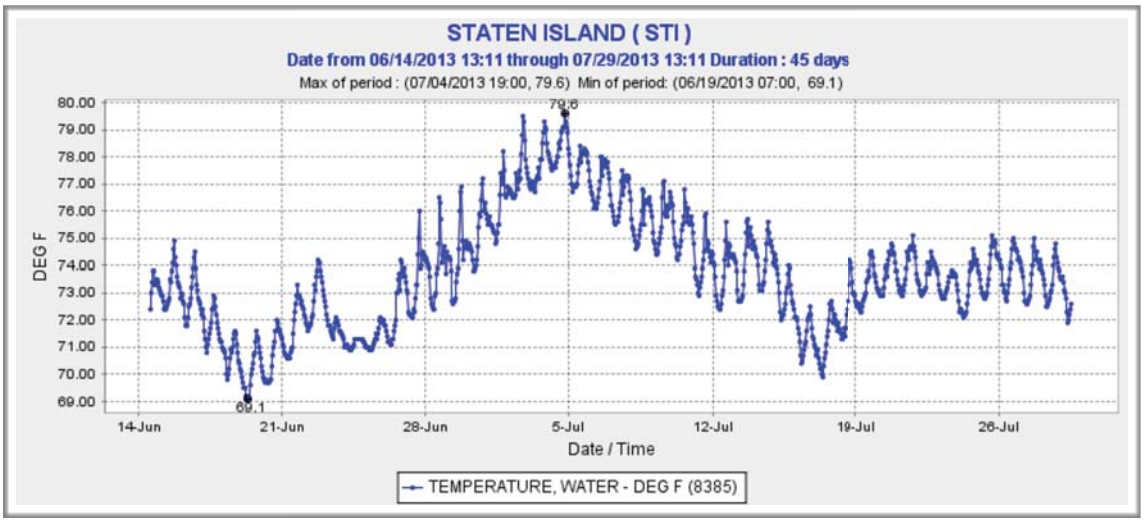



*Figure 20. Water temperature near Staten Island mid June through July 2013. (Source: CDEC)*

# Delta Smelt Vulnerable

With the LSZ reaching into the Central and South Delta at high tides at a greater frequency through July than in wetter years it begs the question as to why were not more smelt salvaged. Clearly small salvage events occurred through mid June coincident with small pulses of exports (Figure 21). But, why not after mid June?

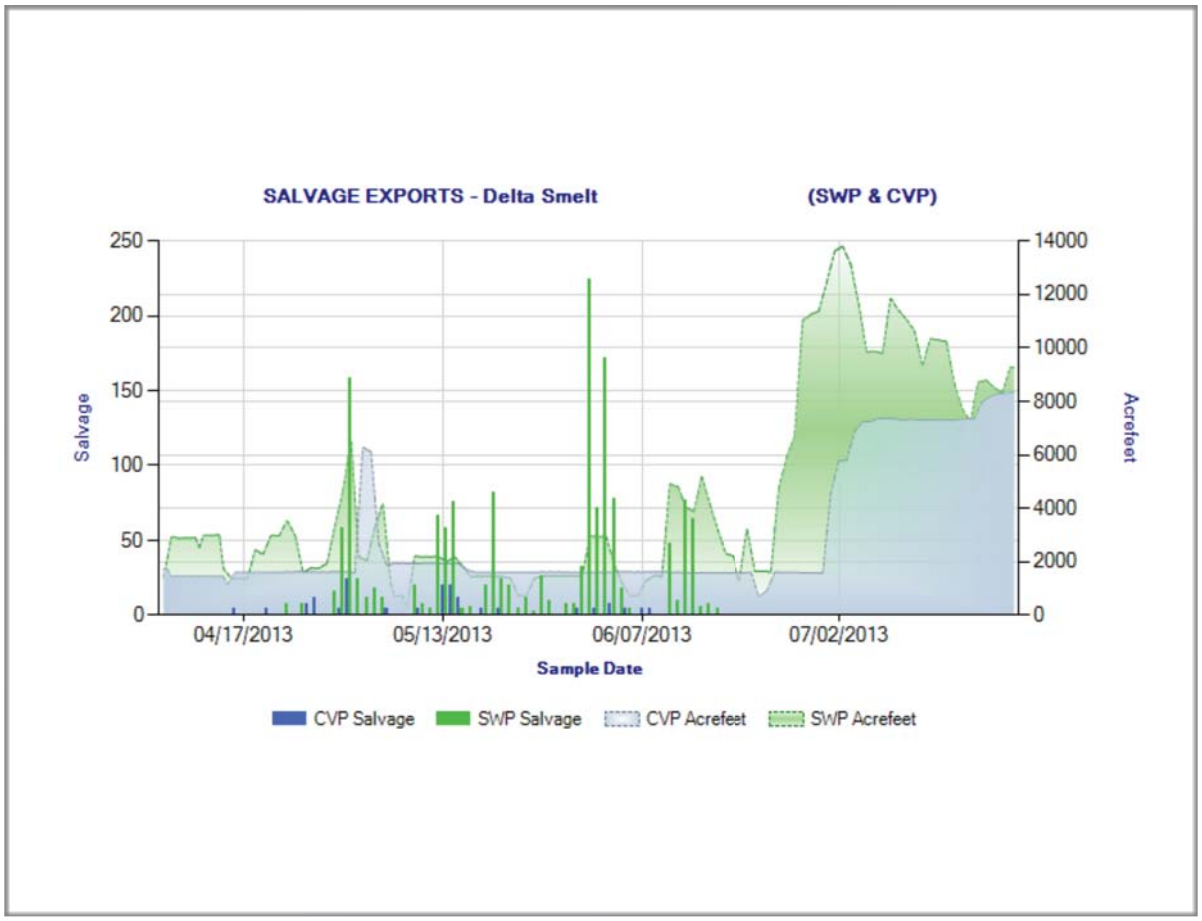



*Figure 21. Delta exports and smelt salvage In spring and summer 2013.* (Source: USBR MP)

First, the high inflows, low exports and high outflows kept the LSZ away from the influence of the pumps toward the end of June. Until about 8 July export demand was satiated by the pool of freshwater left over in the Delta from prior high inflows as observed in Clifton Court Forebay EC (Figure 11). But soon thereafter evidence of the LSZ being drawn to the pumps was apparent.

So why were no smelt salvaged after exports picked up and the LSZ entered the Central Delta? The answer is high water temperatures by early July. No smelt were able to survive passage to the

South Delta export salvage facilities because of lethal water temperatures in the Central and South Delta.

The high exports and high inflows at the end of June and beginning of July not only pulled the LSZ upstream into the Central Delta and under influence of the South Delta pumps at Clifton Court Forebay, but it also lead to a sharp increase in water temperature throughout much of the LSZ that was lethal to delta smelt (77-80F or 25-27C). Warm weather occurred at the beginning of July throughout the Delta (but reaching over 100F to the north and east), along with nearly a week of 20,000 cfs inflow (from the north and east) with high ambient water temperature, and near 10,000 cfs exports resulted in near lethal or lethal water temperatures in the North, Central, West, and South Delta. Smelt were able to survive only in the western portion of the LSZ of eastern Suisun Bay and extreme western Delta (Figure 22) where water temperatures remained sub-lethal at 22-24C.

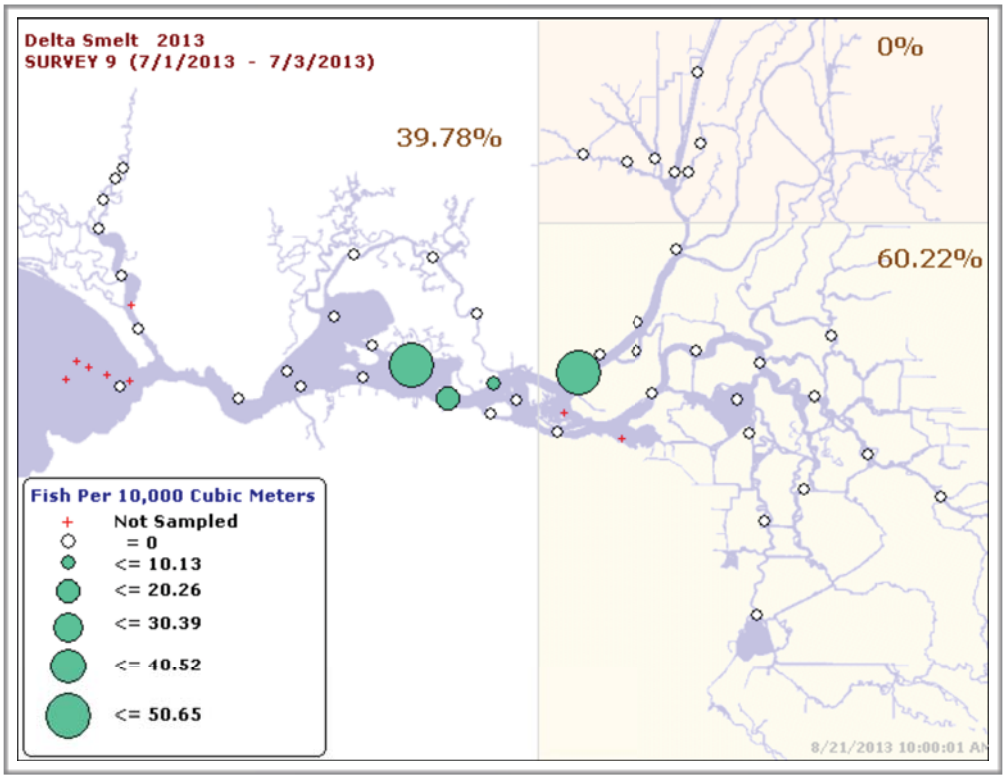



*Figure 22. Early July 20-mm Smelt Survey results. (Source: http://www.dfg.ca.gov/delta/data/20mm/)*

This ninth and last of the Department of Fish and Wildlife's 2013 20-mm Survey shows that the majority of smelt were in the Delta at the beginning of July. The Summer Townet Survey that began in mid June (unpublished CDFW data) has provided a Delta smelt abundance index based upon its first two surveys (weeks of June 10 and 24). The preliminary 2013 index is 0.7, down from last year's 0.9. The results from the remaining Summer Townet Survey and the Fall Mid-

Water Trawl Survey will help reveal the full extent to which Delta smelt were harmed by Project operations this summer. Based upon my decades of experience, I suspect that summer 2013 parallels the conditions during the Pelagic Organism Decline (POD) and record low smelt indices early in the last decade.

# Solution

The problem remains that neither the D-1641 Water Quality Objectives for the Delta or the OCAP Biological Opinions have protections for Delta smelt after June. The demise of VAMP's limit on exports in the late spring has exacerbated the problem. The D-1641 dry and critical year standards for outflow are simply too low to protect delta smelt and their important habitats. Even with higher outflows, excessive exports remain a problem. The inflows necessary to sustain high exports reduce reservoir storage and cold-water pools, and bring warmer, low-productive reservoir water into the Delta and LSZ. Cooler, more productive, more turbid water, critical to delta smelt growth and survival is first exported from the Delta and then replaced with warm, low turbidity, low productivity reservoir water. Higher summer outflow and reduced exports (and a minimum of inflow necessary to sustain reduced exports) in drier years are fundamentally necessary for delta smelt recovery. A minimum of inflow and exports will increase residence time and productivity, allow higher productivity waters and smelt to remain in the Delta, and allow Delta waters to remain cooler to sustain smelt.

# EXHIBIT 3

# Review of Summer 2014 Water Transfers Federal Environmental Assessment

## Introduction

On April 25, 2014, Governor Brown issued a Proclamation of a Continued State of Emergency related to the drought. The Proclamation finds that California's water supplies continue to be severely depleted despite a limited amount of rain and snowfall since January, with very limited snowpack in the Sierra Nevada mountains, decreased water levels in California's reservoirs, and reduced flows in the state's rivers. The Proclamation orders that the provisions of the January 17, 2014 Proclamation remain in full force and also adds several new provisions including: the State Water Board and the Department of Water Resources (DWR) are to expedite requests to move water to areas of need.

Federal water contractors in the Sacramento Valley recently were allocated by the US Bureau of Reclamation (Reclamation) up to 75% of their contract amounts of Central Valley Project (CVP) water this summer, while more "junior" water contractors in the San Joaquin Valley received 0%. The San Joaquin contractors would like to purchase some of the allocated water from the north and transfer it for their use through the federal Central Valley Project export facilities in the Delta to the south. Reclamation, which co-operates the Delta export facilities with the State Water Project, must notice the transfer under the National Environmental Policy Act (NEPA) as a federal action for public review and comment. Reclamation has provided public notice of the proposed transfers under a Finding of No Significant Impact (FONSI) with a supporting Environmental Assessment (EA).

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This document summarizes the major findings of my review of Reclamation's findings specifically as they apply to the effects of the proposed water transfers on Longfin and Delta smelt, two endangered species that reside in the Bay-Delta estuary and who may be adversely affected by the proposed water transfers. The Delta Smelt are only found in the Delta and are at their lowest population level ever recorded. Both smelt populations decline significantly in droughts. Water transfers are a contributing stressor in droughts.

The proposed water transfers would be carried out under applicable Delta protections for water quality and fish (and other beneficial users). The main protections are from the Delta Water Quality Control Plan (D-1641 Water Quality Standards), two federal Endangered Species Act biological opinions (one from the National Marine Fisheries Service for salmon, steelhead, and sturgeon; the other from the US Fish and Wildlife Service for Delta Smelt), and a State Endangered Species Act Incidental Take Permit (ITP) for state listed salmon, steelhead, and smelt (Longfin and Delta smelt). The State Water Board modifies the Standards regularly with Orders upon receiving requests from the California Department of Water Resources and concurrence from others. Water transfers are generally exempt under these Orders.

