DISCLAIMER

This publication is a report by staff of the California Regional Water Quality Control Board, Central Valley Region. This report contains the evaluation of alternatives and technical support for the adoption of a Basin Plan Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins. Mention of specific products does not represent endorsement of those products by the Central Valley Water Board.
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 STAFF REPORT

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REGIONAL WATER QUALITY CONTROL BOARD CENTRAL VALLEY REGION

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
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<tr>
<td>§</td>
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<tr>
<td>μg/L</td>
<td>Micrograms per liter (0.1μg/L = 100 ng/L)</td>
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<td>ACR</td>
<td>acute to chronic ratio</td>
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<td>avg</td>
<td>Average</td>
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<td>Basin Plan</td>
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<td>Criterion Continuous Concentration</td>
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<td>California Department of Pesticide Regulation</td>
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<td>CDFW</td>
<td>California Department of Fish and Wildlife</td>
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<td>Endangered Species Act</td>
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<td>K&lt;sub&gt;DOC&lt;/sub&gt;</td>
<td>Dissolved organic carbon-water partition coefficient</td>
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<td>LA</td>
<td>Load Allocation</td>
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<td>lbs</td>
<td>Pounds</td>
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<td>LC</td>
<td>Loading Capacity</td>
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<td>Management Agency Agreement</td>
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<td>ng/L</td>
<td>Nanograms per liter (100 ng/L = 0.1μg/L)</td>
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<td>NPDES</td>
<td>National Pollution Discharge Elimination System</td>
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<td>Porter-Cologne Water Quality Control Act</td>
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<td>quality assurance</td>
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<td>quality control</td>
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<td>Sacramento River</td>
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<td>TMDL</td>
<td>Total Maximum Daily Load</td>
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<td>UC Davis</td>
<td>University of California, Davis</td>
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<td>Acronym</td>
<td>Full Form</td>
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<td>United States Geological Survey</td>
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EXECUTIVE SUMMARY

The purpose of this Staff Report is to provide the rationale and supporting documentation for proposed amendments to the Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and San Joaquin River Basin (Central Valley Water Board, 2016a). The proposed amendments would establish controls for the discharges of pyrethroid pesticides into selected surface waters in the Sacramento and San Joaquin River Basin, and a phased program of implementation, including:

- A conditional prohibition of discharges of pyrethroid pesticides above certain concentrations into surface waters with aquatic life beneficial uses
- Total Maximum Daily Loads for pyrethroid pesticides in selected surface waters
- Recommendations for agencies that regulate the use of pesticides
- Proposed Board actions for the control of pesticide discharges
- Monitoring requirements and other provisions to ensure data and information is produced to assess progress and inform future Board actions
- Policies and monitoring requirements that address alternative pesticides to pyrethroids.

Pyrethroid pesticides are currently widely used for structural pest control in urban and residential areas, in various consumer use pest control products, and in agriculture in the Central Valley, throughout California, and the United States. Since the early 2000s, pyrethroids have been found at levels of concern in surface waters in the Sacramento and San Joaquin River Basins that receive urban storm water and/or agricultural discharges. The main sources of these pyrethroids are discharges from municipal storm water systems (also known as municipal separate storm sewer systems or MS4s) and agricultural lands. Pyrethroids have also been detected in municipal wastewater treatment plant, (also known as publicly owed treatment works or POTW) discharges at levels of concern. Fourteen surface water bodies in the Central Valley have been documented as impaired by pyrethroids, nine of these are impaired due to municipal storm water discharges, while five are due to agricultural discharges. A surface water body is considered impaired by a single or multiple pyrethroids when data indicate that these insecticides are found at concentrations that exceed applicable narrative water quality objectives established in the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) to protect aquatic life.

Six pyrethroids have been identified as priority constituents because they were identified as contributing to documented pyrethroids impairments and they have the highest use in the Sacramento and San Joaquin River Basins on a mass basis. The six
priority pyrethroids are bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin.

In order to address pyrethroids impairments and the need to control pyrethroid discharges throughout the Sacramento and San Joaquin River Basins, staff of the Central Valley Regional Water Quality Control Board (Central Valley Water Board or Board) have developed a proposed Basin Plan amendment that is discussed in this staff report. The Proposed Basin Plan Amendment for Pyrethroid Pesticides is provided following the Executive Summary.

**Project Goal and Objectives**

The overall goal for the proposed amendment is to establish clear requirements for the control of pyrethroid pesticide discharges that provide reasonable protection of beneficial uses in the Sacramento and San Joaquin River Watersheds, including the Delta.

**Primary Objectives**

1. Establishing measurable pyrethroid concentration goals that provide reasonable protection of beneficial uses.
2. Addressing existing impairments from pyrethroid pesticides through total maximum daily loads (TMDLs) or other means.
3. Developing reasonable and attainable implementation provisions to achieve the pyrethroid concentration goals.

**Additional Objectives**

4. Efficient process to address future impairments.
6. A phased program that:
   a. Includes monitoring and data gathering to resolve uncertainties and inform the Board’s future actions;
   b. Avoids unintended regulatory consequences, and
   c. Significantly improves water quality while uncertainties are being addressed.

**The Need for a Phased Approach**

Pyrethroids can be toxic to aquatic life at very low concentrations. Therefore potential concentration goals for the protection of aquatic life are very low, often below those detectable with current analytical limits, and there is uncertainty about the reductions needed, what practices or controls would be needed to attain targets, and resulting costs. The available data do indicate, however, that significant reductions are needed to attain water quality objectives in water bodies receiving significant urban storm water or agricultural discharges.
There are several effective agricultural management practices to control pyrethroids, including source control efforts, many of which are already being implemented, and these have resolved some pyrethroid toxicity impairments. However, it is not known whether these practices will result in consistent attainment of pyrethroid concentrations below aquatic life protection criteria. Storm water and municipal wastewater dischargers have less management practices available. Notably they cannot control the use of pesticides by individuals in their service areas. Additionally, while POTW treatment significantly reduces pyrethroid concentrations, there are no wastewater treatment technologies that have been demonstrated to reliably achieve concentrations below aquatic life protection criteria. In urban areas, one of the primary means of source control is through the implementation of the authorities of agencies which regulate pesticide use. Because of the uncertainty of attainability of the pyrethroid concentration goals, there is also potential for unintended regulatory consequences, especially for Clean Water Act permitted municipal dischargers, when these goals are established as regulation.

In light of the need to reduce pyrethroid toxicity amid uncertainty, the proposed amendment is a phased approach, designed to move toward water quality improvement and ensure data are collected to resolve these uncertainties. This approach will allow the Board to revise Basin Plan requirements, including the prohibition triggers, TMDL allocations and targets, before these goals would need to be achieved.

**Pyrethroid Concentration Goals**

The first project objective is to establish measurable pyrethroid concentration goals to provide reasonable protection of beneficial uses as we address current uncertainty in analytical capabilities, reductions needed, and economic impacts. At this time the Board does not have enough information to complete the analysis required in the water code for the adoption of pyrethroid water quality objectives. More information is needed, especially on effectiveness of management practices in order to assess attainability of concentration goals and the costs of implementation that would be required to attain water quality objectives. Concentration goals are proposed to be established as targets and allocations for TMDLs, and as triggers for the requirement of management practices in a conditional prohibition to move toward improved water quality while needed information is developed.

