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COLORADO RIVER BASIN REGION

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Total Maximum Daily Load for Pyrethroid Pesticides in Alamo River and New River, Imperial County

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FINAL STAFF REPORT

July 2024

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ACRONYMS AND ABBREVIATIONS

AC	Acute Concentration
Bif	Bifenthrin
BPTC	Best Practicable Treatment or Control
CC	Chronic Concentration
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CTR	California Toxics Rule
Cyf	Cyfluthrin
Cyp	Cypermethrin
DNQ	Detect Non-Quantifiable
EIR	Environmental Impact Report
Esf	Esfenvalerate
FRSH	Freshwater Replenishment
ICFB	Imperial County Farm Bureau
IID	Imperial Irrigation District
ILRP	Irrigated Lands Regulatory Program
IND	Industrial Service Supply
K_{oc}	Soil Sorption Coefficient
Lbs	Pounds
Lcy	Lambda-cyhalothrin
LC 50	Median lethal concentrations
mg/L	Milligrams per liter
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer Systems

ACRONYMS AND ABBREVIATIONS

ND	Non-Detect
NPDES	National Pollutant Elimination Systems
Per	Permethrin
POW	Hydropower Generation
RARE	Preservation of Rare, Threatened, or Endangered Species
REC I	Water Contact Recreation
REC II	Non-Water Contact Recreation
RL	Reporting limits
SED	Substitute Environmental Document
SWAMP	Surface Water Ambient Monitoring Program
TMDL	Total Maximum Daily Loads
UCDM	UC Davis Method
USIBWC	United States International Boundary and Water Commission
µg/g OC	Microgram per gram organic carbon
µg/L	Micrograms per liter
USEPA	United States Environmental Protection Agency
U.S.C	United States Code
WARM	Warm Freshwater Habitat
WDR	Waste Discharge Requirements
WILD	Wildlife Habitat
WQCR	Water Quality Criteria Report
WQO	Water Quality Objectives
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

This Total Maximum Daily Loads Staff Report (TMDLs Staff Report) provides the technical and policy foundation for a proposed amendment to the Water Quality Control Plan for the Colorado River Basin Region (Basin Plan) to establish TMDLs for pyrethroid pesticides in the New River and Alamo River, located in the Imperial Valley. A TMDL is the maximum amount of a pollutant that can enter a waterbody while still meeting water quality standards.

Staff of the California Regional Water Quality Control Board, Colorado River Basin Region (Colorado River Basin Water Board or Regional Board) have identified probable sources of pyrethroid pesticides, assigned wasteload allocations to point sources and load allocations to nonpoint sources for these pollutants to ensure attainment of applicable water quality objectives/targets, and developed an implementation plan to achieve the allocations.

Pollutants Addressed

Pyrethroid pesticides are a class of synthetic pesticides that were developed by modifying the chemical structure of pyrethrin, a botanical insecticide. In California agriculture there are six primary pyrethroid pesticides commonly used: bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin. Pyrethroids target a wide range of pests and are commonly used in non-agricultural and agricultural areas.

Project Area

The proposed TMDLs will address the waterbodies and pollutants listed in Table ES-1 below.

Table ES-1. Waterbodies and Pollutants Addressed by TMDL

Waterbody	ID Number	Listing Status	Pollutants
New River	CAR7231000019-990205102948	Category 5	Bifenthrin Cyfluthrin Cypermethrin Esfenvalerate Lambda-Cyhalothrin Permethrin

EXECUTIVE SUMMARY

Waterbody	ID Number	Listing Status	Pollutants
Alamo River	CAR7231000019-990205093023	Category 5	Bifenthrin Cyfluthrin Cypermethrin Esfenvalerate Lambda-Cyhalothrin Permethrin

Source Analysis

The probable source of pyrethroid pesticides in the New and Alamo Rivers was investigated using available information about land and water uses in the Imperial Valley, the physical and chemical properties of the compounds, their uses, and environmental data. Nonpoint sources of pyrethroids that are likely contributing to impaired water quality include irrigated agricultural lands and transboundary pollution from Mexico. Possible point sources of pyrethroids may be from the municipalities and facilities permitted by the National Pollutant Discharge Elimination Systems (NPDES) and Municipal Separate Storm Sewer Systems (MS4s).

Numeric Targets, TMDLs, and Allocations

Numeric targets for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in the water column of the New and Alamo Rivers were selected according to the Water Quality Criteria Report (WQCR, Fojut, T. L., 2015) and UC Davis method (UCDM, Fojut et. al, 2012) for acute and chronic criteria to protect benthic and aquatic organisms, and wildlife from potentially harmful effects of pyrethroid pesticides. Numeric targets for sediment samples were selected based on the median lethal concentrations (LC50) for each pyrethroid and normalized by the percentage of organic carbon in the sediment sample. Mixtures of insecticides, such as pyrethroids, may have concentration-additive effects which means that if the constituent chemicals have the same mode of action, their toxicity-normalized concentrations can be added to estimate the effective concentration. Several studies have demonstrated that the pyrethroids can co-occur in the environment and have an additive effect on toxicity (Barata et al. 2006, Brander et al. 2009, Trimble et al. 2009), therefore, the UC Davis Method recommends calculating additive toxicity of pyrethroids.

For these TMDLs, allocations have been set equal to the numeric targets and will be implemented in permits as wasteload and load allocations to ensure that discharges do not exceed the loading capacity of the water bodies.

EXECUTIVE SUMMARY
Implementation Plan

To control the discharges of pyrethroid pesticides from irrigated agricultural lands in Imperial Valley and to protect the beneficial uses of the State's waters, this TMDL will be implemented through the Colorado River Basin Water Board's Irrigated Lands Regulatory Program, Order R7-2021-0050, *General Waste Discharge Requirements for Discharges of Waste from Irrigated Agricultural Lands for Dischargers that are Members of a Coalition Group in the Imperial Valley*, *Waste Discharge Requirements Order R7-2021-0050* (Imperial Valley Agricultural General Order).

1. INTRODUCTION

1.1. Problem Statement

This project establishes Total Maximum Daily Loads (TMDLs) for pyrethroid pesticides in the water column and sediment in the New River and the Alamo River, located in the Imperial Valley. The New and Alamo Rivers are impaired by six pyrethroid pesticides, bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin (Table 1-1). California Regional Water Quality Control Board, Colorado River Basin Region (Colorado River Basin Water Board or Regional Board) staff have developed this Control Plan to address these pyrethroid pesticides which violate water quality objectives (WQOs) designated in the Basin Plan to protect these waters.

Table 1-1. Waterbodies Assigned TMDLs.

Waterbody	Identification Number	303(d) Listed Impairments	Additional Pyrethroid Pollutants
New River	CAR7231000019-990205102948	Bifenthrin, Cypermethrin, Lambda-cyhalothrin, pyrethroids	Cyfluthrin, Esfenvalerate and Permethrin,
Alamo River	CAR7231000019-990205093023	Cypermethrin, Lambda-cyhalothrin, pyrethroids	Bifenthrin, Cyfluthrin, Esfenvalerate, and Permethrin

1.2. Project Area

The New River and Alamo River are located in Imperial County, California. Imperial County is home to the Imperial Valley which covers approximately 500,000 acres south of the Salton Sea, most of it irrigated agricultural lands. The principal communities in Imperial Valley are El Centro, Imperial, Brawley, and Calexico. Imperial Valley is one of the most arid areas in the United States and is characterized by its hot, dry summers and cool, dry winters. The hot season typically lasts about four months with temperatures exceeding 100 degrees Fahrenheit. The cold season lasts about four months and coincides with the wet season, averaging about three inches of rainfall per year.

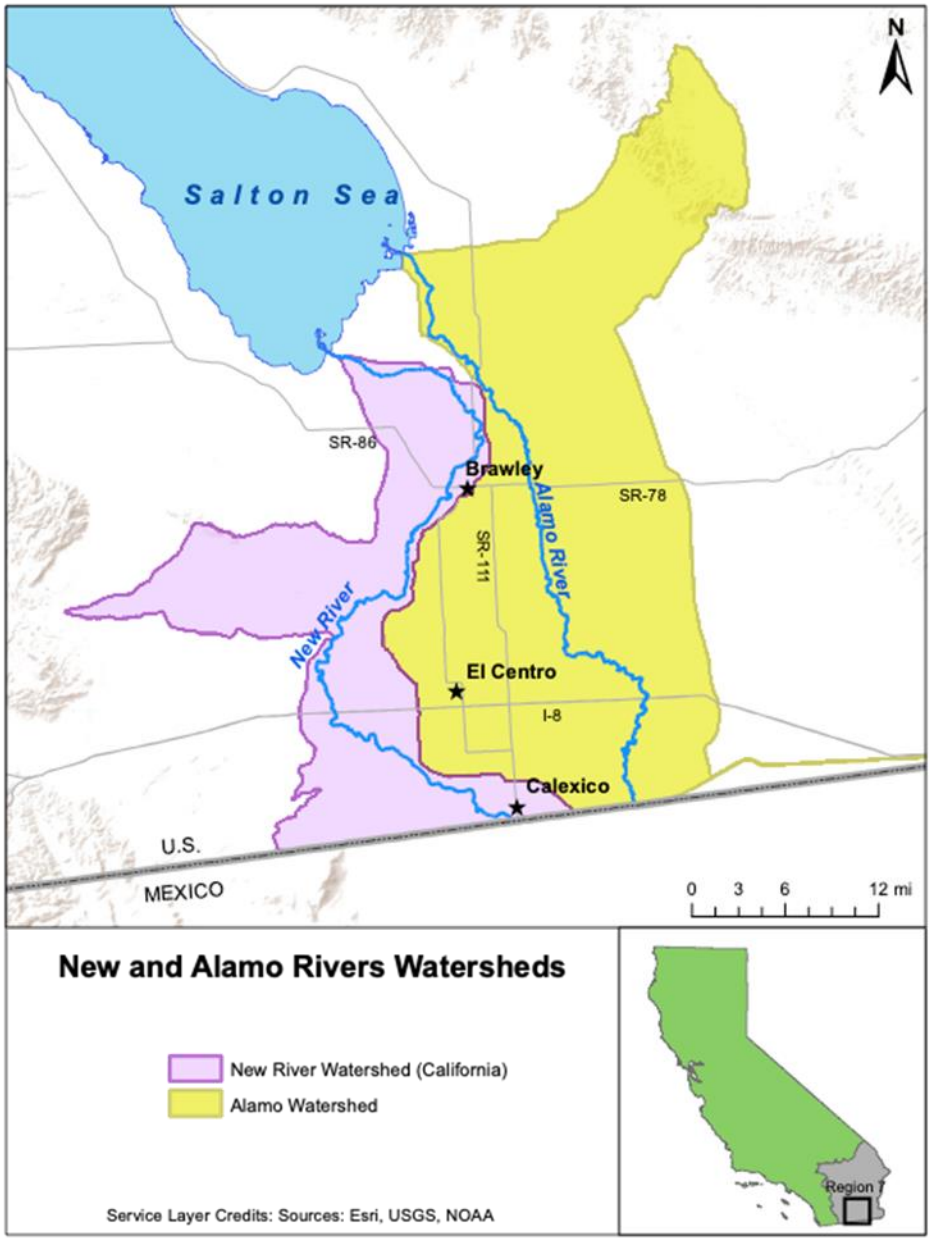
The New River watershed (drainage network) is nested within the Salton Sea Transboundary watershed that is located in the Sonoran desert region in the southeastern corner of California. The New River watershed is approximately 500,000 acres in size: comprised of 200,000 acres of farmland in the US and 300,000 acres in Mexico, including the Mexicali metropolitan area and agricultural land in Mexicali Valley. About half of the New River’s flow is agricultural discharge and

runoff; and the remining flow consists of treated municipal waste, untreated or improperly treated industrial waste, and urban runoff.

The Alamo River is also located within the Salton Sea Transboundary Watershed in the Sonoran Desert region of southeast California (Figure 1-1). The Alamo River originates in Mexico, about a half-mile south of the International Boundary, and runs north about 60 miles before it discharges into the Salton Sea. The Alamo River is one of the Salton Sea's largest tributaries and contributes about half of the Sea's annual inflow. The Alamo River is a sub-watershed that extends approximately 340,000 acres through highly productive agricultural lands within the Imperial Valley. In its flow, the Alamo River carries a mixture of agricultural return and wastewater from the Imperial Valley. This mixture of water contains a combination of pesticides, nutrients, selenium, and silt.

The New and Alamo Rivers border the Salton Sea Wildlife Refuge which provides habitat for a wide range of wildlife including migratory songbirds, shorebirds, waterfowl, native fish, and introduced fish species. In the New River there are currently 15 special status wildlife and plant species as well as one species that is listed endangered and/or threatened. In the Alamo River, there are 22 wildlife species listed as special status, with one of these species listed as endangered and/or threatened.

Figure 1-1. Location of Alamo and New Rivers in Salton Sea Transboundary Watershed.



1.3. Pollutants Addressed

Pyrethroid pesticides constitute a class of synthetic pesticides that are designed based on the structure of the naturally occurring botanical insecticide, pyrethrin. Pyrethrins are natural insecticides which are sourced from chrysanthemum flowers and composed of a mixture of natural chemicals. Widely employed in agriculture, home and garden pest control, veterinary care, and mosquito control, pyrethrins exhibit rapid degradation when exposed to sunlight (ATSDR, 2003). To enhance their stability against light exposure,

the chemical structure of pyrethrins was modified to reduce photosensitivity, resulting in the development of pyrethroids. This alteration has increased the persistence of pyrethroids in the environment, rendering them a cost-effective alternative to pyrethrins.

Many pyrethroids have low water solubility and a high tendency to bind to sediment. In the environment, pyrethroid degradation is temperature dependent and some pyrethroids degrade faster than others (Table 1-2).

Pyrethroids work by targeting the nervous system. Their toxicity is compound specific, with varying degradation rates and temperature dependencies. In insects, they alter nerve functions, resulting in paralysis and eventual death. However, they generally pose relatively little risk to humans and other mammals. Some pyrethroids may be significantly more toxic to certain aquatic life than mammals.

Table 1-2. Chemical and physical properties of pyrethroid pesticides

Pyrethroid Pesticide	Water Solubility (mg/L)	Soil Sorption Coefficient (K_{oc})	Soil Half-Life (Days)	Source
Bifenthrin	0.100	131,000 – 302,000	106 - 147	Fecko, 1999
Cyfluthrin	0.003	3,700 - 33,913	56-63	Casjens, 2002
Cypermethrin	0.004	20,800 to 503,000	12-56	EPA, 1989
Esfenvalerate	0.002	215,000	39	Kelley, 2003
Lambda-cyhalothrin	0.005	247,000–330,000	43	He et al., 2008
Permethrin	0.006	100,000	11 - 113	Imgrund, 2003

The six primary pyrethroid pesticides commonly applied in California agriculture are: (1) bifenthrin; (2) cyfluthrin; (3) cypermethrin; (4) esfenvalerate; (5) lambda-cyhalothrin; and (6) permethrin. Pyrethroids target a wide range of pests and are commonly used in both non-agricultural and agricultural areas (Table 1-3, Figure 1-2). Non-agricultural uses of pyrethroids include, but are not limited to, indoor and outdoor residential use, veterinary products for pets, public health mosquito abatement programs, and for use in commercial and industrial areas. In agricultural areas, pyrethroids are often used as pest control on field and row crops, other fruits and vegetables, and post-harvest treatment of commodities (EPA, 2020).

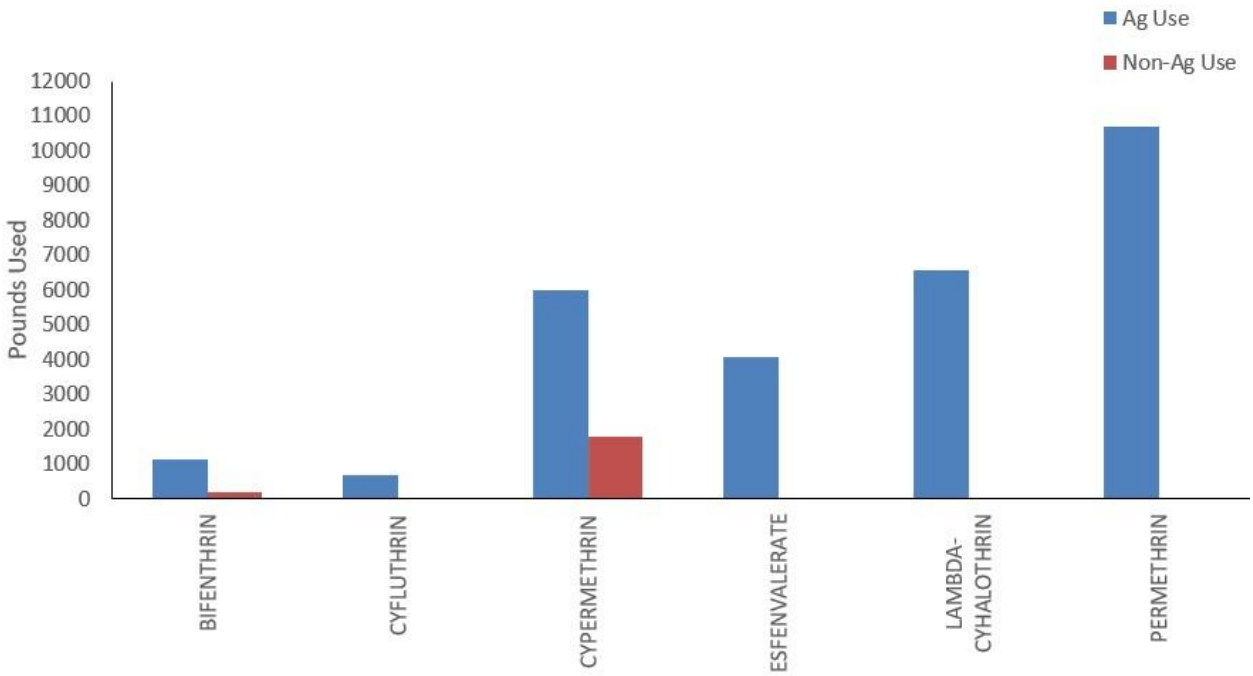
In 2018, 209 million pounds of pesticide were used in California agriculture, of which 5,088,287 pounds were applied in Imperial County alone (CDPR, 2020). Most of the pyrethroid pesticide use in Imperial County occurs within an approximate 650 square mile area of agricultural lands. This high use area extends about 20 miles east of the

Salton Sea and runs south to the International Boundary. In Imperial Valley, more than 31,100 pounds of the six commonly used pyrethroid active ingredients were applied in 2018 for both non-agricultural and agricultural uses (CDPR, 2020), which have caused impairment to surrounding waterbodies.

Table 1-3. Agricultural and Non-agricultural Pyrethroids Sources in 2018 (lbs) based on CDPR's Summary of Pesticide Use Report Data 2018.

Pyrethroid	Agricultural	Non-Agricultural
Bifenthrin	1131.87	181.43
Cyfluthrin	692.3	0.19
Cypermethrin	5988.85	1779.79
Esfenvalerate	4064.49	1.54
Lambda-Cyhalothrin	6584.22	28.3
Permethrin	10688.76	28.42

Figure 1-2. Agricultural and Non-agricultural Pyrethroids Sources in 2018 (lbs) based on CDPR's Summary of Pesticide Use Report Data 2018.



1.4. Clean Water Act Section 303(d) Listing and TMDLs

The federal Clean Water Act gives states the primary responsibility for protecting and restoring surface water quality. The State Water Resources Control Board (State Water Board) is California's water pollution control agency for all federal purposes. (Wat. Code, § 13160.) The State Water Board, along with the nine Regional Water Quality Control Boards (collectively, the Water Boards) protect and enhance the quality of California's water resources through implementing the Clean Water Act, also known as the Federal Water Pollution Control Act Amendments of 1972, as amended (33 U.S.C. § 1251 et seq.; Clean Water Act, § 101 et seq.), and California's Porter-Cologne Water Quality Control Act (Wat. Code, § 13000 et seq.).

The California Regional Water Quality Control Board, Colorado River Basin Region (Colorado River Basin Water Board) has primary responsibility for the protection of groundwater and surface water quality within the Colorado River Basin Region. (Wat. Code, § 13200(i).) The Basin Plan for the Colorado River Basin Region contains water quality standards, consisting of the beneficial uses of a waterbody and the water quality objectives (or "criteria" under federal terminology) designated to protect those beneficial uses, and also includes the federal and state antidegradation policies. (See Wat. Code, § 13240; 33 U.S.C. § 1313.)

Pursuant to Clean Water Act section 303(d), the Colorado River Basin Water Board is required to submit to USEPA a list identifying waterbodies failing to meet water quality standards and the water quality parameters (i.e., pollutants) causing the failure. This is commonly referred to as the "303(d) List." The 303(d) List must include a description of the pollutants causing lack of attainment of water quality standards and a priority ranking of the water quality limited segments account for the severity of the pollution and the uses to be made of the waters. (40 C.F.R. § 130.7(b)(iii)(4).) Federal regulations define a "water quality limited segment" as "[a]ny segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by sections 301(b) and 306 of the [Clean Water] Act." (40 C.F.R. § 130.2(j).)

To restore water quality, a TMDL or other planning tool must be developed for water quality limited segments on the 303(d) List. (See 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. § 130.7(c)(1).) The elements of a TMDL are described in 40 Code of Federal Regulations sections 130.2 and 130.7, Clean Water Act section 303(d), as well as in USEPA guidance (USEPA, 2000b). A TMDL is the "sum of the individual [waste load allocations] for point sources and [load allocations] for nonpoint sources and natural background" (40 C.F.R. § 130.2(i)) such that the capacity of the waterbody to assimilate pollutant loads (the loading capacity) is not exceeded. The maximum load can be expressed in mass per time, toxicity, or other appropriate measure. (40 C.F.R. § 130.2(i).) A TMDL is also required to account for seasonal variations and include a margin of safety to address uncertainty in the analysis.

The TMDL must be incorporated into a state's Water Quality Management Plan (40 C.F.R. §§ 130.6(c)(1), 130.7), which in this case is the Colorado River Basin Region's Basin Plan. The TMDL must also be reviewed and approved by both the State Water Board and the USEPA prior to becoming effective.

1.5. Listing Policy

The *Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* (Listing Policy) (SWRCB, 2015) provides guidance on identifying waters that do not meet water quality standards by establishing a standardized approach for developing California's 303(d) List. The listing policy specifies the minimum number of measured exceedances of WQOs for a given number of samples collected to determine if a waterbody is impaired. Table 1-4 depicts the number of exceedances for a given sample size required for placement on the 303(d) List.

Table 1-4. Number of Measured Exceedances for 303(d) Listing.

Sample Size	Number of Exceedances
2 – 24	2
25 – 36	3
37 – 47	4
48 – 59	5
60 – 71	6

2. WATER QUALITY STANDARDS

Under the federal Clean Water Act, water quality standards consist of designated beneficial uses, numeric and narrative water quality criteria (also referred to as "water quality objectives" under state law, see Water Code section 13241) that protect beneficial uses, as well as the state and federal antidegradation policies.

The Basin Plan for the Colorado River Basin Region (including amendments adopted heretofore) designates beneficial uses, establishes water quality objectives (WQOs) to protect the beneficial uses, and contains implementation programs and policies to achieve those WQOs for all waters addressed through the Basin Plan.

The *Statement of Policy with Respect to Maintaining High Quality Waters in California*, State Water Board Resolution 68-16 (Antidegradation Policy), contains the state's antidegradation policy (Antidegradation Policy). The Antidegradation Policy generally

prohibits the Colorado River Basin Water Board from authorizing discharges that will result in the degradation of high quality waters, unless it is demonstrated that any change in water quality will (a) be consistent with maximum benefit to the people of the state, (b) not unreasonably affect beneficial uses, and (c) not result in water quality less than that prescribed in state and regional policies (e.g., the violation of one or more water quality objectives). The dischargers of waste must also employ best practicable treatment or control (BPTC) to minimize the degradation of high-quality waters. High quality waters are surface waters or areas of groundwater that have a baseline water quality better than required by water quality control plans and policies.

2.1. Beneficial Uses

Beneficial Uses describe how each water body is used, for example, for municipal and domestic supply (MUN) or for wildlife habitat (WILD). Table 2-1 and Table 2-2 summarize the beneficial uses of Imperial Valley waters as designated in the Basin Plan. Beneficial uses are regarded as existing whether the waterbody is perennial or ephemeral, and whether the flow is intermittent or continuous.

In the table, an “X” signifies an existing use, a “P” signifies a potential use, and an “I” signifies an intermittent use. (See Table 2-2 for Beneficial Use definitions.)

Table 2-1. Beneficial Uses.

Waterbody	MUN	FRESH	RECI	RECII	WARM	COLD	WILD	RARE
Alamo River		X	X[1]	X	X		X	X[2]

[1] The only REC I usage that is known to occur is from infrequent fishing activity.

[2] Rare, endangered, or threatened wildlife exists in or utilizes some of these waterway(s). If the RARE beneficial use may be affected by a water quality control decision, responsibility for substantiation of the existence of rare, endangered, or threatened species on a case-by-case basis is upon the California Department of Fish and Wildlife on its own initiative and/or at the request of the Colorado River Basin Water Board; and such substantiation must be provided within a reasonable time frame as approved by the Colorado River Basin Water Board.

New River		X	X[3]	X	X		X	X[12]

Table 2-2. Beneficial Use Definitions

Beneficial Use	Use Definition
Municipal and Domestic Supply (MUN)	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Freshwater Replenishment (FRESH)	Uses of water for natural or artificial maintenance of surface water quantity or quality.
Water Contact Recreation (REC I)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.
Water Non-Contact Recreation (REC II)	Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitats (COLD)	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

[3] Although some fishing occurs in the downstream reaches, the presently contaminated water in the river makes it unfit for any recreational use. An advisory has been issued by the Imperial County Health Department warning against the consumption of any fish caught from the river and the river has been posted with advisories against any bodily contact with the water.

Beneficial Use	Use Definition
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Preservation of Rare, Threatened, or Endangered Species (RARE)	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

2.2. Water Quality Objectives

Water quality objectives (WQOs), which are also known as “water quality criteria” in federal parlance, are established to protect the beneficial uses and can be expressed as concentrations of pollutants that should not be exceeded, or as narrative descriptions of water characteristics that should be met.

The Basin Plan does not contain any numeric WQOs for pyrethroid pesticides. However, the Basin Plan does contain the following narrative WQOs that apply to the Alamo River, New River and Imperial Valley waters:

Basin Plan, Chapter 3 Section II-C. Toxicity,

> All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in human, plant, animal, or indigenous aquatic life.

Basin Plan, Chapter 3 Section II-N. Chemical Constituents,

> No individual chemical or combination of chemicals shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in hazardous chemical concentrations found in bottom sediments or aquatic life.

Basin Plan, Chapter 3 Section II-O. Pesticide Wastes,

> The discharge of pesticidal wastes from pesticide manufacturing processing or cleaning operations to any surface water is prohibited.

In summary, the above narrative WQOs require that surface waters be free of chemical constituents in concentrations that are toxic.

2.3. Numeric Targets for Narrative WQOs

In the absence of a numeric WQO, the standard methodology is to develop a numeric target supportive of the narrative WQO. In other words, numeric targets are numerical interpretations of the narrative WQOs defined in the Basin Plan that must be attained, then maintained, to ensure recovery of the designated beneficial uses of a waterbody. Accordingly, these TMDLs incorporate numeric targets for pyrethroid pesticides.

2.3.1. Water Column Numeric Targets

Numeric targets for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in the water columns of the New River and Alamo River were selected according to the Water Quality Criteria Report (WQCR) (Fojut T. L., 2015) for acute and chronic criteria to protect benthic and aquatic organisms, and wildlife from potentially harmful effects of pyrethroid pesticides. The WQCR is a peer-reviewed report that was updated in May 2015 by the California Regional Water Quality Control Board, Central Valley Region (CRWQCB-CVR) staff to include recently generated toxicity data in the previous version of UC Davis method (UCDM) (Fojut et al, 2012). It was developed to provide an updated, flexible, and more robust method for deriving water quality criteria than the previously accepted USEPA method. To date, the derived criteria appear to be protective considering bioaccumulation, ecosystem level toxicity and most sensitive species as discussed in the WQCR and Central Valley Staff Report. Although these criteria were derived to be protective of aquatic life in the Sacramento and San Joaquin Rivers, these criteria would be appropriate for any freshwater ecosystem in North America, unless species more sensitive than are represented by the species examined in the development of these criteria are likely to occur in those ecosystems.

A data comparison was conducted in the Water Quality Criteria Reports (Fojut T. L., 2015) and the Central Valley Staff Report (https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/pyrethroid_tmdl_bpa/) for the six pyrethroids to assess if the derived criteria for the subject pyrethroids are protective of the most sensitive species. The derived water quality criteria (WQC) are compared to toxicity values for the most sensitive species in both the acceptable (RR) and supplemental (RL, LR, LL) data sets (section 3-6.1, TenBrook et al. 2009). The lowest acute toxicity value in the aqueous data sets is an LC_{50} for *Hyalella azteca*. The acute WQC derived with the 5^{th} percentile value for the five pyrethroids except permethrin is above this LC_{50} and would not likely be protective of this species. For permethrin, the toxicity value is only slightly above the derived acute criterion. Therefore, it is recommended to do the downward adjustment of the water quality criterion to the next lowest acute value for all of the six pyrethroids, including permethrin as the two values are very similar to each other. This is done to ensure that both the acute and chronic WQC are protective of *Hyalella azteca* and other species that may be similarly sensitive to these pyrethroids. Based on these reports, the next lowest acute value, which is the median 2.5^{th} percentile values, is recommended for deriving the acute as well as the chronic WQCs. A comparison of the acute and chronic water quality criteria based on the 1^{st}, 2.5^{th}, and 5^{th} percentiles (aqueous

concentrations, ng/L) and the water column toxicity for the sensitive species *Hyalella azteca* is provided below in Table 2-3.

Table 2-3. Summary of pyrethroid concentration goals alternatives

Alternative	1st percentile 2015 UC Davis criteria		5th percentile 2015 UC Davis criteria		2.5 percentile 2015 UC Davis criteria		2015 criteria via USEPA method		*Hyalella azteca* 96-hour LC_{50}[a]
	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	
Bifenthrin	0.06	0.01	0.8	0.1	0.3	0.05	0.059	--	0.5
Cyfluthrin	0.07	0.01	0.8	0.2	0.3	0.06	--	--	0.55
Cypermethrin	0.04	0.01	1	0.3	0.3	0.07	0.25	0.087	0.56
Esfenvalerate	0.2	0.03	2	0.3	0.7	0.1	--	--	0.85
Lambda-cyhalothrin	0.03	0.01	0.7	0.3	0.2	0.08	0.21	--	0.3
Permethrin	6	1	6	1	6	1	4	--	7

[a] LC_{50}: concentration lethal to 50% of test organisms

The WQCR recommends chronic (4-day) average pyrethroid concentration goals, as toxic effects are typically seen at lower concentrations with longer exposure times, however, the acute (1-hour) average concentration may be used if the acute average does not exceed the chronic average more than once every 3 years. The acute and chronic water quality criteria based on the 2.5th percentile are all below the LC_{50} for the most sensitive species, *Hyalella azteca*, indicating their potential to safeguard this species and others with similar sensitivity (Table 2-4).

Table 2-4. WQCR Pyrethroids Evaluation Guidelines (2015).

Pyrethroid	Water Column (ng/L) Acute Criterion	Water Column (ng/L) Chronic Criterion
Bifenthrin	0.3	0.05
Cyfluthrin	0.3	0.06
Cypermethrin	0.3	0.07
Esfenvalerate	0.7	0.1
Lambda-cyhalothrin	0.2	0.08
Permethrin	6	1

There are two options for compliance with these targets: whole water (total) concentration or freely dissolved concentration. Many researchers have demonstrated

that the freely dissolved concentration of pyrethroids correlates well with bioavailability to aquatic organisms (Bondarenko et al. 2007, Bondarenko and Gan 2009, Hunter et al. 2008, Xu et al. 2007, Yang et al. 2006a, 2006b, 2007). The freely dissolved concentration of a chemical is that which is not bound to dissolved organic carbon (DOC), nor bound to suspended particles, but is truly dissolved in the aqueous phase. The bioavailable concentration is not directly equivalent to the freely dissolved concentration, because the freely dissolved concentration neglects exposure via ingestion of chemicals bound to food sources, or absorption directly through exterior membranes. However, many studies have demonstrated that the freely dissolved concentration is highly correlated with the bioavailable fraction and is a good predictor of bioavailability. The freely dissolved concentration is typically 1-30% of the whole water concentration, indicating that using whole water concentrations may significantly overestimate the toxicity of water samples. It is recommended, but not required, to use the dissolved phase concentration instead of whole water concentration for criteria compliance assessment, as freely dissolved concentrations offer the most accurate prediction of toxicity.

The freely dissolved concentration can be estimated, rather than directly measured, by calculating the concentration of particulate organic carbon and dissolved organic carbon in the sample water. The amount of binding to these components is typically normalized to the organic carbon content of the materials because it is presumed that pyrethroid pesticides, like other hydrophobic organic chemicals, primarily bind to the organic carbon (OC) found in suspended solids and dissolved organic matter. The following equation can be used to estimate the freely dissolved concentration of pyrethroids:

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

where,

$C_{dissolved}$ is the concentration of chemical in the dissolved phase (mg/L)
C_{total} is the total concentration of chemical in water (mg/L)
K_{OC} is the organic carbon–water partition coefficient (L/kg)
[*POC*] is the concentration of particulate organic carbon in water (kg/L)
K_{OC} is the organic carbon–water partition coefficient (L/kg) for DOC
[*DOC*] is the concentration of dissolved organic carbon in water (kg/L)

To calculate the freely dissolved concentration with this equation, water samples must be analyzed for the total concentration of each pyrethroid pesticide (C_{total}), the concentration of particulate organic carbon in water ([*POC*]), and the concentration of dissolved organic carbon ([DOC]) in water. The concentration of POC can be calculated as [*POC*]=[*TOC*]-[*DOC*]. The accuracy of the estimation of the freely dissolved concentration will be improved if site-specific partition coefficients are used, but if site-specific partition coefficients are not available, partition coefficients available in the literature could also be used for this calculation. Because site-specific partition coefficients are not currently available, default partition coefficients are proposed in the

California Regional Water Quality Control Board, Central Valley Region (CRWQCB-CVR) staff report in order to be used in the above equation to estimate the freely dissolved concentration of a sample. Only one study was identified that met all of the data acceptability criteria for the ambient waters (Chickering 2014) established by the Staff Report from CVRWQCB based on their literature survey and the partition coefficients are presented below in Table 2-5. These partition coefficients can be used for the determination of the freely dissolved concentration for compliance with these TMDLs.

