California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

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19 June 2015

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Regional Water Quality Control Board
Central Valley Region
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VIA: Electronic Submission
Hardcopy if Requested

RE: Tentative Order Amending Waste Discharge Requirements, Order R5-2010-0114-03 (NPDES No. CA0077682) for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County

Dear Messrs. Laputz, Marshall, Luo and Ms. Morgan:

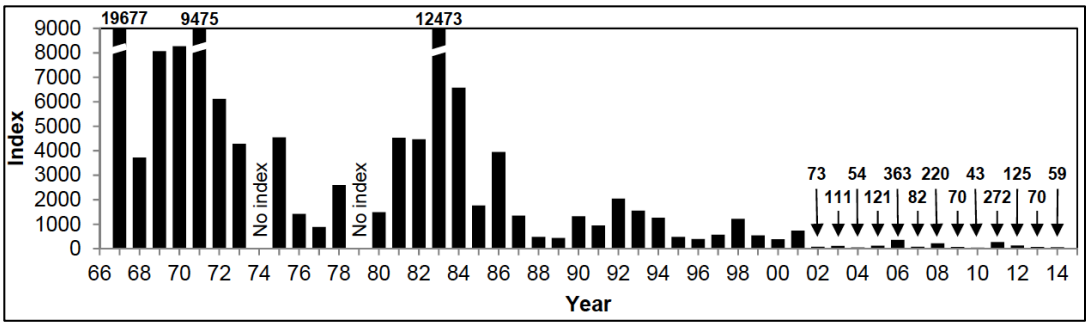
The California Sportfishing Protection Alliance (CSPA) has reviewed the proposed Waste Discharge Requirements (NPDES No. CA0077682) for the Sacramento Regional Wastewater Treatment Plant (Permit) and submits the following comments.

CSPA requests status as a designated party for this proceeding. CSPA is a 501(c)(3) public benefit conservation and research organization established in 1983 for the purpose of conserving, restoring, and enhancing the state's water quality and fishery resources and their aquatic ecosystems and associated riparian habitats. CSPA has actively promoted the protection of water quality and fisheries throughout California before state and federal agencies, the State Legislature and Congress and regularly participates in administrative and judicial proceedings on behalf of its members to protect, enhance, and restore California's degraded water quality and fisheries. CSPA members reside, boat, fish and recreate in and along waterways throughout the Central Valley, including Sacramento County.

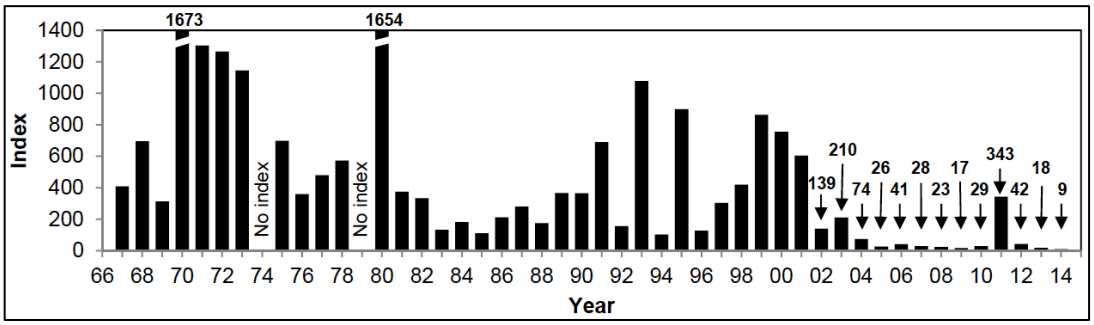
The subject Permit regulates the discharge of municipal wastewater into a relatively narrow reach of the Sacramento River that is within the tidal prism and habitat and a migration corridor for numerous pelagic and anadromous fish species. Species that are listed or proposed to be listed, pursuant to state and federal Endangered Species Acts, and that depend upon the Delta for all or a critical part of their life cycle include: southern Distinct Population Segment (DPS) green sturgeon (*Acipenser medirostris*), federal threatened, candidate for federal endangered; Delta smelt (*Hypomesus transpacificus*), state endangered, federal threatened, Longfin smelt (*Spirinchus thaleichthys*), state threatened, candidate for federal threatened; Central Valley steelhead (*Oncorhynchus mykiss*), federal threatened; Sacramento winter-run Chinook salmon

(*Oncorhynchus tshawytscha*), state endangered, federal endangered; Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), state threatened, federal threatened; Central Valley fall/late-fall-run Chinook salmon (*Oncorhynchus tshawytscha*), federal species of concern, state species of special concern; Sacramento splittail (*Pogonichthys macrolepedotus*), state species of special concern; Pacific lamprey (*Entosphenus tridentate*), federal species of concern and river lamprey (*Lampetra ayresi*), state species of special concern. The Permit also has potential to adversely affect Killer whales or Orcas (Southern Resident DPS) (*Orcinus orca*), federal listed as endangered because they are dependent upon Chinook salmon for 70% of diet and reduced quantity and quality of diet is one of the major identified causes of their decline.

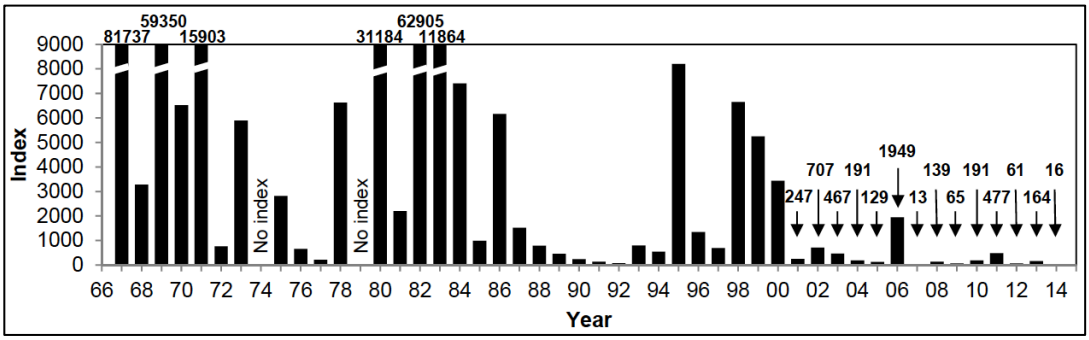
The precipitous collapse of the Central Valley's pelagic and anadromous fish populations has been documented at considerable length. Since 1967, the California Department of Fish and Wildlife's (DFW) Fall Midwater Trawl indices for striped bass, Delta smelt, longfin smelt, American shad, splittail and threadfin shad have declined by 99.7, 97.8, 99.9, 91.9, 98.5 and 97.8 percent, respectively. *See*, http://www.dfg.ca.gov/delta/projects.asp?ProjectID=FMWT.



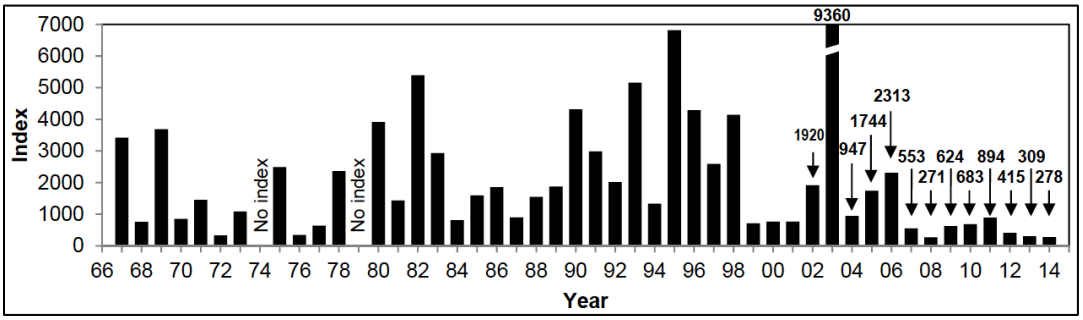
CDFW FMWT Striped Bass annual abundance indices, 1967-2014.



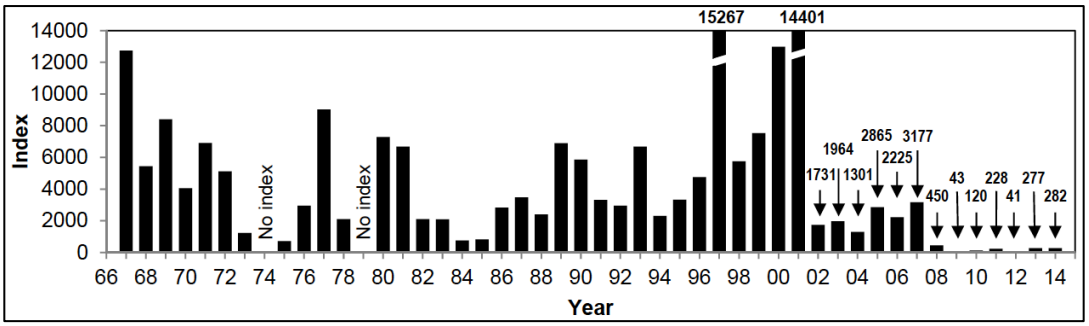
CDFW FMWT Delta Smelt annual abundance indices, 1967-2014.



CDFW FMWT Longfin Smelt annual abundance indices, 1967-2014.



CDFW FMWT American Shad annual abundance indices, 1967-2014.



CDFW FMWT Threadfin Shad annual abundance indices, 1967-2014.

The U.S. Fish & Wildlife Service's (USFWS) Anadromous Fisheries Restoration Program (AFRP) documents that, since 1967, in-river natural production of Sacramento winter-run Chinook salmon and spring-run Chinook salmon have decline by 98.2 and 99.3 percent, respectively, and are only at 5.5 and 1.2 percent, respectively, of doubling levels mandated by the Central Valley Project Improvement Act, California Water Code and California Fish & Game Code. *See*, http://www.fws.gov/lodi/afrp/.

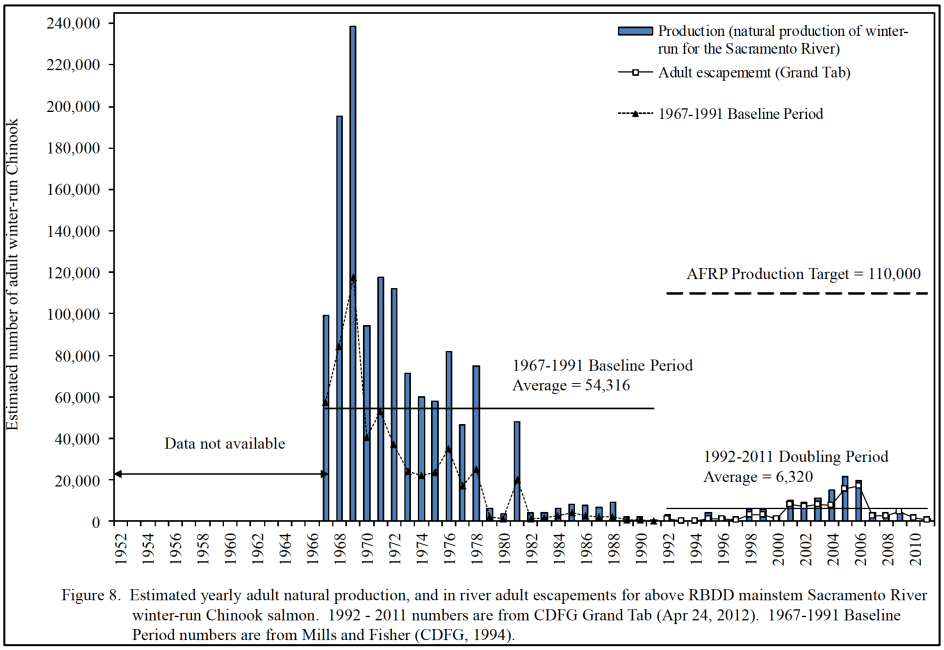


Figure 8. Estimated yearly adult natural production, and in river adult escapements for above RBDD mainstem Sacramento River winter-run Chinook salmon. 1992 - 2011 numbers are from CDFG Grand Tab (Apr 24, 2012). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).

