

**Regional Water Quality Control Board
Central Valley Region
Board Meeting – 8/9 June 2017**

RESPONSE TO COMMENTS ON
PROPOSED AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR THE
SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS FOR THE CONTROL OF
PYRETHROID PESTICIDE DISCHARGES
(final including late revisions)

At a public hearing scheduled for 8 and 9 June 2017, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) will consider adoption of an amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (“Basin Plan”) that would adopt a control program for pyrethroid pesticides. The rationale for adopting a pyrethroid pesticides control program is to address both existing pyrethroid water quality impairments that have been identified as well as pyrethroids detected at levels of potential concern in the future.

The Central Valley Water Board provided interested parties the opportunity to submit written comments on the proposed Basin Plan Amendment and draft staff report from 25 January 2017 to 24 March 2017. The Central Valley Water Board conducted a public hearing to receive oral comments on 24 February 2017. This document contains responses to written and oral comments submitted to Central Valley Water Board staff during this period.

This “Response to Comments” is organized into two sections. Section 1 addresses broad issues identified during the public hearing and submitted in written comment letters. Section 2 addresses specific comments. Comments or portions of comments that are summarized from the original are in brackets.

Written comments were received by:

Name, Title Organization (Submittal Date)	Oral Comments	Written Comments
Ms. Roberta Firoved, Industry Affairs Manager California Rice Commission (March 17, 2017)		X
Ms. Janet Y. Hashimoto, Manager, Water Quality Assessment Section U.S. Environmental Protection Agency Region IX (March 22, 2017)		X
Ms. Delyn Ellison-Lloyd, Senior Engineer City of Roseville (March 23, 2017)		X
Mr. Stephen Louie, Senior Environmental Scientist California Department of Fish and Wildlife (March 24, 2017)		X
Ms. Renee Pinel, Western Plant Health Association (March 24, 2017)		X
Mr. Donald P. Weston, Ph.D., Emeritus Adjunct Professor University of California Berkeley (March 24, 2017)	X	X
Ms. Linda Dorn, Environmental Program Manager	X	X

Sacramento Regional County Sanitation District (March 24, 2017)		
Mr. Greg Kester, Director of Renewable Resource Programs California Association of Sanitation Agencies (March 24, 2017)		X
Mr. Michael Bryan, Ph.D., Robertson-Bryan Inc. on behalf of Port of Stockton Roseville Wastewater Utility (March 24, 2017)	X	X
Mr. Jonathan Evans, Center for Biological Diversity (March 24, 2017)		X
Ms. Theresa A. Dunham, Somach Simmons and Dunn on behalf of Pyrethroid Working Group (March 24, 2017)	X	X
Ms. Debbie Webster, Executive Officer Central Valley Clean Water Association (March 24, 2017)	X	X
<u>Agricultural Groups</u> African-American Farmers of California California Citrus Mutual California Cotton Ginners & Growers Association California Farm Bureau Federation California Fresh Fruit Association East San Joaquin Water Quality Coalition Kern River Watershed Coalition Authority Nisei Farmers League Western Growers Association Western Plant Health Association Westside San Joaquin River Watershed Coalition (March 24, 2017)		X
<u>Environmental and Fisheries Groups</u> Ms. Regina Chichizola Institute for Fisheries Resources/Pacific Coast Federation of Fishermen's Association Mr. Ben Eichenberg, Staff Attorney San Francisco Baykeeper Mr. Paul Towers, Organizing Director & Policy Advocate Pesticide Action Network North America Mr. Colin Bailey, Executive Director Environmental Justice Coalition for Water Mr. Bill Jennings, Executive Director California Sportfishing Protection Alliance (March 24, 2017)		X
Mr. Dave Tamayo, Environmental Scientist Sacramento County Storm Water Program (February 24, 2017)	X	

Ms. Jennifer Teerlink, Senior Environmental Scientist California Department of Pesticide Regulation (February 24, 2017)	X	
Mr. Stephen Clark, Vice President Pacific EcoRisk (February 24, 2017)	X	

SECTION 1: BROAD ISSUES

Several commenters raised four general concerns in written submittals and/or orally at the Hearing:

General Comment No. 1 – Concerns with Bioavailability Approach:

Four commenters (USEPA, Dr. Donald Weston, California Department of Fish and Wildlife, and Environmental and Fisheries Groups) expressed a number of related concerns with the proposed bioavailability approach, which would utilize calculated freely dissolved pyrethroid concentrations to assess attainment of the proposed concentration goals. The concerns with the bioavailability approach expressed were:

- 1) Significant variability in the partition coefficients used to calculate the freely dissolved pyrethroid concentration, which may vary by orders of magnitude based on the characteristics of organic matter and the particles in a given area.
- 2) Uncertainty in how representative the freely dissolved pyrethroid concentration is of the bioavailable concentration because bioavailability is affected by the rate of release of pyrethroids from particles, as well as how organisms interact with sediment.
- 3) Potential underestimation of effects of sediment-bound pyrethroids for species that ingest sediment particles and for sensitive life-stages of fish, which may interact with sediments in the winter when sediments are mobilized and toxicity may be increased due to lower temperatures, particularly in the Delta, where sediments are deposited and many threatened and endangered species reside.
- 4) The fact that this approach has not been used before in total maximum daily loads or for setting levels intended to be protective of beneficial uses.

RESPONSE:

1) It is true that partition coefficients can vary greatly depending on the nature of the particles, and the staff report acknowledges this in section 5.2.2.2. A range of experimental partition coefficients are shown in Table 5-1 and Table 5-2 of the staff report, which demonstrate the potential range of values that may be encountered in environmental samples. The proposed partition coefficients are not at the extremes of the range of partition coefficients; all of the proposed partition coefficients fall within the second and third quartiles of the range (47th-75th percentile of the range of partition coefficients presented in Table 5-1 and Table 5-2 of the staff report). The proposed partition coefficients were recommended because they were determined using an analytical technique that minimizes calibration errors, which may cause partition coefficients to be overestimated. In addition, the proposed amendment allows for the use of site-specific or additional study-based partition coefficients if they become available. The technical basis of the proposed bioavailability approach, including the use of the proposed partition coefficient was supported by the independent scientific peer reviewers. Also, as new information becomes available, these values may be refined to reflect the newest scientific information. In addition, the proposed amendment includes toxicity testing. This testing will provide additional information to evaluate the effectiveness of the program.

2 & 3) The proposed amendment would require toxicity testing with *Hyalella azteca* to provide additional information regarding the toxicity of pyrethroids in the dissolved phase and those bound to organic matter and/or particles. Toxicity testing of both water and sediment will provide information necessary to assess whether there are ambient toxicity concerns. If pyrethroid levels in sediment are reduced below levels toxic to *Hyalella*

azteca, which is the most sensitive organism that has been tested, then they will also be below any levels with potential to cause toxicity to organisms that ingest sediments. Staff will evaluate how the chemical analysis data and toxicity testing results correspond as this data is collected. This is a phased control program and the Regional Board is committed to re-visiting the program, including the use of the freely dissolved pyrethroid concentrations and the partition coefficients used to estimate the freely dissolved concentrations, no later than 15 years after the amendment is effective.

4) It is true that using the freely dissolved concentrations has not previously been used for regulation of pyrethroids in water; however, this approach is based on the best available science to provide the most accurate measure of the toxic potential of pyrethroids. Accounting for bioavailability of pyrethroids in environmental samples will result in a more accurate predication of potential toxicity to aquatic organisms in aquatic ecosystems. This is a reasonable approach that protects aquatic life, while accounting for environmental characteristics and reducing the likelihood that samples that would not cause harm to aquatic organisms would be determined to exceed the pyrethroid concentration goals. The technical basis of the proposed bioavailability approach was supported by the independent scientific peer reviewers.

General Comment No. 2 – Request for Triggers to Apply to Receiving Waters instead of Discharges: Four commenters (Sacramento Regional County Sanitation District, Roseville Wastewater Utility, Port of Stockton, and Central Valley Clean Water Association) requested that the pyrethroid triggers be applied to ambient receiving waters rather than directly to discharges and/or to be able to use representative receiving water monitoring rather than being required to directly monitor discharges. Reasons for this request included that the pyrethroid trigger values are intended to be protective of aquatic life beneficial uses, which are applicable in surface waters, and for wastewater dischargers to be able to apply mixing zones and/or dilution credits.

RESPONSE: It is true that one of the goals of the control program is to establish pyrethroid concentration goals that provide reasonable protection of beneficial uses in receiving waters. As discussed in the staff report, nine different regulatory approaches for pyrethroids were considered in the public process, and a prohibition of discharge was the regulatory approach that was recommended by Regional Board staff and stakeholders. Adopting water quality objectives, which would legally apply in the receiving waters, was not the recommended approach because of a number of factors, as described in the staff report, including insufficient information to analyze attainability of objectives and the economic costs of attainment in accordance with Water Code section 13241. In contrast, Water Code section 13243, the legal basis for the conditional prohibition in this Basin Plan Amendment, expressly authorizes the Regional Board to adopt a prohibition on certain “discharge[s] of waste.”

The recommended approach applies the conditional prohibition to discharges rather than the receiving water for several reasons. The pyrethroids control program is focused on source control, accountability for which requires a clear link between detected pyrethroids and the individual dischargers responsible for an exceedance of the trigger. Establishing this link is comparatively straightforward when applying the prohibition to the discharge as opposed to receiving waters. The cause of exceedances of the trigger in receiving waters may have contributions from other sources, such as nonpoint discharges. Applying the triggers to discharges rather than receiving waters will ensure that trigger exceedances in receiving waters attributable to other sources of pyrethroids (e.g., urban runoff) are not incorrectly attributed to wastewater dischargers. Further, the

proposed amendment language has been changed to state that in reviewing management plans, the Executive Officer shall consider the potential impact of the pyrethroid discharge and whether the actions proposed are commensurate with the potential impact.

Though the prohibition would legally apply at the discharge for all discharge categories, monitoring requirements to detect trigger exceedances will differ for some discharge categories based on practical considerations. For example, representative receiving water monitoring is appropriate for irrigated agriculture and municipal storm water because their discharges of pyrethroids are too geographically diffuse for individual outfall- or field-level monitoring to be practicable. The proposed amendment has been revised to clarify that representative receiving water monitoring can be used for irrigated agriculture and municipal storm water discharges. In contrast, wastewater discharges consist of a small number of discrete point sources, for which it is practical to monitor discharges directly. However, if wastewater discharges are similar for a group of dischargers, in some cases those dischargers may use representative discharge monitoring to represent the group.

General Comment No. 3 – Request for Lower Concentration Goals: Three commenters (California Department of Fish and Wildlife, Environmental and Fisheries Groups, Center for Biological Diversity) commented that the 5th percentile concentration goals may not be adequately protective of beneficial uses and recommended that either the 1st or 2.5 percentile UC Davis criteria be used as the pyrethroid concentration goals. The reasons for requesting lower concentration goals included concerns regarding the cumulative (additive and synergistic) impacts of pyrethroids and other stressors on threatened and endangered species and commercial fisheries, particularly in the Delta ecosystem; increased pyrethroid toxicity at lower temperatures; the 5th percentile concentration goals are close to or equal to LC₅₀s (lethal concentration to 50% of tested population) for *Hyalella azteca* and therefore may not be protective of this species; the potential for underestimation of chronic impacts to fish because of a lack of information on acute-to-chronic ratios for fish; and the exclusion of relatively sensitive estuarine species from the UC Davis criteria calculations, which only use freshwater tests, and therefore may not be protective of these species.

RESPONSE: The best available science was used to conclude that the pyrethroid concentration goals based on the 5th percentile UC Davis criteria would be protective of beneficial uses and consistent with attainment of water quality standards. This conclusion was supported by the external peer review and two of three peer reviewers stated that the 5th percentile values would be protective of aquatic life and that the 1st percentile values are likely overly conservative. The 5th percentile values are also consistent with the level of protection recommended in USEPA criteria derivation guidelines (USEPA, 1985). The 5th percentile chronic concentration goals are lower than, or, in one case, at the LC₅₀ for *Hyalella azteca*, indicating reasonable protection for even the most sensitive identified species.

The proposed amendment also includes toxicity testing, which will provide information on the potential additive and synergistic impacts of pyrethroids in combination with other stressors and the overall level of protection being attained. This additional information is expected to reduce the scientific uncertainty associated with the recommended approach.

General Comment No. 4 – Request for Reliable and Reproducible Methods for Chemical Analysis and Toxicity Testing: Seven commenters (City of Roseville, Dr. Donald Weston, Sacramento Regional County Sanitation District, Roseville Wastewater Utility, Port of Stockton, Central Valley Clean Water Association, and Pacific EcoRisk) had concerns regarding the availability of multiple laboratories to perform pyrethroid analyses and both water column and sediment toxicity testing with *Hyalella azteca* in both ambient water samples and effluent samples. There were also concerns about the need for standardized or harmonized protocols for these analyses.

RESPONSE: Adequate laboratory capacity and standardized or harmonized protocols will be necessary to ensure reliable data to support the proposed control program. Central Valley Water Board staff have begun engaging with State Board staff in the Environmental Laboratory Accreditation Program (ELAP) and Surface Water Ambient Monitoring Program (SWAMP) in order to ensure that there will be reliable methods and protocols for the analyses needed for this Basin Plan Amendment, and discussion of these ongoing activities has been added to Section 8.5 of the staff report.

ELAP provides evaluation and accreditation of environmental testing laboratories to ensure known and documented quality and defensibility of analytical test methods for regulatory purposes. ELAP-accredited laboratories have demonstrated capability to analyze environmental samples using approved methods.

When feasible, the use of ELAP-accredited methods is recommended for both chemical analyses of pyrethroids and toxicity testing with *Hyalella azteca*. Typically there are multiple laboratories accredited for a particular analytical test method and Regional Board staff is working with ELAP to request that more laboratories become accredited for pyrethroids analysis and *Hyalella azteca* toxicity testing. Regional Board staff is working through an established framework for state agency requests to ELAP for new analytical test methods and lowered reporting limits to ensure there are reliable methods for pyrethroids chemical analysis and toxicity testing with *Hyalella azteca* available from multiple laboratories. Through this process, Regional Board staff will also request that the Chief of ELAP contact all laboratories accredited in Fields of Testing (FOT) relevant to pyrethroids chemical analysis (FOT 105 and/or FOT 111 – Semi-volatile organic chemistry) and toxicity testing (FOT 113/119 – Toxicity bioassay) to request that more laboratories offer pyrethroids analysis and testing with *Hyalella azteca* in order to encourage more laboratories to offer these analyses.

Currently, ELAP can only accredit labs for standardized methods, which are not available for all six of the pyrethroids included in this amendment; however, in the future they will be transitioning their program to accredit for non-standardized methods. Because standardized methods are not available for all six pyrethroids, other methods may be used to obtain the required data, as is being done in various programs throughout the state in which pyrethroid monitoring is required. Additional description of the available methods and recommendations for monitoring has been added to sections 8.4-8.6 to the draft staff report.

For water column *Hyalella azteca* toxicity testing, a recent intercalibration study performed the Southern California Coastal Water Research Project (SCCWRP) demonstrated that when test organism age and size are more tightly constrained, the toxicity results across labs are highly comparable (Schiff & Greenstein 2016). Recommendations to follow the SWAMP measurement quality objectives for the water column *H. azteca* toxicity test and the guidance on test organisms from the SCCWRP intercalibration study have been added to the staff report in section 8.6.

NPDES dischargers are typically required to use ELAP-accredited labs for their analyses, however if dischargers do not use ELAP-accredited labs, additional quality assurance and quality control information would need to be provided to ensure the results will be reliable.

Guidance on the factors to be considered by the Executive Officer in approving acceptable methods has been added to the proposed amendment. Under the proposed amendment, the Executive Officer will consider whether the method is ELAP-accredited, whether a new method has undergone independent scientific peer review or has been part of an inter-laboratory study design, if there is a quality assurance project plan (QAPP) in place that can provide assurance that the method used will be reliable, or other factors in determining acceptable methods.

SECTION 2: RESPONSES TO SPECIFIC COMMENTS

This section contains Board staff responses to individual comment letters received during the comment period.

CALIFORNIA RICE COMMISSION COMMENTS

Comments were received from Ms. Roberta Firoved, Industry Affairs Manager, California Rice Commission on 17 March 2017.

California Rice Commission Comment No. 1: From our experience managing water quality programs and our history of monitoring results we believe the 5th percentile is a more positive suggested value if there is a justifiable need to further regulate pyrethroid use in the Central Valley.

RESPONSE: Comments acknowledged.

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX COMMENTS

Comments were received from Ms. Janet Hashimoto, Manager, Water Quality Assessment Section, U.S. Environmental Protection Agency Region IX on 22 March 2017, expressing support for the Central Valley Water Board's effort to control pyrethroids contamination in aquatic ecosystems.

RESPONSE: Central Valley Water Board staff acknowledges USEPA's support.

USEPA Comment No. 1: [The commenter stated that there is uncertainty in how to appropriately consider the bioavailable fraction of the various pyrethroid pesticides, particularly lack of knowledge on the kinetics of pyrethroid release from particles and underestimation of the potential effect of aquatic organisms ingesting pyrethroid-bound particles. The commenter cited Knauer et al. (in press) and Parry et al. (2015) regarding the uncertainty in estimating the bioavailable fraction of pyrethroids, pointing out that the physiology of aquatic organisms and the particle properties affect bioavailability but are not accounted for in the partition coefficients (Koc).

The commenter stated that previous pyrethroid TMDLs did not use a bioavailability adjustment and this would be the first application of a bioavailability adjustment for persistent pesticides. The commenter recommends that the Central Valley Water Board not apply the bioavailability fraction in future water quality standards, such as objectives, to be implemented in NPDES permits because it may not adequately protect aquatic life use and they cite the example of setting the concentration goal at the 5th percentile UC Davis criteria may not be protective of *Hyalella azteca* in sediment for bifenthrin, cypermethrin, esfenvalerate and lambda-cyhalothrin based on Table 5-13 in the staff report.

The commenter recommended a scientific study to determine whether the default partition coefficients are accurate for estimating bioavailability in a range of ambient waters, sediments, and effluents, including using Tenax or SPME extraction methods to quantify the bioavailable fraction in such a study.]

RESPONSE: See response to General Comment No. 1.

The peer review of the proposed Basin Plan amendment and draft staff report concluded that including the bioavailability calculation was technically sound based on the best

available science. Knauer et al. (in press) also stated that pyrethroids were the only class of pesticides that did show a reliable decrease in bioavailability due to binding to organic matter, confirming that this approach is reasonable for pyrethroids, although it may not be for other classes of pesticides.

The consideration of bioavailability for pesticide concentrations is not entirely new. Though chemically different from pyrethroids, copper provides an example of a persistent pesticide active ingredient for which bioavailability is considered in evaluating concentrations potential impacts to aquatic life. Toxicity testing with *Hyalella azteca* will be required and will provide additional information regarding the toxicity of pyrethroids in the dissolved phase and those bound to organic matter and/or particles. If the pyrethroid trigger values and toxicity results do not appear to correlate as we would expect, the bioavailability approach will be re-evaluated, which may include a study on partition coefficients or adjusting for the ingestion exposure route. The analysis in Table 5-13 of the staff report was based on very conservative assumptions and it is expected that attaining the concentration goals based on the 5th percentile UC Davis criteria would be reasonably protective of *Hyalella azteca* in sediments.

USEPA Comment No. 2: We agree that the Regional Board has the mechanism in place to address agricultural pyrethroid runoff through the Regional Board's Irrigated Lands Regulatory Program. We strongly recommend this program include toxicity testing with appropriate test species and include sub-lethal endpoints. The adopted waste discharge requirements for irrigated agriculture (Order Number R5-2014-0032) currently, do not require chronic water column toxicity testing for invertebrate or fish species. We recommend that these orders include water column toxicity testing with both *Ceriodaphnia dubia* (for chronic tests) and *Hyalella azteca* (for acute tests), and sediment toxicity testing with *Hyalella azteca*. We recommend additional EPA acute test species in EPA-821-R-02-012 for water column and EPA-600-R-99-064 for sediment.

RESPONSE: The proposed amendment would establish monitoring goals that would need to be met with sediment and/or water column *Hyalella azteca* toxicity testing by dischargers because *Hyalella azteca* is known to be a sensitive indicator species for pyrethroids. *Ceriodaphnia dubia* is known to be a sensitive indicator for organophosphate pesticides and toxicity testing with *C. dubia* would not be required as part of the proposed amendment because it is aimed at controlling pyrethroids. Changes to other toxicity testing requirements for irrigated agriculture are not within the scope of the proposed amendment.

USEPA Comment No. 3: In the section on MS4 monitoring requirements, we suggest the Regional Board review the specific language in the San Francisco Bay Region, Municipal Regional Storm Water NPDES Permit, Order R2-2015-0049, dated November 2015, in particular section C.8 on Water Quality Monitoring and section C.9. on Pesticides Toxicity Control and consider similar language for the Central Valley Regional Board stormwater permits. We recommend that wastewater and stormwater permits include the same water column and sediment toxicity tests as recommended above for the irrigated lands orders. As permits are renewed, we also recommend requiring permittees to follow methods in the Hladik et al., (2009) report, which includes more specificity for collection and sampling of water and sediment for pyrethroids.

RESPONSE: The proposed amendment would establish monitoring goals that would need to be met with toxicity testing by dischargers. The specified language in the San

Francisco Bay Region, Municipal Regional Storm Water NPDES permit and inclusion of additional toxicity testing may be considered by Central Valley Water Board when storm water permits are renewed or adopted. The staff report has been revised to include a recommendation for dischargers to follow methods in Hladik et al. (2009) for sample collection for pyrethroids analyses and toxicity testing.

USEPA Comment No. 4 (TMDL clarifications): [The commenter requests that the TMDL source analysis be modified to identify all NPDES permitted discharges (NPDES permit number and facility name) within the area covered by the TMDL, including those that may not discharge pyrethroids or are insignificant sources. The commenter recommends specifying wasteload allocations or wasteload reductions necessary for each individual facility or permitted source or whether a discharge does not need to be limited with a specific wasteload allocation to achieve applicable standards. For facilities permitted by a general NPDES permit, concentration-based wasteload allocations may be easiest to implement in situations where multiple facilities are covered by the same wasteload allocation and it is difficult to disaggregate wasteload allocations by discharger.]

The commenter requests clarity on where wasteload allocations apply for permitting, particularly if there are complex discharge situations, such as MS4 storm water outfalls. If wasteload allocation stratification methods are used, it may be appropriate to identify representative outfalls for each stratified land use.]

For more details on our recommendations for NPDES permit implementation, please see the Enclosure and *Helpful Practices for Addressing Point Sources and Implementing TMDLs in NPDES Permits* (2015).

RESPONSE: A list of all NPDES permitted discharges within the TMDL watersheds, including the permit number and facility name, has been added to the staff report in Appendix D, which is in addition to the information already provided in Table 6-1. The TMDL source analysis has been expanded to account for all known point source dischargers. The point source dischargers receiving wasteload allocations are listed in Table 6-1 and all point source dischargers not subject to wasteload allocations are now listed in Appendix D, including the rationale as to why allocations are not needed for these discharges. Because the wasteload allocations are concentration-based, the same allocations are applicable to each of the individual specific permitted sources.

Clarification on the points of compliance has been added to Section 6.1.2.1 of the staff report. The wasteload allocations are concentration-based and thus do not differ between dischargers, and are not aggregated, so they can be readily implemented. Clarification on compliance monitoring for wasteload allocations has been added to the proposed Basin Plan amendment and the draft staff report in section 6.1.2.1. The wasteload allocations apply to storm water outfalls in the TMDL watersheds; however compliance will be assessed using representative receiving water monitoring. Representative receiving water monitoring is appropriate in this TMDL because of the diffuse nature of the sources. Under the Central Valley Region-wide MS4 permit and Statewide General Phase II MS4 permit, separate entities under the permit are listed separately and it is not necessary to stratify wasteload allocations among co-permittees. Representative receiving water monitoring is proposed to determine compliance, so specifying outfalls or stratifying types of outfalls for monitoring is not necessary because the receiving water monitoring will be designed to be representative of outfalls in each TMDL water body.

USEPA Comment No. 5: Given the proposed amendments include the statement that "pyrethroid triggers will not be used as WQBELS or for reasonable potential analysis," and yet these provisions appear to apply to waterbodies throughout the Sacramento and San Joaquin Basins, EPA is requesting more clarification regarding how NPDES sources of pyrethroids would be evaluated in future permit procedures. Please explain if there are unique circumstances that apply and describe what permit requirements will be included to provide assurance that discharges from permitted sources will adequately protect the applicable beneficial uses. If whole effluent toxicity tests will be included as part of this approach, then please explain clearly the intention and mechanisms to assess and/or provide protection.

RESPONSE: It is important to recognize that the Central Valley Water Board has regulatory authorities for preventing future impairments in addition to those available under the federal Clean Water Act. This proposed amendment would prevent future impairments due to pyrethroids using the conditional prohibition described in the staff report. The conditional prohibition would be a basin plan prohibition authorized by Water Code section 13243, which is part of a distinct chapter of the Porter-Cologne Water Quality Control Act from the chapter that implements the NPDES program (Water Code sections 13370 et seq.). Under California law, basin plan prohibitions are directly applicable and enforceable once they are effective. Unlike water quality objectives, their inclusion in a permit is not a prerequisite to enforcement. Therefore, NPDES permittees discharging to one of the water bodies that is not impaired due to pyrethroids would be subject to the conditional prohibition even if it is not included as a term in their NPDES permits. For the reasons provided in the staff report, the imposition of the proposed conditional prohibition and the corresponding requirement to prepare management plans where the pyrethroid trigger is being exceeded are expected to result in significant reductions in pyrethroid concentrations in receiving waters compared to existing levels, thereby preventing future pyrethroid impairments. Therefore, the proposed amendment does not propose to change the NPDES permit procedures for evaluating sources that discharge pyrethroids to non-impaired water bodies.

For NPDES discharges of municipal and domestic wastewater, all of which discharge to non-impaired water bodies, the proposed amendment would not change existing regulations regarding whole effluent toxicity testing and reasonable potential analysis, and if whole effluent toxicity testing demonstrates that there is reasonable potential for toxicity, then a toxicity effluent limitation would be included in permits as appropriate.

For NPDES permittees subject to one of the proposed TMDLs (all of which are municipal storm water dischargers), the pyrethroid wasteload allocations equal to the triggers would be included in their permits as one component of a BMP-based WQBEL implementing the applicable TMDL. Importantly, however, the trigger would not be a numeric effluent limit. Rather, attainment of the wasteload allocations would be a goal of the pyrethroid management plans which would be required by the BMP-based WQBELs in the permit. In this respect, when issuing NPDES permits for dischargers subject to one of the proposed TMDLs, the proposed amendment would authorize the Central Valley Water Board to express pyrethroids WQBELs in the form of best management practices, as authorized by 40 CFR section 122.44(k). For the reasons stated in the staff report, incorporating these requirements into NPDES permits that are subject to the proposed TMDLs is expected to result in significant reductions in pyrethroids concentrations, thereby addressing the existing impairments due to pyrethroids.

