City of Santa Barbara Creeks Division
Fiscal Year 2025 Annual Water Quality Monitoring and Research Report

Report on data collected between July 1, 2024 and June 30, 2025, according to the Fiscal Year 2025 Water Quality Research and Monitoring Plan

Introduction

The following report describes sampling and results that were based on the Fiscal Year 2025 (FY 2025) Research and Monitoring Plan (Appendix A). The Research Plan is organized around program elements and research questions that have been reviewed by the Creeks Advisory Committee (CAC). The Research and Monitoring Program is adaptive, and as questions are answered or modified, sampling strategies change as well. The program elements and research questions are provided below. Where possible, the report is organized around the research questions.

Fiscal Year 2025 Research and Monitoring Plan

Creeks Division staff have monitored water quality in local water bodies since the Division was formed in 2001. Each year, staff review and revise as necessary the annual Research and Monitoring Plan. The following are the goals and focus areas for FY 2025.

The purpose of the monitoring program is to obtain information that can be used to:

1. Develop strategies for water quality improvement, including evaluation and prioritization of projects and programs.
2. Track long-term trends to understand changes over time in surface water quality.
3. Provide clear and accessible information to the public about water quality.
4. Understand the role of climate change and sea level rise in altering creek conditions.

The goals of the monitoring program are to:

1. Assess the impacts of chemical and microbial pollutants:
    a. Identify suspected pollutants of concern, including conventional pollutants such as metals, organics, nutrients, fecal indicator bacteria, trash, and sediment, and emerging contaminants such as personal care products,

newer pesticides, microplastics, per- and polyfluoroalkyl substances, and pathogens. This effort includes field parameters such as dissolved oxygen, pH, temperature, conductivity, and chlorophyll a.

b. Quantify the levels (concentration, flux, and/or load) of microbial contamination and chemical pollution entering waterbodies from surrounding watersheds.

c. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.

    i. Compare pollutant levels to known toxicity thresholds.

    ii. Use toxicity testing and bioassessment to further assess impacts.

d. Identify sources of pollutants to creeks and storm drains, including interactions with groundwater and infrastructure.

2. Evaluate the effectiveness of Creeks Division projects on improving water quality, including collection of baseline data for future projects.
3. Implement hydrologic models of creeks to predict alterations in flow due to climate change.
4. Evaluate the role of infiltration and groundwater movement on creek water quality and quantity, including the intersection with sea level rise.
5. Where feasible, evaluate the effectiveness of City programs, including street sweeping and outreach efforts, in reducing pollutants.
6. Evaluate long-term trends in water quality and quantity.
7. Fulfill monitoring requirements for grants and project permits.
8. Achieve General Permit monitoring requirements.
9. Investigate 303(d)-listed waterbody impairments.
10. Employ contemporary tools to conduct advanced research and monitoring with rigorous quality standards and data management methods.

The FY 2025 Research Plan follows very closely the FY 2024 Plan, as efforts are ongoing. The focus in FY 2025 was on four main efforts: permit required monitoring, long term monitoring, microbial source tracking, and sampling for microplastics.

Water Year 2025 Rainfall

Rainfall data from the Santa Barbara County Building location downtown was downloaded from the Santa Barbara County website. Note that the County reports rainfall in Water Year periods, which do not completely match with City FY periods, though there is overlap and both contain the same winter storm season. Water Year 2025 was from September 1, 2024 through August 31, 2025, and FY 2025 was from July 1, 2024 through June 30, 2025. Water Year 2025 recorded 10.35" at the County Building (Figure 1), which is less than the previous two years (32.96" in Water Year 2024, 37.03" in Water Year 2023) (Figure 2). Despite extremely low rainfall, many creeks flowed throughout the year due to the two previous wet years.

Figure 1: Water Year 2025 accumulated rainfall at the Santa Barbara County Building.

