



BASELINE PYRETHROID MONIOTRING PLAN

Lake County Clean Water Program

Lake County Clean Water Program Municipal Storm Sewer Program (MS4) Baseline Monitoring Plan to accompany the Quality Assurance Project Plan.

For the jurisdictions of County of Lake, City of Lakeport, and City of Clearlake





Document Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Baseline Pyrethroid Monitoring Plan

Table of Contents

Introduction to Pyrethroid Sampling Requirement	3
Sampling Frequency	4
Sampling Locations	4
Pyrethroid Sampling	8
Sampling Methods	8
Water Column Sampling.....	9
Sediment Sampling	9
Additional Site Sampling	9
Resolution R5-2017-0057: Estimated Cost of Compliance	10

Table of Tables

Table 1 Pyrethroid Sampling Schedule.....	4
Table 2 Pyrethroid Sediment and Water Column Representative Monitoring Locations.....	7
Table 3 Pyrethroid Triggers / Exceedance Levels	9
Table 4 Pyrethroid Sampling Protocols and Methods.....	10
Table 5 Estimated Compliance Cost for Pyrethroid One-Time Baseline Sampling	11

Table of Figures

Figure 1 General timeline for pyrethroid baseline monitoring per Resolution No. R5-2017-0057	3
Figure 2 Selected representative pyrethroid sampling locations.....	6
Figure 3 Lake County Storm Water Selected Pyrethroid Sample Locations.....	7



Introduction to Pyrethroid Sampling Requirement

On June 8, 2017, the Basin Plan Amendment and TMDL for the Control of Pyrethroid Pesticide Discharges in the Sacramento and San Joaquin River Basin (BPA) was approved by the Central Valley Regional Water Quality Control Board (hereinafter referred to as “the Board”). The Basin Plan Amendment (Resolution No. R5-2017-0057) established a Pyrethroids Control Program that includes conditional prohibition of discharges and baseline water quality monitoring requirements. Phase II MS4 permittees may forego baseline monitoring if the permittee(s) determine that their stormwater discharges are adequately represented by existing data showing that Northern California stormwater discharges are known to contain concentrations of pyrethroids in exceedance of trigger levels. Permittees that choose to forego baseline monitoring must submit a pyrethroids management plan by August 19, 2021. Permittees that opt to conduct baseline monitoring must submit their results to the Board on or before October 19, 2021. Refer to figure 1 for a general timeline of events in accordance with baseline monitoring conducted under Resolution No. R5-2017-0057.

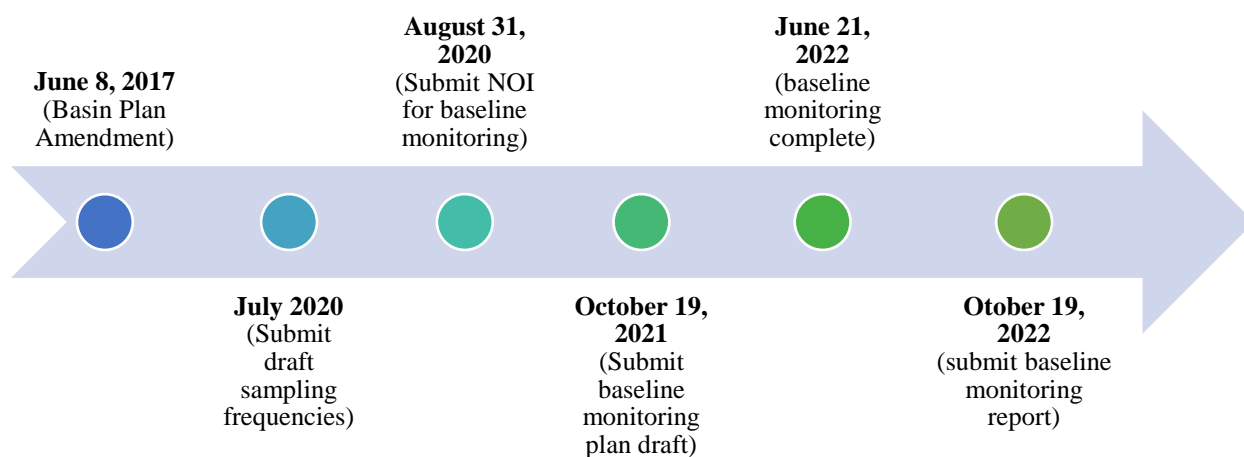


Figure 1 General timeline for pyrethroid baseline monitoring per Resolution No. R5-2017-0057

