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Study 321. Surface Water Monitoring for Pesticides in Agricultural Areas in the Central Coast and Southern California, 2025

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1. INTRODUCTION

Surface water monitoring in agricultural areas is a priority for the California Department of Pesticide Regulation (DPR) to assess potential impacts of pesticides from agricultural runoff on California's aquatic environments. Initiated in 2008, collection of agricultural runoff within the Central Coast and southern regions of California represents one of DPR's long-term environmental monitoring efforts. Annual surface water monitoring data help guide DPR in the development and implementation of regulatory and non-regulatory mitigation activities. This project's current monitoring efforts are focused on two major agricultural regions of California: the Central Coast and the Imperial Valley (Southern California).

The Central Coast (CC) monitoring areas include major watersheds in Monterey, Santa Barbara, and San Luis Obispo counties (Main, 2019, 2020; Deng, 2021, 2022, Lima, 2023, 2024). In 2023, Monterey was the fourth county in total value of production that contributed most to California's agricultural economy, with Santa Barbara and San Luis Obispo also being within the top fifteen state counties (CDFA, 2024). Notable for its broad diversity of crops, many of which are grown year-round, CC leading commodities include strawberry, leaf and head lettuce, broccoli, cauliflower, grapes, among other vegetables and fruit crops (CDFA, 2024; Monterey County Farm Bureau, 2023). Such heavy and diverse agricultural production is linked to a wide range of pesticide active ingredients (AIs) annually applied. The Pesticide Use Reporting (PUR) database estimated imidacloprid, thiamethoxam, cypermethrin, and permethrin among the most applied pesticides in the CC agricultural area with over 15 million pounds of agricultural pesticides were applied in 2022 (DPR, 2024).

Similarly, the Imperial Valley (IMP) in Southern California is known for growing a wide variety of crops. In 2023, Imperial was the eighth county in total value of production that contributed most to California's agricultural economy (CDFA, 2024). Its top crops included alfalfa, leaf and head lettuce, Bermuda grass hay, among other vegetables and fruits and nut crops (Imperial County, 2023). The region is extremely dry with a hot desert climate characterized by daily temperature extremes. Thus, intensive irrigation is required to achieve its high crop production. The extensive use of pesticides on top of heavy use of irrigation and diverse planting endorses both the CC and IMP areas with greater potential for pesticide transport into surface waters via agricultural runoff.

Study 321 is a continuation of DPR's agricultural monitoring efforts in CC and IMP (*see Study 304*). Most current monitoring sites were established in previous years (Deng, 2017, 2022). The watershed-based prioritization approach was applied to help refine the pesticide priority list for monitoring using DPR's Surface Water Monitoring Prioritization model (SWMP; Luo et al., 2013, 2014, 2015). The prioritized lists of pesticides identified by SWMP were used to identify pesticides to include in regional sampling efforts, as well as identify those needing analytical method development. Monitoring frequency in CC will include three sampling events during the irrigation season from May to September, and two sampling events in the winter from November to February to capture storm runoff. Monitoring in IMP will be conducted twice a year in March and October.

2. OBJECTIVES

The goals of the project are to assess emerging issues and long-term trends of pesticide occurrence in surface water resulting from agricultural runoff and their potential impact to the surrounding aquatic environments. Monitoring results can be used to assess the efficacy of mitigation efforts and provide information to DPR management to determine whether additional mitigations are necessary. The objectives of this study are as follows:

- Determine occurrences and measure chemical concentrations of high-priority pesticides in aqueous and sediment samples;
- Determine toxicity of water samples using lab surrogate species (*Hyalella azteca*, *Chironomus dilutus*);
- Evaluate potential impacts on aquatic environments by comparing environmental concentrations with current toxicity thresholds;
- Evaluate storm runoff on pesticide transport from agricultural fields;
- Analyze spatial correlations between observed pesticide concentrations and detection frequencies with region-specific pesticide use;
- Assess trends in pesticide concentrations at long-term monitoring stations to evaluate efficacy of mitigation efforts and future needs;
- Publish raw data sets on Surface Water Monitoring Database (SURF) and annual monitoring results in a summary report. Share aforementioned evaluation reports on DPR Surface Water Protection Program website once they become available.

3. PERSONNEL

This study will be conducted by staff from the Environmental Monitoring Branch, Surface Water Protection Program, under the general direction of Dr. Anson Main, Environmental Program Manager I (Supervisory). Key personnel are listed below:

Project Leader:	Pedro Lima, Ph.D.
Field Coordinator:	To be determined.
Reviewing Scientist:	Robert Budd, Ph.D.
Statistician:	Xuyang Zhang Ph.D.
Laboratory Liaison:	Joshua Alvarado
Analytical Chemistry:	Center for Analytical Chemistry, California Department of Food and Agriculture (CDFA)

Questions concerning this monitoring project should be directed to Dr. Pedro Lima, Sr. Environmental Scientist (Specialist), at (916) 324-4186 or by email at pedro.lima@cdpr.ca.gov.