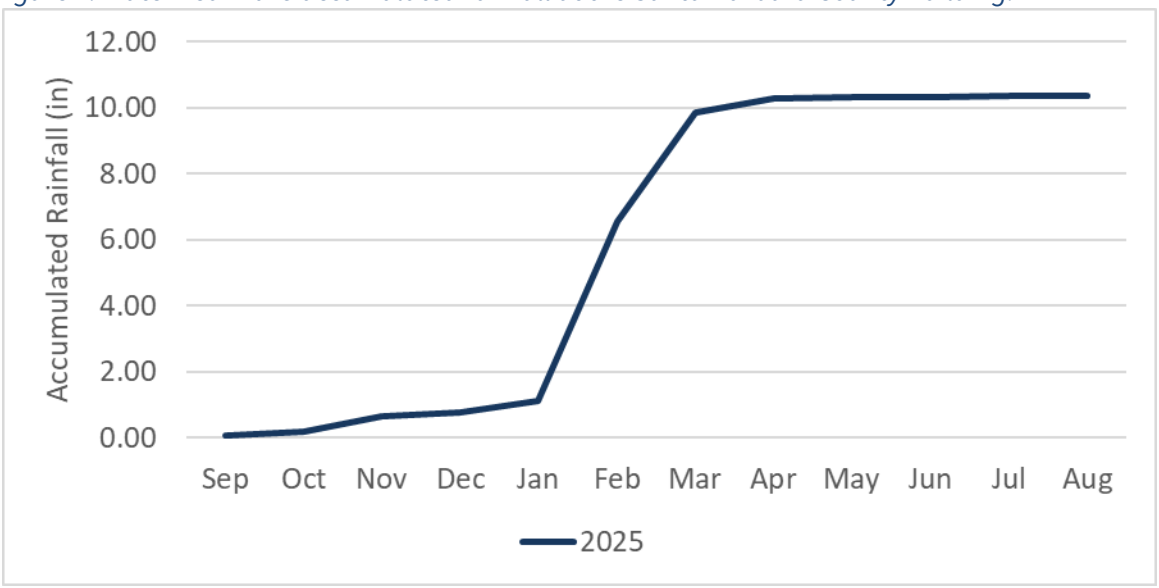
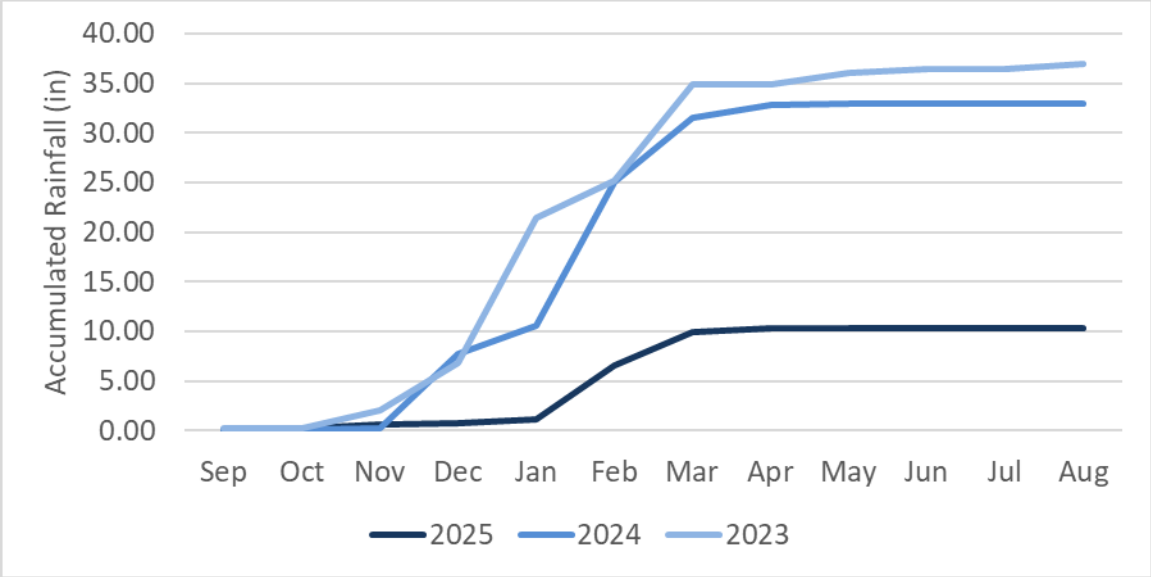


Figure 2: Water Year 2025 accumulated rainfall at the Santa Barbara County Building compared to 2024 and 2023.



