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February 16, 2010

Division of Water Rights
State Water Resources Control Board
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Subject: Sacramento Regional County Sanitation District Participant Written Summary for the State Water Resources Control Board Informational Proceeding to Develop Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources February 16, 2010

Board of Directors Representing:

- County of Sacramento
- County of Yolo
- City of Citrus Heights
- City of Elk Grove
- City of Folsom
- City of Rancho Cordova
- City of Sacramento
- City of West Sacramento

The Sacramento Regional County Sanitation District (SRCSD) supports efforts and research to find solutions to address the myriad of conditions confronting the Delta and its long term sustainability. We appreciate the monumental task the State Water Resources Control Board (State Water Board) has before them to develop flow criteria for the Delta ecosystem that will ensure the necessary protection of public trust resources. SRCSD is very proud of its environmental stewardship role in protecting the environment and our watershed for future generations. We believe environmental stewardship is good business, a public trust responsibility, and key to achieving sustainable outcomes. Motivated by a strong environmental ethic, dedicated staff throughout our organization lead the way in environmental action founded on the latest scientific research. SRCSD is committed to ensuring sound science is a basis for decisions regarding ecosystem protection and water supply in the Delta.

Introduction

Following are SRCSD's responses to the key issue regarding water quality, volume and timing of outflows. We would like to focus on questions one and five as listed in the December 16, 2009 "Notice of Public Informational Proceeding and Pre-Proceeding Conference to Develop Flow Criteria for the Delta Ecosystem Necessary to Protect Public Trust Resources".

Mary K. Snyder
District Engineer

Stan R. Dean
Director of Policy and Planning

Prabhakar Somavarapu
Director of Operations

Marcia Maurer
Chief Financial Officer

Claudia Goss
Director of Communications

Question one asks, in part:

"What key information, in particular scientific information or portions of scientific information, should the State Water Board rely upon when determining the volume, quality and timing of water needed for the Delta ecosystem pursuant to the Board's public trust obligations?"

Question five asks:

“What can the State Water Board reasonably be expected to accomplish with respect to flow criteria within the nine months following enactment of SB 1? What issues should the State Water Board focus on in order to develop meaningful criteria during this short period of time?”

SRCSO has highlighted recent information regarding the effect of entrainment on Delta fish populations that the State Water Board should consider in its determinations under this proceeding. This information is provided below under the heading of “Hydrodynamics-Operations: Fish Loss Due to Entrainment/Encouragement of Predation/Salvage, and in the accompanying exhibits”.

In the short time period available to develop flow criteria, SRCSO recommends that the State Water Board focus primarily on Delta outflows. The recognition that flows are integral to both ecosystem viability and water supply is supported by the State Water Board and other agencies, as well as leading experts on fisheries. The State Water Board’s review of the Bay Delta Plan and CalFED’s review of ammonia effects in the Delta are but two examples where the importance of flow to the Delta ecosystem is emphasized and the relative importance of other stressors in relationship to flow has been appropriately recognized.

The Water Board recognizes the importance of flow in the *“Draft Staff Report 2009 Periodic Review of the 2006 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan)”*. In the staff report, the review of Delta outflow export/inflow objectives is an area identified as needing additional review, whereas the area of other stressors, including ammonia, was identified as an area that did not require additional review due to ongoing efforts by the Water Boards. While believing that hypotheses related to "other stressors" are not the appropriate focus of these specific proceedings, SRCSO is providing testimony and information that addresses these issues should the State Water Board desire to consider the information.

On March 10 and 11, 2009, an independent panel of national experts reviewed the available scientific information about the chemical and biological status of the Delta, considered input from Delta stakeholders and then developed recommendations for scientific study to address specific hypotheses regarding ammonia effects in the Delta. In short, the independent panel concluded:

- There is compelling evidence that human activities have had dramatic impacts on the Delta ecosystem. The most notable changes the expert panel identified are grazing by invasive clams and hydrologic modifications;
- As for the effect of ammonia, the panel indicated that it cannot be conclusively determined at this time whether ammonia is significantly contributing to pelagic organism decline (POD) or to changes in the Delta food web; and
- The panel further commented on the need for the development of an integrated model that would evaluate the various potential drivers and help guide future research and ecosystem management decisions.

