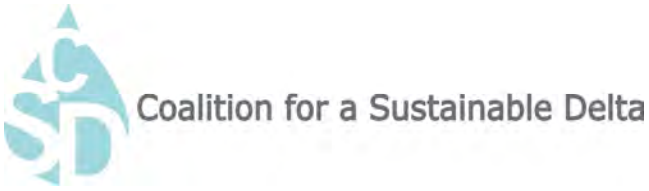

April 25, 2011

VIA ELECTRONIC SUBMISSION (EPA R09-OW-2010-0976)

Erin Foresman
U.S. Environmental Protection Agency
75 Hawthorne Street, WTR-3
San Francisco, CA 94105

Re: Advance Notice of Proposed Rulemaking: Water Quality Challenges in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary – EPA R09-OW-2010-0976.

Dear Ms. Foresman,

The Coalition for a Sustainable Delta (Coalition) is writing in response to the Environmental Protection Agency's (EPA's) request for comments on possible EPA actions to address water quality conditions affecting aquatic resources in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary contained in its Unabridged Advance Notice of Proposed Rulemaking: Water Quality Challenges in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary – EPA R09-OW-2010-0976 (Feb. 2011) (ANPR).

The Coalition is a California nonprofit corporation comprised of agricultural, municipal, and industrial water users in, as well as individuals from the San Joaquin Valley. The Coalition and its members depend on water from the Sacramento-San Joaquin Delta (Delta) for their continued livelihood. Individual Coalition members frequently use the Delta for environmental, aesthetic and recreational purposes; thus, the economic and non-economic interests of the Coalition and its members are dependent on a healthy and sustainable Delta ecosystem.

The Coalition is pleased that EPA has begun to engage in a more comprehensive strategic planning process than in the past, recognizes the complexity of the environmental issues in the Delta, and has identified many of the diverse stressors that are acting on the Delta ecosystem. The Coalition's comments do not cover the full array of issues identified and discussed in the ANPR, but are limited to a subset of those issues.

1. Introduction.

The Coalition's comments on Aquatic Resource Issues (ANPR at 36-39) address the importance of improving pesticide regulation, especially for urban use, by (1) full-use pesticide reporting requirements, (2) improving water, sediment, and biota monitoring in the Delta, (3) supporting improved monitoring, modeling, and the use of more sophisticated analytical methods for lower detection limits, and (4) expanding toxicity testing protocols to include sublethal effects such as

behavior, histopathology; endocrine, immune, reproductive functions; changes in gene expression.

The Coalition's comments on Regulation under the Clean Water Act (ANPR at 41-46) address the diverse and seemingly uncoordinated and disjointed water quality standards in the Delta. They identify areas of improvement for commercial/industrial and urban applications, and conclude with a strong recommendation that EPA use its regulatory authority to ensure that regulations affecting water quality in the Delta are enforced at every level.

2. Comments.

A. EPA Should Improve Urban Pesticide Input and Reporting Requirements.

The ANPR states that in the greater Bay Delta Estuary watershed, approximately 8,430 tons (active ingredient) of 160 different pesticides were applied in 2006 (ANPR at 37), but less than half of the pesticides are monitored and analyzed (ANPR at 39). Of those pesticides that are monitored, peak concentrations occur during the winter and spring storm season when larval and juvenile pelagic species of concern, including species listed as threatened or endangered under state and federal law, are most sensitive to acute or chronic contaminant exposures. Indirect, bottom-up food web effects on fish populations are also highly likely because invertebrate prey species are often more sensitive to pesticide exposure than the fish that feed on them.

Pesticide use reporting is required for all professional applications, but not for nonprofessional uses, which include uses at residences, on lawns and garden, in commercial and industrial circumstances, uses as biocides in medical facilities and veterinary clinics, use in pet flea and tick treatments, use in marine antifouling paint, and uses in swimming pools, spas, and fountains. Up to 70 percent of pesticide use does not require reporting (ANPR at 39). Individual pesticides of the same class often vary widely in toxicity, so reporting by pounds of active ingredient alone is not a reliable indicator of risk to aquatic ecosystems.