Select Results

General Permit Monitoring

During FY 2025 (Permit Year 12), the Creeks Division continued sampling required by the City's National Pollutant Discharge Elimination System (NPDES) General Permit, including outfall testing and 303(d) sampling (biweekly indicator bacteria sampling at several locations) under the 2015 Regional-Board Approved Monitoring Plan (MP)/Quality Assurance Project Plan (QAPP). The City also carried out extensive monitoring and research under the Creeks Advisory Committee-reviewed Water Quality Research and Monitoring Plan (Appendix A).

303(d) Monitoring

303(d) Monitoring for fecal indicator bacteria (FIB) was carried out according to the 2015 approved MP/QAPP. FIB are commonly found in human and animal feces and are used as indicators of fecal contamination. Their presence in a water sample indicates that disease-causing organisms (pathogens) may also be present. The most commonly tested FIB are total coliforms, fecal coliforms, *Escherichia coli* (*E. coli*), and enterococci. Total coliforms are a

group of bacteria widespread in nature and common to human feces, but may also be present in animal feces, soil, and other sources outside of the human body. Fecal coliforms, a subset of total coliforms, are more fecal-specific, but also contain some non-fecal species. *E. coli* is a fecal coliform that is found in human feces and feces from other warm-blooded animals. Enterococci are a fecal streptococcus subgroup generally present in human and other warm-blooded animal feces, with very high concentrations in bird feces, and can survive in salt water. While total coliforms and fecal coliforms were used as indicators in the past, most agencies currently recommend using *E. coli* and enterococci as indicators in recreational waters. Results are provided as most probable number (MPN) or colony forming units (CFU) per 100 mL.

The 2010 303(d) Listings used in the 2015 MP/QAPP included Arroyo Burro Creek for *E. coli* and fecal coliforms, Mission Creek for *E. coli* and fecal coliforms, and Sycamore Creek for fecal coliforms. An "integrator" site, i.e. the most downstream location above tidal influence, was selected for each creek: Arroyo Burro Creek at Cliff Drive (AB Cliff), Mission Creek at Montecito Street (MC Monteci), and Sycamore Creek below the railroad tracks (SC Railroa). FIB samples were collected approximately biweekly, with the following exceptions: Sycamore Creek was not sampled on 14 sample dates due to non-existent flow in the creek and staff turnover. Mission Creek and Arroyo Burro were not sampled on five dates and seven dates, respectively, due to staff turnover.

Although the three creeks were only listed for *E. coli* and/or fecal coliforms, samples were analyzed for total coliforms, *E. coli*, and enterococci. Sycamore Creek was delisted for fecal coliforms in 2020, but samples continue to be collected and analyzed for FIB. The Project Action Limit in the MP/QAPP for *E. coli*/fecal coliforms was based on the Water Quality Control Plan for the Central Coastal Basin's bacteria water objective for non-contact water recreation (REC-2): for a minimum of five samples in any 30-day period, concentration shall not exceed a log mean of 2,000 MPN/100 mL, nor shall more than ten percent of samples collected during

any 30-day period exceed 4,000 MPN/100 mL. As typically less than five samples are collected per 30-day period, the upper limit functions as a single sample maximum for these samples.