CVPIA AFRP Doubling Goals, Sacramento River Natural Production of Winter-run Chinook Salmon.

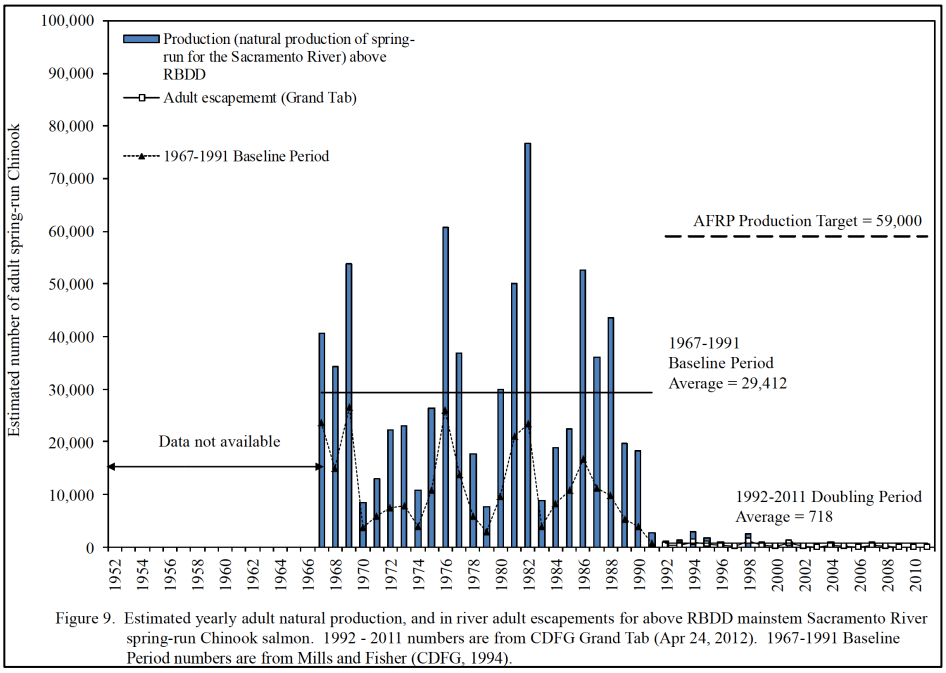


Figure 9. Estimated yearly adult natural production, and in river adult escapements for above RBDD mainstem Sacramento River spring-run Chinook salmon. 1992 - 2011 numbers are from CDFG Grand Tab (Apr 24, 2012). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).

CVPIA AFRP Doubling Goals, Sacramento River Natural Production of Spring-run Chinook Salmon.

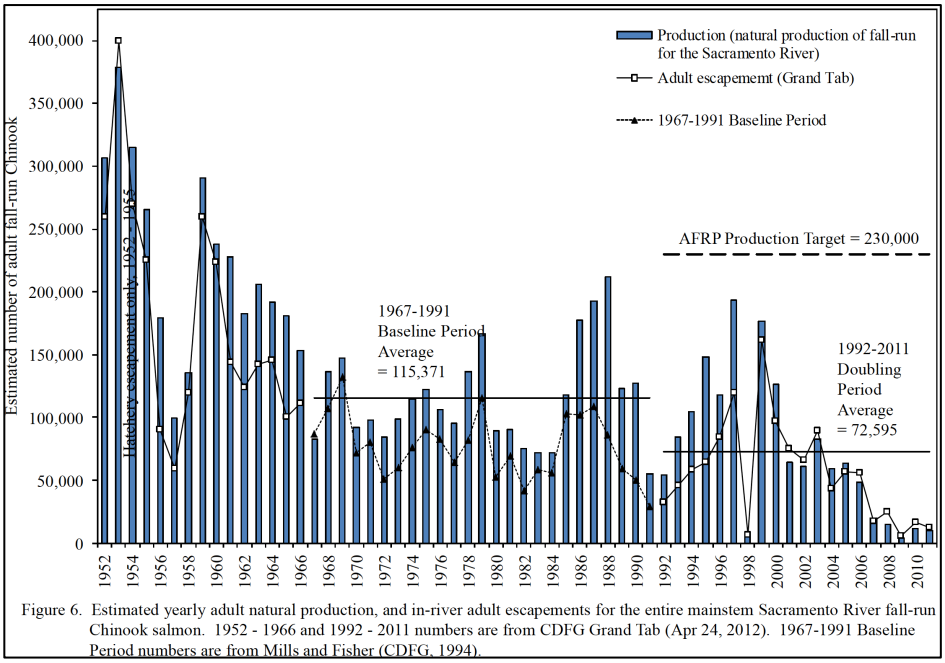


Figure 6. Estimated yearly adult natural production, and in-river adult escapements for the entire mainstem Sacramento River fall-run Chinook salmon. 1952 - 1966 and 1992 - 2011 numbers are from CDFG Grand Tab (Apr 24, 2012). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).

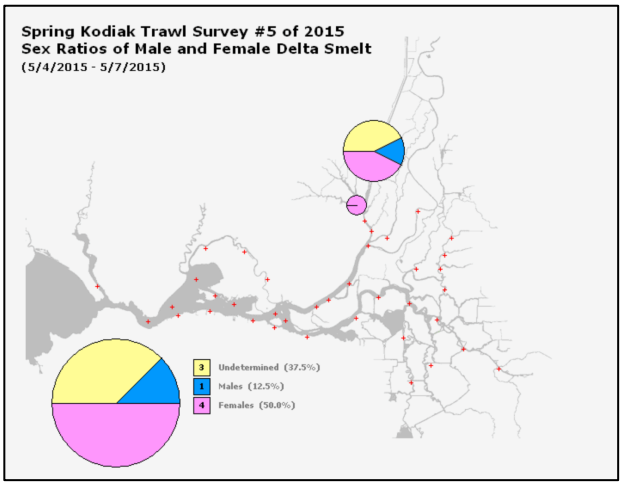
CVPIA AFRP Doubling Goals, Sacramento River Natural Production of Fall-run Chinook Salmon.

The 2013 brood year of Sacramento River winter-run, spring-run and fall-run Chinook salmon were hammered by the present drought, the 2014 brood year of all three species was decimated and there is a real possibility that the 2015 brood year could experience similar losses if Upper Sacramento River water temperature cannot be maintained at 56 degrees Fahrenheit later this year. The loss of a third brood year would likely jeopardize the continued existence of these species.

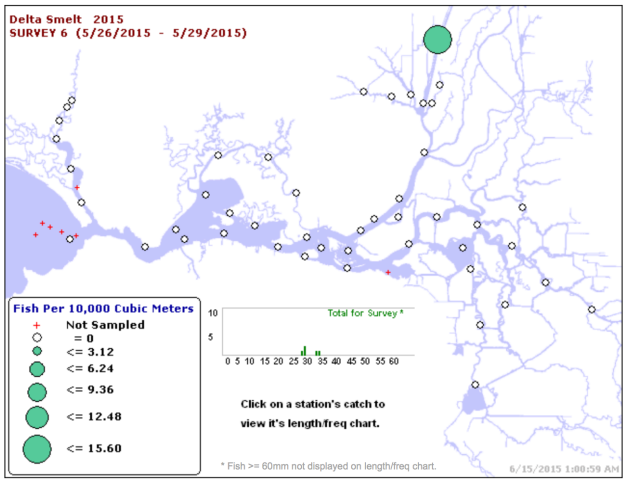
The situation for Delta smelt, one the most abundant species in the estuary, is even more critical. The 2015 abundance index of DFW's Kodiak Trawl for adult Delta smelt, which was initiated following the 2000-2004 Pelagic Species Decline, was the lowest in the history of the Trawl and reflects an 86% decline from 2004. This is significantly lower than any previous trawl and led fisheries scientist Peter Moyle to declare impending extinction of Delta smelt.

DFW's 20 mm Survey was initiated to monitor postlarval-juvenile Delta smelt throughout their historical range. The 2014 abundance index of the 20mm Survey was the second lowest in the history of the Survey and represented a 95.4% decline in abundance since 2000. The 2015 index has not yet been formally released but, over the last few years, the index has been computed from Surveys 3 through 6 (April/May) and the totals numbers of smelt collected in in Surveys 1-6 this year are the lowest in history.

The only Delta smelt collected in both the early May Kodiak Trawl and the late May 20mm Survey this year have been located in the Cache Slough-Sacramento Ship Channel area. No Delta smelt were collected in their traditional habitat in the western Delta and Suisun Bay/Marsh. DFW studies indicate that Delta smelt in the Sacramento Ship Channel are likely to perish should high summer temperatures de-stratify the channel.



DFW Kodiak Trawl #5 Delta Smelt 2015.



DFW 20mm Survey #6 Delta Smelt 2015.

The DFW doesn't include the Sacramento River in the vicinity of the Sacramento Regional outfall diffuser in their regular surveys but the Interagency Ecological Program and the USFWS have conducted regular surveys in the area and found various life stages of Delta smelt in the river between December and June. The Sacramento River does not de-stratify and, consequently, the River may become one of the last refuges for Delta smelt if California experiences a lengthy heat wave later this summer.

Delta smelt are sensitive to changes in water temperatures. Delta smelt spawn in water temperature ranging from 15-20°C (59-68°F),[1] and water temperatures 25°C (77°F) or more are

[1] Bennett, W. 2005. "Critical assessment of the delta smelt population in the San Francisco Estuary, California." San *Francisco Estuary and Watershed Science* 3(2), 71pp.

fatal.[2] Delta smelt and their prey are also sensitive to copper. In laboratory studies with 3-month old delta smelt, Werner (2008) calculated the 7-day lethal LC50 concentration at 24.7 µg/L copper,[3] Teh (2009) calculated the 96-hour LC10 and LC50 for *Eurytemora affinis* at 1.42 µg/L and 3.48 µg/L copper, respectively.[4] The copper concentrations in the Delta and in the Treatment Plant effluent frequently exceed these levels.

