United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Mr. James D. Marshall, P.E.
Senior Water Resources Control Engineer
Regional Water Quality Control Board, Central Valley Region
1120 Sun Center Drive, #200
Rancho Cordova, California 95670-6114

Subject: Comments on the September 3, 2010 Tentative Waste Discharge Requirements Renewal (NPDES No. CA0077682) for Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Sacramento County.

Dear Mr. Marshall:

The U.S. Fish and Wildlife Service (Service) submits these comments and recommendations during the 30-day public comment period on the Tentative Order, NPDES permit renewal, for the Sacramento Regional County Sanitation District (SRCSD). The Service provided comments on the California Central Valley Regional Water Quality Control Board's (Regional Board) "Aquatic Life Issues" document in June, 2010 and submitted recommendations on the SRCSD exception request for the "Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) in August 2010. The Service appreciates the efforts of the Regional Board, SRCSD and other state and federal agencies to develop a draft permit which, if issued in substantially its current form, would allow the SRCSD to perform their important function as a regional wastewater treatment facility in a manner that maintains the beneficial uses of the Sacramento River and downstream waters. The Service appreciates the opportunity to comment and we ask that the following comments be included as part of the final administrative record.

Background

The Sacramento Regional Wastewater Treatment Plant (SRWTP) is a publicly-owned treatment works that serves 1.3 million people in the greater Sacramento, Elk Grove, Rancho Cordova, Citrus Heights and urbanized areas of Sacramento County. The Sacramento Regional County Sanitation District (Permittee) seeks renewal of the SRWTP NPDES permit, which expired in 2005. The Regional Board extended the permit administratively and has begun the process for adoption of a new permit by late 2010.

The facility conducts secondary treatment (solids removal and biological oxygen demand reduction) with chlorination disinfection and dechlorination. The facility discharges at a permitted rate of up to 181 million gallons per day. Treated effluent enters the Sacramento River downstream of the Freeport Bridge through a diffuser at the bottom of the river. The 300-foot long diffuser is oriented perpendicular to river flow. At the point of discharge, the Sacramento River is influenced by tidal action and can flow in a reverse direction. During these times, the SRWTP diverts its discharge to temporary holding basins.

Our comments focus on the effects of the permit on fish and wildlife with emphasis on delta smelt. The Water Quality Control Plan for the Sacramento and San Joaquin basins designates the following beneficial uses for these water bodies: warm and cold fresh water habitat, wildlife habitat, migration of aquatic organisms, and spawning, reproduction and/or early development. The Sacramento River at Freeport is within the designated critical habitat for five federally-listed fish species including winter- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (O. *mykiss*), delta smelt (*Hypomesus transpacificus*) and green sturgeon (*Acipenser medirostris)*. Operation of the SRWTP may also affect wildlife species, including those known to feed on Central Valley fishes like the listed California least tern (*Sternula antillarum brownie)* and giant garter snake (*Thamnopsis gigas*).

The range of delta smelt extends from San Pablo Bay upstream to about Verona on the Sacramento River, though the majority of the population occupies the portion of the range extending from western Suisun Bay/Marsh to about the city of Sacramento on the Sacramento River. Formerly abundant, the delta smelt population has declined, especially since the early 1980's resulting in its listing as threatened in 1993. Reasons for its decline include changes in outflow from the Delta, entrainment losses to water diversions, changes to food organisms, toxic substances, disease, competition and predation (USFWS 1995). In 2010, the Service found delta smelt warranted for uplisting to endangered due to increasing threats to the species. The process of reclassification of the delta smelt from threatened to endangered status is currently precluded, however, by other higher priority listing actions.

Delta smelt enter the Sacramento River and Deep Water Ship Channel from late December to June to spawn in temperatures between 12-18°C. Delta smelt critical habitat in the Sacramento River extends north to the confluence with the American River. Pre-spawning adults could be expected in the vicinity of the city of Sacramento from the latter part of December through June. Spawning on the mainstem of the Sacramento River may occur particularly during years of low freshwater discharge. Some larvae could be expected in the vicinity of the city of Sacramento during February-June. During the larval stage, delta smelt are the most vulnerable to zones of poor water quality or high water temperature due to their restricted mobility.