Table 2-5. Recommended default partition coefficients for pyrethroids (L/kg)

	Ambient Waters		Wastewater Effluents[a]	
Pyrethroid	**K_{OC}**	**K_{DOC}**	**K_{OC}**	**K_{DOC}**
Bifenthrin	4,228,000	1,737,127	15,848,932	800,000
Cyfluthrin	3,870,000	2,432,071	--	--
Cypermethrin	3,105,000	762,765	6,309,573	200,000
Esfenvalerate	7,220,000	1,733,158	--	--
Lambda-cyhalothrin	2,056,000	952,809	7,126,428	200,000
Permethrin	6,075,000	957,703	10,000,000	200,000

[a]All data from Parry and Young (2013)

It should be noted that the recommended default partition coefficients for both ambient waters and unique matrices, such as municipal or domestic wastewater treatment plant effluents, are summarized in Table 2-5. Partition coefficients for wastewater effluents are needed to assess the effects of pyrethroids in effluents on ambient waters. One study has determined partition coefficients for four pyrethroids using wastewater effluents and these values can be used for estimating the freely dissolved pyrethroid concentration in effluents. Parry and Young (2013) determined both K_{OC} and K_{DOC} for bifenthrin, lambda-cyhalothrin, cypermethrin, and permethrin based on six samples from the Sacramento Regional Wastewater Treatment Plant. As recommended above, the 50th percentile of K_{OC} values is used as the default K_{OC} for effluents for each pyrethroid. Only a single K_{DOC} value was reported for each chemical (Parry and Young 2013), and those are the recommended K_{DOC} values for wastewater effluents. Because partition coefficients for wastewater effluents are not available for cyfluthrin and esfenvalerate, the default partition coefficients for ambient waters may be used in cases when these pyrethroids are detected wastewater effluents. However, if partition coefficients specific to municipal and domestic wastewater effluents become available for these compounds in the future, it is recommended that those values are used for assessing pyrethroids in effluents.

2.3.2. Sediment Numeric Targets

Some pyrethroids have low water solubility and a strong tendency to adsorb to soils before degrading. This means that some pyrethroids may be present in both water and

sediment. Hence, it is necessary to determine the sediment numeric targets for such pyrethroids. In Section 1.3, Table 1-2 (p. 7) displays the soil half-life of pyrethroid pesticides, ranging from a few days to months and are dependent on factors such as temperature, salinity, and other water quality parameters. To account for pyrethroids that are insoluble in the water column, pyrethroid concentration in sediment should also be considered. Numeric targets for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in sediment samples collected from the New and Alamo Rivers were selected based on the median lethal concentrations (LC50) for each pyrethroid and normalized by the percentage of organic carbon in the sediment sample (Table 2-6) (Amweg et al., 2005, Amweg and Weston, 2007, Maund et al., 2002).

Table 2-6. Evaluation Guidelines for Pyrethroid Pesticides in Sediment (Dry Weight Basis).

Pyrethroid	Sediment (µg/g OC)	Reference
Bifenthrin	0.43	Amweg et al. (2005) and Amweg and Weston (2007)
Cyfluthrin	1.1	Amweg et al. (2005)
Cypermethrin	0.3	Maund et al. (2002)
Esfenvalerate	1.5	Amweg et al. (2005)
Lambda-cyhalothrin	0.44	Amweg et al. (2005)
Permethrin	8.9	Amweg et al. (2005)

2.3.3. Additive Toxicity

Mixtures of pesticides may produce unexpected effects when one chemical enhances the effect of another chemical. Additive toxicity is defined by an index in which individual toxic contributions of chemicals are summed for two or more chemicals in combination. This linear index expresses the toxicity quantitatively. Thus, pyrethroid pesticides co-occurring in the environment may have the potential to have an additive toxic effect. These mixtures may have concentration-additive effects which means that if the constituent chemicals have the same mode of action, their toxicity-normalized concentrations can be added to estimate the effective concentration. Several studies have demonstrated that the pyrethroids can co-occur in the environment and have an additive effect on toxicity (Barata et al. 2006, Brander et al. 2009, Trimble et al. 2009), therefore, the UC Davis Method recommends calculating additive toxicity of pyrethroids. The UCDM (Fojut et. al, 2012) and WQCR (Fojut T. L., 2015) recommend using an additive concentration approach with the concentrations expressed as freely dissolved concentrations to account for bioavailability. Addressing additive toxicity will ensure that the cumulative toxic potential of these pesticides is addressed.

To calculate additive toxicity and establish a level of protection from the potentially toxic mixtures of pyrethroids, the following equations are recommended:

Equation 1

$$\frac{C_{bif}}{AC_{bif}} + \frac{C_{cyf}}{AC_{cyf}} + \frac{C_{cyp}}{AC_{cyp}} + \frac{C_{esf}}{AC_{esf}} + \frac{C_{lcy}}{AC_{lcy}} + \frac{C_{per}}{AC_{per}} \leq 1$$

Where:

C_{bif} = Average concentration of bifenthrin from a 1-hour averaging period (µg/L)
C_{cyf} = Average concentration of cyfluthrin from a 1-hour averaging period (µg/L)
C_{cyp} = Average concentration of cypermethrin from a 1-hour averaging period (µg/L)
C_{esf} = Average concentration of esfenvalerate from a 1-hour averaging period (µg/L)
C_{lcy} = Average concentration of lambda-cyhalothrin from a 1-hour averaging period (µg/L)
C_{per} = Average concentration of permethrin from a 1-hour averaging period (µg/L)
AC_{bif} = Acute Criterion reference value of bifenthrin (µg/L)
AC_{cyf} = Acute Criterion reference value of cyfluthrin (µg/L)
AC_{cyp} = Acute Criterion reference value of cypermethrin (µg/L)
AC_{esf} = Acute Criterion reference value of esfenvalerate (µg/L)
AC_{lcy} = Acute Criterion reference value of lambda-cyhalothrin (µg/L)
AC_{per} = Acute Criterion reference value of permethrin (µg/L)

Value of calculated additive toxicity cannot exceed 1.0 more than once in any consecutive three-year period.

Equation 2

$$\frac{C_{bif}}{CC_{bif}} + \frac{C_{cyf}}{CC_{cyf}} + \frac{C_{cyp}}{CC_{cyp}} + \frac{C_{esf}}{CC_{esf}} + \frac{C_{lcy}}{CC_{lcy}} + \frac{C_{per}}{CC_{per}} \leq 1$$

Where:

C_{bif} = Average concentration of bifenthrin from a 4-day averaging period (µg/L)
C_{cyf} = Average concentration of cyfluthrin from a 4-day averaging period (µg/L)
C_{cyp} = Average concentration of cypermethrin from a 4-day averaging period (µg/L)
C_{esf} = Average concentration of esfenvalerate from a 4-day averaging period (µg/L)
C_{lcy} = Average concentration of lambda-cyhalothrin from a 4-day averaging period (µg/L),
C_{per} = Average concentration of permethrin from a 4-day averaging period (µg/L)
CC_{bif} = Chronic Criterion reference value of bifenthrin (µg/L)
CC_{cyf} = Chronic Criterion reference value of cyfluthrin (µg/L)

CC_{cyp} = Chronic Criterion reference value of cypermethrin (µg/L)
CC_{esf} = Chronic Criterion reference value of esfenvalerate (µg/L)
CC_{lcy} = Chronic Criterion reference value of lambda-cyhalothrin (µg/L)
CC_{per} = Chronic Criterion reference value of permethrin (µg/L)

Value of the calculated additive toxicity cannot exceed 1.0 more than once in any consecutive three-year period.

It is true that the additive toxicity formula can be used when a combination of pyrethroids exists in a given sample. However, it is recommended by the UCDM and WQCR that the water quality objectives for both the acute and chronic criterion concentrations for criteria compliance are based on individual pyrethroid toxicities instead of the additive toxicity. The interactions between pyrethroids and various pesticides and other chemicals were reviewed by Fojut et al. (2012), and the authors concluded that there is currently not sufficient data to quantify any of these interactions. Due to the lack of data to quantify impacts, quantitative limits to account for these interactions (i.e. additive toxicity) are not recommended for inclusion in the Basin Plan at this time. Therefore, the chosen criteria based on individual concentrations of each pyrethroid are believed to be stringent enough for protection of the water quality. These TMDLs may be subject to revisions over time. These revisions will reflect robust data information on additive toxicity that becomes available in the future.

3. DATA ANALYSIS

To assess water quality conditions and the presence of bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in the New and Alamo Rivers, staff examined water and sediment samples collected by California's Surface Water Ambient Monitoring Program (SWAMP). Monitoring stations were established for agricultural drains at locations where the drain discharges into the river. The New and Alamo Rivers have 10 sampling stations each, which were selected to cover the length of the rivers by starting at their origin points at the International Boundary until their discharge points at the Salton Sea (Figure 3-, Table 3-1).

Figure 3-1. Map of Sampling Locations along New and Alamo Rivers.

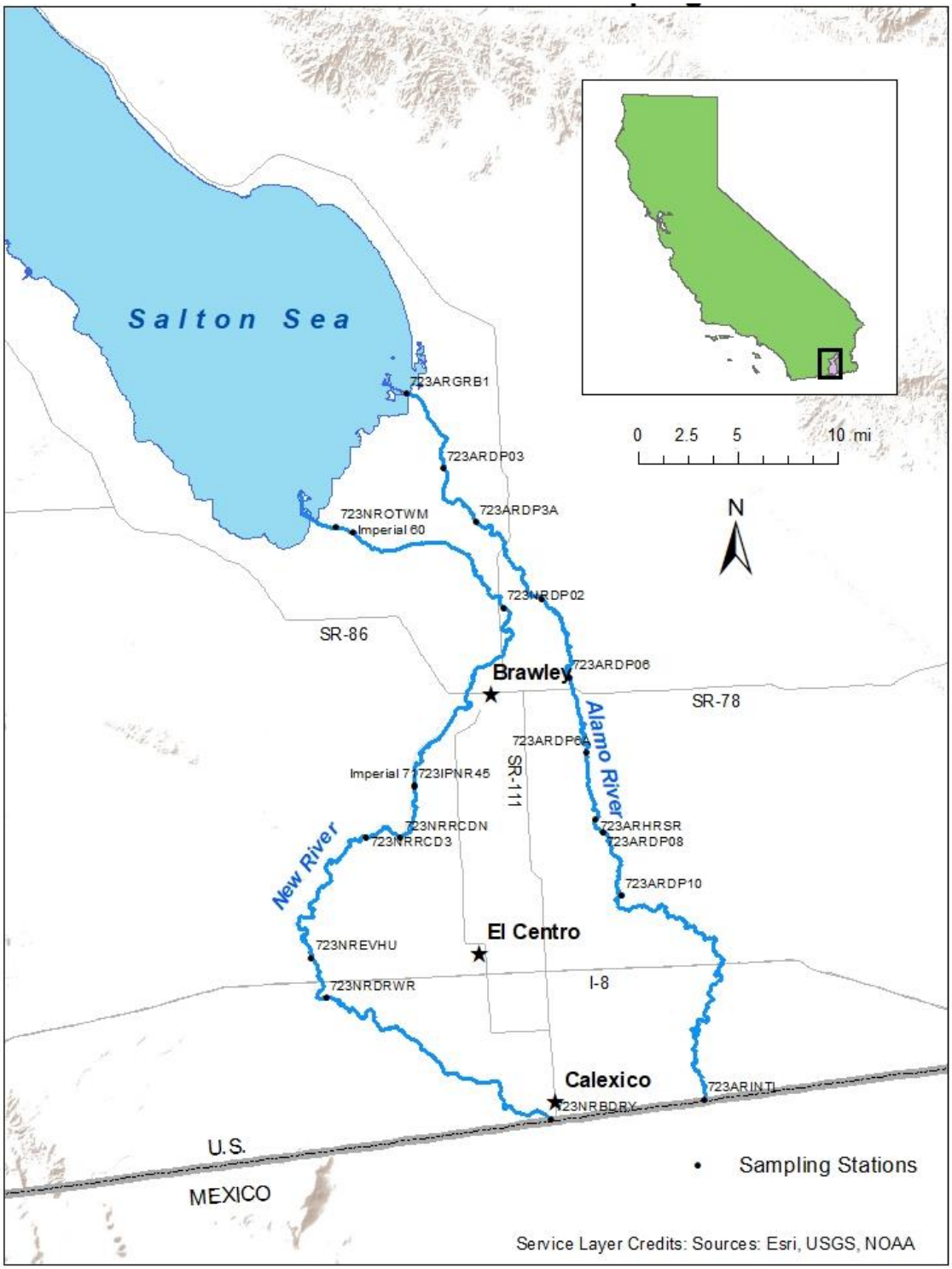


Table 3-1. Sampling Location Stations and Corresponding Station Codes.

Waterbody Name	Location	Code
Alamo River	Drop 3	723ARDP03
Alamo River	Drop 6 Rose Drain	723ARDP06
Alamo River	Drop 8	723ARDP08
Alamo River	Drop 10 Central Drain	723ARDP10
Alamo River	Above Drop 3	723ARDP3A
Alamo River	Drop 6A Holtville Drain	723ARDP6A
Alamo River	Outlet	723ARGRB1
Alamo River	Harris Road Near Imperial	723ARHRSR
Alamo River	International Boundary	723ARINTL
Alamo River	Rutherford	723IPRF29
New River	Keystone S27	723IPNR45
New River	Boundary	723NRBDRY
New River	Drop 2	723NRDP02
New River	Drew Road near Seeley	723NRDRWR
New River	Evan Hughes Hwy	723NREVHU
New River	Outlet	723NROTWM
New River	Rice Drain #3	723NRRCD3
New River	Rice Drain	723NRRCDN
New River	Lack Road (DPR Ag site, ID: Imp_Lack)	Imperial 60
New River	HWY S27/Keystone Rd	Imperial 71

For all data tables, sample results that report detectable concentrations but are below method reporting limits (RLs) in Table 3-2 are commonly reported as Detect Non-Quantifiable (DNQ) and are shown in the data tables along with a DNQ beside the

reported results. Sample results that report non-detectable concentrations are commonly reported as Non-Detect (ND) and are omitted from the tables below. Sample results that exceed the applied numeric targets are in bold font and noted with an asterisk (*). Analytical limits are discussed as a matter of assessing the quality of the data, and the ability to determine if the waters are meeting the WQOs.

Table 3-2. Pyrethroid Reporting Limits in Surface Water and Dry Sediment.

Compound	Water Reporting Limit (µg/L)	Sediment Reporting Limit (µg/g)
Bifenthrin	0.0020	0.01
Cyfluthrin	0.0050	0.01
Cypermethrin	0.0050	0.01
Esfenvalerate	0.0020	0.01
Lambda-cyhalothrin	0.0005	0.01
Permethrin	0.0050	0.01

3.1. Water Quality Data

Pyrethroid pesticides have been found in SWAMP water samples collected from the New and Alamo Rivers. In the New and Alamo Rivers, the 6 primary pyrethroids have been found in concentrations above the RL (Table 3-2). Table 3-3 and

Figure 3-2 show pyrethroid concentrations at each sampling location at the New River and Table 3-4 and

Figure 3-2 show pyrethroid concentrations at each sampling location at the Alamo River.

3.1.1. Bifenthrin

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for bifenthrin (0.3 ng/L), DNQs, and NDs (Table 3-3,

Figure 3-2). Bifenthrin concentrations found in water samples collected from 2003-2020 show an apparent decrease in usage, as samples collected resulted in lower concentrations.

3.1.2. Cyfluthrin

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for cyfluthrin (0.3 ng/L), DNQs, and NDs (Table 3-3, Table 3-4,

Figure 3-2). Cyfluthrin concentrations found in water samples collected from 2003-2020 show an apparent decrease in usage, as samples collected resulted in lower concentrations.

3.1.3. Cypermethrin

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for cypermethrin (0.3 ng/L), DNQs, and NDs (Table 3-3, Table 3-4,

Figure 3-2). Cypermethrin concentrations found in water samples collected from 2005-2020 show an apparent decrease in usage, as samples collected resulted in lower concentrations.

3.1.4. Esfenvalerate

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for esfenvalerate (0.7 ng/L), DNQs, and NDs (Table 3-3, Table 3-4,

Figure 3-2). Esfenvalerate concentrations found in water samples collected from the New River between 2005-2020 show an apparent decrease in usage, as collected samples resulted in lower concentrations. Water samples collected from the Alamo River show an apparent increase in usage.

3.1.5. Lambda-cyhalothrin

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for lambda-cyhalothrin (0.2 ng/L), DNQs, and NDs (Table 3-3, Table 3-4,

Figure 3-2). Water samples collected from the New River and the Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range. A noteworthy outlier in the water sample data for the New River is noted in the figure inset.

3.1.6. Permethrin

Water samples collected from the New and Alamo Rivers resulted in a combination of concentrations that exceeded the numeric target for permethrin (6 ng/L), DNQs, and NDs (Table 3-3, Table 3-4,

Figure 3-2). Permethrin concentrations found in water samples collected from the New River between 2010-2020 show an apparent decrease in usage, as the recent samples collected have resulted in lower concentrations. Water samples collected from the Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range.

Regarding the tables below:

Cells with two or more sample concentrations on a given date indicate samples that were collected from different parent projects.

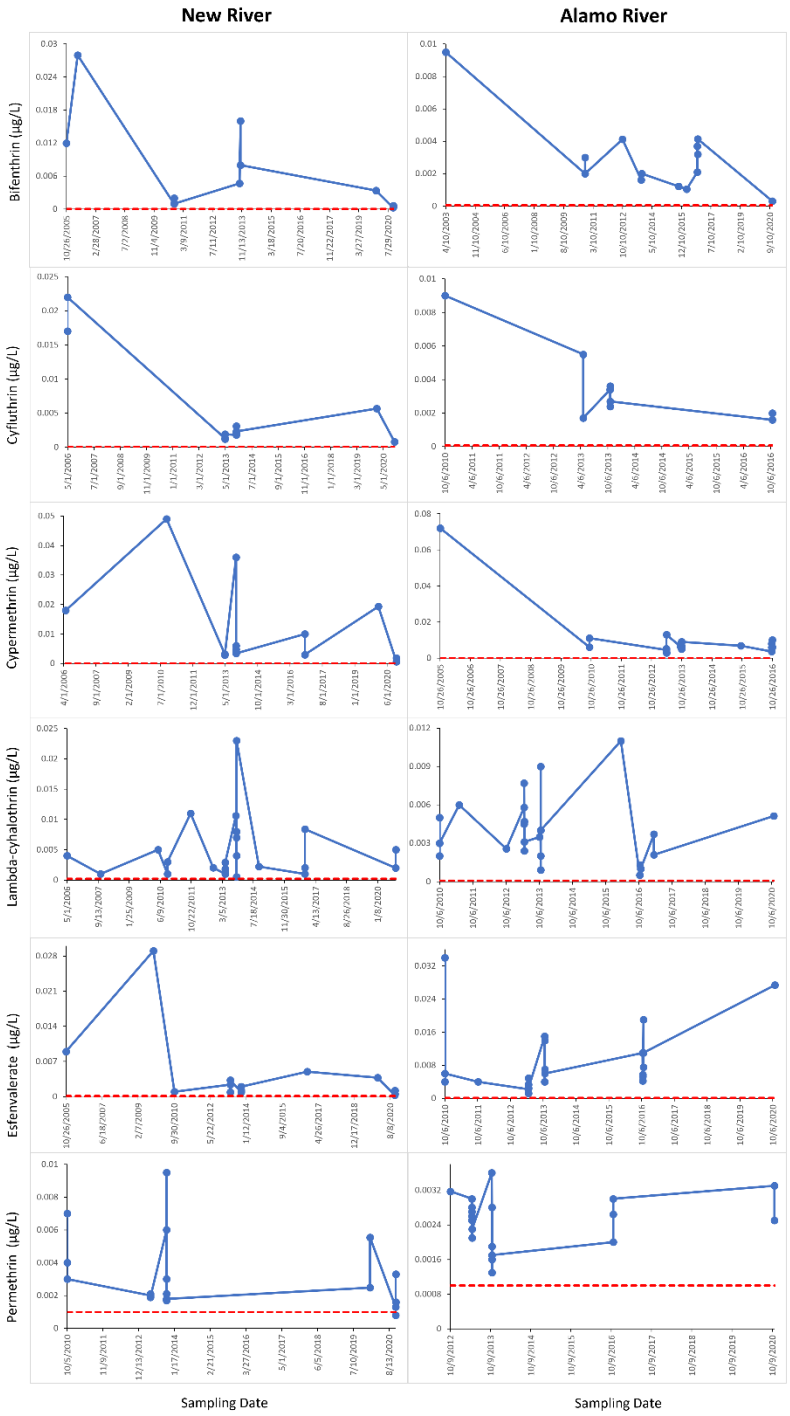
“ND” indicates a non-detection.

“DNQ” indicates a nonquantifiable detection.

“N/A” indicates that there was no sample for the parameter.

An asterisk (*) indicates that the sample result exceeds numeric target.

Figure 3-2. Constituent Concentrations in Water Samples Collected from New and Alamo Rivers, 2003-2020 (µg/L).[4]



[4] Pyrethroid pesticide shown in solid blue line, numeric target shown in dashed red line.

Table 3-3. Constituent Concentrations in Water Samples from New River, 2005-2020 (µg/L).[5]

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River at Drew Road near Seeley	10/28/2020	0.0006 (DNQ)	N/A	0.0006 (DNQ)	0.00054 (DNQ)	N/A	N/A
New River at Boundary	05/1/2006	0.028*	0.017*	0.018*	N/A	0.004*	N/A
New River at Boundary	10/5/2010	0.001*	N/A	0.049*	N/A	N/A	0.004* 0.007*
New River at Boundary	04/23/2013	N/A	N/A	0.0032 (DNQ)	N/A	N/A	0.002
New River at Boundary	10/22/2013	N/A	0.0018 (DNQ)	0.036*	0.0009 (DNQ)	0.0005	0.006* 0.0095*
New River at Boundary	10/25/2016	ND	ND	0.01*	ND	ND	ND
New River at Boundary	01/13/2020	3.38*	5.66*	19.3*	3.79*	N/A	2.48* 5.54*
New River at Boundary	10/28/2020	0.0004 (DNQ)	N/A	0.0019 (DNQ)	N/A	N/A	N/A
New River at Drop 2	04/23/2013	N/A	0.0013 (DNQ)	N/A	0.0024*	0.0018*	0.0021*

[5] Cells with two or more sample concentrations on a given date = samples collected from different parent projects. ND = non-detect. DNQ = detect non-quantifiable. N/A = no sample for this parameter. Asterisk = sample result exceeds numeric target.

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River at Drop 2	10/22/2013	N/A	0.0031 (DNQ)	0.0048 (DNQ)	0.002*	0.007*	0.003*
New River at Drop 2	10/27/2020	0.0003 (DNQ)	N/A	N/A	0.0003 (DNQ)	0.002*	0.0013 (DNQ) 0.0008 (DNQ)
New River at Evan Hughes Hwy	10/6/2010	0.002*	N/A	N/A	0.001 (DNQ)	0.003*	0.003*
New River at Evan Hughes Hwy	04/23/2013	N/A	0.0012 (DNQ)	N/A	0.0009 (DNQ)	0.001*	N/A
New River at Evan Hughes Hwy	10/22/2013	0.016*	N/A	0.006*	0.0011 (DNQ)	0.023	0.0021*
New River at HWY S27/Keystone Rd	10/9/2012	N/A	N/A	N/A	N/A	0.00203*	N/A
New River at HWY S27/Keystone Rd	10/9/2013	0.00467*	N/A	N/A	N/A	0.0106*	N/A
New River at HWY S27/Keystone Rd	10/26/2016	N/A	N/A	N/A	N/A	0.00202*	N/A
New River at HWY S27/Keystone Rd	10/15/2014	N/A	N/A	N/A	N/A	0.00221*	N/A
New River at Lack Road (DPR Ag site, ID:Imp_Lack)	10/26/2016	N/A	N/A	N/A	N/A	0.0084*	N/A
New River at Lack Road (DPR Ag site, ID:Imp_Lack)	10/17/2017	N/A	N/A	N/A	N/A	0.17*	N/A

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River at Rice Drain	04/23/2013	N/A	N/A	N/A	N/A	0.0012*	N/A
New River at Rice Drain	10/22/2013	N/A	0.0019 (DNQ)	0.0038 (DNQ)	0.001 (DNQ)	0.0005	N/A
New River at Rice Drain #3	04/23/2013	N/A	N/A	N/A	N/A	0.0018*	N/A
New River at Rice Drain #3	10/22/2013	N/A	0.0021 (DNQ)	0.0039 (DNQ)	0.0013 (DNQ)	0.008*	0.0017 (DNQ)
New River Outlet	10/26/2005	0.012*	N/A	N/A	0.009*	N/A	N/A
New River Outlet	05/1/2006	0	0.022*	N/A	N/A	N/A	N/A
New River Outlet	10/22/2007	N/A	N/A	N/A	N/A	0.001*	N/A
New River Outlet	10/19/2009	N/A	N/A	N/A	0.029*	N/A	N/A
New River Outlet	05/4/2010	N/A	N/A	N/A	N/A	0.005*	N/A
New River Outlet	10/6/2010	0.001 (DNQ)	N/A	N/A	0.001 (DNQ)	0.001*	N/A
New River Outlet	10/11/2011	N/A	N/A	N/A	N/A	0.011*	N/A
New River Outlet	04/23/2013	N/A	0.0019 (DNQ)	0.0029 (DNQ)	0.0033*	0.0029*	0.0019 (DNQ)
New River Outlet	10/22/2013	0.008*	0.0023 (DNQ)	0.0034 (DNQ)	0.002*	0.004*	0.0018 (DNQ)
New River Outlet	10/26/2016	0.003 (DNQ)	ND	0.003 (DNQ)	0.005*	0.001*	ND ND

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River Outlet	10/29/2020	0.00052 (DNQ)	0.000796 (DNQ)	N/A	0.0012 (DNQ)	0.00501*	0.0033* 0.0016 (DNQ)

Table 3-4. Constituent Concentrations in Water Samples from Alamo River, 2003-2020 (µg/L)

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo River at Harris Road Near Imperial	04/10/2003	0.0095*	N/A	N/A	N/A	N/A	N/A
Alamo River Above Drop 3	10/6/2010	0.002*	0.009*	0.006*	0.034*	0.003*	N/A
Alamo River at Drop 10 Central Drain	10/6/2010	0.003*	N/A	N/A	0.004*	0.002*	N/A
Alamo River at Drop 10 Central Drain	04/24/2013	N/A	N/A	0.0029 (DNQ)	0.0049*	0.0024*	0.0021*
Alamo River at Drop 10 Central Drain	10/23/2013	0.002*	0.0024 (DNQ)	0.005*	0.007*	0.0009*	0.0013 (DNQ)
Alamo River at Drop 10 Central Drain	10/17/2016	ND	ND	0.0036 (DNQ)	0.01099*	0.0005	ND
Alamo River at Drop 3	04/23/2013	N/A	0.0055*	0.0034 (DNQ)	0.0033*	0.0045*	0.0028* 0.0027*
Alamo River at Drop 3	10/22/2013	N/A	N/A	0.007*	0.015*	0.002*	0.0019 (DNQ)
Alamo River at Drop 3	10/26/2016	ND	ND	0.006*	0.019*	0.001*	0.002 (ND)

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo River at Drop 6 Rose Drain	10/6/2010	0.002*	N/A	0.011*	N/A	0.005*	N/A
Alamo River at Drop 6 Rose Drain	04/23/2013	N/A	N/A	0.0052*	0.0024*	0.0077*	0.0025* 0.0026*
Alamo River at Drop 6 Rose Drain	10/22/2013	N/A	N/A	0.006*	0.004*	0.009*	0.0028*
Alamo River at Drop 6 Rose Drain	10/18/2016	0.0021*	0.0016 (DNQ)	0.0059*	0.0042*	0.0013*	ND
Alamo River at Drop 6A Holtville Drain	10/6/2010	0.002*	N/A	N/A	N/A	0.005*	N/A
Alamo River at Drop 6A Holtville Drain	04/24/2013	N/A	0.0017 (DNQ)	N/A	0.0012 (DNQ)	0.0047*	0.0025*
Alamo River at Drop 6A Holtville Drain	10/23/2013	N/A	0.0036 (DNQ)	0.009*	0.014*	0.004*	0.0016 (DNQ)
Alamo River at Drop 6A Holtville Drain	10/18/2016	ND	ND	ND	0.0053*	ND	ND
Alamo River at Drop 8	04/24/2013	N/A	N/A	0.013*	0.0025*	0.0031*	0.0023*
Alamo River at Drop 8	10/23/2013	0.002*	0.0027 (DNQ)	0.009*	0.006*	0.004*	0.0027 (DNQ)
Alamo River at Drop 8	10/18/2016	0.0037*	0.002 (DNQ)	0.008*	0.0057*	0.0013*	ND
Alamo River at International Boundary	05/10/2011	N/A	N/A	N/A	N/A	0.006*	N/A

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo River at Rutherford	10/9/2012	0.00413*	N/A	0.00641*	N/A	0.00257* 0.00348*	N/A
Alamo River at Rutherford	10/13/2015	0.00121 (DNQ)	N/A	0.00684*	N/A	N/A	N/A
Alamo River at Rutherford	03/22/2016	0.00104*	N/A	N/A	N/A	0.011*	N/A
Alamo River at Rutherford	10/26/2016	0.00319*	N/A	N/A	0.00751*	N/A	0.00264*
Alamo River at Rutherford	03/21/2017	N/A	N/A	N/A	N/A	0.0037*	N/A
Alamo River Outlet	10/26/2005	N/A	N/A	0.072*	N/A	N/A	N/A
Alamo River Outlet	10/6/2010	0.002*	N/A	N/A	0.006*	0.003*	N/A
Alamo River Outlet	10/11/2011	N/A	N/A	N/A	0.004*	N/A	N/A
Alamo River Outlet	10/9/2012	N/A	N/A	N/A	N/A	N/A	0.00317*
Alamo River Outlet	04/22/2013	N/A	N/A	0.0045 (DNQ)	0.0022*	0.0058*	0.003* 0.0025*
Alamo River Outlet	10/9/2013	0.00162 (DNQ)	N/A	N/A	N/A	N/A	N/A
Alamo River Outlet	10/21/2013	0.002*	0.0034 (DNQ)	0.006*	N/A	0.004*	0.0036*
Alamo River Outlet	10/26/2016	0.00414 (ND)	ND	0.01*	0.011*	0.001*	0.003* (ND)
Alamo River Outlet	03/21/2017	N/A	N/A	N/A	N/A	0.0021*	N/A

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo River Outlet	10/29/2020	0.0003 (DNQ)	N/A	N/A	0.0274*	0.00512*	0.0033* 0.0025*

3.2. Sediment Data

Pyrethroid pesticides have been found in SWAMP sediment samples collected from the New and Alamo Rivers. Table 3-5 and

Figure 3-2 show pyrethroid concentrations at each sampling location at the New River and Table 3-6 and

Figure 3-2 show pyrethroid concentrations at each sampling location at the Alamo River.

3.2.1. Bifenthrin

Sediment samples collected from the New and Alamo Rivers between 2003-2020 have resulted in concentrations below numeric targets for bifenthrin (0.43 µg/g OC) (Table 3-5, Table 3-6,

Figure 3-3). Bifenthrin concentrations found in sediment samples show an apparent decrease in usage, besides a few outliers, as the recent samples collected have resulted in lower concentrations.

3.2.2. Cyfluthrin

Sediment samples collected from the New and Alamo Rivers between 2004-2017 have resulted in concentrations below numeric targets for cyfluthrin (1.1 µg/g OC) or ND (Table 3-5, Table 3-6,

Figure 3-3). Cyfluthrin concentrations found in sediment samples show an apparent decrease in usage, as samples collected have resulted in lower concentrations.

3.2.3. Cypermethrin

Sediment samples collected from the New and Alamo Rivers between 2005-2020 have resulted in concentrations below numeric targets for cypermethrin (0.3 µg/g OC) (Table 3-5, Table 3-6,

Figure 3-3). Cypermethrin concentrations found in sediment samples show an apparent decrease in usage, besides a few outliers, as samples collected have resulted in lower concentrations.

3.2.4. Esfenvalerate

Sediment samples collected from the New and Alamo Rivers between 2009-2020 have resulted in concentrations below numeric targets for esfenvalerate (1.5 µg/g OC) (Table 3-5, Table 3-6,

Figure 3-3). Esfenvalerate concentrations found in sediment samples collected in the New River show an apparent decrease in usage, besides a few outliers, as samples collected have resulted in lower concentrations. Sediment samples collected from the Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range.