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The Delta water quality standards have been modified under recent State Water Board orders to save water supplies in reservoirs that have been depleted during the three years of drought. Delta outflow and salinity standards (required minimal limits) have been relaxed for the summer under recent orders to reduce the release of reservoir water to the Delta normally prescribed to block salt water intrusion from San Francisco Bay. The state and federal resource agencies responsible for protecting the listed endangered species in the Delta have generally concurred with provisions of the orders. 54

Water transfers come in various forms and may conform to the existing water quality standards and biological opinions, or have their own special rules from specific Orders or changes to biological opinions after consultations with agencies. The federal Central Valley Project (Shasta, Folsom, and New Melones reservoirs) and State Water Project (Oroville Reservoir) are the major sources of water transfer water. However, generally water transfers involve the sale of water from one entity to another. A good example is the sale of Yuba County Water Agency water from Bullards Bar Reservoir on the North Fork of the Yuba River to state and federal water contractors. The purchased water (often 50,000 acre-feet per year) is released over the summer down the Yuba River into the Delta for export "on top of" normal state and federal Delta exports under a special set of rules. While normal summer exports are limited to 65% of the freshwater inflow to the Delta, water transfer water released from reservoirs to the Delta may be exported at 100% of the added contribution to Delta inflow. Therein lies the basic problem with water transfers through the Delta. 55

In the Yuba summer transfer example there is a whole array of actions and potential problems or ramifications. First, water is released from the reservoir for an unintended purpose (not Yuba County irrigation). Storage is lowered. Recreation and future supplies are affected. The Yuba River (and Feather River) is subjected to abnormal flow patterns (good and bad). Extra electricity is generated above that normally allowed under the Yuba Accord. Second, the water enters at the north end of the Delta's tidal bowl and is exported on paper at the south end via the South Delta export pumps. What gets exported is really not Yuba water, but a mix of tidewater habitat with endangered species and their foodweb organisms.

Another good example of a water transfer through the Delta is the spring 30-day flow pulse from San Joaquin Valley reservoirs (100-150 thousand acre-feet) under the guise of a "fish flow". Normal rules call for export of only 35% of spring Delta inflow, but this transfer is allowed to export 100% or 1:1. This transfer occurs from mid-April to mid-May with several thousand cfs of water entering the South Delta from the San Joaquin River at Vernalis. The sources of the pulse flow are the Sierra reservoirs on the Stanislaus, Merced, and Tuolumne Rivers. 56

The problem with transfers is that each is usually small and flies under the radar, but together can have a large cumulative effect that generally is not considered and often ignored. Therefore assessments of transfer effects need consider the individual (local) effects, but more importantly the cumulative effects of the entire array of transfers.

The water transfers proposed by Reclamation are just a subset of the overall transfers proposed this summer. Reclamation's Environmental Assessment covers only proposed federal contractor transfers, and thus does not present sufficient information to assess the true nature and full extent of impacts of all the potential transfers that may occur this summer. Therefore this review is limited only to the specific effects of the proposed federal transfers, with some insights as to the overall effect of all the transfers. 57

The following review lays out the basis for my assessment in a way that is hopefully understandable to those not as familiar as me with the complexities of the Delta. The workings of the state and federal water project, the role of water quality standards, and their effects on Delta fish biology are generally highly contentious.

I provide a summary of my qualifications up front in the report to show my experience with the subject. I am very familiar with the workings and problems of the state's Delta water quality standards and the biological opinions for endangered Central Valley and Delta fishes. I understand how the water quality standards work and how the recent State Water Board orders affect Delta operations and fish. I attempt to explain how the Delta water quality standards work and how Delta operations and the resulting hydrology affect the Longfin and Delta smelt populations. I address how moving transfer water through the Delta for export under relaxed water quality standards places great risk to the smelt and the habitats they and many other species depend upon. I explain the key issues as I see and understand them, and include the data and analyses that support my reasoning. I have tried to minimize the vast amount of technical jargon that plague Delta issues.

I start with background on my qualifications and experience, and then summarize the water transfer requests, how they would work, and my assessment and conclusions. My focus on five key questions:

1. **Will water transfers increase the exposure of Longfin or Delta smelt to South Delta Exports?**
2. **Will water transfers reduce the growth or survival potential of smelt populations?**
3. **Will water transfers increase the risk of extinction of the smelt species?**
4. **Would water transfers under D-1641 standards pose a greater risk to smelt than would otherwise occur without water transfers?**
5. **Would water transfers under D-1641 standards for the transfer period as relaxed per the May 2, State Board Order pose a significant risk to smelt as compared to transfers under normal D-1641 standards for the transfer period?**

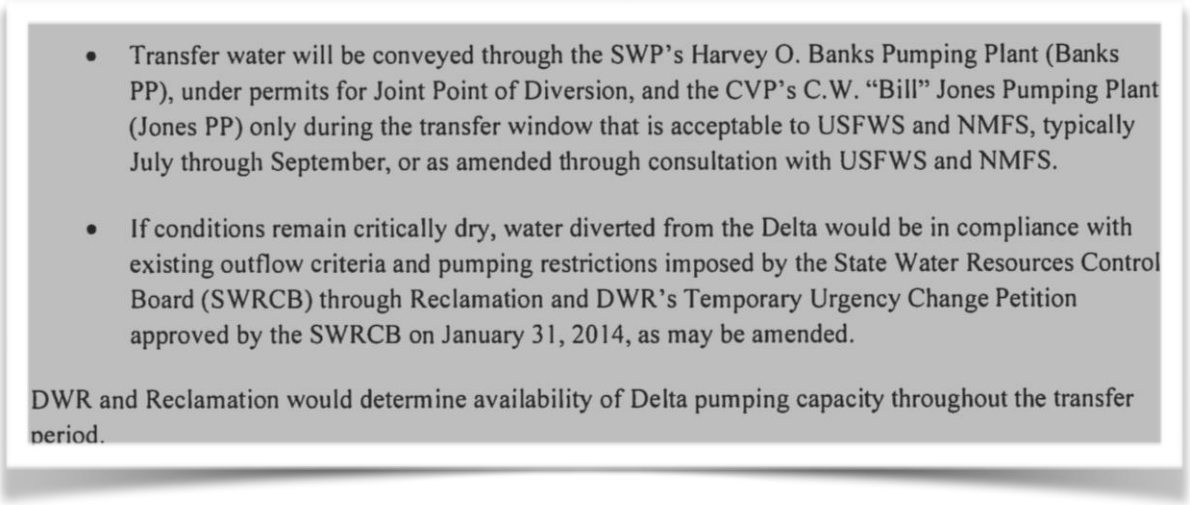
# Experience and Qualifications

I am a specialist in assessing environmental effects on fish and their aquatic habitats. I have over 40 years of experience at this along with degrees in fisheries, biology, and biostatistics. My professional career has focused on estuarine fisheries ecology with experience on East Coast and West Coast estuaries including 25 years since 1977 relating to the Sacramento-San Joaquin Delta Estuary. From 1977-1980 I was project director of Bay-Delta ecological studies for PG&E's Bay-Delta power plants effects studies. From 1980-82, I was a consultant to the State Water Contractors, the National Marine Fisheries Service, and State Water Resources Control Board (State Board) determining the effectiveness of the 1978 Bay-Delta Water Quality Standards in protecting the Bay-Delta ecosystem and striped bass population. From 1986-1987 I was a consultant to the State Water Contractors and Bureau of Reclamation during the State Board hearings on water quality standards. From 1994-1995, I was a consultant to the State Water Contractors and the California Urban Water Agencies, working on the 1995 Bay-Delta Water Quality Standards and how the new standards would affect the Bay-Delta ecosystem and its fish populations. From 1995-2003 I was a consultant to the CALFED Bay-Delta Program where I worked on various teams assessing the effects of alternative Delta operations and water supply infrastructure. From 2002 to 2010 I was involved in activities related to the Striped Bass Stamp Program, Salmon Hatchery Program, and Delta fish surveys funded by the US Fish and Wildlife Service to assess the effects on Delta fish and habitats. In the past decade I have

worked closely with the Fishery Foundation of California, the California Striped Bass Association, and the California Sport Fishing Protection Alliance on Delta science related issues including water quality standards and the Bay Delta Conservation Plan (BDCP). Most recently I have reviewed the effects of the various drought-related orders of the State Water Board and the potential effects of the State's 2014 Drought Plan on the Bay-Delta Estuary's fish populations and habitats.

# Water Transfer Proposal

Reclamation proposes to transfer up to 175,000 acre-feet of Central Valley Project water allocated to Sacramento Valley federal water contractors to San Joaquin Valley federal water contractors. The water would be released from Shasta Reservoir (at a rate of 205-420 cfs depending on the willingness of sellers) this summer and routed down the Sacramento River into the Delta where it will be exported at the federal South Delta export facilities to the San Joaquin Valley via the federal Delta Mendota Canal. The proposal states that the transfer through the Delta would occur under existing water quality standards and biological opinions requirements, as amended through agency consultations (Figure 1).



- Transfer water will be conveyed through the SWP's Harvey O. Banks Pumping Plant (Banks PP), under permits for Joint Point of Diversion, and the CVP's C.W. "Bill" Jones Pumping Plant (Jones PP) only during the transfer window that is acceptable to USFWS and NMFS, typically July through September, or as amended through consultation with USFWS and NMFS.

- If conditions remain critically dry, water diverted from the Delta would be in compliance with existing outflow criteria and pumping restrictions imposed by the State Water Resources Control Board (SWRCB) through Reclamation and DWR's Temporary Urgency Change Petition approved by the SWRCB on January 31, 2014, as may be amended.

DWR and Reclamation would determine availability of Delta pumping capacity throughout the transfer period.

**Figure 1. Transfer water conveyance (from Reclamation's FONSI letter)**

# Restrictions on Water Transfers

Under State Water Board orders, export restrictions in the Delta water quality standards would not apply to water transfers. Salinity standards would apply; however, these standards have been relaxed to accommodate water transfers. A small portion of the transfer water amount entering the Delta may not be exported in order to maintain specific salinity standards. Biological opinion export restrictions only apply through June. Thus to avoid these restrictions, the proposal only applies for the summer (July-September). In summer, exports are restricted to 65% of freshwater inflow, but this limitation does not apply to water transfers between state or federal water contractors. The State Water Board orders restrict exports from the Delta to health and safety needs of no more than 1,500 cfs, with the exception of transfers. "*Any exports greater than 1,500 cfs shall be limited to natural or abandoned flows, or transfers. Additionally, DWR and Reclamation, in cooperation with the fishery agencies, will*

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*consider transfer requests on an individual basis*. *The Interagency 2014 Drought Transfers Group will help facilitate the approval of proposed transfers*." (Source: http://ca.gov/drought/pdf/2014-Operations-Plan.pdf; page 10.)

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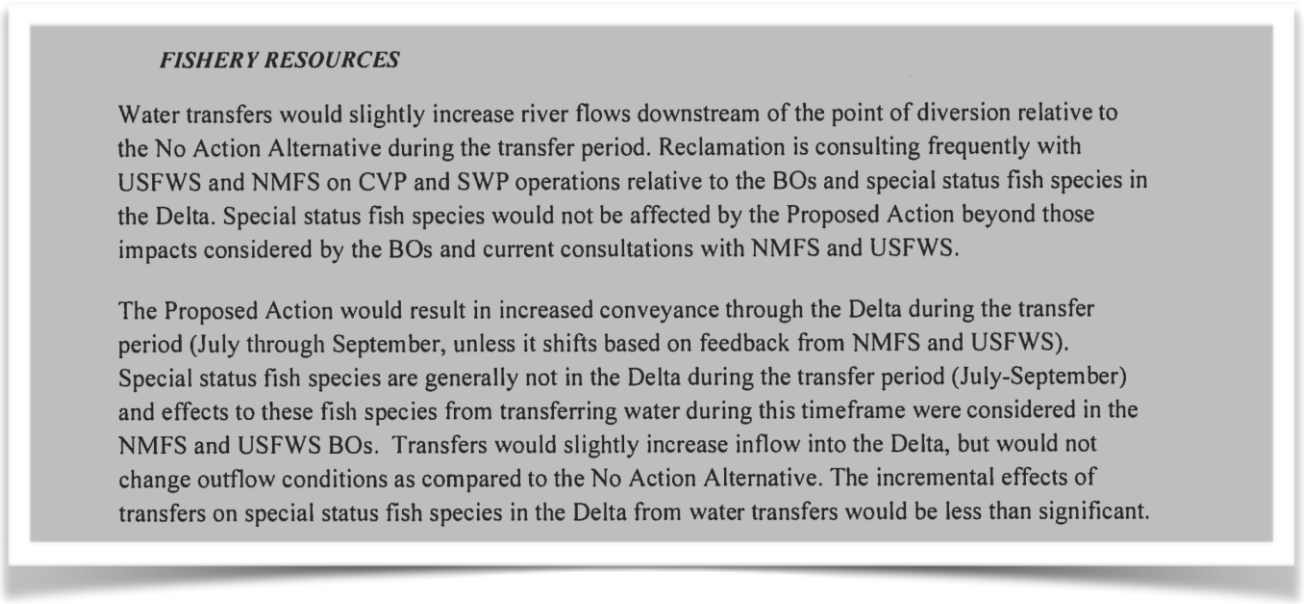
# Summary of Reclamation Assessment

Reclamation has issued a Finding of No Significant Impact (FONSI) based on the following reasoning:

In their FONSI cover letter, the Bureau stated that their Environmental Assessment-Incidental Take Statement (EA/IS) analyses indicated after a "*thorough and systematic evaluation*" that "*no potentially significant environmental impact may occur as a result of the Proposed Action, as mitigated*." Their specific statement on effects on fish resources follows in Figure 2. Their assessment as to potential cumulative effects of these and other transfers follows in Figure 3.