The County of Lake, the City of Clearlake, and the City of Lakeport (hereinafter referred to as “co-permittees”) submitted a Notice of Intent (NOI) to conduct baseline monitoring of pyrethroids on August 31, 2020. If trigger levels are not exceeded during baseline monitoring, co-permittees will formally request permission from the Board to cease sampling and forego the development of a pyrethroids management plan. If trigger levels are exceeded during baseline monitoring, the Board requires subsequent development of a pyrethroids management plan by either August 19, 2021 or one year from the date the exceedance was determined. The frequency of baseline sampling must be approved by the Board before the results can be used to satisfy monitoring requirements, therefore, the Board requested proposed monitoring plans by July 2020. The Co-permittees submitted this draft monitoring plan to the Board for review on August 25th.



along with the accompanying Baseline Monitoring Quality Assurance Project Plan (QAPP) DRAFT document prepared with assistance from EOA, Inc. More details to support this baseline monitoring plan are provided in the QAPP.

Sampling Frequency

The time and frequency of sample collection is based on qualifying wet and dry weather events in 2021-2022. Co-permittees will take four water column samples and five sediment samples from the four representative locations throughout Lake County MS4 direct discharge areas. All samples will be taken by field personnel in accordance with SWAMP methods. Water column samples will be analyzed for pyrethroid pesticides (bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda cyhalothrin, permethrin), total organic carbon (TOC), and dissolved organic carbon (DOC). A 96-hour bioassay using *H. azteca* as a test organism will be collected to quantify water column toxicity of selected, representative MS4 discharges. There must be a total of three wet weather events and one dry weather event to complete the monitoring requirements. The dry weather event must be collected prior to Sept 30, 2021. If there are no qualifying wet weather events during the monitoring period, the monitoring will be extended until three qualifying wet weather events occur. If the last wet weather event occurs after September 19, 2022, the baseline monitoring report will be due 90 days after the last qualifying wet weather event. See Table 1 for qualifying wet and dry weather events.

Table 1 Pyrethroid Sampling Schedule

Type	Sample Location(s)*	Analyses	No. of Samples	Frequency
Water Column	CL1, LP1, N1, M1	1.Total Permethrin 2. TOC 3. DOC 4. 10-day bioassay (<i>H. azteca</i>)	4	3 qualifying wet weather events: When rainfall approaches or exceeds 1 inch in an hour (www.cnrfc.noaa.gov) or when tributary flow is 200-400 (cfs) http://cdec.water.ca.gov/dynamicapp/queryGroup?s=MFE
Sediment	CL1, LP1, N1, M1	1. 10-day bioassay (<i>H. azteca</i>)	4	1 qualifying dry weather event: When tributary flow is less than 100 cfs http://cdec.water.ca.gov/dynamicapp/queryGroup?s=MFE

*Location specifics are provided in Table A2.

Sampling Locations

Locations for sampling pyrethroids from sediments were selected based on their accessibility during storm events, the presence of sediment directly downstream or at the bottom of an outflow that best represents an urban, MS4 area of typical density and land use within Lake County. There are a total of four locations within the county that will be sampled for sediment pyrethroids, two located in County of Lake co-permittee MS4 urban area locations (Nice, Middletown) and one



location in each of the City permittees (Lakeport and Clearlake). The specific locations and relevant addresses are provided in Table 2.

Co-permittees will take four water column samples and five sediment samples from the four representative locations throughout Lake County MS4 direct discharge areas. Three of the sites are discharges into Clear Lake and one is discharge into the other main watershed in Lake County, Putah Creek, located downstream of the Middletown MS4 discharge area. The representative locations will be receiving water sites downstream of MS4 discharge or taken directly from the MS4 discharge.