3.2.5. Lambda-cyhalothrin

Sediment samples collected from the New and Alamo Rivers between 2005-2020 have resulted in concentrations below numeric targets for lambda-cyhalothrin (0.44 µg/g OC) (Table 3-5, Table 3-6,

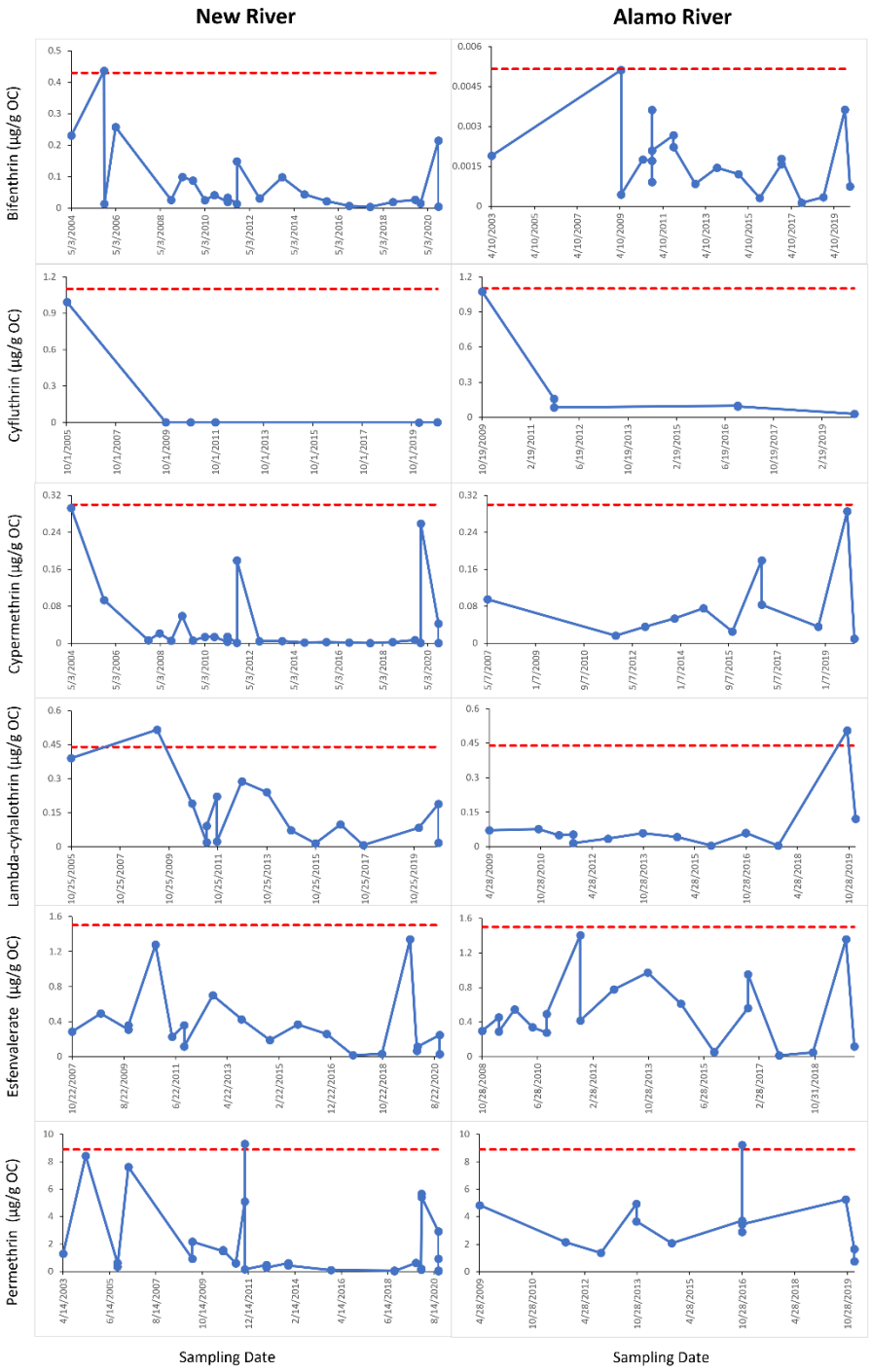
Figure 3-3). Lambda-cyhalothrin concentrations found in sediment samples collected in the New River show an apparent decrease in usage, besides a few outliers, as samples collected have resulted in lower concentrations. Sediment samples collected from the Alamo River show an apparent increase in usage.

3.2.6. Permethrin

Sediment samples collected from the New and Alamo Rivers between 2004-2020 have resulted in concentrations below numeric targets for permethrin (8.9 µg/g OC) or ND (Table 3-5, Table 3-6,

Figure 3-3). Permethrin concentrations found in sediment samples collected in the New River show an apparent decrease in usage, besides a few outliers, as samples collected have resulted in lower concentrations. Sediment samples collected from the Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range.

Figure 3-3. Constituent Concentrations in Sediment Samples from New and Alamo Rivers, 2003-2020 (µg/g OC).[6]



[6] Pyrethroid pesticide shown in solid blue line, numeric target shown in dashed red line.

Table 3-5. Constituent Concentrations in Sediment Samples from New River, 2004-2020 (µg/g OC).

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River at Boundary	5/3/2004	0.0115	0.1829	N/A	N/A	N/A	0.059
New River at Boundary	10/25/2005	0.0218	0.9925	0.00323	N/A	0.00651	0.00442
New River at Boundary	5/1/2006	0.01285	N/A	N/A	N/A	N/A	0.05333
New River at Boundary	4/21/2008	N/A	N/A	0.0133	N/A	N/A	N/A
New River at Boundary	4/28/2009	0.00493	N/A	0.0369	N/A	0.00859	N/A
New River at Boundary	10/19/2009	0.00435	N/A	N/A	0.0031	N/A	N/A
New River at Boundary	5/4/2010	N/A	N/A	0.0085	N/A	N/A	N/A
New River at Boundary	5/10/2011	0.00162	N/A	0.00883	N/A	0.000343	0.00414 0.00416
New River at Boundary	10/11/2011	0.00739	0.00219	0.112	0.0036	0.00369	0.0357 0.0651

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River at Boundary	1/13/2020	N/A	0.00111	0.162	0.00113	N/A	0.0396 0.038
New River at Boundary	10/28/2020	0.0107	0.0034	0.0264	0.00247	0.00315	0.0204
New River at Evan Hughes Hwy	10/6/2010	N/A	0.00281	N/A	N/A	N/A	0.00649
New River Outlet	4/14/2003	N/A	N/A	N/A	N/A	N/A	0.009
New River Outlet	10/26/2005	0.00065	N/A	N/A	0.00285	N/A	0.00237
New River Outlet	10/22/2007	N/A	N/A	0.00409	N/A	N/A	N/A
New River Outlet	10/28/2008	0.00126	N/A	0.00336	0.00493	N/A	N/A
New River Outlet	4/28/2009	N/A	N/A	N/A	N/A	N/A	0.00646 0.0152
New River Outlet	10/19/2009	N/A	0.00323	0.00344	0.00359	N/A	N/A
New River Outlet	5/4/2010	0.00121	N/A	N/A	N/A	N/A	N/A

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River Outlet	10/6/2010	0.00202	N/A	0.00848	0.0128	0.00318	0.0103 0.0109
New River Outlet	5/10/2011	0.000953	N/A	0.00179	0.00226	0.00154	N/A
New River Outlet	10/11/2011	0.000653	N/A	0.000446	0.00117	0.000389	0.00112
New River Outlet	10/16/2012	0.00151	N/A	0.00701	0.00328	0.00263	0.00202
New River Outlet	10/22/2013	0.0049	N/A	0.003	0.00427	0.00402	0.00419 0.00308
New River Outlet	10/22/2014	0.00215	N/A	0.00091	0.00188	0.00122	N/A
New River Outlet	10/19/2015	0.00108	N/A	0.00161	0.00367	0.000263	0.000716
New River Outlet	10/26/2016	0.000314	ND	0.000929	0.00258	0.00165	ND
New River Outlet	10/4/2017	0.000174	ND	0.000157	0.000167	0.000121	ND
New River Outlet	10/10/2018	0.000929	N/A	0.00142	0.000304	N/A	0.000468 0.000207

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
New River Outlet	10/10/2019	0.00132	N/A	0.00438	0.0134	N/A	0.00429
New River Outlet	1/8/2020	0.000743	N/A	0.000413	0.000674	0.00141	0.00133 0.00083
New River Outlet	10/29/2020	0.0002	N/A	0.0000868	0.000295	0.000306	0.000477 0.000234

Table 3-6. Constituent Concentrations in Sediment Samples from Alamo River, 2003-2020 (µg/g OC).

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo R at Harris Road Near Imperial	4/10/2003	0.0019	N/A	N/A	N/A	N/A	N/A
Alamo River at Drop 10 Central Drain	10/6/2010	0.00171	N/A	N/A	N/A	N/A	N/A
Alamo River at Drop 10 Central Drain	10/11/2011	0.00267	0.000463	N/A	0.00879	0.00123	0.0151
Alamo River at Drop 6 Rose Drain	10/6/2010	0.00209	N/A	N/A	N/A	N/A	N/A
Alamo River at Drop 6A Holtville Drain	10/6/2010	0.00362	N/A	N/A	0.00172	0.00178	N/A
Alamo River at International Boundary	4/28/2009	0.000432	N/A	N/A	0.00284	N/A	N/A
Alamo River Outlet	5/7/2007	N/A	N/A	0.00357	N/A	N/A	N/A
Alamo River Outlet	4/28/2009	0.00512	N/A	N/A	0.0018	0.00166	N/A
Alamo River Outlet	10/6/2010	0.000912	N/A	N/A	0.00307	N/A	N/A
Alamo River Outlet	10/11/2011	0.00223	0.000246	0.000601	0.0026	0.000357	N/A
Alamo River Outlet	10/28/2008	N/A	N/A	N/A	0.00186	N/A	N/A
Alamo River Outlet	4/28/2009	N/A	N/A	N/A	N/A	N/A	0.0339
Alamo River Outlet	10/19/2009	N/A	0.00313	N/A	0.00341	N/A	N/A
Alamo River Outlet	5/4/2010	0.00175	N/A	N/A	0.00211	N/A	N/A

Sampling Location	Date	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Lambda-Cyhalothrin	Permethrin
Alamo River Outlet	5/10/2011	N/A	N/A	N/A	N/A	0.00116	N/A
Alamo River Outlet	10/15/2012	0.000844	N/A	0.00133	0.00485	0.000811	0.00959
Alamo River Outlet	10/21/2013	0.00145	N/A	0.002	0.00608	0.00136	0.0346
Alamo River Outlet	10/22/2013	N/A	N/A	N/A	N/A	N/A	0.0257
Alamo River Outlet	10/22/2014	0.00121	N/A	0.00283	0.00381	0.000986	0.0145
Alamo River Outlet	10/21/2015	0.000306	N/A	0.000937	0.000312	0.000107	N/A
Alamo River Outlet	10/26/2016	0.00158	0.00029	0.00672	0.0035	0.00137	0.026
Alamo River Outlet	10/27/2016	0.00178	0.000272	0.00313	0.00596	0.0014	0.0646
Alamo River Outlet	10/28/2016	N/A	N/A	N/A	N/A	N/A	0.0203
Alamo River Outlet	10/29/2016	N/A	N/A	N/A	N/A	N/A	0.0242
Alamo River Outlet	10/4/2017	0.000124	ND	ND	0.000065	0.000097	ND
Alamo River Outlet	10/10/2018	0.000337	N/A	0.00134	0.000301	N/A	N/A
Alamo River Outlet	10/10/2019	0.00363	N/A	0.0107	0.00849	0.0118	0.0368
Alamo River Outlet	1/9/2020	N/A	N/A	0.00037	0.000716	0.00283	0.0116 0.00536

3.3. Additive Toxicity

Data collected from the New and Alamo Rivers indicate that pyrethroid pesticides are co-occurring in the environment and additive toxicity should be considered. Staff recommends that additive toxicity of pyrethroids be evaluated using

and **Error! Reference source not found.** found in Section 2.3.3.

In water samples taken from the New and Alamo Rivers, the concentration of pyrethroid pesticides at a specific location on a given sampling date (refer to Table 3-7 and Table 3-8) surpasses the toxic unit thresholds outlined in Equation 1 and Equation 2. However, in sediment samples gathered from the same rivers, the combined presence of pyrethroids does not exhibit a notable additive impact (see Table 3-9 and Table 3-10). Thus, the computation of additive toxicity for water and sediment samples assists in establishing a safeguard against the potential adverse effects of pyrethroid combinations.

In the tables below, an asterisk (*) indicates that the additive concentration exceeds 1.

Table 3-7. Additive Toxicity Concentrations in Water Samples from New River, 2005-2020 (µg/L).

Sampling Location	Date	Acute Concentration	Chronic Concentration
New River at Drew Road near Seeley	10/28/2020	18.750*	6.700*
New River at Boundary	5/1/2006	85.667*	484.667*
New River at Boundary	10/5/2010	49.650*	248.667*
New River at Boundary	10/22/2013	73.100*	224.5*
New River at Boundary	10/25/2016	10.00*	50.000*
New River at Boundary	1/13/2020	1.20075E+12554*	235523.33332770*
New River at Boundary	10/28/2020	2.00*	10.167*
New River at Drop 2	4/23/2013	86.343*	42.650*
New River at Drop 2	10/22/2013	89.100*	111.500*
New River at Drop 2	10/27/2020	12.205*	6.650*
New River at Evan Hughes Hwy	10/6/2010	37.133*	15.833*

Sampling Location	Date	Acute Concentration	Chronic Concentration
New River at Evan Hughes Hwy	4/23/2013	35.00*	30.500*
New River at Evan Hughes Hwy	10/22/2013	69.877*	109.217*
New River at HWY S27/Keystone Rd	10/9/2013	11.768*	28.983*
New River at Rice Drain	10/22/2013	43.967*	63.000*
New River at Rice Drain #3	10/22/2013	62.403*	84.002*
New River Outlet	10/26/2005	303.00*	65.000*
New River Outlet	10/6/2010	34.583*	8.667*
New River Outlet	4/23/2013	122.323*	75.750*
New River Outlet	10/22/2013	83.735*	95.233*
New River Outlet	10/26/2016	171.417*	45.001*
New River Outlet	10/29/2020	47.797*	34.457*

Table 3-8. Additive Toxicity Concentrations in Water Samples from Alamo River, 2003-2020 (µg/L).

Sampling Location	Date	Acute concentration	Chronic concentration
Alamo River Above Drop 3	10/6/2010	1172.833*	389.333*
Alamo River at Drop 10 Central Drain	10/6/2010	136.083*	29.000*
Alamo River at Drop 10 Central Drain	4/24/2013	168.843*	44.850*
Alamo River at Drop 10 Central Drain	10/23/2013	247.863*	113.783*
Alamo River at Drop 10 Central Drain	10/17/2016	370.433*	73.950*
Alamo River at Drop 3	4/23/2013	136.513*	43.90*
Alamo River at Drop 3	10/22/2013	509.190*	114.950*
Alamo River at Drop 3	10/26/2016	640.533*	128.000*
Alamo River at Drop 6 Rose Drain	10/6/2010	16.500*	68.333*

Sampling Location	Date	Acute concentration	Chronic concentration
Alamo River at Drop 6 Rose Drain	4/23/2013	93.150*	54.650*
Alamo River at Drop 6 Rose Drain	10/22/2013	148.613*	69.400*
Alamo River at Drop 6 Rose Drain	10/18/2016	153.058*	88.600*
Alamo River at Drop 6A Holtville Drain	10/6/2010	5.500*	13.333*
Alamo River at Drop 6A Holtville Drain	4/24/2013	50.617*	50.650*
Alamo River at Drop 6A Holtville Drain	10/23/2013	491.827*	50.650*
Alamo River at Drop 6A Holtville Drain	10/18/2016	176.667*	195.800*
Alamo River at Drop 8	4/24/2013	99.663*	84.850*
Alamo River at Drop 8	10/23/2013	222.770*	141.683*
Alamo River at Drop 8	10/18/2016	206.892*	117.267*
Alamo River at Rutherford	10/9/2012	10.013*	44.073*
Alamo River at Rutherford	10/13/2015	7.143*	36.217*
Alamo River at Rutherford	3/22/2016	366.927*	23.733*
Alamo River at Rutherford	10/26/2016	251.395*	44.187*
Alamo River Outlet	10/6/2010	203.500*	39.333*
Alamo River Outlet	4/22/2013	83.933*	46.600*
Alamo River Outlet	10/21/2013	22.193*	111.133*
Alamo River Outlet	10/26/2016	379.002*	115.400*
Alamo River Outlet	10/29/2020	918.858*	147.743*

Table 3-9. Additive Toxicity Concentrations in Sediment Samples Collected from New River, 2004-2020 (µg/g OC).

Sampling Location	Sampling Date	Additive Toxicity
New River at Boundary	5/3/2004	0.200
New River at Boundary	10/25/2005	0.979
New River at Boundary	5/1/2006	0.036
New River at Boundary	4/21/2008	0.044
New River at Boundary	4/28/2009	0.154
New River at Boundary	10/19/2009	0.012
New River at Boundary	5/4/2010	0.028
New River at Boundary	5/10/2011	0.034
New River at Boundary	10/11/2011	0.407
New River at Boundary	1/13/2020	0.546
New River at Boundary	10/28/2020	0.127
New River at Evan Hughes Hwy	10/6/2010	0.003
New River Outlet	4/14/2003	0.001
New River Outlet	10/26/2005	0.004
New River Outlet	10/22/2007	0.014
New River Outlet	10/28/2008	0.017
New River Outlet	4/28/2009	0.001
New River Outlet	10/19/2009	0.017
New River Outlet	5/4/2010	0.003
New River Outlet	10/6/2010	0.050
New River Outlet	5/10/2011	0.013
New River Outlet	10/11/2011	0.005
New River Outlet	10/16/2012	0.035
New River Outlet	10/22/2013	0.034

Sampling Location	Sampling Date	Additive Toxicity
New River Outlet	10/22/2014	0.012
New River Outlet	10/19/2015	0.011
New River Outlet	10/26/2016	0.009
New River Outlet	10/4/2017	0.001
New River Outlet	10/10/2018	0.007
New River Outlet	10/10/2019	0.027
New River Outlet	1/8/2020	0.007
New River Outlet	10/29/2020	0.002

Table 3-10. Additive Toxicity Concentrations in Sediment Samples Collected from Alamo River, 2003-2020 (µg/g OC).

Sampling Location	Sampling Date	Additive Toxicity
Alamo River at Harris Road Near Imperial	4/10/2003	0.004
Alamo River at Drop 10 Central Drain	10/6/2010	0.004
Alamo River at Drop 10 Central Drain	10/11/2011	0.017
Alamo River at Drop 6 Rose Drain	10/6/2010	0.005
Alamo River at Drop 6A Holtville Drain	10/6/2010	0.014
Alamo River at International Boundary	4/28/2009	0.003
Alamo River Outlet	5/7/2007	0.012
Alamo River Outlet	4/28/2009	1.900*
Alamo River Outlet	10/6/2010	0.004
Alamo River Outlet	10/11/2011	0.001
Alamo River Outlet	10/28/2008	0.001
Alamo River Outlet	4/28/2009	0.004
Alamo River Outlet	10/19/2009	0.005
Alamo River Outlet	5/4/2010	0.005

Sampling Location	Sampling Date	Additive Toxicity
Alamo River Outlet	5/10/2011	0.003
Alamo River Outlet	10/15/2012	0.013
Alamo River Outlet	10/21/2013	0.021
Alamo River Outlet	10/22/2013	0.003
Alamo River Outlet	10/22/2014	0.019
Alamo River Outlet	10/21/2015	0.004
Alamo River Outlet	10/26/2016	0.035
Alamo River Outlet	10/27/2016	0.029
Alamo River Outlet	10/28/2016	0.002
Alamo River Outlet	10/29/2016	0.003
Alamo River Outlet	10/4/2017	0.001
Alamo River Outlet	10/10/2018	0.005
Alamo River Outlet	10/10/2019	0.113
Alamo River Outlet	1/9/2020	8.908*

4. SOURCE ANALYSIS

Pyrethroid pesticides are used to control pests in both non-agricultural and agricultural areas. While the sources of pyrethroid pesticides in the Imperial Valley are currently unknown, nonpoint source and point source discharges could be contributing to the impairment of the New and Alamo Rivers. The sources of pyrethroid pesticides were investigated using available information about the Imperial Valley, the physical and chemical properties of pyrethroids and their uses, and environmental data.

Land use data shows that after undeveloped desert and mountain areas, the largest use of land in Imperial County is for agriculture. Today, about 450,000 acres of irrigated land are in agricultural production. Figure 4-1 shows the map of Imperial Irrigation District's drain system including Alamo and New River, and irrigated area. About 18 percent of county lands are designated for irrigated agricultural use, totaling over 525,000 acres located in the Imperial Valley (County of Imperial, 2015).

In Imperial County, pyrethroid pesticides are applied year-round with fall and late winter applications accounting for over 60 percent of the annual pyrethroid use. In 2018, the top five commodity sources for pyrethroids in 2018 leading to impairment in Imperial Valley are summarized in Table 4-1 (CDPR, 2020).

Figure 4-1. Map of Alamo River, New River and Irrigated Areas (Source: Imperial Irrigation District).

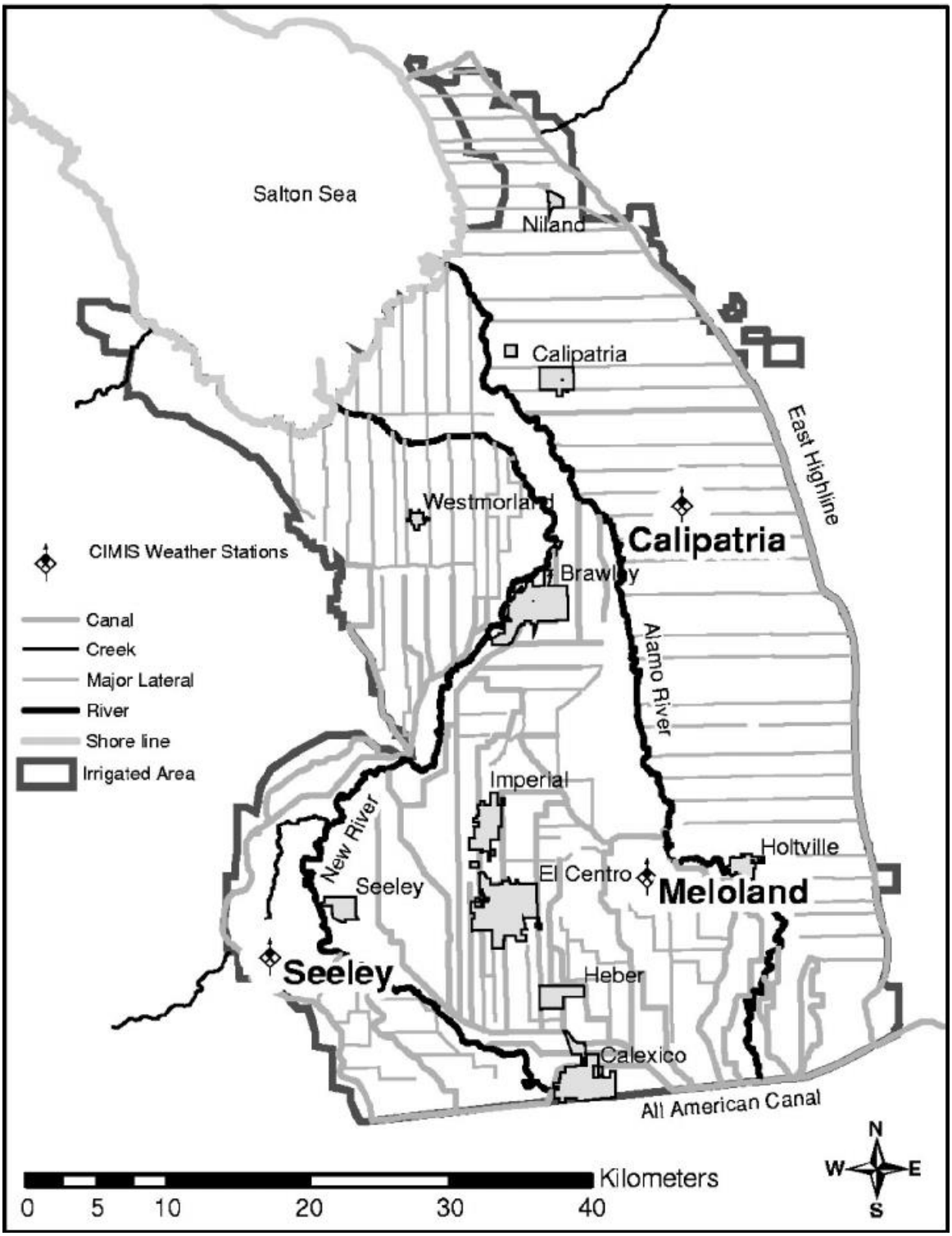


Table 4-1. Top Five Commodity Sources from Agricultural Products for Pyrethroid Pesticides in Imperial Valley in 2018.

Pyrethroid	Commodity	Pounds of Active Ingredient Applied
Bifenthrin	Rapini	344.24
--	Structural pest control	181.21
--	Broccoli	176.8
--	Lettuce, Head	163.81
--	Cabbage	87.2
Cyfluthrin	Alfalfa	457.62
--	Corn, human consumption	196.69
--	Celery	36.06
--	Endive (Esarole)	1.04
--	Lettuce, Head	0.89
Cypermethrin	Structural Pest Control	1779.79
--	Sugarbeet	1583.94
--	Alfalfa	1492.8
--	Lettuce, Leaf	622.14
--	Corn, Human Consumption	598.17
Esfenvalerate	Sugarbeet	2064.52
--	Corn, Human Consumption	1342.34
--	Carrot	387.65
--	Broccoli	152.56
--	Lettuce, Head	65.58
Lambda- cyhalothrin	Alfalfa	3306.81

Pyrethroid	Commodity	Pounds of Active Ingredient Applied
--	Corn, Human Consumption	1415.7
--	Lettuce, Leaf	466.25
--	Lettuce, Head	341.83
--	Onion, Dry	326.41
Permethrin	Lettuce, Leaf	2838.08
--	Alfalfa	2582.38
--	Spinach	1441.32
--	Lettuce, Head	1431.96
--	Onion, Dry	929.22

Sources of water to the New and Alamo Rivers include irrigated agricultural discharges, discharges from Mexico, and discharges from the facilities permitted by the National Pollutant Elimination Systems (NPDES). Agricultural runoff is a known source of pyrethroids, and they are often bound to sediments and particulate matter in runoff (Domagalski et al. 2010, Gan et al. 2005, Werner et al. 2002, Weston et al. 2004, 2009). Effective agricultural management practices to control pyrethroids include those that reduce runoff and particularly those that reduce or capture sediments in runoff. Stormwater runoff is a relatively insignificant source of water due to the arid Imperial Valley climate.

Wastewater treatment plant (WWTP) effluents have also been identified as a possible source of pyrethroids to surface waters (Markle et al. 2014, Parry and Young 2013, Weston and Lydy 2010, Weston et al. 2013a). Pathways of pyrethroids to WWTPs have not been clearly identified, but possibilities include indoor uses that enter sewers by being poured down the drain when cleaning or washing items or areas with pyrethroid residues from indoor pest treatments, washing of clothes impregnated with pyrethroids, washing pets containing residual pyrethroids from flea treatments, and underground termite injections reaching leaky sewer laterals. Weston et al. (2013a) sampled sewer interceptors in Sacramento residential areas where storm and sewer collection systems are separate and found that pyrethroid concentrations in the interceptor samples were not significantly different from plant influent concentrations. This indicates that indoor pyrethroid uses likely represent a significant fraction of total mass loading to wastewater treatment plants and that outdoor sources are not likely a significant contributor. A source identification study undertaken to identify pathways of organophosphate pesticides to WWTPs also concluded that residential sources were the largest

contributor to mass loading compared to commercial sources, such as pet grooming facilities (Singhasemanon et al. 1998). This study is relevant because pyrethroids were the primary replacement products when residential uses of organophosphates were phased out in the early 2000s, and the products have similar residential use patterns (Teerlink 2014).

Other sources of pyrethroid pesticides appear to be from nonpoint discharges from areas in Imperial Valley with high residual concentrations in the soil. Many pyrethroids are insoluble in water and often bind to the sediment, flowing off the land into the waterways.

Pyrethroids have been identified as causing impairments in the water column as well as in sediments. Monitoring data determined transboundary pollution from Mexico is also a source of pyrethroids into the New River, as urban and agricultural runoff, and untreated and partially treated municipal wastewater are discharged into the river. Water samples collected from the international boundary from 2004 to 2020 found all 6 pyrethroids in concentrations that exceed WQOs (http://www.ceden.org). The staff examined water and sediment samples collected by SWAMP to assess the presence of pyrethroid pesticides at the international boundary. The available data do indicate, however, that significant reductions are needed to attain water quality objectives in water bodies receiving significant discharges.

Within the Salton Sea Watershed lies the Imperial Valley which contains the Alamo River and New River watersheds. A majority of the land area of the imperial county is desert or mountains owned by federal, state, or tribal governments with another large portion in private hands. The second largest component is irrigated agriculture, the economic engine of the region. Table 5-2 shows the land use acreage of Imperial County. Due to a lack of water quality data concerning pyrethroids, the amount of pyrethroids discharged from NPDES permitted municipalities and facilities is currently unknown and at this time, further conclusions cannot be made. However, our assumption based on land usage acreage of Imperial County (Table 4-2) and the amount of land used for agricultural purposes, NDPES facilities are likely a minor contributor (de Vlaming et. Al, 2004). NPDES permitted Municipal Separate Storm Sewer Systems (MS4s) discharge urban stormwater into the surrounding waterbodies, however, due to the arid climate in Imperial Valley and limited developed lands, urban stormwater runoff is also a relatively insignificant source of pyrethroids in the New and Alamo Rivers.

Table 4-2. Imperial County Land Use Acreage (Imperial County General Plan, 2015)

Land Use	Acreage	Total Percentage
Desert / Mountains	2,177,884	74%
Federal	1,459,926	
Private	669,288	
State	37,760	
Tribal	10,910	
Irrigated Agriculture	534,328	18.2%
Imperial Valley	512,163	
Bard Valley (including Reservation)	14,737	
Palo Verde Valley	7,428	
Salton Sea (230 ft. elevation)	211,840	7.2%
Developed Areas	18,028	0.6%
Incorporated	9,274	
Unincorporated	8,754	

5. LOADING CAPACITIES AND TMDLS

A TMDL is the sum of wasteload allocations for point sources (e.g., wastewater treatment facilities), load allocations for nonpoint sources (e.g., agricultural activities, Mexico), allocations for natural sources (e.g., wildlife), and a margin of safety, such that the capacity of the water body to assimilate pollutant loads without violating water quality objectives is not exceeded. Allocations are based on the source analysis and numeric target. The margin of safety accounts for uncertainty, and is recommended by USEPA's TMDL Guidelines (USEPA, 1991). A TMDL can be equated as follows:

TMDL = **Wasteload Allocations**
+ **Load Allocations**
+ **Natural Sources**
+ **Margin of Safety**

Per 40 Code of Federal Regulations section 130.2(i), "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate ***measure***." (Emphasis added.) In these TMDLs, the chemical constituent loading capacities are the amounts of specific chemicals that can be received in surface waters without exceeding the Basin Plan's chemical constituent and toxicity WQOs and the CTR standards.

5.1. TMDL Targets

The TMDLs for water column concentration-based and sediment concentration-based impairments have been set equal to the numeric targets as described in Table 5-1, averaged over a three-year period to account for short-term variations.

Table 5-1. Pyrethroid Pesticide TMDL Targets in Water Column and Dry Sediment.

Pyrethroid	Water Column: Acute Criterion (ng/L)	Water Column: Chronic Criterion (ng/L)	Sediment (µg/g OC)
Bifenthrin	0.3	0.05	0.43
Cyfluthrin	0.3	0.06	1.1
Cypermethrin	0.3	0.07	0.3
Esfenvalerate	0.7	0.1	1.5
Lambda-cyhalothrin	0.2	0.08	0.44
Permethrin	6	1	8.9

It is recommended to use the dissolved phase concentration instead of whole water concentration for criteria compliance assessment, as freely dissolved concentrations offer the most accurate prediction of toxicity. However, either the whole water (total) concentration or the freely dissolved concentration will be accepted for compliance. The discharger should delineate which is being submitted and any calculations conducted. The freely dissolved concentration can be estimated, rather than directly measured, by calculating the concentration of particulate organic carbon and dissolved organic carbon in the sample water. The amount of binding to these phases is typically normalized to the organic carbon content of the materials because it is presumed that pyrethroid pesticides, like other hydrophobic organic chemicals, primarily bind to the organic carbon (OC) found in suspended solids and dissolved organic matter. The following equation can be used to estimate the freely dissolved concentration of pyrethroids:

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

where,

$C_{dissolved}$ is the concentration of chemical in the dissolved phase (mg/L)
C_{total} is the total concentration of chemical in water (mg/L)
K_{OC} is the organic carbon–water partition coefficient (L/kg)
[*POC*] is the concentration of particulate organic carbon in water (kg/L)
K_{OC} is the organic carbon–water partition coefficient (L/kg) for DOC
[*DOC*] is the concentration of dissolved organic carbon in water (kg/L)

To calculate the freely dissolved concentration with this equation, water samples must be analyzed for the total concentration of each pyrethroid pesticide (C_{total}), the concentration of particulate organic carbon in water ([*POC*]) and the concentration of dissolved organic carbon ([*DOC*]) in water. The concentration of POC can be calculated as [*POC*]=[*TOC*]-[*DOC*]. The accuracy of the estimation of the freely dissolved concentration will be improved if site-specific partition coefficients are used, but if site-specific partition coefficients are not available, partition coefficients available in the literature could also be used for this calculation. Because site-specific partition coefficients will likely not be available, default partition coefficients are proposed in the California Regional Water Quality Control Board, Central Valley Region (CRWQCB-CVR) staff report in order to be used in the above equation to estimate the freely dissolved concentration of a sample. Only one study was identified that met all of the data acceptability criteria for the ambient waters (Chickering 2014) established by the Staff Report from CVRWQCB based on their literature survey and the partition coefficients are presented below in Table 2-5. These partition coefficients can be used for the determination of the freely dissolved concentration for compliance with these TMDLs.

Table 2-5. Recommended default partition coefficients for pyrethroids (L/kg)

	Ambient Waters		Wastewater Effluents[a]	
Pyrethroid	**K_{OC}**	**K_{DOC}**	**K_{OC}**	**K_{DOC}**
Bifenthrin	4,228,000	1,737,127	15,848,932	800,000
Cyfluthrin	3,870,000	2,432,071	--	--
Cypermethrin	3,105,000	762,765	6,309,573	200,000
Esfenvalerate	7,220,000	1,733,158	--	--
Lambda-cyhalothrin	2,056,000	952,809	7,126,428	200,000
Permethrin	6,075,000	957,703	10,000,000	200,000

[a]All data from Parry and Young (2013)

It should be noted that the recommended default partition coefficients for both ambient waters and unique matrices, such as municipal or domestic wastewater treatment plant effluents, are summarized in Table 2-5. Partition coefficients for wastewater effluents are needed to assess the effects of pyrethroids in effluents on ambient waters. One study has determined partition coefficients for four pyrethroids using wastewater effluents and these values can be used for estimating the freely dissolved pyrethroid concentration in effluents. Parry and Young (2013) determined both K_{OC} and K_{DOC} for bifenthrin, lambda-cyhalothrin, cypermethrin, and permethrin based on six samples from the Sacramento Regional Wastewater Treatment Plant. As recommended above, the 50th percentile of K_{OC} values is used as the default K_{OC} for effluents for each pyrethroid. Only a single K_{DOC} value was reported for each chemical (Parry and Young 2013), and those are the recommended K_{DOC} values for wastewater effluents. Because partition coefficients for wastewater effluents are not available for cyfluthrin and esfenvalerate, the default partition coefficients for ambient waters may be used in cases when these pyrethroids are detected wastewater effluents. However, if partition coefficients specific to municipal and domestic wastewater effluents become available for these compounds in the future, it is recommended that those values are used for assessing pyrethroids in effluents.