To determine appropriate levels for the pyrethroid concentration goals, fourteen alternatives were evaluated as potential pyrethroid concentration goals in the water column. These alternatives included the Basin Plan guidance of $1/10$ of the lowest $\text{LC}_{50}$ (lethal concentration to 50% of the tested population) and water quality criteria derived using several different methods. Each alternative was evaluated based on the project objectives. The evaluation resulted in a focus on criteria developed using the UC Davis methodology. The UC Davis methodology directs use of the 5th percentile of the
Executive Summary

statistical species sensitivity distribution, unless a more sensitive species falls below that value – at which point the 1st percentile is recommended. The 1st percentile UC Davis criteria were identified as being potentially overly conservative when compared to available ecotoxicity data because they were at least a factor of 4 below the lowest LC$_{50}$ in the data sets. For each pyrethroid, the lowest LC$_{50}$ in the data set was for the aquatic invertebrate *Hyalella azteca*, which is a resident species in the Sacramento and San Joaquin River basins. The *Hyalella azteca* LC$_{50}$ fell just higher than the 2.5 percentile, so both the 2.5 and 5th percentile UC Davis criteria were evaluated as providing reasonable protection to aquatic life beneficial uses, which have been identified as the most sensitive beneficial uses for pyrethroids. The UCD criteria are all significantly lower than concentrations currently observed in impaired waters, indicating significant reductions will be needed to attain water quality standards.

Staff recommends the 5th percentile UC Davis acute and chronic criteria, recognizing and considering the need to provide reasonable beneficial use protection (i.e. balance the required level of protection with achievability and economic cost), the significant water quality improvements that will be needed to attain these criteria, uncertainty about potential costs and attainability, potential impacts of alternative pesticides, and the proposed phased regulatory approach which allows the targets to be adjusted if needed.

Considerations in Selecting Concentration Goals

There are several conservative and non-conservative elements and other factors considered in the development of the pyrethroid criteria and proposed concentration goals that affect their overall level of beneficial use protection. These include the averaging period and exceedance frequency of the UC Davis criteria, reduced bioavailability due to binding to suspended solids, the additive toxicity of pyrethroids with other pyrethroids and other toxicants, temperature effects on pyrethroid toxicity, and potential toxic effects not directly incorporated into the criteria calculations. Additionally, there are key policy considerations for using aquatic life pesticide criteria (which are derived using toxicity information for the protection of aquatic life) as concentration goals in a regulatory program. These include the regulatory use of the criteria, attainability and costs, availability of analytical detection limits and potential impacts from alternative pesticides.

Criteria Averaging Periods and Exceedance Frequencies

One conservative assumption in the UC Davis method is that the averaging periods for the acute and chronic criteria are considerably shorter than the toxicity test durations they are derived from. The acute criteria averaging period is 1-hour, while acute toxicity tests are 96-hours long. The chronic criteria averaging period is 4-days, while the chronic toxicity tests are typically at least 7-day exposures. Toxic effects are typically
seen at lower concentrations with longer exposure times, so having shorter averaging periods than the toxicity test exposures is a conservative assumption of the UC Davis method.

The UC Davis method also includes an exceedance frequency of not more than once every 3 years. This requirement 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. The 3 year exceedance frequency of the UC Davis method was chosen based on a literature review of ecosystem recovery studies. Several studies involving pyrethroids showed affected populations recovered from short pulse exposures in several weeks, but one pyrethroid study showed that populations had not fully recovered over 240 days after a short exposure. Most studies showed that recovery occurred in 3 years or less, so the 3 year exceedance frequency is conservative. The acute and chronic averaging periods and the exceedance frequency of the UC Davis are the same as those given in the USEPA guidelines for deriving aquatic life criteria.

Bioavailability and Sediment Toxicity

Staff recommends accounting for the reduced bioavailability of pyrethroids due to binding to suspended solids and dissolved organic matter. Bioavailability is the concept that pyrethroids bound to suspended solids or to dissolved organic matter have a much smaller toxic effect on aquatic organisms compared to pyrethroids that are freely dissolved. Pyrethroids are hydrophobic chemicals, meaning they have a strong tendency to bind to surfaces instead of being freely dissolved in water. In general, 70-99% of pyrethroids in a sample are bound to surfaces, thus only a small fraction of the total pyrethroid has the potential to cause toxicity to organisms in the water column. Protection of benthic organisms is also considered as the bound pyrethroids will settle to the bed sediments. Equilibrium-partitioning calculations indicate that attainment of the UCD criteria in the water column would also likely resolve most of the toxicity to *Hyalella* observed in sediment toxicity testing. Sediment toxicity testing and sediment toxicity targets are also included in the proposed amendment to ensure benthic organisms are protected.

It is not currently feasible to directly measure the freely dissolved pyrethroid concentration in commercial laboratories, although that may be possible in several years. Until direct measurement is feasible, staff is recommending that the freely dissolved pyrethroid concentration be calculated from the total pyrethroid concentration and the dissolved and particulate organic carbon concentrations in a given sample, and used to compare to the concentration goals. This recommendation is based on scientific literature on pyrethroids binding and bioavailability.
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Additive Toxicity

Staff recommends accounting for additive toxicity when multiple pyrethroids are present in the water. Because all pyrethroids have the same general mode of toxic action, when multiple pyrethroids are present in a sample, their toxicity will be additive. Even when each pyrethroid is below its individual concentration goal, the levels can add up to cause a toxic effect. For this reason, staff recommends consideration of additive toxicity of the six priority pyrethroids via a formula that sums the concentration goal-normalized pyrethroids in a sample. The consideration of additive toxicity of pyrethroids is only possible for the six pyrethroids with concentration goals, which are the six highest use and most frequently detected pyrethroids. Other pyrethroids that do not have criteria could not be included in the proposed concentration goal, so total pyrethroid toxicity could be underestimated if other pyrethroids are present.

Pyrethroids also have additive effects with other pesticides and toxicants, such as metals and commonly used pesticides like organophosphates. These effects were considered in criteria derivation, but could not be included in the criteria since the effects could not be quantified across multiple species. Synergism between pyrethroids and piperonyl butoxide (PBO), a pesticide formulation additive and a known synergist of pyrethroids, was also considered in criteria derivation, but not accounted for because it could not be quantified in across multiple species. Increased toxicity of pyrethroids due to the presence of PBO has been documented in the project area (Weston et al. 2006).

Temperature Effects

Pyrethroid toxicity is dependent on water temperatures. This effect is not accounted for in the UC Davis criteria because it could not be adequately described quantitatively across multiple species. Most of the toxicity test data are based on tests at 20-25°C, while ambient water temperatures in Central Valley waterways in winter are closer to 15°C and can range above 30 ºC in some waterbodies during the summer. Pyrethroids have been demonstrated to be 2 to 3 times more toxic at 15°C compared to the standard test temperature of 23 ºC. At 30 ºC toxicity would likely be lower, but pyrethroid toxicity at temperature above 23 ºC has not been tested or quantified. Therefore pyrethroids’ toxic potential during winter storms may be greater than assumed in the criteria, and pyrethroids’ toxic potential in warmer water bodies during summer runoff events may be less than assumed in the criteria.

Species Sensitivity

The most sensitive aquatic organism in the ecotoxicity data sets is the invertebrate *Hyalella azteca*. This species is a resident in the Sacramento and San Joaquin River Basins and is a source of food for many fish species. The chronic (4-day average
concentration) 5th percentile UC Davis criteria for all but one pyrethroid are slightly below the 96-hour LC$_{50}$ (concentration lethal to 50 percent of the tested population in a 4-day test) values for Hyalella azteca. The chronic 5th percentile criterion for one pyrethroid is equal to the Hyalella LC$_{50}$ values. The acute 5th percentile UC Davis criteria are slightly above the Hyalella LC$_{50}$ values, while the 2.5 percentile criteria are all below the H. azteca LC$_{50}$ values. There are other species resident in the Project Area that are known to be similarly sensitive to pyrethroids as the amphipod Hyalella azteca. Estuarine mysid shrimp, such as Americamysis bahia, reside in the Delta, but were not included in criteria derivation because the data for these species are from saltwater toxicity testing and only freshwater toxicity tests were included for criteria derivation.