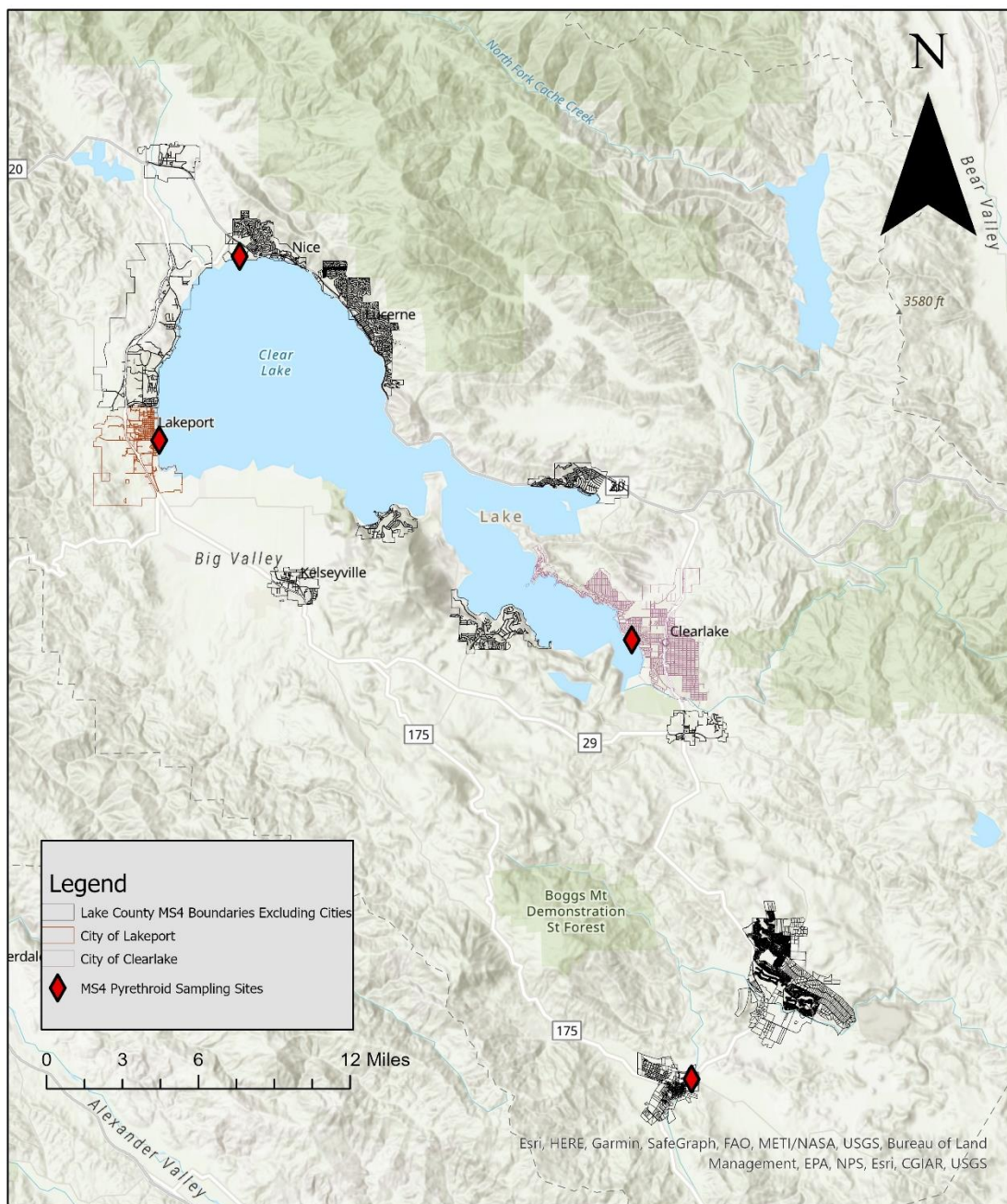


Figure 2 Selected representative pyrethroid sampling locations. Red diamonds represent approximate locations of sampling for baseline pyrethroid monitoring plan, exact locations and addresses are provided in Table 2.

Table 2 Pyrethroid Sediment and Water Column Representative Monitoring Locations.
Letters in Parenthesis in the Region Name Column correspond with site photos in Figure 3.

Region Name	Site Name	Latitude	Longitude	Closest Address
City of Clearlake (A)	CL1	38.95184	-122.642	14460 Lakeshore Drive, Clearlake, CA
City of Lakeport (B)	LP1	39.040489	-122.912023	Outfall on First Street, Lakeport, CA
Nice (C)	N1	39.12203823	-122.8660893	2503 Lakeshore Blvd, Nice, CA
Middletown (D)	M1	38.75639598	-122.6078505	St. Helena Creek Rd, Middletown, CA



Figure 3 Lake County Storm Water Selected Pyrethroid Sample Locations.
A. Clearlake on Lakeshore Blvd. B. Lakeport Forbes Creek at Main St. C. Lake County site in Upper Lake at highway 20. D. Middletown at St. Helena Creek.