FIB results are shown in Figure 3, with the Project Action Limit for *E. coli*/fecal coliforms (4,000/100 mL) shown for visual comparison. Four samples (two from AB Cliff, two from MC Monteci) exceeded the action limit for *E. coli*, on sampling events that occurred during or just after rain events. Table 1 shows all FIB results from these three creeks in FY 2025. For comparison purposes, beach water quality exceedances for the beaches these three creeks discharge to are summarized in Table 2. These data were acquired from the County of Santa Barbara Ocean Water Monitoring Program and were not sampled by the City. Note that the County uses State Health Standards for water contact recreation to evaluate their FIB results, which include: single-samples should not exceed 10,000 MPN/100 mL for total coliforms, 400 MPN/100 mL for fecal coliforms or E. coli, 104 MPN/100 mL for enterococcci, or ratio of fecal to total coliforms 0.1 (if total coliforms >1,000 MPN/100 mL).

Figure 3. Fecal indicator bacteria results during FY 2025. Missing data points represent dates when creek was not flowing due to drought or samples were not collected due to staffing limitations. Open symbols indicate censored values (<10 or >24,196 MPN/100 mL). The Project Action Limit for fecal coliforms/E. coli (4000 MPN/100 mL) is indicated with a horizontal dashed line. The samples that exceeded the action limit for E. coli corresponded with rain events.