USEPA Comment No. 6 (Pyrethroid numeric targets and additivity):

We support the science used to develop and support the development of the six pyrethroids numeric acute and chronic concentration goals (used as TMDL numeric targets). This approach has been rigorously peer-reviewed through the State Water Board's peer review process. We support the approach of addressing the additive toxicity of the pyrethroids. There is extensive scientific evidence showing that chemicals within the same class exhibit the same mode of toxic action, and will have a combined, additive effect, which is always greater than that of each compound alone (Lydy et al. 2004). Compounds present at concentrations even below their "no toxic-effect" level contribute to the joint toxicity of the mixture. Addressing additive toxicity is consistent with your Board's previous adoption of several organophosphate TMDLs.

RESPONSE: Comments acknowledged.

USEPA Comment No. 7 (Bioavailability):

On the issue of bioavailability, we appreciate the technical staff's efforts to consider the application in this TMDL process. However, we believe that there are many areas of uncertainty, mostly the lack of knowledge on the kinetics piece and underestimation of the potential effect of aquatic organisms ingesting pyrethroid-bound particles. More importantly, unlike metals, these persistent pesticides can be a sediment sink for up to 640 days, especially for the most toxic pyrethroid, bifenthrin. This would be the first application of a bioavailability adjustment for a highly persistent pesticide. The staff report states, "Equilibrium-partitioning calculations indicate that attainment of the UC Davis criteria in the water column would also likely resolve most of the toxicity to *Hyalella* observed in sediment toxicity testing." However, a careful examination of Table 5-13 illustrates that in fact, for bifenthrin, cypermethrin, esfenvalerate and lambda-cyhalothrin, setting the goal at the 5th percentile may not be protective of *Hyalella* in sediment. A recent critical review paper which examined 50 studies published over the last 30 years reviewed the influence of particles on bioavailability and toxicity of pesticides in surface water (Knauer et al. in press). Important conclusions from this paper include: "This literature review demonstrates that the bioavailability in toxicity of pesticides to aquatic organisms in the presence of particles cannot simply be predicted by the partitioning of pesticides between water and particles using the Koc. The origin, concentration and properties of particles such as size and OC content have a strong impact on pesticide behavior and bioavailability in aquatic environments. In addition, water quality parameters such as pH may change ionization and thus adsorption of pesticides to particles modifying pesticide bioavailability. Furthermore, the physiology of aquatic organisms, e.g., feeding behavior and digestion, influence both bioaccumulation and toxicity of pesticides. This is also the case for highly lipophilic pesticides, which are generally assumed to be tightly bound particles and therefore not bioavailable." Finally, the route of exposure via ingestion of particle-associated pesticides is not taken into account (Parry et al. 2015).

In addition to reviewing and evaluating toxicity tests and ambient monitoring data generated by dischargers and others, implementation of a scientific study on the bioavailability fraction of pyrethroids would be helpful. A study is needed to determine whether the single default values (one for ambient waters and one for wastewater) as proposed are accurate to fully measure the bioavailable fraction and predict toxicity. Such a study should evaluate a range of ambient water and sediment, as well as effluent samples, using Tenax or SPME extraction methods to quantify the bioavailable fraction of pyrethroids.

RESPONSE: See response to USEPA Comment No. 1.

USEPA Comment No. 8 (Name all NPDES permitted discharges covered by TMDL):

Each TMDL should name all NPDES permitted discharges within the watershed. Include the NPDES permit number and facility name as they appear in the permit itself. This includes all major and minor NPDES discharges, including discharges covered by individual and general NPDES permits; e.g., wastewater, stormwater Phase I and Phase II, construction, industrial, pesticide, Caltrans and vector control. We recommend a table of NPDES permits and related information within each TMDL.

RESPONSE: See response to USEPA Comment No. 4.

USEPA Comment No. 9 (Source analysis to account for all point source dischargers):

The TMDL source analysis should account for all known point source dischargers, noting that some may not discharge the pollutant of concern or discharge insignificant amounts that would not need to be limited with a specific wasteload allocation in order to achieve applicable standards. Care should be taken in evaluating insignificant or "de minimus" discharges to ensure that they are really unimportant at all geographic scales and need not be limited. In cases where individual permitted facilities do not discharge or discharge insignificant amounts of the pollutants of concern, it greatly assists permit development if the TMDL specifies how the NPDES permits should account for these discharges. Potential options for addressing this situation include:

- a. The TMDL can specify that a particular point source need not be addressed by a wasteload allocation or permit limitation (likely including monitoring requirements to help ensure the facility does not discharge the pollutant at significant levels in the future). In this case, the TMDL would explain why no allocation is necessary for this facility.
- b. The TMDL can specify that the permit for a facility should incorporate performance-based limitations to ensure its loading of the pollutant of concern does not increase in the future.
- c. The TMDL can incorporate an explicit margin of safety (MOS) to account for all insignificant sources along with discussion of how this MOS may be available for use in calculating future permit limits (e.g. performance-based limits).
- d. The TMDL can incorporate a WLA of zero for facilities that do not discharge the pollutant of concern, in which case the associated permit would generally prohibit discharge of the pollutant.

RESPONSE: See response to USEPA Comment No. 4.

USEPA Comment No. 10 (Wasteload allocation for each facility and disaggregation if feasible):

If pollutant load reductions are needed, then define the wasteload allocation for each permitted source and facility. In the case of facilities permitted by a general NPDES permit, express the wasteload allocations such that they can be effectively implemented on a facility-by-facility basis; that is, disaggregate wasteload allocations if feasible. Concentration-based wasteload allocations are probably easiest to implement in situations where multiple facilities are covered by the same wasteload allocation and it is difficult to disaggregate wasteload allocations by discharger.

RESPONSE: See response to USEPA Comment No. 4.

USEPA Comment No. 11 (Clarify point(s) of compliance): Clarify where wasteload allocations apply. While the location for the point of compliance is obvious for some traditional

facility discharges, in more complex discharge situations, such as large industrial facilities with multiple stormwater outfalls, it can be difficult to define the correct point of compliance when applying a wasteload allocation during permit preparation. Wasteload allocations associated with MS4 stormwater permits may be notably challenging since there can be many outfalls and often several jurisdictions whose discharges are authorized by the same MS4 permit that are assigned one numeric wasteload allocation value.

RESPONSE: See response to USEPA Comment No. 4.

USEPA Comment No. 12 (Stratification of wasteload allocations for MS4 co-permittees):

For MS4 permit situations in which there are multiple co-permittees, it may be possible to stratify the wasteload allocations based on jurisdiction to distinguish the requirements applicable to individual co-permittees. If wasteload allocation stratification methods are used, it may be appropriate to identify representative outfalls for each stratified land use.

RESPONSE: See response to USEPA Comment No. 4.

CITY OF ROSEVILLE COMMENTS

Comments were received from Ms. Delyn Ellison-Lloyd, Senior Engineer, City of Roseville, on 23 March 2017, expressing support for the phased approach, use of a conditional prohibition, use of the 5th percentile UC Davis criteria, accounting for bioavailability, and the regulatory timeline.

RESPONSE: Comments acknowledged.

City of Roseville Comment No. 1 (*Partition Coefficients*): The partition coefficients (Koc) for esfenvalerate and permethrin presented in Table IV-Z (page xxv of draft staff report) are not the same as those presented in Tables 5-1 and 5-3.

RESPONSE: Table IV-Z has been updated to have the correct values, which are those presented in Tables 5-1 and 5-3.

City of Roseville Comment No. 2 (*Conservativeness of Criteria Averaging Periods*):

[The commenter stated that the criteria averaging periods are additionally more conservative than stated in the staff report because pyrethroids exposure from storm water discharges are episodic and pulse driven often resulting in actual environmental exposures much different and of shorter duration than those of a typical laboratory toxicity test citing Clark et al. (2014). The commenter then expressed further support for use of the 5th percentile criteria because of this additional conservativeness.]

RESPONSE: Comment acknowledged.

City of Roseville Comment No. 3 (*Use of Term Pesticide*): The City requests that the term insecticide be used in place of pesticide for purposes of clarification. Pesticide and insecticide are used interchangeably throughout the draft staff report and proposed amendment language. Insecticide is more accurate, and avoids the potential for any future misunderstanding particularly when discussing alternatives to pyrethroids. While the clear intent of the various provisions pertaining to controlling alternatives to pyrethroids is in regards to alternative *insecticides*, the present use of the word pesticide, which technically includes fungicides and herbicides, in these provisions leaves it unnecessarily open to interpretation. This can be rectified by replacing the word pesticide with the word insecticide throughout the entire draft

staff report and proposed amendment language, except where the clear intent of what is being communicated is pesticide (i.e., insecticide, herbicide, fungicide, etc.).

RESPONSE: The term pesticide was changed to insecticide in the monitoring provisions that require monitoring for alternatives to clarify that insecticide products specifically used as replacements for pyrethroids should be the focus of this evaluation and monitoring. The phrase “pyrethroid pesticide(s)” is used extensively throughout the proposed Basin Plan language and draft staff report and has not been changed to the term insecticide because it does not add clarity to this phrase. The implementation program for the pyrethroid control program is proposed to be in the Basin Plan section entitled “Pesticide Discharges” and therefore it is most clear to use the term pesticide to maintain the continuity of that term throughout this section of the Basin Plan.

City of Roseville Comment No. 4 (*Commitment to Re-evaluate Use of UCD Criteria and Criteria Derivation Methodology*): USEPA is actively working on updating national recommended criteria derivation methodology, and will be evaluating alternatives to the exhaustive data requirements the current USEPA methodology requires. The City requests that the draft staff report include a commitment to re-evaluate the use of criteria derived using the UCD Methodology as part of the proposed re-visitation of the project at 15 years. Moreover, the City requests as part of this review that the criteria themselves be re-visited as sufficient additional toxicity data may be available to negate the need for default acute-to-chronic ratios, or ideally enough toxicity data may be available to derive chronic criteria from a species sensitivity distribution. Presently, discussion of this program re-visitation makes no mention of this need to also re-visit the appropriateness of the UCD Methodology and any pyrethroid criteria derived from it.

RESPONSE: The proposed Basin Plan language states that the numeric pyrethroid triggers will be part of the re-visitation in no later than 15 years, which means that the values themselves will be reviewed and that would include reviewing more recent toxicity data and information and other available values and methodologies for deriving criteria such as those described in this comment.

City of Roseville Comment No. 5 (*Harmonization of Analytical Methods*): As noted in the staff report, very few analytical laboratories are capable of achieving sufficiently low reporting limits (RLs) to support the monitoring provisions of the proposed amendment. There are also varying approaches that could be used by analytical laboratories to achieve such low RLs, including advanced instrumentation (i.e., high resolution mass spectrometry) or changes to sample preparation protocols (i.e., increased sample extraction volumes, modified clean-up and concentration steps, etc.). It can be anticipated that what will result is laboratories using fundamentally different methods of analysis to comply with these low RLs. This leaves questions about the comparability of results that would be obtained from the various analytical labs (i.e., would the analytical reporting be the same for split samples submitted to a number of labs given the different analytical methods?). Successful implementation of the surveillance and monitoring provisions of the proposed amendment will be the harmonization of analytical methods that have clearly been demonstrated to produce comparable results. Given that the proposed amendment places analytical method approval authority on the Executive Officer of the Regional Board, the City requests that the Executive Officer follow the framework developed by the Environmental Laboratory Technical Advisory Committee (ELTAC), an advisory committee to the State Board’s Environmental Laboratory Accreditation Program (ELAP), for regulatory needs for lower RLs from certified laboratories. The ELTAC framework encourages Regulatory Agencies to solicit input from ELAP to assure that there are certified laboratories that

are capable of achieving lower reporting limits (or capable of analyzing for new analytes), and for ELTAC to engage laboratories when capabilities are not sufficient.

RESPONSE: See response to General Comment No.4.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE COMMENTS

Comments were received from Mr. Stephen Louie, Senior Environmental Scientist, Water Branch, California Department of Fish and Wildlife on 24 March 2017.

California Department of Fish and Wildlife Comment No. 1: The preferred pyrethroid concentration goals using the 5th percentile of the species sensitivity distributions do not appear to be protective of aquatic beneficial uses. First, the chronic goal for lambda-cyhalothrin is at a concentration equal to the 96-hour LC50 for known sensitive species. Other goals are within 2 to 3-fold of the LC50 values. LC50 values may seem like arbitrary numbers, but setting a concentration goal equal to the LC50 value is essentially stating that mortality to ½ of the sensitive organisms is protective. In addition, the surviving organisms are not expected to prosper. Most likely, the remaining organisms will die days after the test exposure period, or they will exhibit severe chronic adverse impacts (e.g., reduce growth or failure to reproduce). Pyrethroid concentrations within 2 to 3 fold of LC50 values are expected to kill some portion of the population of sensitive organisms present or cause sub-lethal chronic toxicity.

RESPONSE: See response to General Comment No. 3.

California Department of Fish and Wildlife Comment No. 2: As the staff report states, the standard test organism *Americamysis bahia*, is a surrogate mysid which has been found to have similar sensitivities to pyrethroid as *H. azteca*. The decline in mysid abundances have coincided with increased pyrethroid uses. Based on the sensitivity of mysids to pyrethroids and possible impacts of pyrethroids to mysid prey, it is possible that pyrethroids may have also contributed to mysid abundance declines. Unfortunately, the University of California, Davis (UC Davis) criteria derivation does not incorporate mysid toxicity tests because they were performed in saline water. The sensitivity of mysids and its importance to the estuarine food web are additional evidence that the goals should be lower than the preferred 5th percentile goal.

RESPONSE: Available toxicity data for mysids is included in the UC Davis criteria reports. The 5th percentile concentration goals are below the mysid toxicity values, thus ambient concentrations equal to the pyrethroid concentration goals are expected to provide reasonable protection of mysids.

California Department of Fish and Wildlife Comment No. 3: There is still significant uncertainty around the use of bioavailability calculations for predicting toxicity. A recent review concluded that the bioavailability and toxicity of pesticides to aquatic organisms in the presence of particles cannot simply be predicted by partitioning of particles between water and particles using Koc (Knauer et al. 2017). In addition, the review found that the physiology of aquatic organisms, e.g., feeding behavior and digestion, influence both bioaccumulation and toxicity of pesticides. The exposure of aquatic organisms to pesticides and the environmental risks of many pesticides might be underestimated in prospective risk assessments, when predicted environmental concentrations are estimated based on the Koc of a compound. This is consistent with research that showed mortality to filter-feeding calanoid copepods (*Eurytemora affinis* and *Pseudodiaptomus forbesi*) was higher than what would be predicted from dissolved

concentrations of bifenthrin alone (Parry et al. 2015). The researcher suggested that toxicity could have been from the direct ingestion of bifenthrin-bound particles.

RESPONSE: See response to General Comment No. 1.

Knauer et al. (in press) also stated that pyrethroids were the only class of pesticides that did show a reliable decrease in bioavailability due to binding to organic matter, confirming that this approach is reasonable for pyrethroids, although it may not be for other classes of pesticides.

California Department of Fish and Wildlife Comment No. 4: Furthermore, the regulation of pyrethroids using the dissolved fraction does not account for the fate and transport of sediment bound pyrethroids. Regional Board staff estimated that the sediment bound pyrethroid concentrations will equal or exceed the LC50 values for four out of the six pyrethroids, even if the 5th percentile dissolved pyrethroid concentration goals are being attained. Regional Board studies estimate that 30% to 60% of the suspended sediment that flows into the Delta is deposited in the Delta (Louie et al. 2008; Wood et al. 2010). A large portion of suspended sediment will likely deposit in wetland, marsh, and floodplain habitats. Pyrethroid contaminated sediments deposited in these habitats will likely reduce their benefits. Wetland, marsh, and floodplain habitats have been found to be zones of high primary and secondary productivity that provide important prey (e.g., zooplankton) for estuarine fish species. Regulating sediment bound pyrethroids at the source would be feasible, whereas attempting to characterize the transport, the environmental impacts in the Delta, and the initial source of the pyrethroids in the watersheds are less likely. The Department has invested great efforts to restore Delta habitats for the benefit of imperiled native species, which may be jeopardized by continued inputs of pyrethroid contaminated sediments.

RESPONSE: The analysis in the staff report regarding the estimated maximum pyrethroids concentrations in sediment if the 5th percentile concentration goals are being attained was recognized as very conservative because it is based on the assumption that all of the bed sediment would contain pyrethroids at the estimated levels, but it is likely that it is mixed with sediments that do not contain pyrethroids (section 5.6.1.1, Staff Report). This conservative analysis was not provided as a predictive estimate of expected concentrations, which would likely be significantly lower. It is not expected that sediment bound pyrethroid concentrations will equal or exceed the LC50 values for pyrethroids when the proposed concentration goals are attained, because even the conservatively calculated estimated maximum sediment concentrations did not exceed the LC50 for 3 of the six pyrethroids and did not exceed the LC50 by more than a factor of 3 for any pyrethroid. This analysis indicates that attainment of the proposed concentration goals would likely resolve most of the toxicity to *Hyalella* observed in sediment toxicity testing. Sediment toxicity testing with *Hyalella azteca* is required in monitoring for municipal storm water and agricultural dischargers to ensure that benthic organisms are protected.

California Department of Fish and Wildlife Comment No. 5: In environmental samples, evidence suggests that fish species may be more sensitive to environmental insults than invertebrate species. In a State Water Resources Control Board (State Water Board) SWAMP review of toxicity in Central Valley waters, researchers found that toxicity to fish occurred at a higher frequency than to either the invertebrate or algal species. Where studies were able to evaluate cause of toxicity, insecticides, primarily pyrethroids singularly and in combination with other pesticides, were found to be the cause of toxicity. This suggests that detrimental effects

may be occurring to fish species populations from chronic sublethal impacts, which may not be reflected by the acute mortality studies used to develop species sensitivity distribution. For example, Brander et al. (2016) found chronic reproductive impairments to the resident *Menidia beryllina* occurred at ratios extremely larger than the default acute to chronic ratio (ACR) for bifenthrin (11.4) used for the chronic criteria calculations (e.g., LC50 = 2100 ng/L and reduced fertilized eggs at 0.5 ng/L). The approximate ACR in this study using the LC50 and LOEC is 4,200. A calculation using a maximum acceptable toxicant concentration (MATC) would yield a larger ACR.

The federally listed threatened *Oncorhynchus mykiss* is far more acutely sensitive to bifenthrin toxicity than *Menidia beryllina* (e.g., 96-hour LC50 150 ng/L versus 2100 ng/L, respectively). If an ACR of 4,200 was used to estimate the concentration at which chronic concentrations would impair *O. mykiss* reproduction, then it is estimated that *O. mykiss* reproduction could be impaired at concentrations as low as 0.04 ng/L bifenthrin. ACRs are typically higher in higher trophic level organisms (May et al. 2016). Default ACRs may underestimate the long-term chronic toxicity in fish species. Unfortunately, there is limited or no data available for direct effects to other listed species like Delta smelt and longfin smelt.

RESPONSE: For pyrethroids, the acute lethality data for the most sensitive aquatic invertebrate species is lower than, or in one case¹ equal to, any quantified lethal or sublethal acute or chronic fish toxicity threshold. Therefore at this time the evidence indicates that invertebrates are the most sensitive organisms to pyrethroid and criteria protective of invertebrates, such as the proposed concentration goals, will also be protective against potential impacts to fish.

The acute-to-chronic ratios used to derive the UC Davis criteria are based on the best available science and the technical basis of the ACRs was supported by the independent scientific peer reviewers. If new information becomes available in the future regarding the acute-to-chronic ratios or chronic toxicity levels for fish, this information will be considered by the Central Valley Water Board when the Board re-visits the pyrethroids control program no later than 15 years after the effective date of the Basin Plan amendment. Also, see response to General Comment No. 3.

California Department of Fish and Wildlife Comment No. 6: Based on the known toxicological effects predicted to occur in the aqueous and sediment phases of the aquatic environment using the 5th percentile UC Davis criteria goal, the Department recommends that a more protective goal be adopted (e.g., the 1st or 2.5 percentile UC Davis criteria) considering the current imperiled status of threatened or endangered species which rely on the Delta ecosystem. An alternative approach would be to apply the 5th percentile UC Davis criteria goal to whole water samples, which would likely protect the local aqueous phases as well as the downstream Delta. The downward adjustment of the criteria to lower species sensitivity percentiles is consistent with the peer-reviewed literature, USEPA methodology, and the current revisions of the 2015 UC Davis methods (Tenbrook et al. 2010, USEPA 1985).

RESPONSE: See responses to General Comment No. 1 and General Comment No. 3.

California Department of Fish and Wildlife Comment No. 7: The assumption that the UC Davis 5th percentile criteria is consistent with the USEPA's guidance because 0.05 is used to

¹ The acute (4-day) bifenthrin LC50 for *Hyalella azteca* is equal to the concentration at which Brander et al. (2016) found chronic exposures reduced egg fertilization inland silverside

calculate a Final Acute Value has some uncertainty. First, the distribution calculations for the UC Davis method and the USEPA (1985) methods are different. For example, where the staff report presents values for the water quality criteria following the USEPA guidelines (Table 5-11) the values are below what the UC Davis 5th percentile criteria predicts would be necessary to be protective, and the criteria for bifenthrin, cypermethrin, and lambda-cyhalothrin are more consistent with the UC Davis method 1st and 2.5 percentile criteria. Second, the USEPA (1985) guidelines recommend that:

“To be acceptable to the public and useful in field situations, protection of aquatic organisms and their uses should be defined as prevention of unacceptable long-term short-term effects on (1) commercially, recreationally, and other important species and (2) (a) fish and benthic invertebrate assemblages in rivers and streams, and (b) fish, benthic invertebrate, and zooplankton assemblages in lakes, reservoirs, estuaries, and oceans.”

The protection, restoration, and enhancement of a vibrant and healthy Delta ecosystem are clearly of State importance (DSC 2013). Adjustments to the percentile of the species sensitivity distribution are justified.

RESPONSE: See response to General Comment No. 3. Protection of the Delta ecosystem is of State importance. Protection of aquatic life in the Delta is one of the primary goals of the proposed amendment, and a reason the Board has prioritized development of the proposed amendment. The proposed concentration goals are protective of all aquatic life, including Delta species. Further, the implementation of the proposed amendment is expected to result in substantial reductions in pyrethroid concentrations in the Delta and its tributaries.

California Department of Fish and Wildlife Comment No. 8: The 2.5 percentile UC Davis criteria was not considered by the independent science peer review. It is also unclear, whether the peer reviewers were made aware of the importance of mysid shrimp to the Delta ecology and threatened fish or their sensitivity to pyrethroids. There was no discussion of the current state of the native fish in the Delta or the indirect impact from a reduction in the major food groups in any of the peer review comments. As well, the peer reviews occurred prior to Brander et al. (2016) which demonstrated reproductive impairments to fish at 0.5 ng/L. Not all of the peer reviewers suggested that the 1st percentile criteria might be overprotective. Given the option of the 2.5 percentile criteria, the 5th percentile criteria may not have been preferred given its predicted toxicity in the water and sediment phases or the considerations of current local conditions.

RESPONSE: See response to General Comment No. 3.

The 5th percentile concentration goals are below the mysid toxicity values, thus ambient concentrations equal to the pyrethroid concentration goals are expected to be reasonably protective of mysids. The quantifiable impact of pyrethroids on declines in mysid shrimp populations, fish populations, or reductions in food sources for fish are not available. The 2.5 percentile criteria were not reviewed in the peer review, but that does not change the peer reviewers' conclusions regarding the 5th percentile concentration goals as being reasonably protective.

California Department of Fish and Wildlife Comment No. 9: The concentration goals should reflect the levels to protect beneficial uses, and not what might be closer to current analytical

methods. The goals should be consistent with the current Basin Plan e.g., “All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.” Both the 2.5 and 5th percentile chronic criteria goals are well below analytical detection limits, so compliance assessments for either goal will be limited to the same commercially available analytical methods for, most likely, years. As well, the focus of moving toward improved water quality improvements while gathering additional information will be limited by analytical methods for both options.

As described in the staff report, the majority of the science shows that toxicity testing methods are demonstrating adverse impacts to aquatic life at levels below detection limits. Both percentile options will have to rely largely on toxicity testing for assessments of aquatic life protections, since toxicity tests appear to be the most sensitive means of assessing pyrethroid impacts to aquatic life. In addition, toxicity tests automatically address the question of bioavailability. As well, because this pyrethroid control program is proposing to adopt goals versus water quality objectives, many of the unintended regulatory consequences and restrictions under 40 CFR 136 may be avoided, even using the 2.5 percentile criteria.

The use of goals below detection and quantification limits is appropriate, when there is scientific evidence supporting its need to protect beneficial uses. [The commenter used the Proposed Statewide Mercury Control Program for Reservoirs as an example of proposed State Water Board policies that intend to use load allocations below common method detection limits to ensure protection of beneficial uses.]

Adjusting water quality goals and criteria to be similar to current quantification limits will likely underestimate impairments to beneficial uses.

RESPONSE: The current analytical detection limits were one of many factors considered in recommending the 5th percentile UC Davis criteria as the pyrethroid concentration goals as part of the phased pyrethroid control program. The best available science was used to determine that these values are reasonably protective of beneficial uses (see response to General Comment No. 3).

California Department of Fish and Wildlife Comment No. 10: Non-detect measurements and “J-flag” data are real data, and the use of these measurements is useful for environmental assessments.

[The commenter used the Sacramento-San Joaquin Delta Estuary TMDL for Methylmercury and the Proposed Statewide Mercury Control Program for reservoirs as examples of utilizing data below the detection and quantification limits.]

The pyrethroids that have been reported as above the method detection limit are defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero (40 CFR Part 136). So, the confidence that the pyrethroid is present when detected above “detection limits” is very high. This information is indispensable, for example, when there is additional evidence that beneficial uses are being impaired, e.g., occurrence of toxicity or population impacts.

RESPONSE: Concentration data that are below laboratory reporting limits may be useful for environmental assessments to determine presence but are not a reliable number to determine specific concentrations. The proposed pyrethroids control program would not use flagged data to determine whether or not pyrethroid triggers have been exceeded

because there is the potential for matrix interferences below the reporting limit, which in turn may result in implementation and additional monitoring requirements for dischargers.

California Department of Fish and Wildlife Comment No. 11: In regards to previous testimony provided during Regional Board workshops and hearings, the use of correlations and regressions as exploratory approaches to describe the possible factors contributing to abundance variability is consistent with current state of the science and methods employed in Delta.

[The commenter provided examples of studies that utilized correlations and regressions as exploratory approaches including those by Thomson et al. (2010), Kimmerer (2002), and State Water Board (2016b), The commenter then suggests that previous statements regarding correlation and regression analyses cite Nichols (2000) out of context, as Nichols (2000) describes the limitation of these analyses to migratory bird management and not specifically the statistical methods.]