Pyrethroids can also have sublethal effects on fish at low concentrations similar to those toxic to sensitive invertebrates. Chronic sublethal effects on longfin smelt, fish that reside in the Delta, have been demonstrated at levels equal to the lethal toxicity values (LC$_{50}$) for Hyalella azteca. This study was not available when the UC Davis criteria were derived, but all the UC Davis chronic criteria are below this effect level. Endocrine disruption of reproductive functions in salmon due to inhibition of the olfactory response to pheromonal cues has also been demonstrated at low pyrethroid concentrations (Moore and Waring 2001). These olfactory effects were considered, but not included in criteria derivation calculations because they could not be directly linked to survival, growth or reproduction and effect concentrations were not quantified due to detection limits.

Water Quality Improvements Needed

The proposed concentration goals are well below current concentrations in pyrethroid-impaired waterbodies in urban and agricultural areas, so attaining these goals in these water bodies and throughout the Sacramento and San Joaquin River basins will be a significant water quality improvement, requiring significant reductions in discharges in many areas. Due to a lack of monitoring data and limitations in analytical detection limits, there is considerable uncertainty as to what reductions will be needed to attain the proposed concentration goals in most discharges in order to meet the TMDL allocations and prohibition triggers.

Analytical Capabilities

Commercial analytical methods that can reliably detect pyrethroids at the proposed pyrethroid concentration goals are not currently available. However analytical methods for pyrethroids are continuing to be developed and improved. Detection limits are currently close to allowing determination of attainment of the 5th percentile based criteria, but well above the lower criteria concentrations.
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Available Controls and Costs

Effective agricultural management practices to control pyrethroids, many of which are already being implemented, include improved pest management and use of alternative pesticides to reduce pyrethroid use, application practices that reduce potential for overspray and drift, and practices that reduce or slow runoff, and reduce or capture sediments in runoff such as vegetation and improved water management. While these practices are generally effective, it is not known whether the practices will result in consistent attainment of pyrethroid concentrations below the values being considered as targets and/or triggers for the proposed TMDL and prohibition.

Best management practices for municipal storm water and wastewater dischargers include education and outreach activities, such as encouraging reduced pesticide use and proper pesticide use, reduced runoff, and pollution prevention activities, such as reducing the municipalities' own use of pesticides, and use of integrated pest management and coordination with regulators of pesticide use. In some cases, features such as constructed wetlands can reduce pyrethroid concentrations, but these may not be feasible for many MS4 and POTW facilities. Municipal wastewater treatment by the POTWs has been shown to significantly reduce pyrethroid concentrations, but the levels POTWs can consistently attain in effluent using any of the currently feasible wastewater treatment technologies are uncertain. While the available practices and technology for the MS4s and POTWs can reduce pyrethroid concentrations, they are not known to be consistently effective at reducing pyrethroids to levels which would attain water quality standards. This is especially a concern in urban environments because, under California law, storm water and municipal wastewater dischargers are prohibited from regulating the use of pesticides by individuals in their service areas. In these areas, one of the primary means of source control is implementation of the authorities of agencies that regulate pesticide use: the California Department of Pesticide Regulation (DPR); County Agricultural Commissioners; and USEPA’s Office of Pesticide Programs (OPP), but the overall reductions that can be attained in urban areas remains uncertain.

Due to the uncertainty in the extent of reductions needed and uncertainty about the effectiveness of management practices and other actions to reduce concentrations, there is significant uncertainty as to the overall costs of attainment of the proposed concentration goals based on the 5th percentile. The proposed regulatory approach was designed to meet the goal of reasonable and attainable implementation requirements, but the costs to implement practices to control pyrethroids are likely to be significant with concentration goals based on the 5th percentile. Attaining concentration goals based on more stringent criteria (based on the 2.5th percentile) would likely be more costly, as larger reductions would be needed and more dischargers would need to implement practices to reduce concentrations.
Regulatory Use of the Concentration Goals

The concentration goals are proposed for use as prohibition triggers and in TMDL allocations – both of which apply at the point of discharge. 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. While the proposed regulatory approach was designed to avoid unintended regulatory consequences, potential for regulatory consequences due to non-attainment of the goals would be greater with the lower concentration goals based on the 2.5th percentile.

Alternative Pesticides

Potential impacts from alternative pesticides and the need to have a balanced approach to regulation of all pesticide discharges is also a key consideration. If the pyrethroid concentration goals are lower than what can be considered reasonable and achievable, the members of the regulated community who have control over pesticide applications will most likely seek alternative pesticides with less rigorous water quality regulatory controls than those for pyrethroids.

Proposed Concentration Goals

Staff recommends concentration goals based on the 5th percentile UC Davis acute and chronic criteria, adjusted for bioavailability and additivity. These concentration goals provide reasonable protection of aquatic ecosystems during the first phase of the program while management practices are initiated and additional information on achievability and cost are documented. A significant reduction in pyrethroid concentrations will be realized by attaining the proposed concentration goals. Additionally, the concentration goals are proposed for use as prohibition triggers and TMDL allocations – both of which apply at the point of discharge. Additional dilution will likely be available in most receiving waters – thereby resulting in significantly lower pyrethroid concentrations in receiving waters and providing a margin of safety. Finally, toxicity monitoring will be utilized to assess potential additive or synergistic effects and if pyrethroids are contributing to beneficial use impacts. The overall regulatory approach, in combination with the concentration goals, monitoring, and implementation provisions, will meet the project objectives and overall project goal of establishing clear requirements for the control of pyrethroid pesticide discharges that provide reasonable protection of beneficial uses.

Proposed Regulatory Approach

Staff is proposing a phased overall regulatory approach to meet the project objectives. A phased approach will provide the flexibility needed for adaptive management, while
also providing assurances that progress will be made towards attainment of water quality standards in impaired waters. The proposed regulatory approach would require the implementation of reasonable management practices, coordination with pesticide regulators, and data gathering in the near term to inform the Board on possible future actions.

There are four main components of this regulatory approach:

1. **Monitoring** and data gathering to inform the Board’s future actions.
2. Addressing pyrethroid water quality impairments via:
   a. **Total Maximum Daily Loads (TMDLs)** to address nine impairments in urban water bodies (Sacramento & Roseville). Under the phased approach, the TMDLs would be re-visited before the compliance deadline.
   b. Pollution control requirements that will address pyrethroid impairments in five water bodies that are currently on the 303(d) list due to pyrethroids impairments with agricultural runoff sources. These requirements would support Integrated Report **Category 4b demonstrations** that would meet EPA expectations for demonstrating that TMDLs are not required for water bodies in which existing regulatory requirements are expected to result in attainment of pyrethroid water quality standards.
3. 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.
4. **Continued Coordination** with Department of Pesticide Regulation (DPR) and USEPA Office of Pesticide Programs.

**Monitoring and Data Gathering**

Monitoring and data gathering to inform the Board’s future actions is the first component of the regulatory approach. Initial baseline monitoring will serve to characterize the extent to which water bodies may be receiving pyrethroids at levels exceeding the concentration goals and the levels in different sources (agricultural, urban storm water, POTWs). Baseline monitoring will be focused on water bodies that have not been previously identified as impaired by pyrethroids. The baseline monitoring results will provide the information needed to determine where implementation of management practices is needed to prevent future impairments. Trend monitoring will continue in order to track pyrethroid levels over time as management practices are implemented, and data and information will be gathered regarding treatment feasibility, management practices effectiveness and costs.
Addressing Impaired Waterbodies with TMDLs and Alternative Pollution Control Requirements (Category 4b)

The second component of the regulatory approach will accomplish the second project objective of addressing the existing pyrethroids water quality impairments. The proposed amendment addresses the federal Clean Water Act requirement that the Board establish Total Maximum Daily Loads (TMDLs) or other pollution control requirements to address pollutant exceedances that result in water quality impairments (i.e., federal Clean Water Act section 303(d) listings). The proposed amendment will establish TMDLs for nine water bodies that are currently on the 303(d) list due to pyrethroids impairments with urban runoff sources. The proposed amendment will also establish pollution control requirements that will address pyrethroid impairments in five water bodies that are currently on the 303(d) list due to pyrethroids impairments with agricultural runoff sources.