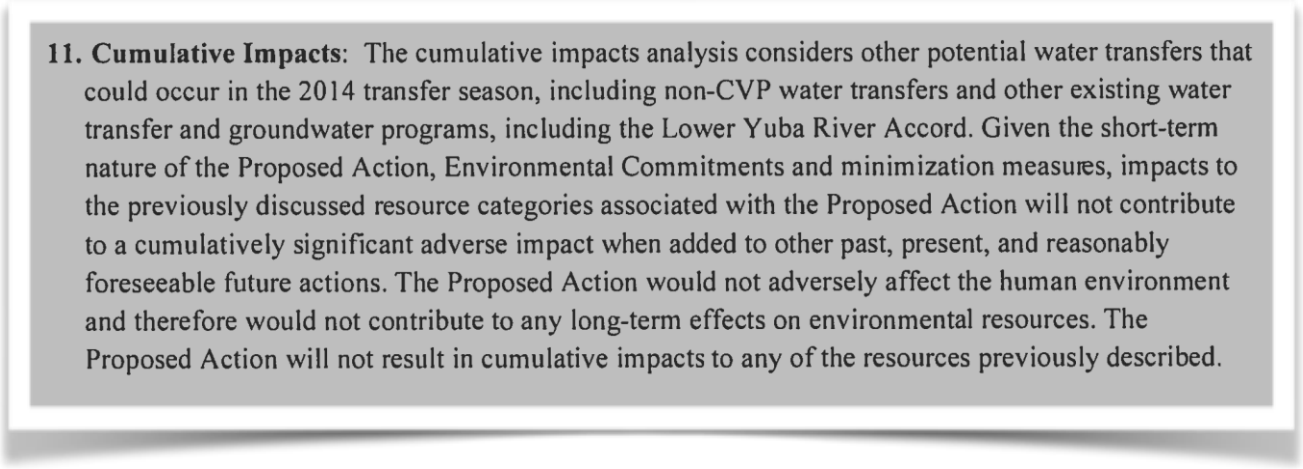


***FISHERY RESOURCES***

Water transfers would slightly increase river flows downstream of the point of diversion relative to the No Action Alternative during the transfer period. Reclamation is consulting frequently with USFWS and NMFS on CVP and SWP operations relative to the BOs and special status fish species in the Delta. Special status fish species would not be affected by the Proposed Action beyond those impacts considered by the BOs and current consultations with NMFS and USFWS.

The Proposed Action would result in increased conveyance through the Delta during the transfer period (July through September, unless it shifts based on feedback from NMFS and USFWS). Special status fish species are generally not in the Delta during the transfer period (July-September) and effects to these fish species from transferring water during this timeframe were considered in the NMFS and USFWS BOs. Transfers would slightly increase inflow into the Delta, but would not change outflow conditions as compared to the No Action Alternative. The incremental effects of transfers on special status fish species in the Delta from water transfers would be less than significant.

**Figure 2. Reclamation's effects statements from FONSI letter.**



11. **Cumulative Impacts**: The cumulative impacts analysis considers other potential water transfers that could occur in the 2014 transfer season, including non-CVP water transfers and other existing water transfer and groundwater programs, including the Lower Yuba River Accord. Given the short-term nature of the Proposed Action, Environmental Commitments and minimization measures, impacts to the previously discussed resource categories associated with the Proposed Action will not contribute to a cumulatively significant adverse impact when added to other past, present, and reasonably foreseeable future actions. The Proposed Action would not adversely affect the human environment and therefore would not contribute to any long-term effects on environmental resources. The Proposed Action will not result in cumulative impacts to any of the resources previously described.

**Figure 3. Reclamation's cumulative effects statement from FONSI letter**

# My Review Approach

My assessment is focused on the potential effects of the proposed water transfer on Longfin and Delta populations residing in the Delta during the summer of 2014. Specifically, I have assessed how the added Sacramento River Delta inflow and export of 205-420 cfs from the South Delta this summer would potentially affect the smelt populations. I also address the veracity of the Bureau's impact arguments and conclusions.

# Information Used for My Review

In preparing for this review and assessment of the effects of proposed water transfers on the listed smelt and their habitats, I have reviewed the daily patterns of Delta operations in recent drought years including 2014 through mid-May. In addition to the reviewing the water transfer proposals and the associated Reclamation environmental assessment and State Board orders, I have reviewed and used hourly or daily data on hydrology, water quality, Delta pumping plant operations and fish salvage, and smelt distributions in the Delta available via the Internet at various state and federal agency web sites. Most helpful is the review and analyses of the agencies' Smelt Working Group (SWG) that has met and reported weekly on Delta operations and the effect of drought operations on as well as assessments of risk to the smelt populations. The Smelt Working Group weekly reports[1] include data from special real-time smelt surveys not available from other sources, as well as the opinions of its members on relevant subjects.

# Review and Analyses

The basis for my review and analyses of effects of the proposed water transfers is a comparison of without-transfer conditions expected this summer with expected with-transfer conditions. Both conditions include recently relaxed water quality standards. The conditions this summer will be somewhat unique because for the first time in nearly 20 years the applicable Delta water

[1] http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm

quality standards have been relaxed because of the present extreme drought[2]. Specifically, (1) the critical year summer standard of 4000 cfs Delta outflow has been reduced to 3000 cfs; (2) the Delta salinity standard[3] for the Emmaton site has been moved upstream approximately 2.5 miles to Three Mile Slough; and (3) South Delta exports are limited to 1500 cfs from the normal maximum of 11,400 cfs or 65% of Delta freshwater inflow (whichever is less), not including transfers.

**Summer Delta Conditions per D-1641 Standards: Without Transfers:**

- Delta Inflow – comprised of abandoned flow and reservoir releases necessary to meet revised standards for Delta outflow and salinity.
- South Delta Exports ≤ 1500 cfs
- Delta Outflow ≥ 4000 cfs
- Delta Salinity at Emmaton = (≤ 2.78 mmhoes EC or ~ 1.7 ppt salinity)

**Summer Delta Conditions per D-1641 Standards: With Transfers:**

- Delta Inflow – comprised of abandoned flow and reservoir releases necessary to meet revised standards for Delta outflow and salinity as well as added water transfer inflow (205-420 cfs)
- South Delta Exports ≤ 1500 cfs plus additional 205-420 cfs transfer water
- Delta Outflow ≥ 4000 cfs
- Delta Salinity at Emmaton = (≤ 2.78 mmhoes EC or ~ 1.7 ppt salinity)

**Summer Delta Conditions per D-1641 Standards: As Relaxed by May 2 Order: With Transfers:**

- Delta Inflow - abandoned flow and reservoir releases necessary to meet standards for Delta outflow and salinity, as well as added water transfer inflow (205-420 cfs)
- South Delta Exports ≤ 1500 cfs plus 205-420 cfs transfer water
- Delta Outflow ≥ 3000 cfs
- Delta Salinity at Three Mile Slough = (≤ 2.78 mmhos EC or ~ 1.7 ppt salinity[4])

# Smelt Risk Assessment: Summer Delta Conditions per D-1641 Standards: Without Transfers

[2] http://www.swrcb.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/050214_tucp_order.pdf

[3] Note: the "Table 2 Western Delta Sacramento River" salinity requirement is 2.78 EC, which is about 1.7 ppt (or psu). Thus, the compliance location for the "Table 2 Western Delta Sacramento River" salinity requirement in Three Mile Slough is a good indicator of the center of the low-salinity zone that defines young Delta Smelt habitat in the Delta in the transfer period.

[4] This is very close to the expected average location of X2 (2 ppt), which would vary from EC as a function of water temperature. Note: X2 as defined as a depth specific or averaged parameter may move up to six miles or more in a single tidal cycle, and vary significantly on a daily, 14-day, or monthly average with outflow and tidal forces. EC can vary significantly as with X2 but also with depth.

Young Delta smelt being pelagic (open water residing) are at risk to exports from the South Delta under the regular standards and even more so under relaxed standards. Adding higher exports from the water transfers further adds to the risk. Regular without-relaxation conditions occurred as recently as the beginning of May 2014 and are expected to soon revert to the relaxed standard conditions through the summer. Delta smelt young were observed at both the state and federal south Delta export facilities in early May (Smelt Working Group May 12 meeting notes[5]). The process in which young smelt are vulnerable to export is depicted in Figure 4. Early May exports were higher at 2500 cfs than the 1500 cfs of the May 2 State Board Order, because of the San Joaquin River water transfer. Exports of this magnitude, though only about 20% of capacity, draw water south from the central Delta (see my added yellow arrows in Figure 4) to the export facilities (added red circle). Delta outflow in this case was 4000 cfs (the regular standard), slightly higher than that of the 3000 cfs of the relaxed standard. Freshwater inflow in Figure 4 is depicted by my added blue arrows. (Note: freshwater inflow is net inflow and may represent only a small percentage of the actual tidal flows.) Delta smelt collected in the 20-mm Net Survey[6] are depicted in Figure 4 by green dots. I also added the approximate location of the average 2 ppt salinity level (red line), which is very near the prescribed location of the regular water quality standard. Under the relaxed standards, this standard location (Emmaton) would move upstream to Three Mile Slough (the left most blue arrow). Note the relocation comes about by less freshwater flow coming down the Sacramento River channel at Three Mile Slough resulting in higher average salinity. With less westward transport young Delta smelt would be less inclined to move west to relative safety. With higher exports and more southerly transport, young smelt would be more inclined to move south across the Delta to the export pumps to their demise. Thus Delta smelt are more vulnerable to being drawn toward south Delta exports under the relaxed outflow standard and higher exports allowed under the transfer.

59

[5]http://www.fws.gov/sfbaydelta/documents/smelt_working_group/swg_notes_05-12-2014.pdf
[6] http://www.dfg.ca.gov/delta/data/20mm/

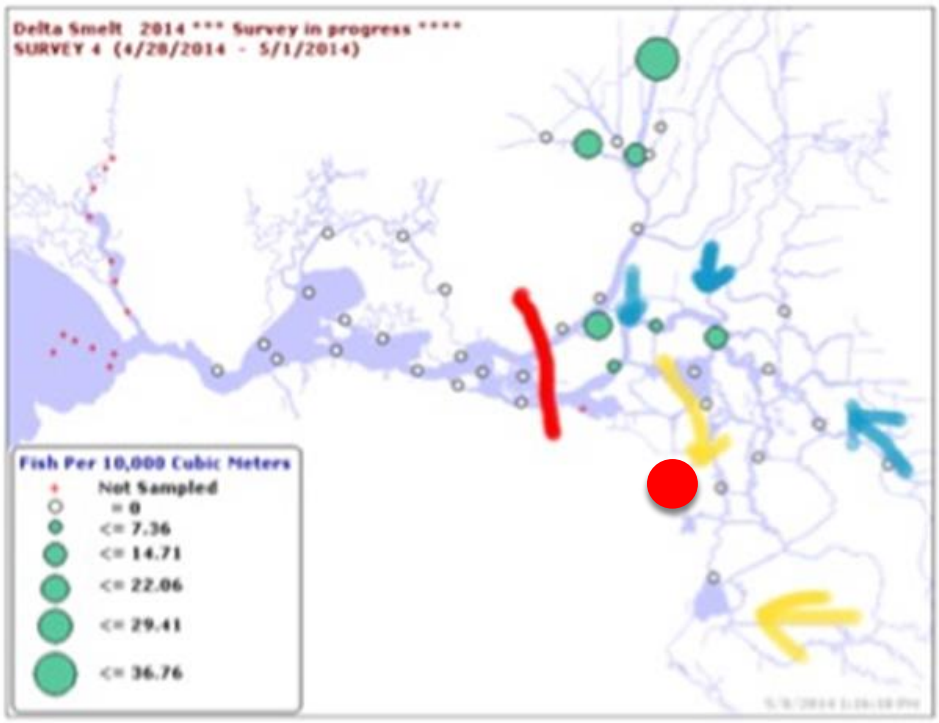



**Figure 4. The distribution of Delta smelt young in early May 2014 survey under near-normal conditions (4000 cfs Delta outflow). Blue arrows represent freshwater inflow. Yellow arrows represent reverse flows to south Delta export facilities at red circle. Red line represents the approximate location of 2 ppt salinity.**

The young Longfin smelt distribution in the same early May 2014 20-mm Net Survey[7] depicts a different risk pattern with Longfin concentrated further downstream in the Bay (Figure 5) than Delta smelt (Figure 4). Thus the Longfin were less vulnerable to the south Delta exports under these regular water quality standards (4000 cfs outflow and 2 ppt salinity at Emmaton). However, under relaxed standards with lower outflow (3000 cfs) and 2 ppt salinity at Three Mile Slough, Longfin concentrations would likely be further upstream in the central Delta and more vulnerable to exports. Increasing exports with water transfers would thus increase the risk to Longfin smelt albeit a lesser overall risk than that for Delta smelt.