The pyrethroid analyses in Fong et al. (2016) as well as the analyses in Thomson et al (2010), Kimmerer (2002), SWRCB (2016b), and the majority of Delta species abundance analyses use retrospective analyses of monitoring data to describe the possible environmental factors that may be driving species abundance. Nichols (2000) states that "retrospective analyses of monitoring data can be used to develop hypotheses and models of animal populations and management responses", which all these studies have attempted to do.

[The commenter then states that while these studies may hypothesize the important environmental factors for population abundances instead of testing the cause and effects, actually testing the causes and effects by monitoring population responses would require a management agency to implement a change.]

The statistical analyses in Fong et al. (2016) were consistent with the methods used to develop the linkage analyses to support the State Water Board's Proposed Statewide Mercury Control Program for Reservoirs (SWRCB 2016c). Regional Board staff should review the methodology and the statistical review by the UC Davis Statistics Laboratory for the efficacy of methods for describing the associations of environmental factors. Clearly, the pyrethroid and species abundance correlations and regressions don't prove cause and effect relations, nor did they attempt to; however, based on the overwhelming evidence of pyrethroid use; discharge; presence in surface water bodies; direct link to toxicology; important food web species sensitivities to pyrethroids; and direct impacts to the food web presented here, in the Staff Report, and elsewhere in the literature, the linkage between pyrethroid use and species abundance declines is supported.

RESPONSE: Comment acknowledged. The proposed pyrethroids Basin Plan amendment does not rely on the use of these correlations and regressions as the basis of the control program, however Fong et al. (2016) is cited in the draft staff report as a source of scientific information regarding potential toxic effects of pyrethroids. The proposed amendment is expected to significantly reduce the potential for these effects on Delta species.

California Department of Fish and Wildlife Comment No. 12: Regarding the proposed Basin Plan amendment text on page xxx:

The pyrethroid pesticides numeric triggers represent maximum allowable levels above which additional management actions may be required. The Regional Water Board may seek additional reductions in pyrethroid pesticides concentrations and exceedance frequencies if such reductions are necessary to account for additive effects with pyrethroids not identified in Table IV-Z or synergistic effects with other chemicals or to protect beneficial uses.

There is ample evidence in the literature that supports the concept that pyrethroids as well as other classes of pesticides have the potential to work in conjunction to adversely impact water quality and impair beneficial uses. [The commenter discussed the following references to support this statement: Ruby 2013; Gilliom et al. 2006; Orlando 2014; Denton et al. 2003; Westergaard et al. 2012; Scott and Sloman 2004; Scholz et al. 2000; Moore and Waring 2001; Hecht et al. 2007; NMFS 2008; NMFS 2009; Potter and Dare 2003; Scott and Sloman 2004.]

The proposed surveillance and monitoring program does not appear to include requirements to assess additive or synergistic effects with other chemicals. The evidence provided suggests that additive toxicity currently occurs in Central Valley water ways. The Department recommends that the impact of these additive effects are evaluated during the phased control program.

RESPONSE: The proposed surveillance and monitoring program utilizes toxicity testing to account for additive or synergistic effects. Evaluation of the resulting toxicity testing data will be part of the phased control program.

California Department of Fish and Wildlife Comment No. 13: Regarding the Beneficial Use discussion on p. 50 of the Draft Staff Report:

There is data that suggests that impairments to MIGR and SPWN through olfactory impairments may be more sensitive than WARM and COLD. Moore and Waring (2001) found significant reductions to salmonid reproduction (e.g., reduced sex hormones and reduced milt production) at levels <4 ng/L. The nominal concentrations that exhibited impairments to reproduction were 0.1 and 1.0 ng/L. The measured concentrations of cypermethrin that were above detection limits ranged between 33% and 150% of nominal concentrations, but measured concentrations averaged less than 100% of nominal concentrations. Accordingly, impairments to olfaction are likely occurring in the range of 0.033 to 0.15 ng/L cypermethrin. This range is below all acute and chronic effect concentrations used to develop the criteria for cypermethrin. As well, these effect concentrations are 2 to 9-fold lower than the preferred 5th percentile chronic UC Davis criteria for cypermethrin. As mentioned earlier, olfaction is important to many necessary behavior responses for reproduction and migration. Reduced milt production could result in the same adverse consequences as reduced egg production in sexually reproductive organisms. Studies to investigate MIGR & SPWN impairments would likely require different methods than those to evaluate WARM and COLD. Including MIGR and SPWN as designated beneficial uses needing protection could ensure that these uses will be assessed in surveillance and monitoring programs.

RESPONSE: Migration and spawning are discussed as potentially sensitive beneficial uses that need protection in section 4 of the draft staff report. MIGR and SPWN beneficial uses are a subset of warm and cold freshwater habitat, so all water bodies with MIGR and SPWN would be covered under the pyrethroids control program. There is less quantifiable data available on effect levels of pyrethroids on MIGR and SPWN, making it difficult to base pyrethroid concentration goals on effects on these beneficial uses.

The Moore and Waring (2001) study was not used in UC Davis criteria calculation because they did not use standard test methods and did not report the chemical purity of cypermethrin used in the study. The olfactory detection test only used one test concentration instead of a series that could demonstrate a dose-response relationship. While it is clear that olfactory detection of priming pheromones play a role in reproduction, this endpoint was not demonstrated to be directly correlated with an adverse effect on reproduction (e.g., reduced hatching), so it was not used in criteria derivation. This study did look at egg fertilization, which is directly linked to reproduction; reduced fertilization was observed at a nominal concentration of 100 ng/L cypermethrin (the measured concentration was not reported), which is well above the proposed chronic pyrethroid concentration goal for cypermethrin of 0.3 ng/L.

California Department of Fish and Wildlife Comment No. 14: Regarding WWTP feasibility and Table 5-14 and 5-15 on p. 100 of the Draft Staff Report:

Because the report states that WWTP dissolved pyrethroid concentrations range between 1-6% of whole water samples, then it is reasonable to assume that current dissolved concentrations would be equivalent to a 94-99% reduction in concentrations for meeting the preferred 5th percentile goals for freely dissolved concentrations. It appears that very little reductions would be necessary to attain the preferred goals, thus attainable. Table 5-14 and 5-15 present reductions necessary for whole water concentrations to meet criteria. The preferred trigger concentrations are in terms of freely dissolved concentrations. Reductions presented as reductions from whole water samples to meet dissolved concentration triggers don't exhibit the true nature of the feasibility of necessary reductions for the program. Recommend that additional tables displaying reductions necessary from current dissolved concentrations to dissolved goals are provided.

RESPONSE: Wastewater treatment plants have been demonstrated to reduce influent pyrethroid concentrations by >90% (Markle et al. 2014) and it is unclear if adjustments to their treatment processes could result in further reductions. There is insufficient evidence in the record to know whether additional reductions in pyrethroid effluent levels are attainable with current technologies. An additional table (Table 5-17) displaying calculated reductions needed to attain the proposed freely dissolved concentration goals, where appropriate data were available to make such calculations, have been added to the staff report.

California Department of Fish and Wildlife Comment No. 15: Regarding Table 5-16 on p. 103 of the Draft Staff Report:

According to the data presented in the table, current peak dissolved pyrethroid concentrations in storm water samples are 71-99.5% lower than whole water concentrations. The dissolved concentrations for the impaired Pleasant Grove Creek are currently meeting the preferred 5th percentile chronic goal for cyfluthrin and slightly above the goal for bifenthrin. The source control program of the STORMS or other CDPR programs should reduce concentrations further, which is supported by testimony provided by stakeholders at the Feb. 24, 2017 Hearing (e.g., statistically significant decline in Pleasant Grove Creek sediment pyrethroid concentrations over time). The data suggests that some storm water programs currently, or in the near future, have the ability to attain dissolved goals, thus attainable and technologically feasible.

RESPONSE: The proposed TMDL, in coordination with the State Water Board Strategy to Optimize Resource Management of Storm Water (STORMS), and California Department of Pesticide Regulation (CDPR) programs will work together to achieve the needed reductions in the TMDL water bodies. The proposed timeline for attaining the TMDLs is no later than 20 years, and it is possible that the numeric targets of the TMDLs will be achieved earlier in some TMDL water bodies. In the case of Pleasant Grove Creek, as noted by the commenter, there may be less reductions need to achieve the TMDL goals.

California Department of Fish and Wildlife Comment No. 16: As described previously, the preferred goals are predicted to impair olfaction in salmonids, which is important for essential behavior responses. Salmonids use olfactory cues to home to natal streams. The disruption of olfaction in salmonids by other pesticides has been shown to likely increase straying in Chinook salmon (Scholz et al. 2000). A high occurrence of straying of fall-run Chinook salmon occurs between the Sacramento and San Joaquin river basins.

The analysis for the protection of endangered and threatened species does not appear to include the cumulative impacts of pyrethroid pesticides, alone and in combination of other stressors, on the chronic long-term direct impacts to endangered species, or the indirect impacts from the reduction of the quantity or quality of food. Predicting the response of different fish species to contaminants requires considering the sensitivity and exposure of different life stages, the energy deficits due to multiple stressors, and the joint effects of temperature on metabolic rate and chemical elimination (Brooks et al. 2012).

The list of federally and state listed threatened or endangered species that may be affected by the discharge of pyrethroids is incomplete. A few examples of missing species include: longfin smelt (*Spirinchus thaleichthys*), California Tiger Salamander (*Ambystoma californiense*), and Clapper Rail (*Rallus longirostris obsoletus*). The most recent list of threatened or endangered animal species can be found: <https://www.wildlife.ca.gov/Conservation>.

RESPONSE: The proposed control program will require significant reductions in pyrethroid levels in the Delta and its tributaries, which will improve water quality for salmonids in these watersheds. Chronic direct impacts have not been demonstrated on threatened and endangered species at levels below the proposed pyrethroid concentration goals, thus achieving the concentration goals is expected to be protective of these species. The concentration goals are also expected to be protective against indirect impacts on food sources because the proposed concentration goals are set at levels to be protective of the most sensitive tested aquatic invertebrate (*Hyalella azteca*).

The list of endangered species that may be affected by the discharge of pyrethroids given in section 5.6.7.2 was not intended to be complete, but to list several species as an example.

California Department of Fish and Wildlife Comment No. 17: Regarding the following text on p. 67 in the Draft Staff Report:

“Sublethal effects on resident fish have been demonstrated at very low levels. Cole et al. (2016) reported reproductive effects on longfin smelt, which reside in the Delta, at 0.5 ng/L bifenthrin, which is equal to the *H. azteca* LC50 for bifenthrin. Other sublethal effects have been documented in resident fish (Fong et al. 2016), but if effects were not

directly linked to survival, growth or reproduction they were not included in criteria derivation.”

It appears that the report may have incorrectly cited Cole et al. (2016). Brander et al. (2016) found reproductive impairments in *Menidia beryllina* at 0.5 ng/L bifenthrin. In addition, the citation for Cole et al. (2016) references *Menidia beryllina* as well, and not longfin smelt.

Brander et al. (2016) demonstrated clear reductions in egg fertilization for 0.5 ng/L bifenthrin exposures (approximately 30% reduction). As well, the study demonstrated that the likely mechanism for the reduced reproductive success, a trend in reduced choriogenin per total protein content, started at fish exposures to 0.5 ng/L bifenthrin. The report is unclear how Staff concluded that effects were not linked to reproduction and not included in the criteria derivation. This study is an additional line of evidence that the 5th percentile criteria goal is not protective of supporting aquatic life beneficial uses.

RESPONSE: The citation for Cole et al. (2016) and reference to longfin smelt were erroneous and were changed to Brander et al. (2016) and inland silverside, respectively, in the draft staff report. Clarification was also added regarding why this effect level was not included in criteria derivation – this effect is clearly linked to reproduction, but the study was published after the pyrethroid criteria reports were updated in 2015 and that is why it was not included. These data would have been used in chronic criterion derivation for bifenthrin if they were available at the time of the update, but it is unlikely that they would have altered the chronic criterion because the toxicity value is above the UC Davis 5th percentile chronic criterion of 0.1 ng/L.

California Department of Fish and Wildlife Comment No. 18: Regarding the following text on p. 68 of the Draft Staff Report:

“Studies on some non-resident species such as the amphipod *Gammarus* species and Atlantic salmon have documented sublethal effects at low concentrations, but these effects were not included in criteria derivation in several cases if they were not directly linked to survival, growth or reproduction or if effect concentrations were not quantified due to detection limits.”

First, the non-native species tests are relevant as surrogate species, when available data are not available for species of concern. For example, the non-native *Ceriodaphnia dubia* was a surrogate species that was used extensively to demonstrate adverse effects from the use of organophosphate pesticides, as well as, to develop criteria for this class of pesticides. Second, the concentrations that caused measured impairments (e.g., reduced milt production and reduced egg fertilization) may have been below detection limits, but the nominal and predicted concentrations were below concentrations found to impair other sensitive species, including *H. azteca*. As well, the concentrations were predicted to be below the preferred 5th percentile chronic UC Davis criteria for cypermethrin. This evidence supports the need to use a goal that is more protective.

RESPONSE: Studies on non-native species are generally included in the criteria derivation, but studies on *Gammarus* species and Atlantic salmon are highlighted in this paragraph because the studies report sensitive effect levels, but were not included in criteria derivation because of a lack of documentation that study parameters met quality objectives. Staff recognized that there may be additional species that are relatively sensitive to pyrethroids; however the available data did not meet the quality level needed

to be included in the UC Davis criteria derivation or that warrant adjustment of the criteria.

California Department of Fish and Wildlife Comment No. 19: Regarding the following text on p. 72 of the Draft Staff Report:

“The UC Davis method also includes an exceedance frequency of not more than once every 3 years. This means that if there are two or more exceedances of the concentration goal in a 3 year period, then the concentration goals would not be achieved...”

Caution should be used for the exceedance frequency of not more than once every 3 years as a conservative measure. Delta smelt abundances are at an all-time low. Delta smelt are an annual species, meaning the current stock gives rise to the next year’s stock. Direct toxicity to Delta smelt populations or a crash in zooplankton prey which prevents Delta smelt from succeeding in any given year has the potential to extirpate the species.

RESPONSE: Staff agrees that a 3 year exceedance frequency is not conservative in all cases because some populations take longer to recover or may not have the resiliency to recover from exceedances and this clarification has been added to the staff report following the above-cited sentence (section 5.3.1).

California Department of Fish and Wildlife Comment No. 20: Regarding section 6.2 Category 4b for Agricultural Waters of the Draft Staff Report:

The staff report is inconsistent in its description of uncertainty around attaining standards. The staff report proposes to make use of goals and triggers due to the uncertainty around the feasibility of attaining water quality standards. However, Section 6.2 suggests that impairments in agricultural watersheds can be addressed through Category 4b of the 303(d)/305(b) Integrated Report as an alternative to TMDLs. If it is predicted that “water quality standards can be attained in the impaired agricultural water bodies in a specified time period”, then it appears that pyrethroid water quality objectives specific to agricultural discharges may be feasible and warranted. The Department suggests that the staff report clarify the current and predicted feasibility of controlling pyrethroid discharges in the agricultural watersheds.

RESPONSE: As discussed in the staff report, the Board does not have adequate information at this time to support the establishment of water quality objectives. However, the water bodies proposed for category 4b demonstrations are small water bodies that only have agricultural runoff as a source. Agricultural dischargers have more management practices available to them including direct source control, than storm water and wastewater dischargers, and a record of resolving pesticide impairments through the ILRP, as discussed in the staff report (see Appendix E), so there is more certainty in the feasibility of attaining pyrethroid concentration goals in those water bodies.

California Department of Fish and Wildlife Comment No. 21: Regarding the following text in the Executive Summary of the Draft Staff Report:

“Therefore additional dilution will likely be available in most receiving waters and resulting pyrethroid concentrations in receiving waters will likely be significantly less, thus providing an additional margin of safety.”

This statement assumes that there are no pyrethroid discharges upstream, as well as any other constituents that could interact with pyrethroids in receiving waters. Without an analysis to predict whether receiving waters have the assimilative capacity to receive pyrethroids, there's no assurance that dilution is available. Considering the large number water bodies included on the 303(d) list for pollutants, including pesticides known to interact with pyrethroids, there is likely no assimilative capacity in many receiving waters to allow for dilution as a safety factor.

RESPONSE: Staff acknowledges other pollutants and discharges in many water bodies would reduce this dilution capacity, nevertheless, many water bodies have dilution available. The Executive Summary in the staff report has been revised to say “many water bodies would have dilution available.” It was not possible to quantify or adjust for toxicity of pyrethroids mixed with other pollutants, but the proposed amendment includes toxicity testing to assess potential additive effects.

California Department of Fish and Wildlife Comment No. 22: Regarding the following text in the Executive Summary of the Draft Staff Report:

A **conditional prohibition** of pyrethroid discharges to all water bodies with aquatic life beneficial uses in the Sacramento River and San Joaquin River basins. Discharge above concentration triggers would be prohibited unless management practices to reduce discharges of pyrethroids are being implemented.

The report states numerous times that there is great uncertainty around dischargers' ability to control pyrethroids in their discharge (i.e., management practices are likely ineffective). It is unclear whether a reduction in pyrethroids in surface waters is expected or will be protective because dischargers will be allowed to discharge pyrethroids above goals (triggers) if they implement management practices, which may or may not be effective at reducing pyrethroid concentrations. Please clarify what the expected reductions in pyrethroid concentrations are, and whether the concentrations are predicted to be protective of beneficial uses.

RESPONSE: The ultimate goal of the pyrethroids control program is to result in concentrations that are protective of beneficial uses. The requirements in the proposed amendment are expected to result in significant reductions in pyrethroid levels and increase protection of beneficial uses. For some dischargers whose management practices can include direct source control (i.e., agriculture) it is expected that beneficial uses will be protected within the timeline for attainment of the concentration goals. During the first phase, it is expected that the currently 303(d) listed water bodies will attain the concentration goals within 20 years, and additional agricultural waterbodies will attain the concentration goals within 20 years of being identified as exceeding the concentration goals. For the remaining water bodies concentration data, as well as toxicity data, will be assessed during updates to the Central Valley Water Board every 3 years and when the pyrethroids control program is re-visited in no later than 15 years after the amendment is effective to provide information on progress towards attaining the concentration goals and protection of beneficial uses. Toxicity monitoring is also included as a backstop that will trigger follow-up action where needed and will provide information necessary to assess whether there are ambient toxicity concerns that could affect overall beneficial use protection.

California Department of Fish and Wildlife Comment No. 23: Regarding pyrethroid resistance on p. 65 of the Draft Staff Report:

Artificial selection for pyrethroid resistant genes is a population effect. As stated in the staff report and supported by the literature, there are many fitness consequences of reduced genetic and biological diversity to populations. In addition to resistance by gene mutation, there are adverse costs to tolerance by acclimation. For example, fish species have been shown to be able to tolerate xenobiotic exposures, but the tolerance resulted in metabolic costs and reduced growth (Beyers et al. 1999). Reduced growth rates throughout the food web can exacerbate mercury contamination (Foe and Louie 2014). These cumulative impacts through the food web do not appear to be accounted for in the calculation of protective goals.

RESPONSE: Staff is not aware of any studies that document fitness consequences for *Hyaella* populations that have developed resistance to pyrethroids, thus accounting for these potential effects would be speculative. *Hyaella* populations have been widely documented throughout the watersheds so it is unclear whether the documented gene mutations are impacting these populations.

WESTERN PLANT HEALTH ASSOCIATION COMMENTS

Comments were received from Ms. Renee Pinel, President/CEO, Western Plant Health Association (WPHA) on 24 March 2017.

Western Plant Health Association Comment No. 1: The WPHA joins the Pyrethroid Working Group (PWG) in its comments with respect to the Draft Amendments and the Draft Staff Report. WPHA agrees with the PWG that there is insufficient information available to adopt water quality objectives at this time, and thus generally supports the staff recommended pesticide control program contained within the Draft Amendments, which would establish numeric triggers for the implementation of management plans. WPHA also agrees that use of 5th percentile values for the establishment of pyrethroid concentration goals are extremely conservative, and thus are protective of aquatic life beneficial uses. There is no compelling reason or justification for use of values that are below those at the 5th percentile level.

RESPONSE: Comments acknowledged.

Western Plant Health Association Comment No. 2: Moreover, WPHA supports the phased approach contained within the Draft Amendments. Pyrethroids are extremely beneficial products for the protection of public health and agriculture, and their beneficial uses must be weighed against their impacts to the environment. At this time, it has been shown that pyrethroids may cause toxicity to laboratory reared *Hyaella azteca*; however, it is not known if impacts to laboratory *Hyaella* actually constitute an unreasonable impact to aquatic life beneficial uses. Until additional data and information is available, the Central Valley Water Board should avoid the premature adoption of water quality objectives, and avoid adoption of an implementation program that would negatively impact public health and agriculture by causing the pyrethroids to no longer be available products. We believe that the Draft Amendments strike this appropriate balance.

RESPONSE: Comments acknowledged.

Western Plant Health Association Comment No. 3: WPHA supports and references the detailed comments submitted by the Pyrethroid Working Group for your consideration, and thanks the Central Valley Water Board and its staff for the balanced approach they have

brought to this issue. We look forward to continuing to participate in these discussions and thank you for your consideration of our comments.

RESPONSE: Comments acknowledged.

DONALD WESTON COMMENTS

Comments were received from Mr. Donald Weston, Ph.D., Emeritus Adjunct Professor, University of California Berkeley on 24 March 2017.

Weston Comment No. 1: [The commenter has three main concerns with the proposed bioavailability approach, which is to estimate the freely dissolved pyrethroid concentration from using total pyrethroid concentrations, the dissolved and particulate organic carbon concentrations, and partition coefficients. The three concerns are the novelty of the approach, the lack of consideration of the bioavailability of particle-bound pyrethroids, and the limited partition coefficient data available and potential variability in those data. These concerns are described in more detail below and responded to jointly in General Comment No. 1.]

Novelty – [The commenter states that the proposed bioavailability approach is not common or well validated. The commenter asserts that this is the first time this approach is being used in a regulatory context and thus it calls for a strong and convincing justification and explanation which the commenter says is lacking in the staff report.]

Bioavailability of particle-bound contaminant – [The commenter expressed uncertainty in how representative the freely dissolved pyrethroids concentration is to the bioavailable concentration. The commenter is concerned that the proposed bioavailability approach assumes biological uptake of particle-bound pyrethroids to be negligible despite evidence suggesting the contrary in other comparable compounds, which would not accurately characterize the bioavailable concentration for filter-feeding and deposit-feeding aquatic species. The commenter also suggests that exclusion of particle-bound pyrethroids from regulatory limits creates the potential for agricultural dischargers to manipulate suspended sediment in their discharge to avoid a pyrethroids exceedance thus also creating a disincentive for agricultural dischargers to reduce suspended sediment discharge.]

Limited Koc and Kdoc data – [The commenter's main concern the commenter is that the significant variability in these coefficients, which may vary by orders of magnitude based on the characteristics of organic matter and the particles in a specific site, is not addressed or accounted for when calculating the freely dissolved pyrethroids concentration. The commenter expressed concern about the proposed use of only one experimentally-derived-set of coefficients, the only study which met the quality assurance criteria used for selection, to represent all waters. The commenter also brings up concern with the inconsistency that the quality assurance criteria used to select only one set of coefficients for ambient waters could not be used for the selection of coefficients for POTWs. Additionally the commenter questions the use of laboratory-based literature coefficient values to calculate the freely dissolved pyrethroids concentration of field samples without validation.]

RESPONSE: See response to General Comment No. 1. Though the proposed default partition coefficients were not derived using site specific materials from the Central Valley, they are the best available values at this time, and their use was supported by the external peer reviewers. The use of these partition values will provide the most accurate representation of the bioavailability of pyrethroids in ambient waters in the

Central Valley region. These values can be revised if additional information becomes available on partition coefficients in Central Valley waters. Further the proposed amendment states that the pyrethroid pesticides numeric triggers represent maximum allowable levels above which additional management actions may be required and additional reductions may be required to protect beneficial uses.

Weston Comment No. 4 (Recommendations):

As I mentioned initially, the challenges in regulating pyrethroids are immense, and I can accept that some compromises may be necessary because of concerns such as enforceability, feasibility of attainment, or cost. But regulatory approaches based upon these kinds of considerations should be identified as such, not defended as scientifically based. My concern is that once Region 5 adopts the approach, other jurisdictions may be quick to do so as well, with the assumption that Region 5's adoption implies a scientific rigor that is not actually there. Nevertheless, if Region 5 elects to pursue the approach currently in the staff report despite consideration of my comments and others that may be received, I recommend the following:

1) The use of default Koc and Kdoc values in a wide variety of water types should receive immediate validation. I do NOT mean compilation and review of the data that dischargers will be gathering as part of their obligations under the TMDL, but a special study to be done in the first couple years after adoption of the TMDL. This study should attempt direct measurement of Koc and Kdoc in a wide variety of field samples so as to determine whether the proposed laboratory-derived default values have any real world validity, establish the variability of these parameters among samples, determine if perhaps use of a few default values could be more defensible [e.g., each applied to only a specified range of suspended sediment or dissolved organic carbon concentrations], and assess their value in predicting toxicity. This study should also evaluate the suitability of using Tenax extractions as an alternative to SPME-based default values. It may be possible for commercial laboratories to actually do Tenax-based analyses on many or most samples, avoiding the need for default values all together, and there is evidence that Tenax provides an estimate of toxicological risk that is at least as good if not better than SPMEs (see for examples: Environ. Toxicol. Chem. 20:706-711 (2001); Environ. Sci. Technol. 41:5672-5678 (2007); Environ. Toxicol. Chem. 27:2124-2130 (2008); J. Environ. Monit. 13:792-800 (2011); Environ. Poll. 173:47-51 (2013). Disclosure: I am a co-author on two of these studies.)

RESPONSE: The proposed amendment is not precedential for other jurisdictions. See response to General Comment No. 1. Accounting for bioavailability of pyrethroids in environmental samples will result in a more accurate predication of potential toxicity to aquatic organisms in aquatic ecosystems. This is a reasonable approach that protects aquatic life, while accounting for environmental characteristics and reducing the likelihood that samples that would not cause harm to aquatic organisms would be determined to exceed the pyrethroid concentration goals.

The technical basis of the proposed bioavailability approach, including the use of the proposed partition coefficient was supported by the independent scientific peer reviewers. Also, as new information becomes available, these values may be refined to reflect the newest scientific information. In addition, the proposed amendment includes toxicity testing. This testing will provide additional information to evaluate the effectiveness of the program. If the pyrethroid triggers based on the freely dissolved concentrations do not appear to correspond with toxicity test results in the monitoring data collected, then the partition coefficients will be re-evaluated and a study such as the one described by the commenter may be undertaken. This type of study could be

conducted as a coordinated, representative study by multiple regulated entities. The Central Valley Water Board will be updated on data collected and progress on implementation at least every 3 years following adoption of the Basin Plan Amendment and the Central Valley Water Board could require such a study at any time.