Pyrethroid Sampling

The pyrethroid sampling outlined in this section satisfies Resolution No. R5-2017-0057 which established a Pyrethroids Control Program in the Central Valley Region. The Monitoring Plan includes the collection of grab samples from four stations that were selected to characterize urban, MS4 areas of typical density and land use within Lake County. Not to surpass 21 June 2022, Water column samples will be monitored for total permethrin (including a total permethrin concentration and five pyrethroid insecticides quantified separately), total organic carbon (TOC), and dissolved organic carbon (DOC). A 10-day bioassay using *H. azteca* as a test organism will be collected to quantify water column toxicity of selected, representative MS4 discharges. Water and sediment samples will be collected during three qualifying wet weather events (i.e., when rainfall approaches or exceeds one inch in an hour or when tributary flow is 200-400 cfs) and one qualifying dry weather event (i.e., when tributary flow is less than 100 cfs). A total of four water column sampling events will take place at the representative monitoring locations throughout Lake County MS4 areas. A total of 5 sediment samples will be collected at the representative monitoring locations at discharges into Clear Lake and one into Putah Creek (i.e. Middeltown). If the results exceed the triggered levels specified in Table IV-Z of Resolution R5-2017-0057, co-permittees will develop a pyrethroids management plan.

Both water column and sediment sampled will be collected at each site at the same time during required wet and dry storm events as described in Table 1. Table 4 outlines the general requirements for pyrethroid sampling.

Sampling Methods

Samples will generally be collected from shore in wadeable waters, in most cases by using a near-surface grab sample. Grab samples will be collected into appropriate pre-cleaned containers and aliquoted into glass, polyethylene, or Teflon sample containers appropriate for the analyses to be performed or will be collected directly into the sample containers, if appropriate. After collection, field-collected samples will be stored at between 0 and 6°C until arrival at the contract laboratory.

Grab samples are collected whenever feasible by direct submersion of the sample container into the stream, or flow from an outfall. When feasible, the sample containers should be opened, filled and recapped below the water surface. Samples should always be collected upstream of sampling personnel and equipment, and with the sample container pointed upstream when the container is opened for sample collection. Care must be taken not to sample water downstream of areas where sediments have been disturbed in any manner by field personnel.

If the centroid of the stream cannot be sampled by wading, sampling devices can be used to reach the sampling location. Such devices typically involve a means to extend the reach of the sampler, with the sample bottle attached to the end of the device for filling at the desired location. These methods do not allow opening of the sample container under water. When sampling from a stream bank, the sample container is attached to a device which is attached in turn to the end of an extendable sampling pole.



Water Column Sampling

Total permethrin water column samples will be taken by field personnel in accordance with SWAMP methods and sent to Pacific EcoRisk/CalTest for analysis via EPA625.1M. Method EPA625.1M requires three 1-liter unpreserved amber glass bottles and has a hold time of 3 days. Samples must be refrigerated or on ice to maintain a maximum temperature of 6°C. The analysis should be written on the COC as “Pyrethroid Pesticides, Total”. Additional analytes should be reported separately and should be listed on the COC as follows, “Bifenthrin”, “Cyfluthrin”, “Cypermethrin”, “Esfenvalerate”, and “Lambdacyhalothrin”. Table 3 outlines the exceedance levels associated with pyrethroids.

Table 3 Pyrethroid Triggers / Exceedance Levels

Target Pyrethroid	Acute (ng/L) / (µg/L)	Chronic (ng/L) / (µg/L)
Bifenthrin	0.8 / 0.008	0.1 / 0.001
Cyfluthrin	0.8 / 0.008	0.2 / 0.002
Cypermethrin	1.0 / 0.01	0.3 / 0.003
Esfenvalerate	2.0 / 0.02	0.3 / 0.003
Lambdacyhalothrin	0.7 / 0.007	0.3 / 0.003
Permethrin (total)	6 / 0.006	1 / 0.001

¹These values are identified by UC Davis 5th Percentile Criteria and provided in the updated Central Valley Regional Water Quality Control Board titled “Proposed Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Pyrethroid Pesticides Discharges Final Staff Report” (June 2017) Available:

https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/pyrethroid_tmdl_bpa/staff_report_bpa_dev/2017june/2017june_pyrbpa_fsr.pdf

Sediment Sampling

Sediment samples will be collected in accordance with the methods described in USGS report 2009-5012 ([Collection of Pyrethroids in Water and Sediment Matrices: Development and Validation of a Standard Operating Procedure](#)). Specifically, trained and prepped field staff will collect sediment “grab samples” by carefully standing directly downstream of the undisturbed sample site in-stream, and using a stain-less steel large kitchen spoon (i.e. not a ladle but a larger stainless steel scooping spoon) and scoop up the top 2 cm of depositional sediments from the same area of stream to fill (at least 75% full) a clean, sterilized 500ml glass jar with plastic screw top. For all sample events, one site will also include a second sampling from the same area to serve as a field duplicate sample to ensure field technique is consistent and meet the QA/QC requirements. Please refer to the QAPP for more details as needed for sediment sampling.