60

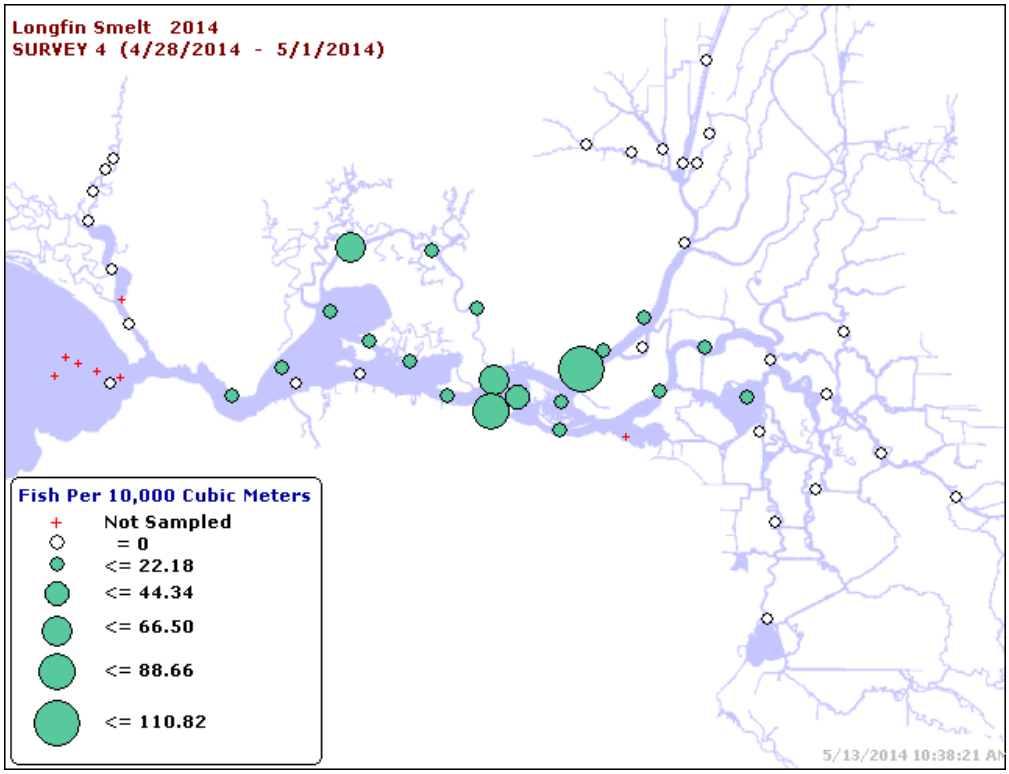



**Figure 5. Distribution of Longfin smelt young in early May 2014 survey.**

[7] http://www.dfg.ca.gov/delta/projects.asp?ProjectID=20mm

To further characterize the risk to smelt, I also looked at the early summer distribution Delta smelt in recent drought years 2009 (Figure 6) and 2013 (Figure 7). In each case outflows were slightly higher than the standards and Delta smelt were concentrated in the west and north Delta. With a change to the relaxed standards, Delta smelt in these two situations would likely shift with the 2 ppt salinity line (solid red line) upstream to a new location (dotted red line) where Delta smelt would be at much higher risk to south Delta exports. Indeed, Delta smelt were observed in south Delta export fish-salvage collections[8] in all three periods with the normal standards, low-outflow, low-export conditions (Figures 8, 9, and 10). 61

## Smelt Risk Assessment: Summer Delta Conditions per D-1641 Standards: With Transfers

While Reclamation has not requested water transfers to occur under normal (non-relaxed) standards, under the Orders water transfers could be conducted in this manner. Such a situation may arise if higher abandoned flows from rainstorms increase reservoir storage or Delta inflows and thus provide for (allow) exports higher than 1500 cfs. In which case, water transfers would occur as they have in past years. With the addition of transfers, the risks to smelt would increase as exports would increase under the same outflow. Delta outflow requirements would be 4000 cfs or higher, plus the added exports would increase risk as they occur under the transfer rule of 100% of inflow compared to the normal export rule of 65% exports/inflows. It is my opinion that the added risk to Delta smelt from transfers is lower the higher the total exports, because the relative proportion of the transfers declines with increasing exports. Thus, the relative effect of transfers is higher under low exports because the transfers represent a higher relative proportion of the inflows and exports. The risk can be amplified if the federal contractor transfers represent only a portion of the potential transfers being proposed this summer. 62

## Smelt Risk Assessment: Summer Delta Conditions per D-1641 Standards: As Relaxed by May 2 Order: With Transfers

To assess the potential risk to Delta smelt of adding summer transfers under relaxed standards I looked at the distribution of Delta smelt in these same surveys from the beginning of summer in recent drought years 2009 and 2013 to ascertain the potential risk to the Delta smelt from increased exports from transfers. It is my opinion that the risk to Delta smelt from transfers is greater under the new relaxed standards. As stated above, the relaxation of outflow from 4000 cfs to 3000 cfs moves the concentrations of Delta and Longfin smelt further to the east where they are more likely to be drawn to the south Delta exports. Adding 15-25% to Delta exports from the water transfers under these low-outflow, low-export conditions adds significantly to the risk. Smelt would be more likely to enter the north-to-south, cross-Delta flow-transport stream to the south Delta exports. It is for this reason that the summer export standard to protect all beneficial uses is 65% of Delta inflows. Allowing water transfers to occur at or very near 100% ignores this basic premise for protecting the beneficial uses including smelt, other fish, and their habitat-foodweb resources. If the federal contractor transfers represent only a portion of the 63

[8] Note: each of the federal and state pumping plants has fish collection facilities that "salvage" fish prior to entering pump facilities. These fish are collected and trucked to the west Delta. Only a very small percentage of smelt survive the salvage process. Furthermore, many of the smelt that move south in the net flows of the export pumps across the Delta are believed to be lost prior to reaching the export salvage facilities.

potential transfers being proposed this summer, then the risk to Longfin and Delta smelt from higher transfer amounts would be even greater. 63

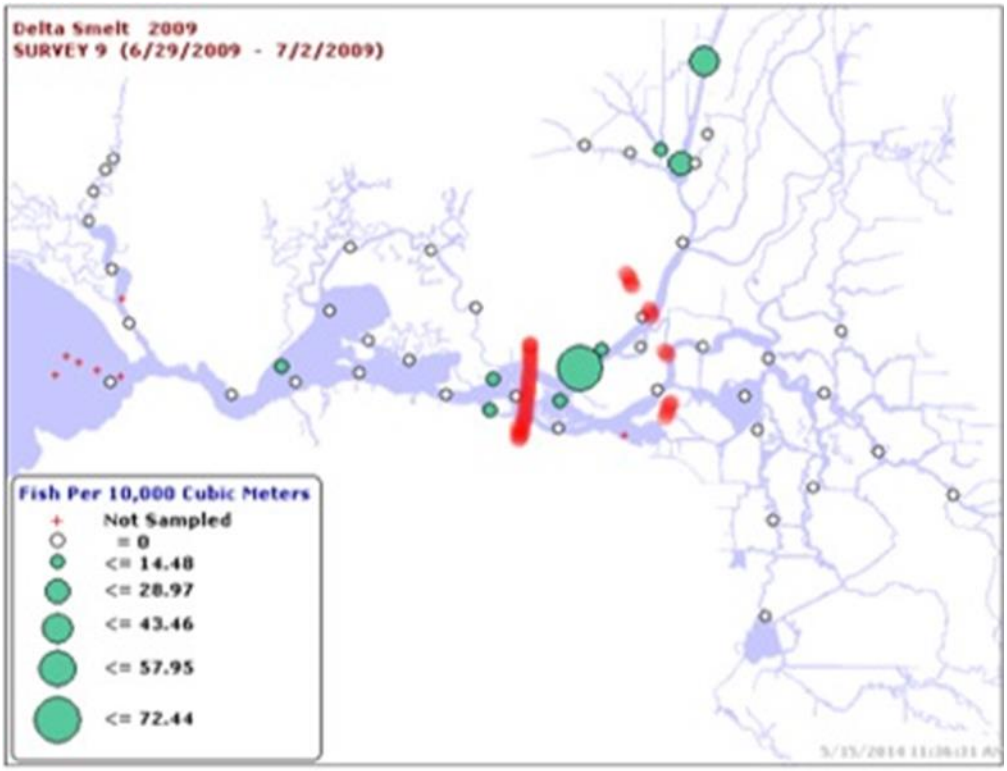



**Figure 6. Distribution of Delta smelt from early summer survey in 2009. Red line depicts the approximate location of 2 ppt salinity during the survey. Dotted red line depicts the likely location of 2 ppt salinity with only 3000 cfs outflow under the relaxed standards of the 2014 Orders.**

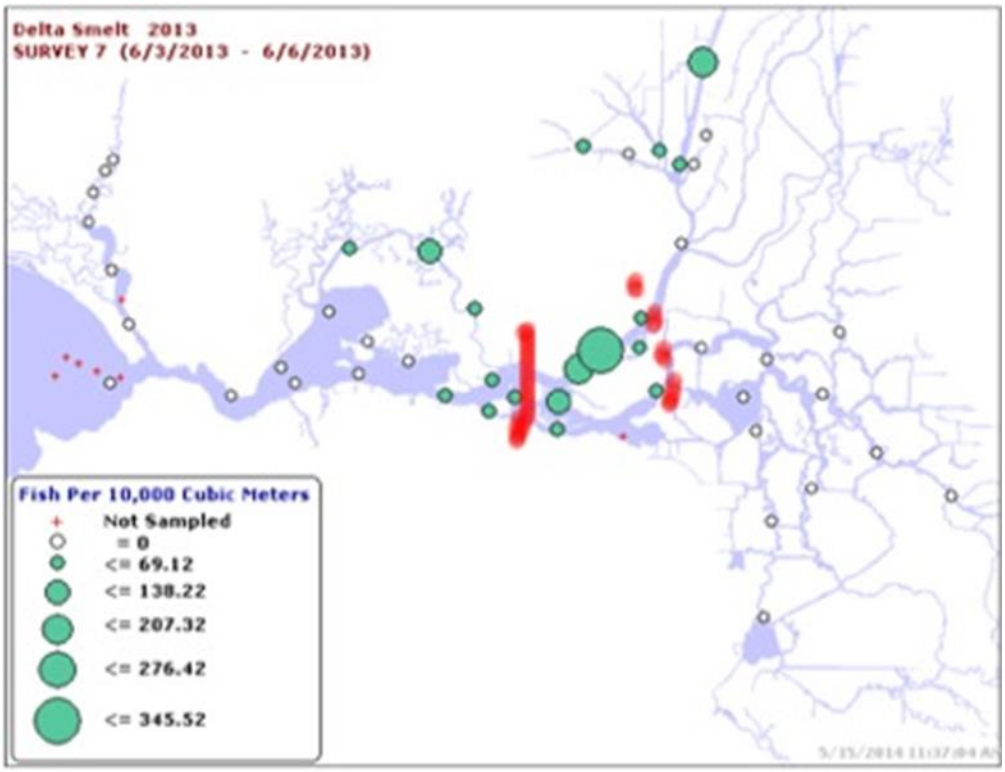



**Figure 7. Distribution of Delta smelt from early summer survey in 2013. Red line depicts the approximate location of 2 ppt salinity during the survey. The dotted red line depicts the likely location of 2 ppt salinity with only 3000 cfs outflow of the relaxed standards under the 2014 Order.**

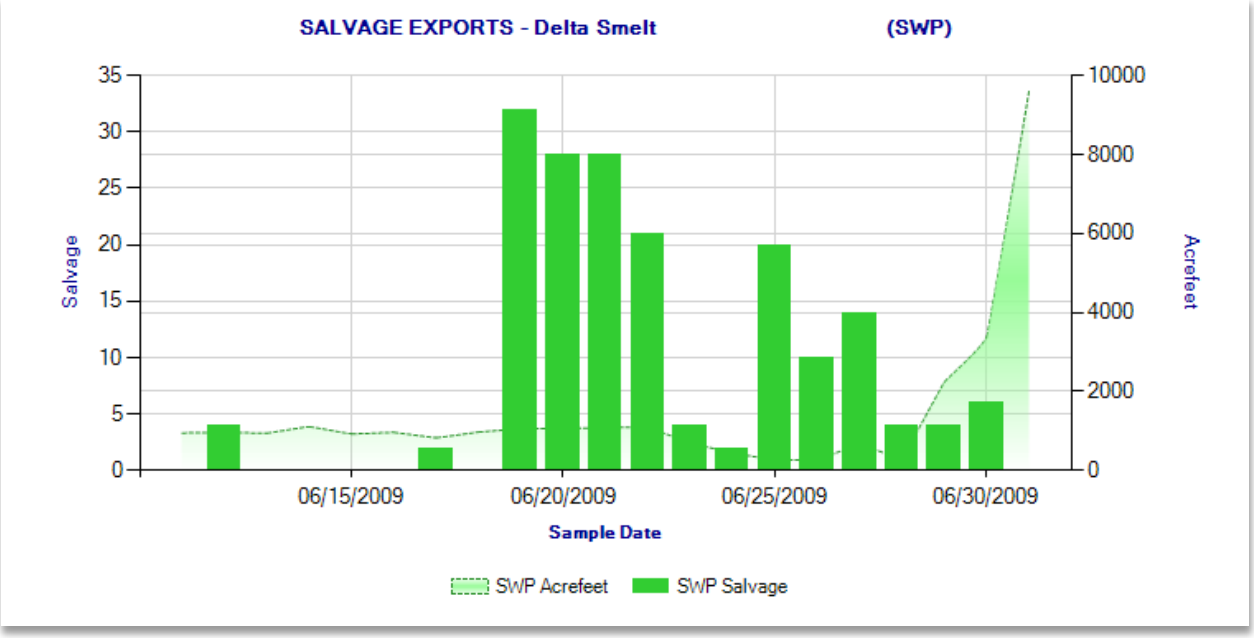



**Figure 8. Salvage of Delta smelt at the Clifton Court Forebay fish collection facilities in the south Delta in June 2009. The export rate was less than 1000 cfs during this period of low Delta outflow.**