Weston Comment No. 5 (Recommendations):

2) I would suggest that sampling done both during the initial baseline data collection period under the TMDL, and then to determine compliance for at least the following few years, ALWAYS includes toxicity testing with *Hyalella azteca*. Given the enormous uncertainties behind the "freely dissolved only" approach being recommended, and the fact that the trigger levels being proposed are nearly the same as the species' LC50s, it is unlikely that compliance with numerical triggers will actually be protective of this species. It is toxicity to this species that led to the current 303(d) listings for pyrethroids, and if the proposed approach does not protect this species, then how can the TMDL ever be expected to eventually lead to de-listing? In addition, *Hyalella azteca* is a species commonly used to measure toxicity in most toxicity laboratories in Region 5, it is a resident species found throughout Region 5 and all of California, and it is often found in such high abundance as to be the dominant macroinvertebrate. Toxicity to it cannot be lightly dismissed, so it is essential to establish if the proposed triggers are protective.

I should also add that many commercial laboratories only report mortality, yet by their very nature, pyrethroids are neurotoxins that cause paralysis prior to death. When an actively swimming animal is unable to do anything more than lay on the bottom twitching, most reasonable people would consider that an adverse effect that bears noting. Yet because paralysis is not a standardized endpoint nor is it in the interest of dischargers to document it, many testing laboratories have turned a blind eye to immobility, not reporting it and treating it as if there is no effect at all. Paralysis may be a more subjective endpoint to quantify than death because there can be a gradation in severity, but it is no less environmentally relevant so I would encourage an effort to standardize and report a paralysis endpoint among laboratories.

RESPONSE: Toxicity testing with *Hyalella azteca* will be required under the proposed monitoring and surveillance provisions. There is some flexibility as to whether toxicity tests will be conducted for every sampling event, but the expectation is that particularly in the baseline monitoring in the first years of the program, some amount of simultaneous chemistry and toxicity monitoring will be conducted in all monitoring programs.

Staff will work with the Environmental Laboratory Accreditation Program (ELAP) in order to explore the possibility of standardizing a paralysis endpoint.

Weston Comment No. 6 (Recommendations):

3) During Board hearings, staff presented graphs using 108 samples from my prior studies, showing those toxic samples that would have been flagged as exceedances based on their proposed criteria, and those samples that would have been in compliance but were toxic nonetheless. Staff repeatedly insisted that they could not use this kind of analysis to set the criteria, arguing that a toxic sample that was in compliance for pyrethroids, may simply have been toxic due to some other unknown substance. While I personally doubt whether other substances were playing a significant role in toxicity within this data set I cannot prove that. However, if staff considers data of this type to be unsuitable to set the criteria, as they asserted repeatedly, then it would seem comparable data collected in the coming years would be equally unsuitable to evaluate the criteria. The uncertainty of toxicity due to unknown substances would

still remain. Staff have proposed a phased approach, in which the early years of the TMDL will be used to review the data that are collected to see how well the exceedance threshold identifies the samples found to be toxic. But their past arguments seem to already discount this type of data, since if they argue such data cannot be used to set criteria, then they cannot be used to evaluate them either. Greater consideration to how the appropriateness of the proposed trigger values will be evaluated is needed, since staff seem to have already dismissed the only approach possible with the data being gathered.

RESPONSE: The basis to determine levels of pyrethroids that would provide reasonable protection of beneficial uses did not rely on the data set of environmental samples referred to in this comment. More appropriately, studies using controlled laboratory conditions have been relied upon. Toxicity testing, in combination with robust chemical analysis, and toxicity identification evaluations (TIEs) and information about other potential stressors are environmental lines of evidence that will be considered during the first phase of the project to evaluate baseline conditions, trends to determine whether the project is moving forward to meet established goals, and whether listed waterbodies are progressing towards de-listing.

The purpose of toxicity and chemistry monitoring is not to evaluate, or “test,” the protectiveness of the criteria. Based on best available science, the criteria are reasonably protective of beneficial uses (see response to General Comment No. 3). Nevertheless, the toxicity monitoring will provide a backstop that will trigger follow-up action where needed based on toxicity results. For example, if toxicity results indicate toxicity in an environmental sample, an evaluation is conducted to try and determine the cause of toxicity (TIE). Should TIE results indicate that pyrethroids are the cause, and the levels of concern do not correspond with the freely dissolved chemistry data, then adjustments to the pyrethroid triggers or partition coefficients or another aspect of the control program can be considered by the Central Valley Water Board.

Weston Comment No. 7 (Recommendations):

4) Greater clarity is needed in the staff report on when an acute criterion (1-hr average concentration), versus a chronic criterion (4-day average concentration), is to be used. In nearly all instances, it is likely that the discharger will have taken only a single grab sample, so an "averaging period" becomes a moot point. The staff report is silent on whether a single grab sample should be viewed as an acute exposure or if it can be assured to be representative of exposure that lasted many days. Assumption of chronic exposure, that perhaps may be appropriate with a POTW effluent, becomes less clear in, for example, agricultural irrigation runoff. Of particular concern is the last sentence of Appendix B, which explicitly places stormwater runoff within the acute category. My work both in the American River and in Cache Slough has shown elevated pyrethroid concentrations and/or toxicity persisting in these waterbodies for 5 days after a storm, and would certainly best be considered as chronic exposure. In winters such as we have just had, back-to-back rainy periods, and the associated pyrethroid inputs via runoff, can extend over many weeks. I suggest modifying the Appendix B sentence noted, and also providing explicit guidance elsewhere in the staff report.

RESPONSE: Generally, samples will be compared to the acute or chronic concentration goal based on the event in which they are collected. There are a number of factors that must be considered in this type of analysis (sample collection parameters, weather conditions, stream flow, etc.). Flexibility to consider such factors must be allowed to ensure selection of the most appropriate comparison for compliance consideration. Samples representing long-term average conditions are typically compared to the

chronic concentration goal and samples representing transient, or short-term, conditions may be compared to the acute concentration goal. Greater clarity has been added to section 8 of the staff report to clarify when comparison to acute or chronic concentration goal would be appropriate.

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT COMMENTS

Comments were received from Ms. Linda Dorn, Environmental Program Manager, Sacramento Regional County Sanitation District on 24 March 2017.

Sacramento Regional County Sanitation District Comment No. 1: Regional San generally supports the language that specifies that the numeric trigger concentrations will not be used as water quality based effluent limitations, or in a reasonable potential analysis. We also agree with Staff that the use of the fifth percentile for establishing the criteria is conservative in protecting beneficial uses.

RESPONSE: Comments acknowledged.

Sacramento Regional County Sanitation District Comment No. 2 (General recommendations): The Regional Board is the responsible entity to establish and approve non-EPA analytical and toxicological methodologies that commercial laboratories can use to ensure comparable data can be produced; wastewater agencies should not be required to develop methods.

RESPONSE: Wastewater agencies or other dischargers are not required to develop analytical or toxicological methods under the proposed amendment. The proposed amendment would require that the methods proposed to be used for monitoring are sent to the Executive Officer for approval because most of the methods are modified EPA methods and the Central Valley Water Board wants to ensure that the results will be comparable and reproducible, if they are not already approved by the Environmental Laboratory Accreditation Program (ELAP). Also see response to General Comment No. 4.

Sacramento Regional County Sanitation District Comment No. 3 (General recommendations): The calculation to determine whether numeric triggers are exceeded should be based on ambient water quality data, not effluent data;

RESPONSE: See response to General Comment No. 2.

Sacramento Regional County Sanitation District Comment No. 4 (General recommendations): It is not appropriate to assume wastewater discharges can control pesticide use or that they can be held accountable for determining future impacts from unknown future pesticides;

RESPONSE: The draft staff report makes it clear that wastewater dischargers do not have the authority to control pesticide use; that authority lies with the USEPA and the California Department of Pesticide Regulation. However, under the California Water Code, dischargers nonetheless are legally responsible for the water quality impacts from their discharges. The monitoring provision for replacement pesticides is intended to make it clear to dischargers that the Central Valley Water Board will be tracking potential impacts from replacement products and that such monitoring may be required.

Sacramento Regional County Sanitation District Comment No. 5 (General recommendations): There needs to be flexibility included in the BPA to allow dischargers the ability to work jointly with other agencies in submitting one management plan, thereby avoiding costly duplication.

RESPONSE: The proposed amendment does not prevent dischargers from working with other agencies and submitting joint management plans. Further language has been added to the proposed amendment to clarify that joint management plans could be submitted as long as they clearly identify the management practices or actions for which each individual discharger is responsible.

Sacramento Regional County Sanitation District Comment No. 6: Many of the individual pyrethroid concentrations are measured at, or are below, the available analytical method detection levels. We appreciate the incorporation into the BPA that bioavailable pyrethroid concentrations below the reporting limit of a reliable commercial laboratory will not be used in calculating the numeric trigger. However, with respect to what constitutes reliable commercial methods, this should be defined as methods that are generally available at multiple laboratories, with results being reproducible and comparable amongst laboratories. With respect to what constitutes reliable commercial methods for the future, multiple labs need to be able to provide reproducible data before the Executive Officer would approve a method. This also applies to the *Hyaella* toxicity monitoring required in Chapter V. Surveillance and Monitoring program. Before a method is approved by the Executive Officer and used for compliance with this BPA, further method validation needs to be done, including evaluating inter-laboratory and species variability among laboratories performing *Hyaella* toxicity testing. We recommend that monitoring not start until reliable methods are established.

RESPONSE: See response to General Comment No. 4 regarding reliable chemistry methods.

There is an ELAP-certified method for water-only *Hyaella azteca* toxicity testing, standard test conditions as defined by the Surface Water Ambient Monitoring Program (SWAMP 2008), and guidance from a recent laboratory inter-calibration study coordinated by the Southern California Coastal Water Research Project (Schiff and Greenstein 2016). While additional studies on this method may be useful, the method has been validated to a level that it may be used for monitoring for the pyrethroids control program and therefore significantly delaying the monitoring that is critical to the proposed control program is not warranted at this time.

Sacramento Regional County Sanitation District Comment No. 7: The proposed BPA language requires effluent monitoring, which we believe is inappropriate. The numeric triggers are related to potential impacts to beneficial uses in receiving waters, not at end of pipe. Therefore, the calculation of whether numeric triggers are exceeded should be based on ambient water quality data, not effluent. This is especially important for wastewater treatment plants that have mixing zones and/or dilution, such as Regional San. We request that the BPA language be changed to reflect ambient conditions, similar to the approach that is being proposed for irrigated agriculture and storm water discharges.

RESPONSE: See response to General Comment No. 2.

Sacramento Regional County Sanitation District Comment No. 8: The Draft Staff Report in some places, and the BPA language, indicates that the Regional Water Board will work with dischargers, California Department of Pesticide Regulation (DPR), and USEPA Office of

Pesticide Programs (OPP) for determining if replacement products require monitoring and mitigation. The Draft Staff report indicates in the CEQA analysis that management plans must identify a set of management practices that taken as a whole, are reasonably expected to mitigate the potential for replacement insecticide products to cause additional water quality impairments. The CEQA analysis also states that potential impacts to hydrology and water quality are expected to be less than significant because the amendment requires **dischargers** to determine whether alternatives to pyrethroid pesticides are being discharged at concentrations that have the potential to cause or contribute to exceedances of applicable water quality objectives.

Language in the Draft Staff Report should be consistently clear that the Regional Board, DPR, OPP, and dischargers are working together for understanding potential impacts from replacement products, as dischargers have no control over the use of pesticides.

RESPONSE: The CEQA analysis for hydrology and water quality has been revised to state that “...dischargers, in cooperation with the Regional Water Board, USEPA and DPR, to determine...” in order to be consistent with the provision in the proposed Basin Plan amendment.

Sacramento Regional County Sanitation District Comment No. 9: Flexibility is also needed to allow wastewater dischargers to work jointly with other agencies in developing a joint management plan and implementing the identified management practices. For example, if a County’s storm water program is conducting education and outreach to the public, the wastewater agency for that County should be able to work collectively, thus, avoiding duplicative programs. The language allows for implementation of management practices in such a fashion, but there should be sufficient flexibility for agencies to submit one management plan.

RESPONSE: There is an advantage in collective approaches, such as between wastewater and storm water agencies. The proposed Basin Plan amendment does not prevent dischargers from working with other agencies and submitting joint management plans. Joint management plans may be submitted as long as they meet the requirements for all of the dischargers using the plan and are submitted to all relevant Central Valley Water Board programs. The following language has been added to the proposed Basin Plan amendment to make this point clear:

“Multiple dischargers that are subject to the above requirements may elect to develop and submit a joint pyrethroid management plan. Such a joint pyrethroid management plan must clearly identify the management practices or actions for which each individual discharger is responsible.”

Sacramento Regional County Sanitation District Comment No. 10:

Pyrethroid Pesticide Discharges (pages xli and xliii) – *“With the assistance of the Regional Water Board and DPR, determine if monitoring and reporting for alternatives to pyrethroid pesticides is necessary and identify alternatives for which monitoring might be appropriate with consideration of the commercial availability of acceptable analytical methods. If an alternative pesticide is identified as appropriate for monitoring, monitoring shall be performed by the discharger to determine whether alternatives to pyrethroid pesticides are being discharged at concentrations with the potential to cause or contribute to exceedances of applicable water quality objective.”*

Determining if any pesticide poses a potential to cause beneficial use impairment is a current duty performed by the Regional Water Board and other agencies. It is inconsistent with text in

the draft staff report (e.g., Section 8; pages 138 and 142) to state, as it seems to state in the Draft BPA, that dischargers would determine the need for monitoring and reporting alternative pesticides, with assistance from the Regional Water Board and DPR. It is not clear why the Regional Water Board would decentralize this duty to individual dischargers without the required expertise. Please clarify this text, since it wouldn't be appropriate for dischargers to have this responsibility. If the intended meaning was to say that the Regional Water Board and DPR would work *with* dischargers to make these determinations, which would be consistent with the draft staff report text (e.g., Section 8; pages 138 and 142), then it would be helpful to clarify why this BPA language is needed for Regional Water Board authority to require additional monitoring, and what process would be followed, if different from existing regulatory processes, to determine if an action is needed. It otherwise doesn't seem necessary to state the authority already held by the Regional Water Board to require additional monitoring by discharges, when justified. These monitoring requirements can be imposed through NPDES permit revisions, monitoring requests, or in accordance with Water Code Section 13267. Please also clarify what involvement dischargers would have in the development or review of data and decisions, if different from the current regulatory process. The draft staff report should be further revised to include USPEA as a partner in these efforts (also see Sections 8.1, 8.2, 8.3).

RESPONSE: Determining the overall potential impacts of pesticide discharges to water quality is the responsibility of the Boards and DPR. However, requiring dischargers to characterize their discharge is both appropriate and necessary to determine if these replacement products are impacting water quality, and is consistent with the Board's legal responsibilities and regulatory authorities.

Generally, the process would likely involve the Central Valley Water Board, DPR, USEPA and dischargers collectively performing a preliminary assessment of which alternative pesticides could be of concern in NPDES discharges based on readily available information about their uses and environmental policies, followed by the development of any needed specific pesticide monitoring requirements based on that preliminary assessment through the NPDES permitting process. The text of the staff report and proposed amendment has been modified to include USEPA in these efforts.

Sacramento Regional County Sanitation District Comment No. 11:

Conditional Prohibition Implementation Components (page xxxiv) – It is helpful that the draft staff report recognizes “...*POTWs have little control over pyrethroid levels in their influent...*” (e.g., Section 7.3; page 128), “...*do not have control over the use of pesticides by individuals in their service area...*” (page 37), and that there is no practical technology for removing pyrethroids. It should also be noted that more than 90% of pyrethroid loads are currently removed by wastewater treatment prior to discharge (Markle et al., 2014; Weston 2013a). However, it is not clear, given these limitations, how a discharger can comply with the Draft BPA language to develop a Pesticide Plan to identify “...*a set of management practices that, taken as a whole, may be reasonably expected to effectively reduce pyrethroid levels in their discharges, and to mitigate the potential for replacement insecticide products to cause additional water quality impairments,*” when also stating that it is “...*unclear if implementing the identified management practices will lead to attainment of the potential pyrethroid concentration goals...*” (Section 5.6; page 105). Please revise the Draft BPA to indicate that dischargers will take *reasonable* steps to implement a management plan, as described in the draft staff report, but they may not be able to reasonably expect to effectively reduce pyrethroid levels in discharges or have any impact on replacement insecticides (or pesticides) for which it is not known if they pose a potential for beneficial use impairment. In fact, it is not clear what additional steps municipal dischargers need to do when current activities may already be

addressing the issues as best as possible given that “*Considerable pro-active engagement by the Board and discharger community with DPR and USEPA OPP has occurred and is ongoing to address pyrethroid water quality concerns.*” (page 37).

RESPONSE: The proposed amendment and staff report identify a number of practices that can be utilized to develop a management plan that may be reasonably expected to effectively reduce pyrethroid levels. These include education and outreach activities to the public, pollution prevention activities to reduce the permittee’s use of pyrethroids through the use of integrated pest management, and support of pollution prevention through the pesticide regulatory process. These can lead to reductions in pesticide uses that are likely to impact water quality. While considerable progress has been made by some dischargers, additional reductions will be likely if all dischargers are engaged in efforts to reduce pyrethroid concentrations.

Sacramento Regional County Sanitation District Comment No. 12:

Pyrethroid Pesticide Discharges (page xxxix) – “*If reliable commercial analytical methods are available with reporting limits at or below the pyrethroid pesticides numeric trigger concentrations in the matrix being monitored, those methods shall be considered by dischargers for monitoring of pyrethroid pesticides.*” The draft staff report recognizes that analytical methods that are 40 CFR part 136-approved are not currently sufficient to detect pyrethroids at concentrations below the proposed goals or 2015 criteria. Therefore, the Regional Water Board will need to approve discharger-specific sampling and analysis plans, each with its own rationale and supporting documentation justifying the analytical lab/method selection and validation. Resulting data may not be helpful in understanding regional trends or the potential for exceedances of the draft goals if most reported concentrations are below detection or qualified. Also note that treated wastewater can have matrix interferences that increase MDLs/RLs higher than in ambient surface water so effluent data may differ in detection limits from surface waters. It would be helpful if the Regional Water Board would provide further guidance on the supporting data, decision criteria, and method validation criteria they would find acceptable for a pyrethroid monitoring program to provide reproducible and reliable data that can be used for compliance with the BPA and be comparable among dischargers using different labs and using different analytical methods.

RESPONSE: See response to General Comment No. 4.

Sacramento Regional County Sanitation District Comment No. 13: It is concerning that some of the most important data referenced in this Draft BPA (i.e., those with the lowest LC50 results for *H. azteca* by an order of magnitude) was based on a single study that is not publically available. Bradley et al. (2013 a,b,c,d,e,f) toxicity reports are not available to the public and it is not clear what methods were used. These acute toxicity studies reported that *H. azteca* were an order of magnitude more sensitive than other chronic studies and the type of water was used, control performance, reference toxicity test results or other test validation data, and detailed results are not available. It hinders transparency for the Regional Water Board to rely on data that are not freely available to the public and, when used in the UC Davis Criteria derivation method, these outliers have a heavy weight on pyrethroid WQC and goals.

RESPONSE: The Bradley studies are publicly available by request from the Central Valley Water Board or California Department of Pesticide Regulation per the California Public Records Act or by request from USEPA per the Freedom of Information Act. These studies are not confidential, but are not to be distributed to multinational entities,

and therefore cannot be posted publicly. The test conditions are summarized in detail in the appendices of the UC Davis criteria reports for six pyrethroids.

Sacramento Regional County Sanitation District Comment No. 14: It is helpful that the draft staff report describes factors considered when developing pyrethroid concentration goals (Section 5.2). Some of the factors increase the environmental relevance of the criteria (e.g., additive toxicity and bioavailability), others are unknowns or less conservative (e.g., potential interactions with other toxicants or temperature), but many are conservative (e.g., dilution, averaging period, application of Assessment Factors/Uncertainty Factors in criteria derivation when data are unavailable). Additionally, unrealistically low values often cannot be met and hinder regulation. We reiterate these conservative, realistic, and less conservative factors to demonstrate that the water quality goals are not only protective, but may be overprotective, due to the multiple conservative factors that are compounded in the WQC derivation and use of goals.

- Conservative
 - Assessment Factors (AFs) – AFs were used when data were insufficient for development of the water quality goals in the individual water quality criteria derivation reports for the six pyrethroids.
 - Exposure Duration/Timing – Data considered in this draft BPA include test organisms exposed to storm water samples for longer than occurs in the environment (i.e., four days). This overestimates toxicity because longer exposures typically result in greater toxicity and organisms in ambient waters are not exposed to first-flush conditions for such long periods.
 - Dilution – The Draft BPA proposes that the water quality goals be compared to pyrethroid concentrations in effluent from POTWs (i.e., the point of discharge). This fails to account for dilution of discharges in receiving waters; and is considered an “*additional margin of safety*” in the Draft BPA (page xviii; Section 5.6.7.2, pages 107-108).
- Realistic
 - Bioavailability adjustment – The freely dissolved pyrethroid concentrations would be measured or estimated to reflect the bioavailable fraction (Section 5.2.2, pages 57-64). This is realistic and reduces uncertainty.
 - Additive toxicity – Because pyrethroids have a similar mode of action, the Draft BPA recommends summing the water quality goal-normalized quotients (Section 5.2.1, pages 54-57). This is generally appropriate, but using water quality criteria or goals that are themselves conservative to normalize concentrations, results in a conservative assessment where exceeding the trigger (summed pyrethroid quotients > 1) does not indicate a potential for adverse effects.
- Not Conservative
 - Interactions with other chemicals/pesticides – Additive or synergistic effects with other chemicals or pesticides with pyrethroids may occur, but are not included in the water quality goal derivation due to a lack of data (page xv; Section 5.2.1, page 57). This may underestimate toxicity.
 - Temperature affects pyrethroid toxicity where greater toxicity are observed at lower temperatures (Section 5.2.3, pages 64-65). The use of toxicity data at warmer temperatures than are often observed in the Delta may underestimate toxicity.

RESPONSE: Comment acknowledged.

Sacramento Regional County Sanitation District Comment No. 15: Throughout the Draft BPA, there are inconsistent references to the water quality ‘goals’. These ‘are referred to as water quality “goals” (page 40, 98, 156) or pyrethroid concentration goals (page xii), “targets” (page 38, 40), “criteria” (page xii, page 71 – UCD WQC), “triggers” (page xii), and “objectives” (page xii, xxi), with some of these terms seemingly used interchangeably (e.g., pages xixii). This causes confusion and ambiguity, particularly related to how these terms fit into the regulatory context. Please define these terms, identify how each fits into a regulatory context, and confirm that they are being used consistently throughout the document. A glossary may be helpful to provide this clarity.

RESPONSE: A glossary of key terms has been added to the front matter of the staff report. The use of these terms has been reviewed and edited for consistency in the staff report.

Sacramento Regional County Sanitation District Comment No. 16: The draft BPA language and draft staff report are not clear in the requirements and evaluation of toxicity testing with *H. azteca* by Municipal and Domestic Wastewater Dischargers or these monitoring requirements are inconsistent with those of Municipal Storm Water and Agriculture (Executive Summary; pages xl and xli; Section 8.3; page 142; Section 9.3; page 152).

- a. The draft BPA text states that *Hyalella azteca* (10-day) survival will be used to evaluate the Sediment Toxicity Numeric Target (page xxxi). This is the only indication of a method for *Hyalella* toxicity testing in the draft BPA text or draft staff report.
- b. The draft BPA changes to Chapter V, Surveillance and Monitoring seems initially consistent with this sediment toxicity testing approach by indicating that Municipal Storm Water will “*Provide chemical analysis and Hyalella azteca toxicity test data to determine whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface waters or bed sediments.*” (page xl; restated in the draft staff report Section 8.1; page 137).
- c. Draft BPA changes to Chapter V, Surveillance and Monitoring also describes the need for Agricultural dischargers to monitor “*...whether receiving waters and bed sediments are attaining the narrative water quality objective for toxicity;*” (page xli; restated in the draft staff report Section 8.2; page 139). This seems to indicate that the water quality objective can be broadly evaluated using a sediment toxicity assessment method.
- d. The use of sediment toxicity testing to evaluate the narrative water quality objective for toxicity seems to be confirmed by only considering sediment toxicity testing in the cost analysis for MS4 dischargers (Table 9-1) and for agricultural dischargers (Table 9-2); although, toxicity testing is not considered at all in the cost analysis for Municipal and Domestic Wastewater discharges (Table 9-3).
- e. The draft BPA changes to Chapter V, Surveillance and Monitoring for Municipal and Domestic Wastewater is also inconsistent in its monitoring requirement for “*...chemical analysis and Hyalella azteca toxicity test data to determine whether municipal or domestic wastewater discharges of pyrethroids are causing or contributing to exceedances of the narrative water quality objective for toxicity in receiving waters;*” (page xlii; restated in the draft staff report Section 8.3; page 142). Unlike MS4 and agricultural discharge monitoring, “sediment” is not stated in this description of Municipal and Domestic Wastewater monitoring so it is not clear if the same approach is intended.

For clarify and consistency, please state that the *Hyalella azteca* (10-day) survival sediment toxicity test will be used for monitoring by Municipal and Domestic Wastewater dischargers and consistently state that this approach will be for all discharges to “*...determine whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for*

toxicity in surface waters or bed sediments.” Please also update the cost analysis for Municipal and Domestic Wastewater dischargers to clarify this inconsistency.

Please clearly indicate the USEPA (2000) method (or most recent version thereof) will be used for sediment toxicity testing with *H. azteca* (Executive Summary, page xxxi). If any other toxicity testing method is required then it would need to be described. There are concerns that *H. azteca* water-only toxicity testing methods are not standardized and are not 40 CFR part 136-approved. Therefore, additional public review is requested if this is intended by the draft BPA language.

RESPONSE: Because wastewater effluents will likely have lower sediment loads than municipal storm water or agricultural discharges, receiving water toxicity testing is proposed for wastewater dischargers, rather than sediment toxicity testing; this explanation has also been added to section 8 of the staff report. The cost estimate for municipal and domestic wastewater dischargers has been revised to include the cost of 96-hour water column *Hyalella azteca* toxicity tests (see section 9.3); this cost was inadvertently left out of the cost estimate in the January draft staff report.

A reference to the EPA sediment toxicity testing method (USEPA 2000) has been added to the staff report in section 8.6, as well as a reference to the EPA water toxicity testing method (USEPA 2002). *Hyalella* species are listed as a supplemental species in the EPA-821-R-02-012 method (USEPA 2002), and therefore this test is approved under 40 CFR part 136. In addition, recommendations to follow the SWAMP measurement quality objectives for this test and the guidance on test organisms from the SCCWRP intercalibration study (Schiff & Greenstein 2016) have been added to the staff report. The SCCWRP intercalibration study demonstrated that when test organism age and size are more tightly constrained, the toxicity results across labs are highly comparable.