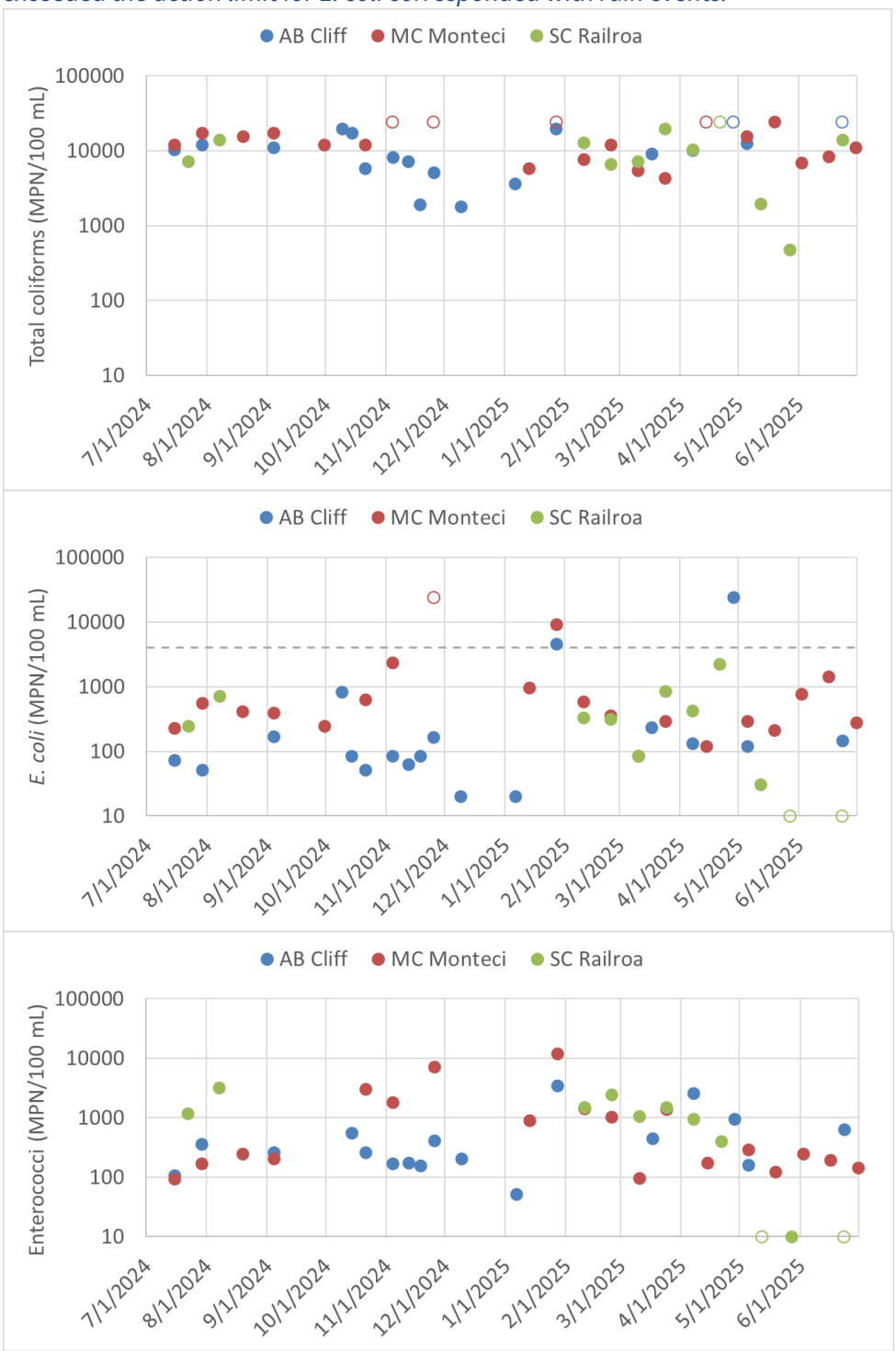


*Table 1. 303(d) Fecal Indicator Bacteria Results for FY 2025. Red text with an * indicates exceedance of the Project Action Limit for fecal coliforms/E. coli (4000 MPN/100 mL) or the ratio of E. coli to total coliforms 0.1 (if total coliforms >1,000 MPN/100 mL). **indicates that the ratio could not be calculated due to censored total coliforms or E. coli results. Enterococci results were not available for AB Cliff on 10/9/24 and MC Monteci on 9/30/24.*

Site	Sample Date	Analyte	Qualifier	Result	Units	Ratio
AB Cliff	7/15/2024	Total coliforms		10462	MPN/100mL	0.01
AB Cliff	7/15/2024	*E. coli*		74	MPN/100mL	
AB Cliff	7/15/2024	Enterococci		109	MPN/100mL	
AB Cliff	7/29/2024	Total coliforms		12033	MPN/100mL	0.00
AB Cliff	7/29/2024	*E. coli*		52	MPN/100mL	
AB Cliff	7/29/2024	Enterococci		359	MPN/100mL	
AB Cliff	9/4/2024	Total coliforms		11199	MPN/100mL	0.02
AB Cliff	9/4/2024	*E. coli*		171	MPN/100mL	
AB Cliff	9/4/2024	Enterococci		262	MPN/100mL	
AB Cliff	10/9/2024	Total coliforms		19863	MPN/100mL	0.04
AB Cliff	10/9/2024	*E. coli*		836	MPN/100mL	
AB Cliff	10/14/2024	Total coliforms		17329	MPN/100mL	0.00
AB Cliff	10/14/2024	*E. coli*		85	MPN/100mL	
AB Cliff	10/14/2024	Enterococci		556	MPN/100mL	
AB Cliff	10/21/2024	Total coliforms		5794	MPN/100mL	0.01
AB Cliff	10/21/2024	*E. coli*		52	MPN/100mL	
AB Cliff	10/21/2024	Enterococci		259	MPN/100mL	
AB Cliff	11/4/2024	Total coliforms		8164	MPN/100mL	0.01
AB Cliff	11/4/2024	*E. coli*		85	MPN/100mL	
AB Cliff	11/4/2024	Enterococci		171	MPN/100mL	
AB Cliff	11/12/2024	Total coliforms		7270	MPN/100mL	0.01
AB Cliff	11/12/2024	*E. coli*		63	MPN/100mL	
AB Cliff	11/12/2024	Enterococci		173	MPN/100mL	
AB Cliff	11/18/2024	Total coliforms		1935	MPN/100mL	0.04
AB Cliff	11/18/2024	*E. coli*		86	MPN/100mL	
AB Cliff	11/18/2024	Enterococci		155	MPN/100mL	
AB Cliff	11/25/2024	Total coliforms		5172	MPN/100mL	0.03
AB Cliff	11/25/2024	*E. coli*		168	MPN/100mL	
AB Cliff	11/25/2024	Enterococci		419	MPN/100mL	
AB Cliff	12/9/2024	Total coliforms		1785	MPN/100mL	0.01
AB Cliff	12/9/2024	*E. coli*		20	MPN/100mL	
AB Cliff	12/9/2024	Enterococci		203	MPN/100mL	
AB Cliff	1/6/2025	Total coliforms		3654	MPN/100mL	0.01
AB Cliff	1/6/2025	*E. coli*		20	MPN/100mL	
AB Cliff	1/6/2025	Enterococci		52	MPN/100mL	
AB Cliff	1/27/2025	Total coliforms		19863	MPN/100mL	0.23*
AB Cliff	1/27/2025	*E. coli*		4611*	MPN/100mL	