Overall, annual contributions of pesticides from agriculture and urban uses (on a weight of active ingredient basis) are about equal; however, the types of pesticides used for agriculture and urban applications, and reporting requirements for professional and nonprofessional applicators vary in important respects. For example, while organophosphates (OPs) are still among the primary pesticides used for agriculture, most OP urban uses were banned in 2004 (with the banning of diazinon) and 2005 (with the banning of chlorpyrifos) because of their toxicity to humans. As a result, the urban-use market is now nearly 75-percent comprised of pyrethroids – a different class of insecticides.[1] But while pyrethroids present considerably less risk to human health than OPs,

[1] Pyrethroid use in the Delta system nearly quadrupled from 1990 to 2006 from approximately 59,525 to 222,667 lbs/year (California Department of Pesticide Regulation). In addition, there has been a shift in recent years from permethrin, one type of synthetic pyrethroid, to more toxic forms, such as bifenthrin and cypermethrin, which are 21 and 29 times more toxic, respectively, to aquatic life compared with permethrin (Amweg et al., *Use and toxicity of pyrethroid pesticides in the Central Valley, California*, Envtl. Toxicol. & Chem. 24:966-972 (2005) (erratum in Vol. 24, number 5)).

pyrethroids are known to be highly toxic to fish and invertebrate species.[2] Other OP replacement pesticides, such as the pryazole insecticide fipronil, are very toxic to aquatic organisms and produce even more toxic compounds as they break down in the environment.

Urban pesticide use is often overlooked as a significant contributor to degraded water quality; but recent studies suggest that adverse impacts of urban pesticide use are substantial and growing. Increased pyrethroid use in urban areas and residential communities with highly impervious surfaces and numerous storm-water outfalls has been linked to contaminant concentrations in urban creeks that are several-fold higher than established thresholds for acute and chronic toxicity for some invertebrate species. In *Urban and agricultural sources of pyrethroid insecticides to the Sacramento-San Joaquin Delta of California*, Envtl. Science & Tech. 44:1833–1840 (2010), Weston and Lydy determined that concentrations of pyrethroids measured in Delta urban runoff and publicly operated treatment works (POTWs) during dry and wet seasons in 2008-2009 often greatly exceeded concentrations shown to cause acute and chronic toxicity *in Hyalella azteca* (Table 1). For example, bifenthrin was detected in 79 percent of urban runoff samples, and of those samples, 58 percent showed concentrations that exceeded acute toxicity levels for *H. azteca*. Bifenthrin was also detected in 39 percent of POTW water samples, of which 22 percent exceeded *H. azteca* acute toxicity levels. Agricultural drain samples contained pyrethroids 12 percent or less of the time. In contrast, agricultural use of pyrethroids is approximately 25 percent of total pyrethroid use, or 16 percent based on toxicity equivalents, and was not shown to be as significant a source of environmental levels as urban use.

Table 1. Frequency of pyrethroid detection in water samples from urban creeks, and frequency sample exceeded acute 96-hr LC50 for *Hyalella azteca* in water toxicity tests.

	Bifenthrin	Cyfluthrin	Cypermethrin	Lamda-Cyhalothrin	Permethrin
Frequency of detection	79%	55%	33%	45%	61%
Exceeded 96-hr LC 50	58%	55%	30%	24%	12%

[2] Pyrethroids have been shown to be toxic to aquatic species, and at lower levels result in decreased growth and impaired swimming performance, increased susceptibility to viral infection, and impacts to olfactory response (Haya, *Toxicity of pyrethroid insecticides to fish*, Envtl. Toxicol. & Chem. 8(5):381-391 (May 1989); Clifford et al., *Synergistic effects of esfenvalerate and infectious hematopoietic necrosis virus on juvenile Chinook salmon mortality*, Envtl. Toxicol. & Chem. 24(7):1766-1772 (2005); Sandahl et al., *Odor-evoked field potentials as indicators of sublethal neurotoxicity in juvenile coho salmon* (Oncorhynchus kisutch) *exposed to copper, chlorpyrifos, or esfenvalerate*, Canadian J. of Fisheries & Aquatic Sciences, 61:404-413 (2004)).