5.2. Linkage Analysis

Linkage analysis establishes a link between the pollutant loads and the desired water quality. In other words, it expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. The analysis describes the relationship between the water quality standard and the identified pollutant sources and based on this linkage, identify what loadings are acceptable to achieve the water quality standard which may further be used to determine the loading capacity of the water body for the pollutant of concern. This ensures that the loading capacities specified in the TMDLs will result in attaining the desired water quality.

For bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin TMDLs, this link is established because the wasteload and load allocations

are equal to the numeric targets, which are the same as the TMDLs. Reductions in the loadings of pyrethroids to the extent allocation will result in attainment of WQOs.

5.3. Allocations

Source analysis determined pyrethroid pesticides in the New and Alamo Rivers come primarily from irrigated agricultural lands, and sources in Mexico that flow into the New and Alamo Rivers on the US side. Due to the lack of water quality data coming from NPDES permitted municipalities and facilities, the amount of pyrethroids coming from point sources is currently unknown. NPDES permitted municipalities and facilities are assigned pyrethroid pesticide allocations, because if these facilities were not assigned allocations for pyrethroids, their allocations would be zero and any detection would be a violation.

Point sources such as municipalities and facilities are subject to regulation under the NPDES program. Some stormwater discharges from MS4s are subject to regulation under the Municipal Storm Water Program which requires stormwater permits for large cities and counties with populations of 100,000 or more. The stormwater discharges from the cities of Imperial, El Centro, Calexico, Brawley, and the County of Imperial and are regulated by State Water Board Order 2013-0011-DWQ, the general permit for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4), as Phase II collection systems. Discharges from NPDES-permitted facilities are regulated by individual permits adopted by the Colorado River Basin Water Board or are regulated by the Industrial or Construction NPDES general stormwater permits (2014-0057-DWQ, 2009-0009-DWQ, 2022-0057-DWQ) adopted by the State Water Board. A total of 15 individual permits and two Industrial or Construction NPDES general stormwater permits are issued to the NPDES-permitted facilities that discharge to New and Alamo Rivers. Table 5-3 reports these NPDES municipalities and facilities that discharge to the New and Alamo Rivers. A review of water quality data from the New and Alamo Rivers indicates the presence of pyrethroid pesticides in water column and sediment samples. To address these impairments, waste load allocations in Table 5-2 for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin have been assigned to each NPDES permitted facility in Table 5-3. These TMDLs will utilize requirements put in place by either individual or general NPDES permits or WDRs. The waste load allocations shall be implemented as NPDES permit numeric effluent limits for each pyrethroid parameter.

Table 5-2. Wasteload Allocations for Pyrethroid Pesticides in New and Alamo Rivers.

Pyrethroid	Water Column: Acute Criterion (ng/L)	Water Column: Chronic Criterion (ng/L)	Dry Sediment (µg/g OC)
Bifenthrin	0.3	0.05	0.43

Pyrethroid	Water Column: Acute Criterion (ng/L)	Water Column: Chronic Criterion (ng/L)	Dry Sediment (µg/g OC)
Cyfluthrin	0.3	0.06	1.1
Cypermethrin	0.3	0.07	0.3
Esfenvalerate	0.7	0.1	1.5
Lambda-cyhalothrin	0.2	0.08	0.44
Permethrin	6	1	8.9

Table 5-3. NPDES Permitted Municipalities and Facilities Assigned Wasteload Allocations.

Municipality or Facility	Order	NPDES Permit	Design Flow (mgd)	Waterbody
Seeley County Wastewater Treatment Plant (WWTP)	R7-2017-0016	CA0105023	0.25	New River
Westmoreland WWTP	R7-2023-0002	CA0105007	0.50	New River
Date Gardens Mobile Home Park WWTP	R7-2018-0009	CA0104841	0.02	New River
Country Life Mobile Home and R.V. Park WWTP	R7-2018-0010	CA0104264	0.15	Alamo River
City of El Centro, WWTP	R7-2019-0002	CA0104426	8	Alamo River
Centinela State Prison WWTP	R7-2019-0003	CA7000001	0.96	New River
City of Calexico, WWTP	R7-2019-0004	CA7000009	4.3	New River

Municipality or Facility	Order	NPDES Permit	Design Flow (mgd)	Waterbody
Imperial Irrigation District El Centro Generating Station	R7-2020-0006	CA0104248	0.995	Alamo River
City of Calipatria, WWTP	R7-2020-0010	CA0105015	1.73	Alamo River
City of Imperial, Water Pollution Control Plant	R7-2021-0002	CA0104400	2.4	Alamo River
City of Brawley WWTP	R7-2021-0005	CA0104523	5.9	New River
U.S. Navy Naval Air Facility El Centro WWTP	R7-2021-0045	CA0104906	0.30	New River
City of Holtville, Municipal WWTP	R7-2022-0005	CA0104361	0.85	Alamo River
Imperial Irrigation District Grass Carp Hatchery	R7-2022-0006	CA7000004	2.52	Alamo River
Heber Public Utilities District, Heber Municipal WWTP	R7-2022-0007	CA0104370	1.20	Alamo River
Industrial or Construction NPDES general stormwater permit	2022-0057-DWQ	CAS000001 CAS000002	N/A	N/A
Municipal Separate Storm Sewer Systems (MS4)	2013-0001-DWQ	CAS000004	N/A	N/A

5.3.1. Load Allocations

In Imperial Valley, irrigated agricultural lands and Mexico are considered nonpoint sources of pollutants. A review of water quality data from the New and Alamo Rivers indicates the presence of pyrethroid pesticides in water column and sediment samples.

To address these impairments, allocations for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin have been set equal to the numeric targets (Table 5-4) and will be implemented in permits as load allocations for the New and Alamo Rivers. The Colorado River Basin Water Board adopted General WDRs for Discharges of Waste from Irrigated Agricultural Lands for agricultural dischargers in the Imperial Valley area (Order R7-2021-0050). This Order supersedes a Conditional Waiver (R7- 2015-0008 with revisions by R7-2019-0056 and R7-2020-0035) for agricultural dischargers in the area.

Table 5-4. Load Allocations for Pyrethroid Pesticides in New and Alamo Rivers.

Pyrethroid	Water Column: Acute Criterion (ng/L)	Water Column: Chronic Criterion (ng/L)	Sediment (µg/g OC)
Bifenthrin	0.3	0.05	0.43
Cyfluthrin	0.3	0.06	1.1
Cypermethrin	0.3	0.07	0.3
Esfenvalerate	0.7	0.1	1.5
Lambda-cyhalothrin	0.2	0.08	0.44
Permethrin	6	1	8.9

5.4. Margin of Safety

A TMDL requires a margin of safety component that accounts for the uncertainty about the relationship between the pollutant loads and the quality of the receiving water. (33 U.S.C. § 1313(d)(1)(C).) The margin of safety may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis); it may also be or explicit, (i.e., expressed in the TMDL as loadings set aside for the margin of safety). The margin of safety is incorporated into these TMDLs implicitly through conservative assumptions, namely, the desired water quality is conservatively achieved through allocations and targets set equal to desired water quality and therefore an additional explicit margin of safety is not required. The allocations are assigned equal to the loading capacity concentrations, and does not account for dilution in the TMDL water bodies receiving stormwater discharges. There will likely be dilution available in the TMDL water bodies because it is unlikely that all of its tributaries are discharging at concentrations approaching the proposed concentration goals. Thus, the available dilution provides a margin of safety for the TMDL water bodies. Because the WLAs and loading capacity are all defined on a concentration-basis, all seasonal variations and critical conditions are considered in the recommended method for defining the numeric triggers, loading capacity and allocations. However, if during the TMDL implementation phase, staff

develops numeric targets and TMDLs that better reflect the desired water quality, the allocations will be set equal to these modified targets and TMDLs.

5.5. Critical Conditions and Seasonal Variation

The Imperial Valley is characterized by its hot, dry summers and cool, dry winters, with little variation in rainfall. Given the dry climate, the New and Alamo Rivers' flow primarily consists of, but not limited to, agricultural discharge from the Imperial Valley, which provides stable water flow within the watershed. With a steady local climate and little variation between the wet and dry seasons, TMDLs and allocations developed based on seasonal variation are not appropriate in this case. However, there is insufficient monitoring data to definitively determine seasonality impairment in the New River. Water and sediment samples collected from the New River at the International Boundary with Mexico during the January 2020 sampling event suggest there may be a seasonal effect on water quality outside the typical monitoring seasons, though data is limited at this time.

TMDLs must always include consideration of critical conditions and seasonal variation to ensure protection of the designated uses of the waterbody. Critical conditions are the combination of environmental factors resulting in the water quality standard being achieved by a narrow margin (i.e., that a slight change in environmental factors could result in exceedance of a water quality standard). Such a phenomenon could be significant if the TMDLs were expressed in terms of loads, and the allowed loads were based on achieving the water quality standards by a narrow margin. However, these TMDLs are expressed as concentrations, which are set equal to the desired water quality condition. Consequently, there are no critical conditions since there is no proven seasonal variation or narrow margin of attainment.

5.5.1. Natural Sources

Pyrethroid pesticides are all man-made compounds, there are no natural sources. Since there are no natural sources of these compounds, natural sources have an allocation of zero.

6. IMPLEMENTATION AND TIMELINE

This section describes the Colorado River Basin Water Board's procedures and the regulatory measures that will be used to provide reasonable assurances that water quality standards will be met. Source Analysis indicates that the vast majority of pyrethroid pesticides in Imperial Valley waters came from irrigated agricultural discharges and discharges from Mexico.

6.1. Irrigated Agricultural Lands

To control the discharges of pyrethroid pesticides from irrigated agricultural lands in Imperial Valley, this TMDL will be implemented through the Colorado River Basin Water Board's Irrigated Lands Regulatory Program.

Prior to adopting the operative *General Waste Discharge Requirements for Discharges of Waste from Irrigated Agricultural Lands for Dischargers that are Members of a Coalition Group in the Imperial Valley*, Waste Discharge Requirements Order R7-2021-0050 (Irrigated Lands General Order), the Colorado River Basin Water Board's Irrigated Lands Regulatory Program relied on a series of conditional waivers of waste discharge requirements under Water Code section 13269. The final iteration of such waivers occurred in 2015 via Order R7-2015-0008 (2015 Conditional Waiver).

Consistent with the State Water Board's direction in Order WQ 2018-0002 (*East San Joaquin Irrigated Lands General Order*), the operative Irrigated Lands General Order continues to utilize a third-party coalition-based approach to waste discharge requirements (WDRs) and monitoring, wherein individual discharger comply with the General Order primarily through a third-party coalition (Coalition). In lieu of regulatory coverage under the Irrigated Lands General Order, individual dischargers may obtain individual WDRs. To date, no dischargers have requested individual WDRs, presumably because of the lower compliance costs for the Irrigated Lands General Order.

Previously formed under the preceding 2015 Conditional Waiver of WDRs (superseded by the now-operative Irrigated Lands General Order), the coalition established by the Imperial Irrigation District (IID) and the Imperial County Farm Bureau (ICFB) (collectively IID-ICFB Coalition) remains the only Coalition that has been formally recognized by the Colorado River Basin Water Board, though there is a procedure in the Irrigated Lands General Order for the establishment and recognition of a new coalition. (See Irrigated Lands General Order, § E.11, pp. 39-40.)

The Irrigated Lands General Order contains a general prohibition against waste discharges from irrigated agricultural lands causing or contributing to an exceedance of the water quality objectives (WQOs), unreasonably affecting beneficial uses, or otherwise causing or contributing to a condition of pollution or nuisance. (Irrigated Lands General Order, § C.1.a [Receiving Water Limitations].)

The Irrigated Lands General Order also imposes a general obligation for dischargers to implement management practices to prevent or control discharges of waste that cause or contribute to exceedances of WQOs. (*Id*., § D.1.a.) The Irrigated Lands General Order thus establishes general Waste Discharge Requirements (WDRs) for agricultural dischargers (e.g., agricultural runoff), including an iterative process of management practice improvement until discharges are no longer causing or contributing to exceedances of WQOs. In the event that monitoring, evaluations or inspections demonstrate that the initially implemented management practices are ineffective or otherwise inadequate, "improved" practices must be implemented. (*Id*.) Thus, Water Quality Restoration Plans (WQRP) are triggered by exceedances and require a Water Boards approved improvement plan to minimize or prevent the discharge of waste to waters of the state through irrigation water runoff and infiltration, non-stormwater runoff, and stormwater runoff.

Under the Irrigated Lands General Order, management practices are identified and evaluated via the Water Quality Management Plan (Farm Plan). Each discharger is required to prepare a Farm Plan utilizing a template approved by the Colorado River Basin Water Board's Executive Officer. (*Id*., § D.2.a, p. 26.) At a minimum, the Farm Plan must include "[a] list of the management practices used on each crop for the annual cycle and an indication whether sediment and erosion control practices are being implemented." (*Id*., § D.2.c.ix, p. 27.) Each discharger is responsible for implementing the management practices identified in the Farm Plan, and "periodically evaluat[ing] the effectiveness of the management practices…, and modifying the Farm Plan "as necessary when visual observation monitoring indicates waste discharges have not been adequately addressed…." (*Id*., § D.2.f, p. 27.)

Beginning in mid-2023, the Coalition(s) began providing an Annual Submittal of Management Practice Data (Farm Plan Annual Report), which will include, among other things, a description of sediment and erosion management practices implemented by each discharger (reported information anonymized to conceal discharger's identity). (Monitoring & Reporting Program R7-2021-0050 [MRP], § IV.C.6, p. B-16.) The MRP does not specify any minimum elements or level of detail that must be included in this discussion. The exact same management practices implemented to address sediment and erosion would also address the discharge of OP and OC compounds into surface waters as well.

Under the MRP, the Coalition(s) must also submit—concurrently with the Farm Plan Annual Report discussed above— an Annual Monitoring Report (AMR) that includes a "Summary of management practice information collected as part of the Farm Plans." (MRP, § VI.E.17, pp. B-20.) Specifically, the Coalition is required to "aggregate and summarize information collected from management practices implementation," and "include a quality assessment of the collected information by township (e.g., missing data, potentially incorrect/inaccurate reporting), and a description of corrective actions to be taken regarding any deficiencies in the quality of data submitted, if such deficiencies were identified." (*Id*., p. B-22.)

The Irrigated Lands General Order contains a cost estimate for the preparation of Farm Plans and the submittal of annual reports:

> The information required by the Farm Plan Template could be compiled by anyone with knowledge of farm characteristics and operations ranging from administrative to professional level employees or Members themselves. Completing and submitting the template is expected to take from one (1) to two (2) hours per parcel per year. Cost estimates for labor to complete the Farm Plan range from $60 to $120 per hour. The cost estimate for submitting a completed Farm Plan are estimated to range from $60 to $240 per farm per year or for 5066 farms, $303,960 to $1,215,840 per year.

(Irrigated Lands General Order, Attach. A—Information Sheet, p. A-9.)

> Regional Water Board staff estimates that the AMR and monthly surface water reports will require 400 person-hours at $100 per hour. The Coalition Group is required to submit one AMR and four quarterly surface water reports per year. The total cost is an estimated $40,000 per year.

(*Id*., p. A-11.)

The Irrigated Lands General Order does not include cost estimates for implementing management practices or improved management practices (i.e., where initial practices are inadequate). The following explanation is provided:

> Implementing management practices that prevent typical agricultural pollutants from entering groundwater and surface waters is the main requirement of the Order. Because of ongoing conservation efforts by IID and sediment reduction programs implemented by the ICFB, management practices for optimizing the uptake of irrigation water by crops, and the nutrients and pesticides that are applied with it, are already being used in the Imperial Valley. The costs of these management practices can be offset by increased crop yields and reduced water and chemical costs. The cost of implementing additional management practices could be a component of the overall costs of complying with the Order but is not considered in the scope of this Cost Analysis.

(*Id*., p. A-9.)

The Irrigated Lands General Order also requires compliance with applicable TMDLs stating that discharges of wastes from irrigated agricultural lands not violate any applicable water quality standard for receiving waters adopted by the Colorado River Basin Water Board or the State Water Board as required by the federal Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Clean Water Act section 303 or amendments thereto, the Colorado River Basin Water Board will be able to revise and modify the Order in accordance with the more stringent standard.

In addition to the TMDLs being considered in this report, the Colorado River Basin Water Board has adopted Siltation/ Sedimentation TMDLs for the Alamo River, New River, and Imperial Valley drains. There is also a TMDL for organophosphate and organochlorine compounds in the same waterbodies. The silt TMDLs cover irrigated agricultural land in the Imperial Valley, and the drain system which conveys the discharges away from the irrigated agricultural land. The Siltation/Sedimentation TMDLs set numeric targets of 200 mg/L for Total Suspended Solids (TSS), require the use of sediment management practices to control the amounts of sediment leaving the agricultural lands, require monthly monitoring of TSS in the Alamo River, New River and Imperial Valley Drains, and annual reporting.

The Irrigated Lands General Order also contains monitoring and reporting provisions, to provide a feedback mechanism for the assessment of progress toward attaining the WQOs. The IID-ICFB Coalition Group is currently collecting water samples from the New and Alamo River twice annually and analyzing the samples for various pesticides. The Coalition is also collecting fish samples annually and analyzing the samples under the current General Order. If the Coalition plans to submit data using the freely dissolved concentration, monitoring will need to include total organic carbon (TOC) and dissolved organic carbon (DOC) in order to use the calculation provided. The monitoring data is anticipated to yield insights into contaminant concentrations, prompting adjustments to management practices and pesticide application protocols. As discussed earlier, the Colorado River Basin Water Board may require Coalition Groups to prepare a WQRP if (a) there is a water quality exceedance or (b) a trend of degradation of water quality is identified that threatens a beneficial use in receiving waters affected by its members' activities on Irrigated Agricultural Lands. An "exceedance" occurs when: (a) a sampling result for a constituent at a single surface water monitoring location exceeds a water quality objective or benchmark limit specified in the MRP, more than three out of four times for the same constituent, or (b) a single groundwater sampling result exceeds a water quality objective.

A WQRP is extensive and contains information for (i) each constituent that indicates an exceedance or a trend of water quality degradation along with data graph and trend analysis, (ii) description of the actual or suspected waste sources that may be causing or contributing to the exceedance or trend of water quality degradation, (iii) identification of the management practices currently being implemented and additional or improved management practices that will be implemented by designated members to prevent or minimize the discharge of any waste, (iv) a schedule for the implementation and completion of all tasks described in the WQRP, and (v) a monitoring and reporting plan to provide feedback on WQRP progress and its effectiveness in achieving compliance with the applicable receiving water limitations of these General WDRs. The WQRP must be approved by the Colorado River Basin Water Board's Executive Offer prior to implementation. Furthermore, the Department of Pesticide Regulation (DPR) has a legal mandate to encourage the use of environmentally sound pest management, including integrated pest management (IPM). Many DPR programs stress a least-toxic approach to pest management and promote risk reduction through information, encouragement, incentives, and community-based problem solving.

6.2. Mexico

To control the discharges of pyrethroid pesticides into the New River at the international boundary with Mexico, the Colorado River Basin Water Board will work with its federal partners to ensure attainment of the TMDL numeric targets. Mexico is an independent nation not bound by California water quality regulations, so the implementation plan for controlling the contribution of diazinon from Mexico requires coordination with the United States International Boundary and Water Commission (USIBWC) and USEPA. The USIBWC is a U.S.-Mexican federal agency whose responsibilities include solving international boundary sanitation problems and other border water quality problems. USEPA is the U.S. federal agency responsible for coordination of water quality issues. USIBWC and USEPA have primary responsibility for ensuring that waste discharges from Mexico do not violate or contribute to a violation of water quality objectives in the New River downstream of the international boundary.

Colorado River Basin Water Board staff recommends that USIBWC and USEPA develop a plan describing proposed measures the U.S. Government will undertake to ensure that waste discharges from Mexico do not violate or contribute to a violation of bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin TMDLs.

6.3. NPDES Permitted Municipalities and Facilities

While the sources of pyrethroid pesticides in the New and Alamo Rivers is unknown, source analysis indicates that NPDES permitted municipalities and facilities were identified as point sources of pyrethroid pesticides. To control the discharges of pyrethroid pesticides from NPDES permitted municipalities and facilities, these TMDLs will dictate the requirements put in place by either individual or general NPDES permits or WDRs. Under the proposed amendment, NPDES permits regulating discharges to water bodies with pyrethroid TMDLs would need to contain requirements to achieve compliance with the proposed TMDL allocations. NPDES permittees (Table 5-3) should begin monitoring pyrethroid pesticides in effluent water. The additional monitoring of pyrethroid pesticides should be for an initial period of three years and be included with their annual monitoring. NPDES permittees should also use best management practices where possible to limit the amounts of pyrethroids, if any, entering Imperial Valley waters from their facilities. The implementation plan for NPDES sources of impairments will be reassessed once enough acceptable data from these facilities is generated.

If the monitoring data does show that NPDES permittees are sources of pyrethroid pesticides, Colorado River Basin Water Board staff will work with the permittees to identify management practices and treatment technologies to reduce loading and achieve their wasteload allocations. Colorado River Basin Water Board staff will utilize the existing NPDES permits and revise as necessary to provide the requirements necessary to implement these TMDLs.

The NPDES permits and WDRs that regulate the discharges generally contain provisions that can implement these TMDL requirements. The individual and general permits contain provisions stating that the MRPs may be modified to increase the number of parameters to be monitored, the frequency of the monitoring or the number and size of samples to be collected or minor clarifications on MRP requirements. Any increase in the number of parameters to be monitored, the frequency of the monitoring or the number and size of samples to be collected may be reduced back to the levels specified in the original MRP and is at the discretion of the Executive Officer. The Executive Officer may also determine the need to conduct additional monitoring on a case-by-case basis.

The individual and general permits also contain permit reopener provisions stating that permits may be reopened and modified in the future to include appropriate requirements necessary to fully implement the approved TMDLs if needed.

6.4. Timeline and Milestones

The estimated target date to achieve the Water Quality Objectives (WQOs) for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in the New and Alamo Rivers is 0 to 3 years after the approval of these Total Maximum Daily Loads (TMDLs) by the USEPA. The initial 2 years are allocated for completing baseline monitoring in areas where pyrethroids have not been thoroughly assessed, followed by 1 year for adjusting monitoring plans, if necessary. This timeline is based on information provided by the Central Valley Regional Water Quality Control Board’s (CVRWQCB) Pyrethroid Control Program Basin Plan Amendment (Central Valley BPA). The staff has devoted considerable time to identifying and evaluating potential regulatory implications due to the very low pyrethroid concentrations considered necessary to protect aquatic life, as well as the effectiveness of management practices to control pyrethroid discharges. As a result, the staff proposes a phased approach in the proposed amendment, with data gathering and implementation of reasonable management practices as the initial core step in the near term to inform the Board of potential future actions. Overall, the estimated target date is determined based on pyrethroids' relatively short soil half-life, trends in pyrethroid concentrations found in water and sediment samples, and the implementation of best management practices.

Based on the updated UC Davis method, the water sample is to not exceed the concentration goal more than once every 3 years. This means that if there are two or more exceedances of the concentration goal within a 3-year period, the concentration goals would not be achieved. The selection of the 3-year exceedance frequency is supported by a literature review of ecosystem recovery studies. This frequency was chosen because some populations may take up to 3 years to recover from the toxic effects of pesticides; however, many populations, particularly invertebrate species with short lifecycles, may recover more quickly from acute exposures to pyrethroids. While several studies involving pyrethroids have shown that affected populations recovered from short pulse exposures in several weeks, one study indicated that populations had not fully recovered over 240 days after a short exposure. Most studies have

demonstrated that recovery occurs within 3 years or less, making the 3-year exceedance frequency a conservative estimate. However, for threatened or endangered species, recovery from excursions of the criteria may be challenging if the populations are already stressed and lack resilience. The acute and chronic averaging periods and the exceedance frequency of the UC Davis method are consistent with those specified in the USEPA guidelines for deriving aquatic life criteria.

Furthermore, effective agricultural management practices to control pyrethroids, many of which are already being implemented, include enhanced pest management and the use of alternative pesticides to reduce pyrethroid use. Application practices aimed at reducing the potential for overspray and drift, as well as practices that minimize runoff and capture sediments in runoff, such as vegetation and improved water management, are also recommended. Best management practices for municipal stormwater and wastewater dischargers encompass education and outreach initiatives, such as promoting reduced pesticide use and proper pesticide application, as well as advocating for reduced runoff and pollution prevention activities, such as reducing the municipalities' own use of pesticides, and adopting integrated pest management along with the coordination with regulators of pesticide use.

Bifenthrin is expected to achieve WQOs 3 years after approval of these TMDLs by the USEPA. This estimate is based on current usage trends and the rate at which bifenthrin degrades in soils. Bifenthrin concentrations found in water and sediment samples collected from the New and Alamo Rivers between 2003-2020 show an apparent decrease in usage, as the more recent samples collected have resulted in lower concentrations. Bifenthrin in sediment samples collected from the New and Alamo Rivers have consistently been below WQOs for all monitoring dates.

Cyfluthrin is expected to achieve WQOs before the approval of these TMDLs by the USEPA. This estimate is based on usage trends and the rate at which cyfluthrin degrades in soils. Cyfluthrin concentrations found in water and sediment samples collected from the New and Alamo Rivers between 2003-2020 show an apparent decrease in usage, as the more recent samples collected have resulted in lower concentrations. Cyfluthrin in sediment collected from the New and Alamo Rivers has consistently been below WQOs during all monitoring dates.

Cypermethrin is expected to achieve WQOs 3 years after approval of these TMDLs by the USEPA. This estimate is based on current usage trends and the rate at which cypermethrin degrades in soils. Cypermethrin concentrations found in water and sediment samples collected from the New River between 2003-2020 show an apparent decrease in usage, as the more recent samples collected have resulted in lower concentrations. Water samples collected from the Alamo River show an apparent decrease in usage although cypermethrin samples collected from the sediment samples in Alamo River show an apparent increase in usage. Nevertheless, cypermethrin in sediment collected from the New and Alamo Rivers have consistently been below WQOs for all monitoring dates.

Esfenvalerate is expected to achieve WQOs 3 years after approval of these TMDLs by the USEPA. This estimate is based on current usage trends and the rate at which esfenvalerate degrades in soils. Esfenvalerate concentrations found in water and sediment samples collected from the New River between 2003-2020 show an apparent decrease in usage, besides a few outliers, as samples collected have resulted in lower concentrations. Although esfenvalerate samples collected from the water samples in Alamo River show an apparent increase in usage while the esfenvalerate in sediment collected from the New River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range. Nevertheless, the sediment data for both the rivers have consistently been below WQOs for all monitoring dates.

Lambda-cyhalothrin is expected to achieve WQOs 3 years after the approval of these TMDLs by the USEPA. This estimate is based on usage trends and the rate at which lambda-cyhalothrin degrades in soils. Water samples collected from the New River between 2003-2020 and Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range. Although lambda-cyhalothrin samples in sediment collected from the Alamo River and New River show an apparent decrease in usage, and lambda-cyhalothrin samples in sediment collected from both rivers have consistently been below WQOs for all monitoring dates.

Permethrin is expected to achieve WQOs before the approval of these TMDLs by the USEPA. This estimate is based on usage trends and the rate at which permethrin degrades in soils. Permethrin concentrations found in water and sediment samples collected from the New River between 2003-2020 show an apparent decrease in usage, as samples collected have resulted in lower concentrations. Water and sediment samples collected from the Alamo River exhibit a lack of a discernible increasing or decreasing trend in the data, instead displaying scatter within a narrow range Nevertheless, sediment samples collected from both the rivers have been consistently below WQOs for all monitoring dates besides a few outliers.

Water Board staff will reevaluate pyrethroid impairment when monitoring data is submitted. Staff will modify the conditions of the Order, if necessary, to address remaining impairments.

7. ASSEMBLY BILL 2108 FINDINGS

Pursuant to Water Code section 13149.2, Basin Plan Amendments incorporating an implementation program allowing time to comply with WQOs must be accompanied by findings on potential environmental justice,[7] tribal impact, and racial equity considerations. Specifically, the findings must include the following:

(1) A concise summary of the anticipated water quality impact in disadvantaged[8] or tribal communities[9] as a result of the permitted activity or facility, and any environmental justice concerns within the scope of the … regional board's authority previously raised … by interested persons with regard to these impacts.

(2) Identification of measures available and within the scope of the … regional board's authority to address the impacts of the permitted activity or facility in a disadvantaged or tribal community.

Such findings are "based on readily available information identified by staff or raised during the public review process…." (Wat. Code, § 13149.2, subd. (b).)

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[7] Water Code section 13149.2, subdivision (f)(2) incorporates the definition of "environmental justice" per Public Resources Code section 30107.3, subdivision (a): "the fair treatment and meaningful involvement of people of all races, cultures, incomes, and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

[8] A "disadvantaged community" is one in which the median household income is less than 80 percent of the statewide annual median household income level. (Wat. Code, § 13149.2, subd. (f)(1).)

[9] A "tribal community" is defined as "a community within a federally recognized California Native American tribe or nonfederally recognized Native American tribe on the contact list maintained by the Native American Heritage Commission for the purposes of Chapter 905 of the Statutes of 2004." (Wat. Code, § 13149.2, subd. (f)(3).)

8. ENVIRONMENTAL REVIEW

Although it constitutes a “project” under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq., this Basin Plan Amendment is a “certified regulatory program” that has been categorically exempted from the requirement for preparation of an Environmental Impact Report (EIR). (Pub. Resources Code, § 21080.5; Cal. Code Regs., tit. 14, 1251, subd. (g).) Basin Plan Amendments must instead comply with the procedural requirements set forth in California Code of Regulations, title 23, section 3775 et seq. This Staff Report and the attached Environmental Review Checklist (Attachment B) constitute the Substitute Environmental Document (SED) that is required per California Code of Regulations, title 23, sections 3777 and 3779.5.

As demonstrated in **Attachment B**, no “fair argument” exists that the proposed Basin Plan Amendment could result in any reasonably foreseeable significant adverse environmental impacts. (See Cal. Code Regs., tit. 23, § 3777, subd. (e); Cal. Code Regs., tit. 14, § 15252, subd. (a)(2)(B).) Similarly, because the proposed Basin Plan Amendment will not require any additional affirmative actions, there are no significant adverse environmental impacts directly resulting from the foreseeable means of compliance. As noted in the previous section, the same iterative process for addressing sedimentation and erosion will be sufficient to address the OC and OP compounds as well.

9. ECONOMIC ANALYSIS

There are three conditions under which economic considerations must be considered in the context of a Basin Plan Amendment.

First, water quality objectives (WQOs) established under the Basin Plan must account for economic considerations. (Wat. Code, § 13241, subd. (d).) Because a total maximum daily load (TMDL) is not WQO, an economic analysis is not required under Water Code section 13241.

Second, prior to the Colorado River Basin Water Board's implementation of an agricultural water quality control program, the Basin Plan must include "an estimate of the total cost of such a program, together with an identification of potential sources of financing…." (Wat. Code, § 13141.) This requirement is inapplicable because such a program already exists in the form of the Board's current Irrigated Lands Regulatory Program (ILRP).

Third, economic considerations must be considered by the SED when analyzing impacts of reasonably foreseeable means of compliance with a new requirement or obligation imposed under the Basin Plan. (See Cal. Code Regs., tit. 23, § 3777, subds. (b)(4), (c).) As noted above, the proposed TMDL Implementation Program does not impose any new obligations or requirements. Consequently, no cost estimates are required.

10. PUBLIC PARTICIPATION

On February 25, 2022, staff conducted a CEQA Scoping Meeting to seek input from public agencies and members of the public on the proposed Basin Plan Amendment, alternatives, reasonably foreseeable methods of compliance, significant impacts to be analyzed, cumulative impacts (if any) and mitigation measures. (Cal. Code Regs., tit. 23, § 3775.5.) The Scoping Meeting was conducted virtually over the internet.

On March 12, 2024, the Colorado River Basin Water Board conducted a public workshop on the proposed Basin Plan Amendment.

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ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

1. Imperial Valley

The Imperial Valley is in the Colorado Desert region of the Sonoran Desert. The climate is characterized by hot, dry summers, occasional thunderstorms, and gusty high winds with sandstorms. It is one of the most arid areas in the United States, with an average annual rainfall of about 3 inches and daily high temperatures in excess of 100ºF for more than 100 days per year.

Major sources of water into Imperial Valley waters include the Colorado River, agricultural discharges, discharges from Mexico, and discharges from NPDES permitted facilities. Past studies have looked at and concluded that urban stormwater runoff into Imperial Valley waters is a relatively insignificant source of water due to the arid Imperial Valley climate and the relatively small area used for urban development (California Regional Water Quality Control Board, Colorado River Basin Region (CRWQBCRBR), 2002; CRWQCBCRBR, 2002b).

The Imperial Valley is allotted an annual entitlement of 3.1 million acre-feet of Colorado River water. Colorado River water flows through the Imperial Dam, located about 20 miles North of Yuma Arizona, through one of three desilting basins before being released into the All-American Canal which then supplies water to the Imperial Valley. This water is used to supply nine cities, and to irrigate agricultural fields throughout the Valley. From 1964 through 1998, IID distributed between 2.6 and 3.2 million acre-feet of Colorado River water per year for irrigation purposes (USBR, 2018). Water used to irrigate agricultural fields is used to satisfy crop needs and to control soil salinity.