An additional public review period is not needed because there was sufficient time to review the draft staff report and proposed Basin Plan amendment, which were available for comment for 51 days, which was extended an additional week for a total comment period of 58 days. There was sufficient time provided to provide specific comments regarding the potential inclusion of *H. azteca* water column testing, which is a reasonable interpretation of the monitoring goals of the proposed amendment. Even if that intent was not clear to the commenter, such testing would be a logical outgrowth of the draft proposal.

Sacramento Regional County Sanitation District Comment No. 17: Executive Summary - It would be helpful to present the recommended 'goals' in a table format (as was done in Table 5-11, page 90) in the Executive Summary and in the proposed changes to the BPA. Although the goals are included in the equation definitions (page xxvi) of the changes to the Proposed Basin Plan Amendment for Pyrethroid Pesticides (pages xxii through xlili), these values are not very obvious and the current presentation diminishes the importance of these concentration goals.

RESPONSE: A table of the recommended concentration goals was added to the Executive Summary. A table of the recommended concentration goals was not added to the proposed amendment to ensure that the concentrations goals are only presented in the recommended context of using freely dissolved pyrethroid concentrations and with the additivity formula.

Sacramento Regional County Sanitation District Comment No. 18: Executive Summary (pages xii-xiii) – The Draft BPA consistently identifies the pyrethroid toxicity data used in

development of the water quality goals as median lethal concentrations (LC50s). However, median effect concentrations (EC50) based on an immobilization endpoint make up a portion of the dataset (e.g., Weston and Lydy 2010). It is concerning that at least some of these EC50 data were misrepresented as LC50s in the text as well as at the Board hearing on February 28, 2017. Moreover, validation of the immobilization endpoint is lacking and interlaboratory comparisons with split samples, albeit a limited dataset, has shown a high degree of variability among labs (RPDs up to 200%), even when test organisms (*H. azteca*) come from the same source [the commenter provided a table of split sample toxicity results]. RPDs for the survival endpoint were less than 100 in all 6 tests. Because this is a sublethal effect that is difficult to reliably measure, use of these data to derive the water concentration goals adds uncertainty. The use of these EC50 data are cautioned and should at least be correctly referenced in the text if not rejected.

RESPONSE: The text has been revised to clarify that not all of the toxicity values in the data sets used for criteria derivation are LC50s. Where LC50s are referred to in the staff report, they are referring to values based on the mortality endpoint. All of the acute *Hyalomma azteca* toxicity values used to calculate the UC Davis criteria, which are proposed as the pyrethroid concentration goals, are LC50s. Toxicity values from Weston and Lydy (2010) were not used to derive the UC Davis criteria.

Sacramento Regional County Sanitation District Comment No. 19: Section 5.2 (page 62) – It would be very helpful for the draft staff report to include references when discussing data or sources of information. Text indicating that one study met all the listed criteria for partition coefficients does not include a citation; nor do Tables 5-1 and 5-2 when describing these data.

RESPONSE: Table 5-1 and Table 5-2 list the references in the last column of each table. The citation has also been added to the text of this section of the staff report.

Sacramento Regional County Sanitation District Comment No. 20: Section 5.2 (page 66) – The following text should be reviewed and may need to be edited as shown. “*However, the F3 generations from these populations were still moreless sensitive than populations from undeveloped areas or laboratory cultures by approximately a factor of 5-10.*”

RESPONSE: The suggested correction to the staff report has been made.

Sacramento Regional County Sanitation District Comment No. 21: Section 5.2 (page 67) – It is curious that changes in a gene are stated to be “population-level effects” from contaminants as if this is an adverse change. It would be helpful to also indicate that there is no evidence in the referenced documents (Weston et al. 2013b and Clark et al. 2015) indicating that wild populations are currently experiencing adverse effects (i.e., reduced number of organisms, growth, or fecundity) due to the development of pyrethroid resistance. The population may have been impacted at one time if pyrethroids or other contaminants caused organism mortality that reduced the population. However, a change in the genetic makeup of a population should not be considered an ongoing beneficial use impairment if the population is now healthy. This is no more of an impairment than is prey selection causing genetic change that favors faster moving organisms to avoid being eaten. It would further be helpful for the Regional Board to reiterate that they are not advocating protection of genes by referencing these statements and that only survival, growth, and reproduction toxicity endpoints, or effects directly linked to these (as indicated in Section 5.2.5, pages 67-68 and page xvi), are considered in criteria derivation and beneficial use impairment determinations.

RESPONSE: The use of the term “population-level effects” does not indicate if the effect is adverse. Language has been added to the staff report to state that there is not information about potential adverse effects of these genetic changes. However, as discussed in the staff report, there is potential for detrimental effects due to genetic changes due to artificial factors.

Sacramento Regional County Sanitation District Comment No. 22: Section 5.2 (page 67) Aquatic Species Sensitivity – *We suggest the following text edit: “Cole et al. (2016) reported reproductive effects on longfin smelt, which reside in the Delta, at 0.5 ng/L bifenthrin, which is equal to the lowest H. azteca LC50 for bifenthrin.”*

RESPONSE: The proposed change to the staff report is accurate and has been made.

Sacramento Regional County Sanitation District Comment No. 23: Section 5.3 (page 70) - Please include the lowest Species Mean Acute Values (SMAVs) used to develop acute criteria in Table 5-4 and/or elsewhere when available criteria are compared to effect concentrations. These data represent the average effect concentrations for the most sensitive species with toxicity data and are more relevant than the lowest LC50/EC50 data which exists, and may represent outliers. The current lowest LC50 data from Bradley (2013) are an order of magnitude below the EC50s for *H. azteca* developed by others (e.g., Weston and Lydy 2010) and so the SMAVs are a statistically relevant basis for comparing how appropriateness of available criteria and guidelines for use as proposed ‘goals’.

RESPONSE: The LC50 data from the Bradley studies represent the species mean acute values for *Hyalella azteca* that were used for criteria derivation, and they are shown in Table 2-2. A link to Table 2-2 has been added to section 5.3. The UC Davis method prioritizes data from flow-through tests in which concentrations were measured to ensure the highest quality data are used for criteria derivation, and the values from the Bradley studies were the only ones that were both flow-through tests and measured the test concentrations. There is no indication that the LC50 data from the Bradley studies are outliers because they are very high quality studies that followed good laboratory practices, as documented in the UC Davis criteria reports.

Sacramento Regional County Sanitation District Comment No. 24: Section 5.3.1 (page 72) – *We suggest the following text edit: “The UC Davis methodology has the ability to handle data sets that do not meet the eight taxa requirements of the USEPA method (USEPA 1985) and can use as few as one datum.”*

RESPONSE: The suggested revision was made in the staff report.

Sacramento Regional County Sanitation District Comment No. 25: Section 5.3 (page 81) – The concentration units indicated in Table 5-6 are inconsistent with other tables presenting these data. We suggest changing the units from µg/L to ng/L to be consistent with the source documents.

RESPONSE: The units in Table 5-6 have been corrected to state that the values are in ng/L; this table was incorrectly labeled as µg/L.

Sacramento Regional County Sanitation District Comment No. 26: Section 6 Addressing Impaired Waters (page 115) – The page header in this section indicates that this is *Appendix A Evaluation of Potential Pyrethroid Concentration Goals*. Please correct this to reflect the correct section.

RESPONSE: The header for this section has been corrected in the staff report.

Sacramento Regional County Sanitation District Comment No. 27: Section 8.1 (page 137) – Please clarify how toxicity testing with *H. azteca* in sediment (Section 6.1.1.2, page 117; and Section 9.2, page 151) will evaluate if “... *pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface water or bed sediments.*” when sediment toxicity tests only evaluate sediment toxicity and not toxicity from the water column. If water column toxicity testing is not required, then this should be stated clearly in the text whenever surface water and sediment toxicity evaluation is discussed. Also, note that toxicity in a sediment test does not implicate pyrethroids as the cause without sediment concentrations exceeding known effect levels (i.e., LC50s and not benchmarks or criteria) or the use of toxicity identification evaluation methods.

RESPONSE: The staff report and proposed amendment have been modified to clearly state that toxicity testing in both bed sediments and water column would be the means to meet this monitoring goal for municipal storm water and agricultural dischargers. For municipal and domestic wastewater dischargers, the monitoring goal only refers to receiving waters and would require receiving water toxicity testing. It is true that toxicity testing by itself would not implicate pyrethroids without concentration data and/or toxicity identification evaluations and this has been noted in the staff report.

Sacramento Regional County Sanitation District Comment No. 28: Section 8.4 (page 143) – The draft staff report discussion of reporting limits indicates that the method detection limit (MDL) for cypermethrin is 0.066 ng/L using EPA1699 and that this is above the “*proposed acute criterion*”. While the acute criterion (0.04 ng/L) in Fojut et al. (2015) is lower than this MDL, the method would adequately measure concentrations below the proposed acute and chronic cypermethrin ‘goals’ of 1 and 0.3 ng/L. Please clarify in this discussion if the purpose of monitoring would be to meet the acute ‘criteria’ or the ‘goals’ / ‘numeric triggers’ or LC50s that represent effect levels.

RESPONSE: This section has been updated to use the term concentration goal instead of criterion.

CALIFORNIA ASSOCIATION OF SANITATION AGENCIES COMMENTS

Comments were received from Mr. Greg Kester, Director of Renewable Resource Programs, California Association of Sanitation Agencies (CASA) on 24 March 2017.

California Association of Sanitation Agencies Comment No. 1: CASA reviewed the draft staff report and attended the February 24, 2017 Central Valley Regional Water Quality Control Board (Central Valley Water Board) hearing on the proposed BPA. CASA appreciates the effort made by Central Valley Water Board staff in developing the proposed BPA, their willingness to engage with stakeholders through this process to understand the challenges that are faced by wastewater agencies in regulating pyrethroids, and identify potential solutions that may help mitigate those concerns and impacts on wastewater agencies.

RESPONSE: Comments acknowledged.

California Association of Sanitation Agencies Comment No. 2: In general, CASA is supportive of the proposed implementation approach for the BPA that allows for two years to collect additional information and data so that several outstanding questions related to

pyrethroid pesticides, their prevalence, fate, and impact on the receiving waters may be answered. As discussed in prior comment letters and during various workshops, CASA believes that the water quality criteria for the pyrethroid pesticides developed by the University of California, Davis may be overly stringent because multiple conservative assumptions were made and safety factors were included where there were insufficient data available to meet the minimum requirements of the methodology used to develop the proposed water quality criteria. It is critical that future water quality objectives are scientifically- and technically based because they can have significant impacts on wastewater agencies. These impacts can include mandatory minimum penalties and other legal actions for compounds that wastewater agencies have limited ability to control, such as the use of pyrethroid pesticides from private users, and to treat or remove these compounds from wastewater.

RESPONSE: The phased implementation program was developed in part to ensure that wastewater dischargers do not face unintended regulatory consequences, such as mandatory minimum penalties for pyrethroids exceedances, until more information is known about treatment feasibility and the potential costs of compliance if water quality objectives were adopted.

California Association of Sanitation Agencies Comment No. 3: During the Central Valley Water Board hearing on February 24, 2017, staff outlined the schedule for implementing the proposed BPA including a review of the proposed BPA in Year 15, or potentially earlier if necessary. This review is intended to evaluate and consider new data collected during this implementation period and determine if the proposed water quality triggers are sufficiently protective of aquatic life. Staff indicated that future water quality objectives may be lower than the proposed water quality triggers if future data and information indicate that it is necessary to do so. CASA wants staff to also consider that future water quality objectives may also be higher than the proposed water quality triggers if future data and information indicate that such objectives would still be protective of water quality and aquatic life. As more information and data are developed to better understand the science, it is expected that the conservative assumptions and safety factors would be reduced.

RESPONSE: It is true that future water quality objectives may be either lower or higher than the proposed pyrethroids concentration goals and that additional information and data will determine if changing the concentration goals is necessary.

California Association of Sanitation Agencies Comment No. 4: CASA understands the increasingly complex challenges that we all face in protecting public and environmental health while providing reasonable protection of beneficial uses. CASA is committed to collaboratively working with its members, regulatory agencies, and other stakeholders in achieving these goals with technically- and scientifically-sound standards and policies. As new chemicals emerge, the science behind the effects of these chemicals on the environment is sometimes not fully understood. That said, the need exists to use consistent and reliable methods and adequate scientific information in the process of establishing enforceable water quality standards in accordance with the requirements of the California Water Code.

RESPONSE: See response to General Comment No 4 in regards to the need to use consistent and reliable methods. Collaboration of CASA with the regulatory agencies and other stakeholders on potential effects of chemicals can provide critical help in protecting public health and the environment. A phased approach for potentially adopting water quality objectives for pyrethroids is being proposed because the Central

Valley Water Board wants to ensure that adequate scientific information is available to determine the feasibility and costs of adopting water quality objectives.

PORT OF STOCKTON & ROSEVILLE WASTEWATER UTILITY COMMENTS

Comments were received from Mr. Michael D. Bryan, Ph.D., Partner/Principal Scientist, Robertson-Bryan, Inc. on behalf of the Port of Stockton and the City of Roseville's Wastewater Utility on 24 March 2017.

Port of Stockton & Roseville Wastewater Utility Comment No. 1 (5th Percentile of Species Sensitivity Distribution (SSD) for setting Triggers):

We agree with the recommendation to utilize the 5th percentile U.C. Davis pyrethroid criteria to establish the acute and chronic prohibition triggers. Two of the three peer reviewers on the Regional Board external scientific peer review panel indicated they favored use of the 5th percentile over use of the 1st percentile for the reasons they stated. Porter-Cologne requires "reasonable protection of beneficial uses." The question, from both a technical and a policy perspective, becomes whether use of the 5th percentile provides reasonable protection of beneficial uses in the receiving waters. Two out of three peer reviewers indicated that they believe that the 5th percentile would provide reasonable protection of beneficial uses. U.S. EPA policy is not to protect all species at all times/places, but rather to protect most of the species most of the time/places.

[The commenter provided example calculations using pyrethroid chemistry and *Hyalella azteca* toxicity data (using the lethality endpoint) to illustrate that the 5th percentile was adequately protective. The commenter also noted concerns about the non-lethal "immobility" toxicity endpoints and non-standard protocols used to produce the historical toxicity data discussed in the staff report, and noted differences in results of toxicity testing from different laboratories.]

These results highlight the limited utility of a dataset that is generated by only one laboratory using a non-standardized toxicity test protocol. Given these limitations, *H. azteca* toxicity test results provided in the staff report do not provide a sufficient basis for selecting triggers based on criteria values lower than the 5th percentile U.C. Davis pyrethroid criteria.

RESPONSE: Comments acknowledged. Also see response to General Comment No. 4 regarding laboratory methods.

Port of Stockton & Roseville Wastewater Utility Comment No. 2 (Apply Conditional Prohibition and Total Maximum Daily Load (TMDL) Waste Load Allocations (WLAs) to Limit Pyrethroid Discharges that Cause or Contribute to Exceedance of the Triggers in the Receiving Water):

Throughout the staff report pyrethroid triggers are applied as WLAs or as triggers for the Conditional Prohibition to MS4 and wastewater dischargers at the point of discharge, that is, at the "end-of-pipe." The Staff Report does not provide sufficient justification requiring application of WLAs and the conditional prohibition triggers at the point of discharge. In comments we provided at the February 24, 2017 Regional Board public hearing to receive comments on the draft policy, Regional Board Chair Dr. Longley asked if we were requesting a mixing zone to determine compliance with the triggers (as WLAs or as conditional prohibition triggers). To further clarify, we are not requesting a mixing zone as described in Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2005; hereinafter, "State Implementation Plan" or "SIP"), as the SIP allows for a mixing zone for the compliance with receiving water objectives for NPDES permitted dischargers. The conditional

prohibition triggers are not receiving water objectives, so a mixing zone in the sense defined by the SIP is not applicable. Rather, we are requesting that the WLAs and conditional prohibition triggers apply to the receiving water, rather than directly to the outfalls. If regulatory constraints related to the Clean Water Act definition of a WLA will not permit this approach, we request that the Regional Board still consider this approach for compliance with the conditional prohibition. Although granting this request would require consistent changes throughout the Staff Report, the following are two examples where we have provided edits to the draft Basin Plan Amendment text consistent with this request:

p. xxii, Item X, first paragraph.

Beginning [3 years from OAL approval date], discharges of pyrethroid pesticides at concentrations that cause exceed pyrethroid triggers (Table IV-Z) to be exceeded in water bodies with designated or existing WARM and/or COLD beneficial uses are prohibited unless a discharger is implementing a management plan to reduce pyrethroid levels in their discharges.

p. xxxi. Item a. Total Maximum Daily Loads for Pyrethroids in Urban Water Bodies

The loading capacity for each water body segment listed in Table IV-X is equal to the numeric triggers for pyrethroids (Table IV-Z). Wasteload allocations equal to the loading capacity are assigned to all permitted municipal separate storm sewer systems (MS4s) that discharge to Table IV-X water bodies. MS4 permittees assigned WLAs shall be deemed in compliance with the WLAs if the MS4 contribution of pyrethroids to the receiving water is not causing or contributing to exceedances of the receiving water's loading capacity.

We recommend the above changes be made, along with consistent changes throughout the staff report, for the following four reasons.

[The commenter provided information to illustrate following four reasons that the prohibition trigger should apply to exceedances in receiving waters

- 1) Applying the prohibition to exceedances in receiving water is consistent with the goal of providing reasonable protection, and avoiding unintended regulatory consequences.
- 2) Available dilution is available in receiving waters
- 3) Prohibiting the discharges from causing or contributing to exceedance of the triggers in the receiving waters is consistent with the Regional Board's policy related to storm water.
- 4) Agriculture discharges would be allowed to comply with the pyrethroid triggers based on receiving water data, as described throughout the staff report.]

Consistent with this approach [for agricultural dischargers], wastewater and MS4 dischargers should be granted the ability to determine compliance with the triggers based on receiving water data, or the Basin Plan Amendment needs to clearly justify why agriculture dischargers are allowed to comply with the triggers in the receiving water while wastewater and MS4 dischargers are not.

RESPONSE: See response to General Comment No. 2.

The monitoring requirements for municipal storm water dischargers have been revised in the proposed amendment to clarify that the determining whether discharges are exceeding the prohibition triggers shall be through representative receiving water

monitoring, consistent with the region-wide MS4 permit and the approach for agricultural dischargers. Although the proposed conditional prohibition legally would apply to the discharge, the potential for unintended consequences identified by the commenter would be ameliorated by the provisions in the proposed amendment stating that compliance shall be assessed using representative receiving water monitoring. Further, the proposed amendment language has been changed to state that in reviewing the pesticide management plans, the Executive Officer or designee shall consider the potential impact of the pyrethroid discharge and whether the actions proposed are commensurate with the potential impact. Receiving water data such as those described in the comment letter could be used to demonstrate the level of potential impact of the discharge. If a discharge is exceeding the trigger but is shown to have minimal potential to impact receiving waters, such as in the example presented by the commenter where there were no exceedances in the receiving water, a less extensive management plan would be commensurate with the limited potential impact.

Port of Stockton & Roseville Wastewater Utility Comment No. 3 (Partition Coefficients):

We support the approach to allow for compliance with the WLAs and conditional prohibition triggers based on the bioavailable or freely dissolved pyrethroid concentrations. The current set of default partition coefficients used to estimate the bioavailable pyrethroid concentration are based on one study for ambient waters and one study for wastewater effluent. Because this limited data set could be expanded through partition coefficients developed in the future, we recommend that the Basin Plan Amendment language be modified to allow for the use of additional or alternate partition coefficients. Specifically, we recommend the language in Table IV-Z be modified as follows:

Site-specific or alternative study-based partition coefficients approved by the Executive Officer may be used in the above equation. If site-specific or alternative study-based partition coefficients are not available or have not been approved, the following partition coefficients shall be used in the above equation:

RESPONSE: The recommended changes have been made to the proposed Basin Plan amendment language.

Port of Stockton & Roseville Wastewater Utility Comment No. 4 (Analytical Methods for Pyrethroids):

As stated in the staff report (p. xxxix, second paragraph), the Basin Plan Amendment states that a discharger shall consider using “*reliable commercial analytical methods [that] are available with reporting limits at or below the pyrethroid pesticides numeric trigger concentrations in the matrix being monitored.*” Because there are no USEPA approved methods of sufficient analytical sensitivity for the analysis of the six priority pyrethroids in wastewater effluent or other environmental water samples, we recommend that, at a minimum, a “reliable” analytical method be considered one in which the analytical sensitivity (detection limit and reporting limit), as well as the accuracy and precision (as assessed by quality control samples) can be replicated by multiple laboratories. Were an analytical method available at only one commercial laboratory with sufficient sensitivity to quantify pyrethroids below the numeric trigger concentrations, a second commercial laboratory could not be used to verify the results. Dischargers should not be expected to utilize the most sensitive analytical method when a second laboratory is not available to provide quality assurance/quality control via split pyrethroid testing to verify the pyrethroid concentration in a sample. Granting this definition of a “reliable analytical method” could also reduce analytical costs by increasing the competition among analytical laboratories.

RESPONSE: See response to General Comment No. 4.

Port of Stockton & Roseville Wastewater Utility Comment No. 5 (Specifying Toxicity Monitoring Requirements for Wastewater Dischargers):

The staff report indicates that baseline and trend monitoring for wastewater dischargers would include toxicity testing with *H. azteca* (Staff Report, p. xlii and p. 141), and the specific monitoring requirements for dischargers would be determined in the Monitoring and Reporting Programs of their respective NPDES permits (Staff Report, p. 141). The staff report's requirement to add *H. azteca* toxicity testing provisions to NPDES permits has the potential to have unintended regulatory consequences that should be considered in a more detailed evaluation of the specific policies and guidance documents that have formed the basis for current toxicity-related effluent limitations and compliance activities of NPDES permits.

NPDES permits currently contain a numeric acute toxicity effluent limitation that applies to results of 96-hour bioassays in undiluted effluent. These effluent limitations have been developed consistent with the Regional Board's Toxicity Policy (Basin Plan, p. III-8.01) and other guidance for NPDES Permit writers (USEPA's September 2010 NPDES Permit Writer's Manual; USEPA's February 1994 Guidance for NPDES Permit Issuance). NPDES permits currently require acute toxicity testing with Fathead Minnow or Rainbow Trout to evaluate compliance with the acute toxicity effluent limitation. NPDES permits also contain a narrative chronic toxicity effluent limitation, chronic toxicity testing with 3 separate species, and a numeric chronic toxicity trigger that, if exceeded, results in additional toxicity monitoring and Toxicity Reduction Evaluations (TREs) to determine and control the source of toxicity. These provisions have been incorporated in NPDES permits due to the SIP's toxicity control provisions being incorporated into the Basin Plan by reference.

Unintended regulatory consequences of requiring *H. azteca* in NPDES permits could include receiving violations of the numeric acute toxicity effluent limitation or requirements to conduct costly additional monitoring or TREs when *H. azteca* toxicity is observed. We recommend that the staff report provide additional detail on how *H. azteca* toxicity testing would be incorporated into NPDES permits, greater evaluation of consistency with current Regional Board policies, and an evaluation of potential regulatory consequences (including cost estimates). To avoid potential unintended regulatory consequences, we also recommend that *H. azteca* toxicity testing be required through the use of 13267 orders, so that this toxicity testing is not included in individual NPDES permits.

RESPONSE: The proposed amendment was specifically developed to avoid potential unintended regulatory consequences. The staff report includes both an evaluation confirming consistency of the proposed amendment with current plans and policies and a cost estimate. The proposed amendment and staff report indicate that toxicity testing for wastewater treatment plants would be required for receiving waters only to ensure that discharges are not causing or contributing to toxicity. This requirement would not be a numeric acute toxicity effluent limitation because effluents would not be tested.

Additional information regarding toxicity testing has been added to the draft staff report (section 8.6) to clarify the recommended test methods and the cost estimate for wastewater discharges has been updated to include toxicity testing (section 9.3), which was inadvertently left out of the earlier version of the staff report. The use of 13267 orders instead of permit requirements for *H. azteca* toxicity monitoring requirements is not necessary as the potential for unintended regulatory consequences has been minimized through changes to the proposed amendment.

Port of Stockton & Roseville Wastewater Utility Comment No. 6 (Specifying MS4 Monitoring Requirements in NPDES Permits): The staff report indicates (p. 138, first

unnumbered paragraph) that specific monitoring requirements for MS4 dischargers would be determined in the Monitoring and Reporting Programs of their respective NPDES MS4 permits. Central Valley Phase 1 MS4s are currently permitted under the Regional MS4 Permit, and a specific monitoring and reporting program for individual constituents is not provided in this permit. Rather, the Regional MS4 Permit requires a discharger to develop a monitoring and reporting program as part of their Storm Water Management Plan. Accordingly, we recommend that this paragraph be modified as follows to allow for greater consistency with the Regional MS4 Permit:

As part of the recommended alternative for general monitoring and surveillance requirements discussed above, municipal storm water dischargers would be allowed to use representative monitoring programs, including coordinated regional monitoring programs to meet their monitoring requirements. Specific monitoring requirements for dischargers would be determined, as applicable, in the Monitoring and Reporting Programs of their respective NPDES MS4 permit or in a Central Valley Water Board approved Storm Water Management Plan.

RESPONSE: The following revisions to section 8.1 have been made in the draft staff report:

As part of the recommended alternative for general monitoring and surveillance requirements discussed above, municipal storm water dischargers would be allowed to use representative monitoring programs, including coordinated regional monitoring programs to meet their monitoring requirements. Specific monitoring requirements for dischargers would be determined, either in the Monitoring and Reporting Programs of their respective NPDES MS4 permit or in a Central Valley Water Board approved Storm Water Management Plan.

Port of Stockton & Roseville Wastewater Utility Comment No. 7 (Annual Progress Reports for Wastewater Dischargers):

On p. xxxv of the Basin Plan Amendment (third paragraph), an annual progress reporting frequency is specified for wastewater dischargers. In contrast, MS4 dischargers are allowed an annual reporting frequency or a reporting frequency consistent with their NPDES permit. Annual progress reports are too frequent to be meaningful to the Central Valley Water Board. Mid-term or permit-term reports are more likely to be used by the Board as the factual basis behind periodic updates on the program, not annual reports. It takes time to implement actions and monitor the outcome, as well as resources to report on these efforts. Further, this section can be interpreted as requiring annual adjustments to BMP implementation (public outreach and pollution prevention efforts) even though it is likely to take numerous years for their effectiveness to be measurable. Progress reports every three years would be more appropriate, and could be granted under individual NPDES permits. We recommend the following changes to this section:

An annual progress report shall be provided to the Board every three years to document the management practices that have been implemented and to track effectiveness. The progress report can be included in existing reports to the Board as appropriate. If the management practices are inadequate to result in pyrethroid discharge concentrations at or below the numeric triggers in Table IV-Z, then the modification of the management plan will be required to identify additional actions to be taken to reduce pyrethroid discharges if reasonable and feasible actions are available or a justification for why

current practices will result in achieving the applicable triggers within a reasonable timeframe.