Maximum concentrations of various pyrethroids in water samples collected throughout the Delta during 2008 and 2009 are shown in Table 2 (Weston and Lydy, *supra*, 2010; Werner et al., *Monitoring acute and chronic water column toxicity in the northern Sacramento-San Joaquin Estuary, California, USA, using the euryhaline amphipod,* Hyalella azteca: *2006–2007*, Envtl. Toxicol. & Chem., 29: 2190–2199 (2010)). Bifenthrin concentrations measured in urban runoff were as high as 30 ng/L – or four times the acute toxicity level for *H. azteca* (Weston & Jackson, *Use of Engineered Enzymes to Identify Organophosphate and Pyrethroid-Related Toxicity in Toxicity Identification Evaluations*, Envtl. Science & Tech., 43: 5514–5520 (2009)) and 15 times the chronic toxicity level (Deanovic et al., *Evaluating the suitability of Hyalella azteca water column 92 tests for the detection of insecticide toxicity* in Pelagic Organism Decline (POD): Acute and Chronic Invertebrate and Fish Toxicity Testing in the Sacramento-San Joaquin Delta 2008-2010 Final Report (Werner et al., July 24 2010)). POTW samples contained bifenthrin about 40 percent of the time, with maximum concentrations *five times* the acute, and *20 times* the chronic toxicity level for *H. azteca*.

Table 2. Maximum pyrethroid concentrations measured (ng/L).

	Bifenthrin	Cyfluthrin	Cypermethrin	Lamda-Cyhalothrin	Permethrin
Urban runoff	30	18	12	6	46
POTW	39	6	6	17	33
Northern Sacramento-San Joaquin Estuary	117	20	16	No data	35

Because urban uses of pyrethroids are having demonstrably adverse effects on water quality in Delta tributaries, EPA should use its regulatory authority to improve reporting requirements to enable EPA, other regulatory agencies, policy makers, and the public to make informed decisions about urban uses of pesticides in the Delta and along the tributaries that feed it.

B. Professional Structural Pyrethroid Applications Should Be Required to Report Percentage of Application Above and Below Ground.

EPA labeling allows up to 85% of professional structural pyrethroid application (or 76% expressed in permethrin equivalents) for structural pest control to be injected underground. However, there are no reporting requirements to inform the percentage of pyrethroids applied above ground versus underground. Other alternatives to perimeter spraying (for example, container baits), especially in areas with extensive impervious surfaces, should be evaluated.

In addition, more detailed use reporting and fate and transport data on pyrethroids in surface water and groundwater from above and underground application methods are needed.

C. EPA Should Improve Toxicity Testing in the Delta and Its Tributaries.

Standard toxicity testing for waterborne pyrethroids (and other pesticides) often does not depict the potential extreme toxicity of these agents. The ANPR acknowledges pyrethroid insecticides are acutely toxic, citing 96-hour LC50 values from less than 1 part per billion to medium parts per trillion (ANPR at 38). But recent studies have demonstrated toxicity occurs at even *lower* concentrations (2 to 8 ppt) depending on the invertebrate species. (See Table 3; Yang et al., *Inhibition of aquatic toxicity of pyrethroid insecticides by suspended sediment*, Envtl. Toxicol. Chem. 25:1913-1919 (2006), Weston & Jackson, *supra*, 2009, Deavonic et al., *supra*, 2010).

Table 3. Acute an chronic pyrethroid toxicity data *Ceriodaphnia dubia* and *Hyalella azteca*.