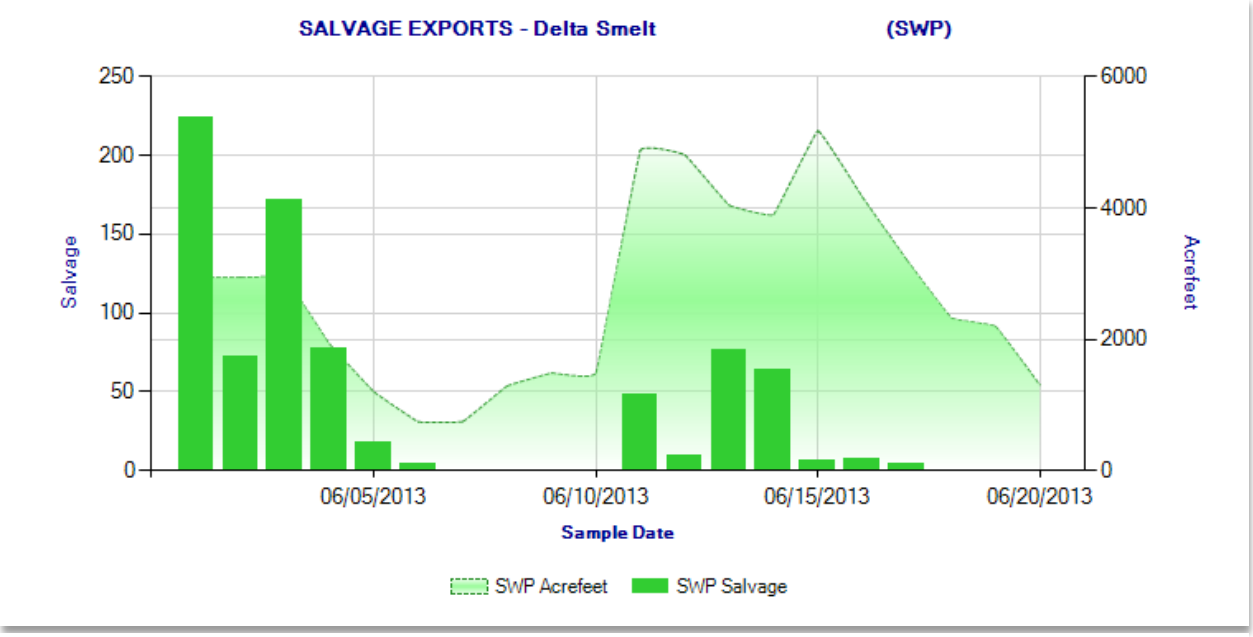



**Figure 9. Salvage of Delta smelt at Clifton Court Forebay fish collection facilities in the south Delta in June 2013. The export rate was 500-2500 cfs during this period of low Delta outflow.**

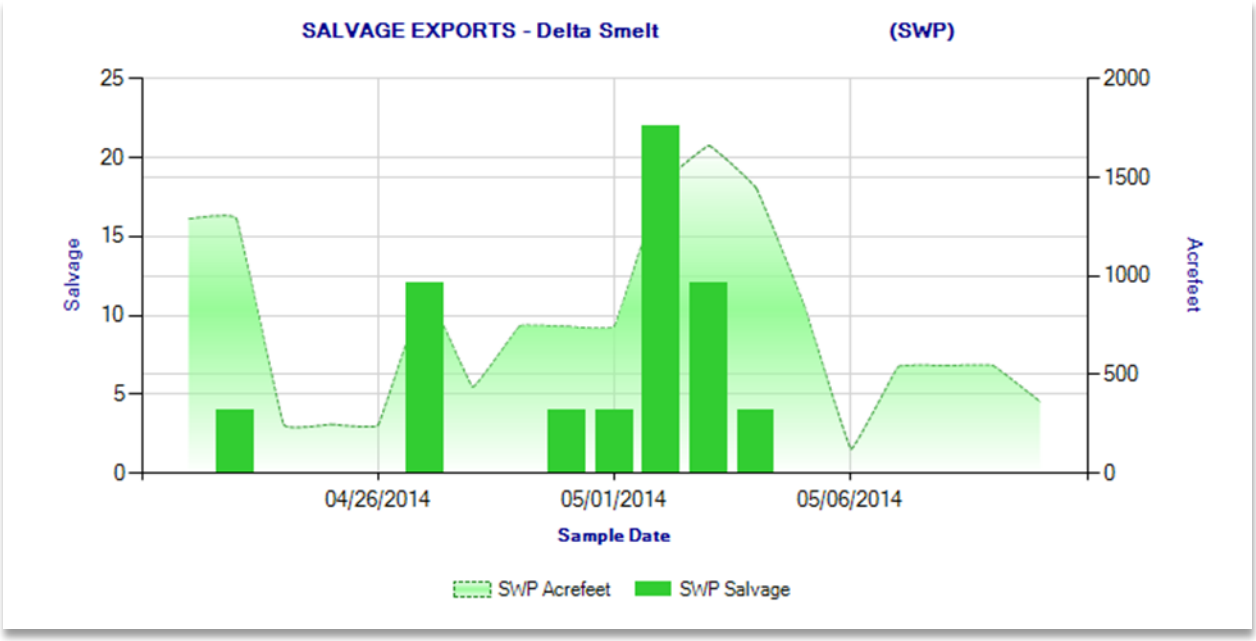



**Figure 10. Salvage of Delta smelt at Clifton Court Forebay fish collection facilities in the south Delta in late April and early May 2014. Export rate was less than 3000 cfs during this period of low Delta outflow.**

# My Answers for Key Questions

In my review and analyses I kept in mind the key questions I was going to address on the potential effects of the Proposed Action:

1. Will water transfers increase the exposure of Longfin or Delta smelt to South Delta Exports?
2. Will water transfers reduce the growth or survival potential of smelt populations?
3. Will water transfers increase the risk of extinction of the smelt species?
4. Would water transfers under D-1641 standards pose a greater risk to smelt than would otherwise occur without water transfers?
5. Would water transfers under D-1641 standards for the transfer period as relaxed per the May 2, State Board Order pose a significant risk to smelt as compared to transfers under normal D-1641 standards for the transfer period?

Opinion on Question 1: Water transfers this summer under normal or relaxed water quality standards would significantly increase the risk to smelt residing in the Delta to being drawn into the south Delta and exported (lost) at the federal and state export facilities. 64

Opinion on Question 2: Water transfers will increase the export of low salinity pelagic habitat; and degrade remaining habitat through increase water temperatures, reduced foodweb productivity, and lower turbidity in smelt nursery areas (from higher river inflows of water transfers); which would reduce growth and survival of Longfin and Delta smelt. 65

Opinion on Question 3: The Delta smelt and Longfin smelt populations are at or near record low index levels. Any further stressors such as higher exports from water transfers on the population would significantly increase the already high risk of extinction. The Bay-Delta population of Longfin smelt risk of extinction though less than that of Delta smelt is also higher because the relaxed standards will shift their population upstream from the relative safety of Suisun Bay into the West and Central Delta where the effects of added transfers will be significantly higher. 66

Opinion on Question 4: Water transfers under normal D-1641 standards and under normal dry year conditions with low Delta inflows, low Delta outflows, and low exports pose a significant risk to smelt because transfers have a higher proportional effect on the conditions. Under 1:1 criteria, transfers increase inflow and exports proportionally over outflow, which increases the risk to smelt. 67

Opinion on Question 5: Water transfers in dry year conditions under relaxed D-1641 standards water quality standards would significantly increase the risk to smelt over that under the normal water standards. With even less outflow and a LSZ being further upstream and well into the cross-Delta flow of export water, transfers pose a much greater risk to the smelt 68

# Conclusions

(1) The EA for the 2014 North to South Water Transfers does not present sufficient information to assess the true nature and extent of impacts that water transfers may have on Longfin and 69

Delta smelt. Specifically, the EA does not address the added risk from the changes to the water quality standards requested by Reclamation and approved by the State Water Board. 69

(2) With or without the relaxation of the water quality standards, the transfers are likely to have a significant adverse effect on Longfin and Delta smelt through increased direct loss of young smelt to south Delta exports and indirect loss from degradation of smelt critical habitat by higher water temperatures, lower turbidity, and reduced foodweb productivity. 70

(3) State Board Orders and the April 18 Drought Plan call for changes in Delta water quality standards (D-1641) that increase already high risks to the Bay-Delta ecosystem including Longfin and Delta smelt. Adding water transfers under relaxed standards will add significantly to already high risks.

(3.1) Relaxed outflow standards in summer (reduced outflow from 4000 cfs to 3000 cfs) will reduce the amount of low-salinity habitat in the Delta critical to Longfin and Delta smelt (two listed species that reside primarily in the low salinity zone in late spring and summer), and reduce migration cues for smelt that must pass through the Delta to their fall-winter nursery areas in upper San Francisco Bay. In addition to the decline in area of the low salinity zone, the low salinity zone will be located further upstream (to the east) in the Central and Northern Delta which will result in poor water quality (high water temperatures that may reach lethal levels for smelt, and higher concentration of chemicals including ammonia and pesticides potentially lethal to smelt and their food organisms). Further deterioration of the low salinity zone would occur from higher water temperatures, lower turbidity, and poor Delta foodweb production, as well as the potential upstream expansion of invasive non-native Bay clams. Lower turbidity will reduce smelt growth and survival, and lead to increased predation by non-native fish species on native fish species including smelt. In July there would be no protection for smelt and other pelagic Bay-Delta fish species and their plankton food supply from planned Delta exports that include water transfers. The overall effects will result in potentially dramatic changes to the Bay-Delta endangered fish populations that will last for decades to come. 71

(3.2) The proposed change in the lower Sacramento agricultural water quality standard from Emmaton to Three Mile Slough (necessary under the relaxed lower Delta outflow) will raise Delta salinities and allow further reductions in Delta outflows to the detriment of smelt, salmon, and steelhead. Salinity at Emmaton and Rio Vista in the lower Sacramento River will more than double (EC will go from 2 to 5 millimhos at EMM). Salinity in water exported from the south Delta including transfer water will also be higher with relaxed standards.

(4) Only federal Central Valley Project water transfers were included in the Environmental Assessment. Significant other transfers are possible this summer, thus no adequate cumulative effects assessment was conducted by Reclamation. 72

# Veracity of Reclamation FONSI Conclusions

- *"Special status species would not be affected by the Proposed Action beyond those impacts considered by the BOs and current consultations with NMFS and USFWS."* Neither biological opinion prescribes protection for covered species during the summer. However, 73

both opinions recognize existing water quality standards (mainly 65% export/inflow and Delta salinity standards) as valid protections. (e.g., USFWS BO, pages 29, 128) 73

- *"Special status fish species are generally not in the Delta during the transfer period (July-September)."* Longfin and Delta smelt both will reside in the Delta under the relaxed water quality standards as they do in most drought years. Nearly the entire Delta smelt population will reside within the Delta this summer with or without the approved changes to the water quality standards. 74

- *"Effects to these fish species from transferring water during this timeframe were considered in the NMFS and USFWS BOs."* While water transfers up to 600,000 acre-feet were considered in the BOs, such water transfers were assumed to occur under existing water quality standards, not under the specific relaxed standards of: 3000 cfs outflow; and ag-salinity standard moved 2.5 miles upstream from Emmaton to Three Mile Slough. 75

- *"Transfers would slightly increase inflow into the Delta, but would not change outflow conditions compared to the No-Action Alternative."* Delta outflow would be controlled by new relaxed standard of 3000 cfs. Delta inflows from the Sacramento River would increase when Sacramento Valley contractors do not divert their allocated water and instead allow it to pass through to the Delta for export. 76

- *"The incremental effects of transfers on special status fish species in the Delta from water transfers would be less than significant."* The incremental effect of transfers will be significant, especially under the conditions expected with relaxed standards. 77

- *"The Proposed Action will not result in cumulative impacts to any resources previously described."* The cumulative effect of all transfers would likely have serious consequences to the smelt populations incrementally above that of the relaxed standards. The Proposed Action being one of the potentially larger transfers would have one of the greatest incremental effects. 78

# EXHIBIT 4

Thomas Cannon

5161 Oak Shade Way,
Fair Oaks , CA 95628
916-952-6576
tccannon@comcast.net

June 9, 2014

Tom Lippe
Law Offices of Thomas N. Lippe APC
201 Mission St., 12th Floor
San Francisco, CA 94105

Dear Tom,

At your request, I have reviewed Delta outflows records maintained by the Department of Water Resources to assess whether the outflow measures known as the Net Delta Outflow Index (NDOI) and Net Delta Outflow (NDO) are comparable. My review indicates that in low flow conditions such as July of 2013 and May of 2014, NDOI grossly overestimates actual Delta outflow (see attached charts.)