RESPONSE: The frequency for providing progress reports for wastewater dischargers has been changed from annual to mid-term and end-term during a discharger's 5 year permit term.

Port of Stockton & Roseville Wastewater Utility Comment No. 8 (Cost Estimates):

Baseline and trend monitoring for wastewater, as described in the staff report (p. xlii) and would include toxicity testing with *H. azteca*, however cost estimates provided on p. 152 of the staff report did not include costs for toxicity testing. Because toxicity testing costs are substantial, and Regional Board members expressed concern at February 24, 2017 hearing regarding costs to dischargers, we recommend that the cost estimate for wastewater dischargers be updated with an estimate for toxicity testing costs.

RESPONSE: The cost estimate for wastewater discharges has been updated to include toxicity testing (section 9.3), which was inadvertently left out of the earlier version of the staff report.

Port of Stockton & Roseville Wastewater Utility Comment No. 9 (References to CWA 303(d)-listed Segment of Pleasant Grove Creek):

The segment of Pleasant Grove Creek that is currently listed as impaired for pyrethroids on the Clean Water Action (CWA) Section 303(d) list is the segment upstream of Fiddymnt Rd. The following sections of the staff report reference the 303(d)-listed segment of Pleasant Grove Creek without specifying that the impaired segment is upstream of Fiddymnt Rd.

- p. 18, Table 2-3
- p. 26, Section 2.3.1.7
- p. 120, Table 6-1

We request that where these sections of the staff report reference Pleasant Grove Creek, that the impaired segment be qualified as the segment of Pleasant Grove Creek upstream of Fiddymnt Rd. Since Section 2.3.1 of the staff report contains a discussion of the current status of pyrethroid impairments of 303(d)-listed segments, it is most appropriate to focus this discussion on the segment of Pleasant Grove creek upstream of Fiddymnt Rd.

RESPONSE: It is correct that the segment of Pleasant Grove creek that is listed as impaired by pyrethroids is the segment upstream of Fiddymnt Road. The staff report has been updated to specify the segment of Pleasant Grove Creek upstream of Fiddymnt Rd as requested. The discussion of recent monitoring data from this segment in section 2.3.1 has also been revised to only include data from monitoring stations from within this segment.

CENTER FOR BIOLOGICAL DIVERSITY COMMENTS

Comments were received from Mr. Jonathan Evans, Environmental Health Legal Director, Center for Biological Diversity on 24 March 2017.

Center for Biological Diversity Comment No. 1: The Center urges the Central Valley Regional Water Quality Control Board ("Central Valley Water Board") to adopt an alternative that is tied to specific numeric limits because the Proposed Alternative 8 would result in future listings and separate Total Maximum Daily Load requirements, or other control methods, when pyrethroids continue to violate water quality standards. We also urge the Central Valley Water

Board to apply the proposed control program for pyrethroids to all water bodies in the Sacramento and San Joaquin River Basins in order to avoid cumulative or synergistic impacts that will continue to lead to water quality impairments for downstream water bodies.

RESPONSE: Although the proposed control program does not rely on numeric effluent limits, it does hold individual dischargers accountable by assessing their discharges with reference to numeric triggers. The proposed control program would apply to all water bodies with aquatic life beneficial uses (i.e., WARM and/or COLD). This application would cover a very high percentage of water bodies in the project area. All discharges into water bodies with WARM and/or COLD would be subject to regulation if the triggers are exceeded, which will ensure that downstream water bodies will also be protected.

Center for Biological Diversity Comment No. 2: Pyrethroid pesticides are highly toxic to aquatic ecosystems and the Central Valley Water Board should assure that the water quality standards and limitations established by the Proposed Amendments do not allow continued exceedances of the water quality standards required under the Clean Water Act. 33 U.S.C. 1251 *et seq.* The Sacramento and San Joaquin Bay-Delta ecosystem is incredibly stressed by a range of factors including pyrethroids. Strong action by the Central Valley Water Board to reduce pyrethroids and improve water quality for drinking water supplies, endangered species, and commercial fisheries is critical to its mission and mandate under the Clean Water Act.

RESPONSE: The development of a pyrethroid control program was prioritized by the Board in the 2014 Delta Strategic Plan. The goals of the pyrethroids control program include establishing concentration goals that provide reasonable protection of beneficial uses, addressing existing impairments and preventing future impairments. Aquatic life was determined to be the beneficial use most sensitive to pyrethroids, and was therefore used to develop the concentration goals. The proposed amendment is expected to result in considerable reductions in pyrethroid concentrations in areas where there are levels of concern throughout the Sacramento and San Joaquin River Basins which drain to the Delta. Additionally the proposed phased approach will allow the Board to address impairments not adequately resolved during the first phase of the control program.

Center for Biological Diversity Comment No. 3: The Center is encouraged by the actions in the Proposed Amendment to assure continued coordination and recommendations for agencies that regulate the use of pesticides including the U.S. Environmental Protection Agency (“EPA”) and California Department of Pesticide Regulation (“DPR”). As part of this coordination and recommendation process the Central Valley Water Board must assure that staff and staff time will be dedicated to comments, coordination, and communication on new and renewed pesticide registrations and uses by EPA and DPR. This coordination must emphasize restrictions on registrations and use, must limit use by the general public and certified applicators, establish riparian buffers, prohibit urban and agricultural uses in watersheds exceeding water quality standards, prohibit application in the wet season or when storms are expected, require Integrated Pest Management practices before more hazardous pesticides can be used, and limit uses that will unintentionally contaminate water bodies.

While this coordination is important it should not be a substitute for strong prohibitions enacted by the Central Valley Water Board and it must assure that the prohibitions, Total Maximum Daily Loads, and pollution control requirements are numerically based, measurable, and enforceable. The Basin Plan states that no individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses, and discharges shall not result in

pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses. Enforceable standards must achieve this requirement.

RESPONSE: There are proposed recommendations for the Central Valley Water Board in the draft Basin Plan amendment language that would commit the Board to actions similar to the coordination described in the above comment. It should be noted that while the Board can make recommendations to EPA and DPR, the Board cannot regulate pesticide use in the ways recommended by the commenter.

Coordination with pesticide regulatory agencies is proposed as a complement to the proposed control program for discharges of pyrethroids. The proposed prohibitions, Total Maximum Daily Loads, and pollution control requirements are designed to be numerically based, measurable, and enforceable.

Center for Biological Diversity Comment No. 4: We emphasize that the Central Valley Water Board must assure that its analysis of the cumulative effects of introduction of these various chemicals on water quality is included in the basin amendment documents in order to assure that the cumulative and synergistic effects of pesticides and other non-point and environmental factors are properly considered.

RESPONSE: The proposed concentration goals would provide reasonable protection against impacts to beneficial uses and when these concentration goals are achieved, the proposed Basin Plan Amendment is not expected to significantly contribute to any cumulative impacts. Under CEQA and certified regulatory programs that implement its mandates, the environmental impacts of a proposed discretionary approval are measured against the environmental baseline—that is, the physical conditions existing at the time the agency commences its CEQA or CEQA-equivalent review. The baseline conditions for the California Environmental Quality Act review of the impacts of the proposed amendment are the current pyrethroid concentrations in the Sacramento and San Joaquin River watersheds. The proposed amendment does not propose to introduce pyrethroids into these watersheds above and beyond current levels, but rather is designed to reduce pyrethroid concentrations in these watersheds. Additive and synergistic effects with other constituents and impacts of other stressors (e.g., temperature) are included in section 5.2 of the staff report, and are among the factors considered by the Board when considering adoption of the proposed amendment. The proposed amendment also includes monitoring for toxicity in water and sediment which will aid detection and control of any potential additive or synergistic effects of multiple toxicants.

Center for Biological Diversity Comment No. 5: Finally we encourage the Central Valley Water Board to rely upon the most environmentally protective pyrethroid concentration goal. Given the highly impacted status of the Sacramento and San Joaquin Bay-Delta ecosystem and that pyrethroids are identified as a likely cause of that decline, the pyrethroids targets should be well below toxic thresholds to ensure pyrethroids are not contributing to the further decline of aquatic life and endangered fish in the Delta. The unknowns related to additive and temperature impacts should not be dismissed, but lead the board to choose the most protective alternative.

RESPONSE: See response to General Comment No. 3.

PYRETHROID WORKING GROUP COMMENTS

Comments were received from Ms. Tess Dunham, Somach Simmons & Dunn on behalf of the Pyrethroid Working Group on 24 March 2017.

Pyrethroid Working Group Comment No. 1: Our firm represents the Pyrethroid Working Group (PWG) in matters related to *Proposed Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticides Discharges* (Draft Amendments). On behalf of the PWG, we would like to convey our sincere thanks to you and other Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff for your efforts with respect to preparation of the Draft Amendments as well as the Draft Staff Report. Central Valley Water Board staff has maintained an open, transparent and inclusive stakeholder process. Further, staff has maintained an open mind in considering data and information provided by all stakeholders. Through this open process, staff has put forward recommendations that are fair yet protective of aquatic life beneficial uses. Accordingly, the PWG is generally supportive of staffs recommendations with respect to the use of proposed pyrethroid triggers that are *not* water quality objectives. In summary, the PWG provides the following comments and enclosed information. With respect to the implementation measures, the PWG provides little comment and defers to those dischargers impacted by such measures.

RESPONSE: Comments acknowledged.

Pyrethroid Working Group Comment No. 2: The commenter discussed the Porter-Cologne mandate for the reasonable protection of beneficial uses and provided a discussion of the benefits of pyrethroids. Benefits of pyrethroids discussed included public health benefits and agricultural benefits, utilizing almonds and citrus as an example.

RESPONSE: Comments acknowledged. As discussed in the staff report, the benefits of pyrethroids were a consideration in the development of the proposed amendment.

Pyrethroid Working Group Comment No. 3 (Use of Fifth (5th) Percentile Values as Pyrethroid Concentration Goals is Appropriate and Protective): The Draft Amendments propose pyrethroid concentration goals for water to calculate numeric triggers for pyrethroid pesticides. The water concentration goals are based on the University of California Davis (UCD) methodology for setting pesticide criteria. The UCD methodology recommends the use of the statistically-derived 5th percentile of the species sensitivity distribution (SSD), unless a more sensitive species falls below that value, at which point the 1st percentile is recommended. With respect to the pyrethroids, the UCD calculated criteria were set at the 1st percentile because the endpoint for the aquatic invertebrate *Hyalella azteca* fell below the 5th percentile value. However, here, as is appropriate, the Draft Staff Report explains that use of the UCD criteria at the 1st percentile are overly conservative for several reasons, and thus the Draft Staff Report recommends use of 5th percentile values. The PWG agrees that use of the 1st percentile values is overly conservative. The PWG also believes that the 5th percentile values are more than adequate to protect beneficial uses, and would argue that they are too overly protective. However, for the intended purpose of determining concentration goals that are *not* explicitly water quality objectives, PWG finds use of the 5th percentile values to be reasonable.

Use of 5th percentile values is supportable for a variety of reasons, including the inherent, built-in conservatism in the use of the 5th percentile values as is being proposed. For example, peer reviewer Dr. Kevin Armbrust of Louisiana State University noted the following:

A great deal of conservatism is already built into the process via a maximum exceedance of the chronic criteria of only once in three years over a 4-day period and using toxicity values based upon laboratory reared organisms that appear to be more sensitive than native organisms in impacted areas. While the use of the 1st centile of the

SSD is consistent with scientific knowledge, methods and practices it would appear to be overly protective based upon the conservatism already in place. Criteria values based upon the 5th percentile would be equally justified scientifically, consistent with other national and international methods and standards as noted by the staff report, and would likely still provide adequate protection for the identified beneficial uses.

[Commenter provided a number of reasons the use of the 5th percentile values is supportable including

- Built in conservatism in the values as proposed (commenter quoted the external peer review comments of Dr. Kevin Armbrust as an example).
- The use of the 5th percentile is consistent with U.S. EPA's approach, as documented in *Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*. (The commenter noted that *Hyaella azteca* are not a species of recreational or commercial importance, so protection of *H. azteca* is not a valid justification for using values below the 5th percentile.)
- The inclusion of additivity and allowable frequencies of exceedances in the concentration goals provides additional protection.
- The 5th percentile values are calculated with a safety factor of two.
- The 5th percentile is consistent with the Porter-Cologne requirement of providing reasonable protection of beneficial uses.]

In this case, the Central Valley Water Board seeks to protect aquatic life beneficial uses by adopting a conditional prohibition of discharges that would exceed the numeric triggers, unless certain management practices are being implemented. After reviewing a number of different alternatives, the Draft Staff Report finds that use of the 5th percentile values is appropriate, and reasonably protects aquatic life beneficial uses. Again, PWG agrees.

RESPONSE: Comment acknowledged.

Pyrethroid Working Group Comment No. 4 (Consideration of Bioavailable Portions, or Freely Dissolved Pyrethroid Concentrations Is Appropriate): As part of the Draft Amendments, Central Valley Water Board staff recommend that the freely dissolved pyrethroid concentrations be used in formulas to calculate acute and chronic additive concentration goals, which are the numeric triggers. The PWG supports this recommendation. As discussed in detail in the Draft Staff Report, it correctly recommends accounting for the reduced bioavailability of pyrethroids due to binding to suspended solids and dissolved organic matter. (See Draft Staff Report, pp. 57-64.) The justification for this recommendation is that the dissolved pyrethroid concentration and not the whole water concentration is the toxic fraction to aquatic biota that should be compared with protection goals. As correctly stated in the Draft Staff Report, many studies have demonstrated that the freely dissolved concentration is highly correlated with the bioavailable fraction and a good predictor of bioavailability. (See, e.g., *Water Quality Criteria Report for Bifenthrin, Updated Report* (May 2015), pp. 14-15.) The Draft Amendments include a formula for calculating dissolved pyrethroid concentrations from measured residues using only values above the reporting limits, which is logical and appropriate. (See Draft Staff Report, p. xxv and p. 61.).

Further, the K_{oc} and K_{doc} values for the various pyrethroids used in the equation were developed by the PWG under Good Laboratory Practices (GLP), in a single experienced laboratory, with automated SPME equipment to reduce variability. Otherwise, the PWG study used similar approaches to those used by others (e.g., Cui and Gan, U.C. Riverside). The PWG resulting coefficients were similar to those in other studies, but less variable. Adherence to GLP assures

that all raw study data are retained, and that numbers in the report were verified by auditors against raw data (QA/QC). These values currently represent the best available data for pyrethroid freely dissolved adsorption coefficients.

To properly determine freely dissolved concentrations, both particulate organic carbon (POC) and dissolved organic carbon (DOC) concentrations are required in the calculation of the dissolved pyrethroid concentration. Where actual POC measurements are not known, the equation allows for the calculation of POC by subtracting DOC from the amount of total organic carbon (TOC). However, the Draft Amendments do not indicate what should occur if no OC rates are available. Since it is inappropriate to compare whole water concentrations against the pyrethroid concentration goals and subsequently calculated numeric triggers, we recommend that the Draft Amendments and Draft Staff Report clarify that in such cases, sample results should not be compared against numeric trigger values to determine if the trigger value has been exceeded. Or, in the alternative, median national POC/DOC values should be used to calculate freely dissolved concentrations (See, National POC/DOC Database).

RESPONSE: Dissolved organic carbon and particulate organic carbon concentrations are both spatially and temporally variable and these values have a significant effect on calculation to estimate freely dissolved pyrethroid concentrations. If DOC and/or POC data are not available for a given sample then comparison to the triggers may require additional data, depending on the levels of total pyrethroids. For example, where a total pyrethroids sample is non-detect using proper methods, additional data may not be needed. However, should the value exceed the trigger, then DOC and POC data would be required to fully assess whether the trigger is exceeded. It is very important that high quality data is collected to inform the Board in this phased approach, and DOC and POC data are needed to have a more complete picture of the bioavailability and potential toxicity of pyrethroids in discharges and surface waters. The proposed monitoring goals have been updated to specify that DOC and POC data are required to ensure those data are collected and can be used for comparing to the triggers in the future, thus, national median values for POC and DOC will not be used to estimate dissolved concentrations.

Pyrethroid Working Group Comment No. 5 (Lack of Evidence that *Hyalella* Are Essential Prey to Pelagic Fish):

Some stakeholders in the Central Valley Water Board's process have argued that it is necessary to set pyrethroid concentration goals at the 1st percentile (or 2.5 percentile) to protect *Hyalella azteca* and mysids because they are important as prey items for pelagic fish, including the delta and longfin smelt. As documented in the attached paper, *Pyrethroid sensitivity analysis of fish prey and causative factors of fish declines in the San Francisco Bay-Delta and freshwater tributaries*, this is not the case. (See Exhibit I, *Pyrethroid sensitivity analysis of fish prey and causative factors of fish declines in the San Francisco Bay-Delta and freshwater tributaries* (Pyrethroid Sensitivity Analysis of Fish Prey), attached hereto.) The Pyrethroid Sensitivity Analysis of Fish Prey provides details on predatory fish in the San Francisco Bay-Delta and freshwater tributaries, fish prey items, prey item sensitivity to pyrethroids and factors implicated in the decline of fish populations in the region, other than pyrethroids.

Based on this detailed review, there is substantial evidence that shows that fish in the San Francisco Bay-Delta are *not* dependent on *H. azteca*, and that essential fish prey are substantially less sensitive to pyrethroids than *H. azteca*. For example, mysid shrimp were found to be between 3 to 21 times less sensitive than *H. azteca*. (Pyrethroid Sensitivity Analysis of Fish Prey, p. 11.) The copepods *E. affinis* and *P. forbesi* were over 30-fold less sensitive, and chironomids, cladocerans, and insects were substantially less sensitive than *H. azteca*.

(Pyrethroid Sensitivity Analysis of Fish Prey, p. 11.) Accordingly, Pyrethroid Sensitivity Analysis of Fish Prey concluded as follows:

We conclude that fish in the SF Bay-Delta and its tributaries are not dependent on *H. azteca*, although amphipods do comprise a portion of some fish diets. Furthermore, *H. azteca*, populations appear to be abundant at select sites, despite current pyrethroid loading rates. Pyrethroid toxicity data indicate that essential fish prey in the SF estuary and associated freshwater streams are substantially less sensitive to pyrethroids than *H. azteca*. (Pyrethroid Sensitivity Analysis of Fish Prey, p. 12.) Accordingly, it is not necessary to use the 1st or 2.5th percentiles to set pyrethroid concentration goals in order to protect prey for pelagic fish found in the San Francisco Bay-Delta.

RESPONSE: There is uncertainty as to the importance of *H. azteca* as a prey species for Delta pelagic fish. Some evidence also indicates *H. azteca* is important to pelagic fish (Toft et al. 2003).

Consistent with narrative toxicity objective and the aquatic life beneficial use definition in the Basin Plan, the concentration goals in the proposed amendment would provide adequate protection to aquatic invertebrates, including *H. azteca*. *H. azteca* is utilized as a proxy species to assess protection of aquatic life beneficial uses, which isn't dependent on *H. azteca*'s relationship to pelagic fish. Therefore the proposed concentration goals are appropriate, regardless of whether or not *H. azteca* are an important prey species for pelagic fish.

Pyrethroid Working Group Comment No. 6 (Lower Percentiles Are Not Necessary to Prevent Overlooking Toxic Samples):

Another argument by some stakeholders is that use of pyrethroid concentration goals based on the 1st or 2.5 percentiles is necessary to prevent oversight of potentially toxic samples. In other words, some stakeholders have argued that concentration goals set at these lower levels would ensure that samples are not toxic, and are therefore protective of the aquatic life beneficial uses. However, using this argument, and based on review of data provided by Dr. Don Weston of the University of California, Berkeley, there are numerous samples for which a specific concentration of pyrethroids (measured in CNCUs) results in elevated mortality to *Hyalella*. The inverse, however, is also true and there are samples with the same CNCU level of pyrethroids that result in little or no mortality to *Hyalella*. While selecting a low concentration will arguably mean that all toxic samples will be identified, it also means that many false positives will occur and non-toxic samples will be incorrectly identified as toxic.

The key to selecting appropriate concentration goals is to determine which concentration levels most accurately distinguish between toxic and non-toxic samples. A well-known method called Receiver Operating Characteristics (ROC) can be used to help make such determinations.

[The commenter presented and summarized a memorandum from Michel Johnson illustrating the use of the ROC method with the pyrethroid data to determine an optimal target which would minimize the number of "false negatives" and "false positives".]

Based on this information, use of the 5th percentile for setting pyrethroid concentration goals results in a very conservative target that is well below the optimal target of 8.83 CNCUs. Thus, use of the 2.5 or 1st percentile values would be overly conservative, and would result in a great number of false positives.

RESPONSE: The draft staff report does not rely on Dr. Weston's data set to determine an appropriate level for the pyrethroid concentration goals, but instead relies on controlled laboratory toxicity tests. Based on the data from controlled laboratory toxicity tests and the other factors considered as described in the staff report, concentration goals based on the 5th percentile UC Davis criteria are expected to provide reasonable protection of aquatic life beneficial uses and are not expected to be overly conservative. However, ambient toxicity testing is also proposed as another line of evidence to evaluate whether there are ambient toxicity concerns.

Pyrethroid Working Group Comment No. 7 (Linear Regression Analyses Between Fish Populations and Pyrethroid Use Are Inappropriate To Support the Use of Lower Concentration Goals):

In addition to the arguments above, other stakeholders have argued that there is a statistically significant temporal relationship between increasing use of pyrethroid pesticides in areas that drain to the Delta and declines in abundance indices of several pelagic organisms. This relationship was based on linear regression analyses on a time series examining pelagic fish abundance and pyrethroid pesticide use for a defined region that drains into the Delta. The results of these analyses were first presented before the Central Valley Water Board by Mr. Stephen Louie from the California Department of Fish and Wildlife, and have since been published as a journal article. On behalf of the California Department of Fish and Wildlife, Mr. Louie uses this information in part to support lower pyrethroid concentration goals as compared to those being recommended in the Draft Staff Report.

[The commenter presented and summarized an analysis by Michael Johnson highlighting potential issues with the linear regression presented by Mr. Stephen Louie.]

In light of the significant level of uncertainty associated with the linear regression analyses, Mr. Louie's analyses do not provide any level of evidence to support the need for lower pyrethroid concentration goals to protect aquatic life beneficial uses. Moreover, opponents of the use of the 5th percentile values provide no other significant or supportable evidence to suggest that the 5th percentile values are not protective. Rather, the record is replete with documentation and information that supports use of the 5th percentile values for establishing pyrethroid concentration goals. Accordingly, the Central Valley Water Board should retain and adopt the staff's recommendation. Further, the Central Valley Water Board should make it abundantly clear that the 5th percentile concentration goals shall remain in place unless the Water Quality Control Plan is otherwise amended to adopt different concentration goals.

RESPONSE: By virtue of their inclusion in the Basin Plan, the proposed concentration goals would remain in place if adopted unless and until they were changed by another Basin Plan amendment or other regulation. Such a change may be considered during the review of the first phase of the control program. The draft staff report does not rely on regression data described by the commenter to determine an appropriate level for the pyrethroid concentration goals, but instead relies on controlled laboratory toxicity tests. Based on the data from controlled laboratory toxicity tests and the other factors considered as described in the staff report, concentration goals based on the 5th percentile UC Davis criteria are expected to provide reasonable protection of aquatic life beneficial uses.

Pyrethroid Working Group Comment No. 8 (Substantial Evidence Shows that Pyrethroids Are Not Endocrine Disrupting Compounds): The Draft Staff Report states that pyrethroids have been identified as endocrine disrupting compounds. (Draft Staff Report, p. 16.) However,

U.S. EPA's screening framework for the Endocrine Disrupter Screening Program provides convincing evidence to the contrary.

[The commenter provided a summary of USEPA the Endocrine Disrupter Screening for pyrethroids.]

Thus, while the endocrine disrupting potential of a cypermethrin is still currently under regulatory review, for all other pyrethroids tested, there was either no convincing evidence for potential interaction, or EPA determined that there was no risk based on a weight of evidence analysis. Therefore, the claims stated in the Draft Staff Report with respect to identification of pyrethroids as being endocrine disrupting compounds should be revised to reflect the status of EPA' s review for four of the pyrethroids, and indicate that the fifth pyrethroid is undergoing further review.

RESPONSE: The results of EPA's review have been added to the discussion of endocrine disrupting effects in the staff report.

Pyrethroid Working Group Comment No. 9 (Pyrethroids Do Not Bioaccumulate or Biomagnify In the Food Chain): Due to their hydrophobicity and ability to moderately persist in sediment, Central Valley Water Board members and others questioned if pyrethroids bioaccumulate in aquatic organisms. As stated in the Draft Staff Report, the answer to that question is no. (See Draft Staff Report, p. 14, ["Pyrethroids have low potential to bioconcentrate in aquatic organisms because they are typically rapidly metabolized or eliminated."].) Further evidence in support of this fact is provided in the attached paper prepared by Compliance Services International. (See Exhibit 3, *Bioaccumulation, Biotransformation, and Biomagnification of Pyrethroids in Aquatic Organisms* (March 2017), attached hereto.) As detailed extensively in this paper, the majority of measured and estimated bioconcentration factors (BCFs) for pyrethroids are below 1,000, and the pyrethroids are metabolized and detoxified rapidly in organisms. Accordingly, pyrethroids are considered to have low bioconcentration and biomagnification potential. The overwhelming empirical evidence and model simulations "indicate that pyrethroids typically do not have significant bioconcentration, bioaccumulation, or biomagnification potential resulting from aqueous or dietary exposure in aquatic and marine organisms in natural environments." (Exhibit 3, p. 12.)

RESPONSE: Comments acknowledged.

Pyrethroid Working Group Comment No. 10 (Sublethal Effects): Some stakeholders have claimed that the pyrethroid concentration goals should consider potential sub lethal effects of pyrethroids. However, most measured sub lethal endpoints are not quantitatively linked to the primary assessment endpoints of survival, growth, and reproduction. A PWG review of the more than 100 published articles on pyrethroid effects on behavioral, biochemical, hematological, genetic, immunological, endocrine, and other sublethal endpoints supports the conclusion that sublethal effects, when observed, generally result from exposure concentrations near or above the standard apical endpoints that are used in risk assessment. Sub lethal effects have occasionally been observed at lower concentrations, but these endpoints could not be closely linked to survival, growth, or reproduction.

RESPONSE: The data used to derive the criteria utilized in the proposed pyrethroid concentration goals only relied on the standard apical endpoints of survival, growth, and reproduction. However, sublethal impacts are, appropriately, included in the staff report for consideration relative to their impact on beneficial uses and the attainment of the

narrative toxicity objective, which states that, “All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.”