Comments

The draft permit is well-written and addresses the majority of the Service's concerns related to the SRWTP discharge. If adopted by the Regional Board, the permit would result in important reductions in aquatic pollution in the Sacramento River and San Francisco Bay-Delta (Delta). The draft permit includes numeric effluent limitations effective at the adoption of the final permit. It also includes less stringent interim limitations which are in effect until November 30, 2020. The interim limitations provide controls on six water quality parameters while allowing

SRCSD time to modify plant operations to meet the more stringent limitations expected in 2020. Five of the six water quality parameters with interim limitations are of significance to fish and wildlife: biological oxygen demand, total suspended solids, ammonia, total residual chlorine and chlorpyrifos.

Implementation of the permit is an important contribution to the overall effort by stakeholders to address deterioration of the Delta and San Francisco estuary ecosystems. If requirements and conditions in the final permit result in less improved environmental conditions, the Service would seek opportunity to provide additional clarification and provide additional comments. Overall the Service's concerns about SRWTP effluent relate to the cumulative effects of multiple physical and chemical stressors on the Sacramento River and Delta from the SRWTP discharge both near- and far-field.

Far-Field

The ability for the Sacramento River and Delta to assimilate effluent far-field without impacting beneficial uses has been documented for some chemical constituents and thermal discharge by SRCSD studies. The chemical constituents for which the Service is most concerned are nitrogen, in several forms including ammonia, and phosphorous. Available science suggests that numeric nutrient criteria for water bodies of the Delta ecosystem and its watershed should be a priority for the Regional Board.

Increased loading of nitrogen in the form of ammonia from the SRWTP has occurred in the Sacramento River and the Delta since 1995 (Jassby 2008). Existing information indicates that the SRWTP discharge does not result in events of acute or chronic ammonia concentrations (Foe *et al*, 2009; Foe *et al* 2010, Mueller-Solger 2009) and therefore there has been no observed direct toxicity from effluent ammonia levels. However, ammonia loading in the Delta may be inhibiting nitrogen uptake by phytoplankton throughout delta smelt's habitat, reducing energy availability at the base of the Delta food web (Dugdale 2007; Jassby 2008; and Glibert 2010). The draft permit would reduce ammonia discharges by 2020 to a level which is more protective of aquatic organisms and eventually to a level necessary to protect freshwater mussels as required by the pending 2009 EPA ammonia criteria.

Understanding loadings and concentrations of nitrogen and phosphorous are important, but science has long known the importance of ecosystem-specific nitrogen-to-phosphorous ratios in determining the productivity of aquatic systems. While the SRWTP is not the only source of nutrient loading into the ecosystem, it is a significant contributor. A study conducted by Regional Board staff observed a rise in ammonia from 0.04 mg/L-N upstream of the outfall to 0.46 mg/L-N below the outfall (Foe *et al* 2010). The same study observed that soluble reactive phosphorus concentration in the Sacramento River doubled from 0.03 to 0.06 mg/L-P (Foe *et al* 2010) below the outfall.

EPA and state agencies have been focused on aquatic nutrient issues since the late 1990's including the initiation of science necessary to establish numeric nutrient criteria. EPA published technical guidance for developing nutrient criteria for estuaries and coastal waters in October 2001. In 2007, EPA Region 9 prepared "Technical Guidance to Develop Nutrient Criteria Numeric Endpoints for California Estuaries" (Sutula *et al* 2007). The Service is aware

the California State Water Resources Control Board has made some progress in developing numeric nutrient criteria, and encourages the Regional Board and the Permittee to continue efforts to develop and implement Delta-specific criteria for nitrogen, phosphorous, and ammonia.