Basin-Wide Conditional Prohibition

The third regulatory component is the establishment of a conditional prohibition of pyrethroids above the concentration goals. This component is aimed at preventing future impairments and addressing areas where pyrethroids may be negatively affecting beneficial uses. The proposed amendment would establish a conditional prohibition for discharges of six pyrethroid pesticides to all water bodies with aquatic life beneficial uses in the Sacramento River and San Joaquin River basins, with the exception of those water bodies covered under pyrethroids TMDLs. Under the conditional prohibition, discharges of pyrethroids at concentrations that exceed numeric pyrethroid triggers are prohibited unless a discharger is implementing a management plan to reduce pyrethroid levels in their discharges. Under the conditional prohibition, it is anticipated that some municipal storm water dischargers, agricultural dischargers, and publicly-owned treatment works (POTWs) would be required to implement management practices to reduce pyrethroid discharges and a monitoring program to track effectiveness and cost. The requirement to implement management practices addresses the third project objective of developing reasonable and attainable implementation provisions. Dischargers would be required to develop management plans and choose practices to implement. This framework represents an adaptive management approach so that dischargers and the Board may continue learning about the effectiveness of different practices as well as their economic impact.

Coordination with Pesticide Regulatory Agencies

The fourth regulatory component is coordination with the agencies with legal authority to regulate pesticide use. Such coordination aims to improve source control to reduce current and future water quality impairments caused by pyrethroids and replacement products alike. The agencies that regulate pesticide use are the California Department
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of Pesticide Regulation (DPR) and U.S. Environmental Protection Agency (USEPA). Coordination between the Board, dischargers and the pesticide regulatory agencies is an important component of the overall regulatory approach because DPR and USEPA are the only agencies that have the authority to affect product registrations, product labels, require mitigation or adopt regulations for the use of pesticides. The proposed amendment contains actions for the Central Valley Water Board to support the project goals and recommendations for DPR and USEPA to continue and enhance their roles in preventing water quality impairments by pesticides.

Regulatory Timeline

A timeline of the phased regulatory approach in the proposed amendment includes a short timeline for dischargers to impaired waters to develop management plans, an initial 2 year period to complete baseline monitoring in areas where pyrethroid levels have not been thoroughly assessed and a year following that to develop management plans. There will be staff updates to the Board every 3 years to report on progress of the control program and a commitment for the Board to re-visit the pyrethroids control program in 15 years as part of the triennial review processes. There is a proposed deadline of 20 years for impaired waters to be attaining standards. When the Board re-visits the pyrethroids control program, the goal is to have enough information to complete a full analysis of the Water Code 13241 factors for adopting a water quality objective. At that time, the Board may consider whether adopting a pyrethroids water quality objective is reasonable and necessary to protect beneficial uses. In order to complete the analysis of 13241 factors, more information is needed on effectiveness of management practices in order to assess attainability of concentration goals and the costs of implementation that would be required to attain water quality objectives. The monitoring and information gathering requirements in the proposed amendment are designed to collect this information.

The proposed amendment represents the continuing efforts of the Board to establish a comprehensive program to control discharges of pesticides that pose a significant risk to surface water quality in the Sacramento River and San Joaquin River basins.
PROPOSED BASIN PLAN AMENDMENT FOR PYRETHROID PESTICIDES

The proposed amendment describes a pyrethroids control program that includes:

1) Actions for the Central Valley Water Board,
2) Recommendations for the agencies that regulate pesticide use (California Department of Pesticide Registration and U.S. EPA),
3) A conditional prohibition for pyrethroid discharges in exceedance of numeric triggers for Sacramento and San Joaquin River Basin water bodies with the aquatic life beneficial uses,
4) Total maximum daily loads for pyrethroids for impaired waters in urban areas, which include numeric targets that will be used to assess attainment of the wasteload allocations,
5) Requirements for addressing water bodies on the 303(d) list for pyrethroids in agricultural areas,
6) Monitoring requirements to assess baseline conditions as well as continued trend monitoring, and
7) A timeline for the Board to re-visit the pyrethroids control program in a phased approach, including regular updates on the program.

Note: Text additions are noted by being underlined and deletions of existing Basin Plan text are noted by strikeout.
Changes to Chapter IV, Implementation

Under “Regional Water Board Prohibitions”

Add the following:

X. Pyrethroid Pesticides Discharges

Beginning [3 years from OAL approval date], discharges of pyrethroid pesticides at concentrations that exceed pyrethroid triggers (Table IV-Z) to water bodies with designated or existing\(^1\) WARM and/or COLD beneficial uses are prohibited unless a discharger is implementing a management plan to reduce pyrethroid levels in their discharges. Management plans must identify specific management practices for controlling pyrethroid pesticides that will be implemented and are subject to approval processes within the Boards’ applicable regulatory programs. Draft management plans must be submitted at least 6 months prior to [3 years from OAL approval date]. Dischargers shall begin implementing their management plans within 30 days after receipt of written approval of their management plan. For municipal storm water and municipal and domestic wastewater dischargers, management plans are deemed approved and ready to implement if no written approval is provided after 6 months, unless the Executive Officer provides written notification to extend the approval process. If concentrations in a discharge not covered under a management plan are found to exceed the pyrethroid triggers after [3 years from OAL approval date], the discharger must submit a draft management plan for approval within 1 year of identifying the exceedance and begin implementing the management plan within 30 days after receipt of written approval of the management plan. Further implementation provisions relating to the conditional prohibition of pyrethroid pesticide discharges are given in the Implementation chapter under the header Pyrethroid Pesticides Control Program (p. IV-xxx).

The pyrethroid triggers are intended to be used to indicate when management practices are to be implemented by the discharger. When the triggers are exceeded in monitoring 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 for use as water quality-based effluent limitations or for reasonable potential analysis.

\(^1\) Existing as defined in Title 40 of the Code of Federal Regulations, section 131.3(e)
Discharges of pyrethroids that are subject to and are meeting all applicable pyrethroid TMDL requirements shall be deemed in compliance with this prohibition.
Table IV-Z. Numeric triggers for pyrethroid pesticides (including all stereoisomers).

**Pyrethroid Concentration Calculation**

Concentrations of pyrethroid pesticides must be above reporting limits (limits of quantitation) to be included; concentrations reported as not-detected or as below the limit of quantitation will be considered as zero (0) in the below formulas. Guidance on acceptable methods is given in the Surveillance and Monitoring chapter under the header Pyrethroid Pesticides Discharges (p. V-xx).

**Freely dissolved pyrethroid concentrations** may be used in the below formulas to determine the sum of acute and chronic additive concentration goal units (CGUs). The freely dissolved concentration of each quantified pyrethroid pesticide in a sample may be directly measured or estimated using partition coefficients. Methods for direct measurement must be approved by the Executive Officer before they are used for determining exceedances of the pyrethroid pesticides numeric triggers. To estimate the freely dissolved concentration of a pyrethroid pesticide with partition coefficients, the following equation shall be used:

\[
C_{dissolved} = \frac{C_{total}}{1 + (K_{OC} \times [POC]) + (K_{DOC} \times [DOC])}
\]

Where:
- \( C_{dissolved} \) = concentration of a an individual pyrethroid pesticide that is in the freely dissolved phase (ng/L),
- \( C_{total} \) = total concentration of an individual pyrethroid pesticide in water (ng/L),
- \( K_{OC} \) = organic carbon-water partition coefficient for the individual pyrethroid pesticide (L/kg),
- \([POC]\) = concentration of particulate organic carbon in the water sample (kg/L), which can be calculated as \([POC]=[[TOC]-[DOC]]\),
- \( K_{DOC} \) = dissolved organic carbon-water partition coefficient (L/kg),
- \([DOC]\) = concentration of dissolved organic carbon in the sample (kg/L).