On September 24, 2009, the Central Valley Regional Water Quality Control Board (Regional Water Board) staff provided a summary of the August 18-19, 2009 Ammonia Summit, that was co-hosted by the Regional Water Board and the Interagency Ecological Program. A key conclusion in that summary is that no evidence has been collected to date to demonstrate that ammonia is causing beneficial use impacts in the Sacramento River or in the Delta. A summary of the key evidence related to ammonia is provided below and in our exhibits.

Both the CalFED Workshop and the Regional Board Summit identified areas for further research. SRCSD believes there is a need for additional research to address evolving hypotheses and confirm whether and to what extent ammonia and other stressors related to water quality may be having an impact on the Delta, and is supporting that ongoing research. However, findings available to date or that will be available in the next several months provide no evidence of effects associated with other stressors that would provide a basis for modifying your decisions regarding Delta flow criteria. Therefore, we recommend you focus your efforts in meeting the legislative mandate you have been given on establishing new Delta flow criteria, which are known to have direct impacts to the ecosystem, beneficial uses, and public trust resources.

The remainder of SRCSD's summary is organized according to the recommended topic panels in the Water Boards January 29, 2010 revised notice. As this is a summary, we encourage you to view exhibits supplied to you on the attached CD corresponding to the topics listed below.

Other Stressors-Water Quality: Ambient Ammonia Concentrations: Direct Toxicity and Indirect Effects on the Food Web

Ambient ammonia concentrations (See SRCSD Exhibit 1)

Ample evidence indicates that ambient ammonia concentrations throughout the Delta and the brackish estuary are not acutely toxic to delta smelt, calanoid copepods (which are important prey items for delta smelt), or the wide range of other aquatic organisms explicitly protected by current USEPA ammonia criteria. This characterization of ambient conditions applies to "POD" years (e.g., 2002 onward) and also to the entire 35-year period for which long-term monitoring data are available. USEPA acute and chronic toxicity criteria have been used to screen almost 12,000 grab samples from 90 long-term monitoring stations throughout the Delta and the brackish estuary. Ammonia concentrations have *never* exceeded the USEPA acute criterion; the chronic criterion was exceeded *only twice* in the available record (in 1976, 1991). Margins of safety are large: on average in the freshwater Delta, ambient ammonia concentrations are below the acute and chronic USEPA criteria by factors of 300 and 80, respectively. All of the ambient data are comfortably below acute effects thresholds for delta smelt and applicable thresholds for Delta copepods. To date, allegations of chronic toxicity for selected Delta species rely on use of acute-to-chronic ratios (ACRs). Some of the ACRs in use for this purpose have been developed using approaches which diverge from those of the USEPA; an evaluation of these approaches is included in SRCSD Exhibit 1.

Indirect Effects on the Food Web (See SRCSD Exhibit 1)

Previous work has shown that, under certain environmental conditions, low levels of ammonium delay uptake of nitrate and development of diatom blooms in the brackish estuary (Dugdale et al. 2007, Wilkerson et al. 2006). This phenomenon, termed "ammonium inhibition" by the principal investigators, is currently being investigated in the freshwater Delta. Information emerging from these investigations indicates that phytoplankton responses to ammonium in the Sacramento River are

different than those reported from the Suisun, San Pablo, and Central Bays; patterns in primary production in the freshwater Delta are so far not explained by ammonium concentrations. Preliminary results presented at the 2009 Ammonia Summit sponsored by CalFED and CVRWQCB indicate that ammonia does not inhibit phytoplankton production in the Sacramento River between Sacramento and Suisun Bay.

Another area under investigation focuses on ammonia levels and its effect on the production of *Microcystis*. There are proposals, primarily based on information from highly nutrient rich estuaries or laboratory work outside the Delta, that ammonia levels in the Delta might be contributing to the occurrence or toxin-production of *Microcystis*. However, several field studies from the Delta *do not* confirm a relationship between ambient ammonia levels and the abundance or toxicity of *Microcystis*. Instead, physical factors such as water temperature, flow, and turbidity so far best explain *Microcystis* abundance and toxicity in the San Francisco estuary.

In summary, there is currently no definitive scientific basis for proposals that ammonium has contributed to the collapse of pelagic fish species or to changes at lower trophic levels in the food web that supports them.