In addition to furthering efforts for Delta ecosystem nutrient criteria, the Service recommends that the Board work with the Permittee and other Delta stakeholders, including the Service, to study the fate and transport of nitrogen from their effluent in the ecosystem. We recommend the Regional Board and Permittee conduct field studies and modeling efforts to determine what nitrogen and ammonia effluent loads or concentrations can be discharged from the SRWTP and other wastewater treatment facilities in the ecosystem without inhibiting nitrogen uptake by phytoplankton throughout the Delta.

Near-Field

Permitting Options-Mixing Zones/Dilution

The Service recommends that compliance with water quality criteria be met at the "end-of-the-pipe" and that no dilution or mixing zones be permitted. As we understand, the draft permit does not permit an acute mixing zone. In reference to chronic mixing zone allowance, we have found inconsistencies in the draft permit, the effluent limitation table and the fact sheet. The fact sheet indicated the allowance of a 400-foot wide, 350-foot long chronic mixing zone for cyanide (p. F-35, F-40) and chlorpyrifos (p. F-35, F-40) but then suggests that it is not allowed on pages F-65 and F-68. The Service supports the exclusion of mixing zones and dilution as per the Effluent Limitations Tables and the justifications provided in the fact sheet on pages F-65 and F-68.

Permitting Options-Ammonia/Nitrate Removal

The Service strongly recommends ammonia and nitrate be removed from the SRWTP effluent to protect aquatic life from acute and chronic exposures, to reduce ammonia-induced oxygen demand in the effluent, and to prevent eutrophication of the Sacramento River and its receiving waters. Existing information indicates that the SRWTP discharge does not currently result in events of acute or chronic ammonia concentrations outside the mixing zone (Foe et al, 2009; Mueller-Solger 2009). However, recent studies suggest that existing EPA criteria, when converted to unionized ammonia, may not be protective of ammonia sensitive species in the Delta, specifically delta smelt, both acutely when pH equals or exceeds 8.3 and chronically depending on pH, temperature and conductivity (Werner 2009). The NPDES permit should include the expectation of compliance with EPA's 1999 Ambient Freshwater Criteria for Ammonia. The Service conceptually supports EPA's 2009 draft ambient freshwater ammonia criteria, which we believe will provide new criteria needed for the protection of freshwater mussels. Once promulgated by EPA, these criteria should be included in the SRWTP permit to better protect freshwater mussels in the Sacramento River and the Delta. When information becomes available, more stringent site-specific ammonia criteria protective of Delta biota could replace the nation-wide criteria if necessary.

SCRSD has identified ammonia removal as one way the facility can address effluent oxygen demand (Larry Walker Associates 2010). It is important that the SRWTP comply with the basin plan objective of 7 mg/L year round.

Ecosystem effects of anthropogenic nitrogen are of specific concern. Increased loading of ammonia from the SRWTP has occurred in the Sacramento River and the Delta since 1995 (Jassby 2008). Ammonia loading in the Delta may inhibit nitrogen uptake by phytoplankton throughout delta smelt's habitat, reduce energy availability at the base of the Delta food web (Dugdale 2007; Jassby 2008; and Glibert 2010). There is also an association between ammonia, nitrogen enrichment and blooms of the toxin-producing cyanobacteria, *Microcystis*, which have increased in recent years. Factors associated with increased cyanobacteria blooms include drought, longer water residence times, increased water temperatures and increased nutrient loads. Ammonia and nitrate reductions are needed to address these ecological concerns as per the Service comments in the Far-Field section.

The Service supports the "Ammonia and Nitrogen" special studies requirement (p. 27). We encourage the Permittee and the Regional Board to work with stakeholders to investigate the fate and transportation of nitrogen discharged by the SRWTP and its affect on survival of fish species like delta smelt, and the food web on which they depend, below the outfall in the Sacramento River and throughout the Delta.