Acute 96-hour LC50	*Ceriodaphnia dubia*	*Hyalella azteca*
Bifenthrin	50 ng/L	8 ng/L
Cypermethrin	194 ng/L	2 ng/L
Chronic 7-10 d	*Ceriodaphnia dubia* (7 d)	*Hyalella azteca* (10 d)
Bifenthrin	266 ng/L	2.3 ng/L
Cyfluthrin	712 ng/L	1.9 ng/L

These data do not take into account an even lower threshold of toxicity to protect against sublethal effects (e.g., lower than acute toxicity values by a factor of 10) and, for pyrethroids, higher toxicity at lower temperatures (an additional factor of 3), such as those found in the Delta and its tributaries during the winter storm season when pesticide runoff is greatest and sensitive life stages are most vulnerable to contaminant exposure.

As shown in Table 3, test organism species vary in sensitivity to different contaminants. Whereas *C. daphnia* are more sensitive to organophosphates, *H. azteca* are more sensitive to pyrethroids. *Hyalella azteca* should be used for sediment and surface-water toxicity testing because it offers the benefits of data from a more susceptible resident species that is able to tolerate freshwater and euryhaline water, which better represents the fresh-to-estuarine water conditions of the Delta.

Other needed advancements in toxicity testing include incorporating behavioral changes, tissue concentrations, histopathology, and changes in gene expression in response to stress. These data can provide information on the causative agents of the response, and also provide clues to the relationships between pesticide exposure, bottom-up food limitation, and the sublethal effects (such as reproduction, endocrine function, immune function, DNA damage) that are often difficult to detect, quantify, and interpret ecologically.

D. Water Quality Monitoring in Delta Waters Is Inadequate and Should Be Improved.

Water quality degradation caused by the introduction and accumulation of a variety of contaminants in the Delta and its tributaries is well documented, as are the acute and chronic effects of numerous contaminants on aquatic organisms. While the data on the direct and indirect effects of contaminants on aquatic organisms that reside in the Delta are limited, the available information strongly suggests that contaminants are a substantive contributor to ecosystem disruption and the decline of pelagic fishes in the Sacramento-San Joaquin Delta (e.g., Randall Baxter et al., Interagency Ecological Program 2010 Pelagic Organism Decline Work Plan and Synthesis of Results (2010); U.S. Fish and Wildlife Service, *Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes* (1996)), and action is warranted.

As EPA recognizes in the ANPR, impacts from stormwater runoff, in-Delta agriculture, and wastewater treatment facilities must be considered.

Standard measures obtained to meet pre-identified requirements (for example, to determine whether a water body is impaired for the purpose of section 303(d) of the Clean Water Act) are insufficient to generate data that allows scientists to answer critical questions about the causes of Delta ecosystem decline or to allow resource managers to respond with directed actions that can produce desired ecosystem responses. The decline of the Delta's pelagic fishes clearly indicates that management is failing; and the inability of ecosystem resource scientists and managers to identify the cause(s) of the declines indicates that they are failing to gather the data that are necessary to inform the broad diversity of state and federal conservation efforts identified in the ANPR.

Monitoring is not merely a systematic effort to measure myriad environmental variables of interest, but a distinctly scientific enterprise that is undertaken in efforts to link suspected system stressors to ecological outcomes of concern. Data must be collected in an experimental framework that is designed to provide specific answers to explicit hypotheses about how the ecosystem operates. This approach to problem solving has not been typical of past and ongoing monitoring efforts in the Delta.

Moreover, new analytical techniques should be employed in water quality monitoring efforts. For example, water samples analyzed for the presence of pesticides often do not look for newer or emerging contaminants or their degradates, and even where they do, the current analytical limits of detection are often too low. For example, the limit of detection for pyrethroids by most analytical methods – one part per thousand – is approximately 30 times too low to detect those contaminants in surface water. Detection limits for pyrethroids in sediment are about 1 part per billion. New analytical techniques, such as tandem mass spectrometry (MS-MS) and negative chemical ionization MS should be employed because they can achieve detection levels near 0.1 ppt in water and 0.1 ppb in sediment. In addition, improved modeling to address the fate of contaminants in the Delta would assist in this effort, and would provide much needed guidance to adaptive management approaches that can address contaminants on an ecosystem level.