Delta smelt are apparently coming into contact with these elevated concentrations of copper and bioaccumulating copper in their tissue, suggesting repeated exposure and possible chronic effects. A recent study measured copper levels in delta smelt and determined that, "concentrations of copper in delta smelt in the Sacramento River have been measured at 6.5 mg/KG (wet weight), which is over 32 times higher than normal background concentrations (Bennett et al. 2005)."[5]

Copper is highly toxic to many aquatic species throughout the food web, including microbes, algae, invertebrates, and many fish species, especially in early life stages. In evaluating conditions in the Delta, the Department of the Interior has stated, "…exposure to metals, even at low concentrations often measured in the environment, can exert toxic effects, such as changes in feeding, growth, and swimming behavior, on aquatic organisms, especially on sensitive early life stages."[6]

Copper also affects the olfactory mechanism of many fish species.[7] The olfactory system conveys critical information to fishes, enabling activities such as mating, locating food, discriminating kin, avoiding predators and homing. In a review of such studies on contaminant effects to fish olfactory systems, Raloff (2007) cited one researcher that noted, "pesticides and copper at concentrations similar to those in the environment knock out olfactory communications in every species tested to date – whether water fleas, leeches, or fish." Sandahl, et al. (2007) observed a 40% reduction in olfactory response in juvenile coho salmon exposed to copper concentrations as low as 2 µg/L for only 3-hours. This loss in olfactory sensitivity led to a failure to initiate predatory avoidance behaviors in response to chemical alarm cues.

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[2] Swanson C, Reid T, Young PS, Cech JJ Jr. 2000. "Comparative environmental tolerances of threatened delta smelt (*Hypomesus transpacificus*) and introduced wakasagi (*H. nipponensis*) in an altered California estuary." *Oecologia* 123:384-390.

[3] Werner, I. 2008. "Pelagic organism decline: acute and chronic invertebrate and fish toxicity testing." Progress Report. Aquatic Toxicology Laboratory, School of Veterinary Medicine, University of California, Davis, California. April 30, 2008.

[4] Teh, S. J. 2009. "Acute toxicity of ammonia, copper, and pesticides to key copepods, *Pseudodiaptomus forbesi* and *Eurytemora affinis* , of the San Francisco Estuary", presented at the 18-19 August 2009 Ammonia Summit at the Central Valley Regional Water Quality Control Board.

[5] Bennett, W. 2005. "Critical assessment of the delta smelt population in the San Francisco Estuary, California." San *Francisco Estuary and Watershed Science* 3(2), 71pp.

[6] U.S. Bureau of Reclamation. 2008. Biological Assessment of the Continued Longterm Operation of the Central Valley Project (CVP) and State Water Project (SWP), Appendix V. May 16, 2008.

[7] Tierney, K.B., D.H. Baldwin, T.J. Hara, P.S. Ross, N.L. Scholz and C.J. Kennedy. 2009. "Olfactory toxicity in fishes." *Aquatic Toxicology* , 96 (2010): 2-26; Raloff, J. 2007. "Aquatic non-scents: repercussions of water pollutants that mute smell." *Science News Online* 171(4):59; Sandahl, J.F., D.H. Baldwin, J.J. Jenkins and N.L.Scholz. 2007. "A sensory system at the interface between urban stormwater runoff and salmon survival." *Environmental Science and Technology*, 41:2998-3004.

Mayer and Ellersieck pointed out that toxicity increased with temperature for most chemicals.[8] In a study of the effects of increasing climate temperatures on the toxicity of three contaminants in different fish species, researchers found that all pesticides and industrial contaminants studied became toxic in the upper 5ºC range of species' temperature tolerance.[9] Mercury and lead exhibit elevated toxicity at higher temperatures, apparently due to a direct relation between metal accumulation and temperature and mercury accumulates twice as fast with a 10ºC rise in temperature.

The Department of the Interior has identified wastewater treatment plants as one of the primary sources of copper entering the Delta.[10] Copper concentrations in the Treatment Plant's effluent averaged 4.3 µg/l between June 2005 and July 2008. The Proposed Permit reports the highest daily average to be 6.34 µg/l. (Permit Fact Sheet, F-8). This concentration exceeds levels that have been shown to effect salmon olfactory response even after very short exposure times.[11]

The screening analysis conducted for the Bay Delta Conservation Plans EIR/EIS identified total copper concentrations at Greens Landing (below Freeport), based upon 30 samples, as an average of 11.6 µg/l and a maximum of 30.0 µg/l.[12] A study of metal concentrations conducted by the Regional Board, pursuant to the Bay Protection and Toxic Cleanup Program, found that, based upon 33 samples in 1995, total copper concentrations at Greens Landing averaged 8.3 µg/l with a maximum of 28.4 µg/l.[13]

The proposed Resolution adopting the proposed Permit states, at Finding 5, that:

> This Order amends Order R5-2010-0114-03 to address a Sacramento Superior Court order. On 11 April 2014, the Superior Court for Sacramento County entered a judgment and peremptory writ of mandate in the matter of *California Sportfishing Protection Alliance* v. *California Regional Water Quality Control Board, Central Valley Region (Case No. 34-2013-80001358-CU-QM-GDS)* (Regional San Decision), ruling that the Central Valley Water Board abused its discretion by 1) failing to use the equation set forth in the California Toxics Rule (CTR) and by using the hardness value of the effluent in the equations; 2) failing to establish a weekly effluent limitation for aluminum; and 3) continuing the Thermal Plan exceptions in effect without first concluding the permitted discharge, considered cumulatively with all other significant impacts on affected species,

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[8] Mayer, F.L., Jr. and Ellersieck, M.R., Manual of acute toxicity: Interpretation and data base for 410 chemicals and 66 species of freshwater animals, U.S. Fish. Wildl. Serv. Resour. Publ. No. 160, Department of the Interior, Washington, D.C., 1986. and - Mayer, F.L., Jr. and Ellersieck, M.R., Experiences with single-species tests for acute toxic effects in freshwater animals, *Ambio,* 17, 367-375, 1988.

[9] Patra, R. W., Chapman, J. C., Lim, R. P., Gehrke, P. C. and Sunderam, R. M. (2015), Interactions between water temperature and contaminant toxicity to freshwater fish. Environmental Toxicology and Chemistry. doi: 10.1002/etc.2990.

[10] U.S. Bureau of Reclamation. 2008, supra , at p. 3.

[11] Sandahl, et al., 2007, *supra*.

[12] Draft Environmental Impact Report/Environmental Impact Statement, Bay Delta Conservation Plan, Appendix 8C, Screening Analysis, pp. 8C-22-8C-27.

[13] Central Valley Regional Water Quality Control Board, 1998, Metal Concentrations, Loads and Toxicity Assessment in the Sacramento/San Joaquin Delta 1993-95, pp. 82-84.

> would "assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on" the Sacramento River. Therefore, the Central Valley Water Board shall modify Order R5-2010-0114-03 (NPDES Permit No. CA0077682) to 1) vacate the Thermal Plan exceptions in the Permit and to reconsider the issue of whether Thermal Plan exceptions may be granted in this case under the standards set forth in Code of Federal Regulations (CFR) at 40 CFR § 125.73(a); 2) vacate the portions of the Permit establishing effluent limitations for hardness-dependent metals, and to recalculate such effluent limitations using the equations set forth in 40 CFR § 131.38(b)(2), and without using the hardness value of the effluent in those equations; and 3) establish in the Permit a weekly effluent limitation for aluminum as required by 40 CFR § 122.45(d)(2). Order R5-2010-0114-03 is amended in accordance with the Regional San Decision.

CTR HARDNESS DEPENDANT METALS

The Central Valley Regional Water Quality Control Board has failed to comply with the Court's Order to vacate the portions of the Permit establishing effluent limitations for hardness-dependent metals, and to recalculate such effluent limitations using the equations set forth in 40 CFR § 131.38(b)(2), and without using the hardness value of the effluent in those equations

Hardness

The California Toxics Rule (CTR) (Title 40 Code of Federal Regulations Part 131) established a list of water quality standards for a wide variety of pollutants for surface waters in the State of California. The CTR includes water quality standards for seven metals that vary as a function of hardness: (1) cadmium, (2) copper, (3) chromium III, (4) lead, (5) nickel, (6) silver, and (7) zinc. At a given concentration these metals are toxic to freshwater aquatic life. The toxicity of the individual metal varies as a function of the hardness concentration in water. The hardness concentration is important since metals exhibit greater toxicity in lower hardness (softer) water.

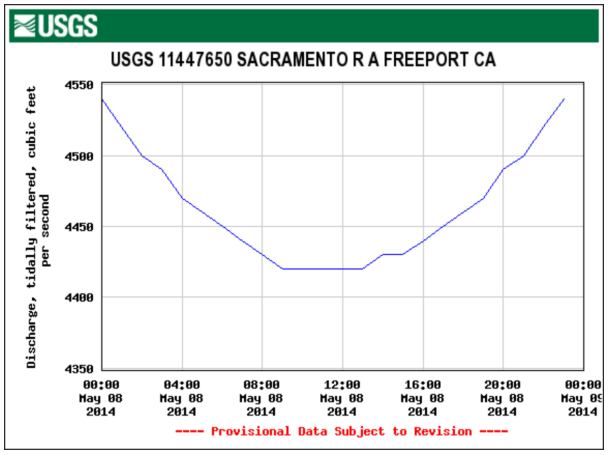
CTR water quality standards are required to be incorporated into National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits are required for all point source wastewater discharges into surface waters. Permit limits for toxic metals are generally based on the lowest observed hardness since this is the condition where metals will exhibit the greatest toxicity.

1. The proposed Permit fails to identify the proper 1Q10 or 7Q10.

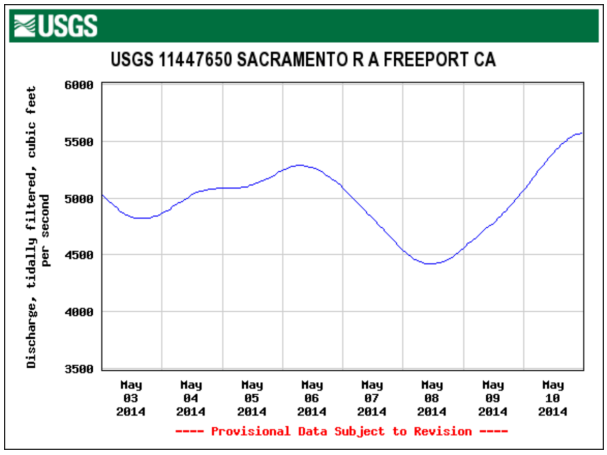
The proposed Permit states, on page F-31:

> The direction in the CTR regarding hardness selection is that it must be based on ambient hardness and consistent with design discharge conditions for design flows and mixing zones. Consistent with design discharge conditions and design flows means that the selected "design" hardness must result in effluent limitations under design discharge conditions that do not result in more than one exceedance of the applicable criteria in a three year period.2 Where design flows for aquatic life criteria include the lowest one-day flow with an average reoccurrence frequency of once in ten years (1Q10) and the lowest

average seven consecutive day flow with an average reoccurrence frequency of once in ten years (7Q10). The 1Q10 and 7Q10 Sacramento River flows are 5,060 cfs and 5,846 cfs, respectively.



USGS Freeport Gage, 8 May 2014.



USGS Freeport Gage, 3 – 10 May 2014.