4. STUDY PLAN

4.1 Pesticides for monitoring

Pesticides of potential concern were prioritized following the procedures described in the SWMP model memos (Luo et al., 2013, 2014, 2015). The 12-digit hydrologic units (HUC12) on the U.S. Geological Survey (USGS) Watershed Boundary Database tool (NHD 2024) are used to define the watershed boundary as an input to the SWMP model. The watershed boundary identifies the areas that contribute to the specific HUC12 where the monitoring site is located. The SWMP model aggregates the total use of each pesticide upstream and within each HUC12 by utilizing their use amounts reported in the PUR database. The model adjusts the total use by factoring in pesticide aquatic dissipation as a function of travel time between each upstream HUC12 and the HUC12 where the monitoring site is located. Pesticide aquatic dissipation was calculated based on water-sediment DT_{50} (dissipation time 50% half-life) of each pesticide of interest. This study applied the SWMP model to generate a ranked list of pesticides for each sampling site. The final *rank score* of a pesticide is the product of the rank in use amount and the relative toxicity of that pesticide among all pesticides used upstream. Pesticides were then analyzed to produce final monitoring lists for individual watershed following the general procedure below:

1) Pesticides with a use score ≥ 2 and a final ranking scores ≥ 8 in a priority list for a watershed of interest will be monitored;
2) Pesticides with a use score < 2 and final scores < 8 in a priority list are considered low priority but may be monitored as part of a large analytical screen;

3) Historical monitoring data and/or current availability of analytical methods at the CDFA lab are additional factors to consider in deciding a final list for monitoring recommendation.
4) Pesticides that are identified as high priority for monitoring that are not included in current analytical screens will be noted for requiring analytical method development.

4.2. Selection of monitoring sites

Monitoring will be conducted in Monterey, Santa Barbara, and San Luis Obispo counties in the CC and Imperial County in Southern California. Most sites described in this protocol have been previously sampled by DPR (Main, 2019, 2020; Deng, 2021, 2022, Lima, 2023, 2024). These sites were selected using the watershed prioritization component of the SWMP model, which identifies HUC12s based on reported pesticide use and toxicity data. Using the SWMP model and its aggregation tool (Luo et al., 2017), the top six priority HUC12s for the Imperial Valley (Table 16, Figure 1) and the top ten priority HUC12s are identified for the CC (Table 17, Figures 2 and 3). Factors such as downstream sampling, budgetary constraints, and other monitoring agency representation direct site selection in the HUCs. A more detailed justification is provided in both Tables 16 and 17.

Monitoring plans for each county is described below. The chemical lists for monitoring were generated by the SWMP model using the average yearly pesticide use from 2020–2022.

4.2.1. Imperial County

Ambient monitoring will be conducted in Imperial County twice a year at six established sites. Whole water samples will be collected during two sampling events and a subset of water samples will be collected during each sampling event for toxicity testing. Sediment samples will be collected once a year in the fall. Sediment samples will be analyzed for eight pyrethroids (bifenthrin, λ-cyhalothrin, permethrin, cyfluthrin, cypermethrin, fenpropathrin, esfenvalerate, and deltamethrin). Monitoring locations are located at the Alamo River and New River watersheds (Table 1, Figure 1). Monitoring will be conducted in March and October to capture the runoff during the periods of higher pesticide uses coinciding with spring and fall in Imperial County.

The recommended chemicals for monitoring by the model for the New River and Alamo River are similar to those in 2024 (Tables 2, 3). Linuron, and 4-(2,4-DB), dimethylamine salt are recommended for monitoring by the prioritization model, but will not be monitored in 2025 because the analytical method for the two AIs are not currently developed.

4.2.2. Monterey County

Ambient monitoring will be conducted in Monterey County five times a year at eight sites including three times during the growing season (May, July, and September), and two times during storm events in the fall and winter. Whole water samples will be collected during each sampling event for chemical analysis and a subset of water samples will be collected during each sampling event for toxicity testing. Sediment samples from all eight sites will be collected only in September for pyrethroid analysis. Monitoring sites are located at the Salinas River and Tembladero Slough watersheds (Table 4, 5; Figure 2).

The chemicals recommended by the priority model are similar to those in 2024 (Table 4, 5). Spinetoram, cyantraniliprole, PCNB, and propyzamide are recommended for monitoring by the prioritization model, but will not be monitored in 2025 because the analytical method for the four AIs are not currently developed (Table 4, 5).

4.2.3. Santa Barbara and San Luis Obispo Counties

Ambient monitoring will be conducted in Santa Barbara and San Luis Obispo counties three times a year in May, July, and September at four established sites (Table 1). Whole water samples will be collected during each sampling event for chemical analysis and a subset of water samples from the four sites will be collected during each sampling period for toxicity testing. Sediment samples will only be collected in September for pyrethroid analysis. Monitoring sites are located at Orcutt Creek and Oso Flaco Creek watersheds (Table 1, Figure 3).

The chemicals recommended by the model for monitoring in the Orcutt Creek Watershed are similar to those in 2024 (Table 13). Propyzamide, linuron, and novaluron appear on the priority list for monitoring (score = 8, Tables 6, 7). However, they will not be included for monitoring as analytical methods have not been developed for the three AIs.

4.3. Modifications from 2024

The neonicotinoids screen has been modified to remove imidacloprid and acetamiprid to avoid duplicative data (Table 11). Meanwhile, clothianidin has been removed from the Liquid chromatograph (LC) multi-analyte screen (Table 8) in favor of quantitative reporting of clothianidin detections in the neonicotinoid screen. Deltamethrin has been added to both water and sediment pyrethroids screen (Tables 12 and 14).

5. SAMPLING METHOD

5.1. Water and Sediment Sampling

Whole water samples will be collected as grab samples directly into 1-liter amber glass bottles by hand or using a pole and then sealed with Teflon-lined lids (Deng and Ensminger, 2021). Auto samplers (Teledyne Isco, Inc., Lincoln, NE) will be used to collect storm runoff over the course of a storm event (time-weighted) where possible. Sediment samples will be collected into half-pint Mason jars using stainless steel scoops from the top 2-cm bed layer. Sediments will be sieved through a 2-mm sieve to remove gravel and plant materials and homogenized (Deng and Ensminger, 2021; Ensminger, 2017). Samples will be stored and transported on wet ice or refrigerated at 4°C until analyzed.