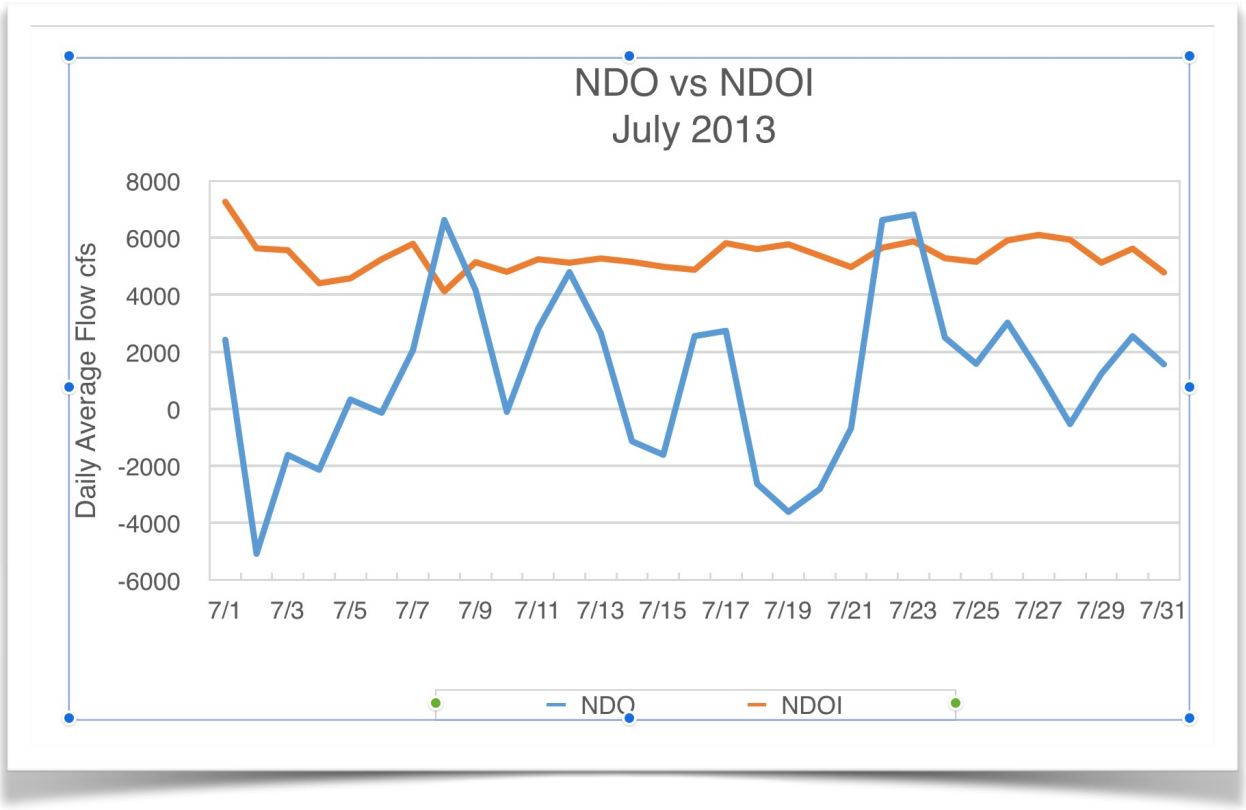
The comparison is similar to one provided by DWR's for NDOI and NDO for the year 2013 at:

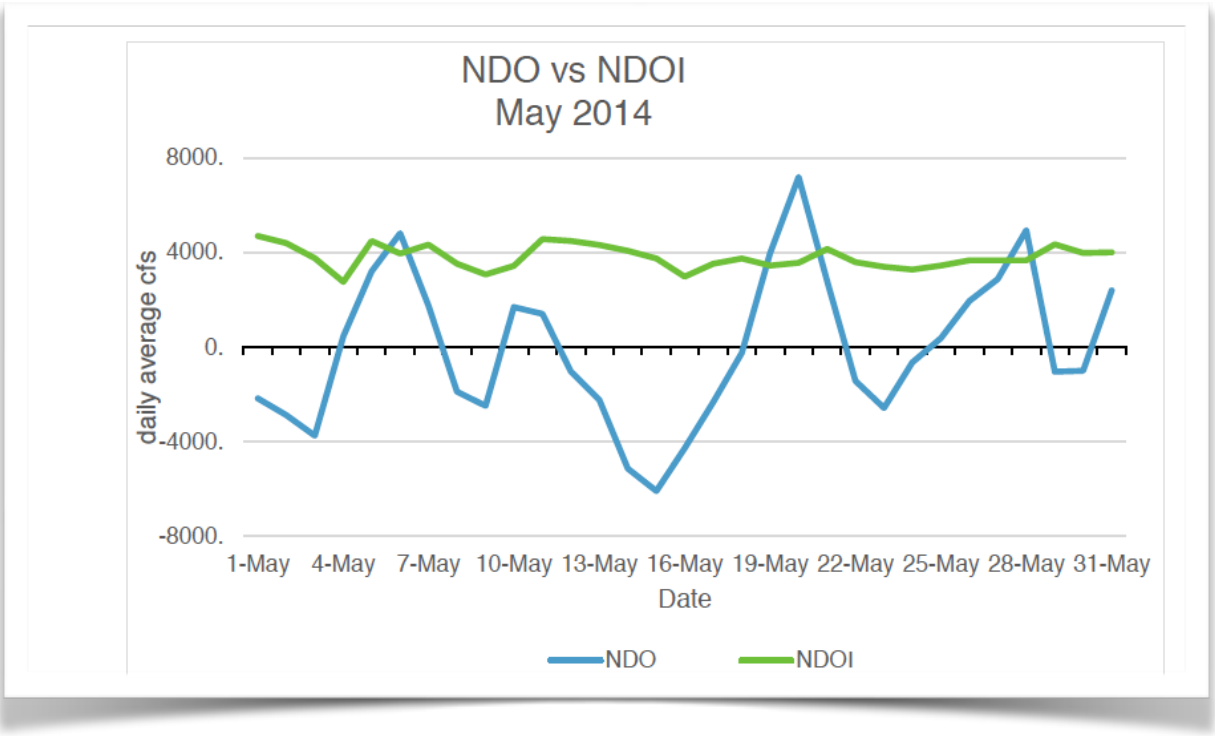
http://www.water.ca.gov/dayflow/docs/2013_Comments.pdf .

In July of 2013, average NDOI was 5,340 cfs, while average NDO was 1,169 cfs. In May of 2014, average NDOI was 3805 cfs, while average NDO was - 45 cfs.

Sincerely yours

Thomas Cannon


NDO vs NDOI
July 2013
Daily Average Flow cfs
8000
6000
4000
2000
0
-2000
-4000
-6000
7/1 7/3 7/5 7/7 7/9 7/11 7/13 7/15 7/17 7/19 7/21 7/23 7/25 7/27 7/29 7/31
NDO
NDOI


NDO vs NDOI
May 2014
daily average cfs
8000.
4000.
0.
-4000.
-8000.
1-May 4-May 7-May 10-May 13-May 16-May 19-May 22-May 25-May 28-May 31-May
Date
NDO
NDOI

# EXHIBIT 5

# United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, CA 95825-1898


IN REPLY REFER TO:

MP-410
ENV-6.00

JUN 06 2014

Thomas N. Lippe
201 Mission Street
San Francisco, CA 94105

Subject: 2014 San Luis & Delta-Mendota Water Authority Water Transfers - NEPA

Dear Mr. Lippe:

Your letter dated May 30, 2014 addressed to Brad Hubbard of my staff was forwarded to me. The Bureau of Reclamation (Reclamation) has reviewed this letter and the Exhibits provided, including Tom Cannon's *Review of Summer 2014 Water Transfers Federal Environmental Assessment Report*. Your letter and Mr. Cannon's report both focus specifically on a claim that the proposed 2014 San Luis & Delta Mendota Water Authority Water Transfers could have significant effects on the Federally listed delta smelt.

Our office solicited the review of Mr. Cannon's report by biologists Ms. Frances Brewster with Santa Clara Valley Water District and Dr. Erwin Van Nieuwenhuyse with Reclamation's Bay Delta Office. The responses we received are provided below.

Ms. Frances Brewster's assessment:

*Their arguments make no sense to me.*

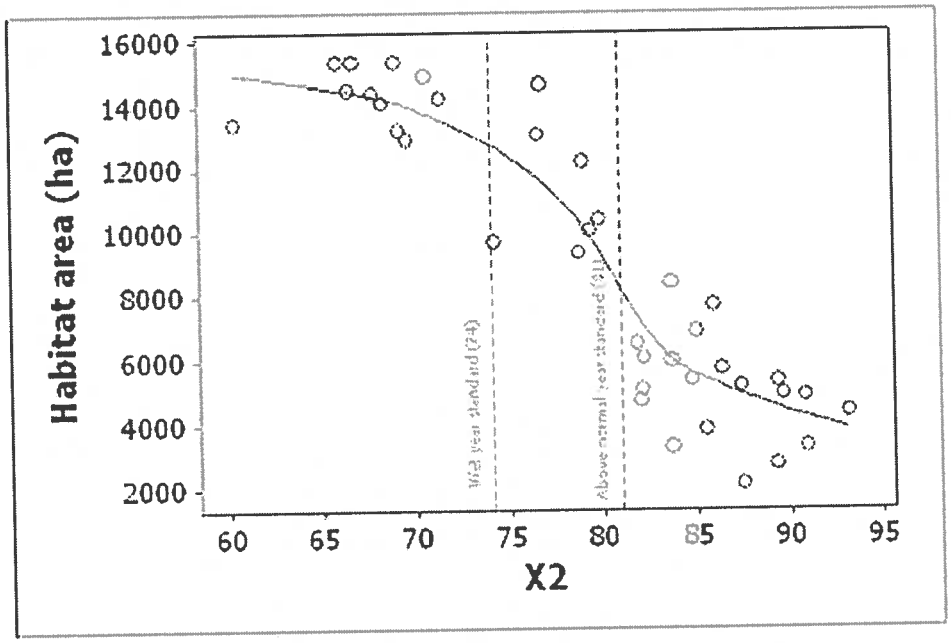
*1. They claim there will be higher mortality due to higher temperatures at 3-mile slough than at Emmaton. That claim is not supported by the data. I compared temps at Emmaton with those at Rio Vista for 7/1/2013 through 10/2/2013 (the transfer window). Rio Vista is considerably further upstream than 3-mile slough, but the 3-mile slough station doesn't have a temp sensor. The average difference in temperature is 0.5 degrees F (n=2173 hourly measurements). That difference in temperature is insignificant. (see attached file)*

*2. They claim there will be increased entrainment of young-of-the-year due to higher reverse flows. The BiOps have no OMR requirements during the transfer window and in a typical year OMRs can be upwards of -8,000 cfs (easy to pull some real data to support actual OMR during that timeframe). Will the transfers even come remotely close to creating that level of negative OMR (model data ought to be available to support that). There is no BiOp OMR requirements during the transfer window timeframe because entrainment risk is so low based on historic data (the BiOp should provide support for that).*

*3. Their final claim makes the least sense. They claim that transfer flows will displace plankton rich, higher turbidity water with plankton poor, low turbidity water. How is what is being proposed any different from a normal water year when the projects make reservoir releases for export and to augment outflow?*

*4. Finally, assuming the amount of LSZ habitat makes a difference, according to FWS the available habitat area (as defined by salinity only) when X2 is at Emmaton versus at 3-Mile Slough is essentially equal. Both areas are within the confined Sacramento River channel around X2=95km (see figure below from BiOp at 374).*

**Figure B-17. Relationship between X2 and habitat area for delta smelt during fall, with standard shown for wet and above normal years.**




Dr. Erwin Van Nieuwenhuyse's assessment:

*I read Tom Cannon's report and Frances Brewster's comments and agree with Frances' assessment. I don't think that Tom's concerns about increased entrainment are warranted given how low OMR flows are expected to be and his concerns about increased water temperature and reduced turbidity and foodweb productivity are also off the mark. As Frances points out, the area of the Low Salinity Zone (LSZ) will not change appreciably and the temperature difference between Emmaton and Rio Vista is negligible. Under these low flow conditions, turbidity in the LSZ is mostly a function of wind-induced sediment resuspension rather than flow. Similarly, I would not expect the proposed water transfers to have any discernible effect on the LSZ foodweb. Most of the smelt population now resides in the Sacramento Deepwater ship channel upstream of Cache Slough. The ship channel offers relatively high food supplies for smelt and is thermally stratified during July-Oct. Our data indicate that temperature in the lower half of the water column (bottom six meters) remains below 23 C during summer-fall. The ship channel is thus a temperature refuge for over-summering fish. By contrast, unless management actions are taken to stimulate a fall phytoplankton bloom in the lower Sacramento River, the LSZ during the water transfer period is likely to remain relatively food-poor with water temperatures at or near the 25 C threshold. I do not think that the proposed transfer would increase the likelihood of delta smelt extinction.*

A copy of the spreadsheet file Ms. Brewster provided is enclosed for your reference. Based on these assessments, Reclamation has determined the impacts of the information provided were already covered in the existing EA, so no changes are warranted. Therefore, Reclamation will not be supplementing the Environmental Assessment or preparing an EIS. Please contact Mr. Brad Hubbard, Natural Resources Specialist, at 916-978-5204 or bhubbard@usbr.gov if you have any questions about our reply.

Sincerely,

Richard J. Woodley
Regional Resources Manager

Enclosure

cc: Ms. Frances Mizuno
Assistant Executive Director
San Luis & Delta Mendota Water Authority
P.O. BOX 2157
Los Banos, CA. 93635

# Butte Environmental Council

Educating and advocating for the land, air, and water in Northern California since 1975

citizens water watch of Northern California

BUTTE-SUTTER BASIN AREA GROUNDWATER USERS

December 1, 2014

Brad Hubbard (USBR)
Frances Mizuno (SLDMWA)

**Subject: Comments, Long-Term Water Transfers (LTWT) Environmental Impact Statement/Environmental Impact Report (EIS/R), September 2014**

Butte Environmental Council (BEC) and the undersigned groups and individuals submit the following comments concerning Long-Term Water Transfers. The comments focus on the legal issues surrounding groundwater substitution water transfers and the technical deficiencies found within Section 3.3 and Appendix D of the EIS/R. Concerned citizens of the northern Sacramento Valley recognize that it is long past the time needed to realize the limitations and variability of our natural water supply. We must learn to live within the confines of that system and stop the exploitation of groundwater and strive to improve protections of this critical, fail-safe source of life.

BEC's policy statement regarding water identifies our concerns for Northern Sacramento Valley water resources. Specifically, we believe that citizens should have control over local resources; that Northern California's watersheds must be protected for future generations; and that its ground and surface water must not be exported out of the area to address misuse, waste, and over-allocation elsewhere in California. The undersigned groups and individuals submit these comments holding to one conviction:

> The EIS/R should be withdrawn from public circulation until the issues listed herein can be adequately addressed.

1

A leading-edge organization for hydrogeologists and groundwater professionals recently posted an opinion on the declining groundwater conditions across the state.

> *Thirty-six alluvial groundwater basins that have a high degree of groundwater use and reliance* ***may possess greater potential to incur water shortages*** *as a result of drought. The basins exist in the North Coast, Central Coast,* ***Sacramento River****, Tulare Lake, and South Coast hydrologic regions.* (Groundwater Resources Association of California, Hydrovisions Summer 2014)

2

## Introduction

This EIS/R is inadequate and lacks clarity concerning findings of "no injury to other legal users of the water involved" and "no unreasonable effects on fish and wildlife." Many of the inhabitants of the northern Sacramento Valley are solely dependent on and are "legal users of water" from the underlying strata, and varying and often disparate aquifer systems of the Sacramento Valley groundwater basin.