Dissolved oxygen

The Service supports the final and interim biological oxygen demand (BOD) limits as determined in the effluent limitation tables in the draft permit. Sacramento River dissolved oxygen sags below the basin plan requirement of 7 mg/L occurred in 2008 and 2009 per data from the California Department of Water Resources. SRCSD has addressed oxygen demand treatment options in its "Low Dissolved Oxygen Prevention Assessment" (Larry Walker Assoc 2010) submitted to the Regional Board in May, 2010. Plans by the SRCSD to control oxygen demand via ammonia control would simultaneously provide favorable reductions in two parameters of concern to aquatic biota. The Service supports BOD and ammonia criteria in the draft permit and requests efforts be made during the interim effluent limitations to address oxygen depletion prior to the 2020 compliance deadline.

Temperature

The Service acknowledges and appreciates the incorporation of our thermal recommendations and believes that the draft permit provisions would be protective of fish and wildlife related beneficial uses. The Service studies incorporated into the draft permit (Temperature study, special studies, p. 28-29) would provide reasonable assurance regarding the protection of larval fishes, particularly delta smelt. If the thermal conditions in the final permit represent no change from the 2000 permit requirements, the requested thermal studies could begin after adoption of the final 2010 permit. In addition to the current permit efforts, the Service encourages the Regional Board and SRCSD to include thermal discharge in the long-term planning for the facility.

Compliance monitoring and locations

The Service believes that the compliance monitoring schedules and locations will provide data necessary for the Regional Board and the SRCSD to monitor permit compliance and the effects of the discharge to the Sacramento River and other receiving waters. In addition, the Service recommends increased emphasis of upstream monitoring at the Freeport Bridge (RSWU-001).

Adequate data collection at this site will allow the Regional Board and SRCSD to understand baseline river conditions and the changes that occur as a result of the permitted discharge.

The Service requests continuous monitoring of dissolved oxygen, temperature and ammonia at RSWD-003 or RSWD-004 or -005 through the interim effluent limitations period. Oxygen, temperature and ammonia are water quality parameters of specific concern to aquatic biota. Continuous monitoring at these specific sites is needed to provide information on the conditions in the Sacramento River which result from effluent discharge or upstream sources. Continuous monitoring via automated equipment is relatively simple and routine for these three parameters. The DWR monitoring site at Hood showed deviations from the Basin Plan Objective of 7 mg/L, yet SRCSD was unaware of any association of its discharge with the oxygen depletion. Continuous monitoring will provide a more complete scientific understanding of the effluents effects on these three parameters and will allow timely modification of SRWTP facility operations to prevent violations. This additional data could also be useful to SRCSD in the calibration of existing modeling.

Toxicity testing

The Service supports the inclusion of *Hyalella azteca* and rainbow trout as appropriate toxicity testing organisms for this permit. Changes in testing organisms are needed to better represent delta endemic aquatic species like delta smelt and their food organisms. An allowance of time for the SRCSD to submit a work plan and testing implementation schedule for these species is reasonable provided that implementation occurs within one year.

The Service does not support the Regional Board's allowance to eliminate ammonia from acute toxicity testing until the compliance deadline of November 30, 2020. The purpose of toxicity testing is to evaluate the effects of whole effluent on aquatic biota in the receiving waterbody. Ammonia has been linked to synergistic toxicity with other chemicals. We acknowledge that other efforts are being made to address ammonia levels but testing of raw effluent should be required. It would be reasonable to conduct simultaneous testing with and without ammonia to facilitate toxicity identification, but permit compliance should include ammonia-induced toxicity.

Pyrethroids

Pyrethroid pesticides are of specific concern in the Delta. Pyrethroid toxicity to zooplankton has been observed at detection levels in the American River (Amweg et al 2009). In the absence of Water Quality Based Effluent Limitations, the permit addresses these concerns with the inclusion of effluent pyrethroid monitoring, and the addition of appropriately sensitive toxicity testing organisms (*H. azteca* and rainbow trout). The Service appreciates efforts by the Regional Board and the SRCSD to reduce pyrethroid concentrations in the Delta.