Site	Sample Date	Analyte	Qualifier	Result	Units	Ratio
AB Cliff	1/27/2025	Enterococci		3448	MPN/100mL	
AB Cliff	3/17/2025	Total coliforms		9208	MPN/100mL	0.03
AB Cliff	3/17/2025	*E. coli*		238	MPN/100mL	
AB Cliff	3/17/2025	Enterococci		455	MPN/100mL	
AB Cliff	4/7/2025	Total coliforms		10133	MPN/100mL	0.01
AB Cliff	4/7/2025	*E. coli*		133.5	MPN/100mL	
AB Cliff	4/7/2025	Enterococci		2566.5	MPN/100mL	
AB Cliff	4/28/2025	Total coliforms	>	24196	MPN/100mL	**
AB Cliff	4/28/2025	*E. coli*		24196*	MPN/100mL	
AB Cliff	4/28/2025	Enterococci		959	MPN/100mL	
AB Cliff	5/5/2025	Total coliforms		12515	MPN/100mL	0.01
AB Cliff	5/5/2025	*E. coli*		120	MPN/100mL	
AB Cliff	5/5/2025	Enterococci		160.5	MPN/100mL	
AB Cliff	6/23/2025	Total coliforms	>	24196	MPN/100mL	**
AB Cliff	6/23/2025	*E. coli*		146	MPN/100mL	
AB Cliff	6/23/2025	Enterococci		637	MPN/100mL	
MC Monteci	7/15/2024	Total coliforms		12033	MPN/100mL	0.02
MC Monteci	7/15/2024	*E. coli*		228	MPN/100mL	
MC Monteci	7/15/2024	Enterococci		93	MPN/100mL	
MC Monteci	7/29/2024	Total coliforms		17329	MPN/100mL	0.03
MC Monteci	7/29/2024	*E. coli*		563	MPN/100mL	
MC Monteci	7/29/2024	Enterococci		171	MPN/100mL	
MC Monteci	8/19/2024	Total coliforms		15531	MPN/100mL	0.03
MC Monteci	8/19/2024	*E. coli*		416	MPN/100mL	
MC Monteci	8/19/2024	Enterococci		246	MPN/100mL	
MC Monteci	9/4/2024	Total coliforms		17329	MPN/100mL	0.02
MC Monteci	9/4/2024	*E. coli*		393	MPN/100mL	
MC Monteci	9/4/2024	Enterococci		203	MPN/100mL	
MC Monteci	9/30/2024	Total coliforms		12098	MPN/100mL	0.02
MC Monteci	9/30/2024	*E. coli*		249	MPN/100mL	
MC Monteci	10/21/2024	Total coliforms		12033	MPN/100mL	0.05
MC Monteci	10/21/2024	*E. coli*		631	MPN/100mL	
MC Monteci	10/21/2024	Enterococci		3076	MPN/100mL	
MC Monteci	11/4/2024	Total coliforms	>	24196	MPN/100mL	**
MC Monteci	11/4/2024	*E. coli*		2370.5	MPN/100mL	
MC Monteci	11/4/2024	Enterococci		1829	MPN/100mL	
MC Monteci	11/25/2024	Total coliforms	>	24196	MPN/100mL	**
MC Monteci	11/25/2024	*E. coli*	>	24196*	MPN/100mL	
MC Monteci	11/25/2024	Enterococci		7270	MPN/100mL	
MC Monteci	1/13/2025	Total coliforms		5794	MPN/100mL	0.17*
MC Monteci	1/13/2025	*E. coli*		960	MPN/100mL	
MC Monteci	1/13/2025	Enterococci		906	MPN/100mL	