5.2. Sample Transport

The SWPP staff will transport water and sediment samples to the Center for Analytical Chemistry at CDFA for chemical analysis and to the UC Davis Aquatic Health Program Laboratory (AHPL) following the procedures outlined in DPR SOP QAQC004.01 (Jones, 1999). A chain-of-custody record will be completed and will accompany each sample.

5.3. Field Measurements

Dissolved oxygen, pH, specific conductivity, total dissolved solids (TDS), salinity and water temperature will be measured *in situ* during each sampling event (Mecredy, 2024) with an Aqua Troll 400 multi-parameter water quality Sonde (In Situ Inc., Fort Collins, CO).

6. LABORATORY ANALYSES

6.1. Chemical Analysis

Chemical analyses will be performed by the Center for Analytical Chemistry at CDFA. A total of 82 pesticides will be analyzed in the water samples collected from the sampling sites in 2025. Table 8 presents 58 pesticides and their associated analytical method reporting limits and method detection limits in a single liquid chromatograph multi-analyte screen (LC-screen). Additional screens (and number of AIs) including dinitroanilines (6), phenoxies (4), neonicotinoids (3), pyrethroids (8), and glyphosate (3), will also be analyzed (Tables 9 - 13). Sediment samples will be analyzed for eight pyrethroids (Table 14). Quality Assurance/Quality Control (QA/QC) will be conducted in accordance with the Standard Operating Procedure QAQC001.00 (Peoples, 2019). Approximately 10% of all samples collected during the 2024 monitoring year will be included for QC. Laboratory QA/QC will follow DPR guidelines and will consist of laboratory blanks, matrix spikes, surrogate spikes, field matrix spikes, and field matrix spikes duplicates (Peoples, 2019). Laboratory blanks and matrix spikes will be included in each extraction set. All pesticides identified as high priority by the SWMP model are included in current analytical screens except for the following eight pesticides: linuron, novaluron, cyantraniliprole, 4-(2,4-DB), dimethylamine salt, PCNB, spinetoram, and propyzamide. Analytical methods will need to be developed for the aforementioned pesticides before their inclusion for monitoring.

6.2. Organic Carbon and Suspended Solid Analyses

Total organic carbon (TOC) and dissolved organic carbon (DOC) in water samples will be analyzed by DPR staff using a Vario TOC Cube TOC/TNb Analyzer (Elementar Analysensysteme GmbH, Langenselbold, Germany) following a procedure similar to that outlined in Elementar (2009). Before analysis of each sample set, lab blanks and calibration standards will be run to ensure the quality of the TOC and DOC data. Water samples will also be analyzed for suspended sediment (Ensminger, 2013). Similarly, sediment samples collected during September (Central Coast) and October (Imperial Valley) will be analyzed for TOC using the TOC Cube TOC/TNb Analyzer.

6.3. Toxicity Analysis

Toxicity analyses will be conducted in collaboration with the UC Davis Aquatic Health Program Laboratory (AHPL). Grab whole water samples collected from a set of selected sampling sites in the Central Coast and Southern California regions will be tested for mortality by the AHPL using *Hyalella azteca* and *Chironomus dilutus* as surrogate species.

7. DATA ANALYSIS

All data generated by this project will be entered in a Microsoft Office Access database that holds field information, field measurements, and laboratory analytical data. All ambient monitoring analytical data will also be uploaded into the DPR Surface Water Database (SURF, DPR 2024).

Periodic assessments of monitoring data can include the following:

- Comparison of pesticide concentrations to aquatic toxicity benchmarks, water quality objectives, and other toxicity thresholds (US EPA, 2024).
- Spatial analysis of data to identify correlations between observed pesticide concentrations and pesticide uses, rainfall and geographical features.
- Assessment of multiple years of data to characterize patterns and trends in detection frequencies and exceedances of toxicity thresholds.
- Assessment of SWMP model results to determine potential needs of additional monitoring in regions with similar pesticide use patterns.

8. ESTIMATED TIMETABLE

Field Sampling:	January 2025–December 2025
Chemical Analysis:	January 2025–February 2026
Draft Report:	May 2027
Data Entry into SURF:	May 2027

9. SAMPLING EVENTS

The sampling schedule for each county is provided in Table 15.

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11. TABLES

Table 1. Sampling site information for Study 321 in 2025.