Californians have approved millions in bond funding since 2000 for projects that should help her citizens develop and implement strategies to improve water quality, availability, and affordability. These funds should be allocated and spent prior to the development of any project for which the sole objective is focused on 'supplemental water.' California's water supply is over allocated – the very nature of that adjective means that there exists no supplemental water for anyone or anything.

3

1. **The LTWT EIS/R is contrary to laws encompassing NEPA, CEQA and California Water Code.**
    a. The EIS/R should be withdrawn and rewritten to reflect a programmatic EIS/R.

The very act of invoking Sec 1745.1 of the California Water Code necessitates a programmatic EIS/R. The document must follow NEPA guidelines for length and tiering as well as detailing the plan for the development and delivery of project level EIS/R(s).

NEPA regulation 40 CFR 1502.7 declares that the text of an EIS for "proposals of unusual scope or complexity shall normally be less than 300 pages." It is impossible for organizations interested in thoughtfully responding to the LTWTP documents to be staffed for a thorough NEPA/CEQA review based on the unreasonable size of the released documentation.

4

> *NEPA 40 CFR 6.200(f) To eliminate duplication and to foster efficiency, the Responsible Official should use tiering (see 40 CFR 1502.20 and 1508.28) and incorporate material by reference (see 40 CFR 1502.21) as appropriate.*

Associated tiered documentation must be included and show that transfers are consistent with applicable Groundwater Management Plans (GMPs) or, in the absence of a GMP, the transferring water supplier can show a transfer will not create, or contribute to, conditions of long-term overdraft in the groundwater basin.

5

b. Groundwater substitution transfers are illegal if sourced from most Sacramento Valley groundwater basins

Section 1220 of the California Water Code states that **groundwater cannot be exported from these basins** unless pumping complies with a GMP. It is inadequate to simply list associated GMPs in a table (Table 3.3-1); each GMP listed must be included with the EIS/R documentation set and clearly show approval '**by vote from all counties that lie within**' the Sacramento Valley groundwater basin.

> *…states that groundwater cannot be exported from these basins unless pumping complies with a GMP,* ***adopted by the county board of supervisors*** *in collaboration with affected water districts,* ***and approved by a vote from the counties that lie within*** *the basin.* (EIS/R p. 3.3-5)

6

According to the CVPIA Section 3405(a), the following principles must be satisfied for any transfer:

- Transfer will be limited to water that would be consumptively used or irretrievably lost to beneficial use;
- Transfer will not have significant long-term adverse impact on groundwater conditions; and
- Transfer will not adversely affect water supplies for fish and wildlife purposes.

7

Groundwater substitution transfers do not qualify under the intent of the first item. Groundwater substitution transfers involve foregoing the use of surface water and pumping groundwater. But this requires use of a water source that was not or would not be consumptively used given access to surface water rights. Nor is groundwater available that was irretrievably lost to beneficial use. Neither the natural recharge of groundwater nor the 'deep percolation' of excess from applied irrigation water has been defined in California water law as water irretrievably lost to a beneficial use. This first limitation provides **no water** under groundwater substitution transfers by intent of the law.

The EIS/R does not provide any defining characteristics of significant long-term adverse impacts to groundwater conditions and fails to adequately identify the current groundwater conditions of the Sacramento Valley. As such, it is impossible for decision makers to decide if impacts might occur from LTWT and to separate from impacts occurring presently.

8

The EIS/R fails to quantify the interactions between groundwater and surface water, which is known to be a controversial and difficult process. Lacking an understanding of this set of mechanisms leaves public agencies without the proper tools to assess the adverse affects to water supplies for fish and wildlife purposes under current groundwater usage. Increasing groundwater pumping under the climatic stresses of dry and critically dry water years should be unlawful.

9

## 2. LTWT and Process Issues

The project description has changed and the EIS/R fails to make this clear. What was stated during and subsequent to the scoping process are in fact no longer correct. It is understood where the 600,000 acre-feet originates. It is the same value that the Bay Delta Conservation Plan promotes. What is not clear is why the May 2011 Scoping Report states an entirely different value than documented within this EIS/R. [1] 10

> *Commenters were concerned that transfers may include up to 600,000 acre-feet of water annually; however, this EIS/EIR will include a much smaller transfer volume (approximately 100,000 to 150,000 acre-feet).* [Long-Term Water Transfers: Scoping Report. BOR & SLDMWA. May 2011.]

Federal regulation 40 CFR 1501.1 requires early NEPA integration into planning process prior to the preparation of the EIS emphasizing cooperative consultation among agencies. 11

> *(b) Emphasizing cooperative consultation among agencies before the environmental impact statement is prepared rather than submission of adversary comments on a completed document.*

Either the Bureau has failed to develop an understanding of the hydrologic system of the northern Sacramento Valley and has abused the mandates of NEPA (40 CFR 1501.1(b)); or the California Department of Water Resources, as a responsible agency to LTWT, is complicit in covering the adverse hydrologic conditions existing in the Sacramento Valley present day. 12

a. Cumulative impact analysis fails to take into consideration all programs present and future.

Sec. 1.7 of the EIS/R lists issues of known controversy, yet the cumulative impacts to Water Supply, Water Quality and Groundwater Resources are missing many critical projects and list projects that will not increase dependence on groundwater resources. 13

> *The cumulative effects analysis must include all water transfers and programs that result in additional groundwater pumping in the Sacramento region.* (EIS/R p. 1-19)

Glenn-Colusa Irrigation District Groundwater Supplemental Supply Project; DWR Future Water Supply Project; and the Bay Delta Conservation Plan currently use groundwater and will increase the exploitation of groundwater supplies from the Sacramento Valley.

b. The purpose and need behind this project is nebulous and imprecise.

Facilitating water transfers from willing sellers upstream of the Delta to points south of the Delta are illegal, wasteful, and unnecessary; and do not of themselves define a reasonable ***purpose*** for a project. 14

[1] National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries] 2009) analyze transfers through the Delta from July to September (commonly referred to as the "transfer window") that are up to 600,000 AF in dry and critically dry years.

> *The **purpose** of the Proposed Action is to facilitate and approve voluntary water transfers from willing sellers upstream of the Delta…* (EIS/R p. 1-2)

Water users all over California have a ***need*** for immediately implementable and flexible solutions to water supply problems. These problems include shortages from inappropriate allocation of natural supplies;[2] the risks inherent in living in a Mediterranean climate; and poorly envisioned projects that have left behind a wake of environmental destruction and have decimated surface and groundwater supplies.

> *Water users have the **need** for immediately implementable and flexible supplemental water supplies to alleviate shortages.* (EIS/R p. 1-2)

14

No project should be allowed that focuses on the 'needs' of a few. This seems to be the antithesis of the purposes of NEPA and CEQA, which are set in place to ensure protection of the environment and **benefit to the public**. There would be no need for a project if California were to mandate that we live within the means of our natural water supply. The timing and place of water flow has been significantly altered, to the detriment of the environment, throughout California from the construction of dams and canals and use of rivers as modified canals. These countless acts have in turn created a limitation on our water supply. The placement and slowing of water in unnatural environments at unnatural times has resulted in water quickly evaporating or percolating to replenish overdrafted groundwater or both.

The following issues render this EIS/R incomplete; inadequate to mandated findings of "no injury to other legal users" and "no unreasonable effects on fish and wildlife" under NEPA and CEQA; and misleading: these issues preclude meaningful public review.

> The EIS/R should be withdrawn from public circulation until the issues listed here can be adequately addressed.

15

1. **The Sacramento Valley groundwater basin is inadequately characterized to assess findings of significance under NEPA and CEQA.**
2. **Well logs included in the EIS/R depict only very shallow aquifers of the region.**
3. **EIS/R fails to adequately describe the existing hydrologic conditions of the Sacramento Valley.**
4. **The selection process for a 'reasonable' range of alternatives is biased.**
5. **Mitigation methods are inadequate to address the significant impacts resulting from project alternatives.**

[2] Abuse of beneficial use guidelines under California water law – the very nature of moving water from the Delta to points far south is an abuse of the constitutional provisions that prohibit waste and unreasonable use.

BEC incorporates by reference within these comments those of several other correspondents regarding the LTWT. [3] 16

## Discussion

1. **The Sacramento Valley groundwater basin is inadequately characterized to assess findings of significance under NEPA and CEQA for the LTWT EIS/R.**

The EIS/R inaccurately and detrimentally characterizes the Sacramento Valley as a large, contiguous, and homogenous groundwater basin that extends from a boundary just north of Red Bluff south to the Cosumnes River. The description of depth to base of fresh water essentially paints the aquifer system as one large alluvial-filled 'bathtub.' Inconsistencies exist throughout the EIS/R that understates the complex nature of the aquifer systems that exist within the basin boundaries of the Sacramento Valley. And, statements such as follows, solidify the intention of this document to misrepresent the groundwater system of the Sacramento Valley (see further discussion of this under Issue 3. below). 17

> *Figure 3.3-8 and Figure 3.3-9 show the location and groundwater elevation of select monitoring wells that portray the local groundwater elevations within the Sacramento Valley Groundwater Basin.* (EIS/R p. 3.3.-22)

The EIS/R fails to provide adequate discussions concerning the unique surface hydrology, geologic and hydrogeologic characteristics of the subbasins found within the Sacramento Valley. For example, there exists no mention of the confining layers and varying stratigraphy created under differing formation periods and depositional environments of the Tuscan Formation. The data and analyses incorporated in the EIS/R are cherry-picked, providing a 30,000-foot view of the basin and fails to provide a rigorous definition of the environment and groundwater conditions of the valley today. This oversight results in a suspect analysis. The process of revealing or exposing only what is favorable to the lead agencies shrouds the methodology of the EIS/R, leaving the public and other agencies inadequate tools to assess the results.

2. **Selected well logs included in the EIS/R depict only the very shallow aquifers of the region. Inclusion of this data simply shrouds reality, weakening any credence the associated assessment and analysis may have established with this effort.**

The six (6) monitoring wells selected to "portray" local groundwater elevations within the northern Sacramento Valley groundwater basin are all very shallow. The average depth to water below ground surface (bgs) ranges between 5′ and 45′ bgs. While the historical low of any of the wells never exceeded 100′ bgs. These wells do not represent the groundwater elevations nor does the discussion surrounding the 18

[3] Butte Environmental Council joins with the comments of Tony St. Amant and AquAlliance.

hydrographs represent groundwater conditions currently found throughout the northern Sacramento Valley.

Shallow wells shown in the EIS/R may show an endemic decline from underlying aquifers "recovering" water and a long-evolving change in groundwater storage capacity. In the case of confined aquifers, "recovery" might be dewatering the confining layers. Recharge and recovery are not the same hydrologic mechanisms and differ in the ability to ascertain the health of a groundwater production zone. **Recovery of groundwater levels in a production zone is not indicative of a balanced aquifer system**.

18

Figure 1 shows a significant decline and little recovery that occurred during the summer of 2007. The City of Chico maintains a very steady draw from their groundwater production wells. These hydrographs depict a stress that has altered the efficacy and perhaps the storage capacity of the production zone that these monitoring wells represent. The questions this EIS/R fails to addressed are considerable. What caused this irreversible change in the groundwater source? What affects does this impact have on the quality of the water sourced from this production zone? What affects will this have on the Central Plume? How many other instances of similar significance have occurred throughout the Sacramento Valley groundwater basin? To what extent will similar impacts occur under the pumping proposed through the LTWT throughout the Sacramento Valley groundwater basin?

19

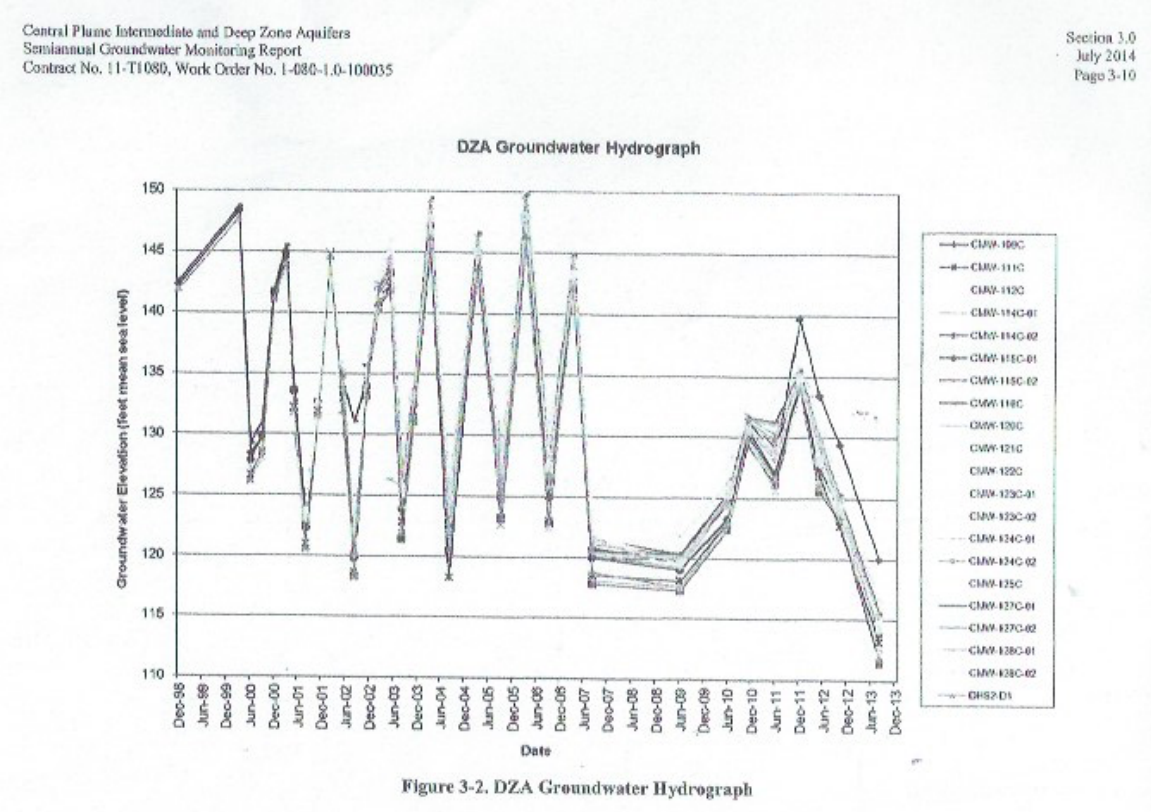



**Figure 1: Monitoring wells of the Central Plume for intermediate and deep aquifer zones.**

3. **EIS/R fails to adequately describe the existing hydrologic conditions of the Sacramento Valley. Modeling lacks appropriate boundary conditions and fails to evaluate stresses given current and a best assessment of future conditions.**

Use of the SACFEM2013 model to simulate stresses on regional surface and subsurface hydrology due to additional groundwater pumping over baseline from groundwater substitution transfers was a useless analysis of the past. Baseline conditions are not delineated and it is unclear if they represent the modeling period or the proposed period for transfers. It is necessary to model impacts under the most accurate assumptions of the hydrologic conditions surrounding the transfer period to understand and mitigate for the most likely range of stresses. The assessment process fails to do just that.