Other Stressors-Water Quality: Direct Toxicity Ammonia/Pyrethroids

Direct toxicity ammonia/pyrethroids (See SRCSD Exhibit 2)

It is important that the presentation of facts regarding the potential for toxicity to fish and invertebrate species from ammonia in the Delta accurately reflect the available information on this subject. Recent studies have repeatedly shown that ambient ammonia concentrations are well below those acutely toxic to sensitive fish (Werner et al. 2009a, b). These data validate the weekly acute bioassays conducted by SRCSD that do not show acute effects to fish in effluent, nor do quarterly bioassays show evidence of chronic toxicity to fish, zooplankton, or algae test species at environmentally relevant concentrations. As noted above, ambient ammonia concentrations in the Sacramento River are much lower than EPA acute or chronic toxicity values.

With respect to pyrethroids, recent studies have shown that toxicity can occur at extremely low levels. However, the levels of pyrethroids detected in SRCSD effluent are not of sufficient magnitude to cause toxicity to the most sensitive species in the Sacramento River.

Hydrodynamics-Operations: Fish Loss Due to Entrainment/Encouragement of Predation/Salvage

Fish loss due to entrainment/encouragement of/predation/salvage (See SRCSD Exhibit 3)

Strong evidence exists regarding the direct mortality of fish in the Delta due to entrainment. Key evidence, including recent research and papers, is summarized in SRCSD's exhibit of Hydrodynamics-Operations. While more research is needed to establish the population-level impacts of this mortality, available information and findings by fisheries experts indicates that entrainment losses are important to multiple fish species under certain seasonal and annual conditions.

The delta smelt and salmonid biological opinions completed by USFWS and NMFS in 2008 and 2009 and other recent scientific investigations have found that entrainment losses are directly related to export rates and reverse flows in Old and Middle River. This is a key factor that must be addressed by

the SWRCB in its Delta flow criteria determinations. Under its public trust responsibility, the determinations the SWRCB makes regarding timing and volume of exports must take the direct mortality of fish due to entrainment into account and should also take into account the indirect effects of exports on food web, habitat, predation and other stressors.

Conclusion and Recommendations

In conclusion, SRCSO recommends that the State Water Board focus primarily on Delta outflows which are known to have direct impacts to the ecosystem, beneficial uses, and public trust resources. The recognition that flows are integral to both ecosystem viability and water supply is well documented. SRCSO believes there is a need for additional research to address evolving hypotheses and confirm whether and to what extent other stressors related to water quality may be having an impact on the Delta, and is supporting that ongoing research. However, the effects of other stressors on the Delta are already being addressed in other venues and should not be included in the State Water Board's efforts to establish Delta flow criteria.

SRCSO would like to make specific recommendations on research and projects to assist the SWRCB in the future evaluation of appropriate flow criteria for the Delta.

- Develop an ecosystem model that begins with hydrology of the system, including exports, and then evaluate other stressors in the model.
- Determine volume and timing of flows needed to reduce Microcystis blooms.
- Perform more research to investigate the extent to which fish populations are impacted indirectly as a result of altered hydrodynamic conditions and seasonal variations.
- Focus on improving South Delta fish facilities, which CalFED and others have noted as a priority mitigation area, including screens or other devices to prevent fish from entering Clifton Court Forebay to reduce the effects of predation.

SRCSO is available to assist the SWRCB in this effort and our technical experts are available to answer any questions. We have included some additional CDs that contain the following:

- Participant's Written Summary
- Witness Identification List
- Witness Statements of Qualifications
- Witness Written Testimony
- Exhibit Identification List

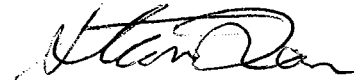
The Exhibit Identification List serves as a table of contents for the CD.

SRCSD Summary on SWRCB Flow Criteria
February 16, 2010

If the decision is made to proceed forward with an Other Stressors panel, (which we do not believe this proceeding is the appropriate venue), we would ask that our witnesses be called to participate in that panel to be able to offer our scientific information as part of that panel discussion.

We look forward to reviewing the exhibits once posted to provide meaningful, relevant questions in helping focus the SWRCB efforts in determining Delta flow criteria, keeping in mind what can be done in the short term. The best available evidence strongly supports focusing on Delta outflows as the key in the short term for assuring protection of the ecosystem and providing a reliable water supply.

Sincerely,

A handwritten signature in black ink, appearing to read "Stan R. Dean". The signature is fluid and cursive, with a large initial "S" and "D".

Stan R. Dean
Director of Policy and Planning

cc: Mary Snyder, SRCSD District Engineer
Terrie Mitchell, SRCSD Legislative and Regulatory Affairs Manager