Compliance timeline and interim expectations

The Service acknowledges the significant technological challenges that would result from implementing the draft permit effluent limitations. We believe implementation of the 2010 permit effluent limitations (p. 10) would result in significant water quality improvements. However, the permit would not require ammonia and BOD reductions until November 2020.

The Service encourages the Regional Board and SCRSD to provide an interim plan that would improve these parameters *while* working to meet the final effluent limitation goals.

Conclusion

In order to be adequately protective of listed fish, the Regional Board should adopt the draft permit as proposed, along with the modifications provided in our comments. The Service believes that the proposed alternatives to the draft permit would not be adequate to address endangered species and critical habitat concerns. The Service's comments are enumerated and listed in the attached Comments Summary Table as requested by the Regional Board staff.

The Service appreciates the opportunity to comment on the draft permit. If you have any questions or comments about this letter, please contact Mike Hoover of my staff at (916) 930-5639. Please include the Service's San Francisco Bay-Delta Fish and Wildlife Office on the distribution list for all further notices related to the Sacramento Regional Wastewater Treatment Plant NPDES permit.

Sincerely,

Dan Castleberry
Field Supervisor

Attachment

cc: Pamela C. Creedon, Executive Officer, CVRWQB
Elizabeth Sablad, Environmental Scientist, NPDES Permits, EPA Region 9

Literature Cited

Amweg, E., D. Weston and N. Ureda. 2009. Use and toxicity of pyrethroid pesticides in the Central Valley, California, USA. Environmental Toxicology and Chemistry 24(4): 966-972.

Dugdale, Richard C., Frances P. Wilkerson, Victoria E. Hogue and Albert Marchi. 2007. The role of ammonium and nitrate in spring bloom development in San Francisco Bay. Estuarine, Coastal and Shelf Science 73: 17-29.

Foe, C., A. Ballard and S. Fong. 2010. Nutrient concentrations and biological effects in the Sacramento-San Joaquin Delta. July 2010. Regional Water Quality Control Board, Central Valley Region, California Environmental Protection Agency.

Foe, Chris, Adam Ballard and Randy Dahlgren. 2009. Preliminary ammonia results from an ongoing monitoring program. Presented to the Central Valley Water Quality Control Board, Ammonia Summit, August 18-19, 2009

Glibert, Patricia M. 2010. Long-term changes in nutrient loading and stoichiometry and their relationships with changes in the food web and dominant pelagic fish species in the San Francisco Estuary, California. Reviews in Fisheries Science, in press.

Jassby, Alan. 2008. Phytoplankton in the upper San Francisco Estuary: recent biomass trends, their causes and their trophic significance. San Francisco Estuary and Watershed Science 6(1): 1-24

Larry Walker and Associates. 2010. Low Dissolved Oxygen Prevention Assessment. Submitted to the Sacramento County Sanitation District. May 2010.

Mueller-Solger, Anke. 2009. IEP, POD, and Ammonia/um Studies in the San Francisco Estuary – A Summary. Presentation at the March 18-19, 2009, CALFED Science workshop, "The development of a research framework to assess the role of ammonia/ammonium on the Sacramento-San Joaquin Delta and Suisun Bay Estuary Ecosystem."

Sutula, M., C. Creager and G. Wortham. 2007. Technical approach to develop nutrient numeric endpoints for California estuaries. Prepared for US EPA Region 9 and the California State Water Resources Control Board, Planning and Standards Implementation Unit by Tetra Tech, Southern California Coastal Water Research Project, Lafayette, CA.

U. S. Fish and Wildlife Service. 1995. Sacramento-San Joaquin Delta Native Fishes Recovery Plan. U. S. Fish and Wildlife Service, Portland, Oregon.

Werner, I. 2009. Effects of ammonia/um and other wastewater effluence associated contaminants on delta smelt. Presented at the Ammonia Summit at the Central Valley Regional Water Quality Control Board, August 18-19, 2009.