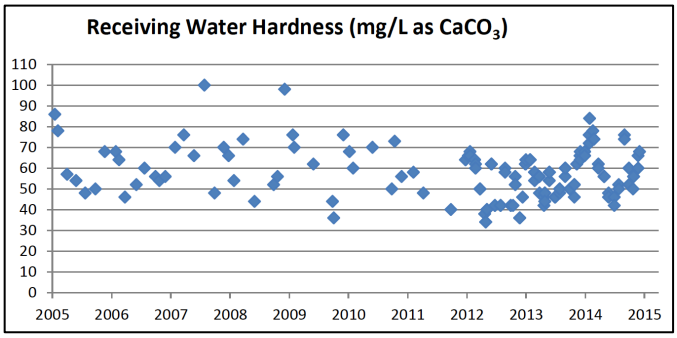
Apparently, Regional Board staff didn't examine flows from the United States Geological Survey (USGS) gage at Freeport, immediately upstream of the wastewater treatment plant. The average daily tidally filtered flow at Freeport on 8 May 2014 was 4,464 cfs. The seven-day average flow between 3 May and 10 May 2014 was 4,960 cfs. Consequently, the 1Q10 is actually 596 cfs less than the Regional Board claims and the 7Q10 is 889 cfs less. The proposed Permit overestimated the 1Q10 and 7Q10 by 12% and 15%, respectively.

2. The propose Permit improperly selected a technically unjustified high hardness value to represent a worst-case scenario.

Regional Board staff apparently limited their data gathering to the discharger's upstream and downstream monitoring data between 2005 and 2015 and failed to review other available databases. One of the highest identified receiving water hardness values (84 mg/l) was then selected to represent a worst-case situation. As shown in the chart blow, extracted from the proposed Permit on page F-31, there were only three data points with higher hardness levels than the 84 mg/l hardness selected by staff.

The selection of a high hardness value is apparently justified by an assumption that low hardness is likely to occur only under occasional low flow situations. However, the only discussion on this matter refers to a mystical "iterative approach" that attempts to arrive at limits that are protective under "reasonable worst-case ambient conditions."

First, it should be noted that while the California Water Code requires Regional Boards to be "fair and reasonable" when setting regulations, no such language exists in the federal regulations. Permit limits must be fully protective of beneficial uses and developed in accordance with explicit regulatory requirements.



Receiving water hardness (both upstream and downstream), Proposed Permit, p. F32.

Second, contrary to the implied assumption that lower hardness values are only found under low flow conditions, review of monitoring databases shows that lower and higher hardness levels can be found under both low and high flow conditions.

Third, the use of downstream hardness values constitutes a double dipping in which the discharger receives benefit in the calculation of limits from the degraded downstream water quality caused by its pollutant discharges. This is essentially de facto mixing without a defensible mixing zone analysis. That is why hardness values must be selected from upstream ambient conditions.

3. The proposed Permit fails to identify and use the lowest sampled hardness data contrary to state and federal regulations requiring the use of all valid, relevant and representative data.

The NPDES permit for the Sacramento Regional Wastewater Treatment Plant (Order No. R5-2010-0114-03, NPDES NO. CA0077682) identified the lowest ambient surface water hardness as 26 mg/l. "*Upstream receiving water hardness data for the Sacramento River ranged from 26 mg/L to 100 mg/L (as CaCO3), based on 100 samples from June 2005 to July 2008.*" (Permit page F-30)

The Water-Quality Assessment of the Sacramento River Basin, California Water-Quality, Sediment and Tissue Chemistry, and Biological Data, 1995-1998 (Open-File Report 2000- 91) by the United States Geological Survey (USGS) found the total hardness of the Sacramento River at Freeport to be 19 mg/l as CaCO3 on 6 January 1997 (http://ca.water.usgs.gov/sac_nawqa/Publications/ofr_2000-391/data_sw/Freeport/freefld.html).

The USGS is a reliable source of information and there is no reason not to use the lowest reported hardness of 19 mg/l. The data is at least as reliable as that reported by the Discharger and utilized by the Regional Board.

The proposed Permit, page F-29, identifies the ambient hardness as ranging from 34 mg/l to 100 mg/l.

Federal Regulations, 40 CFR 122.44(d), requires that limits must be included in permits where pollutants will cause, have reasonable potential to cause, or contribute to an exceedance of the State's water quality standards. US EPA has interpreted 40 CFR 122.44(d) in *Central Tenets of*

the National Pollutant Discharge Elimination System (NPDES) Permitting Program (Factsheets and Outreach Materials, 08/16/2002) that; although States will likely have unique implementation policies there are certain tenets that may not be waived by State procedures.

These tenets include that "where valid, reliable, and representative effluent data or instream background data are available they MUST be used in applicable reasonable potential and limits derivation calculations. Data may not be arbitrarily discarded or ignored." The Regional Board has failed to use valid, reliable and representative data in developing limitations, contrary to the cited Federal Regulation.

The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries Of California* (SIP), Section 1.2 requires that:

> "When implementing the provisions of this Policy, the RWQCB shall use all available, valid, relevant, representative data and information, as determined by the RWQCB. The RWQCB shall have discretion to consider if any data are inappropriate or insufficient for use in implementing this Policy. Instances where such consideration is warranted include, but are not limited to, the following: evidence that a sample has been erroneously reported or is not representative of effluent or ambient receiving water quality; questionable quality control/quality assurance practices; and varying seasonal conditions."

The proposed Permit contains on discussion or information regarding the failure to use the 26 mg/l hardness data from the last permit. The proposed Permit does not contain any discussion of the 19 mg/l hardness data from the USGS although this data was submitted by CSPA to the Regional Board in 2010. The Regional Board has not documented any scientific reason that would show the lower hardness data to be invalid. The Regional Board has ignored valid, reliable and representative hardness data.

4. The Regional Board makes unsupported conclusory statements regarding hardness and the need to use discretion in selecting worst-case protective hardness values.

The proposed Permit states on pages F-29 and F-32, that:

> "*As shown above, ambient hardness varies substantially. Because of the variation, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum, midpoint). While the hardness selected must be hardness of the ambient receiving water, selection of an ambient receiving water hardness that is too high would result in effluent limitations that do not protect beneficial uses. Also, the use of minimum ambient hardness would result in criteria that are protective of beneficial uses, but such criteria may not be representative or fair and reasonable considering the wide range of ambient conditions."*

The Regional Board suggests that water hardness varies from 32 to 100 mg/l in the Sacramento River and this creates an unusual situation for NPDES permitting. Nonsense. The variability of hardness in the Sacramento River is no different than other waterways in the Central Valley. For example the:

> City of Turlock, Central Valley Water Board NPDES No. CA0078948, Permit on Page F-27 observes that "Discharge Point No. 002 (San Joaquin River). The upstream receiving water hardness in the San Joaquin River ranged from 32 mg/L to 345 mg/L, based on 20 samples from May 2006 to April 2007.
>
> City of Woodland, Central Valley Water Board NPDES No. CA0077950, Permit Page F-19 observes that the upstream hardness varied from 140 to 472 mg/l.
>
> City of Stockton, Central Valley Water Board NPDES No. CA0079138, Permit Page F-31 observes that the upstream hardness varied from 36 to 210 mg/l.
>
> City of Lodi, White Slough WWTP, Central Valley Water Board NPDES No. CA0079243, Permit Page F-19 observes that the upstream hardness varied from 44 to 150 mg/l.

The CTR, Part 131.38 (c)(4), addresses the applicability of the hardness dependent metals criteria for waters where the hardness is below 400 mg/l. The cited range of hardness values in the Sacramento River Delta does not present a unique or unanticipated permitting issue with regard to hardness and the regulation of hardness dependent toxic metals.

In 2000, the United States Environmental Protection Agency promulgated the California Toxics Rule ("CTR"), pursuant to the Clean Water Act, which established numeric criteria for 23 priority toxic pollutants, which are "legally applicable in the State of California for inland surface waters, enclosed bays and estuaries *for all purposes and programs under the Clean Water Act.*" (Emphasis added). Federal Regulation 40 C.F.R. 122.4 (a), (d) and (g) require that no permit may be issued when the conditions of the permit do not meet the applicable requirements of the CWA, or regulations promulgated under the CWA. Likewise, California Water Code, section 13377, requires that:

> "Notwithstanding any other provision of this division, the state board and the regional boards shall, as required or authorized by the [Clean Water Act], as amended, issue waste discharge and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

In other words, while the Regional Board may impose standards that are *more* stringent that the Clean Water Act and its implementing regulations require, under California law it does not have any discretion to impose standards which are *less* stringent than those required by the Clean Water Act and its implementing regulations, including the CTR.

However, this is *exactly* what the Regional Board did. Specifically, the Regional Board failed to use the CTR criteria, the instream hardness and the specific equations properly promulgated by the EPA. Throughout the process the Regional and State Water Boards have not provided any regulatory citation that would allow them to impose standards that are less stringent than those

required by the CWA, Federal Regulation or the California Water Code as no such allowance exists.

5. The Regional Board's claim that use of the lowest observed receiving water hardness would result in overly stringent limitations is unsupported and contrary to evidence.

The Regional Board assertion that use of the lowest observed receiving water hardness in the CTR equations would result in overly stringent limitations for hardness dependent toxic metals that are not necessary to protect the beneficial uses of receiving waters is not technically supported and is contrary to scientific evidence.

In Fact, the US EPA has concluded that even their hardness dependent toxic metals criteria may not be protective of beneficial uses.

The proposed Permit states, on page F-30 No. 2, that:

> "*The California Water Code requires the Water Board to be fair and reasonable when setting regulations. Using lower ambient hardness values will result in more conservative effluent limits that are not needed to protect beneficial uses yet will result in additional costs to the Discharger and rate payers*."

Are the CTR criteria overly or unnecessarily restrictive? According to US EPA and the CTR, the answer is no. The CTR (Federal Register/Vol. 65, No. 97/Thursday, May 18, 2000, pages 31688 and 31689) states that:

> *"For aquatic life, EPA evaluates many diverse aquatic toxicity studies to determine chronic and acute toxicity taking into account how other factors (such as pH, temperature or hardness) affect toxicity. EPA also, to the extent possible, addresses bioaccumulation or bioconcentration. EPA then uses this toxicity information along with exposure information to determine the guidance criterion. Importantly, EPA subjects such evaluation to peer review and/or public comment."*
>
> "*An aquatic life criterion derived using EPA's CWA Section 304(a) method "might be thought of as an estimate of the highest concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses." (45 FR 79341) EPA's guidelines are designed to derive criteria that protect aquatic communities. EPA's 1985 guidelines attempt to provide a reasonable and adequate amount of protection with only a small possibility of substantial overprotection or underprotection.*"

The Regional Board's conclusions regarding the CTR criteria are diametrically opposite the conclusions expressed by EPA in developing the criteria and as presented in the CTR.

The following citations clearly show that significant scientific analysis is required in order to determine whether the hardness based CTR limitations are overly (or under) protective, not a

simple statistical equation of hardness data as was done by the Regional Board. The Regional Board has not presented any valid scientific evidence that the limitations generated by using the CTR equations and the lowest observed hardness is overly stringent. To the contrary, as is cited below, the CTR based limitations may not be sufficiently protective.