Excess irrigation water either percolates into the ground or flows off the tail end of the field. There are over 1,450 miles of surface drains in Imperial Valley that provide a drainage outlet for each governmental subdivision of approximately 160 acres. These drains are typically unlined and are used to collect excess surface flow from agricultural fields (tailwater), subsurface discharges (tilewater) and operational discharge from canals and laterals. These Imperial Valley Drains discharge into the Alamo River, New River, or directly into the Salton Sea. The Imperial Irrigation District (IID) maintains this extensive gravity flow drainage system. The district is obligated to provide its drains at sufficient depth, generally 6 to 10 feet deep, to accept tile drain discharge. Where the drain cannot be maintained at sufficient depth, a sump and pump are provided and maintained by the district.

The Alamo River sub-watershed encompasses approximately 340,000 acres within the Imperial Valley. The Alamo River has its headwaters about 0.6 river miles south of the International Boundary. The Alamo River flows northward roughly 60 river-miles through the Imperial Valley, eventually emptying into the southeast corner of the Salton Sea just southwest of the community of Niland. The flow at the international boundary with Mexico is less than two (2) cubic feet per second (cfs) [Approximately 1,440 acre-feet

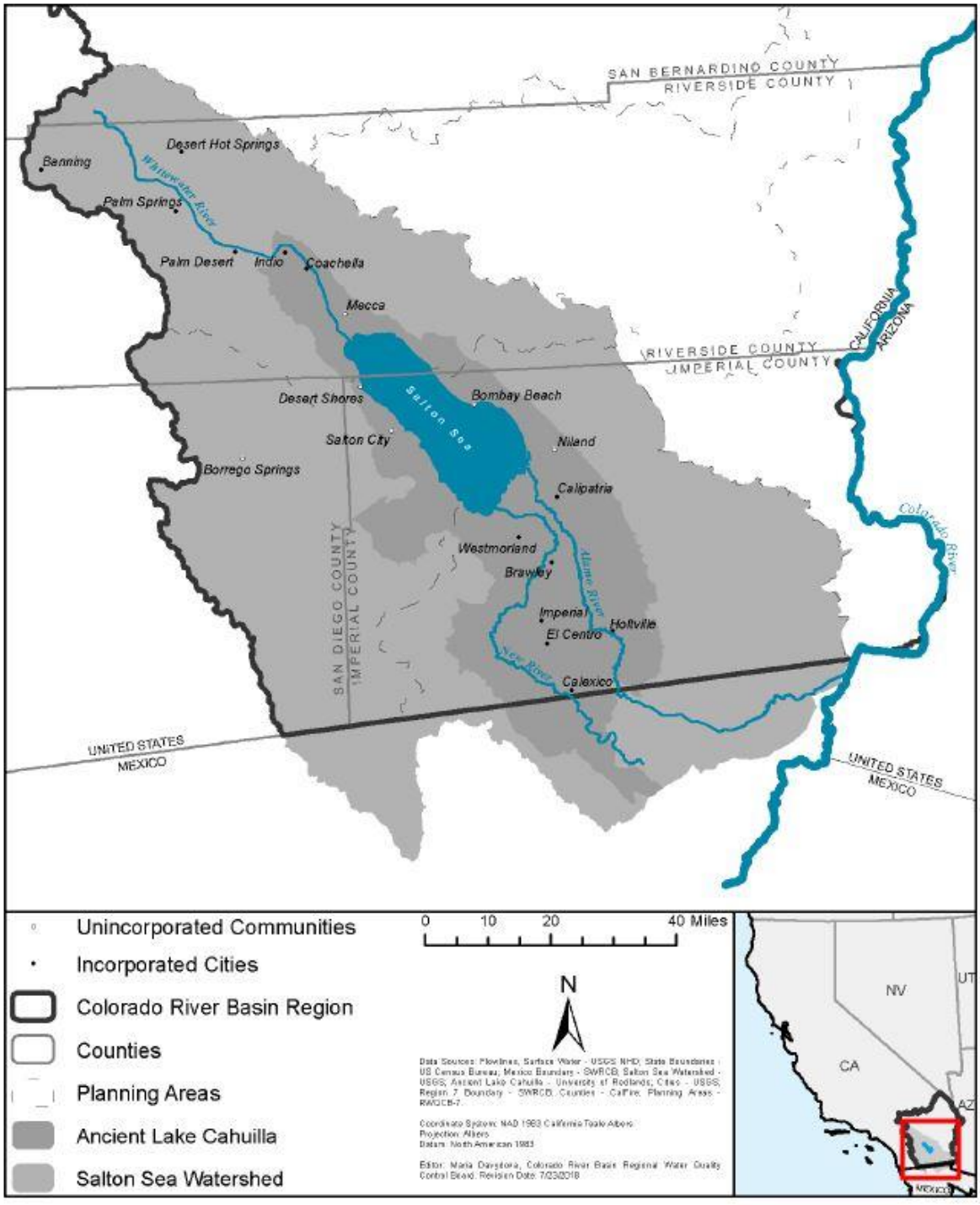
per year (AFY)]. The flow volume of the Alamo River increases as it travels through the Imperial Valley, where it receives water from over 900 miles of agricultural drains. The United States Geological Survey (USGS) operates streamflow-gaging stations on the Alamo River. A gage located near the river's outlet to the Salton Sea reports the mean annual daily flow (Period of Record (POR) 1961- 2017) ranging from approximately 680 to 990 cfs, averaging about 839 cfs [Approx. 607,400 AFY] (USGS, 2018). The Alamo River is the Salton Sea's largest tributary, contributing about 50% of the Sea's annual inflows, and therefore has a major influence on the water quality of the Sea. The Alamo River flows from an elevation of about 10 feet above mean sea level at the International Boundary to an elevation of about 231.8 feet below mean sea level at the Salton Sea, depending on the level of the Salton Sea which fluctuates based on agricultural return flow discharges and seasonal evapotranspiration rates.

The New River watershed encompasses approximately 175,000 acres in Imperial Valley, and 300,000 acres in the Mexicali metropolitan area and Mexicali Valley, Mexico. The New River carries agricultural runoff, partially treated and untreated municipal and industrial wastewater, storm water, and urban runoff from Mexicali Valley northward across the international boundary into the United States. Currently, the flow of the New River at the international boundary with Mexico is approximately 110 cfs [79,600 AFY] (USGS 2018c). Agricultural runoff makes up approximately 50 to 55 percent of New River flow at the international boundary. Flows have been reduced by as much as 50 percent during the last 10 years due to several factors, including reduction of agricultural runoff and municipal wastewater discharged into the New River and its tributaries in Mexico. As the River travels through Imperial Valley, it receives water from: (a) agricultural runoff from about 400 miles of IID Ag Drains (accounting for about 2/3 of river flow), (b) treated municipal and industrial wastewater, and (c) storm water and urban runoff. The USGS operates streamflow-gaging stations on the New River. A gage located near the river's outlets to the Salton Sea reports the mean annual daily flow (POR 1944- 2017) ranging from approximately 484 to 740 cfs and averaging about 606 cfs (Approx. 438,700 AFY) (USGS, 2018b).

The Imperial Valley is located in the Salton Sea Transboundary watershed which consists of the Salton Sea, a saline lake located within the lowest portion of the Salton Trough depression, and the confluence of the Coachella Valley, Anza Borrego, and Imperial Valley planning areas. A section of the watershed extends to Mexicali Valley south of the United States-Mexico international boundary (See Figure A-2).

ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

Figure A-2. Salton Sea Transboundary Watershed.



ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

2. Land Uses

Imperial County covers approximately 5,000 square miles (2,942,080 acres) (Imperial County, 2015). About 74 percent of County lands are undeveloped desert and mountain areas, mostly under the ownership of the federal or state government. The Salton Sea covers about 7 percent of the county's land (Imperial County, 2015 calculated at elevation -230 feet). About 17 percent of county lands are designated for irrigated agriculture use, totaling over 525,000 acres located mostly in the Imperial Valley (Imperial County, 2015). Cities, communities and support facilities occupy less than 1 percent of county land. Table A-1, shows general land uses and their acreage in Imperial County, while Figure A-3 is a map showing their distribution.

Table A-1. Imperial County Land Use Distribution (County of Imperial, 2015)

Land Use	Acres	Data Source
Irrigated (Agriculture)	-	-
Imperial Valley	512,163	Imperial County, 2015
Bard Valley	14,737	Imperial County, 2015
Palo Verde	7,428	Imperial County, 2015
Developed	-	-
Incorporated	9,274	Imperial County, 2015
Unincorporated	8,754	Imperial County, 2015
Desert/Mountains	-	-
Federal	1,459,926	Imperial County, 2015
State	37,760	Imperial County, 2015
Indian	10,910	Imperial County, 2015
Private	669,288	Imperial County, 2015
Other	-	-
Salton Sea	211,840	Imperial County, 2014 (calculated at elevation -230)

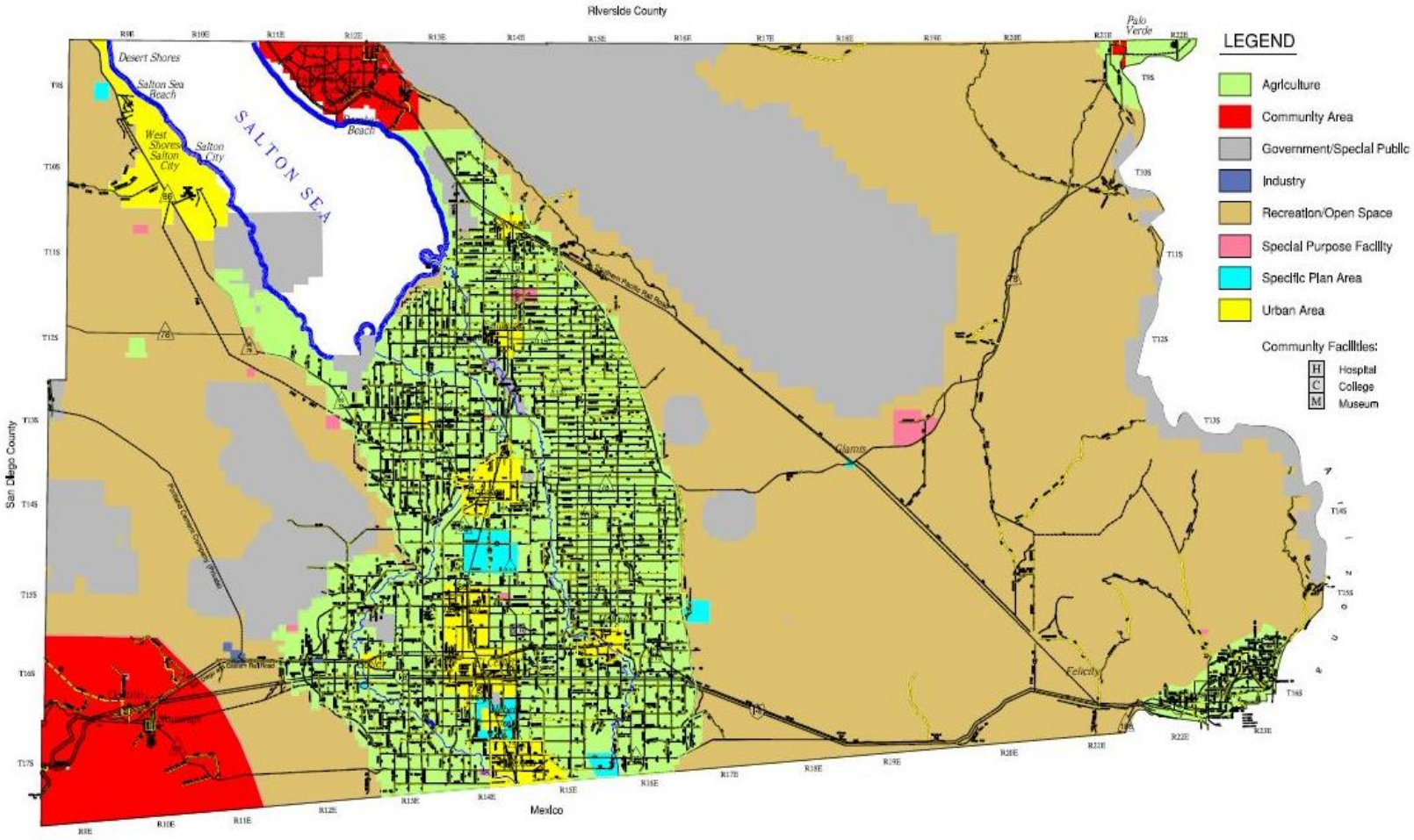
The following bulleted paragraphs provide definitions to the land uses associated with Figure A-3 (Source: County of Imperial, 2015):

ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

- **Agriculture**- Land uses for agricultural production and related industries including aquaculture (fish farms), ranging from light to heavy agriculture. Packing and processing of agricultural products may also be allowed in certain areas, and other uses necessary or supportive of agriculture.
- **Community Area**- Land uses associated with the unincorporated communities of Hot Mineral Spa/Bombay Beach, Ocotillo/Nomirage, and Palo Verde. Their land use orientation is primarily toward relatively low density second home and retirement dwellings and recreational services, rather than urban residential, commercial, and industrial uses.
- **Government/Special Public**- Lands generally owned by public agencies which are presently, and for the foreseeable future, used for a specific governmental purpose. This designation includes military bases, schools or school related facilities and public parkland and may also be applied to airports, sewer and water facilities, cemeteries, and other public utilities and facilities.
- **Industry**- Heavy manufacturing land uses located in areas with the necessary supporting infrastructure and located away from conflicting existing or planned land uses. Generally, these lands are not suitable for agricultural use and are located adjacent to major transportation systems.
- **Recreation/Open**- This category recognizes the unique recreational character of Imperial County and includes desert, mountain, and waterfront areas with the potential for development as public or private parks and recreation facilities in appropriate areas.
- **Special Purpose Facility**- Land uses for basic governmental services which have physical or operational characteristics incompatible with most other land use categories. In particular, noise, odors, air and water quality impacts, aesthetics, and traffic may create dangerous or objectionable conditions.
- **Specific Plan Area**- Land uses with environmental constraints or unique land use concerns or opportunities which require special land use and/or design control.
- **Urban**- Urban land uses characterized by a full level of urban services, in particular public water and sewer systems, and contain or propose a broad range of residential, commercial, and industrial uses.

ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

Figure A-3. Map of Imperial Valley Land Uses.



Source County of Imperial, 2007

3. Biological Resources in The Imperial Valley

Lands and waters in the Imperial Valley and the Salton Sea provide habitat that supports diverse communities of terrestrial and aquatic wildlife. Regional Water Board staff investigated the biological resources in the Imperial Valley using California Department of Fish and Wildlife's (CDFW) Biogeographic Information and Observation System (BIOS), a geographical information system designed to enable the management, visualization, and analysis of biogeographic data collected by the CDFW and its partner organizations. The BIOS application identifies the species and natural communities found in a given location and reports their federal and state protective status as reported in the California Natural Diversity Database (CNDDB). "Special" species are defined as plants, animals, or natural communities whose populations are of concern, including those that are endangered, threatened, special concern species, and otherwise rare/sensitive. "Endangered" species are those that have such limited numbers that they are in imminent danger of extinction throughout all or a significant portion of their range. "Threatened" species are those that are likely to become endangered in the foreseeable future. "Special Concern Species" are those that have declining population levels, limited ranges, and/or continuing threats that have made them vulnerable to extinction. (State-listed Special Concern Species that are "Protected" or "Fully Protected" are those that may not be taken or possessed without a state permit. Federally listed Special Concern Species are no longer tracked by the U.S. Fish and Wildlife Service, and thus are not discussed in this report.) "Rare/Sensitive" species are those that are biologically rare, very restricted in distribution, declining throughout their range, in danger of local extirpation, are closely associated with a rapidly declining habitat, or have a critical, vulnerable stage in their life cycle that warrants monitoring.

Based upon our investigation of the Imperial Valley area, Regional Water Board staff identified four natural communities; Active Desert Dunes, Desert Fan Palm Oasis Woodland, Stabilized and Partially Stabilized Desert Dunes, and Transmontane Alkali Marsh. These communities support forty-one unique plant and one hundred and eleven unique animal species. Two plant and seventy-five animal species are identified as having a special protective status. Table A-2 reports on those species and their protective status.

Table A-2. Special Status Species Occurring or Potentially Occurring in the Imperial Valley and the Salton Sea.

Common Name	Scientific Name	Protective Status[10]
Plants	-	-
Peirson's milk-vetch	Astragalus magdalenae var. peirsonii	FT, SE
Algodones Dunes sunflower	Helianthus niveus ssp. Tephrodes	SE
Animals	-	-
Sonoran Desert toad	Incilius alvarius	SSC
Northern leopard frog	Lithobates pipiens	SSC
Lowland leopard frog	Lithobates yavapaiensis	SSC
Couch's spadefoot	Scaphiopus couchii	SSC
Cooper's hawk	Accipiter cooperii	WL
Sharp-shinned hawk	Accipiter striatus	WL
Golden eagle	Aquila chrysaetos	FP, WL
Short-eared owl	Asio flammeus	SSC
Burrowing owl	Athene cunicularia	SSC
Ferruginous hawk	Buteo regalis	WL
Western snowy plover	Charadrius alexandrinus nivosus	FT, SSC
Mountain plover	Charadrius montanus	SSC
Black tern	Chlidonias niger	SSC
Northern harrier	Circus hudsonius	SSC

[10] FT = Federally Threatened, FE = Federally Endangered, ST = State Threatened, SE = State Endangered, SSC = Species of Special Concern, FP = Fully Protected, SC = State Candidate, WL = Watch List.

ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

Common Name	Scientific Name	Protective Status[10]
White-tailed kite	Elanus leucurus	FP
Willow flycatcher	Empidonax traillii	SE
Southwestern willow flycatcher	Empidonax traillii extimus	FE, SE
California horned lark	Eremophila alpestris actia	WL
Merlin	Falco columbarius	WL
Prairie falcon	Falco mexicanus	WL
American peregrine falcon	Falco peregrinus anatum	FP
Gull-billed tern	Gelochelidon nilotica	SSC
Yellow-breasted chat	Icteria virens	SSC
Least bittern	Ixobrychus exilis	SSC
Gray-headed junco	Junco hyemalis caniceps	WL
Loggerhead shrike	Lanius ludovicianus	SSC
California gull	Larus californicus	WL
California black rail	Laterallus jamaicensis coturniculus	ST, FP
Laughing gull	Leucophaeus atricilla	WL
Gila woodpecker	Melanerpes uropygialis	SE
Wood stork	Mycteria americana	SSC
Long-billed curlew	Numenius americanus	WL
Black storm-petrel	Oceanodroma melania	SSC
Osprey	Pandion haliaetus	WL
Harris' hawk	Parabuteo unicinctus	WL
Large-billed savannah sparrow	Passerculus sandwichensis rostratus	SSC

ATTACHMENT A: IMPERIAL VALLEY DESCRIPTION

Common Name	Scientific Name	Protective Status[10]
American white pelican	Pelecanus erythrorhynchos	SSC
California brown pelican	Pelecanus occidentalis californicus	FP
Double-crested cormorant	Phalacrocorax auratus	WL
Summer tanager	Piranga rubra	SSC
White-faced ibis	Plegadis chihi	WL
Black-tailed gnatcatcher	Polioptila melanura	WL
Vermilion flycatcher	Pyrocephalus rubinus	SSC
Yuma Ridgway's rail	Rallus obsoletus yumanensis	FE, ST, FP
Black skimmer	Rynchops niger	SSC
Yellow warbler	Setophaga petechia	SSC
California least tern	Sternula antillarum browni	FE, SE, FP
Crissal thrasher	Toxostoma crissale	SSC
Le Conte's thrasher	Toxostoma lecontei	SSC
Least Bell's vireo	Vireo bellii pusillus	FE, SE
Yellow-headed blackbird	Xanthocephalus xanthocephalus	SSC
Desert pupfish	Cyprinodon macularius	FE, SE
Razorback sucker	Xyrauchen texanus	FE, SE, FP
Crotch bumble bee	Bombus crotchii	SC
Pallid bat	Antrozous pallidus	SSC
Western mastiff bat	Eumops perotis californicus	SSC
Western yellow bat	Lasiurus xanthinus	SSC
California leaf-nosed bat	Macrotus californicus	SSC

Common Name	Scientific Name	Protective Status[10]
Pocketed free-tailed bat	Nyctinomops femorosaccus	SSC
Big free-tailed bat	Nyctinomops macrotis	SSC
Desert bighorn sheep	Ovis canadensis nelson	FP
Peninsular bighorn sheep DPS	Ovis canadensis nelsoni pop. 2	FE, ST, FP
Palm Springs pocket mouse	Perognathus longimembris bangsi	SSC
Yuma hispid cotton rat	Sigmodon hispidus eremicus	SSC
American badger	Taxidea taxus	SSC
Palm Springs round-tailed ground squirrel	Xerospermophilus tereticaudus chlorus	SSC
Southern California legless lizard	Anniella stebbinsi	SSC
California glossy snake	Arizona elegans occidentalis	SSC
Coastal whiptail	Aspidoscelis tigris stejnegeri	SSC
Red-diamond rattlesnake	Crotalus ruber	SSC
Desert tortoise	Gopherus agassizii	FT, ST
Sonoran mud turtle	Kinosternon sonoriense	SSC
Flat-tailed horned lizard	Phrynosoma mcallii	SSC
Colorado Desert fringe-toed lizard	Uma notata	SSC
Sandstone night lizard	Xantusia gracilis	SSC

4. Agriculture In the Imperial Valley

Abundant sunshine, fertile soils, and easy access to irrigation water are a few of the many factors that make it ideal for growing crops in the Imperial Valley. Imperial Valley is the 11th-ranked agricultural county in the state of California, producing over $1.9 billion dollars in revenue in 2015 (California Department of Food and Agriculture

[CDFA], 2016). In 2016, the county Agricultural Commissioner calculated that agriculture contributed 4.5 billion dollars to the local economy (County of Imperial Agricultural Commissioner, 2017). Crops produced include alfalfa, bermudagrass, sudangrass, lettuce, sugarbeets, and other fruit and vegetable crops (Table A-3).

Table A-3. Crops Grown in Imperial Valley (2017).[11]

Crop	Acres
Alfalfa (all)	148,397
Bermudagrass (all)	52,050
Sudangrass (all)	43,834
Lettuce (all)	32,069
Sugarbeets	26,498
Wheat	16,988
Carrots (all)	16,475
Kleingrass	14,510
Onions (all)	13,194
Broccoli (all)	13,016
Duck Ponds	9,546
Spinach	8,775
Corn, sweet	7,300
Citrus (all)	7,214
Melons, spring (all)	5,750
Vegetables, mixed	5,123
Corn, field	4,123

Crop	Acres
Cauliflower	3,699
Cabbage	1,933
Potatoes	1,589
Rapini	1,539
Sunflowers (seed)	1,441
Celery (all)	1,279
Ryegrass	1,221
Dates	1,174
Cilantro	1,126
Watermelons	1,028
Oats	904
Grass, mixed	611
Olives	607
Fish farms	480
Sugarcane	472
Palms	459
Coriander seed	428
Pasture, permanent	414

Crop	Acres
Okra	379
Flowers	296
Sesbania	294
Kale	286
Swiss chard (all)	253
Red beets	230
Sweet basil	211
Mustard (all)	191
Parsley (all)	169
Nursery	156
Barley	153
Cabbage, Chinese	140
Sorghum silage	139
Triticale grain	122
Squash	88
Spirulina algae	85
Artichoke (all)	84
Rapeseed	79

[11] Source: Imperial Irrigation District website accessed on 8/13/18

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Crop	Acres
Quinoa	74
Collards	70
Fennel	63
Jujube	57
Brussels sprouts	54
Parsnips	50
Ornamental trees	47

Crop	Acres
Aloe vera	41
Mangos	39
Sorghum grain	38
Herbs, mixed	33
Radishes	33
Cucumbers	30
Rockett	25
Asparagus	20

Crop	Acres
Safflower	15
Peppers, bell	8
Eucalyptus	7
Pecans	4
Fruit, mixed	3
Melons, fall (all)	3
Bamboo	1
Total Acres	**449,336**

5. Regulating Discharges into Imperial Valley Waters

The Colorado River Basin Water Board and State Water Board issue permits to control nonpoint and point source discharges of waste into waters of the state. The permits include Waste Discharge Requirements (WDRs), Conditional Waivers of WDRs, or National Pollutant Discharge Elimination Systems (NPDES) permits, depending on the nature of the waste discharged and the receiving water body. NPDES permits apply to municipalities and facilities that discharge treated wastewater directly to waters of the United States, whereas WDRs apply to facilities that discharge to waters of the United States and waters of the state. Nonpoint source discharges are diffuse in nature and originate from landscape-type sources. Point source discharges originate from distinct sources.

a. Regulating Nonpoint Source Discharges

The main nonpoint source discharge into Imperial Valley waters is from irrigated agricultural lands. To control the discharges from irrigated agricultural lands the Colorado River Basin Water Board adopted Order R7-2021-0050, *General Waste Discharge Requirements for Discharges of Waste from Irrigated Lands for Dischargers that are Members of a Coalition Group in the Imperial Valley* (Irrigated Lands General Order). Owners and/or operators of irrigated agricultural land in Imperial Valley are required to enroll their land for regulatory coverage under the General Order, or alternatively, submit a report of waste discharge and apply for an individual waste discharge permit. The Irrigated Lands General Order is primarily a representative-based order where a third party formed a coalition group (IID-ICFB Coalition Group) to assist

individual owners and operators of irrigated agricultural land in Imperial Valley (Irrigated Agricultural Dischargers) in complying with requirements of the General Order. No individual owners/operators elected to enroll outside of the IID-ICFB Coalition Group and be regulated through an individual waste discharge permit, although this is an option.

The Irrigated Lands General Order requires enrolled dischargers to implement management practices, monitor water quality, and report to the Regional Water Board. Among other requirements, agricultural dischargers are required under the Irrigated Lands General Order to implement pesticide and sediment best management practices.

The Imperial Agricultural Order was initially in effect for a period of five years. It was originally scheduled to expire in January 2020 but was twice extended for an additional twenty-four months and expired in January 2022. The Colorado River Basin Water Board modified and renewed the Imperial Agricultural Order. The new Irrigated Lands General Order has many of the same provisions and requirements as the previous Conditional Waiver, new provisions and requirements, it is consistent with how the Colorado River Basin Water Board intends to regulate agricultural waste discharges in the Region, and is consistent with the state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy, SWRCB, 2004).

i. Siltation/Sedimentation TMDLs

Since 2001, the Colorado River Basin Water Board has developed and adopted Sedimentation/ Siltation Total Maximum Daily Loads (TMDLs) and Implementation Plans (hereafter "silt TMDLs") for the Alamo River, New River, and Imperial Valley Drains. The silt TMDLs cover irrigated agricultural land in the Imperial Valley, the drain system which conveys the discharges away from the farmed fields, and discharges from Mexico. The Siltation/Sedimentation TMDLs set Numeric Targets of 200 mg/L for Total Suspended Solids (TSS), require the use of sediment management practices to control the amounts of sediment leaving the agricultural lands, required monthly monitoring of TSS in the Alamo River, New River and Imperial Valley Drains, and annual reporting.

The silt TMDLs were adopted by the Colorado River Basin Water Board via Basin Plan amendments. The State Water Board and the U.S. EPA approved the silt TMDLs. Table A-4, show the dates that the TMDLs were adopted and approved. TMDL implementation officially begins after USEPA approval.

Table A-4. Sedimentation/Siltation TMDL Adoption and Approval Dates.

Approving Authority	Alamo River Silt TMDL	New River Silt TMDL	IV Drains Silt TMDL
Regional Water Board Adoption Dates	6/27/01	6/26/02	1/19/05

State Water Board Approval Dates	2/19/02	11/19/02	7/21/05
USEPA Approval Dates	6/28/02	3/31/03	9/30/05

ii. Regulating Point Source Discharges

Point source discharges into Imperial Valley waters come from discrete sources and are regulated either by NPDES permits or WDRs. As of April 2021, there are 16 facilities that discharge to Imperial Valley waters that are regulated by individual NPDES permits adopted by the Colorado River Basin Water Board. The number of NPDES permits adopted and active will change over time as new dischargers seek regulatory coverage and as existing permits are terminated or expire. The permits for these individual NPDES facilities establish effluent and receiving water limitations, require the use of best management practices, monitoring, and annual reporting. Table A-5 reports information about these NPDES facilities.

Table A-5. Individually-Permitted NPDES Facilities Discharging to Imperial Valley Waters as of April 2021.

Facility Name	Board Order (NPDES Permit number)	Adoption Date	Design Flow (mgd)[12]	Receiving Waterbody
City of Brawley Wastewater Treatment Plant	R7-2015-0004 CA0104523	6/11/2015	5.9	New River
City of Imperial Water Pollution Control Plant	R7-2015-0030 CA0104400	9/17/2015	2.4	Alamo River
Grass Carp Hatchery (IID)	R7-2016-0003 CA7000004	3/10/2016	2.52	Alamo River
City of Holtville Municipal Wastewater Treatment Plant	R7-2016-0005 CA0104361	6/30/2016	0.85	Alamo River

[12] Million gallons per day.

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Facility Name	Board Order (NPDES Permit number)	Adoption Date	Design Flow (mgd)[12]	Receiving Waterbody
Heber Public Utility District Wastewater plant, Heber	R7-2016-0006 CA0104370	6/30/2016	1.2	Alamo River
Naval Air Facility El Centro Wastewater Treatment Plant	R7-2016-0004 CA0104906	6/30/2016	0.3	New River
Seeley County Wastewater Treatment Plant	R7-2017-0016 CA0105023	11/9/2017	0.25	New River
City of Westmorland Wastewater Treatment Plant	R7-2017-0017 CA0105007	9/21/2017	0.5	New River
Country Life Mobile Home and R.V. Park Wastewater Treatment Plant	R7-2018-0010 CA0104264	5/14/2018	0.15	Alamo River
Date Gardens Mobile Home Park Wastewater Treatment Plant	R7-2018-0009 CA0104841	5/14/2018	0.02	New River
El Centro Wastewater Treatment Plant	R7-2019-0002 CA0104426	3/7/2019	8	Alamo River
Centinela State Prison Wastewater Treatment Plant	R7-2019-0003 CA7000001	4/11/2019	0.96	New River
Niland Wastewater Treatment Plant	R7-2019-0005 CA0104451	5/15/2019	0.5	Salton Sea

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Facility Name	Board Order (NPDES Permit number)	Adoption Date	Design Flow (mgd)[12]	Receiving Waterbody
Calexico Water Pollution Control Plant	R7-2019-0004 CA7000009	5/15/2019	4.3	New River
El Centro Generating Station (IID)	R7-2020-0006 CA0104248	1/16/2020	0.995	Alamo River
Calipatria Wastewater Treatment Plant	R7-2020-0010 CA0105015	11/12/2020	1.73	Alamo River

There are also municipalities and facilities that discharge lesser amounts of wastewater into Imperial Valley waters and are regulated by general NPDES permits or WDRs adopted by the Colorado River Basin Water Board or the State Water Board.

As of April 2021, the cities of Imperial, El Centro, Calexico, Brawley, and the County of Imperial are enrolled under the State Water Board Order 2013-0001-DWQ, *National Pollutant Discharge Elimination System (NPDES) General WDRs for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4), a*s Phase II MS4 collection systems (applies to municipalities with a population less than 100,000). Forty-nine facilities are regulated under the State Water Board Order 2009-0009-DWQ, *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) as of April 2021*. Fifty-four facilities are regulated under the State Water Board Order 2014-0057-DWQ, *NPDES General Permit for Storm Water Discharges Associated with Industrial Activities* (Industrial General Permit) as of April 2021. The number of dischargers enrolled under the general stormwater permits will change over time as new dischargers seek regulatory coverage and as existing permits are terminated or expire. These general stormwater permits require the development of a Storm Water Pollution Prevention Plan (SWPPP) and a monitoring plan. Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution are described.

Three facilities are regulated under Colorado River Basin Water Board Order R7-2015-0006, *General WDRs for Low Threat Discharges to Surface Water* (Low Threat Order) as of April 2021. The Low Threat Order applies to individuals, public agencies, private business, and other legal entities that occasionally discharge treated or untreated wastewater directly to waters of the United States that pose an insignificant or minimal threat (i.e., low threat) to water quality. Examples of low threat discharges include discharges from dewatering projects to construct or protect pipelines and structures from groundwater infiltration or flotation, groundwater extraction because of drilling,

constructing, developing, and purging wells. Some low threat discharges may need minimal treatment, such as settling out sediment or dechlorination, to remove specific pollutants prior to discharge and/or application of best management practices (BMPs) to ensure that the discharge does not create conditions of pollution or nuisance. The Low Threat Order establishes effluent and receiving water limitations, requires enrolled dischargers to implement management practices where necessary, monitor water quality, and report to the Regional Water Board. Low threat dischargers are required to develop and implement a BMP Plan that includes site-specific plans and procedures to prevent the generation and potential release of pollutants to waters of the United States.

Thirty facilities are regulated under Colorado River Basin Water Board Order R7-2013-0800, *General NPDES Permit for Concentrated Animal Feeding Operations in the Colorado River Basin Region* (CAFO General Order) as of April 2021. The CAFO General Order applies to operations where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period and where vegetation is not sustained in the confinement area during the normal growing season. The CAFO General Order, generally prohibits the direct and indirect discharge of waste to surface water or tributaries, establishes effluent limitations and discharge specifications for manure (nutrients)/litter/process wastewater pollutants, requires monitoring of effluent and solid wastes discharged, and contains provisions to fully contain wastes until they can be properly disposed of.

6. Summary

Regional Water Board staff reviewed available documents and data to characterize land and water uses in Imperial Valley. Imperial County is in the Colorado Desert region of the Sonoran Desert and is a part of the greater Salton Sea Transboundary watershed.

Land use data shows that after undeveloped desert and mountain areas, the largest use of land in Imperial County is for agriculture. About 17 percent of county lands are designated for irrigated agriculture use, totaling over 525,000 acres located mostly in the Imperial Valley (County of Imperial, 2015). In comparison, cities, communities, and support facilities occupy less than 1 percent of county land.

Staff identified four natural communities that support forty-one unique plant and one hundred and eleven unique animal species in the Imperial Valley and Salton Sea. Two plant and seventy-five animal species are identified as having a special protective status.