Pyrethroid Working Group Comment No. 11 (Key References Incorrectly Suggesting Pyrethroid Impact on Resident Biota): Two papers referenced in the Draft Staff Report with respect to Toxic Effects of Pyrethroids attempt to incorrectly highlight the impacts of pyrethroids on resident biota. (Draft Staff Report, p. 15)

[The commenter presented and summarized PWG reviews of two papers (Fong et al. 2016 and Rogers et al. 2016) referenced in the staff report in the discussion on toxic effects of pyrethroids.]

RESPONSE: The draft staff report does not rely on the regression analyses presented in Fong et al. (2016), and that regression is not part of the scientific basis of the proposed amendment. The staff report did refer to the literature review of documented pyrethroid effects at many organism levels presented in Fong et al., as these effects are an important consideration for the Board when evaluating the proposed amendment. The summary of the study by Rogers et al. (2016) presented in the staff report is an accurate description of the results and conclusions they reported in a peer-reviewed publication. Discussion of and references to the PWG review comments on the Rogers study have been included in the staff report.

Pyrethroid Working Group Comment No. 12 (Water Quality Conditions Reasonably Achievable): Based on available monitoring data, the Draft Staff Report shows that significant reductions in pyrethroid discharges will be needed in all water body types to meet the identified options for pyrethroid concentration goals. (Draft Staff Report, Tables 5-14 and 5-15, pp. 101-102.) Notably, the monitoring data used to compare with protection goals in these tables are based on whole water measurement and not the dissolved fraction. Because these calculations are based from comparisons with whole water concentrations, the Draft Staff Report states that reductions needed to attain these protection goals would be lower but still significant if they were compared with freely dissolved values. These tables show that substantial reductions ranging from 46 to 94 percent for all average pyrethroid concentrations across all water bodies would be needed when using the acute 5th percentile, and reduction ranging from 82 to 98 percent for all average pyrethroid concentrations across all water bodies would be needed when using the chronic 5th percentile. However, until there is accurate, data available for freely dissolved concentrations, it will be difficult to actually determine the level of reductions that will be necessary. Furthermore, these calculations cannot be verified because the monitoring data and the methods of calculating means are not presented. It is likely (but cannot be verified) that a large fraction of the monitoring data used in this analysis is from application practices that are no longer current. Because of these unknowns, the PWG supports the proposed phased approach in the Draft Amendments, and agrees that it is premature for the Central Valley Water Board to adopt water quality objectives at this time as it is unknown if the water quality conditions are reasonably achievable.

RESPONSE: Comment acknowledged.

Pyrethroid Working Group Comment No. 13: Page xiii - There is an incorrect statement that *Hyalella azteca* is a resident California species. *Hyalella spp* (complex of multiple species) not *Hyalella azteca* are collected in California water bodies.

RESPONSE: This text has been revised in the draft staff report to state that *Hyalella* spp. are resident in California, which may include *H. azteca*.

Pyrethroid Working Group Comment No. 14: Page xxxiii (Table IV-W) The listing for Del Puerto Creek should be reconsidered based on fine grain (depositional mapping work) that shows only 4 percent of the stream bed in this water body is depositional area where pyrethroids may be found if sources exist. (See Exhibit 6, Hall et al. 2012, attached hereto.)

RESPONSE: The staff report includes an evaluation of the monitoring data in Del Puerto Creek. There are monitoring data for Del Puerto Creek indicating that pyrethroid levels in sediments are exceeding water quality standards. The percent of depositional area would not affect these results.

Pyrethroid Working Group Comment No. 15: Page 3, para. I - It is stated that pyrethroid concentrations in ambient water and sediment samples are toxic to aquatic invertebrates. More correctly, it should be stated that toxicity has been reported for laboratory strains of a single invertebrate *Hyalella*.

RESPONSE: *Hyalella azteca* are considered to be representative of other aquatic invertebrates, thus it is accurate to say that they have been documented at levels toxic to aquatic invertebrates. Additionally, pyrethroids have contributed to toxicity to *Ceriodaphnia dubia* in some samples, as indicated by toxicity identification evaluation results.

Pyrethroid Working Group Comment No. 16: Page 19 (Table 2-4) - The bifenthrin sediment toxicity value in Amweg et al. 2006 is 0.52 ug/g OC rather than 0.43 ug/g OC, as listed in this table.

RESPONSE: The sediment toxicity value reported in this Table 2-4 is the evaluation guideline used by the State Board for developing the 303(d) list and it is the geometric mean of the toxicity value reported in Amweg et al. (2006) of 0.52 ug/g OC and the value reported in Amweg & Weston (2007) of 0.26 ug/g OC.

Pyrethroid Working Group Comment No. 17: Page 22 (Table 2-5) - Concentrations are based on total pyrethroids (not dissolved), so the exceedances calculations may change drastically if dissolved measurements are used.

RESPONSE: Comment acknowledged.

Pyrethroid Working Group Comment No. 18: Page 65 (Temperature Effects on Pyrethroid Toxicity) - It is stated that the State Board Stream Pollution Trends Program is recommending toxicity tests (e.g., *Hyalella*) be conducted at 15 °C rather than the standard test temperature of 23 °C. The stated reason for this is that pyrethroids are more toxic at lower temperatures. This reasoning and justification is flawed because the standard test temperature is well established as part of an approved method. Moreover, a test temperature of 15 °C would also fail to represent late spring and summer conditions when temperatures are much higher (closer to 23 °C than 15 °C).

RESPONSE: The staff report accurately describes the State Board Stream Pollution Trends Program recommendation of testing at 15 °C when that temperature better reflects ambient temperatures such as during spring sample collection, to ensure that

pyrethroids-caused toxicity is not underestimated due to the known temperature effects. The staff report also discusses the potential for the opposite effects at higher temperatures during summer and fall.

Pyrethroid Working Group Comment No. 19: Pages 65 and 66 (Pyrethroid-resistant Aquatic Organisms)-The Weston et al 2013b reference in the Draft Staff Report that is used to support much of the text in this section concerning *Hyalrella* resistance has some flaws and the Draft Staff Report's conclusions should be made with caution. The reasons for caution are: (1) the technology used to collect expression data (microarrays) does not permit direct comparison of the expression data between the two strains because they are fairly genetically distinct; (2) it is not clear that the two (necessarily) different NOEC treatments provide a comparable experimental baseline against which gene expression differences for the two strains can be compared; and (3) the broad differences in function of genes expressed between the lab and resistant strains (upon NOEC exposure) do not suggest much about different toxicity pathways, and may simply reflect the fact that one strain has the VGSC mutation and the other does not. In summary, it is not known what are the evolutionary consequences of genetic tolerance to chemical stressors. What is known is that *Hyalrella* populations are abundant throughout California water bodies and have been collected at 914 sites. *Hyalrella* have also been reported as the most dominant amphipod in these California water bodies. (*Id.*)

RESPONSE: The draft staff report provides a summary of current information regarding pyrethroid-resistant aquatic organisms, but does not draw any conclusions on this topic or the potential evolutionary consequences of genetic tolerance. As discussed in the draft staff report, until further information is available on this topic, it is appropriate to continue to rely on standard laboratory toxicity tests to determine appropriate concentration goals.

Pyrethroid Working Group Comment No. 20: Page 67 (Aquatic Species Sensitivity) - The statement that the estuarine mysid (*Americamysis bahia*) has similar sensitivity to pyrethroids as *Hyalrella* is not accurate. For example, the *Hyalrella* LC50 for bifenthrin is 0.0005 ug/L while the *A. bahia* LC50 for bifenthrin is 0.004 ug/L, an order of magnitude less sensitive. Further, a comprehensive evaluation of toxicity data finds that no other organisms were similarly sensitive to pyrethroids. The combined species sensitivity distribution previously provided by PWG indicates that the next closest organisms are approximately 3 to 4 times less sensitive than *Hyalrella azteca*. Thus, statements in the Draft Staff Report that state other species are known to be similarly sensitive should be revised to state that other species in the project area are known to be slightly less sensitive to pyrethroids as *Hyalrella azteca*.

RESPONSE: Section 5.2.5 of the staff report has been revised to more thoroughly describe the relative sensitivity of mysids and *Hyalrella azteca*.

Pyrethroid Working Group Comment No. 21: Page 266 (Appendix B) - All the data sets from Dr. Don Weston used in this section were from 2008 and 2009 so the comparison of these data with concentration goals does not reflect current use patterns. Notably, of the 109 samples, 40 samples were toxic to *Hyalrella* but 7 of these samples (7/40 or 18%) contained no detectable pyrethroid concentrations meaning that other stressors caused toxicity. The text of Appendix B incorrectly states that the percentage was 6% by using a calculation of 7/109, which is an incorrect presentation of the data.

RESPONSE: Current use patterns may be different than those in 2008 and 2009. The observed toxicity in the samples without detectable pyrethroids could have been due to

other compounds and/or non-detectable concentrations of pyrethroids. The text in Appendix B has been changed to further clarify that the percent of toxic samples in the data set with no detectable pyrethroids was 6% of the total samples and 18% of the toxic samples.

Pyrethroid Working Group Comment No. 22: For the above-mentioned reasons, the PWG generally supports the staff-recommended approach to *not* adopt the water quality objectives at this time, but rather implement a phased approach.

RESPONSE: Comment acknowledged.

CENTRAL VALLEY CLEAN WATER ASSOCIATION COMMENTS

Comments were received from Ms. Debbie Webster, Executive Officer, Central Valley Clean Water Association on 24 March 2017.

Central Valley Clean Water Association Comment No. 1 (Comments on Recommended for Implementation by Other Agencies): CVCWA appreciates the direction to other agencies to include consideration of discharges from wastewater treatment plants and urban runoff as well as agricultural runoff. With this direction, CVCWA believes it is important for both the U.S. EPA and the California Department of Pesticide Regulation to also consider the fate and transport of pyrethroids through POTW treatment processes. Accordingly, we recommend that this be added to the considerations for both agencies.

RESPONSE: Continuing to refine estimates and consideration of the fate and transport of pesticides in wastewater treatment plants (as well as other types of discharges) has been added to the list of recommended actions for USEPA and DPR.

Central Valley Clean Water Association Comment No. 2 (Comments on Changes to Chapter IV, Implementation): CVCWA generally supports the use of numeric triggers for pyrethroid pesticides rather than the adoption of such triggers as water quality objectives, or recognized water quality criteria within the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan). However, we are concerned that the language as proposed implies that all wastewater dischargers need to develop a management plan regardless of whether the numeric trigger has been exceeded. CVCWA does not support this aspect of the program if that is the intent. Rather, management plans should only be required of those that cause an exceedance of the numeric trigger in the receiving water.

We have reviewed the Proposed Amendments and believe that some additional revisions are necessary to ensure that the Proposed Amendments have clarity with respect to the application of the Conditional Prohibition, and how the program should be implemented in the future.

RESPONSE: See response to General Comment No. 2.

Central Valley Clean Water Association Comment No. 3 (Suggested Revisions to Regional Water Board Prohibitions Language (Draft Staff Report, p. xxiii)): As currently expressed, the Conditional Prohibition applies to the level of pyrethroids in the discharge - not the concentration of pyrethroids in the receiving water. Because the concern is the impact to the receiving water, the Conditional Prohibition should apply directly to the receiving water. CVCWA recommends the following sentence be modified to ensure proper application of the Conditional Prohibition:

"Beginning [3 years from OAL approval date], discharges of pyrethroid pesticides at concentrations that cause the receiving water to exceed pyrethroid triggers (Table IV-Z) ~~to in~~ water bodies with designated or existing WARM and/or COLD beneficial uses are prohibited unless a discharger is implementing a management plan to reduce pyrethroid levels from causing the receiving water to exceed pyrethroid triggers in their discharges."

The second paragraph under section X, Pyrethroid Pesticides Discharges, should be amended to provide further clarification.

"The pyrethroid triggers are intended to be used to indicate when management plans need to be developed and when management practices are to be implemented by the discharger. When the triggers are exceeded in monitoring results or as part of a toxicity evaluation, the discharger will be required to initiate additional monitoring. These actions will provide information on achievability and costs to the Board to inform future evaluation of potential water quality objectives. The pyrethroid triggers are not water quality standards and are not for use as water quality-based effluent limitations or for reasonable potential analysis."

RESPONSE: See response to General Comment No. 2.

The requested revision to the first sentence of the second paragraph under section X, Pyrethroid Pesticides Discharges regarding the intent of the triggers to clarify that a management plan must be developed prior to implementing management practices has been changed in the proposed amendment. The suggested revision stating that pyrethroid triggers are not water quality standards was not accepted because this addition does not add clarity to the intent of the pyrethroid triggers.

Central Valley Clean Water Association Comment No. 4 (Suggested Revisions to Table IV-Z (Draft Staff Report, p. xxv.)): In Table IV-Z, CVCWA suggests the following revisions:

- First paragraph (p. xxv), "Guidance on acceptable analytical methods is given in the Surveillance and Monitoring Chapter under the header Pyrethroid Pesticides Discharges (p. V-xx)."
- Second paragraph (p. xxv), "Methods for direct measurement must be approved by the Executive Officer before they are used to determine the freely dissolved pyrethroid concentrations that are used in the calculations for determining exceedances of the pyrethroid pesticides numeric triggers."

RESPONSE: The word "analytical" has been added to the first paragraph in Table IV-Z as suggested for clarification.

The phrase "to determine the freely dissolved pyrethroid concentrations that are used" has been added to the second paragraph in Table IV-Z as suggested, however the suggested phrase "in the calculations" was not added because it may lead to confusion between the calculations for the freely dissolved concentrations and the additive trigger formula.

Central Valley Clean Water Association Comment No. 5 (Comments/Suggested Revisions to Pyrethroid Pesticides Control Program (pp. xxx - xxxvii)): Although CVCWA generally supports the use of triggers and the pesticides control program as proposed, CVCWA has one significant issue of concern with paragraph 3. This paragraph briefly explains what the numeric triggers represent. However, the paragraph is lacking in that it does not specify the location in

which the triggers apply, which should be to the receiving water. CVCWA recommends that the first sentence of this paragraph be revised as follows:

"The pyrethroid pesticides numeric triggers represent maximum allowable levels in receiving waters above which additional management actions may be required."

Similarly, and consistent with the comments above, CVCWA is concerned that the triggers would be applied to POTW effluent at the end of pipe. By applying the trigger to effluent directly, it eliminates consideration of mixing zones and/or dilution that may otherwise be available in the receiving water. Further, it is our understanding that proposed water quality triggers will be used to require implementation of management practices and/or monitoring. In other words, exceedances of triggers are of concern because this may mean that there are impacts to aquatic life beneficial uses, which apply in the receiving water. In light of the fact that concerns are related to potential impacts to beneficial uses in receiving water, CVCWA believes it is appropriate for triggers to apply in the receiving water - not at the end of pipe. Moreover, an exceedance of a trigger in effluent does not mean that the trigger would be exceeded in the receiving water immediately downstream of the discharge. Yet, POTWs will be required to expend resources on implementing management practices and monitoring even though there is no potential impact to aquatic life beneficial uses. Further, since many CVCWA members are cities or districts with both stormwater and wastewater responsibilities, CVCWA recommends that the development, implementation, and reporting of management actions/plans be allowed to be completed with one plan that applies to both entities, rather than requiring two separate plans. Accordingly, CVCWA recommends that the Proposed Amendments be further revised to ensure that we are looking to protect the receiving water.

RESPONSE: See response to General Comment No. 2.

Language has been added to the proposed amendment to clarify that the degree of implementation of practices should be commensurate with the impact of the discharge, thus if a discharger can demonstrate that there is little to no potential impact from their discharge, the proposed management plans should reflect that.

The development, implementation, and reporting of management practices/plans would be allowed to be completed with one plan that applies to multiple entities, as long as it covers all of the requirements for each entity and each requirement is clearly labeled. This flexibility has been clarified in the Basin Plan language.

Central Valley Clean Water Association Comment No. 6 (Additional revisions): Municipal and Domestic Wastewater Discharges (p. xxxiv), "Dischargers subject to the conditional prohibition of pyrethroid pesticides discharges are required to develop and implement management plans to reduce pyrethroid levels from causing the receiving water to exceed pyrethroid triggers."

RESPONSE: See response to General Comment No. 2.

The suggested revision was not made because the pyrethroid triggers apply to the discharge, not the receiving water.

Central Valley Clean Water Association Comment No. 7 (Additional revisions): Municipal and Domestic Wastewater Discharges (p. xxxv), "The pyrethroid triggers are intended to indicate when management practices are to be implemented by the discharger; the pyrethroid triggers are not water quality standards and are not criteria for interpreting the narrative toxicity

objective, and are not for use as water quality-based effluent limitations or for reasonable potential analysis."

RESPONSE: The suggested revision was not made because it does not add clarity as to what the triggers indicate and how they are intended to be used.

Central Valley Clean Water Association Comment No. 8 (Additional revisions): Municipal and Domestic Wastewater Discharges (p. xxxv), "If the management practices are inadequate to result in pyrethroid discharge concentrations in the receiving water at or below the numeric triggers in Table IV-Z, then the modification of the management plan will be required to identify additional actions to be taken to reduce pyrethroid concentrations in the receiving water discharges if reasonable and feasible actions are available or a justification for why current practices will result in achieving the applicable triggers within a reasonable timeframe."

RESPONSE: See response to General Comment No. 2. The suggested revision was not accepted because the pyrethroid triggers apply to the discharge, not the receiving water.

Central Valley Clean Water Association Comment No. 9 (Additional revisions): Municipal and Domestic Wastewater Discharges (p. xxxv), "Management plans are completed when it can be demonstrated that the Acute and Chronic Pyrethroid Triggers are not exceeded in discharges or in the receiving waters, and the demonstration is approved by the Executive Officer."

RESPONSE: See response to General Comment No. 2. The suggested revision was not accepted because the pyrethroid triggers apply to the discharge, not the receiving water.

Central Valley Clean Water Association Comment No. 10 (Additional revisions): Further, the control program seeks to make POTWs responsible for mitigating the potential use of replacement products. This is not a task or responsibility that can be assigned to POTWs. Accordingly, this reference must be deleted, as shown here.

~~"A management plan must identify a set of management practices that taken as a whole, may be reasonably expected to effectively reduce pyrethroid levels in their discharges, and to mitigate the potential for replacement pesticide products to cause additional water quality impairments."~~

RESPONSE: The following revision was made to the proposed amendment:

"A management plan must identify a set of management practices that taken as a whole, may be reasonably expected to effectively reduce pyrethroid levels in their discharges, and to consider whether there are mitigate the potential water quality concerns with for replacement insecticide pesticide products to cause additional water quality impairments."

Central Valley Clean Water Association Comment No. 11 (Baseline Monitoring Needs to Be Timed With Permit Waste Characterization Requirements): The Draft Amendments would require baseline monitoring to be completed 2 years following approval of the Basin Plan changes by the Office of Administrative Law (OAL), with trend monitoring occurring 3 years after OAL approval. This would mean that for many POTWs, baseline monitoring would need to be conducted on a different schedule than other effluent characterization monitoring, which is usually required once per permit cycle. Rather than requiring that baseline monitoring occur within 2 years from adoption, CVCWA recommends that baseline monitoring for POTWs be

allowed to be conducted concurrently with effluent characterization monitoring, with trend monitoring commencing thereafter if necessary. To facilitate this change, we recommend the following revisions.

- First paragraph (p. xxxix), "The Board will require baseline monitoring to be completed by [2 years following OAL approval] and continued trend monitoring to occur after [3 years following OAL approval], except for Municipal and Domestic Wastewater which is set forth below."
- Second paragraph under *Municipal and Domestic Wastewater*, (p. xliii), "The baseline pyrethroids monitoring and reporting program for municipal or domestic wastewater discharges shall be conducted concurrently with effluent characterization monitoring and be designed to collect information necessary to:"
- First paragraph (p. xliii), "The pyrethroids trend monitoring and reporting program for municipal or domestic wastewater discharges shall commence after the effluent characterization monitoring has been completed and after being directed to start such monitoring by the Executive Officer. The trend monitoring and reporting program shall be designed to collect information necessary to meet the above goals for baseline monitoring, as well as:"

RESPONSE: The suggested revisions were accepted in order to shift baseline monitoring for POTWs to be concurrent with effluent characterization monitoring rather than within 2 years of the effective date of the amendment.

Central Valley Clean Water Association Comment No. 12 (Monitoring and Reporting Requirements Need to Be Adjusted for Small and Very Small POTWs): CVCWA is concerned that the baseline and trend monitoring for very small and small POTWs will be costly and burdensome. Further, the volume of discharges from such small entities is unlikely to have any significant impact on aquatic life beneficial uses from pyrethroid pesticides. To avoid the unintended economic impact on small POTWs, CVCWA recommends that POTWs with a permitted discharge volume of 1 million gallons per day (mgd) or less be exempted from the baseline and trend monitoring requirements. For POTWs with a permitted discharge volume between 1 mgd and 5 mgd, CVCWA recommends that monitoring be limited to once per permit cycle.

RESPONSE: Very small (<1 mgd) POTWs would be exempted from the proposed baseline and trend monitoring and the proposed amendment has been updated to reflect this change. Small (1-5 mgd) POTWs would not be exempted from the proposed baseline and trend monitoring; however there are various options that are available to reduce the economic impacts for these dischargers. The monitoring requirements for POTWs will be phased in over time as part of the required effluent characterization monitoring. Effluent characterization monitoring requirements are relative to the potential impact of the discharge, so small POTWs will not be required to monitor at the same frequency as large POTWs. In addition, the proposed amendment allows for representative monitoring, so a group of small dischargers could collaborate and share the costs to fulfill the baseline and trend monitoring requirements. The monitoring requirements may be discontinued by the Executive Officer, as stated in the proposed amendment, so pyrethroids monitoring may not be a long term cost. In particular, the trend monitoring would be commensurate with the potential impact of the discharge and small facilities may request reduced trend monitoring based on characterization results.

Central Valley Clean Water Association Comment No. 13 (Requiring Monitoring for Alternatives Is Inappropriate (p. xi iii)): The Draft Amendments would require municipal and domestic wastewater dischargers to determine if monitoring for alternative pesticides to pyrethroids is necessary, and to identify those alternative pesticides for which monitoring would be appropriate. Then, if monitoring for an alternative pesticide is determined appropriate, the discharger would be required to monitor for the alternative to see if it is causing or contributing to an exceedance of an applicable water quality objective. CVCWA has multiple concerns with this requirement.

First, it is inappropriate and unreasonable to require municipal wastewater dischargers to be responsible for the potential use of alternative pesticides in the future. POTWs do not have control over pesticide registrations or consumer use patterns. Thus, POTWs are being made responsible for something over which they have no control.

Second, it is highly likely that there are no available criteria or water quality objectives for the alternative pesticides, thus making it difficult to determine if a water quality objective is being exceeded.

Third, this provision is akin to requiring POTWs to conduct research monitoring, which again is inappropriate and unreasonable.

Accordingly, CVCWA recommends that this paragraph be deleted in its entirety.

RESPONSE: It is not the responsibility of POTWs, and they do not have authority, to control or mitigate the use of replacement pesticide products, however, POTWs are responsible for the water quality impacts from their discharges. The proposed text is intended to require collaboration of Permittees, Water Board, and DPR to evaluate in management plans whether replacement products are of concern and warrant monitoring. Where there are no approved analytical methods available, monitoring would not be required. Monitoring for alternative insecticides would not be research monitoring, but would be based on data indicating there is a potential for impacts, as determined by the Central Valley Water Board, DPR, and the Permittee. It is important to consider when developing management plans and recommended practices whether actions would lead to shifting of use from pyrethroids to another compound. Where the identified compound has a high threat to impact surface waters based on use patterns and other factors (e.g., mobility, toxicity, etc.), such consideration for monitoring is reasonable.

Central Valley Clean Water Association Comment No. 14 (There Is No Definition for "Reliable Commercial Analytical Methods"): CVCWA remains concerned that the Draft Amendments fail to define what constitutes a "reliable commercial analytical method." For CVCWA, and wastewater in particular, there are concerns with current analytical methods for these chemicals as well as *Hyalella* in toxicity tests.

CVCWA believes that this definition needs to incorporate the concepts that multiple laboratories can provide a reproducible and reliable method over time that is comparable at several public access laboratories, and that the method has been certified by California's Environmental Laboratory Accreditation Program (ELAP) for a wastewater matrix. For example, there is not a U.S. EPA approved methodology for toxicity tests using *Hyalella*. A recent study by the Southern California Stormwater Monitoring coalition, conducted by the Southern California

Coastal Water Research Project (SCCWRP) using Surface Water Ambient Monitoring Program protocols for *Hyalrella* showed that lack of an approved method for *Hyalrella* resulted in low comparability and incorrect determinations of toxicity (i.e. ., reporting known non-toxic samples as toxic) amongst various laboratories. After constraining aspects of testing protocols, greater consistency and accuracy was found in a single repeat inter-laboratory analysis in this study. It is our understanding that there have been no inter-laboratory comparisons done over time that have tested comparability between *Hyalrella* sources. Thus, we do not know if this test is at a level of reliability to use for regulatory determinations or its impact on the reliability of prior studies, including those relied on by UCD in development of these criteria. Until there are consistent and approved reliable methods, CVCWA believes that all monitoring requirements as imposed on municipal and domestic dischargers should be suspended.

RESPONSE: See response to General Comment No. 4.

The proposed toxicity testing requirements for *Hyalrella azteca* only include receiving waters, not wastewater effluents. The SCCWRP study mentioned above demonstrated that with additional standardization on the age and size of *Hyalrella azteca* test organisms, the laboratory intercalibration results were highly comparable. A recommendation to follow the guidance on age and size of test organisms for *Hyalrella azteca* toxicity tests was added to section 8.6 of the staff report.

Central Valley Clean Water Association Comment No. 15 (1st v. 5th Percentile): CVCWA supports the Draft Amendments and Draft Staff Report's recommendation to use 5th percentile concentration goals in the numeric trigger calculations. The 5th percentile has been stated to be appropriately protective by two of the peer reviewers, and is consistent with U.S. EPA's approach for establishing water quality criteria using the Species Standard Deviation. There is insufficient reliable data and information available to support the need for the 1st or 2.5 percentiles at this time. When the Central Valley Water Board reviews the triggers as proposed in the Draft Amendments, it can then at that time determine if it is necessary to use the 5th percentile or another appropriate value as a trigger.

Moreover, because reasonable protection will be better assessed in phased implementation, as is being proposed, CVCWA recommends that the Central Valley Water Board consider multiple factors moving forward. Specifically, future evaluations should consider the type of surface water (e.g., estuary, river, urban creek, agricultural drain), the flow conditions (e.g., wet weather, dry season, wet season, irrigation season, etc.), and other factors that can affect ambient toxicity.

RESPONSE: Comments acknowledged. Future evaluations may consider the suggested factors that can affect ambient toxicity.

Central Valley Clean Water Association Comment No. 16 (Other General Comments): With respect to the Draft Amendments, CVCWA appreciates the Central Valley Water Board's efforts to propose a reasonable, phased approach. As stated previously, CVCWA supports the use of triggers versus the adoption of water quality objectives. CVCWA further supports triggers that are based on the bioavailable fraction as compared to the total concentration of a pyrethroid.