As we discuss at greater length below, the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) issued a biological opinion on the CTR that found that it was not protective of the aquatic ecosystem. Their joint determination that the CTR was not likely to jeopardize the very existence of a broad array of species was based on an agreement that EPA would undertake a number of actions, including revising its methods of calculating hardness dependent metals to account for the interaction of a number of constituents other than hardness and the understanding that the lowest upstream ambient hardness would be used. On that basis they agreed to a No Jeopardy Opinion.

EPA has now issued revised national recommended freshwater aquatic life criteria for copper (*Aquatic Life Ambient Freshwater Quality Criteria—Copper 2007 Revision*).

In adopting the copper criteria EPA stated that:

> "Copper is an abundant naturally occurring trace element found in the earth's crust that is also found in surface waters. Copper is a micronutrient at low concentrations and is essential to virtually all plants and animals. At higher concentrations copper can become toxic to aquatic life. Mining, leather and leather products, fabricated metal products, and electric equipment are a few of the industries with copper-bearing discharges that contribute to manmade discharges of copper into surface waters. Municipal effluents may also contribute additional copper loadings to surface waters.
>
> Since EPA published the hardness-based recommendation for copper criteria in 1984, new data have become available on copper toxicity and its effects on aquatic life. The Biotic Ligand Model (BLM) – a metal bioavailability model that uses receiving water body characteristics to develop site-specific water quality criteria – utilizes the best available science and serves as the basis for the new national recommended criteria.
>
> The BLM requires ten input parameters to calculate a freshwater copper criterion (a saltwater BLM is not yet available): temperature, pH, dissolved organic carbon (DOC), calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity. The BLM is used to derive the criteria rather than as a post-derivation adjustment as was the case with the hardness-based criteria. This allows the BLM-based criteria to be customized to the particular water under consideration.

> BLM-based criteria can be more stringent than the current hardness-based copper criteria and in certain cases the current hardness-based copper criteria may be overly stringent for particular water bodies. We expect that application of this model will result in more appropriate criteria and eliminate the need for costly, time-consuming site-specific modifications using the water effect ratio." Emphasis added.

However, the Regional Board did not use the new BLM methodology in developing the copper limits in the proposed permit. It failed to even acknowledge or discuss the new EPA criteria. Instead, it embraced an approach that is not only much less protective than the CTR but one that provides limits that are acceptable to the discharger and will even allow greater copper concentrations to be discharged to an already degraded river.

As noted above, on March 24, 2000 the USFWS and NMFS issued a biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act). The Services believed the CTR criteria was not sufficiently protective of fish and wildlife because it failed to account for other constituents in the water.

The biological opinion was issued to the U.S. Environmental Protection Agency, Region 9, with regard to the "Final Rule for the Promulgation of Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR)". The document represented the Services' final biological opinion on the effects of the final promulgation of the CTR on listed species and critical habitats in California in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; Act).

On Page 13 (C) and repeated on pages 216 and 232 of the biological opinion it is required that:

> "By June of 2003, EPA, in cooperation with the Services, will develop a revised criteria calculation model based on best available science for deriving aquatic life criteria on the basis of hardness (calcium and magnesium), pH, alkalinity, and dissolved organic carbon (DOC) for metals."

The biological opinion contains the following discussion, beginning on page 205, regarding the use of hardness in developing limitations for toxic metals:

> "The CTR should more clearly identify what is actually to be measured in a site water to determine a site-specific hardness value. Is the measure of hardness referred to in the CTR equations a measure of the water hardness due to calcium and magnesium ions only? If hardness computations were specified to be derived from data obtained in site water calcium and magnesium determinations alone, confusion could be avoided and more accurate results obtained (APHA 1985). Site hardness values would thus not include contributions from other multivalent cations (e.g., iron, aluminum, manganese), would not rise above calcium + magnesium hardness values, or result in greater-than-

intended site criteria when used in formulas. In this Biological opinion, what the Services refer to as hardness is the water hardness due to calcium + magnesium ions only.

The CTR should clearly state that to obtain a site hardness value, samples should be collected upstream of the effluent source(s). Clearly stating this requirement in the CTR would avoid the computation of greater-than-intended site criteria in cases where samples were collected downstream of effluents that raise ambient hardness, but not other important water qualities that affect metal toxicity (e.g., pH, alkalinity, dissolved organic carbon, calcium, sodium, chloride, etc.). Clearly, it is inappropriate to use downstream site water quality variables for input into criteria formulas because they may be greatly altered by the effluent under regulation. Alterations in receiving water chemistry by a discharger (e.g., abrupt elevation of hardness, changes in pH, exhaustion of alkalinity, abrupt increases in organic matter etc.) should not result, through application of hardness in criteria formulas, in increased allowable discharges of toxic metals. If the use of downstream site water quality variables were allowed, discharges that alter the existing, naturally-occurring water composition would be encouraged rather than discouraged. Discharges should not change water chemistry even if the alterations do not result in toxicity, because the aquatic communities present in a water body may prefer the unaltered environment over the discharge-affected environment. Biological criteria may be necessary to detect adverse ecological effects downstream of discharges, whether or not toxicity is expressed.

The CTR proposes criteria formulas that use site water hardness as the only input variable. In contrast, over twenty years ago Howarth and Sprague (1978) cautioned against a broad use of water hardness as ”shorthand ” for water qualities that affect copper toxicity. In that study, they observed a clear effect of pH in addition to hardness. Since that time, several studies of the toxicity of metals in test waters of various compositions have been performed and the results do not confer a singular role to hardness in ameliorating metals toxicity. In recognition of this fact, most current studies carefully vary test water characteristics like pH, calcium, alkalinity, dissolved organic carbon, chloride, sodium, suspended solid s, and others while observing the responses of test organisms. It is likely that understanding metal toxicity in waters of various chemical makeups is not possible without the use of a geochemical model that is more elaborate than a regression formula. It may also be that simple toxicity tests (using mortality, growth, or reproductive endpoints) are not capable of discriminating the role of hardness or other water chemistry characteristics in modulating metals toxicity (Erickson *et al*. 1996). Gill surface interaction models have provided a useful framework for the study of acute metals toxicity in fish (Pagenkopf 1983; Playle *et al*. 1992; Playle *et al*. 1993a; Playle *et al*. 1993b; Janes and Playle 1995; Playle 1998), as have studies that observe physiological (e.g. ion fluxes) or biochemical (e.g. enzyme inhibition) responses (Lauren and McDonald 1986; Lauren and McDonald 1987a; Lauren and McDonald 1987b; Reid and McDonald 1988; Verbost *et al*. 1989; Bury *et al*. 1999a; Bury *et al*. 1999b). Even the earliest gill models accounted for the effects of pH on metal speciation and the effects of alkalinity on inorganic complexation, in addition to the competitive effects due to hardness ions (Pagenkopf 1983). Current gill models make use of sophisticated, computer-based, geochemical programs to more accurately account for modulating effects in waters of different chemical makeup (Playle 1998). These programs have aided

in the interpretation of physiological or biochemical responses in fish and in investigations that combine their measurement with gill metal burdens and traditional toxicity endpoints.

The Services recognize and acknowledge that hardness of water and the hardness acclimation status of a fish will modify toxicity and toxic response. However the use of hardness alone as a universal surrogate for all water quality parameters that may modify toxicity, while perhaps convenient, will clearly leave gaps in protection when hardness does not correlate with other water quality parameters such as DOC, pH, Cl- or alkalinity and will not provide the combination of comprehensive protection and site specificity that a multivariate water quality model could provide. In our review of the best available scientific literature the Services have found no conclusive evidence that water hardness, by itself, in either laboratory or natural water, is a consistent, accurate predictor of the aquatic toxicity of all metals in all conditions.

Hardness as a predictor of copper toxicity: Lauren and McDonald (1986) varied pH, alkalinity, and hardness independently at a constant sodium ion concentration, while measuring net sodium loss and mortality in rainbow trout exposed to copper. Sodium loss was an endpoint investigated because mechanisms of short-term copper toxicity in fish are related to disruption of gill ionoregulatory function. Their results indicated that alkalinity was an important factor reducing copper toxicity, most notably in natural waters of low calcium hardness and alkalinity. Meador (1991) found that both pH and dissolved organic carbon were important in controlling copper toxicity to *Daphnia magna*. Welsh *et al*. (1993) demonstrated the importance of dissolved organic carbon in affecting the toxicity of copper to fathead minnows and suggested that water quality criteria be reviewed to consider the toxicity of copper in waters of low alkalinity, moderately acidic pH, and low dissolved organic carbon concentrations. Applications of gill models to copper binding consider complexation by dissolved organic carbon, speciation and competitive effects of pH, and competition by calcium ions, not merely water hardness (Playle *et al*. 1992; Playle *et al*. 1993a; Playle *et al*. 1993b). Erickson *et al*. (1996) varied several test water qualities independently and found that pH, hardness, sodium, dissolved organic matter, and suspended solids have important roles in determining copper toxicity. They also suggested that it may difficult to sort out the effects of hardness based on simple toxicity experiments. It is clear that these studies question the use of site calcium + magnesium hardness only as input to a formula to derive a criterion for copper because pH, alkalinity, and dissolved organic carbon concentrations are key water quality variables that also modulate toxicity. In waters of moderately acidic pH, low alkalinity, and low dissolved organic carbon, the use of hardness regressions may be most inaccurate. Also, it is not clear that the dissolved organic carbon in most or all waters render metals unavailable. This is because dissolved organic carbon from different sources may vary in both binding capacity and stability (Playle 1998)."

The SIP Sections 1.4.3.1 *Ambient Background Concentration as an Observed Maximum* and 1.4.3.2 state in part that: "If possible, preference should be given to <u>ambient water column concentrations measured immediately upstream or near the discharge, but not within an allowed mixing zone for the discharge</u>. Emphasis added.

The Federal Register, Volume 65, No. 97/Thursday, May 18th 2000 (31692), adopting the California Toxics Rule and confirming that the ambient hardness is the upstream hardness, absent the wastewater discharge, states that:

> "A hardness equation is most accurate when the relationship between hardness and the other important inorganic constituents, notably alkalinity and pH, are nearly identical in all of the dilution waters used in the toxicity tests and in the surface waters to which the equation is to be applied. If an effluent raises hardness but not alkalinity and/or pH, using the lower hardness of the downstream hardness might provide a lower level of protection than intended by the 1985 guidelines. If it appears that an effluent causes hardness to be inconsistent with alkalinity and/or pH the intended level of protection will usually be maintained or exceeded if either (1) data are available to demonstrate that alkalinity and/or pH do not affect the toxicity of the metal, or (2) the hardness used in the hardness equation is the hardness of upstream water that does not include the effluent. The level of protection intended by the 1985 guidelines can also be provided by using the WER procedure." Emphasis added.

Both EPA, in adopting the new criteria for copper, and the "Services" in issuing their biological opinion on the CTR stress that the use of translators and the old CTR hardness based standard for copper may not be protective of the aquatic life beneficial use. The Regional Board suggests that the biological opinion is not relevant as it only addresses the previously adopted CTR. However, the scientific discussion of hardness dependent metals is valid. The Regional Board has not presented any valid scientific evidence that the limitations generated by using the CTR equations and the lowest observed hardness are overly stringent. To the contrary, as is cited above, the CTR based limitations may not be sufficiently protective of aquatic life.