Site	Sample Date	Analyte	Qualifier	Result	Units	Ratio
MC Monteci	1/27/2025	Total coliforms	>	24196	MPN/100mL	**
MC Monteci	1/27/2025	*E. coli*		9208*	MPN/100mL	
MC Monteci	1/27/2025	Enterococci		12033	MPN/100mL	
MC Monteci	2/10/2025	Total coliforms		7701	MPN/100mL	0.08
MC Monteci	2/10/2025	*E. coli*		591	MPN/100mL	
MC Monteci	2/10/2025	Enterococci		1421	MPN/100mL	
MC Monteci	2/24/2025	Total coliforms		12033	MPN/100mL	0.03
MC Monteci	2/24/2025	*E. coli*		359	MPN/100mL	
MC Monteci	2/24/2025	Enterococci		1043	MPN/100mL	
MC Monteci	3/10/2025	Total coliforms		5475	MPN/100mL	0.02
MC Monteci	3/10/2025	*E. coli*		86	MPN/100mL	
MC Monteci	3/10/2025	Enterococci		97	MPN/100mL	
MC Monteci	3/24/2025	Total coliforms		4352	MPN/100mL	0.07
MC Monteci	3/24/2025	*E. coli*		295	MPN/100mL	
MC Monteci	3/24/2025	Enterococci		1396	MPN/100mL	
MC Monteci	4/14/2025	Total coliforms	>	24196	MPN/100mL	**
MC Monteci	4/14/2025	*E. coli*		121	MPN/100mL	
MC Monteci	4/14/2025	Enterococci		173	MPN/100mL	
MC Monteci	5/5/2025	Total coliforms		15531	MPN/100mL	0.02
MC Monteci	5/5/2025	*E. coli*		295	MPN/100mL	
MC Monteci	5/5/2025	Enterococci		292	MPN/100mL	
MC Monteci	5/19/2025	Total coliforms		24196	MPN/100mL	0.01
MC Monteci	5/19/2025	*E. coli*		213	MPN/100mL	
MC Monteci	5/19/2025	Enterococci		122	MPN/100mL	
MC Monteci	6/2/2025	Total coliforms		6867	MPN/100mL	0.11*
MC Monteci	6/2/2025	*E. coli*		776	MPN/100mL	
MC Monteci	6/2/2025	Enterococci		250	MPN/100mL	
MC Monteci	6/16/2025	Total coliforms		8335.5	MPN/100mL	0.17*
MC Monteci	6/16/2025	*E. coli*		1439	MPN/100mL	
MC Monteci	6/16/2025	Enterococci		197	MPN/100mL	
MC Monteci	6/30/2025	Total coliforms		11199	MPN/100mL	0.03
MC Monteci	6/30/2025	*E. coli*		282	MPN/100mL	
MC Monteci	6/30/2025	Enterococci		145	MPN/100mL	
SC Railroa	7/22/2024	Total coliforms		7270	MPN/100mL	0.03
SC Railroa	7/22/2024	*E. coli*		246	MPN/100mL	
SC Railroa	7/22/2024	Enterococci		1198	MPN/100mL	
SC Railroa	8/7/2024	Total coliforms		14136	MPN/100mL	0.05
SC Railroa	8/7/2024	*E. coli*		712	MPN/100mL	
SC Railroa	8/7/2024	Enterococci		3255	MPN/100mL	
SC Railroa	2/10/2025	Total coliforms		12997	MPN/100mL	0.03
SC Railroa	2/10/2025	*E. coli*		331	MPN/100mL	
SC Railroa	2/10/2025	Enterococci		1529	MPN/100mL	