County	Site ID	SURF ID	Location	Watershed	Latitude	Longitude	Waterbody Type	Site Type
Imperial	Imp_NewRiv27	13_71	New River at HWY S27/Keystone Rd	New River	32.9136	-115.60646	Waterway	Main Stem
Imperial	Imp_Lack	13_60	New River at Lack Road	New River	33.0999	-115.64876	Waterway	Main Stem
Imperial	Imp_Rice3	13_69	Rice Drain III at Weinert Rd	New River	32.8691	-115.651	Engineered Conveyance	Ag Ditch
Imperial	Imp_Rutherford	13_56	Alamo River at Rutherford Rd	Alamo River	33.0447	-115.48829	Waterway	Main Stem
Imperial	Imp_Garst	13_10	Alamo River at Garst Road	Alamo River	33.199	-115.59696	Waterway	Main Stem
Imperial	Imp_Holtville	13_22	Holtville Main Drain at HWY 115	Alamo River	32.9309	-115.40611	Engineered Conveyance	Ag Ditch
Monterey	Sal_Quail	27_7	Quail Creek at HWY 101; Spence and Potter Rds	Salinas River	36.6092	-121.56269	Waterway	Main Stem
Monterey	Sal_Chualar	27_8	Chualar Creek at Chualar River Rd	Salinas River	36.5584	-121.52964	Engineered Conveyance	Ag Ditch
Monterey	Sal_Davis	27_13	Salinas River at Davis Rd	Salinas River	36.647	-121.70219	Waterway	Main Stem
Monterey	Sal_Blanco	27_9	Blanco Drain at Cooper Rd	Salinas River	36.6987	-121.73516	Engineered Conveyance	Ag Ditch
Monterey	Sal_Hartnell	27_70	Alisal Creek at Hartnell Rd	Tembladero Slough	36.6435	-121.57836	Engineered Conveyance	Ag Ditch
Monterey	Sal_SanJon	27_12	Rec Ditch at San Jon Rd	Tembladero Slough	36.7049	-121.70506	Engineered Conveyance	Ag Ditch
Monterey	Sal_Tembl	27_57	Tembladero Slough at HWY 183	Tembladero Slough	36.75166	-121.74186	Waterway	Tributary Stream
Monterey	Sal_Haro	27_66	Tembladero Slough at Haro St.	Tembladero Slough	36.7596	-121.75433	Waterway	Main Stem
San Luis Obispo	SM_OFC	40_13	Oso Flaco Creek at Oso Flaco Creek Road	Oso Flaco Creek	35.0164	-120.58755	Waterway	Main Stem
Santa Barbara	SM_Solomon	42_48	Solomon Creek at HWY 1	Orcutt Creek	34.9414	-120.5742	Waterway	Tributary Stream
Santa Barbara	SM_Orcutt	42_50	Orcutt Creek at West Main St	Orcutt Creek	34.9576	-120.63244	Waterway	Main Stem
Santa Barbara	SM_Main	42_49	Main Ditch at HWY 166	Main Ditch	34.95474	-120.48501	Engineered Conveyance	Ag Ditch

Table 2. Pesticide prioritization for surface water monitoring in Alamo River in Imperial County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Permethrin	3	7	21	Yes
Pendimethalin	5	4	20	Yes
Trifluralin	5	4	20	Yes
Malathion	3	6	18	Yes
λ-cyhalothrin	2	8	16	Yes
Esfenvalerate	2	8	16	Yes
Imidacloprid	3	5	15	Yes
Carbaryl	3	5	15	Yes
Atrazine	3	5	15	Yes
4-(2,4-DB), dimethylamine salt	4	3	12	No[1]
Methomyl	3	4	12	Yes
Bensulide	5	2	10	Yes
Oxyfluorfen	2	5	10	Yes
Dimethoate	3	3	9	Yes
Methoxyfenozide	3	3	9	Yes
2,4-D	4	2	8	Yes
Linuron	2	4	8	No[1]
Chlorantraniliprole	2	4	8	Yes

Alamo River drainage area = 1,264 km^2

[1]Analytical method not currently available.

Table 3. Pesticide prioritization for surface water monitoring in New River in Imperial County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Pendimethalin	5	4	20	Yes
Malathion	3	6	18	Yes
Trifluralin	4	4	16	Yes
λ-cyhalothrin	2	8	16	Yes
Carbaryl	3	5	15	Yes
Imidacloprid	3	5	15	Yes
Permethrin	2	7	14	Yes
4-(2,4-DB), dimethylamine salt	4	3	12	No[1]
Methomyl	3	4	12	Yes
Bensulide	5	2	10	Yes
Atrazine	2	5	10	Yes
Oxyfluorfen	2	5	10	Yes
Dimethoate	3	3	9	Yes
Methoxyfenozide	3	3	9	Yes
2,4-D	4	2	8	Yes
Linuron	2	4	8	No[1]
Chlorantraniliprole	2	4	8	Yes

New River drainage area = 1,729 km^2
[1]Analytical method not currently available.

Table 4. Pesticide monitoring prioritization in Salinas River in Monterey County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Permethrin	3	7	21	Yes
Methomyl	5	4	20	Yes
Imidacloprid	4	5	20	Yes
Malathion	3	6	18	Yes
λ-cyhalothrin	2	8	16	Yes
Bifenthrin	2	8	16	Yes
Oxyfluorfen	3	5	15	Yes
Glufosinate-ammonium	4	3	12	Yes
Pyraclostrobin	3	4	12	Yes
Bensulide	5	2	10	Yes
Carbaryl	2	5	10	Yes
PCNB	3	3	9	No[1]
Spinetoram	3	3	9	No[1]
Cyantraniliprole	3	3	9	No[1]
Propyzamide	4	2	8	No[1]
Prometryn	2	4	8	Yes
Pendimethalin	2	4	8	Yes
Trifloxystrobin	2	4	8	Yes

Salinas River drainage area = 11,082 km^2
[1]Analytical method not currently available.

Table 5. Pesticide monitoring prioritization in Tembladero Slough in Monterey County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Malathion	4	6	24	Yes
Permethrin	3	7	21	Yes
Methomyl	5	4	20	Yes
Bifenthrin	2	8	16	Yes
λ-cyhalothrin	2	8	16	Yes
Oxyfluorfen	2	5	10	Yes
Imidacloprid	2	5	10	Yes
Cyantraniliprole	3	3	9	No[1]
Spinetoram	3	3	9	No[1]
Bensulide	4	2	8	Yes
Pyraclostrobin	2	4	8	Yes
Trifloxystrobin	2	4	8	Yes
Prometryn	2	4	8	Yes

Tembladero Slough drainage area = 291 km^2
[1]Analytical method not currently available.