The Imperial Valley has been heavily agricultural since the mid-1920s. Today, about 450,000 acres of land in Imperial Valley are in agricultural production. Agricultural data shows approximately 74 different types of crops being grown on Imperial Valley lands. The major crops grown in the Imperial Valley, based on the amount of land in production, are alfalfa, wheat, sudangrass, lettuce, and sugar beets.

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The Imperial Valley is allotted an annual entitlement of 3.1 million acre-feet of Colorado River water. The water flows through the Imperial Dam through one of three desilting basins before being released into the All-American Canal which then supplies water to nine cities and agricultural fields in Imperial Valley. After its use, wastewater is discharged to the ground or to surface waters.

Sources of water in the Alamo River, Imperial Valley Drains, and New River include irrigated agricultural discharges, discharges from Mexico into the New River, and discharges from National Pollutant Discharge Elimination System (NPDES) permitted facilities. The source of water into Wiest Lake is the All-American Canal. The water in the Alamo River, Imperial Valley Drains, and New River can mostly be attributed to irrigated agricultural discharges. The water in the New River at the International Boundary can mostly be attributed to discharges from Mexico. Urban stormwater runoff into Imperial Valley waters is a relatively insignificant source of water due to the arid Imperial Valley climate, and the minor amount of developed land.

The Colorado River Basin Water Board or State Water Board issue permits to regulate nonpoint and point source discharges of waste into waters of the state. These regulatory control mechanisms include WDRs, Conditional Waivers of WDRs, or NPDES permits.

In Imperial Valley, the main nonpoint source discharges are from irrigated agricultural lands and are regulated by the Irrigated Lands General Order. The Irrigated Lands General Order requires enrolled dischargers to implement management practices, monitor water quality, and report to the Regional Water Board.

Point source discharges come from many sources and are regulated by individual or general NPDES permits or WDRs. Staff identified five municipalities and 119 facilities that discharge to the Imperial Valley waters as of April 2021. The stormwater discharges from the cities of Imperial, El Centro, Calexico, Brawley, and the County of Imperial are regulated by State Water Board Order 2013-0001-DWQ, the general permit for stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4), as Phase II collection systems. Of the 119 NPDES permitted facilities, the discharge from 16 of the NPDES facilities are regulated by individual permits adopted by the Colorado River Basin Water Board, discharges from the remaining 113 facilities are regulated by general NPDES permits or WDRs adopted by the Regional Water Board or the State Water Board. The number of NPDES permits adopted and active will change over time as new dischargers seek regulatory coverage and as existing permits are terminated or expire. The permits generally establish effluent and receiving water limitations, require the use of best management practices, monitoring, and annual reporting.

7. References

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ATTACHMENT B: ENVIRONMENTAL REVIEW CHECKLIST

A. Project Title

Basin Plan Amendment to Establish Total Maximum Daily Load for Pyrethroid Pesticides

B. Lead Agency Name and Address

California Regional Water Quality Control Board,
Colorado River Basin Region
73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

C. Lead Agency Contact Person

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Work Phone: 760-776-8960

D. Project Description

The project is a proposed amendment to the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Colorado River Basin Region (Regional Board). The amendment would incorporate into the Basin Plan a Total Maximum Daily Load (TMDL) for Pyrethroid Pesticides in the Alamo River and New River in Imperial County, California.

The existing Basin Plan includes narrative water quality objectives that apply to pyrethroid pesticides. The objectives are being violated and the beneficial uses are being impaired in the Alamo and New Rivers by excessive discharge of six primary pyrethroid pesticides by nonpoint and point sources dischargers in the Imperial Valley Watershed. The identification of probable sources of pyrethroid pesticides, assignment of wasteload allocations to point sources and load allocations to nonpoint sources for these pollutants will ensure the development of an implementation plan to achieve the allocations and thus, the attainment of applicable water quality objectives/targets.

The TMDL Implementation Plan requires that parties responsible for the impairment to implement: a) management practices (MPs), monitoring and reporting with a time

schedule for the agricultural sources by the Imperial Valley agricultural general order R7-2021-0050; b) coordination between Regional Water Board and U.S. federal agencies to control discharges of pyrethroid pesticides into the New River at the international boundary from Mexico; and c) requirements put in place by either individual or general NPDES permits or WDRs like monitoring and requirements to report pollutant loads associated with these facilities.

E. Project Location

Colorado River Basin Region (southeastern California),
Imperial County, California

F. CEQA Checklist

The CEQA Checklist is a series of questions grouped by subject that identifies different types of potential environmental impacts that a project may cause. CEQA considers what are the existing conditions of the physical project site as a baseline. It then compares how much change will occur to the site if the project is implemented. Based on the CEQA Guidelines, the impact severity is rated on a scale of four impact levels. The four levels are: potentially significant impact, less than significant with mitigation incorporated, less than significant impact, or no impact.

1. Aesthetics

The level of impacts to aesthetics are evaluated based on the following questions posed under impact description in the matrix below, except as provided in Public Resources Code section 21099, will the project:

Table B-1. CEQA Checklist—Aesthetics.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Have a substantial adverse effect on a scenic vista?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
B. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	no	no	no	**YES**
C. Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	no	no	no	**YES**
D. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	no	no	no	**YES**

2. Agriculture and Forestry Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

ATTACHMENT B: ENVIRONMENTAL REVIEW CHECKLIST

The level of impacts to agriculture and forestry resources are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-2. CEQA Checklist—Agriculture and Forestry Resources.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	no	no	no	**YES**
B. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	no	no	no	**YES**
C. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	no	no	no	**YES**
D. Result in the loss of forest land or conversion of forest land to non-forest use?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
E. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	no	no	no	**YES**

3. Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. The level of impacts to air quality are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-3. CEQA Checklist—Air Quality.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Conflict with or obstruct implementation of the applicable air quality plan?	no	no	no	**YES**
B. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
C. Expose sensitive receptors to substantial pollutant concentrations?	no	no	no	**YES**
D. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	no	no	no	**YES**

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4. Biological Resources

The level of impacts to biological resources are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-4. CEQA Checklist—Biological Resources.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	no	no	no	**YES**
B. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
C. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	no	no	no	**YES**
D. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	no	no	no	**YES**
E. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	no	no	no	**YES**
F. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	no	no	no	**YES**

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5. Cultural Resources

The level of impacts to cultural resources are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-5. CEQA Checklist—Cultural Resources.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5?	no	no	no	**YES**
B. Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5?	no	no	no	**YES**
C. Disturb any human remains, including those interred outside of dedicated cemeteries?	no	no	no	**YES**

6. Energy

The level of impacts to energy are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

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Table B-6. CEQA Checklist—Energy.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	no	no	no	**YES**
B. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	no	no	no	**YES**

7. Geology and Soils

The level of impacts to geology and soils are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

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Table B-7. CEQA Checklist—Geology and Soils.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving rupture of known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	no	no	no	**YES**
B. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving strong seismic ground shaking?	no	no	no	**YES**
C. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving seismic-related ground failure, including liquefaction?	no	no	no	**YES**
D. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving landslides?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
E. Result in substantial soil erosion or the loss of topsoil?	no	no	no	**YES**
F. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	no	no	no	**YES**
G. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	no	no	no	**YES**
H. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	no	no	no	**YES**
I. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	no	no	no	**YES**

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8. Greenhouse Gas Emissions

The level of impacts to greenhouse gas emissions are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-8. CEQA Checklist—Greenhouse Gas Emissions.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	no	no	no	**YES**
B. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	no	no	no	**YES**

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9. Hazards and Hazardous Materials

The level of impacts to hazards and hazardous materials are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-9. CEQA Checklist—Hazards and Hazardous Materials.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	no	no	no	**YES**
B. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	no	no	no	**YES**
C. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
D. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	no	no	no	**YES**
E. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	no	no	no	**YES**
F. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	no	no	no	**YES**
G. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	no	no	no	**YES**

10. Hydrology and Water Quality

The level of impacts to hydrology and water quality are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-10. CEQA Checklist—Hydrology and Water Quality.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	no	no	no	**YES**
B. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	no	no	no	**YES**
C. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in a substantial erosion or siltation on- or off-site?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
D. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	no	no	no	**YES**
E. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
F. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?	no	no	no	**YES**
G. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	no	no	no	**YES**
H. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	no	no	no	**YES**

11. Land Use and Planning

The level of impacts to land use and planning are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

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Table B-11. CEQA Checklist—Land Use and Planning.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Physically divide an established community?	no	no	no	**YES**
B. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	no	no	no	**YES**

12. Mineral Resources

The level of impacts to mineral resources are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-12. CEQA Checklist—Mineral Resources.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
B. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	no	no	no	**YES**

13. Noise

The level of impacts to noise are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-13. CEQA Checklist—Noise.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	no	no	no	**YES**
B. Generate excessive ground-borne vibration or ground-borne noise levels?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	no	no	no	**YES**

14. Population and Housing

The level of impacts to population and housing are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-14. CEQA Checklist—Population and Housing.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
B. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	no	no	no	**YES**

15. Public Services

The level of impacts to public services are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:

Table B-15. CEQA Checklist—Public Services.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Fire protection?	no	no	no	**YES**
B. Police protection?	no	no	no	**YES**
C. Schools?	no	no	no	**YES**
D. Parks?	no	no	no	**YES**
E. Other public facilities?	no	no	no	**YES**

16. Recreation

The level of impacts to recreation are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-16. CEQA Checklist—Recreation.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	no	no	no	**YES**
B. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	no	no	no	**YES**

17. Transportation

The level of impacts to transportation are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

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Table B-17. CEQA Checklist—Transportation.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	no	no	no	**YES**
B. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	no	no	no	**YES**
C. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	no	no	no	**YES**
D. Result in inadequate emergency access?	no	no	no	**YES**

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18. Tribal Cultural Resources

The level of impacts to tribal cultural resources are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

Table B-18. CEQA Checklist—Tribal Cultural Resources.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?	no	no	no	**YES**
B. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	no	no	no	**YES**

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19. Utilities and Service Systems

The level of impacts to utilities and service systems are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-19. CEQA Checklist—Utilities and Service Systems.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	no	no	no	**YES**
B. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	no	no	no	**YES**
C. Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	no	no	no	**YES**

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
D. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	no	no	no	**YES**
E. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	no	no	no	**YES**

20. Wildfire

The level of impacts to wildfire are evaluated based on the following questions posed under impact description in the matrix below as to whether the project is located in or near state responsibility areas or lands classified as very high fire hazard severity zones will the project:

Table B-20. CEQA Checklist—Wildfire.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Substantially impair an adopted emergency response plan or emergency evacuation plan?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
B. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	no	no	no	**YES**
C. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	no	no	no	**YES**
D. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	no	no	no	**YES**

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21. Mandatory Findings of Significance

The level of impacts to mandatory findings of significance are evaluated based on the following questions posed under impact description in the matrix below as to whether the project will:

Table B-21. CEQA Checklist—Mandatory Findings of Significance.

Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
A. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	no	no	no	**YES**

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Impact Description	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
B. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)?	no	no	no	**YES**
C. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	no	no	no	**YES**

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G. Discussion

This section provides detailed discussions on the items listed in the environmental checklist above.

1. Aesthetics Discussion

Will the project:

1A. Have any substantial adverse effect on a scenic vista?

No Impact. The proposed project will not have a substantial adverse effect on a scenic vista. The project applies to land that has been cultivated for at least the last 60 years and in many cases to farmland that has been cultivated for over a century. The MPs which will be implemented to control and improve tailwater and tilewater quality will occur on existing, privately owned farmland and farmland owned by the IID. The RPs have been implementing many of these MPs (e.g., Irrigation Land Leveling, Irrigation Water Management, Pesticide Selection, etc.) for decades as part of their day-to-day farming operations. Further, the compliance monitoring activities will take place at static locations on the New and Alamo Rivers, and effluents of point sources. This project expects to improve aesthetic qualities by improving the health of the ecosystem through reduced pollutant discharges from agricultural lands, NPDES facilities and the international boundary.

1B. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The proposed project will not substantially damage scenic resources within a state scenic highway. MP implementation will occur on existing farmland cultivated for at least the last 60 years and in many cases to farmland that has been cultivated for over a century. Compliance monitoring will occur at static locations on the waterbodies and effluents of point sources. Controlling and improving the quality of agricultural and NPDES wastewater discharges, and compliance monitoring will not affect scenic resources. This project expects to improve scenic resources by improving the health of the ecosystem through reduced pollutant discharges from agricultural lands, NPDES facilities and the international boundary.

1C. Substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

No Impact. The proposed project will not substantially degrade the existing visual character or quality of the site and its surroundings. MP implementation and compliance monitoring will occur on existing farmland cultivated for at least the last 60 years and in

existing NPDES and international boundary facilities. These agricultural lands, NPDES and international boundary facilities are not sensitive with respect to visual character or quality. Controlling and improving the quality of agricultural, NPDES and international boundary wastewater discharges, by implementing MP and compliance monitoring will not affect such resources.

1D. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

No Impact. The proposed project will not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. MP implementation and compliance monitoring will occur mostly in daylight hours, using standard non-glaring machinery (e.g., tractors, backhoes and sampling equipment).

2. Agriculture and Forestry Resources Discussion

Will the project:

2A. Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The proposed project will not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use. The project requires farmers/growers to continue using MPs on farmland to control agricultural wastewater discharge quality and control pollutants associated with discharges. It also requires farmers/growers, and NPDES facilities to perform compliance monitoring.

2B. Conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The proposed project does not conflict with existing zoning for agricultural use, or the California Land Conservation Act known as the Williamson Act. MP implementation will occur on existing farmland cultivated for at least the last 60 years and compliance monitoring will occur in drains transporting tail water and in existing NPDES facilities and surface water bodies.

2C. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. The proposed project does not conflict with existing zoning for or cause rezoning of, forest land, timberland or timberland zoned Timberland Production. MP implementation will occur on existing farmland cultivated for at least the last 60 years

and compliance monitoring will occur in drains transporting tail water and in existing NPDES facilities.

2D. Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The proposed project does not conflict with existing zoning for agricultural use, or the California Land Conservation Act known as the Williamson Act. MP implementation will occur on existing farmland cultivated for at least the last 60 years and compliance monitoring will occur in existing NPDES facilities.

2E. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The proposed project does not involve other changes in the existing environment which could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use. MP implementation will occur on existing farmland cultivated for at least the last 60 years and compliance monitoring will occur in existing NPDES facilities.

3. Air Quality Discussion

Will the project:

3A. Conflict with or obstruct implementation of the applicable air quality plan?

No Impact. The implementation of MP and compliance monitoring does not conflict with or obstruct implementation of the applicable air quality plan.

3B. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality?

No Impact. The contribution attributable to the proposed project is not considered cumulatively in the Imperial County Air Quality Plans and therefore, is less than significant. The Imperial County is considered a nonattainment area for PM 2.5 and 8-hour ozone. The project requires farmers/growers to continue using MPs on farmland and NPDES facilities to control pollutants associated with discharges and compliance monitoring. MPs themselves are not sources of emissions. Construction, operation, and maintenance of some MPs (e.g., land leveling, sprinkler irrigation, drip irrigation, etc.) may involve the temporary use (one-time or once-per-year) of construction equipment (e.g., tractors, backhoes) that are sources of gasoline/diesel byproduct emissions and fugitive dust emissions (particulates). However, the equipment used for construction and operation and maintenance meets emission standards. Therefore, construction equipment emissions are not expected to violate or contribute substantially to an existing or projected air quality violation.

3C. Expose sensitive receptors to substantial pollutant concentrations?

No Impact. The proposed project will not expose sensitive receptors to substantial pollutant concentrations. The MPs and compliance monitoring are not individually or cumulatively significantly different than current agricultural practices (e.g., preparing land for planting) or practices used in NPDES facilities. The project requires farmers/growers to continue using MPs on farmland to control agricultural wastewater discharge quality and control pollutants associated with discharges. Particulate emissions associated with MP and water quality monitoring will occur primarily in agricultural fields where large numbers of people are not expected to congregate.

3D. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

No Impact. The proposed project will not create objectionable odors. Implementation of MPs and compliance water quality monitoring will not create objectionable odors.

4. Biological Resources Discussion

Will the project:

4A. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact. The proposed project will not have a substantial adverse effect, either directly or through habitat modifications, on species identified as a candidate, sensitive, or special status species in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. MP implementation, and compliance water quality monitoring will not affect such resources, on the contrary. Improved water quality contributes to healthier and sustainable habitat for biological resources.

4B. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact. The proposed project will not have a substantial adverse effect on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife, or U.S. Fish and Wildlife Service.

The Alamo and New Rivers support riparian habitat. Riparian habitat provides valuable vegetative cover for numerous sensitive bird species, including the endangered Yuma

Clapper Rail, the Mountain Plover, Burrowing owl, Short-eared owl, Black-tailed gnatcatcher, Crissal thrasher, Yellow warbler, California gray-headed junco, and Colorado Valley woodrat. Reduction of pollutants to the drains will not alter this important vegetative cover nor will it affect sensitive wildlife in any adverse manner. To the contrary—improved water quality creates a healthier habitat for wildlife and other biological resources.

In 2011, the Natural Resources Agency prepared an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Salton Sea Species Conservation Habitat Project. The Species Conservation Habitat Project is intended to serve as a proof of concept for the restoration of the shallow water habitat that currently supports fish and wildlife dependent on the Salton Sea. This habitat is being threatened and lost due to salinity increases and declining Sea elevation. The Species Conservation Habitat Project's goals are: (1) to develop a range of aquatic habitats that will support fish and wildlife species that depend on the Sea; and (2) develop and refine data needed to successfully manage the Project's habitat through adaptive management. The 2020 Annual Report on the Salton Sea Management Program can be downloaded from:

https://saltonsea.ca.gov/wp-content/uploads/2020/02/2020-Annual-Report_2-21-20-v3.pdf

The proposed project complements the Natural Resources Agency's Project and the Agency's overall efforts to restore the Salton Sea because it requires implementation of management practices to address water quality impairments and improve overall drain water quality—drain water is a vital source of flow for the Salton Sea. Further, it also compliments and is consistent with the New River Improvement Project Strategic Plan (New River Strategic Plan). In May 2012, the California-Mexico Border Relations Council adopted the New River Strategic Plan, which recommends implementation of a series of structural and non-structural measures to address New River water quality impairments. Included in the non-structural recommendations is the development and implementation of Imperial Valley agricultural General Order of Waste Discharge Requirements (Order R7-2021-0050) to address water quality impacts associated with agricultural return flows discharged into the New River. A copy of the New River Strategic Plan can be downloaded from:

https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/Border-CMBRC-2011yr-StrategicPlan.pdf

A factsheet with an update of the New River Strategic Plan implementation can be downloaded from:

https://www.waterboards.ca.gov/coloradoriver//water_issues/programs/new_river/2019/031219_fs_new_river_fnl.pdf

4C. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. The proposed project will not have a substantial adverse effect on federally protected wetlands through direct removal, filling, hydrological interruption, or other means. Control and reduction of pollutant discharges that could impair water quality will benefit water bodies in the project area. Improved water quality creates a healthier habitat for wildlife and other biological resources.

4D. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

No Impact. The proposed project will not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with an established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Control and reduction of pollutant discharges that could impair water quality will benefit water bodies in the project area. Improved water quality creates a healthier habitat for wildlife and other biological resources.

4E. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact. The proposed project does not conflict with any local policies or ordinances protecting biological resources. Control and reduction of pollutant discharges that could impair water quality will benefit water bodies in the project area. Improved water quality creates a healthier habitat for wildlife and other biological resources.

4F. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. The proposed project does not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Control and reduction of pollutant discharges that could impair water quality will benefit water bodies in the project area. Please see discussion responding to Question 4B., above, for further discussion of the Natural Resources Agency Salton Sea Species Conservation Habitat Project.

5. Cultural Resources Discussion

Will the project:

5A. Cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5?

No Impact. The proposed project will not cause a substantial adverse change in the significance of historical resources. The Colorado River Basin Water Board is not aware of these resources in the project area and the CEQA Scoping Meeting it held on February 25, 2023, early in the development of this TMDL, did not disclose the presence of any such resources as well. The Colorado River Basin Water Board received no comments regarding the occurrence of sensitive or unique historical, archaeological, paleontological, or geological resources. Likewise, no information was obtained concerning the occurrence of ancient burial grounds, outside of formal cemeteries.

MPs implementation and compliance monitoring will occur on existing farmland cultivated for at least the last 60 years and existing NPDES facilities. Therefore, it is unlikely that any new historical resources will be identified. Control and reduction of pollutants that impair water quality is beneficial to water bodies in the project area, and will not affect historical resources.

5B. Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5?

No Impact. The proposed project will not cause a substantial adverse change in the significance of archaeological resources. Please see discussion responding to Question 5A., above.

5C. Disturb any human remains, including those interred outside of dedicated cemeteries?

No Impact. The proposed project will not disturb any human remains, including those interred outside of formal cemeteries. Please see discussion responding to Question 5A, above.

6. Energy Resources Discussion

Will the project:

6A. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

No Impact. The proposed project will not result in potentially significant environmental impact due to wasteful consumption of energy resources. MPs implementation and compliance monitoring on farmland and on NPDES facilities will not result in unnecessary consumption of energy. Control and reduction of pollutant discharges that could impair water quality will benefit water bodies in the project area.

6B. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact. The proposed project will not conflict with a state or local plan for renewable energy or energy efficiency. MP implementation and compliance monitoring will occur on existing farmland cultivated for at least the last 60 years. Compliance monitoring will occur on waterbodies and existing NPDES facilities.

7. Geology and Soils Discussion

Will the project:

7A. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving rupture of known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

No Impact. The proposed project will not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic activity. While it is true that the Imperial Valley is one of the most active seismic zones in North America, with numerous historic earthquakes, the MPs in the proposed project are not individually or cumulatively significantly different than current agricultural practices (e.g., preparing land for planting). The project requires farmers/growers to continue using MPs on farmland to control agricultural wastewater discharge quality and control pollutants associated with discharges. Likewise, the compliance monitoring in the proposed project is not individually or cumulatively significantly different than the current compliance monitoring used on farmland and NPDES facilities.

7B. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving strong seismic ground shaking?

No Impact. The proposed project will not cause potential substantial adverse effects involving strong seismic ground shaking. MP implementation and compliance monitoring will occur on existing agricultural farmland cultivated for at least 60 years and at existing NPDES facilities.

7C. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving seismic-related ground failure, including liquefaction?

No Impact. The proposed project will not cause potential substantial adverse effects involving seismic related ground failure, including liquefaction. MP implementation and compliance monitoring will occur on existing agricultural farmland cultivated for at least 60 years and compliance monitoring will occur at NPDES facilities. MPs and monitoring

likely to be implemented do not involve structures that will affect or disturb soils to any significant degree, cause soils to become unstable, or result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

7D. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving landslides?

No Impact. The proposed project will not cause potential substantial adverse effects involving strong seismic ground shaking and landslides. Please see discussion responding to Question 7C., above.

7E. Result in substantial soil erosion or the loss of topsoil?

No Impact. The proposed project will not result in substantial soil erosion or the loss of topsoil. MP implementation will occur on existing farmland and most likely reduce soil erosion or the loss of topsoil. Compliance monitoring will not result in soil erosion or the loss of topsoil.

7F. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

No Impact. The proposed project will not be located on a geologic unit or soil that is unstable as a result of the project. Please see discussion responding to Question 7C., above.

7G. Be located on expansive soil, as defined in Table 18 1 B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

No Impact. The proposed project will not be located on expansive soil creating substantial direct or indirect risks to life or property. MPs implementation and compliance monitoring will occur on existing agricultural farmland cultivated for at least 60 years and at NPDES facilities. MPs and compliance monitoring to be implemented are unlikely to affect soil to any significant degree or create substantial risk to life or property.

7H. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

No Impact. The proposed project does not involve septic tanks or alternative wastewater disposal systems.

7l. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact. The proposed project will not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. MPs implementation and compliance monitoring will occur on existing farmland cultivated for at least the last 60 years and at NPDES facilities.

8. Greenhouse Gas Emissions Discussion

Will the project:

8A. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

No Impact. The proposed project will not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. MPs and compliance monitoring themselves are not sources of emissions. Construction, operation, and maintenance of some MPs (e.g., land leveling, sprinkler irrigation, drip irrigation, etc.) may involve the temporary use (one-time or once-per-year) of construction equipment (e.g., tractors, backhoes) that generate mobile point source emissions. However, the equipment used for construction and O&M meets emission standards. Therefore, construction equipment emissions are not expected to violate or contribute substantially to greenhouse gas emissions.

8B. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

No Impact. The proposed project does not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emission of greenhouse gases.

9. Hazards and Hazardous Materials Discussion

Will the project:

9A. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

No Impact. The proposed project will not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. The proposed project may indirectly impact the application of pesticides on farmland. Pesticides can be considered as hazardous materials, but the application of pesticides is controlled by the California Department of Pesticide Regulation (CDPR) and the Imperial County Agricultural Commissioner (ICAC) to prevent and mitigate hazards to the public or the environment. Pesticides should only be applied after consulting with a licensed Agricultural Pest Control Advisor, and only then by a certificated Qualified

Applicator. In addition, the MPs are not individually or cumulatively significantly different than current agricultural pesticide practices. The project requires farmers/growers to continue using MPs on farmland to control agricultural wastewater discharge quality and control pollutants associated with discharges. It also requires NPDES facilities to implement compliance monitoring and to control pollutants associated with discharges.

9B. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

No Impact. The proposed project will not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Please see discussion responding to Question 9A., above.

9C. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. The proposed project will not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. MPs implementation and compliance monitoring will occur on existing agricultural farmland cultivated for at least 60 years and at NPDES facilities. Please see discussion responding to Question 9A., above.

9D. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. The proposed project will not be located on sites included on a list of hazardous materials sites that would result in creation of a significant hazard to the public or the environment. MP implementation and compliance monitoring will occur on existing agricultural fields and NPDES facilities.

9E. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. Small portions of the proposed project are located within two miles of public airports, but the proposed project will not result in a safety hazard for people residing or working in the project area. According to the Airport Land Use Compatibility plan, Imperial County Airports (Imperial County, 1996), the principal means of reducing risk to people on the ground is to restrict land uses so as to limit the gathering of people in areas most susceptible to aircraft accidents, which means that agricultural land use, which does not tend to result in a gathering of people, can be carried out with minimal exposure to safety hazards. Construction and/or installation of some MPs in an airport

land use area may involve the temporary use of farming and construction equipment (e.g., tractors, backhoe, and caterpillars) that may temporarily increase the hazard potential. However, such activities will occur on farmland not typically surrounded by people, and once installed, the MPs themselves are not areas where people would tend to gather. The NPDES facilities are not within two miles of a public airport or public use airport. MP implementation and compliance monitoring will occur on existing agricultural farmland cultivated for at least 60 years and at NPDES facilities.

9F. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact. The proposed project will not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. MP implementation and compliance monitoring will occur on existing agricultural fields and NPDES facilities, which generally are not corridors for emergency response or evacuation.

9G. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

No Impact. The proposed project will not expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands. MP implementation and compliance monitoring will occur on existing farmland and at NPDES facilities. MPs to be implemented are unlikely to increase the risk of loss, injury or death involving wildland fires.

10. Hydrology and Water Quality Discussion

Will the project:

10A. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

No Impact. The proposed TMDL requires implementation of actions to reduce pollutant discharges to Imperial Valley waterways and groundwaters and to discharge in compliance with Basin Plan water quality standards (WQS). Implementation of MPs will improve the water quality of receiving surface waters and groundwaters by reducing pollutant loading to receiving waters, and preventing pollutants from reaching receiving waters. The proposed TMDL also includes a comprehensive monitoring program for receiving waters to ensure compliance with WQS, and overall improvements in water quality.

10B. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

No Impact. The proposed project does not involve the extraction or recharge of groundwater supplies and will not impede sustainable groundwater management of the basin. The Imperial Valley is part of the Imperial Hydrologic Unit. In general, first-encountered groundwater in the Imperial Valley is not used for domestic purposes because it typically consists of storm water and irrigation water that percolates and passes the root zone of farmland. Tile drains have been installed by IID to convey shallow groundwater away from the root zone of crops. Most of the shallow groundwater, leaching water, or excess irrigation water flows into the New and Alamo Rivers. Groundwater levels have remained relatively stable within the majority of the basin between 1970 and 1990 because of a constant rate of discharge from canals and subsurface agricultural drains (DWR, 2003).

10C. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in a substantial erosion or siltation on or off site?

No Impact. The proposed project does not require alteration of the existing drainage pattern of the site or area, and would not result in substantial erosion or siltation on or off site. Rather, the proposed project expects to reduce sediment/silt discharge to surface waters by implementing MPs that minimize erosion and sediment deposition.

10D. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off site?

No Impact. The proposed project does require alteration of the existing drainage pattern of the site or area, and would not result in a substantial increase in the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. Alteration of drainage patterns (e.g., re-routing surface waters, increasing paved areas, increasing agricultural runoff) is not a foreseeable method of compliance with this TMDL. Please see discussion responding to Question 10C., above.

10E. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

No Impact. The proposed project will not substantially alter the existing drainage pattern of the area nor create or contribute runoff water. Rather, the proposed project should improve the quality of runoff from agricultural fields, thereby reducing substantial additional sources of pollution. Please see discussion responding to Question 10D., above.

10F. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?

Impact. The proposed project will not substantially alter the existing drainage pattern of the area nor impede or redirect flood flows. Please see discussion responding to Question 10D, above.

10G. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Impact. The proposed project will not expose people or structures to a significant risk release of pollutants due to project inundation by seiche, tsunami, or flood hazard.

10H. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Impact. The proposed project will not obstruct implementation of a water quality control plan or sustainable groundwater management plan. Rather, the proposed project requires implementation of actions to reduce pollutant discharges to Imperial Valley waterways and groundwaters and comply with Basin Plan water quality standards (WQS).

11. Land Use and Planning Discussion

Will the project:

11A. Physically divide an established community?

No Impact. The proposed project will not physically divide an established community. MP and compliance monitoring will occur on existing fields and NPDES facilities and will not result in any land use or planning impacts.

11B. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact. The proposed project will not conflict with any applicable land use plan, policy, or regulation adopted by an agency with jurisdiction over the project for the purpose of avoiding or mitigating an environmental effect. MP implementation and compliance monitoring will occur on existing fields and drains and will not impact land use or planning.

12. Mineral Resources Discussion

Will the project:

12A. Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?

No Impact. The proposed project will not result in the loss of availability of a known mineral resource of value to the region and the residents of the state. MP and compliance monitoring will occur on existing farmland and NPDES facilities.

12B. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. The proposed project will not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. MP and compliance monitoring will occur on existing farmland and NPDES facilities.

13. Noise Discussion

Will the project:

13A. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

No Impact. The proposed project will not result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan ordinance, or applicable standards of other agencies. Construction and/or installation of some MPs may involve the temporary use of farming and construction equipment (e.g., tractors, backhoe, caterpillars) that may emit noise at levels greater than 60 decibels. However, such activities will occur on farmland not typically surrounded by people.

13B. Generate excessive groundborne vibration or groundborne noise levels?

No Impact. The proposed project will not expose persons to or generate excessive groundborne vibration or groundborne noise levels. Construction and/or installation of some MPs may involve the temporary use of farming and construction equipment (e.g., tractors, backhoe, caterpillars) that may emit groundborne vibration or noise. However, such activities will occur on farmland not typically surrounded by people. Once installed, the MPs themselves are not sources of significant groundborne vibration or noise.

13C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. Small portions of the proposed project are located within two miles of public airports, but the proposed project will not expose people residing or working in the project area to excessive noise levels. According to the Airport Land Use Compatibility plan, Imperial County Airports (Imperial County, 1996), noise exposure in the vicinity of the airports for agricultural cropland will clearly be acceptable, which means that agricultural land use can be carried out with essentially no interference from the noise exposure. Construction and/or installation of some MPs may involve the temporary use of farming and construction equipment (e.g., tractors, backhoe, and caterpillars) that may increase ambient noise levels in the area. However, such activities will occur on farmland not typically surrounded by people, and once installed, the MPs themselves are not the sources of excessive noise.

14. Population and Housing Discussion

Will the project:

14A. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The proposed project will not induce substantial unplanned population growth in an area. MPs and compliance monitoring will not result in new homes and businesses nor extend other infrastructures that will induce population growth.

14B. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The proposed project will not displace substantial numbers of people or housing, necessitating the construction of replacement housing elsewhere. MPs and compliance monitoring will not displace people.

15. Public Services Discussion

Will the project create impacts to:

15A. Fire protection?

No Impact. The proposed project will not result in adverse impacts on fire protection. MP implementation and compliance monitoring will occur on existing agricultural farmland under cultivation for at least 60 years and at NPDES permitted facilities. MPs and monitoring to be implemented are unlikely to affect fire protection, police protection, schools, parks and other public facilities.

15B. Police protection?

No Impact. The proposed project will not result in adverse impacts on police protection and associated activities related to acceptable service ratios, response times, or other performance objectives for this public service. Please see discussion responding to Question 15A., above.

15C. Schools?

No Impact. The proposed project will not result in adverse impacts on schools and associated activities. Please see discussion responding to Question 15A., above.

15D. Parks?

No Impact. The proposed project will not result in adverse impacts on parks and associated activities related to other performance objectives for this public service. Please see discussion responding to Question 15A., above.

15E. Other public facilities?

No Impact. The proposed project will not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for public services. Please see discussion responding to Question 15A, above.

16. Recreation Discussion

Will the project:

16A. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. The proposed project will not increase the use of existing neighborhood and regional parks or other recreational facilities. MPs and monitoring to be implemented will not increase park or recreational facility use.

16B. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. The proposed project will not include recreational facilities or require the construction or expansion of recreational facilities. MPs and monitoring to be implemented will not include or require recreational facility use.

17. Transportation Discussion

Will the project:

17A. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

No Impact. The proposed project does not conflict with adopted policies, plans, or programs addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. MP and compliance monitoring implementation do not involve or affect alternative transportation. The proposed project will not exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways. Construction and/or installation of some MPs and compliance monitoring may require use of vehicle and farming or construction equipment (e.g., tractors, backhoe, caterpillars). However, transportation and movement of farming equipment is common on the roads and highways serving the area where MPs are to be implemented. Potential traffic congestion may occur temporarily in isolated areas, but is not expected to exceed a level of service standard for designated roads or highways.