Commenter: USFWS

Comment No.	Topic (i.e., ammonia, Title 22 tertiary, dilution, etc.)	Summarized Comment
1	Overall	The Service supports the draft permit and believes it would result in reductions in aquatic pollution in the Sacramento River and Delta.
2	Overall	If the permit is adopted with less improved environmental conditions, the Service will seek opportunity to provide additional clarification and comments.
3	Nutrients	The Service identifies the science-based need and requests that the Regional Board make it a priority to work with stakeholders to develop and implement numeric nutrient criteria for Delta water bodies.
4	Nutrients	The Service recommends that the Regional Board and Permittee conduct field studies and modeling efforts to determine the fate and transport of nitrogen and ammonia from effluent in the Delta.
5	Mixing zones/dilution	The Service recommends water quality criteria be met at the end of the pipe and that no dilution or mixing zones be permitted.
6	Mixing zones/dilution	There appears to be no chronic mixing zone permitted. The fact sheet and effluent limitations table contradictions make the determination unclear. If a chronic mixing zone is intended for chlorpyrifos and cyanide, concentrations of these chemicals have potential impacts on aquatic life, and the Service requests no mixing zones or dilution be granted for these chemical constituents.
7	Ammonia/nitrate removal	The Service strongly recommends ammonia and nitrate removal. Removal is needed to reduce phytoplankton uptake inhibition, effluent oxygen demand and nutrient loading in the Delta.
8	Ammonia/nitrate removal	If promulgated, the 2009 ammonia criteria should be included in the final permit to protect freshwater mussels.
9	Ammonia/nitrate removal	The Service supports the "Ammonia and Nitrogen" special studies.
10	BOD limits	Effluent limits for BOD should result in compliance with the Basin Plan objective for dissolved oxygen of 7.0 mg/L.
11	BOD limits	The Service requests that efforts be made during the interim effluent limitations to address oxygen depletion in the Sacramento River prior to the 2020

Commenter: USFWS

Comment No.	Topic (i.e., ammonia, Title 22 tertiary, dilution, etc.)	Summarized Comment
		compliance deadline.
12	Temperature	The Service acknowledges and appreciates the incorporation of our thermal recommendations into the draft permit.
13	Temperature	The Service will work with the Regional Board to insure that the required studies meet information needs in a reasonable and timely manner.
14	Temperature	The Service encourages long-term planning for thermal effluent for the SRWTP.
15	Compliance and monitoring locations	The Service requests increased monitoring upstream of the facility at the site at the Freeport Bridge to facilitate understanding of the baseline conditions upstream of the SRWTP and its effects on the Sacramento River and downstream waters.
16	Compliance and monitoring locations	The Service requests continuous monitoring for three parameters: 1) dissolved oxygen, 2) temperature and 3) ammonia. These three water quality parameters should be monitored continuously at RSWD-003 and RSWD-004 or -005 through the interim effluent limitation period. This monitoring is needed to understand the SRWTP effects on the Sacramento River and downstream waters.
17	Toxicity testing	The Service supports the use of *Hyalella azteca* and rainbow trout as appropriate toxicity testing organisms.
18	Toxicity testing	The Service does not support the removal of ammonia from effluent during WET testing in determination of compliance. Ammonia removal is reasonable to remove for further toxicity identification.
19	Pyrethroids	The Service acknowledges the inclusion of pyrethroid effluent monitoring and appropriately sensitive toxicity testing organisms.
20	Pyrethroids	The Service appreciates all efforts by the Regional Board and SCRSD to control pyrethroids in the SRWTP effluent.
21	Compliance timeline and interim expectations	The Service encourages the Regional Board and SCRSD to provide an interim plan which improves BOD and ammonia prior to the 2020 effluent limitation goals.
22	Overall	To be adequately protective of listed fish species,

Commenter: USFWS

Comment No.	Topic (i.e., ammonia, Title 22 tertiary, dilution, etc.)	Summarized Comment
		the Regional Board should adopt the draft permit with the modifications provided in our comments. The proposed alternatives would not address endangered species needs or critical habitat concerns.