Table 6. Pesticide monitoring prioritization in Orcutt Creek in Santa Barbara County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Malathion	5	6	30	Yes
Permethrin	3	7	21	Yes
Imidacloprid	4	5	20	Yes
Methomyl	4	4	16	Yes
Bifenthrin	2	8	16	Yes
Oxyfluorfen	3	5	15	Yes
Fenpropathrin	2	7	14	Yes
Prometryn	3	4	12	Yes
Pendimethalin	3	4	12	Yes
Novaluron	2	6	12	No[1]
Propyzamide	4	2	8	No[1]
Pyraclostrobin	2	4	8	Yes
Linuron	2	4	8	No[1]
Chlorantraniliprole	2	4	8	Yes

Orcutt Creek drainage area = 301 km^2

[1]Analytical method not currently available.

Table 7. Pesticide monitoring prioritization in Oso Flaco Creek in San Luis Obispo County.

Chemical	Use Score	Tox Score	Final Score	Monitoring Inclusion
Malathion	5	6	30	Yes
Permethrin	3	7	21	Yes
Bifenthrin	2	8	16	Yes
Oxyfluorfen	3	5	15	Yes
Imidacloprid	3	5	15	Yes
Fenpropathrin	2	7	14	Yes
Pendimethalin	3	4	12	Yes
Novaluron	2	6	12	No[1]
Cyprodinil	3	3	9	Yes
Methomyl	2	4	8	Yes
Pyraclostrobin	2	4	8	Yes
Trifloxystrobin	2	4	8	Yes
Prometryn	2	4	8	Yes

Oso Flaco Creek drainage area = 51 km^2

[1]Analytical method not currently available.

Table 8. Reporting Limits and Method Detection Limits for Pesticides in LC* Multi-Analyte Screen (EMON-SM-05-037).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
LC	Abamectin	4	20
LC	Acetamiprid	4	20
LC	Atrazine	4	20
LC	Azoxystrobin	4	20
LC	Bensulide	4	20
LC	Boscalid	4	20
LC	Bromacil	4	20
LC	Carbaryl	4	20
LC	Chlorantraniliprole	4	20
LC	Chlorpyrifos	4	20
LC	Cyprodinil	4	20
LC	Diazinon	4	20
LC	Diflubenzuron	4	20
LC	Dimethoate	4	20
LC	Diuron	4	20
LC	Ethoprop	4	20
LC	Etofenprox	4	20
LC	Fenamidone	4	20
LC	Fenhexamid	5	20
LC	Fludioxonil	4	20
LC	Hexazinone	4	20
LC	Imidacloprid	4	10
LC	Indoxacarb	4	20
LC	Isoxaben	4	20
LC	Kresoxim-methyl	4	20
LC	Malathion	4	20
LC	Mefenoxam	4	20
LC	Methidathion	4	20
LC	Methomyl	4	20
LC	Methoxyfenozide	4	20
LC	Metribuzin	4	20
LC	Norflurazon	4	20
LC	Oryzalin	4	20
LC	Oxadiazon	4	20
LC	Prometon	4	20
LC	Prometryn	4	20
LC	Propanil	4	20
LC	Propargite	4	20
LC	Propiconazole	4	20
LC	Pyraclostrobin	4	20
LC	Pyriproxyfen	4	15
LC	Quinoxyfen	4	20

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
LC	Simazine	4	20
LC	S-Metolachlor	4	20
LC	Tebuconazole	4	20
LC	Tebufenozide	4	20
LC	Tebuthiuron	4	20
LC	Thiabendazole	4	20
LC	Thiacloprid	4	20
LC	Thiamethoxam	4	20
LC	Thiobencarb	4	20
LC	Trifloxystrobin	4	20
LC	Fipronil	4	10
LC	Fipronil Amide	4	10
LC	Fipronil Sulfide	4	10
LC	Fipronil Sulfone	4	10
LC	Desulfinyl Fipronil	4	10
LC	Desulfinyl Fipronil Amide	4	10

*LC = Liquid chromatograph multi-analyte screen (54 AIs).

Table 9. Reporting Limits and Method Detection Limits for Dinitroanilines and Oxyfluorfen (DN/OX*) in whole water (EMON-SM-05-006).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
DN/OX	Benfluralin (*Benefin*)	14	50
DN/OX	Ethalfluralin	15	50
DN/OX	Oxyfluorfen	10	50
DN/OX	Pendimethalin	12	50
DN/OX	Prodiamine	12	50
DN/OX	Trifluralin	14	50

*DN/OX = dinitroanilines and oxyfluorfen.

Table 10. Reporting Limits and Method Detection Limits for Phenoxy in whole water (EMON-SM-05-012).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
Phenoxy	2,4-D	15	50
Benzoic acide	Dicamba	17	50
Phenoxy	MCPA	22	50
Pyridine	Triclopyr	20	50

Table 11. Reporting Limits and Method Detection Limits for Neonicotinoids in whole water (EMON-SM-05-052).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
Neonics	Clothianidin	4	20
Neonics	Dinotefuran	4	20
Neonics	Sulfoxaflor	4	20

Table 12. Reporting Limits and Method Detection Limits for Pyrethroids in whole water (EMON-SM-05-022).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
Pyrethroid	Bifenthrin	0.91	1
Pyrethroid	λ-cyhalothrin	1.74	2
Pyrethroid	Permethrin	1.05	2
Pyrethroid	Cyfluthrin	1.46	2
Pyrethroid	Cypermethrin	1.54	5
Pyrethroid	Fenpropathrin	1.32	5
Pyrethroid	Esfenvalerate	1.66	5
Pyrethroid	Deltamethrin	2.78	4

Table 13. Reporting Limits and Method Detection Limits for Glyphosate in whole water (EM-SM-05-046).