6. The proposed Permit uses an alternative mass balance equation to modify the explicit equation mandated by the CTR and consequently employs the defacto use of a mixing zone resulting in relaxed and nonprotective effluent limitations for metals.

The proposed Permit uses US EPA's "simple mass balance equation" which considers the effects of mixing the effluent with receiving waters to develop limitations for hardness dependent metals. The proposed Permit however does not contain a mixing zone analysis as required by the SIP. The failure to use the mandated CTR equation and the lowest instream ambient hardness as ordered by the Court results in significantly relaxed limitations for hardness dependent metals. The proposed Permit is contrary to the Court's Order, the CTR (federal regulation CTR, 40 CFR 131.38(c)(4)), mixing zone requirements (SIP) and good science.

a. The California Toxics Rule (CTR) Federal Regulation 40 CFR 131.38(c)(4) states that:

> "For purposes of calculating freshwater aquatic life criteria for metals from the equations in paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations." (Emphasis added).

The CTR requires the use of the equations presented in paragraph (b)(2) of 40 CFR 131.38 for the development of effluent limitations for hardness dependent metals. The required CTR equation is:

> CTR Criterion = WER x (exp(m[ln(H)]+b)
>
> where: H = hardness (mg/L as CaCO3), WER = water-effect ratio (with a default value of 1) and m, b = metal and criterion specific constants.

The Regional Board's use of the simple mass balance equation to modify the explicit CTR equation is simply a ruse to evade the Court's explicit direction to use the CTR equation in computing limitations for hardness dependent metals. It is a backdoor attempt to sneak in a mixing zone where no mixing zone analysis has been done. The resulting limits in the Permit are not protective of beneficial uses.

b. US EPA's simple mass balance equation is presented in the NPDES Permit Writers Manual (beginning on page 6-24). US EPA modifies the use of the equation on the basis of whether the discharge is rapidly and completely mixed or incomplete mixed with the receiving stream. The equation is principally used to determine a downstream pollutant concentration after complete mixing occurs (page 6-24). In simple terms, a mixing zone is applied. The State's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (SIP), Section 1.4.2.2, contains requirements for a mixing zone study which must be analyzed before a mixing zone is allowed for a wastewater discharge. Properly adopted state Policy requirements are not optional. The proposed Effluent Limitations in the proposed Permit are not supported by the scientific investigation that is required by the SIP and the Basin Plan.

The SIP Section 1.4.2.2 requires that a mixing zone shall not:

1. Compromise the integrity of the entire waterbody.
2. Cause acutely toxic conditions to aquatic life.
3. Restrict the passage of aquatic life.
4. Adversely impact biologically sensitive habitats.
5. Produce undesirable aquatic life.
6. Result in floating debris.
7. Produce objectionable color, odor, taste or turbidity.
8. Cause objectionable bottom deposits.
9. Cause Nuisance.
10. Dominate the receiving water body or overlap a different mixing zone.
11. Be allowed at or near any drinking water intake.

The proposed Permit's use of the simple mass balance equation to modify the results of the CTR equation results by using the effects of a mixing zones have not addressed a single required item of the SIP's requirements governing the establishment of a mixing zone. Indeed, page F-57 of the proposed Permit states that dilution credits are not allowed for copper.

The proposed Permit states on page F-81:

"For the receiving water, upstream total copper concentration varied from 0.89 µg/L to 5.8 µg/L. Using paired hardness and copper data, the maximum ambient receiving water concentration did not exceed the applicable CTR criteria for copper."

The Regional Board fails to evaluate the copper concentrations at the lower hardness values which do indeed exceed the CTR criteria, there is nothing in the record that would support the Regional Board's theory that hardness and flow are linked 100% of the time and that these data must be linked. To the contrary, we have cited above conditions when low flows and low hardness have occurred at the same time. The Regional Board could have developed seasonal limitations, as suggested in the City of Davis precedential Order, if they had reliable evidence that flow and hardness are always linked or paired, however such data does not exist.

7. The proposed Permit contains no Antidegradation Policy analysis and does not comply with the requirements of Section 101(a) of the Clean Water Act, Federal Regulations 40 CFR § 131.12, the State Board's Antidegradation Policy (Resolution 68-16) and California Water Code (CWC) Sections 13146 and 13247.

The proposed Permit, page F-30, No 3, states that:

> *"Using an ambient hardness that is higher than the minimum of 34 mg/L will result in a limit that may allow increased metals to be discharged to the river, but such discharge is allowed under the antidegradation policy (State Water Board Resolution 68-16). The Board finds that this degradation is consistent with the antidegradation policy (see antidegradation findings in Section IV.D.4 of the Fact Sheet). The Antidegradation policy requires the Discharger to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur, and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."*

The average monthly and daily maximum limits for copper are actually higher in the proposed Permit than the one it replaces. This allowable increase in concentration and mass loading of copper will inevitably reduce ambient water quality and lead to increased degradation. Consequently an antidegradation analysis must be performed.

The proposed Permit states on page F-1:

> **"Total Recoverable Copper**. Amended Order R5-2010-0114-04 includes revised effluent limitations for total recoverable copper that are less stringent than the effluent limitations adopted in Order R5-2010-0114. The revised effluent limitations are based on updated receiving water hardness data since adoption of R5-2010-0114. The new

> receiving water hardness data submitted by the Discharger is considered new information by the Central Valley Water Board."

The cited "new information" is simply ongoing hardness sampling data collected by the Discharger as required under the NPDES permit. The "new" hardness data is not outside the range of the data that was available previously. Instead, the "new" hardness data is a truncated data set and has been used to discard representative and valid data showing lower hardness values which is essential in developing protective limitations for hardness dependent metals. Not only is the "new" hardness data nothing new, it has been used to relax limitations in the permit to levels that are not protective of the beneficial uses of the receiving stream. The "new" information in the permit does not meet the test required under federal regulation 40 CFR 122.44(l)(C) to allow backsliding since the Regional Board discards reliable representative lower hardness data that would mandate more stringent limitations. The cited "new" information is insufficient to defend backsliding with regard to relaxed effluent limitations for copper and does not meet the test required for justifiable and complete Antidegradation analyses.

The Antidegradation Policy Section of the proposed Permit is however unchanged from the previous version with the exception of three sentences stating that a higher hardness was used to develop the limitation for copper. The proposed Permit, page F-30 No. 3, states:

> "Using an ambient hardness that is higher than the minimum of 34 mg/L will result in a limit that may allow increased metals to be discharged to the river, but such discharge is allowed under the antidegradation policy (State Water Board Resolution 68-16). The Board finds that this degradation is consistent with the antidegradation policy (see antidegradation findings in Section IV.D.4 of the Fact Sheet). The Antidegradation policy requires the Discharger to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that: a) a pollution or nuisance will not occur, and b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

These are simply unsupported assertions without any analysis. There is no discussion of how the increased concentration and mass loading of copper into a seriously impaired river that already exceeds criteria for copper and that is critical habitat to a number of species facing possible extinction is of benefit to the people of California.

The Regional Board is required to complete an Antidegradation Policy analysis anytime it takes an action to reduce water quality. The Regional Board freely admits that the action proposed for copper will result in lower water quality. There is no evidence that any additional Antidegradation Policy analysis has been undertaken with regard to this permit revision. The proposed Permit contains statements that the increase in copper is consistent with the Antidegradation Policy without any analysis or factual basis.

CWC Sections 13146 and 13247 require that the Board in carrying out activities which affect water quality shall comply with state policy for water quality control unless otherwise directed by statute, in which case they shall indicate to the State Board in writing their authority for not complying with such policy. The State Board has adopted the Antidegradation Policy

(Resolution 68-16), which the Regional Board has incorporated into its Basin Plan. The Regional Board is required by the CWC to comply with the Antidegradation Policy.

Section 101(a) of the Clean Water Act (CWA), the basis for the antidegradation policy, states that the objective of the Act is to "restore and maintain the chemical, biological and physical integrity of the nation's waters." Section 303(d)(4) of the CWA carries this further, referring explicitly to the need for states to satisfy the antidegradation regulations at 40 CFR § 131.12 before taking action to lower water quality. These regulations (40 CFR § 131.12(a)) describe the federal antidegradation policy and dictate that states must adopt both a policy at least as stringent as the federal policy as well as implementing procedures.

California's antidegradation policy is composed of both the federal antidegradation policy and the State Board's Resolution 68-16 (State Water Resources Control Board, Water Quality Order 86-17, p. 20 (1986) ("Order 86-17); Memorandum from Chief Counsel William Attwater, SWRCB to Regional Board Executive Officers, "federal Antidegradation Policy," pp. 2, 18 (Oct. 7, 1987) ("State Antidegradation Guidance")). As a state policy, with inclusion in the Water Quality Control Plan (Basin Plan), the antidegradation policy is binding on all Regional Boards (Water Quality Order 86-17, pp. 17-18).

Implementation of the state's antidegradation policy is guided by the State Antidegradation Guidance, SWRCB Administrative Procedures Update 90-004, 2 July 1990 ("APU 90-004") and USEPA Region IX, "Guidance on Implementing the Antidegradation Provisions of 40 CFR 131.12" (3 June 1987) (" Region IX Guidance"), as well as Water Quality Order 86-17.

The Regional Board must apply the antidegradation policy whenever it takes an action that will lower water quality (State Antidegradation Guidance, pp. 3, 5, 18, and Region IX Guidance, p. 1). Application of the policy does not depend on whether the action will actually impair beneficial uses (State Antidegradation Guidance, p. 6).

Actions that trigger use of the antidegradation policy include issuance, re-issuance, and modification of NPDES and Section 404 permits and waste discharge requirements, waiver of waste discharge requirements, issuance of variances, relocation of discharges, issuance of cleanup and abatement orders, increases in discharges due to industrial production and/or municipal growth and/other sources, exceptions from otherwise applicable water quality objectives, etc. (State Antidegradation Guidance, pp. 7-10, Region IX Guidance, pp. 2-3). Both the state and federal policies apply to point and nonpoint source pollution (State Antidegradation Guidance p. 6, Region IX Guidance, p. 4).

Even a minimal antidegradation analysis would require an examination of: 1) existing applicable water quality standards; 2) ambient conditions in receiving waters compared to standards; 3) incremental changes in constituent loading, both concentration and mass; 4) treatability; 5) best practicable treatment and control (BPTC); 6) comparison of the proposed increased loadings relative to other sources; and 7) an assessment of the significance of changes in ambient water quality.

A minimal antidegradation analysis must also analyze whether: 1) such degradation is consistent with the maximum benefit to the people of the state; 2) the activity is necessary to accommodate

important economic or social development in the area; 3) the highest statutory and regulatory requirements and best management practices for pollution control are achieved; and 4) resulting water quality is adequate to protect and maintain existing beneficial uses.

The Regional Board's unsupported statements and conclusions regarding compliance with the Antidegradation Policy, in lieu of an updated antidegradation analysis, violate both state and federal requirements.