E. Water Quality Standards Should Be Established in a Consistent Manner Throughout the Delta and Its Tributaries.

In the Delta, water quality standards composed of water quality criteria and designated uses are contained in three Delta basin plans: the San Francisco Bay Basin Plan, the San Francisco/Sacramento-San Joaquin Delta Estuary Basin Plan, and the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Sacramento/San Joaquin Basin Plan). The Sacramento/San Joaquin Basin Plan is the most extensive with narrative water quality criteria for pesticides as a group, numeric water quality criteria for individual pesticides (such as diazinon and chlorpyrifos), and narrative toxicity criteria that are relevant when pesticides are the source of toxicity. When numeric criteria are not adopted for individual pesticides and other concentration and effect data are not available, the Central Valley Regional Water Quality Control Board (Central Valley RWQCB) uses one tenth of the acute 96-hour LC 50 for the most sensitive species as the upper limit or daily maximum.

The Central Valley RWQCB is developing a Pesticides Basin Plan Amendment (Pesticides BPA) to address impaired water quality and includes interactive effects. A total of 38 pesticides were identified as having high (28) or moderate (10) risks for which numeric water quality criteria. And TMDLs will be developed in two phases – Phase I (organophosphates), and Phase II (pyrethroids and other high-risk pesticides).

The State Board has also proposed statewide numeric toxicity criteria. These criteria are expressed as statistical endpoints, which represent the toxicant response that causes a given percent reduction in a biological measurement. The proposed acute and chronic criteria are equivalent to the concentration at which 20 percent or 25 percent, respectively, of the test organisms demonstrate adverse biological effect.

Given the connected nature of the Delta waters, the various plans and water quality standards pose regulatory and technical challenges that EPA could assist in addressing by promulgating guidance for establishing numeric toxicity criteria for organophosphates and pyrethroids that state and regional water quality agencies could use to develop consistent water quality standards for the Delta and its tributaries.

F. Regulation of Agricultural Discharge Should Also Strive to Protect the Aquatic Ecosystem.

According to the ANPR, the Central Valley RWQCB has released the draft Programmatic Environmental Impact Report (PEIR) for the long-term Irrigated Lands Regulatory Program (ILRP). The 2010 PEIR draft goals are to restore/maintain reasonable water quality considering all water demands, minimize waste discharge, maintain economic viability, and ensure agricultural discharges do not impair access to safe drinking water. However, EPA should insist that the proposed ILRP also ensures that waste discharge from irrigated agricultural lands does not degrade the aquatic ecosystem. In addition, EPA should utilize its regulatory authority to ensure that the ILRP is fully enforced.

G. Enforcement Should Be a Top Priority at Every Level of Government.

Improved water quality standards, monitoring, and analysis are virtually meaningless if water quality standards and other water regulations are not consistently enforced. Thus, enforcement should be a top priority in the Delta. As detailed below, EPA should gather information from state agencies regarding their enforcement responsibilities in the Delta in order to determine whether there is a need for additional enforcement tools and capacity to protect the Delta ecosystem.

The current state of the Delta is attributable in large part to the failure of state and federal agencies to properly enforce existing laws and regulations. For decades, regulatory authorities have allowed a wide array of Delta actors to violate environmental laws, including state laws respecting:

- candidate, threatened, and endangered species,
- fully protected species,
- lake and streambed alteration,
- water quality, and
- water rights

Lax enforcement undermines the rule of law in two ways. First, inadequate enforcement gives an unfair advantage to persons engaged in illegal activity by allowing them to avoid the costs of compliance with the law that law-abiding citizens incur. Second, selective enforcement in the context of environmental laws can be even more insidious because persons subject to enforcement may be required to bear the costs of offsetting environmental harm caused by others, as well as themselves.