Analytic Screen	Pesticide	Method Detection Limit (ng/L)	Reporting Limit (ng/L)
Glyphosate	Glyphosate	4.95	70
Glyphosate	Glufosinate-ammonium	11.54	70
Glyphosate	Aminomethylphosphonic Acid (AMPA)	27.86	200

Table 14. Reporting Limits and Method Detection Limits for Pyrethroids in sediment (EMON-SM-52-9).

Analytic Screen	Pesticide	Method Detection Limit (ng/g dry wt)	Reporting Limit (ng/g dry wt)
Pyrethroid	Bifenthrin	0.1083	1
Pyrethroid	λ-cyhalothrin	0.1154	1
Pyrethroid	Permethrin	0.1159	1
Pyrethroid	Cyfluthrin	0.1830	1
Pyrethroid	Cypermethrin	0.1070	1
Pyrethroid	Fenpropathrin	0.1094	1
Pyrethroid	Esfenvalerate	0.1430	1
Pyrethroid	Deltamethrin	0.0661	1

Table 15. Number of samples for pesticide analyses by counties from January to December 2025*.

Analyte Group**	Location[1]	Mar	May	July	Sept	Oct	Fall Storm	Winter Storm***	Total samples[2]
LC-Full	Imperial	6				6			12
DN/OX	Imperial	6				6			12
Phenoxy	Imperial	6				6			12
Neonics	Imperial	6				6			12
PY-Water	Imperial	6				6			12
PY-Sediment	Imperial					6			6
LC-Full	CC		12	12	12		8	8	52
DN/OX	CC		12	12	12		8	8	52
Neonics	CC		12	12	12		8	8	52
PY-Water	CC		12	12	12		8	8	52
GL	CC		12	12	12		8	8	52
PY-Sediment	CC				12				12
Overall		**30**	**60**	**60**	**72**	**36**	**40**	**40**	**338**

*Numbers under each month represent the total number of samples collected for each analyte or analyte group. One whole water grab sample for each analyte or analyte group will be collected from one site.

**LC = Liquid chromatograph multi-analyte screen (54 AIs); DN/OX = Dinitroaniline & Oxyfluorfen; Neonics = Neonicotinoids; PY = Pyrethroid; GL = Glyphosate.

***Winter storm could possibly occur in the following year (2026).

[1]CC = Central Coast = Monterey, Santa Barbara and San Luis Obispo counties.

[2]10% of the equivalent total samples collected will be used for QA/QC.

Table 16. Top ten HUC12's identified for agricultural monitoring in Imperial Valley, ordered by the ranking process.

HUC12 Code	HUC12 Name	DPR Monitoring Location	Comments
181002040703	Town of Fuller-Alamo River	Imp_Holtville	
181002040704	Gieselmann Lake-Alamo River		Drains into Ramer Lake-Alamo River and Obsidian Butte-Frontal Salton Sea HUC12 waterways
181002040705	Ramer Lake-Alamo River	Imp_Rutherford	
181002041202	Obsidian Butte-Frontal Salton Sea	Imp_Garst, Imp_Lack	
181002040702	Ash Main Canal-Alamo River	Sal_Haro, Sal_Tembl, Sal_SanJon	Drains into Town of Fuller-Alamo River HUC12 waterways

HUC12 Code	HUC12 Name	DPR Monitoring Location	Comments
181002010804	Guadalupe Creek-Whitewater River		SWAMP monitoring location along Whitewater River*

*Non-DPR monitoring locations evaluated using California Environmental Data Exchange Network (CEDEN) available at: http://www.ceden.org/

Table 17. Top ten HUC12's identified for agricultural monitoring in Central Coast, ordered by the ranking process.

HUC12 Code	HUC12 Name	DPR Monitoring Location	Comments
180600080503	Corralitons Canyon	SM_Orcutt, SM_Main, SM_Solomon	
180600080502	Lower Orcutt Creek		Drains into Corralitos Canyon HUC12 waterways
180600080404	Santa Maria Canyon-Sisquoc River		Drains into Corralitos Canyon HUC12 waterways
180600080603	Lower Santa Maria River		Drains into Corralitos Canyon HUC12 waterways
180600150103	Alisal Slough-Tembladero Slough	Sal_Haro, Sal_Tembl, Sal_SanJon	
180600150102	Natividad Creek-Gabilan Creek		Drains into Alisal Slough-Tembladero Slough HUC12 waterways
180600051505	Johnson Creek	Sal_Chualar	
180600051311	Paraiso Springs-Arroyo Seco		Drains into Salinas River which is sampled downstream at Alisal Creek-Salinas River and Johnson Creek HUC12 sites
180600051004	Lower San Lorenzo Creek		Drains into Salinas River which is sampled downstream at Alisal Creek-Salinas River and Johnson Creek HUC12 sites
180600051509	Alisal Creek-Salinas River	Sal_Blanco, Sal_Davis, Sal_Hartnell	
180600060704	Oso Flaco Creek	SM_OFC	