8. The Regional Board cites State Water Board precedential Orders for the cities of Davis and Yuba City as allowing discretion in selecting which hardness to use in the CTR equations for toxic hardness dependent metals but ignores the requirements in those Orders to use the lowest observed instream hardness.

The State Water Board issued a prescidental order for City of Davis Order in response to an appeal from CSPA. The Order directed the Regional Board to use the lowest upstream ambient data. We frankly don't understand how the Regional Board interprets the requirement to use the lowest upstream hardness at Davis as justification to use virtually the highest upstream/downstream hardness in the proposed Permit.

SWRCB prescidential Order No. WQ 2008-0008 (Corrected) regarding a petition for consideration of the City of Davis' NPDES Permit states and concludes that:

> "Based on the current record, it would be more appropriate to use the lowest reliable upstream receiving water hardness values of 78 mg/l for Willows Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain for protection from acute toxicity impacts, regardless of when the samples were taken or whether they were influenced by storm events. Because high flow conditions may deviate from the design flow conditions for selection of hardness as specified in the CTR, it may not be necessary, in some circumstances, to select the lowest hardness values from high flow or storm event conditions. Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions."
>
> **"Conclusion**: The Central Valley Water Board was justified in using upstream receiving water hardness values rather than effluent hardness values. However, for protection from acute toxicity impacts in the receiving waters, which can occur in short durations even during storm events, in this case, based on the existing record, the Central Valley Water Board should have used the lowest valid upstream receiving water hardness values of 78 mg/l for Willow Slough Bypass and 85 mg/l for Conaway Ranch Toe Drain. Effluent limitations must protect beneficial uses considering reasonable, worst-case conditions. We recognize that this approach does not necessarily agree with conclusions in other guidance stating that low flow conditions are the "worst-case" conditions. However, nothing in this Order is intended to suggest that low flows are inappropriate for determining the reasonable, worst-case conditions in other contexts." (Emphasis added)

SWRCB precedential Order No. WQ 2004-0013, Conclusion No. 5, requires that: "In calculating the hardness value of the receiving water for purposes of determining the need for effluent

limitations for metals, i.e., the reasonable potential, it is appropriate to use the "worst case" historical data…"

9. An analysis using the CTR equation and the lowest recorded ambient instream hardness of 26 mg/l yields effluent limitations for copper lead and zinc significantly more stringent than in the proposed Permit.

Metals	Maximum Effluent Concentration,	CTR criteria using a hardness of 26 ug/l	
	From Permit Table F-2 and RP	Acute	Chronic
Copper	6.34	3.9	3.0
Lead	1.19	15	0.55
Zinc	41	38	38

Section 122.44(d) of 40 CFR requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. The proposed Permit contains limitations, or fails to contain any limitations, for toxic hardness dependent metals that exceed the level prescribed in the CTR and therefore does not comply with 40 CFR 122.44.

Temperature limits and the Thermal Plan

10. In considering the current drought and cumulative impact of its thermal discharge together with all other significant impacts on the species affected the Regional Board cannot approve a thermal plan exception and possibly assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in the Sacramento River as required by federal regulation.

The proposed Permit grants an exception to the Thermal Plan that includes:

- **Thermal Plan Objective 5A(1)(a) Exception:**

  The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than:

  25º F from 1 October through 30 April;
  -and-
  20º F from 1 May through 30 September

- **Thermal Plan Objective 5A(1)(b) Exception:**

  If the natural receiving water temperature is less than 65ºF, the discharge shall not create a zone, defined by water temperature of more than 2ºF above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

> If the natural receiving water temperature is 65ºF or greater, the discharge shall not create a zone, defined by a water temperature of 1ºF or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

The technical basis for the thermal plan exception is a report completed in March 2013 and a May 2014 *Delta Smelt Addendum*. Since completion of that report California has suffered from a condition of significant drought resulting in low river flows and elevated temperatures, which are not considered in the report and therefore not in the thermal plan exception.

40 CFR Section 125.73(a), provides that,

> "Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made."

The proposed Permit states on page 9:

> "The Central Valley Water Board, after consideration of the Discharger's temperature studies and *consultation with the National Marine Fisheries Service (NMFS), the United States Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW) (fishery agencies), finds the Discharger's studies adequate demonstrate the following*:
>
> - The thermal plume from the discharge will show no *direct acute or chronic thermal effects on fishes (including larval and juvenile life stages),* benthic macroinvertebrates, or plankton. The thermal exposures, either in the near-field plume area or far-field downstream areas would not exceed lethal or sub-lethal effect thresholds for aquatic life.
>
> - The is a sufficient zone of passage such that the thermal plume from the discharge will not result in blockage or significant delay upstream migration of adult fishes or downstream migration of larval and juvenile fishes. The discharge upon its full mixing with river flow would not block or delay upstream adult migration of fish species.
>
> - Predatory fishes were not hold in the warmer water plume near the diffuser, where they could prey upon ESA-listed fishes as they migrate past the diffuser.

- Fishes were not holding within the plume area due to the elevated water temperature for sufficient periods of time to experience toxicity, based on plume water quality.

This demonstration has shown the Effluent and Receiving Water Limitations for temperature in this Order are sufficient, considering the cumulative impact of the thermal discharge together with all other significant impacts on the species affected, to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and n the body of water into which the discharge is made." Emphasis added.

The proposed Permit implies that NMFS, USFS and CDFS had been consulted, had evaluated the effects of the Thermal Plan Exception on listed species and had indicated approval of the Exception. We requested copies of all correspondence between the respective agencies and the Regional Board and received one letter from NMFS, two from USFWS and two from the CDFW. We examined those letters.

The 2 June 2014 review of the March 2013 *Temperature Study to Assess the Thermal Impacts of the Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River* (Thermal Study) by NMFS was vey specific to the questions posed. As such it did not address the myriad sublethal impacts caused by the interaction of elevated temperatures with the universe of chemical constituents that are affected and which are frequently more toxic under conditions of elevated temperatures. It did not address the additive or synergistic interactions between chemical constituents and elevated temperatures and their effects on aquatic life. Nor did it address the increased vulnerability to diseases that commonly affect, especially when exposed to excessive temperature. Beyond that, there were numerous qualifications related to the limitations of this one year study. The NMFS letter cannot in any semblance of the imagination be characterized as approval of the Thermal Plan Exception or provide justification for concluding that there are no adverse impacts caused by the Thermal Plan Exception.

A few of the qualifying cautions about the Thermal Study include:

"In particular, predation effects within the reach may have variable levels of impact, and is dependent on predator abundance in the Delta, location of populations and interactions within and between predators and prey, and random variation in these parameters. A study over multiple years would serve to account for the potential range of variability that could occur within this system." Page 4.

"Although some effects may occur to the presence of the diffuser and thermal plume, it would appear that they would be in the form of harassment of behavioral modification which were not part of the study design to evaluate." Page 6.

"The criteria used in the Temperature Study "are not sufficiently sensitive to the more subtle effects of exposure which do not cause mortality or overt morbidity." Page 8

"NMFS reiterates that these data are from only a single year, and that conditions in other years under different environmental conditions and different predator/prey populations structures may result in different findings." Page 8.

> "As with most field data, a study in which data from only one sampling year are gathered is generally most truly reflective of that year and may not represent results over multiple years. Changes may occur under different environmental conditions or water year types which are not reflected in that particular year." Page 9.
>
> "Potential future studies should include interactions between temperature exposure scenarios defined in this study with expected chemical constituents in the thermal plume over the predicated exposure duration. However, such interactions were not part of the initial study design and would have to be evaluated at a future time." Page 10.
>
> "NMFS recognizes that this is only one year's worth of data, and results from additional years with different predator distributions may result in different findings." Page 12.

Again, the NMFS review of the Thermal Study cannot be read as agreeing that all of the potential impacts of elevated temperatures have been analyzed and discussed. The review makes clear that they haven't been fully addressed. The review of the Thermal Study was not a formal consultation of the Thermal Plan Exception nor can the review be interpreted as an endorsement of the Exception. It was simply a review of a study. We assume that NMFS will now at some point undertake a formal assessment of the Thermal Plan Exception.

The 18 December 2013 review of the March 2013 *Temperature Study to Assess the Thermal Impacts of the Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River* (Thermal Study) by the USFWS was highly critical of the Study and its effects regarding Delta smelt. It noted:

> "There are, however, a few omissions in the study which prevent the Service from fully evaluating the thermal effects of the facility on delta smelt" and offered a series of comments and recommendations.
>
> As a result of the issues discussed above, the Service is unable to fully evaluate the effects of the thermal plume on delta smelt or concur with the conclusions of S1-1 (p. 55) in the Summary of Findings for Study Element 1 which states that 'current operations would not cause acute lethality of sub-lethal adverse effects on special-status fish species, phytoplankton, or zooplankton passing through the plume at any time of year.'"

The USFWS offered a series of recommendations on further studies that resulted in an addendum being prepared that focused on Delta smelt.

The 14 May 2015 review of the March 2015 *Temperature Study to Assess the Thermal Impacts of the Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River: Delta Smelt Addendum* (Smelt Addendum) by the USFWS cannot be interpreted as having resolved all of the myriad sublethal impacts caused by the interaction of elevated temperatures with the universe of chemical constituents that are affected and which frequently more toxic under conditions of elevated temperatures. As the USFWS review states:

> "In conclusion, the Thermal Study and Smelt Addendum provided by the District included adequate information needed to evaluate the effects of their current thermal discharge on Delta Smelt and its critical habitat." Page 2.

The USFWS letter cannot be read as approving the Thermal Plan Exception or concluding that there are no adverse impacts. The USFWS simply said they now have the information needed to begin to evaluate the effects of thermal discharge on Delta smelt.

The two letters from the CDFW were not reviews of the Temperature Study. The 15 June 2010 letter was a "Response to request for review and comment on the Aquatic Life and Wildlife Preservation Issues for the Sacramento Regional Wastewater Treatment Plant NPDES Permit Renewal." With respect to the Thermal Plan Exception, the letter stated:

> "Issue 4: Thermal Conditions
> Comment: Pending a determination by the National Oceanic and Atmospheric Administration, the Department recommends the permit require compliance with the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan)." Page 3.

The 7 October 2010 three page letter was titled Response to the proposed NPDES permit renewal for the Sacramento Regional County Sanitation District Sacramento Regional Wastewater Treatment Plant. Addressing temperature the letter said:

> "DFG supports the inclusion of a temperature study to evaluate the protection of delta smelt and the Sacramento River biota." Page 2.

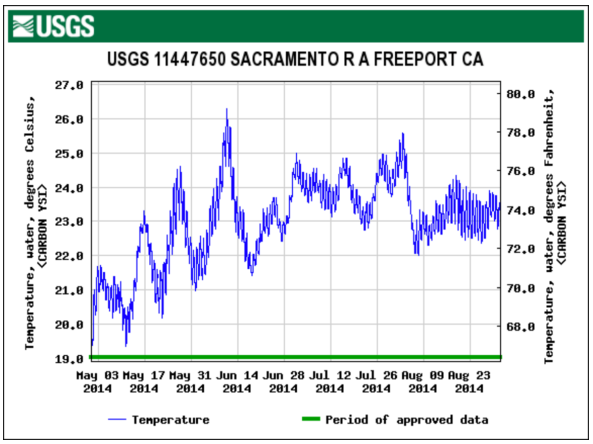
Nothing in either letter from CDFW indicates support for the Thermal Plan Exception or suggests that the Department has concluded that there are no adverse impacts to aquatic life from the discharge of elevated temperatures into the Sacramento River. To the contrary, the CDFW 15 June 2010 letter recommended compliance with the Thermal Plan.