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

<table>
<thead>
<tr>
<th>Pyrethroid Pesticide</th>
<th>Ambient Waters</th>
<th>Wastewater Effluents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( K_{OC} ) (L/kg)</td>
<td>( K_{DOC} ) (L/kg)</td>
</tr>
<tr>
<td>Bifenthrin</td>
<td>4,228,000</td>
<td>1,737,127</td>
</tr>
<tr>
<td>Cyfluthrin</td>
<td>3,870,000</td>
<td>2,432,071</td>
</tr>
<tr>
<td>Cypermethrin</td>
<td>3,105,000</td>
<td>762,765</td>
</tr>
<tr>
<td>Esfenvalerate</td>
<td>7,212,000</td>
<td>1,733,158</td>
</tr>
<tr>
<td>Lambda-cyhalothrin</td>
<td>2,056,000</td>
<td>952,809</td>
</tr>
<tr>
<td>Permethrin</td>
<td>6,074,000</td>
<td>957,703</td>
</tr>
</tbody>
</table>
Acute Pyrethroid Trigger
The acute additive pyrethroid pesticides numeric trigger is equal to one (1) acute additive concentration goal unit (CGU) not to be exceeded more than once in a three year period. The CGUs are calculated as the sum of individual measured pyrethroid concentration-to-acute concentration goal ratios, as defined in the following formula. For calculation of CGUs, available samples collected within the applicable averaging period for the numeric trigger will be used to determine exceedances of the trigger. Freely dissolved pyrethroid concentrations may be used in the numerator of each ratio if appropriate data are available, as described in the equation to calculate freely dissolved concentrations given above.

\[
CGU_{\text{acute}} = \frac{C_{\text{bif}}}{ACG_{\text{bif}}} + \frac{C_{\text{cyf}}}{ACG_{\text{cyf}}} + \frac{C_{\text{cyp}}}{ACG_{\text{cyp}}} + \frac{C_{\text{esf}}}{ACG_{\text{esf}}} + \frac{C_{\text{lcy}}}{ACG_{\text{lcy}}} + \frac{C_{\text{per}}}{ACG_{\text{per}}}
\]

Where:
- \( C_{\text{bif}} \) = Average concentration of bifenthrin in ng/L from a 1-hour averaging period,
- \( C_{\text{cyf}} \) = Average concentration of cyfluthrin in ng/L from a 1-hour averaging period,
- \( C_{\text{cyp}} \) = Average concentration of cypermethrin in ng/L from a 1-hour averaging period,
- \( C_{\text{esf}} \) = Average concentration of esfenvalerate in ng/L from a 1-hour averaging period,
- \( C_{\text{lcy}} \) = Average concentration of lambda-cyhalothrin in ng/L from a 1-hour averaging period,
- \( C_{\text{per}} \) = Average concentration of permethrin in ng/L from a 1-hour averaging period,
- \( ACG_{\text{bif}} \) = Bifenthrin acute concentration goal of 0.8 ng/L,
- \( ACG_{\text{cyf}} \) = Cyfluthrin acute concentration goal of 0.8 ng/L,
- \( ACG_{\text{cyp}} \) = Cypermethrin acute concentration goal of 1 ng/L,
- \( ACG_{\text{esf}} \) = Esfenvalerate acute concentration goal of 2 ng/L,
- \( ACG_{\text{lcy}} \) = Lambda-cyhalothrin acute concentration goal of 0.7 ng/L,
- \( ACG_{\text{per}} \) = Permethrin acute concentration goal of 6 ng/L,
- \( CGU_{\text{acute}} \) = The sum of measured pyrethroid concentration-to-acute concentration goal ratios, rounded to one significant figure. A sum exceeding one (1) indicates an exceedance of the acute additive pyrethroid pesticides numeric trigger.

Chronic Pyrethroid Trigger
The chronic additive pyrethroid pesticides numeric trigger is equal to one (1) chronic additive concentration goal unit not to be exceeded more than once in a three year period. The chronic CGUs are calculated as the sum of individual measured pyrethroid concentration-to-chronic concentration goal ratios, as defined in the following formula. For calculation of CGUs, available samples collected within the applicable averaging period for the numeric trigger will be used to determine exceedances of the trigger. Freely dissolved pyrethroid concentrations may be used in the numerator of each ratio if appropriate data are available, as described in the equation to calculate freely dissolved concentrations given above.

\[
CGU_{\text{chronic}} = \frac{C_{\text{bif}}}{CCG_{\text{bif}}} + \frac{C_{\text{cyf}}}{CCG_{\text{cyf}}} + \frac{C_{\text{cyp}}}{CCG_{\text{cyp}}} + \frac{C_{\text{esf}}}{CCG_{\text{esf}}} + \frac{C_{\text{lcy}}}{CCG_{\text{lcy}}} + \frac{C_{\text{per}}}{CCG_{\text{per}}}
\]

Where:
- \( C_{\text{bif}} \) = Average concentration of bifenthrin in ng/L from a 4-day averaging period,
- \( C_{\text{cyf}} \) = Average concentration of cyfluthrin in ng/L from a 4-day averaging period,
- \( C_{\text{cyp}} \) = Average concentration of cypermethrin in ng/L from a 4-day averaging period,
- \( C_{\text{esf}} \) = Average concentration of esfenvalerate in ng/L from a 4-day averaging period,
- \( C_{\text{lcy}} \) = Average concentration of lambda-cyhalothrin in ng/L from a 4-day averaging period,
- \( C_{\text{per}} \) = Average concentration of permethrin in ng/L from a 4-day averaging period,
- \( CCG_{\text{bif}} \) = Bifenthrin chronic concentration goal of 0.1 ng/L,
- \( CCG_{\text{cyf}} \) = Cyfluthrin chronic concentration goal of 0.2 ng/L,
- \( CCG_{\text{cyp}} \) = Cypermethrin chronic concentration goal of 0.3 ng/L,
- \( CCG_{\text{esf}} \) = Esfenvalerate chronic concentration goal of 0.3 ng/L,
- \( CCG_{\text{lcy}} \) = Lambda-cyhalothrin chronic concentration goal of 0.3 ng/L,
- \( CCG_{\text{per}} \) = Permethrin chronic concentration goal of 1 ng/L,
- \( CGU_{\text{chronic}} \) = The sum of measured pyrethroid concentration-to-chronic concentration goal ratios, rounded to one significant figure. A sum exceeding one (1) indicates an exceedance of the chronic additive pyrethroid pesticides numeric trigger.
Add the following:

**California Department of Pesticide Regulation (DPR)**

Like the Regional Water Board, DPR is part of the California Environmental Protection Agency. It regulates pesticide product sales and use within California pursuant to the California Food and Agricultural Code. When DPR evaluates whether to register a pesticide product, one consideration is the potential for environmental damage. As a part of the pesticide registration process DPR seeks to identify pesticide products whose use or runoff may result in adverse environmental impacts and condition or deny product registration accordingly. DPR is mandated to protect water quality from environmentally harmful pesticide materials and can implement mitigation measures when monitoring data provides evidence of adverse environmental impacts.

Consistent with its authorities, DPR should continue to implement the following actions:

1) **Conduct statewide urban and agricultural monitoring program to identify pesticides applied in such a manner that runoff does or could cause or contribute to water quality concerns;**
2) **Deny registration to pesticide products during registration evaluation process that present an unacceptable risk to surface water;**
3) **Require registrants to provide information necessary to assess potential water quality impacts as a condition of registration, including, when necessary, development of analytical methods with adequately low limits of quantification in appropriate matrices;**
4) **Continue and enhance efforts to evaluate the potential for registered pesticide products to cause or contribute to water quality concerns, including completing studies to address identified data gaps;**
5) **Notify USEPA of potential deficiencies in product labels for products that threaten water quality;**
6) **Work directly with registrants to address product uses specific to California environmental concerns;**
7) **Where necessary, develop and modify pesticide use regulations to address pesticide uses that are causing unacceptable water quality impacts;**
8) **Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control (work with County Agricultural Commissioners, urban runoff management agencies, and the**
University of California Statewide Integrated Pest Management Program to coordinate activities);

9) Continue and enhance, in coordination with county agricultural commissioners, implementation and enforcement of water quality protection regulations and label requirements, including urban surface water protection regulations;

10) Continue and enhance reporting on progress and challenges in implementing water quality protection-related efforts for pesticides with concentrations of concern.