RESPONSE: Comments acknowledged.

Central Valley Clean Water Association Comment No. 17 (Conclusion): In summary, CVCWA encourages the Central Valley Water Board to adopt the Proposed Amendments, with

the language revisions recommended above. Further, CVCWA recommends that the Draft Staff Report be revised to reflect and be consistent with the revisions recommended above.

RESPONSE: Please see above responses regarding which recommended revisions were accepted.

AGRICULTURAL GROUPS COMMENTS

Comments were received from African-American Farmers of California, California Citrus Mutual, California Cotton Ginners & Growers Association, California Farm Bureau Federation, California Fresh Fruit Association, East San Joaquin Water Quality Coalition, Kern River Watershed Coalition Authority, Nisei Farmers League, Western Agriculture Processors Association, Western Growers Association, Western Plan Health Association, and Westside San Joaquin River Watershed Coalition on 24 March 2017. This group of commenters is referred to as Agricultural Groups.

Agricultural Groups Comment No. 1: In general, we agree with comments submitted by the Pyrethroid Working Group that there is insufficient information available to adopt water quality objectives at this time, and thus generally support a program that looks to implementation of management practices rather than the application of strict water quality criteria to receiving waters. We further appreciate that the control program for agricultural discharges looks to the Central Valley Water Board's other regulatory programs, such as the Irrigated Lands Regulatory Program, to develop and implement such plans. However, as currently proposed, the language suggests that each individual grower within a coalition, or an area represented by that receiving water location, would need its own individual management plan. This language is not consistent with the current Irrigated Lands Program and should be revised as follows:

"If the prohibition trigger is exceeded in a receiving water after [3 years from OAL approval date], all dischargers in the areas represented by that receiving water monitoring location shall implement a management plan for pyrethroids. Management plans may be developed for the area rather on an individual basis, and may be developed under a Water Board regulatory program, such as the Irrigated Lands Regulatory Program or the Dairy Order."

RESPONSE: The change suggested by the commenter was not made as it could create regulatory ambiguity about the responsibility for compliance. However, to address this concern and provide clarity, the proposed amendment was revised to state that the "Management plans may be developed by a third party representing multiple dischargers in an area under a Water Board regulatory program, such as the Irrigated Lands Regulatory Program or the Dairy Order."

Agricultural Groups Comment No. 2: With respect to the Surveillance and Monitoring Provisions, we are concerned with the potential impact that additional monitoring requirements may have on costs for surface water monitoring within the coalitions. The Draft Amendments will likely result in increased monitoring, and therefore increased costs. We are particularly concerned with the additional requirement to determine whether alternatives to pyrethroid insecticides are causing exceedances of water quality objectives. This is an open-ended requirement that could result in significant increased monitoring costs to agriculture in the Sacramento and San Joaquin River Basins. Accordingly, we recommend that this provision be deleted. Further, this provision is not necessary, as the Irrigated Lands Regulatory Program

already has a process in place to determine when and what additional insecticides should be monitored for as part of the program.

RESPONSE: The provision to determine whether alternatives to pyrethroid insecticides are causing or contributing to exceedances of water quality objectives is included to ensure that regulating pyrethroid discharges does not result in alternative pesticides becoming water quality issues. The [pesticides evaluation protocol](#) for third party groups (i.e., agricultural coalitions) that was issued on 29 November 2016 can be used to determine when monitoring alternative insecticides may be warranted, and thus monitoring of pesticides identified consistent with that protocol would satisfy the monitoring requirement to determine whether alternative insecticides are causing exceedances of water quality objectives. The pesticides evaluation protocol will be used by all third party groups to prepare pesticide monitoring proposals beginning with water year 2017-18 and the costs of monitoring for alternatives to pyrethroid insecticides would be included in the monitoring proposals prepared using the protocol. Thus, monitoring for alternatives to pyrethroid insecticides would not create an additional cost, but would be included in monitoring plans if an alternative insecticide was prioritized and proposed for monitoring. While the Irrigated Lands Regulatory Program currently has a process in place that addresses monitoring prioritization, having requirements in the Basin Plan ensures that such processes will remain in place.

Agricultural Groups Comment No. 3: Next, in the Surveillance and Monitoring Provisions, there is continual reference to agricultural dischargers “causing or contributing to exceedances of Acute and Chronic Triggers.” These references imply that the triggers act as receiving water limits, which is not the case. To avoid this implication, the language should be consistent with Table IV-Z, which speaks in terms of exceedances, rather than using causing or contributing language.

RESPONSE: This monitoring goal was re-written as follows to be in terms of exceeding the pyrethroid triggers rather than “causing or contributing to exceedances”:

“Determine whether discharges from agricultural operations are exceeding the Acute and Chronic Pyrethroid Triggers (Table IV-Z) through representative receiving water monitoring.”

Agricultural Groups Comment No. 4: We support a phased approach, as is contained within the Draft Amendments. Pyrethroids are extremely beneficial products for agriculture, and their beneficial uses must be weighed against their impacts to the environment. At this time, we understand that pyrethroids may cause toxicity to laboratory-reared *Hyalella Azteca*; however, it is not known if impacts to laboratory *Hyalella* actually create an unreasonable impact to aquatic life beneficial uses. Until additional data and information is available, the Central Valley Water Board should avoid the premature adoption of water quality objectives, and avoid the adoption of an implementation program that would negatively impact agriculture by causing the pyrethroids to no longer be available products. We believe that the Draft Amendments strike this appropriate balance.

RESPONSE: Comments acknowledged.

ENVIRONMENTAL AND FISHERIES GROUPS

Comments were received from Ms. Regina Chichizola, Pacific Coast Federation of Fishermen’s Association/Institute for Fisheries Resources, Mr. Ben Eichenberg, Staff Attorney, San

Francisco Baykeeper, Mr. Paul Towers, Organizing Director & Policy Advocate, Pesticide Action Network North America, Mr. Colin Bailey, Executive Director, Environmental Justice Coalition for Water, and Mr. Bill Jennings, Executive Director, California Sportfishing Alliance on 24 March 2017. This group of commenters is referred to as Environmental and Fisheries Groups.

Environmental and Fisheries Groups Comment No. 1: Pyrethroids are known to have high toxicity and significant impacts to aquatic food chains. We are concerned that nearly all samples taken so far that tested positive for pyrethroids showed major exceedances, which most likely means that fisheries are already being impacted by these highly toxic chemicals. The Basin Plan states that no individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses, and that discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses. It is apparent to us that pyrethroid discharges are resulting in both, in violation of the Plan.

RESPONSE: The pyrethroids control program and TMDLs are being developed because there have been documented cases of toxicity caused by pyrethroids. The goal of the control program and TMDLs is to reduce pyrethroids levels to concentrations that provide reasonable protection of beneficial uses.

Environmental and Fisheries Groups Comment No. 2: IFR represents commercial fishermen who have faced extremely restrictive salmon seasons many years within the last twenty years, therefore the state the San Joaquin and Sacramento River are of economic importance to our industry and all the other industries and communities we support. The Sacramento River Fall Chinook ocean abundance projection declined from 652,000 in 2015 to around 300,000 in 2016. The number of salmon-permitted vessels has declined from approximately 5000 in 1980 to approximately 1100 today. In 2015, only 585 vessels actually landed salmon in California. Fisheries and fishery-dependent coastal communities are suffering through back-to-back resource crises, with a poor salmon season in 2015, and 2016, loss of half of the crab season, and the prospect of another poor salmon season this year. Sacramento Fall chinook are not overfished. Their abundance declines are due to declines in river productivity, which in turn are caused by reduced flows, habitat degradation, the presence of toxic chemical species at mutagenic and lethal concentrations, and many other factors.

RESPONSE: Comments acknowledged.

Environmental and Fisheries Groups Comment No. 3: Fishermen bear the financial burdens of these impacts, which in many cases occur in contravention of the law, past settlements, and management plans. Pyrethroid discharges are no exception. We are especially concerned with the cumulative impacts of pyrethroid pesticides with other chemicals that are entering the watershed such as diazinon and chlorpyrifos, and with other water quality pollutants such as selenium, nitrates, salts, temperatures, poor pH, and phosphates. We have requested that an analysis of the cumulative effects of introduction of these various chemicals on water quality be included in the basin amendment documents, however this request seems to have been ignored. This is unacceptable.

RESPONSE: See response to Center for Biological Diversity Comment No. 4.

Environmental and Fisheries Groups Comment No. 4: We have also advocated for a zero allocation of pyrethroids, pyrethroid sediments concentration standards, and a robust sampling and monitoring program as part of this process. We are disappointed with the recommendation of the UC Davis 5th percentile standard, which is not protective of the WARM and COLD beneficial uses. The staff report lays out the reasoning for at least the UC Davis 1st percentile

standards for the water column and numeric standards due to the lack of monitoring data in non-listed watersheds, major exceedances where samples have been taken, already occurring bioaccumulation, genetic mutation of *Hyalella azteca*, and temperature impacts to toxicity. While the issues outlined in the staff report support the adoption of stringent standards, the staff uses uncertainties to justify less protective alternative and even not regulating the agriculture industry as part of this TMDL.

RESPONSE: See response to General Comment No. 3.

As discussed in the staff report, a zero allocation for pyrethroids would not be reasonable as long as pyrethroids remain registered for widespread use as it would require cessation or an unfeasible level of treatment of all MS4 and POTW discharges and either cessation or an infeasible level of treatment for agricultural discharges or cessation agricultural pyrethroid uses. Also as discussed in the staff report, overly stringent concentration goals could result in unintended environmental impacts from other pesticides (e.g., replacement products). The proposed amendment will require robust monitoring by agricultural, wastewater and municipal storm water dischargers. The proposed amendment includes significant requirements for agricultural dischargers. Agricultural discharges are not proposed to be regulated under TMDLs because they are already regulated under the Irrigated Lands Regulatory Program, and adopting TMDLs would not provide meaningfully different regulatory requirements on these discharges.

Environmental and Fisheries Groups Comment No. 5: The proposed concentration goals/targets are above levels of lethality for aquatic organisms such as *Hyalella azteca* and fail to account for increased toxicity of pyrethroids at low temperatures, and increased toxicity due to the numerous pesticides and other chemicals discharged into the estuary and its tributaries in the Central Valley, along with additive effects from multiple pyrethroids. The proposed concentration targets also allow increased concentrations of pyrethroids by assuming most of them are not "bioavailable", but this assumption is unproven in the field and the factors used to make this calculation are known to vary greatly, increasing the likelihood that there will be toxic impacts allowed by the board under the proposed concentration targets. The use of the bioavailable standard is also not protective of sediments which are likely to be mobilized when pyrethroids are most toxic in cool water months. This is the period when many species are emerging from eggs and larval stages, maximizing somatic growth and preparing for outmigration.

RESPONSE: See response to General Comment No. 3.

Environmental and Fisheries Groups Comment No. 6: The adoption of basin-wide TMDL standards is the most suitable option for the conservation of fish according to Basin Plan requirements, however the compliance schedule should apply immediately to anything but WWTP. Numeric triggers and management actions could be used. We support Alternative 1 for all water bodies. The WARM and/or COLD beneficial use alternative is not viable as it does not deal with the [the fact that] WARM and COLD [water bodies] are receiving bodies to the unregulated waters. We do not support the proposed alternative as it allows the board to decide which water bodies can have unregulated discharges using a heretofore undefined rubric.

RESPONSE: The rationale for the proposed regulatory approach is described in the staff report. A Basin-Wide TMDL was considered but ultimately not recommended as the regulatory alternative for the reasons specified in the staff report. As stated in the staff report, one of the main goals of the proposed control program is the protection of beneficial uses. Accordingly, the regulatory approach proposed in the staff report

appropriately focuses on water bodies with beneficial uses that are threatened by pyrethroids.

The regulatory approach in the control program in the proposed amendment would utilize TMDLs, prohibitions, and other regulatory requirements to require the development and implementation of management plans to reduce pyrethroid pesticide discharges. The proposed amendment would apply to all discharges to water bodies in the Sacramento/San Joaquin River Basins with WARM and/or COLD beneficial uses. It should be noted that nearly all natural water bodies in the Sacramento and San Joaquin River Basins have WARM and/or COLD designated uses. In addition, the Central Valley Water Board has the discretion and authority to address any water quality impairments that may be caused by upstream discharges to water bodies that do not have WARM and/or COLD beneficial uses.

Environmental and Fisheries Groups Comment No. 7: Given the highly impacted status of the Delta and its fish populations, and given the fact that pyrethroids are identified as a likely cause of that decline, the pyrethroids targets should be well below known toxicity thresholds to ensure pyrethroids are not contributing to the further decline of aquatic life and endangered fish in the Delta and that proposed concentration goals/targets are consistent with the Board's mandates and water quality objectives. The unknowns related to additive and temperature impacts should not be dismissed, but lead the board to choose the most precautionary alternative.

RESPONSE: See response to General Comment No. 3.

The proposed concentration goal explicitly addresses the additive toxicity of the six main pyrethroids of concern, and the proposed amendment also includes toxicity monitoring with the most sensitive known test species for pyrethroids to determine if other additive or synergistic effects are occurring. The proposed concentration goals will be a significant reduction in current concentrations and can be revised during the scheduled future evaluation as warranted.

Environmental and Fisheries Groups Comment No. 8 (Temperature and Flushing Impacts): The staff report states that the UC Davis 1st percentile is too protective. We strongly disagree with this conclusion. None of the alternatives deal with low temperature impacts, which greatly magnify pyrethroid toxicity and cumulative impacts to marine species. Furthermore, current flow processes aim to make water colder in important winter months to mimic natural spawning conditions. While these cold water flows are greatly needed, known increased cold water pyrethroid toxicity compromise their effectiveness in facilitating salmonid health. Extreme flood events and resulting unpredictable large discharges during winter months will likely occur in the future. Choosing an alternative that is barely protective if known pyrethroid toxicity is ignored will not led to water quality objective attainment.

RESPONSE: The proposed concentration goals will be a significant reduction in current concentrations and can be revised in the future if necessary, particularly if additional information is available on the effects of lower temperatures on multiple species for pyrethroids. The proposed amendment also includes toxicity monitoring with *Hyaella azteca*, which is the most sensitive test species for pyrethroids, to determine if other additive effects are occurring. Also see response to General Comment No. 3.

Environmental and Fisheries Groups Comment No. 9 (Impacts to *Hyaella azteca* and other aquatic species): The impacts of pyrethroids on endangered and commercial salmon species are of grave concern to fishermen, who are dealing with the economic consequences of

the ecological decline of the Delta. Pyrethroids have sublethal impacts on salmon and on species that filter water from contaminants that impact salmon. Salmon exposed to sediments and not just the water column including during their most susceptible points of lifecycle. While the impacts to local salmon are not well documented, studies of other Delta species, and salmon in other areas give us an indication of ways that salmon are being impacted by high concentrations of pyrethroids in the Sacramento and San Joaquin Rivers. Some of these studies point to the need to adopt more stringent standards due to the timings of exposure.

Furthermore genetic impacts and stressors in *Hyaella azteca* bring up some very important questions related to endangered species in the Delta. Studies related to genetically altered salmon have found that genetic disturbance to salmon species have the chance to cause serious decline in already struggling species, however the staff report rarely mentions fisheries impacts let alone genetic and cumulative impacts.

Another issue that point to the need for stringent standards from pyrethroids is the fact that they are likely traveling and concentrating into estuaries.

RESPONSE: Staff is not aware of any studies linking pyrethroid exposures to genetic alterations in fish. The presence of pyrethroids in estuaries is a key concern and a reason the Board has prioritized the development of the Pyrethroid Pesticide Control Program. Also see response to General Comment No. 3.

Environmental and Fisheries Groups Comment No. 10 (Water Quality Impacts): We are very concerned that there is little to no discussion of cumulative watershed impacts within this SED despite the fact that studies from *Hyaella azteca* point to the fact that pyrethroid can cause genetic issues and other impacts that can leave species susceptible to other water quality stressors. There is no one answer to what is killing of the food web and salmon populations in the Bay Delta and its tributaries. This makes a discussion of cumulative impacts, and recommendations based on this discussion especially important. The fact that other highly toxic chemicals such as mercury and organochlorine are also stored in sediments and mobilized by the same events that mobilize pyrethroids also point to the need for a hard look at cumulative impacts in this process. Staff dismissed Cumulative Impacts in this SED and in their recommendations.

Additive Impact with other pyrethroids are discussed but not well accounted for and additive impacts with other pesticides, including the same ones that pyrethroids were meant to replace was not addressed. This is a serious issue as one would assume that they would impact the very same waters and sediments.

RESPONSE: See response to Center for Biological Diversity Comment No. 4:

Environmental and Fisheries Groups Comment No. 11 (Algae and Biomass): The fact that pyrethroids are impacting biomass and encouraging alga, which can be harmful to fish and humans needs to be addressed further.

RESPONSE: The potential for pyrethroids to impact biomass and/or encourage alga are significant concerns that were considered in the development of the proposed amendment. The proposed concentration goals would be protective against impacts from these kinds of effects, since they are protective of even the most sensitive organisms, including the invertebrates that consume alga.

Environmental and Fisheries Groups Comment No. 12 (Sediments): For many of the reasons outlined above we support a goal of no pyrethroids in sediments and are extremely disappointed that not only is this option dismissed in this SED, but setting numeric standards for sediments is also dismissed. We understand that sediments already have accumulated pyrethroids, however this only supports the need for no new discharges especially when taken into account that additional toxins are present in sediments.

RESPONSE: The rationale for the elimination of the “no pyrethroids in sediments” alternative is described in the staff report. This alternative would simply be impossible for the Board and dischargers to achieve at this time, and could result in significant unintended consequences from alternative pesticides. For these reasons, it would not be reasonable or feasible at this time to prohibit all discharges of pyrethroids, however it is appropriate to instigate a control program that leads to beneficial use protection.

Environmental and Fisheries Groups Comment No. 13 (Issues related to Bioavailability): We have concerns the that staff is suggesting not using actual pyrethroid concentrations in water samples to determine exceedances but instead want to use an undetermined method for accounting for bioavailability. This method involves estimating concentrations, and no evidence that this method is proven or exact is provided in the SED.

Furthermore using whole water standards is more protective of sediments. The fact that organisms can be impacted by interaction with sediments, through mobilization in storm events, and through food sources demonstrate that this method will not be as protective of beneficial uses.

RESPONSE: See response to General Comment No. 1.

As discussed in the staff report, the attainment of the proposed water concentration goals is expected to result in sediment concentrations that are also below toxic thresholds.

Environmental and Fisheries Groups Comment No. 14 (Additive Toxicity): We are very concerned with additive toxicity from multiple pyrethroids. The fact that quantitative limits are not recommended to address additive toxicity, along with the fact that temperature impacts and cumulative impacts are not addressed and sediment numeric standards are not being adopted point to the fact that the more protective UC Davis 1st percentile standard should be adopted. It seems that anywhere issues that demonstrate the need to greatly protections are dismissed for lack of data, which leads to finding the less protective alternatives would meet water quality standards. However this is a highly toxic chemical that has already could serious water quality impairments. Dismissing such serious issues should lead to the board to air on the side of caution.

RESPONSE: See response to Environmental and Fisheries Groups Comment No. 7.

Environmental and Fisheries Groups Comment No. 15 (Agriculture): We do not support the proposal that agricultural discharges be regulated through the Irrigated Lands program instead of a TMDL. This is of concern because often dischargers do not have a responsibility to monitor and report regularly, and there is no monitoring plan laid out in this document.

For instance the general permit for dairy operations do not require monitoring for pesticides and orchards are still allowed to aerial spray pyrethroids, while in municipalities there are regulations on spraying.

We suggest that agriculture is regulated through TMDLs and more protective BMPs are required such as riparian buffers of 200 feet from any WARM or COLD waterway and 100 feet of any conveyance. No aerial spraying should be allowed at all. We also suggest that all applicators have to be certified and trained in HazMAT protocol so that pyrethroids are not discharged through cleaning and storing of clothes and equipment.

How exceedance are detected and who is doing the monitoring, and when needs to be laid out for this effort to be effective. Do farmers do their own monitoring? Where are the samples processed Do they monitor in winter? Do they monitor in floods? How are we guaranteed this will happen? Monitoring at the wrong times can lead to lack of detecting exceedances.

RESPONSE: The proposed amendment includes significant requirements for agricultural dischargers. As discussed in the staff report, agricultural discharges are not proposed to be regulated under TMDLs because they are already regulated under the Irrigated Lands Regulatory Program, and adopting TMDLs would not provide meaningfully different regulatory requirements for these discharges. The Board does not have authority to mandate the means of compliance with water quality objectives [Water Code section 13360], and therefore does not require specific management practices, such as those proposed by the commenter. Instead, the proposed amendment would require the dischargers to determine how to best meet the concentration goals and submit a plan to that effect for Executive Officer approval.

The Board also cannot regulate pesticide use or requirements for applicators of pesticides, as that is within the exclusive jurisdiction of DPR and USEPA. Agricultural monitoring is performed by dischargers through the ILRP, which includes the development and implementation of appropriate monitoring and reporting programs for agricultural dischargers. Under the proposed amendment agricultural dischargers, including dairies would be required to conduct monitoring adequate to meet the monitoring goals, and subject to Executive Officer approval. The Executive Officer's review would include assessing if monitoring would be conducted at the appropriate times and places and with adequate methods, to meet the proposed monitoring goals.

Environmental and Fisheries Groups Comment No. 16 (Coordination with other agencies): It is stated that municipalities do not have the ability to ban pesticides, yet pesticides with similar toxicity issues have either been banned or categorized in a way where they can only be used in certain situations by certified applicators. We suggest that the Central Valley and State Boards contact the EPA, DPR, and other agencies including wildlife agencies to establish protective regulations such as no application by the general public, riparian buffers, no application in the wet season or when summer storms are expected, application standards, HazMat type protocols for equipment, storage and clothing. If protect standards, prohibitions, and BMP are used than there is no reason to not be able to obtain a zero discharge standard in most water bodies.

RESPONSE: The Board cannot regulate pesticide use or requirements for applicators of pesticides, as that is within the exclusive jurisdiction of DPR and USEPA. Central Valley Water Board and State Board staff regularly coordinates with DPR on pyrethroids and other pesticide issues, and the proposed control program includes continued work with the State Board to coordinate with DPR and EPA to reduce pesticide water quality impacts. The Water Boards have also been involved in working with EPA on pyrethroids and will continue to work with EPA to request that water quality, particularly for California

conditions, is considered when pesticides are reviewed or considered for approval. However, as long as pyrethroids are used in the Sacramento and San Joaquin River Basins, achieving zero discharge of pyrethroids will not be reasonably attainable, thus the proposed concentration goals are aimed at providing reasonable protection of beneficial uses.

Environmental and Fisheries Groups Comment No. 17 (Alternatives): We wish to state again that the 5th percentile threshold is not protective enough as it does not account for the up to 3 fold toxicity during cold temperatures, sediment movement, cumulative impacts, uncontrolled discharges in flood events, and additive toxicity. It is only if there important issues are not accounted for that the proposed standard can claim to be protective.

We also do not agree with the dropping of the no concentrations in sediments goal. Dismissing this goal because it is hard to regulate pyrethroids is not justified as the goal is achievable.

While controlling pyrethroid discharges may be difficult and involve coordination with other agencies it is in fact possible, and the EPA and NOAA fisheries have opportunities, to engage in processes that can help achieve this goal currently. The alternative is feasible under this type of coordination.

Last we recommend the most protective monitoring program be implemented and that monitoring in areas where pyrethroid use is suspected begin immediately.

RESPONSE: See response to General Comment No. 3 regarding the proposed concentration goals.

See response to Environmental and Fisheries Groups Comment No. 4 regarding the no concentrations targets.

The proposed amendment includes coordination with DPR and EPA, but there is not certainty as to what actions they will take. Their regulatory actions will be a consideration in future board evaluations of the control program and when the Board considers potential numeric water quality objectives for pyrethroids.

The proposed amendment would result in a significant increase in pyrethroid monitoring in areas where they are greatest concern within the first two years of the program. It should also be noted that relevant monitoring is also ongoing through the Delta Regional Monitoring Program, the Boards Surface Water Ambient Monitoring Program, DPR monitoring, and Irrigated Lands and Storm Water and Wastewater programs.

SACRAMENTO COUNTY STORM WATER PROGRAM COMMENTS

Comments were received from Mr. Dave Tamayo, Environmental Scientist, Sacramento County Storm Water Program, on February 24, 2017. (Below is a summary based on the transcript of the Board Hearing.)

Sacramento County Storm Water Program Comment No. 1: Expressed support for recognizing the important role of state and federal regulators of pesticides (DPR, EPA), including the STORMS program, pathway for cooperative coordinated regional monitoring.

RESPONSE: Comments acknowledged.

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION COMMENTS

Comments were received from Ms. Jennifer Teerlink, Senior Environmental Scientist, California Department of Pesticide Regulation on February 24, 2017. (Below is a summary based on the transcript of the Board Hearing.)

California Department of Pesticide Regulation Comment No. 1: Ms. Teerlink provided a summary of the Department of Pesticide Regulation's Surface Water Protection Program, particularly the monitoring and assessment work that DPR performs. DPR continues to make efforts to prevent pesticide water quality problems through their pesticide registration process. Ms. Teerlink complimented Central Valley Water Board staff for incorporating them into the stakeholder process and consulting with them on proposed Basin Plan language. Ms. Teerlink summarized DPR's monitoring sites in California and described how DPR is monitoring to determine the effectiveness of their 2012 urban pyrethroid surface water regulations. In the future DPR is planning to collect both particulate and dissolved organic carbon data in order to estimate the freely dissolved pyrethroid concentrations, as proposed in the pyrethroids control program.

RESPONSE: Comment acknowledged.

PACIFIC ECORISK COMMENTS

Comments were received from Mr. Stephen Clark, Vice President, Pacific EcoRisk, on February 24, 2017. (Below is a summary based on the transcript of the Board Hearing.)

Pacific EcoRisk Comment No. 1: Mr. Clark recommended that the analytical chemistry and toxicity testing protocols are well-vetted and going through the Environmental Laboratory Accreditation Program in order to assure that there are well-vetted protocols available to support regulations.

RESPONSE: Monitoring for regulatory programs must use well-vetted protocols to ensure that the results are reliable. See response to General Comment No. 4.

Pacific EcoRisk Comment No. 2: Mr. Clark stated that there is likely a lot of variability in an immobility endpoint in *Hyalella* toxicity testing since the Southern California Coastal Water Research Project study showed high variability in the survival endpoint, which should be more clear-cut than the sublethal endpoint. Mr. Clark supports the 5th percentile concentration goals in light of potential variability in immobility toxicity data.

RESPONSE: The toxicity test methods proposed for use for *Hyalella azteca* measure survival as the test endpoint and do not measure an immobility endpoint. The 5th percentile concentration goals are expected to provide reasonable protection of aquatic life beneficial uses and the acute concentration goals were developed using survival data for *Hyalella azteca*.

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