17B. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

No Impact. The proposed project will not have impact on vehicle miles traveled nor cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections). Construction and/or installation of some MPs may require use of farming equipment (e.g., tractors, backhoe, caterpillars). However, transportation and movement of farming

equipment is common on roads and highways serving the area where MPs are to be implemented. Traffic congestion may occur temporarily in isolated areas, but is not expected to increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections.

17C. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The proposed project will not substantially increase hazards due to design features or incompatible uses. Construction and/or installation of some MPs and compliance monitoring may require use of vehicle, farming and construction equipment (e.g., tractors, backhoe, caterpillars). However, transportation and movement of farming and construction equipment is common on the roads and highways serving the area where MPs are to be implemented, and do not create an incompatible use hazard.

17D. Result in inadequate emergency access?

No Impact. The proposed project will not result in inadequate emergency access. Construction and/or installation of some MPs and compliance monitoring may require use of vehicle, farming and construction equipment (e.g., tractors, backhoe, caterpillars). However, transportation and movement of farming and construction equipment is common on the roads and highways serving the area where MPs are to be implemented, and should not create inadequate emergency access.

18. Tribal Cultural Resources Discussion

Will the project:

18A. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

No Impact. MP implementation and compliance monitoring will occur on existing agricultural drains, on farmland under cultivation for at least 60 years and at NPDES permitted facilities. These activities are not expected to affect or change any Tribal cultural resources. Further, implementation of the TMDL is not expected to affect sites listed on the state or federal register of historic places.

18B. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

No Impact. Please see the response at 18A. In addition, in the event that the ground disturbances uncover previously undiscovered or documented resources, California law protects Native American burials, skeletal remains, and associated grave goods regardless of the antiquity and provides for the sensitive treatment and disposition of those remains. (Health & Safety Code, section 7050.5; Public Resource Code, section 5097.9 et seq).

19. Utilities and Service Systems Discussion

Will the project:

19A. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No Impact. The proposed project will not require or result in construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities or expansion of existing facilities. MPs and compliance monitoring will not require construction of new or expanded water or wastewater treatment. Implementation may involve new monitoring in wastewater treatment plants and storm water drainages.

19B. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

No Impact. The proposed project will not require new water supplies to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years. MPs implementation and monitoring does not involve new water supplies.

19C. Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. MP implementation and compliance monitoring will not increase demand on the wastewater treatment providers. The proposed project will not result in a determination regarding its capacity by the wastewater treatment provider.

19D. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

No Impact. The proposed project does not involve landfills, and will not generate additional solid waste to be accommodated by a landfill.

19E. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact. The proposed project complies with federal, state, and local statutes and regulations related to solid waste. MP implementation and compliance monitoring does not involve solid waste.

20. Wildfire Discussion

Will the project:

20A. Substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact. The proposed project does not impair an adopted emergency responses or evacuation plans. MPs implementation and compliance monitoring will occur on existing farmland, existing NPDES facilities and waterbodies, which generally are not corridors for emergency response or evacuation.

20B. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact. The proposed project does not exacerbate wildfire risks and expose project occupants to pollutant concentrations from a wildfire. MPs implementation and compliance monitoring will occur on existing farmland, at NPDES facilities and surface waterbodies, which does not exacerbate wildfire risks.

20C. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. The proposed project does not involve installation or maintenance of infrastructure that may exacerbate fire risk. MP implementation and compliance monitoring will occur on existing farmland and NPDES permitted facilities. MPs to be implemented are unlikely to increase the risk of loss, injury or death involving wildland fires

20D. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact. The proposed project does not expose people or structures to significant risks from post-fire impacts. MPs and compliance monitoring will occur on existing fields, NPDES facilities and waterbodies that are generally in a plane area with a low gradient, which generally are not corridors for emergency response or evacuation.

21. Mandatory Findings of Significance Discussion

Will the project:

21A. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

No Impact. The proposed project will not degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory. Rather, the proposed project is expected to improve the environment by regulating the discharges of waste and thereby improve water quality in the area such that it meets the Water Quality Standards.

21B. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)?

No Impact. The proposed project will not have impacts that are individually limited or cumulatively considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

There are several existing and proposed projects involving water quality of the Alamo River and New River: TMDLs for Sediment in the Alamo River, Imperial Valley Drains and the New River; TMDLs for Organophosphorus and Organochlorine Compounds in Imperial Valley Waters (including Alamo and New Rivers); Imperial Valley Agricultural General Order of Waste Discharge Requirements; Wetlands Demonstration Projects;

Colorado River Quantification Settlement Agreement (QSA); and California Natural Resources Agency's Salton Sea Management Program (SSMP).

These projects have been providing benefits to the water quality of the affected waterbodies and to the biological resources and environment by reducing the amount of pollutants inflow into the waterbodies. For example, the QSA projects provided for mitigation of the adverse water quality impacts that the QSA projects might create, and further enhances water quality by creating the Species Conservation Habitat (SCH) Project to restore the Salton Sea. In connection with the SCH Project, this project compliments the SCH Project and overall efforts to restore the Salton Sea because this project requires implementation of management practices to address water quality impairments and improve overall drain water quality.

In addition, implementation of existing laws/regulations/treaties, better coordination with third party cooperating agencies/organizations, and monitoring of water quality are activities that are not cumulatively considerable. Rather, the proposed project is expected to reduce negative cumulative effects, if any, through better agency coordination, and to protect beneficial uses of the Alamo and New Rivers by reducing the amount of pollutants in agricultural discharges

21C. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

No Impact. The proposed project does not have environmental effects which will cause substantial adverse effects on human beings either directly or indirectly. Implementation of existing laws/regulations/treaties, better coordination with third party cooperating agencies/organizations, and monitoring are activities that do not adversely affect human beings. Rather, the proposed project is expected to reduce water quality related problems (e.g., unsafe fish consumption) that may adversely affect human beings.

Preface

The Colorado River Basin Water Board staff will propose the adoption of the Basin Plan amendment to the Water Quality Control Plan (Basin Plan) to establish the Total Maximum Daily Loads (TMDLs) for the Alamo River and New River in the Imperial Valley. These water bodies are not meeting their water quality objectives (WQOs) due to the pollution caused by six pyrethroid pesticides, namely bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin.

Pursuant to Health and Safety Code section 57004, all California Environmental Protection Agency (CalEPA) organizations are required to submit the scientific basis and scientific portion of all proposed policies, plans and regulations for external scientific review. The peer reviewer's responsibility is to determine whether the scientific findings, conclusions, and assumptions are based upon sound scientific knowledge, methods, and practices.

The University of California, Berkeley (UCB) facilitated the peer reviewer selection. Two individuals were selected to review this document for scientific adequacy:

1. **Ofer Dahan, Ph.D.**
   Associate Professor, Dept. of Environmental Hydrology & Microbiology
   Ben-Gurion University of the Negev, Beersheba, Israel

2. **Patrick W Moran**
   Biologist (Ecotoxicologist), United States Geological Survey
   Washington Water Science Center, Tacoma, WA, United States

These researchers collectively have substantial research expertise in pesticide pollution, environmental chemistry, toxicology, hydrology, irrigated agriculture in arid regions, fate and transport of pyrethroid compounds, and Total Maximum Daily Loads (TMDLs).

Health and Safety Code section 57004 further provides that if the peer reviewers find that an agency failed to demonstrate that the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices, the reviewer's report shall state that finding, and the reasons explaining the finding.

The staff of California Regional Water Quality Control Board, Colorado River Basin (Colorado River Basin Water Board) requested the reviewers to comment on whether the scientific portions of the TMDL Staff Report are based upon sound scientific knowledge, methods, and practices. Specifically, the reviewers were asked to comment on five specific areas:

(1) **Selection of Numeric Targets for Pyrethroid Pesticides** – Whether the proposed water column and sediment numeric targets are reasonable and adequately protective.

(2) **Data Analysis to Determine Pyrethroid Concentrations in Water Samples** – Whether the interpretation of the monitoring data for the water column and sediment is based on sound science.

(3) **Sources Analysis** – Whether the sources of impairment and their allocations are correct.

(4) **Loading Capacity, TMDLs, and Allocations** – Whether the proposed TMDLs, loading capacity and load/wasteload allocations reasonable and adequately protective.

(5) **Implementation** – Whether the implementation methods are scientifically sound and adequately justified.

In addition to the findings, assumptions and conclusions, each reviewer was also requested to identify and address additional subjects that should be considered as part of the scientific basis of the TMDL project and to comment whether the entirety of the proposed TMDL project is based on sound scientific knowledge, methods, and practices. Other assumptions, knowledge, methods, and practices that are in addition to the agreed upon review are included within the reviewer's comments.

Colorado River Basin Water Board staff appreciates the thorough reviews provided by the external scientific peer reviewers. Staff have taken their comments and expertise into consideration to improve the technical information in the TMDL Staff Report.

ATTACHMENT C: STAFF RESPONSE TO PEER REVIEW COMMENTS

1. **Comments by Ofer Dahan, Ph.D.**

Main Comment: The criterions setting the TMDLs were based on protocols and monitoring concepts that were previously established for the Sacramento and San Juaquin Rivers. Accordingly, the numeric values and methodology are considered valid and non-questionable in this review. Yet, in my view the report has one significant drawback. The TMDLs, which aims at characterizing the maximum pollutants load, is based entirely on measured concentration of the target pollutant in the river water and sediment at fixed monitoring stations along the river. Although the monitoring points are well distributed along the rivers, from the border of Mexico to Salton Sea, it provides information on the final unavoidable outcome of pesticide application in the agricultural fields surrounding the rivers. Accordingly, the measured concentration in the river water and sediment, which are the basis for the TMDLs, could not provide amendments means for reducing the pollutants loads. It can only provide a late alert for pollution processes that started in the agricultural fields, away from the rivers, long before it is loaded to the river by discharge of agricultural wastewater and subsurface return flow. Although the TMDLs, as presented here, is a well structure monitoring program, it is incapable of providing amendment since it is detached from the pesticide applications practices in the agriculture fields. It is obvious that proper management of pesticide application in the agricultural fields is the key for controlling pesticide load to the rivers. Therefore, amendment programs that aim at reduction of pesticides load to the rivers should also refer to pesticide application protocols. These may include: pesticides application quantities and methods, timing with respect to irrigation and growing phase, weather, soil condition, cultivation stages, etc. These conditions control the total output of pesticides from the fields to the river. Apparently, this report does not refer to any of the governing conditions that control the total pesticide load to the rivers. It only provides a good monitoring program for the final outcome which is the river state. Therefore, the term Maximum Load is somewhat miss leading since the maximum load is controlled by the pesticide application practices and not by the measured concentration in the river.

Staff Response: Colorado River Basin Water Board staff appreciate your comment regarding the management programs and pesticide application protocols that aim at the reduction of pesticides load to the rivers.

TMDLs are developed based on the measured concentrations of pollutants in water and sediment samples. Board staff do not plan to emphasize the pesticide application protocols or management practices in the irrigated agriculture in Imperial Valley in the staff report, as these concerns are beyond the scope of the TMDL. For specific components and requirements of a TMDL, refer to the Clean Water Act (CWA) Section 303(d) and 40 Code of Federal Regulation (CFR) Section 130.2 et seq. TMDLs primarily

focus on setting numeric targets in the form of water quality objectives for pollutants exceeding allowable concentrations in samples. As the TMDL is implemented, discharge facilities must measure pollutant loads in their discharge and the additional data collected will likely offer more insights into contaminant concentrations and potential source areas, prompting adjustments to management practices and pesticide application protocols.

The responsibility of the Water Boards is to specify the maximum allowable values for pollutant loads, while there are other entities, such as the Department of Pesticide Regulation, that layout best management practices for controlling pesticide pollution. Furthermore, The Regional Board's General Orders, namely the Imperial Valley Irrigated Lands General Order (General Order), establishes an iterative process of management practice improvement and mandates the implementation of management practices until discharges (e.g., agricultural runoff) are no longer causing or contributing to exceedances of WQOs. Under the General Order, management practices are identified and evaluated via the Water Quality Management Plan (Farm Plan). The General Order also requires dischargers to implement practices preventing or controlling waste discharges that contribute to water quality objective exceedances. Thus, Water Quality Restoration Plans are triggered by exceedances and require a Water Boards approved improvement plan to minimize or prevent the discharge of waste to waters of the state through irrigation water runoff and infiltration, non-stormwater runoff, and stormwater runoff. Other ongoing efforts by the Imperial Irrigation District (IID) and sediment reduction programs by the Imperial County Farm Bureau (ICFB) have led to the use of management practices in the Imperial Valley. These practices optimize the uptake of irrigation water, along with nutrients and pesticides applied to crops. Detailed information on the proper use of pyrethroid pesticides can be found in the Department of Pesticide Regulation.

To address the reviewer's comment in the staff report, we have added the following information in Section 6: Implementation and Timeline, sub-section 6.1: Irrigated Agricultural Lands of the staff report, and the paragraphs now reads as:

> The Irrigated Lands General Order also imposes a general obligation for dischargers to implement management practices to prevent or control discharges of waste that cause or contribute to exceedances of WQOs. (§ D.1.a.) The Irrigated Lands General Order thus establishes general Waste Discharge Requirements (WDRs) for agricultural dischargers (e.g., agricultural runoff), including an iterative process of management practice improvement until discharges are no longer causing or contributing to exceedances of WQOs. In the event that monitoring, evaluations or inspections demonstrate that the initially implemented management practices are ineffective or otherwise inadequate, "improved" practices must

be implemented. (*Id.*) Thus, Water Quality Restoration Plans (WQRP) are triggered by exceedances and require a Water Boards approved improvement plan to minimize or prevent the discharge of waste to waters of the state through irrigation water runoff and infiltration, non-stormwater runoff, and stormwater runoff.

The Irrigated Lands General Order also contains monitoring and reporting provisions, to provide a feedback mechanism for the assessment of progress toward attaining the WQOs. The Imperial Irrigation District (IID) – Imperial County Farm Bureau (ICFB) Coalition Group is currently collecting water samples from the New and Alamo River twice annually and analyzing the samples for various pesticides. The Coalition is also collecting fish samples annually and analyzing the samples under the current General Order. This monitoring is expected to continue under the Irrigated Lands General Order. The monitoring data is anticipated to yield insights into contaminant concentrations, prompting adjustments to management practices and pesticide application protocols. As discussed earlier, the Colorado River Basin Water Board may require Coalition Groups to prepare a WQRP if (a) there is a water quality exceedance or (b) a trend of degradation of water quality is identified that threatens a beneficial use in receiving waters affected by its members' activities on Irrigated Agricultural Lands. An "exceedance" occurs when: (a) a sampling result for a constituent at a single surface water monitoring location exceeds a water quality objective or benchmark limit specified in the MRP, more than three out of four times for the same constituent, or (b) a single groundwater sampling result exceeds a water quality objective.

A WQRP is extensive and contains information for (i) each constituent that indicates an exceedance or a trend of water quality degradation along with data graph and trend analysis, (ii) description of the actual or suspected waste sources that may be causing or contributing to the exceedance or trend of water quality degradation, (iii) identification of the management practices currently being implemented and additional or improved management practices that will be implemented by designated members to prevent or minimize the discharge of any waste, (iv) a schedule for the implementation and completion of all tasks described in the WQRP, and (v) a monitoring and reporting plan to provide feedback on WQRP progress and its effectiveness in achieving compliance with the applicable receiving water limitations of these General WDRs. The WQRP must be approved by the Colorado River Basin Water Board's Executive Offer prior to implementation. Furthermore, the Department of Pesticide Regulation (DPR) has a legal mandate to encourage the use of environmentally sound

pest management, including integrated pest management (IPM). Many DPR programs stress a less toxic approach to pest management and promote risk reduction through information, encouragement, incentives, and community-based problem solving.

1.1. Selection of Numeric Targets for Pyrethroid Pesticides

Comments: The Numeric targets for achieving the WQOs were adopted from previous reports that were established for the Sacramento and San Juaquin rivers. These were considered valid and therefore accepted and not questioned in this review. Yet, the review request (in attachment 2) states that "… numeric targets as the values that must be achieved….” I believe that this goal is not achievable solely on the basis of the TMDLs. See the Main Comment above.

Staff Response: Colorado River Basin Water Board staff has addressed this in the above Staff Response to the Reviewer’s Main Comment.

1.2. Data Analysis to Determine Pyrethroid Concentrations in Water Samples

Comments: Data analysis is based on a very well-structured monitoring program. It includes a set of monitoring stations for the river water and sediment, a good calculation method for the cumulative toxicity, and a method to calculate the additive impact of the organic matter, for both acute and chronic conditions. I have no comments for this part.

Staff Response: Colorado River Basin Water Board staff appreciate your comments validating the data analysis and monitoring program.

1.3. Source Analysis

Comments: The source analysis seems very comprehensive. I am not aware of other sources that could add important information to the analysis made here. Yet, as mentioned in my main comment I believe that if the objective aims at amendments of the river water quality, further attention should be given to the pesticide application practices in the fields, rather than focusing only on monitoring of the rivers, since the river only reflects the load from the fields.

Staff Response: Colorado River Basin Water Board staff does not disagree with the comment. An established TMDL prompts increased monitoring efforts, subsequently

fostering the formulation of practical applications and management strategies in agricultural settings. It's important to note that specifying management protocols is not inherently mandatory for a TMDL. A detailed explanation is provided in Staff Response to the Reviewer's Main Comment.

1.4. Loading Capacity, TMDLs, and Allocations

Comments: Along with my main comment above I believe that the program describes the actual load but does not provide means that can bring amendments or reduction in load to meet the WQOs. Therefore, the term Maximum load that should be met, as a regulatory action, is miss leading and not achievable without additional regulated / recommended / enforced protocols of pesticide application practices. Nevertheless, as for the monitoring program and data analysis, I see that the methods for calculation of both the water quality and the margins of safety reasonable.

Staff Response: Colorado River Basin Water Board staff appreciate your comments regarding our efforts in developing the water quality objectives. As mentioned in the Staff Response to the Reviewer's Main Comment, enforced protocols or management practices are beyond the scope of this TMDL. Please note that the implementation of the TMDL is an iterative process. As additional data and insights are gained regarding the sources of contaminants, how and if we can control them, and the preferred flow paths, we will work with the stakeholders to modify behavior and control the transport of the contaminants. This TMDL is one of many which are either in effect or in development to address these and similar contaminant concentrations in the water bodies. We anticipate that the implementation of this TMDL along with the others and the best management practices will have positive effects on the water quality associated with the targeted contaminants. In summary, as the TMDL is being implemented, monitoring data is anticipated to yield insights into contaminant concentrations, prompting formulation or adjustments to management practices and pesticide application protocols.

1.5. Implementation

Comments: Implementation of the program seems reasonable. I have no comments on that part.

Staff Response: Colorado River Basin Water Board staff thank you for validating the proposed implementation of this TMDL.

2. Comments by Patrick W Moran

Minor Comments: Page 6. Pollutants Addressed. The 1st paragraph states “Pyrethrins are a naturally occurring insecticide And the 2nd and 3rd paragraph talk about synthetic pyrethrins known as “pyrethroids”, who have been manufactured or designed to have greater toxicity than pyrethrins. However, 5 of the 6 insecticides listed in Table 1-2 and being considered in this document are the synthetic pyrethroids with much greater toxicity than the single “naturally occurring insecticide” (ie pyrethrin). Please revise the statement to say, “4 of the 5 pesticides being reviewed in this document are the synthetic pyrethroids, and pyrethrin is derived from the chrysanthemum plant and refined for commercial purposes. Given that 4 of the 5 are pyrethroids, it seems that paragraph should come first, the pyrethrin paragraph should follow.

Staff Response: All six pollutants that form the basis of this TMDL are pyrethroids. The definition of pyrethrin is included to provide context that pyrethroids are synthetic insecticides that are designed based on the structure of naturally occurring pyrethrin insecticides.

To address the reviewer’s comment, we have modified the following information section 1.3: Pollutants Addressed of the staff report to avoid any potential confusions, and the paragraph now reads as:

> Pyrethroid pesticides constitute a class of synthetic pesticides that are designed based on the structure of the naturally occurring botanical insecticide, pyrethrin. Pyrethrins are natural insecticides which are sourced from chrysanthemum flowers and composed of a mixture of natural chemicals. Widely employed in agriculture, home and garden pest control, veterinary care, and mosquito control, pyrethrins exhibit rapid degradation when exposed to sunlight (ATSDR, 2003). To enhance their stability against light exposure, the chemical structure of pyrethrins was modified to reduce photosensitivity, resulting in the development of pyrethroids. This alteration has increased the persistence of pyrethroids in the environment, rendering them a cost-effective alternative to pyrethrins.

Minor Comments (Continued): Table 1.3 in the Draft TMDL Report is helpful, but more citation and documentation of where those number came from is needed. In particular, where did the “non-Ag Use” come from? Please provide a citation for the values appearing in Figure 1-2.

Staff Response: Citation for the information source for Table 1-3 and Figure 1-2 has been added within the table and figure captions in the staff report. Please see the citation that was used:

"California Department of Pesticide Regulation (CDPR), 2020. Summary of Pesticide Use Report Data 2018. June 2020."

Minor Comments (Continued): Section 3.3 2nd Paragraph states "In sediment samples collected from the New and Alamo Rivers, the combination of pyrethroids did not have a significant additive effect (Table 3-9 and Table 3-10). By calculating additive toxicity, a level of protection from the potentially harmful effects of pyrethroid combinations can be established." This sentence is awkward and unclear. A) what is meant by "combination of pyrethroids", if it means sum of detected pyrethroids, please say that, B) "did not have a significant additive effect". Was a biological response, i.e. and "effect" measured? It is inferred by this statement. And "significant" implies that a statistical test of significance was conducted. Was this the case? If not, please considering using a different adjective than "significant", perhaps "substantial". Please revise and clarify.

Staff Response: The reviewer's comments are addressed in a similar manner as they were mentioned:

A) The term "combination of pyrethroids" denotes the sum of detected pyrethroids, representing the combined presence of pyrethroids exhibiting an additive toxicity effect.

B) In the context of sediment samples, the statement "did not have a significant additive effect" indicates that the calculated values for additive toxicity in various sediment samples were below the threshold value defined in equations 1 and 2. Importantly, no statistical test of significance was conducted to assess the biological impact of pyrethroid toxicity. Consequently, the term "significant" is replaced with "notable" to prevent any potential confusion.

Colorado River Basin Water Board staff has amended the confusing language, and the paragraph in Section 3.3 now reads as:

> In water samples taken from the New and Alamo Rivers, the concentration of pyrethroid pesticides at a specific location on a given sampling date (refer to Table 3-7 and Table 3-8) surpasses the toxic unit thresholds outlined in Equation 1 and Equation 2. However, in sediment samples gathered from the same rivers, the combined presence of pyrethroids does not exhibit a notable additive impact (see Table 3-9 and Table 3-10). Thus, the computation of additive toxicity for water and sediment samples assists in establishing a safeguard against the potential adverse effects of pyrethroid combinations.

2.1. Selection of Numeric Targets for Pyrethroid Pesticides

1. Are the proposed water column and sediment numeric targets in the draft staff report reasonable and adequately protective (based on the assumptions, findings, and conclusions of this TMDL)? If not, what additional existing science would the peer reviewer direct Colorado River Basin Regional Board staff to or what changes would the peer reviewer recommends.

Comments: Yes, the proposed water column and sediment numeric targets accurately reflect both the state of the science and an appropriate approach for deriving numerical criteria. The UC Davis method, not specifically a topic of this review, seeks to utilize as much of the data as possible in utilizing a species mean acute value approach and a more modern species sensitivity distribution calculation method. The only other consideration, which would take time and money, would be to generate species specific toxicity test data, to augment but not replace, with unique species known to be present in the Alamo and New Rivers. One might be tempted to limit a criteria derivation to just those species present in the Imperial Valley rivers, but that is not advised at this time as it would greatly limit a dataset with known data limitations. However, a large, likely-multi-year effort could be undertaken to generate species toxicity data with species specifically from the two rivers of concern.

Furthermore, the background documents presenting the “UC Davis Method” for deriving water quality criteria, in an analogous way to EPA’s criteria derivation guide from 1985, (i.e., Fojut 2012) and the six other documents addressing each of the pyrethroids here (i.e., the six Fojut 2015 documents) are thorough, accurate, thoughtful, and impressive. For example, there is an unusual phenomenon where pyrethroids have been shown to be more toxic to invertebrates at lower temperatures that was noted in the reviews but not factored in, and appropriately so, in the Fojut 2015 documents. This phenomena and thus consideration is not applied, and appropriately so, for the typically warm waters of the Imperial Valley.

Staff Response: Colorado River Basin Water Board staff appreciate your comments validating the proposed water column and sediment numeric targets. Staff concurs with the reviewer's observation that establishing numeric targets based on the unique species found in the Alamo and New Rivers is currently impractical due to various limitations. While it would be ideal to incorporate more data from species unique to these water bodies, the toxicity data for standard toxicity species utilized in this staff report remains robust for deriving the numeric targets. This is because the considered species exhibit behavior consistent with expectations in the presence of pyrethroid pollution in these water bodies. Additionally, the Colorado River Basin Water Board staff aligns with the reviewer's perspective that considering toxicity to invertebrates at lower

temperatures is not relevant for this staff report, given the warm nature of the waters in the Alamo and New Rivers.

2. Does the proposed additive toxicity present a technically valid interpretation of narrative water quality objectives?

Comments: Yes, the approach presented based on the assumption of additive toxicity is a technically valid and appropriate approach to address mixture toxicity. There is insufficient data currently available to support a more sophisticated assessment of the mixture toxicity from the group of pyrethroids being considered in this TMDL. Given this lack of true mixture exposure dose-response testing, the assumption of additivity used here is technically valid, is supported in general by several case studies, several cited by the Fojut criteria documents, and the most appropriate approach in this situation.

Staff Response: Colorado River Basin Water Board staff thanks you for your comments affirming that the strategy based on the additive toxicity is a suitable approach.

2.2. Data Analysis to Determine Pyrethroid Concentrations in Water Samples

1. Are the proposed additive toxicity numeric targets determined in Section 3.3 based on technically valid numeric interpretation of the scientific information on narrative water quality objectives presented in Chapter 2 of the technical staff report?

Comments: Yes, as discussed above, the targets are supported by the science and toxicity datasets available. The additive toxicity estimates in Tables 3-7 and 3-8 were not independently calculated by this reviewer, but they appear to be accurate and demonstrate large exceedances of the mixture target, and frankly are worrisome. However, given that the monitoring data consistently if not always is exceeding the single chemical criteria (i.e. Figure 3-2), these targets appear to be very difficult to obtain in the short term. Considerations of time and feasibility and practicality may be needed during implementation of these targets. Three years seems like a reasonable, albeit perhaps ambitious, timeline. See further discussion in #2.

Staff Response: The monitoring data for the six pyrethroid pesticides highlighted in this staff report indicates a declining trend over the years. Considering this downward trajectory, the Colorado River Basin Water Board staff is optimistic about achieving the specified numeric targets within the designated timeframe. Contributing to the decline in pyrethroid concentrations can be attributed, in part, to the widespread adoption of neonicotinoids as alternatives in irrigated agriculture. This shift to neonicotinoids is implemented to prevent the development of resistance in pests that are typically

targeted by pyrethroids. Consequently, there has been a noticeable reduction in the use of pyrethroid insecticides in recent years.

While expressing confidence in meeting the targets within the set timeline, staff acknowledges the possibility of adjustments being necessary. In the event that the targets are not achieved as planned, revisions to the TMDL staff report can be made through a basin plan amendment. This flexibility allows for timely adjustments to the timelines and plans based on the urgency and evolving needs of the situation in the future.

2. Is the interpretation of the collected sampling data for the water column and sediment based on sound science? If not, what additional existing science would the peer reviewer direct Colorado River Basin Regional Board staff to or what changes would the peer reviewer recommend?

Comments: The answer to this question is both yes and no. Yes, the interpretation is mostly accurate given the type of monitoring data at hand, which appears from the SWAMP datasets and based on whole water data. However, given the large Kow of these pyrethroids, one would expect- as has been demonstrated (see Liu et al. Envir Tox & Chem 2004, Yang et al. Envir Tox & Chem 2006) that the dissolved phase would have much reduced concentrations than whole water. Given the high sorption tendencies, it has been reported that large percentages of the pyrethroids in whole water may be unavailable to interact with aquatic organisms. Then again, it has also been suggested this whole water limitation, with unknown bioavailability of pyrethroids, is a limitation of most toxicity testing data as well (Weston et al Environ Tox & Chem 2013). Given the historically high turbidity levels of the Alamo and New Rivers, it is likely the bioavailability of the pyrethorids in whole water is substantially less than in clear waters. It is noted at the end of section 2.3.3 in the TMDL report that UC Davis method recommends comparison of mixture toxicity based dissolved concentrations. However, two considerations, a) it is unlikely that there is sufficient and consistent DOM, DOC or even turbidity data available to “adjust” whole water samples of monitoring and toxicity data to a free dissolved estimates, and b) even if one was able to do so, the very large mixture exceedances reported here suggest there will still be substantial reason for concern. These two assumptions could be explored.

Staff Response: Colorado River Basin Water Board staff agrees with the reviewer that enhancing the interpretation of numeric targets from monitoring data would be achieved by considering the dissolved concentration and bioavailability of pyrethroids. However, it's important to acknowledge that the lack of information on Dissolved Organic Matter (DOM), Dissolved Organic Carbon (DOC), or turbidity in past monitoring data, which forms the foundation of this staff report, poses limitations for exploring mixture toxicity based on dissolved concentrations. As the reviewer points out, the large mixture

exceedances reported in the additive toxicity concentrations in the water samples would still be substantial even after adjusting the whole water samples of monitoring data. It is worth noting that the Regional Water Board will initiate the monitoring for DOC, a development which may address this concern in future assessments. TMDLs are subject to periodic updates based on new information, and the inclusion of DOC data may offer valuable insights. Consequently, whenever such information becomes available, a reevaluation of this TMDL can be undertaken to assess the whole water samples using the updated monitoring datasets.

2.3. Source Analysis

1. Do the peer reviewers agree with the assumption that the main source of the impairments is agriculture and that the allocations are appropriately based on the water quality objectives? If not, what additional existing science would the peer reviewer direct Colorado River Basin Regional Board staff to, or are there changes the peer reviewer would recommend?

Comments: I agree with the assumption, based on the published literature and my own research and measurements around the US, that the primary source of pyrethroids in these two watersheds is from Agricultural uses. However, the presentation and discussion of Non- Agricultural sources in this document seems minimal relative to the Agricultural source attribution. For example, Table 1-3 reports Cypermethrin from non-Ag sources to be 37% of Agricultural sources, and approximately 16% for bifenthrin. Perhaps this is simply a result of the California pesticide reporting system, and “over the counter” sales and applications are much more difficult to track and documentation is lacking? Is there no additional data that could be added to Figure 1-2 to inform non-agricultural uses of these pyrethroids? Current estimates place the population of the Imperial Valley at nearly 200,000 people, and one would expect, and the literature supports, significant urban pesticide applications. However, the report appropriately notes that the Imperial Valley averages only 3 inches of rain a year, and as such, urban stormwater runoff seems a rare event. Is there any documentation about the lack of water in storm drains or wet and dry days per year of representative drains? Data documenting this “lack of an urban source due to little rainfall” would add weight to this assumption. Are there other reasons beyond lack of rainfall, which is a strong justification in itself, that urban applications and sources are not considered more in the document?

Staff Response: Monitoring non-agricultural origins of pyrethroid insecticides, such as those stemming from industrial and residential use, has been limited due to inadequate tracking of these numerous non-point sources. Determining contributions from

residential sources proves challenging, as quantifying the amount of pesticides applied in households that ultimately reach stormwater is complex. Consequently, further research on non-point source monitoring is imperative to comprehensively understand the origins of pyrethroid pollution. Moreover, considering Imperial Valley receives only 3 inches of rain annually (Vlaming et al., 2004), the likelihood of these pesticides significantly contributing to urban runoff appears low. The data presented in Table 1-3 and Figure 1-2 effectively determines the source allocation of pyrethroids from both the agricultural and non-agricultural sources based on the information presented by CDPR's Summary of Pesticide Use Report Data 2018. Unmonitored pollution sources, such as wastewater treatment plants, may also result in the underestimation of point sources. The implementation of this TMDL will impose the requirement on such dischargers to monitor for pyrethroids. This step is crucial to confirm whether sources beyond agriculture significantly contribute to the pesticide load in Imperial County's surface water.

Comment (continued): Secondly, it seems a "start and finish" or longitudinal comparison of the monitoring data is warranted. Are concentrations at the outlet to the Salton Sea more or less the same as at the International Border? Is this comparison presented somewhere? Given the particularly long half-lives of pyrethroids, it is possible that a significant portion of the load entering the US may still be detected at the monitoring stations. Is there any trend in the average concentration of each pyrethroid from the US border to the Salton Sea for these rivers? Addressing the lack of urban runoff assumption and the intra-US contribution assumption with data, where possible, would add evidence to the overall assumption that Agriculture is the primary pyrethroid source.

Staff Response: Colorado River Basin Water Board conducts periodic monitoring of the six pyrethroids to assess their concentrations, forming the foundation of this report. The objective is to observe the trend in pyrethroid usage over time. A rigorous comparison of the sources of pyrethroids, such as the international border, was not carried out at this time for the purpose of this staff report. However, the available literature sources (Mora Miguel A., 2009; Vlaming et. al, 2004) have reported that boundary pollution from Mexico is a significant source of pesticide pollution in addition to the extensive agriculture in Imperial Valley. Additionally, as highlighted in the Staff Response to the Main Comment from another reviewer, the development of the TMDL is primarily focused on the existing concentrations of the pollutants in the water body to establish the water quality objectives in the form of numeric targets. As this TMDL is being implemented, the additional data collected will likely provide more insights into the contaminant sources and their individual contributions, thereby facilitating proper source apportionment.

2.4. Loading Capacity, TMDLs, and Allocations

1. Are the proposed TMDLs, loading capacity and load/wasteload allocations reasonable and adequately protective?

Comments: Yes, a TMDL measure that seeks to establish a protective concentration throughout the river is an appropriate target. Table 5-3 of the NPDES discharges is interesting, but without concentration data for each discharger, the table is not particularly useful. A presentation and discussion of the data suggested above in question 3-1 would go a long ways in addressing the last consideration of “reasonable” allocations to some sources but not others. As discussed above, the steps outlined by the UC Davis method (ie. the lower confidence interval of the 5th percentile of a species sensitivity distribution, further checked against known sensitive species) is an adequately protective approach consistent with the assumptions and levels of protection in the EPA water quality criteria guidance from 1985.