U. S. Environmental Protection Agency (USEPA) Office of Pesticide Programs

USEPA is responsible for implementing the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act. USEPA is therefore responsible for ensuring that both federal pesticide laws and water quality laws are implemented. USEPA should exercise its authorities to ensure that foreseeable pesticide applications do not cause or contribute to water column or sediment toxicity in the Region's waters. Because some pesticides pose water quality risks, USEPA should implement the following actions:

1) Continue to improve the pesticide registration and registration review processes to ensure that pesticide applications and resulting discharges are protective of water quality and do not cause water quality impairments (i.e., restrict uses or application practices to manage risks). This should include consideration of discharges from wastewater treatment plants and urban runoff as well as agricultural runoff;

2) Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control;

3) Require registrants to provide information necessary to assess potential water quality impacts as a condition of registration, including, when necessary, adequate ecotoxicity data to develop water and sediment quality criteria for pesticides of concern and development of analytical methods with adequately low limits of quantification in appropriate matrices;

4) Complete studies to address critical data needs;

5) Respond in a timely manner to identified deficiencies in product labels for products that threaten water quality;

6) Continue and enhance internal coordination efforts between the Office of Pesticide Programs and the Office of Water to implement the above-stated actions to ensure pesticide registration decisions protect water quality.
Under “Pesticide Discharges from Nonpoint Sources” (p. IV-33.31):
Make the following revisions:

**Pesticide Discharges from Nonpoint Sources**

*Central Valley Regional Water Quality Control Board Actions*

The Regional Water Board will implement the following actions related to programs regulating pesticide discharges:

1. Track USEPA and DPR pesticide evaluation and registration activities as they relate to water quality and share monitoring and research data with USEPA and DPR;

2. When necessary, request that USEPA coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act;

3. Encourage USEPA and DPR to fully address water quality concerns within their pesticide registration and use regulation processes, including urban runoff and wastewater discharges as well as agricultural runoff. This shall include providing comments in coordination with the State Water Resources Control Board on USEPA registration reviews for pesticides of concern;

4. Work with DPR, County Agricultural Commissioners, and the Structural Pest Control Board to promote pesticide application practices that result in discharges that comply with water quality regulations by participating in and providing support for regulatory and educational activities that promote these practices;

5. Assemble available information (such as monitoring data) to assist USEPA and DPR in taking actions necessary to protect water quality;

6. Use authorities (e.g., through permits or waste discharge requirements) to require implementation of best management practices and control measures to minimize pesticide discharges to surface waters;

7. Staff will provide periodic updates to the Board on overall progress at addressing pesticide related water quality concerns. These updates may include implementation control programs for specific pesticides, and coordination with USEPA and DPR.
Add the following subheading and text:

**Pyrethroid Pesticides Control Program**

In order to reduce discharges of pyrethroids to surface waters, the pyrethroids control program will rely on coordination with the agencies that regulate pesticide use (California Department of Pesticide Regulation and U.S. EPA Office of Pesticide Programs), implementation of management practices as part of a conditional prohibition to address elevated levels of pyrethroids before a water body becomes impaired, and data collection to inform future actions. The pyrethroids control program is taking a phased approach and the Board will periodically re-visit the program in the future to consider whether additional actions are required.

1. The Regional Water Board will take actions and encourage actions by other agencies that support attainment of the narrative water quality objective for toxicity with respect to pyrethroid pesticides, as specified in the Basin Plan under the heading Pesticide Discharges.

2. Following [OAL approval date], the Board will require monitoring information from dischargers, as described in the Monitoring and Surveillance Chapter under the heading Pyrethroid Pesticides Discharges (p. V-xx).

3. 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.

4. The Regional Water Board will review the pyrethroid pesticides prohibition, the pyrethroid pesticides total maximum daily load allocations, the numeric pyrethroid triggers, and the implementation provisions for pyrethroid pesticide discharges in the Basin Plan no later than [15 years from the effective date of this amendment] as part of the Triennial Review process. Following this review, the Regional Water Board may consider the adoption of pyrethroid water quality objectives. Board staff will provide updates to the Regional Water Board on the progress of the pyrethroids control program at least every 3 years as part of the Triennial Review, beginning with the first Triennial Review scheduled after [2 years from the effective date of this amendment].

5. **Addressing Known Water Quality Impairments**

xxx
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.

The following TMDL numeric targets will be used to protect aquatic life:

1) Pyrethroid Pesticides Water Column Additivity Numeric Target
   The numeric target is equal to the Acute Pyrethroid Trigger and Chronic Pyrethroid Trigger in Table IV-Z and applies to the receiving waters listed in Table IV-X.

2) Pyrethroid-Caused Sediment Toxicity Numeric Target
   The pyrethroid-caused sediment toxicity numeric target is the evaluation of the narrative water quality objective for toxicity using standard aquatic toxicity tests to determine toxicity in bed sediments. The toxic determination is based on comparison of the test organism’s response to the sample and a control. The standard aquatic toxicity test in Table IV-Y will be used to determine compliance with the sediment toxicity numeric target. If other stressors are identified as the cause of toxicity, it will not be considered an exceedance of the pyrethroid-caused sediment toxicity numeric target.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test</th>
<th>Biological Endpoint Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment Toxicity</td>
<td><em>Hyalella azteca</em> (10-day)</td>
<td>Survival</td>
</tr>
</tbody>
</table>

In the water bodies listed in Table IV-X, discharges shall be reduced to ensure attainment of the pyrethroid numeric targets and allocations as soon as practicable but no later than [20 years from effective date of this amendment].

MS4 permittees who discharge to water bodies listed in Table IV-X shall attain the wasteload allocations by developing and implementing a Pesticide Plan that identifies management practices to reduce pyrethroid pesticides in urban runoff to the maximum extent practicable. MS4 permittees who discharge to water bodies listed in Table IV-X are required to submit Pesticide Plans (or modifications to existing Pesticide Plans) for the control of pyrethroid pesticide discharges to those water bodies no later than [1 year from the effective date of this amendment]. Management plans may include actions required by state and federal regulations. The Pesticide Plan can be included with the MS4’s storm water management plan, as appropriate. The management practices listed in 6C
shall be considered for inclusion in the Pesticide Plan. A MS4 discharger has the
discretion to implement any of the practices listed in 6C, or may identify others
that are not included here, but must provide justification to the Board regarding
their decision whether to select or not select each management practice listed in
6C. Management practices may be implemented by individual urban runoff
management entities, jointly by two or more entities acting in concert, or
cooperatively through a regional or statewide approach that addresses urban
pesticide water pollution, including with domestic or municipal wastewater
dischargers, as appropriate.

A progress report shall be provided to the Board annually or at a frequency
consistent with a discharger’s permit requirements to document the management
practices that have been implemented, to evaluate attainment of the wasteload
allocations, and to identify effective actions to be taken in the future. The
progress report can be included in existing reports to the Board, as appropriate. If
the management practices do not result in attainment of the wasteload
allocations, then the MS4 discharger shall either identify reasonable and feasible
additional/alternative practices for implementation if any are available, or provide
a justification for why current practices will result in attainment by the compliance
date. This justification may include actions required by state and federal
regulations.