20

Standard methods of study for groundwater basins are not easily applied to the Sacramento Valley. Standard assumptions cannot account for the hydrogeologic complexity, such as anisotropy, associated with the stratigraphy and range of geologic materials present in the Tuscan, Mehrten and Tehama formations. Numerical groundwater models are intended to help shed light on the possible range of responses a system might exhibit over space and time given predictable changes in stresses. They should not be used to support decisions that may jeopardize the long-term sustainability of water resources of the northern Sacramento Valley.

The following statements from the EIS/R show the vagueness surrounding results of the modeling and analyses. The known or estimated impacts are not clearly quantified or defined making it impossible for public officials to assess potential impacts to their jurisdictions. Specifically, terms like long-term recovery and short-term declines must be defined and quantified for every legal user of water supplies sourced above and below the surface.

> *…most of the recovery near the pumping zone occurs in the year after the transfer event. Groundwater levels return to approximately 75 percent of the baseline level five years after the single year transfer event in WY 1981 and between 50-75 percent six years after the multi-year transfer event…* (EIS/R p. 3.3-70)
>
> *…the maximum groundwater level declines resulting from substitution transfers within the Sacramento Valley Groundwater Basin range widely depending on the distance from the transfer groundwater pumping.*
>
> *Seasonal groundwater level declines would be greater than the typical fluctuation when substitution pumping is included, indicating the potential for adverse effects.* (EIS/R p. 3.3-81)

21

The EIS/R fails to define and quantify the following terms: seasonal groundwater level declines and typical fluctuation (there is nothing typical in the changes experienced presently in this valley, see the decadal groundwater elevation changes in Fig. 2.). What are the "baselines" for the supporting modeling and analyses behind this EIS/R? Were these "baselines" established under climatic and hydrologic conditions of nearly a half century ago?

> *The potential for adverse drawdown effects would increase as the amount of extracted water increased. The potential for adverse effects would be higher during dry years, when baseline fluctuations would already be large and groundwater levels would likely be lower than normal.* (EIS/R p. 3.3-81)

The EIS/R fails to define and quantify the adverse drawdown effects. What are the differences in stresses to the entire system under dry and critically dry years? It is disingenuous to document, in a time when wells are going dry across the Sacramento Valley, that reduction in well ***yields*** is the greatest concern the modeling and analyses behind this EIS/R has uncovered.

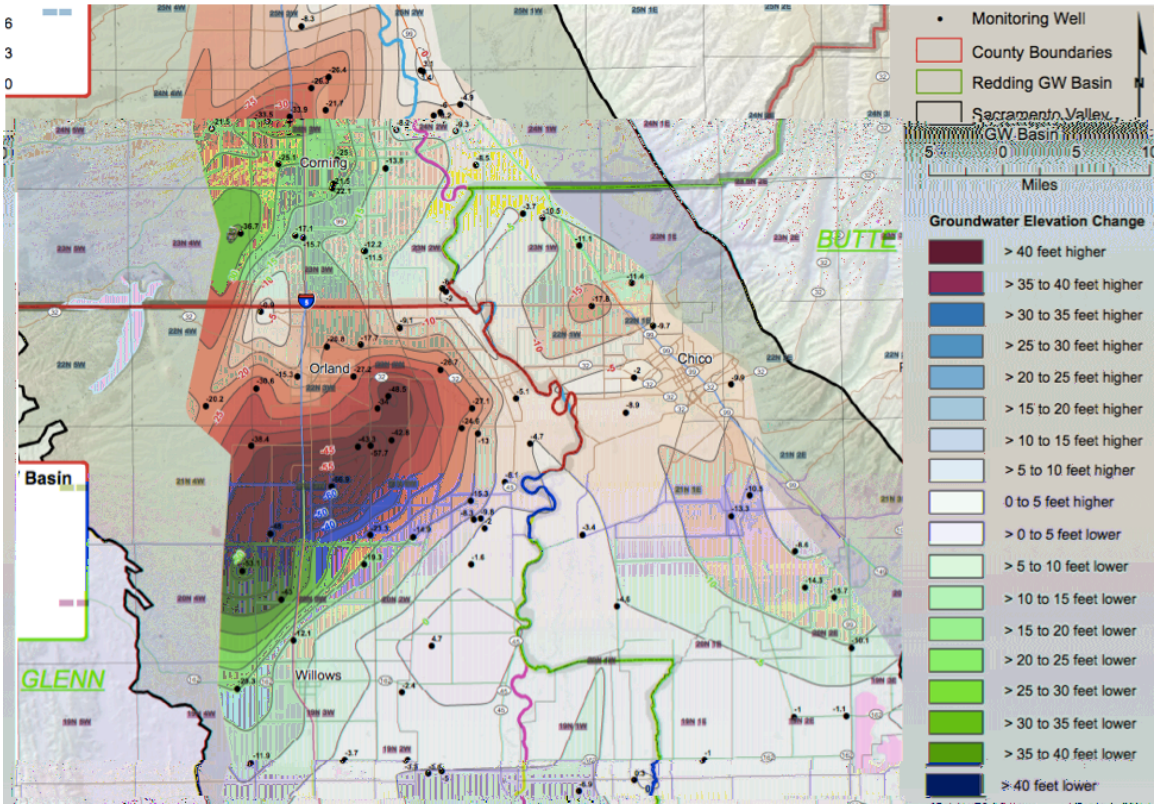



**Figure 2: Shallow groundwater elevation changes Summer 2004 to Summer 2014 for well depths 100-450' bgs**

22

## 4. The selection process for a 'reasonable' range of alternatives is biased.

It appears that alternatives were studied only from the perspective of benefits to water supply and not to the full intent of NEPA and CEQA. The process is unreasonably biased toward the narrow interests of the lead agency SLDMWA and does not adequately protect the region from which the water will be produced. The EIS/R must show substantial treatment, that is **rigorous exploration and objective evaluation**, of all alternatives.[4]

23

[4] **§ 1502.14 Alternatives including the proposed action.** This section is the heart of the environmental impact statement. Based on the information and analysis presented in the sections on the Affected Environment (§ 1502.15) and the Environmental Consequences (§1502.16), it should

Metrics used to evaluate alternatives and establish a purpose and need for this project are biased and lack objective criteria (Table 2-1, p. 2-4). Meeting the intent of the CVPIA mandates, such as retiring lands would better serve the entire state and would provide immediate and long-term benefits. All Californians are in need of flexibility in the water supply system during dry or critically dry years. Those of us dependent on groundwater should not fear the extraction of their resource for sale by willing sellers during a time when its use will increase.

Flexibility is not a reasonable or fair metric. There are many other projects the Bureau and SLDMWA can develop to secure the water necessary to meet the needs of the region that are based on hydrologic reality of that region. 23

Robbing one region of their primary source of water to provide another region with additional water is not a reasonable or fair metric to evaluate alternatives in the context that has been established through this project. For example, Agricultural Conservation in the seller service area somehow meets all three-evaluation metrics while Ag Conservation in the buyer service region does not.

> *Immediate: the term proposed for this EIS/EIR is 2015 through 2024. This period is relatively short, and measures need to be able to* ***provide some measurable benefit*** *within this time period.*
>
> *Flexible: project* ***participants need water in some years, but not in others****. They need measures that have the flexibility to be used only when needed.*
>
> *Provide* ***Substantial*** *Water: project participants need measures that have the capability of providing* ***additional water to regions*** *that are experiencing shortages.* (EIS/R p. ES-7; 2-3; 2-4; ***and*** 4-1)

5. **Mitigation methods are inadequate to address the significant impacts resulting from project alternatives.**

A 'reasonable range' of alternatives was limited by a poorly defined purpose and the screaming bias inherent in the charters of the lead agencies'.5 Environmental impacts and consequences were inappropriately analyzed and lack a fair cumulative analysis. The baseline conditions were not identified or assessed or are nonsense and the existing or known projects dependent on increasing the exploitation of the Sacramento Valley groundwater basin were not included. The EIS/R fails to adequately define the resources that might be impacted: stream flow depletions; irrecoverable groundwater losses; subsidence; and water quality changes in surface and the subsurface. The EIS/R fails to provide a clear line of reasoning in its conclusions related to the direct, indirect, and cumulative impacts. The EIS/R fails to adequately mitigate for potential or known impacts from the project alternatives on the physical, natural, and socioeconomic environment of the region. 24

present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.

[5] Comment Letter 1, Tony St. Amant, November 3, 2014 is incorporated by reference.

NEPA requires that mitigation involve:

> ***§ 1508.20 Mitigation.*** *Mitigation includes: (a) Avoiding the impact altogether by not taking a certain action or parts of an action. (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (e) Compensating for the impact by replacing or providing substitute resources or environments.*

Groundwater substitution transfers could decrease flows in neighboring surface water bodies and alter existing subsurface hydrology resulting in a variety of effects to groundwater levels, land subsidence, and groundwater quality. The EIS/R indicates repeatedly that groundwater basins require an unknown amount of time to recharge following a transfer.

> *The reductions in CVP and SWP supplies are not complete within one year, but can extend over multiple years as the groundwater aquifer refills.* (EIS/R p. 3.1-17)

a. Streamflow depletion

Applying a Streamflow Depletion Factor is not a mitigation method (SW-1). It simply and often erroneously identifies how much surface water might be lost due to groundwater pumping. It is a method of charging willing sellers for water the state owns (stream flow) that is assumed to be lost to groundwater pumping. According to Trevor Joseph, DWR, streamflow depletion factors are controversial and little understood with regard to surface and groundwater interactions and the time delays associated with "additional pumping."

25

b. Irrecoverable groundwater losses

Dependence on GMPs to reduce the significance of impacts as a result of groundwater substitution water transfers is not an adequate mitigation method (GW-1). In 2014, DWR and the California Water Foundation performed separate studies to assess the current state of groundwater management planning in California. Both organizations found GMPs lacking mandated components necessary to promote good groundwater management practices and monitor groundwater levels. DWR found plans that include all California Water Code requirements cover just 17% of the groundwater basins defined in Bulletin 118.[6]

26

[6] Many plans lacked basic basin management objectives (BMOs), such as groundwater level or quality thresholds. Groundwater data, crucial for effective management, is lacking in many groundwater basins. There has been slight improvement in the plans since the passage of SB 1938, which requires specific elements to be included in a GMP in order for an agency to be eligible for certain DWR funding. However, most plans did not contain an implementation strategy for ensuring that BMOs, when articulated, will be met. Stakeholder outreach and participation was either non-existent or not described adequately in many, if not most, of the plans. Additionally, 28% of the plans were written in 2002 or earlier and have not been updated.

*An Evaluation of California Groundwater Management Planning*, California Water Foundation, July 2014

c. Subsidence

The potential for serious impacts due to subsidence are clearly defined by DWR's latest report. [7] The fact that this report is not referenced is problematic, shedding more light on the egregious analytical shortcomings of this EIS/R.

> *Groundwater extraction for groundwater substitution transfers would decrease groundwater levels, increasing the potential for subsidence. Most areas of the Sacramento Valley Groundwater Basin have not experienced land subsidence that has caused impacts to the overlying land.* (EIS/R p. 3.3-82)

27

d. Water quality

The environmental assessment surrounding the LTWT completely ignores groundwater quality issues. There are numerous plumes throughout the Sacramento Valley for which the Department of Toxic Substance Control has oversight.

28

**Conclusion**

**The EIS/R should be withdrawn from public circulation; and**

**The EIS/R should be modified to:**

Reflect the elements and requirements of a programmatic EIS/R, strictly adhering to page limitations and tiering of appropriate project level environmental documentation; and

Reflect a legally appropriate lead agency, such as a group of agencies, including SLDMWA and the counties that overlie the DWR Bulletin 118 groundwater basins and confined (deeper) aquifers from which groundwater substitution transfers may occur, organized into a cooperative effort by contract, joint exercise of powers, or similar device.[8]

29

Sincerely,

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Butte Environmental Council

Carol Perkins
Water Policy Advocate
Butte Environmental Council

[7] *Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California*, CA Department of Water Resources, October 2014.

[8] 14 CCR § 15051 (d).

cc: Nancy Quan, State Water Project Analysis Office
Debbie Davis, Office of Planning and Research
John Laird, Secretary – California Natural Resources Agency
Craig McNamara, President – California Department of Food and Agriculture
Karen Ross, Secretary– California Department of Food and Agriculture
Matthew Rodriquez, Secretary – California Environmental Protection Agency