In examining the *Temperature Study to Assess the Thermal Impacts of the Sacramento Regional Wastewater Treatment Plant Discharge on Aquatic Life of the Lower Sacramento River* and the *Delta Smelt Addendum*, we could find nothing to indicate that it considered or analyzed the myriad impacts of adding additional thermal stress to a river already experiencing unknown toxicity and multiple physical, chemical, chronic and sublethal stressors. We could find nothing regarding elevated temperature on increased susceptibility of fish and lower trophic levels to disease, bioaccumulation, bioconcentration or additive or synergistic impacts. Indeed, we conducted repeated word searches for metals and industrial, household and pharmaceutical constituents that are identified as present in the Sacramento River to no avail.

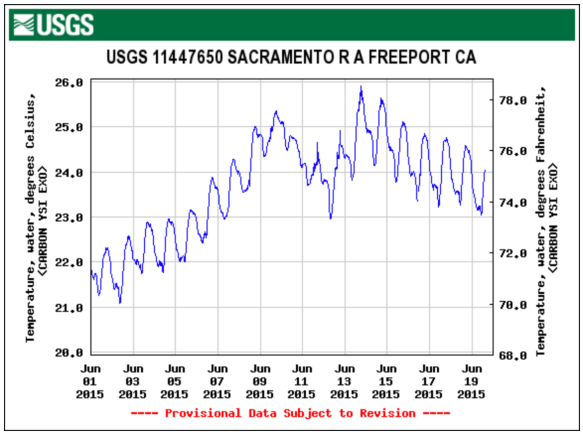
The Thermal Study only examined direct impacts of temperature on selected aquatic life and those impacts were discussed through the prism of highly criticized modeling of a complex tidal prism. Models are frequently preferred over empirical observation because models can be manipulated to achieve desired outcomes.

We've had recent experience with temperature models. The U.S. Bureau of Reclamation's (USBR) temperature model for Shasta Dam and the Upper Sacramento River predicted that 56ºF temperature could be met at Clear Creek below Shasta Reservoir during 2015. Unfortunately, the model was off by more than four degrees and the result was the loss of 95% of the brood year of Sacramento winter-run Chinook salmon, virtually all of the spring-run of Chinook salmon and 98% of Sacramento River fall-run Chinook salmon. After the fact, NMFS acknowledged that it doesn't believe USBR's "water quality modeling accurately reflects increases in water temperature between Keswick Dam and CCR compared with actual data.[14] This spring, USBR again assured the State Water Board it could maintain temperatures in the Upper Sacramento and received a provisional approval of their Temperature Management Plan. Weeks later they informed the Board that actual monitoring revealed that they would not be able to maintain 56ºF at Clean Creek and the Board's Executive Officer rescinded the approval of he Management Plan.

The Regional Board should be extremely cautious about relying on modeling representations in lieu of actual monitoring in order to reauthorize a Thermal Plan Exception that the Court ordered vacated. The Sacramento River is already temperature stressed during much of the year. The Thermal Study only looked at an extremely limited data set over the course of one year. Its historical range of temperature chart on page 13 understates actual temperatures by several degrees. When temperature is already bordering lethal levels, any additional and higher thermal discharge can push temperature past the level of lethality.



USGS Freeport Gage, Temperature, May-August 2014.

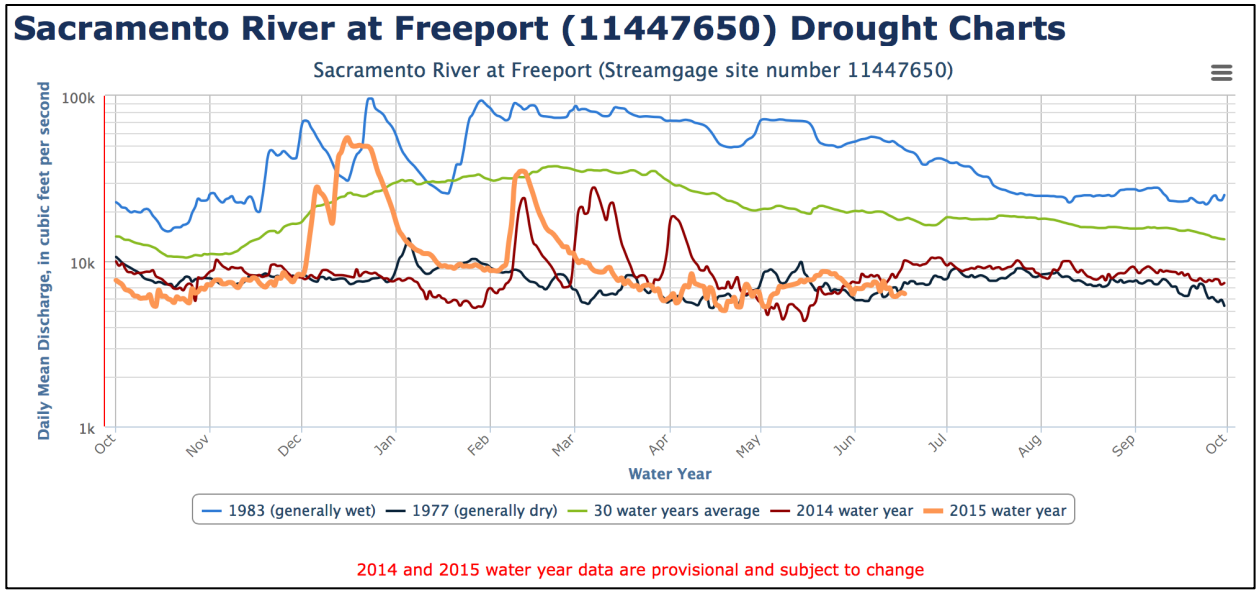


USGS Freeport Gage, Temperature June 1-19 2015.

To continue a Thermal Plan Exception allowing thermal discharges of as much as 180 mgd of water that may be as high as 20 or 25 degrees above those of receiving waters, including all of the chronic and sublethal effects of temperatures in conjunction with synergistic or additive impacts with the myriad other stressors fish experience in these water evidences a complete disregard for the environment and the public trust resources belonging to all of the citizens of

[14] National Marine Fisheries Service, Evaluation of Alternatives for Sacramento River Water Temperature Compliance for Winter-Run Chinook Salmon, 205. http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/2015/nmfs_sacrtemp041515.pdf

California. It also evidences a disregard for future generations and the impact of rising global temperatures.



USGS Freeport Gage, 2015, 2014, 1983, 1977 and 30 Year Average.

The current state of the Sacramento River:

The Sacramento Bee; 28 March 2015, stated in part:

> Endangered steelhead about to hatch in the American River could soon be killed by low flows and warm temperatures caused by the drought, a sign of the ongoing struggle over scarce water supplies. The fish, which are protected by the Endangered Species Act, are beginning to hatch from eggs in riverbed gravel. They require water cooler than 57 degrees to survive. Temperatures are already warmer than that due to record-breaking heat this month and low river flows caused by a fourth year of drought in California. The conflicts are expected to intensify this summer, when winter-run Chinook salmon – also an endangered species – begin migrating downstream on the Sacramento River. An estimated 95 percent of the run perished last year because there wasn't enough cold water to protect the fish.

Here and Now – NPR, Wednesday, May 27, 2005, stated in part:

> This is how it goes throughout California. North of the Carrizo Plain, high-up in the mountains, snow pack is a fraction of what it should be. In April, it measured just 5 percent of the monthly average. That's trickling down – or not trickling down – to the fish that swim in California's rivers. "Everything right now is putting extreme pressure on those populations," says Stafford Lehr, chief of fisheries for the California Department of Fish and Wildlife.
>
> Lehr says the drought killed off nearly every single endangered winter-run Chinook salmon in the state last year. The San Joaquin and Sacramento rivers where they spawn

> are shallower. They're warmer. They're too warm for the fish to thrive. "Conditions were even worse this year," Lehr says.
>
> In early June, the state and federal government will finish up what's been called the biggest fish-lift project in California's history. Lehr says the Central Valley's five fish hatcheries produce about 30 million baby salmon every year. They're supposed to swim to the ocean. The drought killed off nearly every single endangered winter-run Chinook salmon in California last year, according to Stafford Lehr, chief of fisheries for the California Department of Fish and Wildlife. (USFWS via Flickr) "However, in this drought scenario, the conditions go to the point where most likely none of them would make it out," Lehr says. The solution sounds unnaturally simple. Put all 30 million fish into trucks and drive them an hour and a half to the San Francisco Bay.

2 October 2014, The Sacramento Bee, stated in part:

> And in case Sacramento River flows become too low or too warm, state and federal agencies are considering another new tool: egg injection. In this strategy, salmon eggs would be preserved in a hatchery until river temperatures cool off later this fall, then moved to the river and injected with a hose into gravel beds, where they theoretically would hatch on their own. Egg injection has been successful in Oregon and Alaska but has never been used in California. Kevin Shaffer, salmon program manager at the California Department of Fish and Wildlife, said egg injection is being "seriously considered." But it would be used experimentally, not as a broadly applied tool to protect the salmon run.

16 May 2015 Associated Press, stated in part:

> What do you do when you have 30 million young salmon ready for their big journeys downstream, but drought and development have dried your riverbeds to sauna rocks? In California this year, you give the fish a ride. State and federal wildlife agencies in California are deploying what they say is the biggest fish-lift in the state's history through this month, rolling out convoys of tanker trucks to transport a generation of hatchery salmon downstream to the San Francisco Bay.
>
> California is locked in its driest four-year stretch on record, making the river routes that the salmon normally take to the Pacific Ocean too warm and too shallow for them to survive. "It's huge. This is a massive effort statewide on multiple systems," said Stafford Lehr, chief of fisheries for the California Department of Fish and Wildlife, which since February has been rolling out four to eight 35,000-gallon tanker trucks filled with baby salmon on their freeway-drive to freedom. "We're going to unprecedented drought," Lehr said. "We're forced to extreme measures." Drought and heavy use of water by farms and cities have devastated key native fish in California. Last year, for example, 95 percent of the state's winter-run of Chinook salmon died. The fish is vital for California's fishing industries and for the food chain of wildlife.

Given the current and cumulative impact of the Sacramento Regional Wastewater Treatment Plant's thermal discharge together with the existing degradation of the Sacramento River, depleted fisheries and all other significant impacts on species hovering on the brink of extinction, the Regional Board cannot approve a Thermal Plan Exception and increase the concentration and mass loading of copper into the River and possibly hope to assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in the Sacramento River. We urge the Regional Board to vacate the Thermal Plan Exception and develop limits for hardness dependent metals that is protective of the environment and complies with statutory and regulatory requirements.

Thank you for considering these comments. If you have questions or require clarification, please don't hesitate to contact us.

Sincerely,

Bill Jennings, Executive Director
California Sportfishing Protection Alliance