Table IV-X. Water body segments with Total Maximum Daily Loads (TMDLs) for
pyrethroid pesticides

<table>
<thead>
<tr>
<th>Water Body Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcade Creek</td>
</tr>
<tr>
<td>Chicken Ranch Slough</td>
</tr>
<tr>
<td>Curry Creek (Placer and Sutter Counties)</td>
</tr>
<tr>
<td>Elder Creek</td>
</tr>
<tr>
<td>Kaseberg Creek (tributary to Pleasant Grove Creek, Placer County)</td>
</tr>
<tr>
<td>Morrison Creek</td>
</tr>
<tr>
<td>Pleasant Grove Creek (upstream of Fiddyment Road)</td>
</tr>
<tr>
<td>Pleasant Grove Creek, South Branch</td>
</tr>
<tr>
<td>Strong Ranch Slough</td>
</tr>
</tbody>
</table>

b. Agricultural Waters Bodies with Known Pyrethroid Pesticides Impairments

Discharges of pyrethroid pesticides to water bodies listed in Table IV-W will be
controlled using existing Regional Water Board regulatory programs. Agricultural
dischargers (either individual dischargers or a discharger group or coalition) to
water bodies listed in Table IV-W are required to submit management plans (or
modifications to existing management plans) for the control of pyrethroid pesticide discharges to those water bodies no later than [60 days from the effective date of this amendment]. The management plans will describe the actions that dischargers will take to reduce pyrethroid pesticides discharges to levels that do not exceed the narrative water quality objective for toxicity by the required compliance date.

At a minimum, management plans must describe:
1) The sources of pyrethroid pesticides causing nonattainment of narrative water quality objective for toxicity;
2) The actions that the dischargers will take to reduce pyrethroid pesticides discharges and attain the narrative water quality objective for toxicity as soon as practicable, but no later than [20 years from effective date of this amendment];
3) A schedule for the implementation of those actions;
4) A monitoring plan to track effectiveness of pollution control practices;
5) The process for revising the management plan if the actions do not effectively reduce pyrethroid pesticides discharges or the implemented actions have water quality impacts that must be addressed.

Management plans may address discharges to multiple downstream water bodies for which discharge reductions are required. Management plans may include actions required by state and federal regulations. Revisions to management plans may be required if applicable triggers are not achieved. If a water body that is not attaining the narrative water quality objective for toxicity with respect to pyrethroid pesticides is being used by the discharger to represent water quality conditions in multiple water bodies, management plans must address pyrethroid pesticides in all of the represented water bodies.

Table IV-W Water body segments with known pyrethroid pesticide impairments receiving agricultural discharges.

<table>
<thead>
<tr>
<th>Water Body Segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Del Puerto Creek</td>
</tr>
<tr>
<td>Hospital Creek (San Joaquin and Stanislaus Counties)</td>
</tr>
<tr>
<td>Ingram Creek (from confluence with Hospital Creek to Highway 33 crossing)</td>
</tr>
<tr>
<td>Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)</td>
</tr>
<tr>
<td>Mustang Creek (Merced County)</td>
</tr>
</tbody>
</table>

6. Conditional Prohibition Implementation Components
   a. Municipal Storm Water Discharges
Dischargers subject to the conditional prohibition of pyrethroid pesticides discharges are required to develop and implement management plans to reduce pyrethroid levels in their discharges to the maximum extent practicable, referred to as Pesticide Plans. A Pesticide Plan may be included in the discharger’s storm water management plan (SWMP), as appropriate. A Pesticide 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 insecticide products to cause additional water quality impairments. The management practices listed in 6C shall be considered for inclusion in a discharger’s Pesticide Plan. A Pesticide Plan may include any of the practices listed in 6C, or may identify others that are not included here, but must provide justification to the Board regarding their decision whether to select or not select each practice listed in 6C. Management plans may include actions required by state and federal regulations. Management practices may be implemented by individual urban runoff management entities, jointly by two or more entities acting in concert, or cooperatively through a regional or statewide approach that addresses urban pesticide water pollution, including with domestic or municipal wastewater dischargers, as appropriate.

A progress report shall be provided to the Board annually or at a frequency consistent with the discharger’s permit requirements to document the management practices that have been implemented, to evaluate pyrethroid concentrations with respect to the pyrethroid triggers, and to identify effective actions to be taken in the future. The progress report can be included in other reports submitted to the Board, as appropriate. If the management practices do not result in discharge concentrations at or below the pyrethroid numeric triggers, then the MS4 discharger shall either identify any available, reasonable and feasible additional/alternative practices for implementation, or provide a justification for why current practices are expected to result in achieving the triggers within a reasonable timeframe. This justification may include actions required by state and federal regulations.

Management plans are completed when it can be demonstrated that the Acute and Chronic Pyrethroid Triggers are not exceeded in discharges and the demonstration is approved by the Executive Officer.

b. Municipal and Domestic Wastewater Discharges
Dischargers subject to the conditional prohibition of pyrethroid pesticides discharges are required to develop and implement management plans to reduce pyrethroid levels in their discharges. Management plans, which can be included
in dischargers’ Pollution Prevention Plan, shall identify management practices to reduce discharges of pyrethroid pesticides. The pyrethroid triggers are intended to indicate when management practices are to be implemented by the discharger; the pyrethroid triggers 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.

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. The management practices listed in 6C shall be considered for inclusion in a discharger’s management plan. In considering management practices for pyrethroids, a domestic or municipal wastewater discharger has the discretion to implement any of the practices listed in 6C, or may identify others that are not included here, but must provide justification to the Board regarding decision whether to select or not select each practice listed in 6C. Management practices may be implemented by individual NPDES permittees, jointly by two or more permittees acting in concert, or cooperatively through a regional or statewide approach, including with municipal storm water dischargers, as appropriate.

An annual progress report shall be provided to the Board 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.

Management plans are completed when it can be demonstrated that the Acute and Chronic Pyrethroid Triggers are not exceeded in discharges and the demonstration is approved by the Executive Officer.

The following management practices shall be considered by municipal storm water dischargers and by municipal and domestic wastewater dischargers and implemented as appropriate. Some of these practices may be accomplished by participation in organizations such as California Stormwater Quality Association
(CASQA), which coordinates with DPR and other organizations taking actions to protect water quality from the use of pesticides in the urban environment. Other practices may also be proposed. If the State Water Resources Control Board establishes a statewide water quality control plan that requires best management practices for the control of urban pesticide discharges, compliance with those requirements shall be deemed compliance with this section.

Education and outreach activities
1) Undertake targeted outreach programs to encourage communities within a discharger’s jurisdiction to reduce their reliance on pesticides that threaten water quality, focusing efforts on those most likely to use pesticides that threaten water quality, potentially by working with DPR, County Agricultural Commissioners, and the University of California Statewide Integrated Pest Management Program, or other entities as appropriate;

2) Make available point-of-purchase outreach materials to pesticide retailer(s) in or near the Permittee’s jurisdiction. These materials shall provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control.

3) Conduct outreach to Permittee’s residents and businesses who may hire structural pest control and landscape professionals that contains messages that (a) explain the links between pesticide usage and water quality; and (b) provides information about structural pest control IPM certification programs and IPM for landscape professionals;

4) Encourage public and private management practices (e.g., landscape design, irrigation management, etc.) that minimize pesticide runoff.

Pesticide pollution prevention activities
1) Reduce reliance on pyrethroids and other pesticides that threaten water quality by adopting and implementing policies or procedures that minimize the use of pesticides that threaten water quality in the discharger’s operations and on the discharger’s property;

2) Develop and implement an Integrated Pest Management policy that:
   a. Is consistent with IPM as defined by the University of California Statewide IPM Program (UC-IPM) or the California Structural Pest Control Board definition.
   b. Applies to all Permittee staff who conduct or contract for pest management and to pest management vendors under contract to the Permittee.
c. Assigns responsibilities to a designated staff position and/or department to coordinate Permittee activities and ensure that the IPM policy is implemented.