13. FIGURES

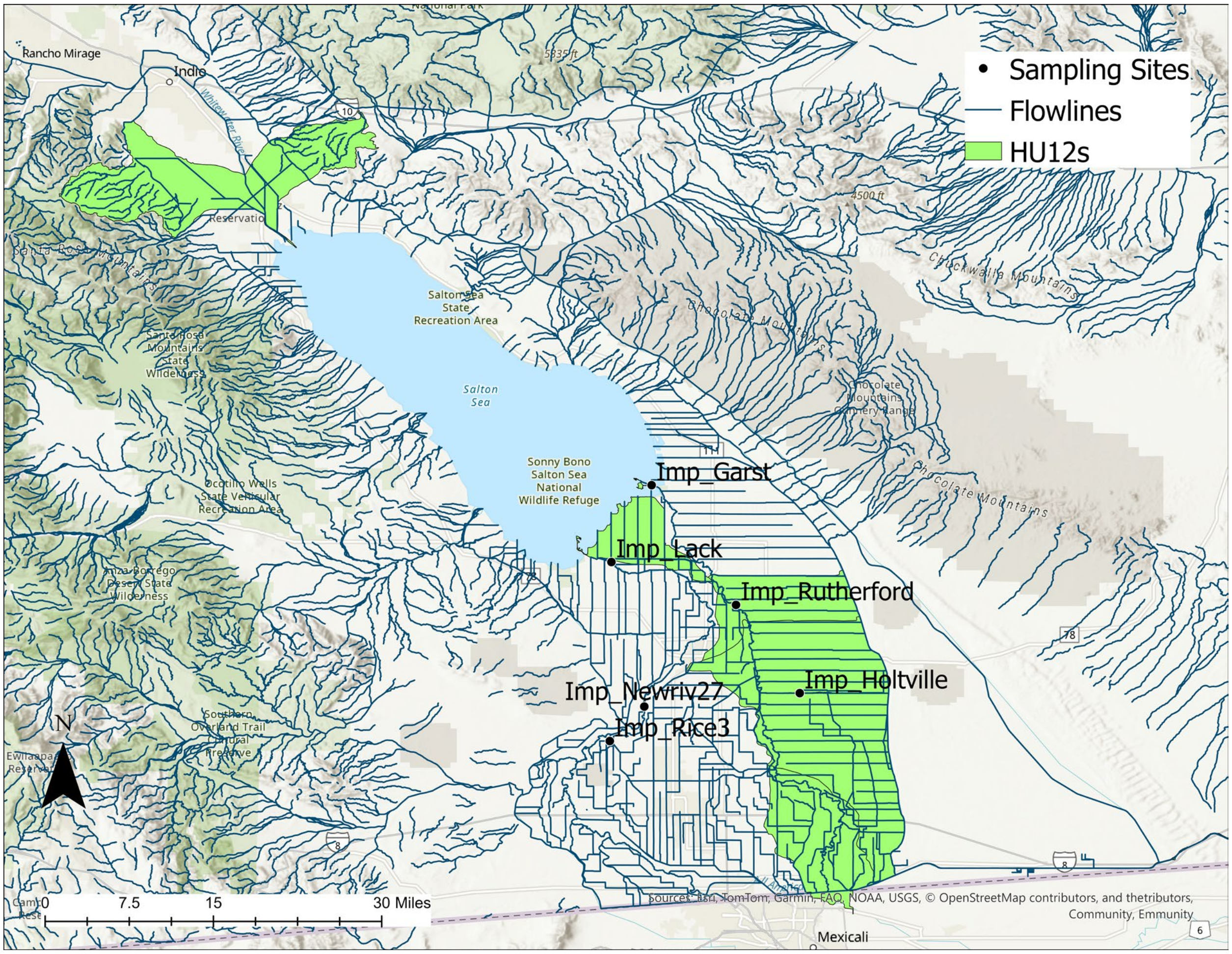

Figure 1. Monitoring sites in Alamo River and New River in Imperial County.