Staff Response: Colorado River Basin Water Board staff appreciate your comments regarding our efforts in proposing the loading capacity and load/wasteload allocations.

Regarding the presentation of concentrations at the NPDES discharges, kindly refer to the Staff Responses to your earlier point and other reviewer’s Main Comment for a comprehensive explanation. In summary, as this TMDL is being implemented, the NPDES facilities will be required to monitor their discharges for the pyrethroid insecticides. Consequently, the Regional Water Board will have the ability to assign allocations based on the monitoring data provided by these dischargers.

2. Are the reductions in listed pyrethroid concentrations that are required to attain water quality standards calculated appropriately? If not, what additional existing science would the peer reviewer direct Colorado River Basin Regional Board staff to or what changes would the peer reviewer recommend?

Comments: Yes, the calculations of the target single chemical and mixture targets appear to be calculated appropriately. As mentioned above, some consideration of what the “background” or “incoming” concentrations of pyrethroids are, coupled with estimates of “travel time” of a water mass in these systems would provide more insight into how much improvement might be expected form agricultural sources. See longitudinal and “start to finish” comparisons recommended above.

Staff Response: Colorado River Basin Water Board staff appreciate your comments. As per the Clean Water Act (CWA) Section 303(d) and 40 Code of Federal Regulation (CFR) Section 130.2 et seq. specifying the components and requirements of a TMDL, a background source allocation is not a required component in the TMDL development.

Instead, it is crucial to analyze the concentration of pollutants in the water body to establish water quality objectives in the form of numeric targets. Furthermore, there is a notable scarcity of literature data concerning non-agricultural source apportionment, particularly in terms of residential and industrial discharges, which complicates the analysis. Once the TMDL is implemented, all known dischargers will be required to monitor pyrethroid pollutants, potentially enhancing the quality of data and facilitating comparisons of pollutant sources, urban contributions and concentrations.

3. Is the interpretation of the margin of safety based on sound science? If not, what additional existing science would the peer reviewer direct Colorado River Basin Regional Board staff to or what changes would the peer reviewer recommend?

Comments: Section 5.4 “Margin of Safety” indicates that an explicit margin of safety was not applied. Rather, it appears that conservative assumptions during the process (i.e., The 50^{th} or 95^{th} confidence interval of the 5^{th} or 1^{st} percentile, depending; the “checking” if other considerations are needed (i.e., Bioaccumulation, sensitive species, mixtures, comparison to EPA 1985 results) all add a margin of safety. Two further considerations, 1) the use of whole water samples and assuming they are all bioavailable, and 2) the use of Acute to Chronic ratios to arrive at chronic values where chronic data is missing, also provide a sufficient margin of safety with the established numerical, concentration based targets proposed.

Staff Response: The staff of the Colorado River Basin Water Board staff has elected to use the numeric targets developed in the peer-reviewed Water Quality Criteria Report (WQCR). These targets are based on conservative assumptions and an implicit margin of safety considering the recently generated toxicity data for the most sensitive species of the aquatic life. To date, the derived criteria appear to be protective considering bioaccumulation, ecosystem level toxicity, and threatened and endangered species as discussed in the WQCR. Consequently, the derived numeric values are notably conservative, indicating a promising level of protection for the aquatic species in both New and Alamo Rivers.

2.5. Implementation

1. Are the implementation methods (such as regulating NPDES permitted facilities, additional monitoring of pyrethroid pesticides, etc.) through the proposed TMDL amendment scientifically sound and adequately justified, as outlined in Section 6 of the Staff Report?

Comments: Yes, it is justifiable to request or collect some pyrethroid concentration data from the NPDES permittees, as that appears to be a current data gap. However, some

of these are unlikely to be providing a significant source to the rivers, and as such, an estimate of how many NPDES permit samples are needed, and what non-detection frequency would warrant ending additional monitoring should be discussed initially. Under what circumstances can a NPDES permittees stop sampling should also be documented.

Staff Response: The Regional Board's directives to dischargers in the form of Board Orders, formed subsequent to TMDL establishment, include specifications for NPDES permit samples and their frequency of generation. The Colorado River Basin Water Board has the discretion of revising the monitoring requirements based on the data generated by discharge facilities. The NPDES permits undergo reassessment every five years through a reasonable potential analysis, leading to the evaluation of sampling frequency and other parameters. As a result, TMDLs are dynamic documents subject to revision over time, reflecting the most current information available.

2. Does the data presented in Figures 3-2 and 3-3 indicate concentration trends could continue under the recommended implementation timeline, as detailed in Section 6.4: Timeline and Milestones of the Staff Report? If not, could the peer reviewer provide some scientific recommendations to the Colorado River Basin Regional Board staff?

Comments: It does not appear that a formal, statistical “test for trend” has been conducted and presenting. If so, please provide. If not, please consider these two methods for a ‘test for trend’ in a set of water sampling data;

Nonparametric tests for trends in water-quality data using statistical analysis system
Open-File Report 83-550
Charles G. Crawford, James R. Slack, and Robert M. Hirsch
https://doi.org/10.3133/ofr83550

or-

Computer program for the Kendall family of trend tests
Scientific Investigations Report 2005-5275
Dennis R. Helsel, David K. Mueller, and James R. Slack
https://doi.org/10.3133/sir20055275

Staff Response: The staff of the Colorado River Basin Water Board opted against performing a statistical "test for trend." Instead, they relied on visual interpretation to analyze whether the pollutant surpasses the concentration limit. The staff believes that, for this particular TMDL, an extensive statistical analysis is currently unnecessary as the data clearly illustrates the trend qualitatively for the pyrethroid insecticides in question. The staff appreciates the reviewer's input and will consider it for more intricate TMDL developments in the future.

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ATTACHMENT D: STAFF RESPONSE TO PUBLIC COMMENTS

In accordance with California Code of Regulations, title 23, section 3779, subdivision (d), Colorado River Basin Water Board staff has prepared the following responses to significant environmental issues raised in written comments received during the formal written comment period (February 26 to April 10, 2024).

On April 10, 2024, a comment letter from Rachel Magos, Executive Director of the Imperial Valley Irrigated Lands Coalition (CVILC). No other public comments were received.

IVILC General Comments—Part 1

Comments

The draft BPA for the New and Alamo Rivers in Imperial County is a proposed TMDL in which water quality objectives will be implemented upon approval by USEPA. It appears that there are significant issues with both the Staff Report and the draft BPA documents, including a lack of adherence to established precedents in setting pyrethroid goals, as well as factual and mathematical inaccuracies.

Additionally, not calculating the dissolved phase concentration of the pyrethroids because there are no historic data for organic carbon is not a valid argument when there is a well vetted, standard equation that can be used. The Central Valley Regional Water Quality Control Board's (Central Valley Water Board) Pyrethroid Control Program Basin Plan Amendment, adopted for use on June 8, 2017, approved by State Water Board on July 10, 2018, and by USEPA on April 22, 2019, includes equations and parameter values to be used to calculate the dissolved concentration(s) of pyrethroids which is a more scientific approach for estimating the bioavailable fraction of pyrethroids in the water column that could be affecting aquatic life.

Response

Regarding the calculation of dissolved phase concentration of pyrethroids, staff agrees that determining freely dissolved pyrethroid concentrations is recommended for assessing criteria compliance. An equation exists to calculate these concentrations. However, the absence of the concentration data for dissolved organic carbon (DOC) and total organic carbon (TOC) in the water samples from the project area complicates the calculation of chemical concentrations in the dissolved phase as per the equation referenced by IVILC.

The equation in question is as follows:

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

where,

$C_{dissolved}$ is the concentration of chemical in the dissolved phase (mg/L)
C_{total} is the total concentration of chemical in water (mg/L)
K_{OC} is the organic carbon–water partition coefficient (L/kg)
$[POC]$ is the concentration of particulate organic carbon in water (kg/L)
K_{DOC} is the organic carbon–water partition coefficient (L/kg) for DOC
$[DOC]$ is the concentration of dissolved organic carbon in water (kg/L)

In addition to requiring K_{DOC} and K_{OC} values, the equation necessitates values for [*DOC*] and [POC] to calculate $C_{dissolved}$. The concentration of POC can be calculated as [*POC*]=[*TOC*]-[*DOC*]. Besides the availability of the K_{DOC} and K_{OC} values in the standard equation as suggested in the Central Valley Water Board's Pyrethroid Control Program Basin Plan Amendment, staff initially hesitated to use this equation due to the lack of [*DOC*] and [*TOC*] values for the water samples from the project area. However, upon careful consideration, we believe that calculating freely dissolved concentrations using the above equation will be more appropriate, with the understanding that the dischargers also monitor for DOC and TOC. Therefore, staff acknowledges IVILC's comment and incorporates the use of dissolved phase pyrethroid concentration or whole water (total) concentration for criteria compliance assessment. The freely dissolved concentrations offer the most accurate prediction of toxicity and require additional monitoring of TOC and DOC in Imperial Valley waters to acquire data necessary for the calculations.

In the Final Staff Report, section 2.3.1 has been revised to emphasize the use of either the dissolved phase concentration or whole water concentration for criteria compliance assessment, depending on the discharger's capabilities. Both the whole water concentration and freely dissolved concentrations will be acceptable for compliance determination with the decision left to dischargers as to which concentration will best suit their needs. Dischargers should identify which concentration is used and any calculations undertaken to determine the concentration of pyrethroids in the sample.

IVILC General Comments—Part 2

Comments

The Draft Staff Report identifies Mexico as a source of pyrethroids in the New River and Alamo Rivers. The Coalition appreciates that identification of this source as a compounding factor in managing pyrethroids in the Imperial Valley and proposed coordination with the United States International Boundary and Water Commission (USIBWC) and USEPA. Although we recognize that this is a challenge, we encourage Colorado River Basin Water Board staff to push for this coordinated effort and to continue to acknowledge this source when implementing the TMDL and assessing the impact of management practices implemented by agriculture on pyrethroid concentrations in the water column.

Response

Acknowledged.

IVILC-1

Comment

Clarity is needed on whether the objective is based on individual or summed pyrethroid toxicities.

The objectives listed in the draft BPA are essentially individual concentrations of each pyrethroid, unadjusted by a reference value. This ignores the additive toxicity of pyrethroids, all of which have the same mode of action. The Staff Report discusses summed toxicity across all pyrethroids, however, defaults to a chemical-by-chemical comparison of a sampled concentration to an acute or chronic criterion concentration.

Response

In the Final Staff Report, section 2.3.3 has been revised as follows to clarify use of individual pyrethroid toxicity for criteria derivation:

> It is true that the additive toxicity should be used when a combination of pyrethroids exists in a given sample as they have the same general mode of toxic action resulting in their toxicity to be additive. However, it is recommended by the UCDM and WQCR that the water quality objectives for both the acute and chronic criterion concentrations are based on individual pyrethroid toxicities instead of the additive toxicity. This is because the interactions between pyrethroids and various pesticides and other chemicals were reviewed by Fojut et al. (2012), and the authors

concluded that there is currently not sufficient data to quantify any of these interactions. Due to the lack of data to quantify impacts, quantitative limits to account for these interactions (i.e. additive toxicity) are not recommended for inclusion in the Basin Plan at this time. Therefore, the chosen criteria are based on individual concentrations of each pyrethroid which are believed to be stringent enough to protect the water quality. These TMDLs may be subject to revisions over time. These revisions will reflect the more robust data information on additive toxicity that becomes available in the future.

IVILC-2

Comment

The criteria should be compared to only the dissolved phase pyrethroid concentrations.

The Draft BPA does not specify whether the comparisons to the criteria involve dissolved or total pyrethroids. However, due to the lack of guidance on how to calculate a dissolved fraction in addition to the arguments in the Staff Report, the default is that the concentration of the total pyrethroid (sum of dissolved and particulate bound) is the basis for comparison with the individual criterion concentration for each chemical. Because the organic carbon partitioning coefficient (Koc) values for each of the pyrethroids are so large, the overwhelming majority of the pyrethroid(s) in any sample are bound to particulates which makes them biologically inactive, i.e., non-toxic. The TMDL concentrations, therefore, should be framed as the concentration of pyrethroids in the dissolved phase only, not total pyrethroids. This is ignored in the Draft BPA with no valid reason provided.

The Central Valley Water Board's Pyrethroid Control Program BPA includes equations and parameter values to be used to calculate the dissolved concentration(s) of pyrethroids. The inclusion of the equation in the Central Valley BPA is an explicit acknowledgment that the dissolved phase is the biologically active and therefore the only important fraction. The Koc values necessary for these equations have been vetted by the both the Central Valley Water Board and the State Water Board. The equation used to calculate the dissolved fraction of pyrethroids have been vetted and agreed upon by both dischargers and the Central Valley Water Board.

Response

Refer to Staff's response to IVILC General Comments—Part 1.

Additionally, Section 5.1 of the Final Staff Report has been revised to emphasize the use of either the dissolved phase concentration or whole water concentration of the pyrethroid pesticides for criteria compliance assessment.

IVILC-3

Comment

Equations 1 and 2 of the Staff Report are incorrect and do not reflect the summed toxic units of pyrethroids in a sample.

As stated on page 16 of the Draft Staff Report:

> Additive toxicity is defined by an index in which individual toxic contributions of chemicals are summed for two or more chemicals in combination. This linear index expresses the toxicity quantitatively.

To calculate the additive toxicity, which is the sum of the toxic units of each chemical, the concentration of each chemical must be compared individually to its own reference value. For example, the number of toxic units of bifenthrin in the sample should be calculated by dividing the average concentration of bifenthrin (C_{bif}) in the sample by the Acute Criterion reference value for bifenthrin (AC_{bif}), as such: C_{bif}/AC_{bif}. This should then be added to the toxic units of cypermethrin calculated in the same manner, and then cyfluthrin and so on. Instead, Equations 1 and 2 are presented in a way that would have all the pyrethroid concentrations in the sample added together, then divided by the sum of the acute or chronic criterion reference values, as seen here in Equation 1 (page 17):

$$S \leq 1.0 \frac{C_{bif} + C_{cyf} + C_{cyp} + C_{esf} + C_{lcy} + C_{per}}{AC_{bif} + AC_{cyf} + AC_{cyp} + AC_{esf} + AC_{lcy} + AC_{per}}$$

A simple arithmetic example illustrates why this is incorrect. Perform the operation 1/3 + 1/2. Converting to decimals, it becomes 0.33 + 0.5 = 0.83. Now perform the operation incorrectly as described in Equations 1 and 2: (1+1)/(3+2) = 2/5 = 0.4. Clearly 0.83 is not the same as 0.4. Performing the calculation incorrectly underestimates the number of toxic units and is not protective of sediment or water quality.

Additionally, the form of the equations that include the terms 1.0, while not incorrect as any number multiplied by 1 is that number, does not reflect the text which states that the summed value cannot exceed 1.0. For example, the Central Valley Water Board's Pyrethroid Control Program BPA acute concentration goal unit calculation is presented as the following text and equation:

> 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.

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

Finally, the reference values are incorrectly described in the boxes below each equation as “AC = Acute concentration” (Equation 1) and “CC = Chronic concentration” (Equation 2) of the individual chemicals. These descriptions are inaccurate in that they do not incorporate the reference value framework into the equations. Instead, AC should be defined as the acute criterion and CC as the chronic criterion.

The Draft BPA defaults to a simple concentration for each chemical, unadjusted by a reference value, as the proposed objectives, ignoring the additive toxicity of pyrethroids. However, the additive feature must involve the dissolved fraction of the chemicals, not the total concentration (dissolved + bound). Because of the differences in the organic carbon partition coefficient values for the different chemicals, their concentrations cannot simply be added to achieve a correct measure of additive effects of pyrethroids.

Response

IVILC has identified a typographical error in Equations 1 and 2. Section 2.3.3 of the Final Staff Report has been revised as follows:

> To calculate additive toxicity and establish a level of protection from the potentially toxic mixtures of pyrethroids, the following equations are recommended:
>
> Equation 1
>
> $$\frac{C_{bif}}{AC_{bif}} + \frac{C_{cyf}}{AC_{cyf}} + \frac{C_{cyp}}{AC_{cyp}} + \frac{C_{esf}}{AC_{esf}} + \frac{C_{lcy}}{AC_{lcy}} + \frac{C_{per}}{AC_{per}} \leq 1$$
>
> Where:
> C_{bif} = Average concentration of bifenthrin from a 1-hour averaging period (µg/L)
> C_{cyf} = Average concentration of cyfluthrin from a 1-hour averaging period (µg/L)
> C_{cyp} = Average concentration of cypermethrin from a 1-hour averaging period (µg/L)
> C_{esf} = Average concentration of esfenvalerate from a 1-hour averaging period (µg/L)
> C_{lcy} = Average concentration of lambda-cyhalothrin from a 1-hour averaging period (µg/L)
> C_{per} = Average concentration of permethrin from a 1-hour averaging period (µg/L)
> AC_{bif} = Acute Criterion reference value of bifenthrin (µg/L)
> AC_{cyf} = Acute Criterion reference value of cyfluthrin (µg/L)

AC_{cyp} = Acute Criterion reference value of cypermethrin (µg/L)
AC_{esf} = Acute Criterion reference value of esfenvalerate (µg/L)
AC_{lcy} = Acute Criterion reference value of lambda-cyhalothrin (µg/L)
AC_{per} = Acute Criterion reference value of permethrin (µg/L)

Value of calculated additive toxicity cannot exceed 1.0 more than once in any consecutive three-year period.

Equation 2

$$\frac{C_{bif}}{CC_{bif}} + \frac{C_{cyf}}{CC_{cyf}} + \frac{C_{cyp}}{CC_{cyp}} + \frac{C_{esf}}{CC_{esf}} + \frac{C_{lcy}}{CC_{lcy}} + \frac{C_{per}}{CC_{per}} \leq 1$$

Where:
C_{bif} = Average concentration of bifenthrin from a 4-day averaging period (µg/L)
C_{cyf} = Average concentration of cyfluthrin from a 4-day averaging period (µg/L)
C_{cyp} = Average concentration of cypermethrin from a 4-day averaging period (µg/L)
C_{esf} = Average concentration of esfenvalerate from a 4-day averaging period (µg/L)
C_{lcy} = Average concentration of lambda-cyhalothrin from a 4-day averaging period (µg/L),
C_{per} = Average concentration of permethrin from a 4-day averaging period (µg/L)
CC_{bif} = Chronic Criterion reference value of bifenthrin (µg/L)
CC_{cyf} = Chronic Criterion reference value of cyfluthrin (µg/L)
CC_{cyp} = Chronic Criterion reference value of cypermethrin (µg/L)
CC_{esf} = Chronic Criterion reference value of esfenvalerate (µg/L)
CC_{lcy} = Chronic Criterion reference value of lambda-cyhalothrin (µg/L)
CC_{per} = Chronic Criterion reference value of permethrin (µg/L)

Value of the calculated additive toxicity cannot exceed 1.0 more than once in any consecutive three-year period.

It is true that the additive toxicity formula should be used when a combination of pyrethroids exists in a given sample. However, it is recommended by the UCDM and WQCR that the water quality objectives for both the acute and chronic criterion concentrations for criteria compliance are based on individual pyrethroid toxicities instead of the additive toxicity. The interactions between pyrethroids and various pesticides and other chemicals were reviewed by Fojut et al. (2012), and the authors concluded that there is currently not sufficient data to quantify any of these interactions. Due to the lack of data to quantify impacts, quantitative limits to account for these interactions (i.e. additive toxicity) are not

> recommended for inclusion in the Basin Plan at this time. Therefore, the chosen criteria based on individual concentrations of each pyrethroid are believed to be stringent enough to protect water quality. These TMDLs will be subject to revisions over time, which will reflect the more robust data information on additive toxicity that becomes available in the future.

IVILC-4

Comment

The reference to the impact of organochlorine compounds not varying seasonally is incorrect and is also irrelevant to the discussion of pyrethroids.

Remove the following sentence from page 5 of the Draft Staff Report:

> Additionally, legacy pollutants, chlordane, DDT, dieldrin, PCBs and toxaphene have persisted in the environment for many years, and their impacts and impairments are not expected to vary seasonally.

It has been demonstrated that water temperature has an influence on both the bacterial degradation rate of pyrethroids as well as the toxicity of the compounds. Colder water temperatures typically result in higher toxicity because the enzyme systems that are responsible for degradation of pyrethroids in organisms are less active at lower temperatures making the chemicals more toxic. However, we agree with peer reviewer Patrick W. Moran that this phenomenon is appropriately not applied to this TMDL due to the "*typically warm waters of the Imperial Valley.*" (Attachment C, p. 163.)

Response

Staff did not intend to establish any direct correlation in the quoted language, which is removed from the Final Staff Report. Staff acknowledge that the pyrethroid toxicity is dependent on water temperatures. Pyrethroids have been demonstrated to be more toxic than assumed in the concentration goals at lower temperatures while the pyrethroids' toxic potential may be less than assumed in the concentration goals at higher temperatures (Weston et al. 2009, Harwood et al. 2009).

IVILC-5

Comment

Statements in the draft BPA confound pyrethroid applications (usage) and management practice effectiveness.

Pyrethroid applications are easily tracked through the Department of Pesticide Regulations' (DPR) *Pesticide Use Reporting* system (PURS), or from inquiries to the County Agricultural Commissioner's office. The statement should not be made that "*concentrations found in water and sediment samples collected from the New River between 2003-2020 show an apparent decrease in usage, as samples collected have resulted in lower concentrations*" (Draft BPA, pages 12-13). Usage is easily obtainable, and that data can be used to substantiate the claim that decreases in concentration are due to decline in use. Also, figures in the Draft Staff Report are not convincing as to a decrease in concentration as is claimed in the Draft BPA. Similar to comments from the peer reviewer Patick W. Moran (Draft Staff Report, Attachment C, pp. 162, 170), unless some sort of statistical analysis is performed, statements about increases or decreases in concentration should be avoided.

Response

Staff agrees that PURS provides data on pesticide usage and applications. In Table 1-3 and Figure 1-2 of the staff report, information regarding Agricultural and Non-agricultural Pyrethroid Sources in 2018 (lbs) is presented based on CDPR's Summary of Pesticide Use Report Data 2018. Therefore, the staff has recognized this as a data source and integrated the information from the DPR Use Report 2018. However, it's important to clarify that the data referred to in this context pertains to Pyrethroid concentrations found in Surface Water Ambient Monitoring Program (SWAMP) water samples collected from the New and Alamo Rivers between 2003 and 2020.

As mentioned in the response to the peer reviewer's comment, staff opted against performing a statistical test for trend. Instead, they relied on visual interpretation of the data to analyze whether the pollutant surpasses the concentration limit. The staff believes that, for this particular TMDL, an extensive statistical analysis is currently unnecessary and rather a qualitative illustration of the data trend is performed for the pyrethroid insecticides in question. The initial phase of the regulatory approach involves monitoring and data collection to guide future actions by the Board. Trend monitoring will continue to track pyrethroid levels over time, with plans to gather additional data and information in the future. Only after this comprehensive data collection phase will the staff consider the potential for conducting the in-depth analysis using rigorous statistical methods, for more intricate TMDL developments in the future, as recommended by one of the peer reviewers.

IVILC-6

Comment

We suggest using the standard 5th percentile chronic and acute criteria from the 2015 Water Quality Criteria Report.

Staff has elected to use the numeric targets developed in the peer-reviewed *Water Quality Criteria Report* (Fojut T. L., 2015), but it appears that the 1st percentile values, and not the 5th percentile values have been used for five of the six pyrethroids, as listed in Table 2-3 of the Draft Staff Report. The use of the 1st percentile vs. 5th percentile sensitivity values was discussed during the development of the Central Valley Pyrethroid Control Program BPA. After considerable discussion, both the Central Valley Water Board and the dischargers agreed that the 1st percentile values were too conservative and that the 5th percentile values were more appropriate as goals. Additionally, the coalition uses one of three major California laboratories that have been approved to analyze samples for low level pyrethroids. This lab has reporting limits for pyrethroids ranging from 0.0005 to 0.005 ug/L, as can be seen in the table below. All the acute and chronic criteria values listed in the Staff Report, except for permethrin, are below the laboratory's reporting limit, which means these criteria values are too low to be quantified. We suggest using the 5th percentile chronic and acute criteria from the 2015 *Water Quality Criteria Report*. These values can be re-evaluated at a future time to determine if they are protective or if they need to be revised.

		Acute Criteria (ug/L)		Chronic Criteria (ug/L)	
	Laboratory Reporting Limit (ug/L)	Colorado River Basin draft BPA	2015 WQCR, 5th percentile	Colorado River Basin draft BPA	2015 WQCR 5th percentile
Bifenthrin	0.0005	0.00006	0.0008	0.00001	0.0001
Cyfluthrin	0.0005	0.00007	0.0008	0.00001	0.0002
Cypermethrin	0.0005	0.00004	0.001	0.00001	0.0003
Esfenvalerate	0.001	0.0002	0.002	0.00003	0.0003
Lamda-cyhalothrin	0.0005	0.00003	0.0007	0.00001	0.0003
Permethrin	0.005	0.006	0.006	0.001	0.001

Response

Staff appreciates the input and has considered it for making necessary revisions to the staff report.

The UC Davis method outlines procedures to evaluate derived Water Quality Criteria (WQC) to ensure that they will protect against adverse effects to: (1) sensitive species; (2) species in the ecosystem; and (3) threatened or endangered species. (TenBrook et al. 2010.) When such data show toxicity can occur at a lower concentration than the acute or chronic WQC derived with the 5th percentile value, the method guidance is to ensure protection by adjusting the criteria downward to the 1st percentile (or lower 95% confidence interval of the 5th percentile, whichever is higher). The adjustment to the

lower percentile is also suggested by the USEPA and agreed upon by the State Water Board to estimate a level that would be protective of the most sensitive aquatic life.

A data comparison was conducted in the 2015 *Water Quality Criteria Report* for the six pyrethroids to assess if the derived criteria for the subject pyrethroids are protective of the most sensitive species. The derived WQC were compared to toxicity values for the most sensitive species in both the acceptable (RR) and supplemental (RL, LR, LL) data sets (§ 3-6.1, TenBrook et al. 2009). The lowest acute toxicity value in the aqueous data sets is a LC_{50} for *Hyalella azteca.* The acute WQC derived with the 5th percentile value for the five pyrethroids except permethrin is above this LC_{50} and would not likely be protective of this species. For permethrin, the toxicity value is only slightly above the derived acute criterion. Therefore, it is recommended to do the downward adjustment of the water quality criterion to the next lowest acute value for all of the six pyrethroids, including permethrin as the two values are very similar to each other. This is done to ensure that both the acute and chronic WQC are protective of *Hyalella azteca* and other species that may be similarly sensitive to these pyrethroids. Based on these reports by Fojut T. L., 2015, the next lowest acute value is the median 1st percentile values for deriving the acute as well as the chronic WQCs.

However, staff acknowledges IVILC's concerns regarding the potential overprotectiveness of the 1st percentile criteria values for the most sensitive species. Therefore, we have opted to utilize the 2.5th percentile value recommended in the Central Valley Pyrethroid Control Program BPA Staff Report, as they offer a less stringent but still protective alternative. The 5th percentile criteria may provide less protection for the most sensitive species, we cannot adopt it as the WQC. Instead, the 2.5th percentile criteria have been chosen to ensure protection of sensitive species. The acute and chronic WQC based on the 2.5th percentile are all below the LC_{50} for the most sensitive species, *Hyalella azteca*, indicating their potential to safeguard this species and others with similar sensitivity. A comparison of the acute and chronic WQC based on the 1st, 2.5th, and 5th percentiles with the water column toxicity for the sensitive species *Hyalella azteca* is provided below for reference:

Table: Summary of pyrethroid concentration goals alternatives – Aqueous concentrations (ng/L) and water column toxicity for the sensitive species *Hyalella azteca*

Alternative	1st percentile 2015 UC Davis criteria		5th percentile 2015 UC Davis criteria		2.5 percentile 2015 UC Davis criteria		2015 criteria via USEPA method		*Hyalella azteca* 96-hour LC_{50}[a]
	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	
Bifenthrin	0.06	0.01	0.8	0.1	0.3	0.05	0.059	--	0.5
Cyfluthrin	0.07	0.01	0.8	0.2	0.3	0.06	--	--	0.55
Cypermethrin	0.04	0.01	1	0.3	0.3	0.07	0.25	0.087	0.56
Esfenvalerate	0.2	0.03	2	0.3	0.7	0.1	--	--	0.85
Lambda-cyhalothrin	0.03	0.01	0.7	0.3	0.2	0.08	0.21	--	0.3
Permethrin	6	1	6	1	6	1	4	--	7

[a]LC_{50}: concentration lethal to 50% of test organisms

Based on the above discussion, Staff has revised the acute and chronic criteria for the water column across the Staff Report. The objective values for the water column, including Water Quality Objectives, Water Column Numeric Targets, Load Allocations, and Waste Load Allocations, are now derived from the 2.5th percentile instead of the 1st percentile, and the corresponding information and tables in the staff report have been modified to reflect the updated values.

Regarding measurement capabilities, staff acknowledges the current absence of commercial analytical methods capable of reliably detecting pyrethroids at the proposed concentration goals. However, there is ongoing development and enhancement of analytical methods for pyrethroids. In fact, significant improvements have been made in pyrethroid analytical methods over the past decade. Presently, detection limits are nearing the point where determination of compliance with the concentration goals based on the UC Davis 5th percentile criteria is feasible. With the collection of more aqueous concentration data using these improved detection limits, a more precise assessment of water quality standards attainment in the Project Area will be possible.

IVILC-7

Comment

There are additional sources of pyrethroids outside of agriculture.

The Draft Staff Report (p. 49) states: “In 2018, the top five commodity sources for pyrethroids in 2018 leading to impairment in Imperial Valley are summarized in Table 4-1 (CDPR, 2020).”

However, on page 53, it is recognized that there are additional potential sources of pyrethroids other than agriculture: “Monitoring data determined transboundary pollution from Mexico is also a source of pyrethroids into the New River, as urban and

agricultural runoff, and untreated and partially treated municipal wastewater are discharged into the river."

We suggest changing the sentence on page 49 to state as follows:

> In 2018, the top five commodity sources for pyrethroids in 2018 are summarized in Table 4-1 (CDPR, 2020). Table 4-1 does not include other sources of pyrethroids such as urban use or use that occurs in Mexico.

Response

Table 4-1 is exclusively focused on the commodity sources related to agricultural products in Imperial Valley. Therefore, it is inappropriate to include Mexico and urban sources of pollution in this context. However, staff will add "agricultural products" to the table caption to prevent any confusion.

IVILC-8

Comment

We suggest planning for additional research to fill in known data gaps.

During the development of the Central Valley Pyrethroid Control Program BPA, Central Valley Water Board staff recognized that the data used to evaluate the potential for pyrethroids to cause or contribute to water quality concerns contained considerable knowledge gaps. The BPA included a provision that the Central Valley Water Board would work with stakeholders to develop a Pyrethroid Research Plan that will describe research and other special studies on this topic. The Colorado River Basin Water Board's Draft BPA should a similar plan to address knowledge gaps in the data to inform future iterations of this control program.

Response

Colorado River Basin Water Board staff appreciates your input regarding addressing knowledge gaps in the data to guide future iterations of this control program.

We have expanded the information provided, and the paragraph in *Section 6.4: Timeline and Milestones* now reads as follows:

> "The estimated target date to achieve the Water Quality Objectives (WQOs) for bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin in the New and Alamo Rivers is 0 to 3 years after the approval of these Total Maximum Daily Loads (TMDLs) by the USEPA. The initial 2 years are allocated for completing baseline monitoring in areas where pyrethroids have

not been thoroughly assessed, followed by 1 year for adjusting monitoring plans, if necessary. This timeline is based on information provided by the Central Valley Regional Water Quality Control Board's (CVRWQCB) Pyrethroid Control Program Basin Plan Amendment (Central Valley BPA). The staff has devoted considerable time to identifying and evaluating potential regulatory implications due to the very low pyrethroid concentrations considered necessary to protect aquatic life, as well as the effectiveness of management practices to control pyrethroid discharges. As a result, the staff proposes a phased approach in the proposed amendment, with data gathering and implementation of reasonable management practices as the initial core step in the near term to inform the Board of potential future actions. Overall, the estimated target date is determined based on pyrethroids' relatively short soil half-life, trends in pyrethroid concentrations found in water and sediment samples, and the implementation of best management practices.

Based on the updated UC Davis method, the water sample is to not exceed the concentration goal more than once every 3 years. This means that if there are two or more exceedances of the concentration goal within a 3-year period, the concentration goals would not be achieved. The selection of the 3-year exceedance frequency is supported by a literature review of ecosystem recovery studies. This frequency was chosen because some populations may take up to 3 years to recover from the toxic effects of pesticides; however, many populations, particularly invertebrate species with short lifecycles, may recover more quickly from acute exposures to pyrethroids. While several studies involving pyrethroids have shown that affected populations recovered from short pulse exposures in several weeks, one study indicated that populations had not fully recovered over 240 days after a short exposure. Most studies have demonstrated that recovery occurs within 3 years or less, making the 3-year exceedance frequency a conservative estimate. However, for threatened or endangered species, recovery from excursions of the criteria may be challenging if the populations are already stressed and lack resilience. The acute and chronic averaging periods and the exceedance frequency of the UC Davis method are consistent with those specified in the USEPA guidelines for deriving aquatic life criteria.

Furthermore, effective agricultural management practices to control pyrethroids, many of which are already being implemented, include enhanced pest management and the use of alternative pesticides to reduce pyrethroid use. Application practices aimed at reducing the potential for overspray and drift, as well as practices that minimize runoff and capture sediments in runoff, such as vegetation and improved water management, are also recommended. Best management practices for municipal stormwater and wastewater dischargers encompass education and outreach initiatives, such as promoting reduced pesticide use and proper pesticide application, as well as advocating for reduced runoff and pollution prevention activities, such as reducing the municipalities' own

use of pesticides, and adopting integrated pest management along with the coordination with regulators of pesticide use."