Support of Pollution Prevention through the Pesticide Regulatory Process

1) Track USEPA and DPR pesticide evaluation and registration activities as they relate to surface water quality and encourage these agencies to accommodate urban water quality concerns within their pesticide registration processes. This may include assembling and submitting available information (such as monitoring data) to USEPA and DPR during public comment periods to assist in their pesticide evaluation and registration activities. This best management practice would be implemented most effectively through a cooperative regional or statewide approach.

d. Agricultural Discharges

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 under a Water Board regulatory program, such as the Irrigated Lands Regulatory Program or Dairy Order. Management plans are due no later than 1 year after the discharger or the Board identifies that an applicable trigger has been exceeded.

7. Vector Control Discharges

Discharges of pyrethroid pesticides from vector control applications are subject to the Statewide NPDES Permit for Biological and Residual Pesticide Discharges to waters of the United States from Vector Control Applications. Vector control dischargers are not subject to any additional implementation provisions for attainment of the pyrethroid triggers or TMDLs for pyrethroids.
Under “Estimated Costs of Agricultural Water Quality Control Programs and Potential Sources of Financing” (p. IV-38.00-40.00)

Add the following subheading and text:

**Pyrethroid pesticides discharges into Sacramento River and San Joaquin River basin waters**

Estimated costs for implementation of practices to control pyrethroid pesticide discharges are encompassed in the costs of the Long-Term Irrigated Lands Regulatory Program, as described above.

Estimated costs for monitoring and reporting associated with the pyrethroid pesticide control program are 1.4 million dollars per year (2017 dollars). This is a high-end estimate, as similar monitoring and reporting costs would likely be incurred due to other Board Requirements to meet pre-existing Basin Plan requirements under the Long-Term Irrigated Lands Regulatory Program.

Potential funding sources include:

1. Those identified in the San Joaquin River Subsurface Agricultural Drainage Control Program and the Pesticide Control Program.
Changes to Chapter V, Surveillance and Monitoring

Add the following subheading and text:

Pyrethroid Pesticides Discharges

The Regional Water Board will require pyrethroid pesticides dischargers to provide information to the Board. This information may come from the dischargers’ monitoring efforts; monitoring programs conducted by state or federal agencies or collaborative watershed efforts; or from special studies that evaluate the effectiveness of management practices. 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]. The baseline and trend monitoring will be designed to meet the goals outlined for each discharger type below.

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. Methods with reporting limits above the pyrethroid trigger concentrations may be used if methods with reporting limits at or below the pyrethroid trigger concentrations are not available or based on the consideration of other factors, such as cost or the reporting limit needed after the calculation of freely dissolved pyrethroid concentrations. The chemical analysis method shall be approved by the Executive Officer before the data can be used to meet the monitoring requirements of this section.

Municipal Storm Water

With Executive Officer approval, representative monitoring programs, including coordinated regional or statewide monitoring programs, may be used to meet the monitoring requirements. Routine monitoring for pyrethroid pesticides and alternatives can be discontinued upon a discharger showing that the specific pesticide is not found, or is not reasonably expected to be found, in receiving waters at concentrations with the potential to exceed the pyrethroid wasteload allocations or Acute and Chronic Pyrethroid Triggers. The potential for the pyrethroid pesticides specified in Table IV-Z to be discharged at concentrations exceeding wasteload allocations or Acute and Chronic Pyrethroid Triggers shall be assessed prior to permit renewal, based on an analysis of allowable pesticide uses, use restrictions, pesticide use data for urban applications, and representative monitoring data.
The monitoring and reporting program that addresses municipal storm water discharges to TMDL water bodies (Table IV-X) shall be designed to collect information necessary to:

1) Determine whether receiving waters are attaining the Pyrethroid Pesticides Water Column Additivity Numeric Targets;

2) Determine whether bed sediments are attaining the Sediment Toxicity Numeric Target. In order to link sediment toxicity to pyrethroid pesticides, chemical analysis of the sediment for pyrethroid pesticides shall be performed if the sediment is toxic;

3) Determine whether the wasteload allocations are being attained in discharges. In some cases, receiving waters may be representative of discharges;

4) Determine whether the implementation of management practices is sufficient to attain the TMDL Allocations and Numeric Targets.

The baseline pyrethroids monitoring and reporting program for municipal storm water discharges shall be designed to collect information necessary to:

1) Determine whether pyrethroid concentrations in municipal storm water discharges are exceeding the Acute and Chronic Pyrethroid Triggers (Table IV-Z). In some cases, receiving waters may be representative of discharges;

2) 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. With Executive Officer approval, the baseline monitoring requirements may be met by submittal of a report, including a compilation and interpretation of representative monitoring data, demonstrating that the required information has been collected and is sufficient to make the required determinations.

The pyrethroids trend monitoring and reporting program for municipal storm water discharges shall be designed to collect information necessary to meet the above goals for the baseline monitoring, as well as:

3) Determine the effectiveness of management practices that are implemented to reduce pyrethroid levels in discharges;
4) With the assistance of the Regional Water Board and DPR, determine if monitoring and reporting programs for alternatives to pyrethroid pesticides are 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 objectives.

**Discharges from Agricultural Operations**

Representative monitoring may be used to determine whether the pyrethroid triggers are exceeded. Changes in monitoring frequency may result if information such as pesticide use data, pesticide registration status, management practices, runoff potential, or other monitoring studies indicates additional or less monitoring is needed to meet the monitoring requirements, which may include discontinuation of pyrethroid pesticides monitoring.

The monitoring and reporting program that addresses agricultural discharges to water bodies named in Table IV-W shall be representative of those water bodies, either directly or through a representative monitoring program designed to collect information necessary to:

1) **Determine whether receiving waters are attaining the Acute and Chronic Pyrethroid Triggers (Table IV-Z);**

2) **Determine whether receiving waters and bed sediments are attaining the narrative water quality objective for toxicity;**

3) **Determine whether the implementation of management practices is sufficient to attain the Acute and Chronic Pyrethroid Triggers (Table IV-Z) in receiving waters.**

The baseline pyrethroids monitoring and reporting program for agricultural discharges shall be designed to collect information necessary to:

1) **Determine whether agricultural discharges of pyrethroids are causing or contributing to exceedances of the Acute and Chronic Pyrethroid Triggers (Table IV-Z).** This may be done through representative receiving water monitoring;
2) Determine whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface waters or bed sediments;

The pyrethroids trend monitoring and reporting program for agricultural discharges shall be designed to collect information necessary to meet the above goals for the baseline monitoring, as well as:

3) Determine the extent of implementation of management practices to reduce off-site movement of pyrethroid pesticides and whether these practices are sufficient to attain the Acute and Chronic Pyrethroid Triggers;

4) 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.

**Municipal and Domestic Wastewater**

With Executive Officer approval, representative monitoring programs, including coordinated regional monitoring programs, may be used to meet the monitoring requirements. Routine monitoring for pyrethroid pesticides and alternatives can be discontinued upon a discharger showing that the specific pesticide is not found in the effluent at concentrations with the potential to exceed the Acute and Chronic Pyrethroid Triggers, except the requirement to monitor for pyrethroid pesticides once per permit cycle will continue to be required, at least as long as pyrethroid pesticides specified in Table IV-Z are registered for use in the collection service area or at the discretion of the Executive Officer.

The baseline pyrethroids monitoring and reporting program for municipal or domestic wastewater discharges shall be designed to collect information necessary to:

1) Determine whether pyrethroid concentrations in municipal or domestic wastewater discharges are exceeding Acute and Chronic Pyrethroid Triggers (Table IV-Z);

2) Provide 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;
The pyrethroids trend monitoring and reporting program for municipal or domestic wastewater discharges shall be designed to collect information necessary to meet the above goals for the baseline monitoring, as well as:

3) **Determine the effectiveness of management practices that are implemented to reduce pyrethroid levels in discharges;**

4) **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.**