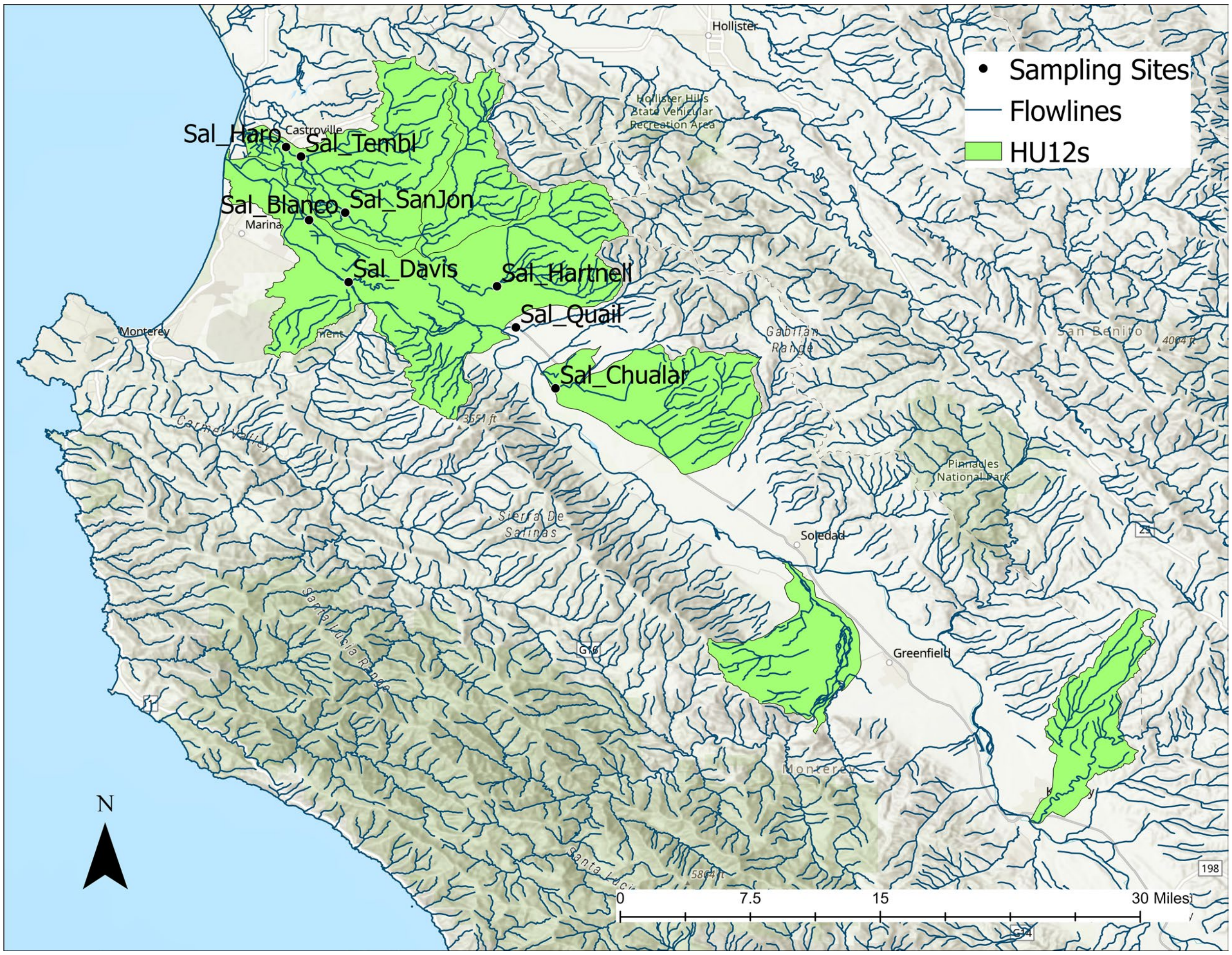

Figure 2. Monitoring sites in Salinas River and Tembladero Slough in Monterey County.

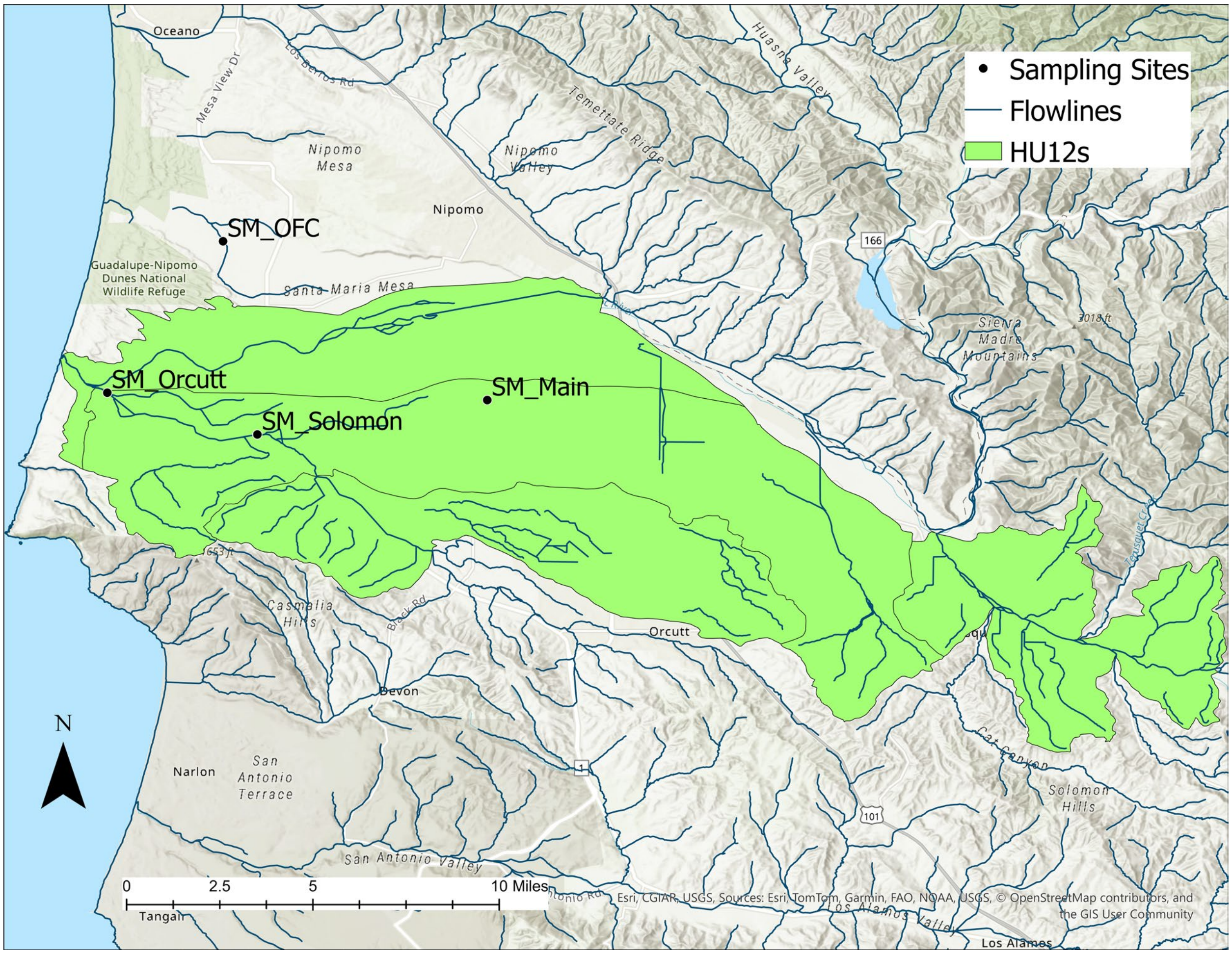

Figure 3. Monitoring sites in Orcutt Creek and Oso Flaco Creek in San Luis Obispo and Santa Barbara Counties.