The enforcement authorities of the State are considerable, and, if brought to bear, those authorities could result in dramatic improvements in the Delta ecosystem. By way of example, the Water Boards, which are delegated authority to stand in the shoes of EPA and implement key provisions of the federal Clean Water Act, have significant enforcement authorities that extend to both water rights and water quality (State Water Resources Control Board, ***Water Quality Enforcement Policy*** (2002)). With respect to water rights, the State Board has statutory authority, for example, to appropriate water and investigate appropriations (Cal. Water Code § 1250 et seq.). In the area of water quality, the Water Boards' enforcement authorities cover National Pollutant Discharge Elimination System ("NPDES") permits and section 401 Water Quality Certifications issued pursuant to the federal Clean Water Act and Waste Discharge Requirements ("WDRs") issued pursuant to the Porter-Cologne Water Quality Control Act, and include a variety of enforcement tools such as the issuance of cease and desist orders, time schedule orders, and notices of violation (Cal. Water Code § 13300 et seq.). Additionally, the Water Boards have the ability to refer matters to the state Attorney General for civil enforcement actions or to the appropriate county District Attorney or City Attorney for criminal enforcement (***Water Quality Enforcement Policy*** at 24).

NPDES permits and WDRs issued by the Water Boards contain enforceable provisions related to protection of beneficial uses, which the Water Boards may use to bring an enforcement action against a discharger. Further, the Water Boards have the authority and administrative responsibility to implement and enforcement Total Maximum Daily Loads ("TMDLs") and other water quality standards in order to protect beneficial uses.

The underutilization of existing enforcement authorities has led to a proliferation of ongoing, illegal activities in the Delta. Cataloging these is beyond the scope of this letter; however, two categories of illegal activities deserve mention here.

It is well documented that thousands of water diversions exist in the Delta (for example, Herren and Kawasaki, *Inventory of Water Diversions in Four Geographic Areas in California's Central Valley*, Contributions to the Biology of Central Valley Salmonids (R.L. Brown, ed. 2001)), that most of these are unscreened and entraining unknown numbers of fish protected by the federal and California Endangered Species Acts, and that a substantial number are diverting water without valid water rights. Approximately 1.3 million acre-feet annually is diverted to support Delta agriculture (California Department of Water Resources, *California Water Plan Update 2005* (2005)). The Department of Fish and Game and the State Water Resources Control Board, through the Fish and Game Code and California Water Code respectively, both have enforcement authorities that authorize those agencies to address on-going legal violations at these points of diversion. Yet their willingness to exercise those authorities has been tentative at best.

In addition, discharges into the Delta in violation of the federal Clean Water Act and California Porter-Cologne Water Quality Control Act are commonplace. Although the federal and state governments have robust enforcement authorities under these statutes, they have largely abdicated their responsibilities. As a result, enforcement is generally left to non-profit groups, such as the Coalition, the Natural Resources Defense Council, and the California Sportfishing Protection Alliance. Unfortunately, these groups will never have the investigative and prosecutorial powers and resources available to the State. While macro-level effects of contaminants on fish populations are uncertain, recent research suggests that specific contaminants have a profound disruptive influence on the food web that supports the Delta's desired fisheries.

Efforts to halt illegal activities in the Delta are few and largely ineffective. For this reason, a principle focus on the rule of law through robust enforcement should be a central feature of EPA's regulatory efforts to address water quality issues in the Delta. In addition, EPA should request that state agencies with jurisdiction in the Delta report their enforcement obligations and activities. Agency reports should include enforcement obligations, ongoing enforcement actions, existing enforcement resources, and prioritized lists of both ongoing and desired enforcement activities. With this list, EPA can identify enforcement shortcomings, identify enforcement resources needed by the agencies, and can prioritize deployment of resources to augment enforcement activities. These activities should be part of every regulatory program aimed at improving water quality in the Delta.

3. Conclusion.

The Coalition hereby requests that these comments be placed into the administrative record for the ANPR. We would be happy to answer any questions regarding these comments and look forward to working with EPA to address these important issues.

Sincerely,

William D. Phillimore
Board Member