Additional Site Sampling

Total organic carbon (TOC) water column samples will be taken by grab sample by field personnel and sent to Pacific EcoRisk Laboratory / Alpha Analytical Laboratory for analysis via SM5310C. SM5310C for TOC water column samples requires two 40mL amber glass vials preserved with



phosphoric acid. TOC samples have a 28-day hold time. Results for water column samples will be in mg/L. The analysis should be written on the COC as “TOC”.

Dissolved organic carbon (DOC) water column samples will be taken by grab sample on site by field personnel and sent to Pacific EcoRisk / Alpha Analytical Laboratory for analysis via SM5310C. SM5310C for DOC water column samples requires one 125mL unpreserved amber glass bottle. DOC samples have a 28-day hold time. Results for water column samples will be in mg/L. The analysis should be written on the COC as “DOC”. Please refer to the QAPP for more details related to additional site sampling.

Table 4 Pyrethroid Sampling Protocols and Methods

Constituent	Sample Type	Analyzed by	Method	Bottle Req.	Hold Time	Temp Req.
Total Permethrin, Bifenthrin, Cyfluthrin, Cypermethrin, Esfenvalerate, Lambdacyhalothrin	Water Column	Pacific EcoRisk /CalTest	EPA625.1M	3x 1L unpreserved amber glass	3 days	Cool (0-6°C)
Total Organic Carbon (TOC)		Alpha Analytical	SM5310C	2x 40mL amber glass (H ₃ PO ₄)	28 days	
Dissolved Organic Carbon (DOC)				125mL unpreserved amber glass		
H. Azteca toxicity bioassay	Water Column	Pacific EcoRisk	EPA-821-R-02-012	2x 1-gallon amber glass bottle	36 hours	
	Sediment	Pacific EcoRisk	EPA-600/ R-99-064	2-liter jar	14 days	

Resolution R5-2017-0057: Estimated Cost of Compliance

Table A5 outlines the estimated cost of compliance with Resolution R5-2017-0057. The cost distribution is determined by the four representative sample sites, 2 within the County jurisdiction and one for each city jurisdiction. The sub-total cost for sampling lab analysis and prep for the four sites over the required five qualifying sample events is \$45,908. This programmatic sampling costs will impact Lake County co-permittees budgets for a single year (estimated July 2021 – June 2022). The individual cost shared amounts are provided in the bottom three lines of Table A5. As being the second “poorest” county within the state of California, as determined by the median income being <20% of the state average, this cost is significant to all co-permittees and will be sourced from the same budgets utilized to improve storm water programs, projects, and infrastructure.

For the Baseline Pyrethroid monitoring plan activities, the Cities of Lakeport and Clearlake are going to contract with Lake County Water Resources Department to conduct both dry and wet weather sampling. Coordinating, preparation, monitoring, sampling, shipping, and data collection, analysis, and reporting will be reimbursed from the cities to the Counties in monthly installments



during the baseline monitoring project duration. This cost breakdown is described below Table 5. The estimated cost for conducting sampling does not exceed the \$45,000 as estimated by the Water Board in the original

Table 5 Estimated Compliance Cost for Pyrethroid One-Time Baseline Sampling

Co-Permittee Shared Expenses	Parameter being Sampling and Matrix	Sites	Events	Cost per Sample / unit	Sub Total Cost
	Total Pyrethroids (Water)	4	4	\$400.00	\$6,400.00
	Total Organic Carbon (TOC) (Water)	4	4	\$76.50	\$1,224.00
	Dissolved Organic Carbon (DOC) (Water)	4	4	\$76.50	\$1,224.00
	H. Azteca toxicity bioassay (water)	4	4	\$953.00	\$15,248.00
	H. Azteca toxicity bioassay (soil)	4	5	\$1,332.00	\$21,312.00
	Field Labor Hours (crew =3)	-	-	\$71.00 / hour*	\$4,260.00
	Handling and Preparation	-	-	\$71.00 / hour	\$710.00
	Project Coordinating (lab communications, reporting prep, data collection, analysis, troubleshooting)	-	-	\$71.00 / hour	\$2,840.00
	Travel Clearlake (mileage 365 miles)	4	5	0.39 / mile	\$143.00
Total for Shared Expenses					\$53,361.00
County of Lake (2 sites, 50%)					\$26,680.50
City of Lakeport (1 site, 25%)					\$13,197.25
City of Clearlake (1 site, 25%) + mileage \$143					\$13,483.25

*This cost per hour reflects the highest hourly wage to be applied, however in all likelihood field crews will include staff that bill at a lower wage but it's unknown at this time the exact crew composition to be used for every sample event.