Site	Sample Date	Analyte	Qualifier	Result	Units	Ratio
SC Railroa	2/24/2025	Total coliforms		6630.5	MPN/100mL	0.05
SC Railroa	2/24/2025	*E. coli*		315	MPN/100mL	
SC Railroa	2/24/2025	Enterococci		2430.5	MPN/100mL	
SC Railroa	3/10/2025	Total coliforms		7270	MPN/100mL	0.01
SC Railroa	3/10/2025	*E. coli*		85	MPN/100mL	
SC Railroa	3/10/2025	Enterococci		1050	MPN/100mL	
SC Railroa	3/24/2025	Total coliforms		19863	MPN/100mL	0.04
SC Railroa	3/24/2025	*E. coli*		860	MPN/100mL	
SC Railroa	3/24/2025	Enterococci		1500	MPN/100mL	
SC Railroa	4/7/2025	Total coliforms		10462	MPN/100mL	0.04
SC Railroa	4/7/2025	*E. coli*		426	MPN/100mL	
SC Railroa	4/7/2025	Enterococci		959	MPN/100mL	
SC Railroa	4/21/2025	Total coliforms	>	24196	MPN/100mL	**
SC Railroa	4/21/2025	*E. coli*		2247	MPN/100mL	
SC Railroa	4/21/2025	Enterococci		408	MPN/100mL	
SC Railroa	5/12/2025	Total coliforms		1974.5	MPN/100mL	0.02
SC Railroa	5/12/2025	*E. coli*		30.5	MPN/100mL	
SC Railroa	5/12/2025	Enterococci	<	10	MPN/100mL	
SC Railroa	5/27/2025	Total coliforms		481	MPN/100mL	
SC Railroa	5/27/2025	*E. coli*	<	10	MPN/100mL	
SC Railroa	5/27/2025	Enterococci		10	MPN/100mL	
SC Railroa	6/23/2025	Total coliforms		14136	MPN/100mL	
SC Railroa	6/23/2025	*E. coli*	<	10	MPN/100mL	**
SC Railroa	6/23/2025	Enterococci	<	10	MPN/100mL	

Table 2. Santa Barbara County Beach Water Quality Results during FY 2025 for Beaches Impacted by 303(d) impaired water. Warning means one or more of the State Health Standards were exceeded, and #N/A represents no sample was collected, typically on days where resamples were collected for some beaches but not others. Blank cells represent that the sample was collected and the results were within compliance of the standards. State Health Standards for water contact recreation include: single-samples should not exceed 10,000 MPN/100 mL for total coliforms, 400 MPN/100 mL for fecal coliforms or E. coli, 104 MPN/100 mL for enterococcci, or ratio of fecal to total coliforms 0.1 (if total coliforms >1,000 MPN/100 mL).

Date	Arroyo Burro Beach	East Beach @ Mission Creek	East Beach @ Sycamore Creek
7/1/2024			
7/15/2024			
7/22/2024			
7/29/2024			
8/5/2024			
8/12/2024		Warning	
8/14/2024	#N/A	Warning	#N/A
8/19/2024			
8/26/2024		Warning	
8/28/2024	#N/A		#N/A
9/2/2024			
9/9/2024		Warning	
9/16/2024			
9/23/2024			
9/30/2024			
10/7/2024			
10/14/2024			
10/28/2024		Warning	
11/4/2024			
11/11/2024			
11/18/2024			
12/2/2024	Warning		
12/4/2024		#N/A	#N/A
12/9/2024			
12/16/2024			
1/6/2025			
1/13/2025			
2/10/2025			
2/17/2025			
2/24/2025			
3/3/2025		Warning	
3/5/2025	#N/A		#N/A
3/10/2025	Warning		

Date	Arroyo Burro Beach	East Beach @ Mission Creek	East Beach @ Sycamore Creek
3/12/2025		#N/A	#N/A
3/24/2025			
3/31/2025	Warning		
4/7/2025			
4/14/2025			
4/21/2025			
4/28/2025			
5/5/2025			
5/12/2025			
5/19/2025			
5/26/2025			
6/2/2025	Warning		
6/9/2025			
6/16/2025			
6/25/2025			
Total # of warnings	4	6	0

Long Term Monitoring

In addition to NPDES General Permit monitoring, the Creeks Division continued to sample and monitor long-term monitoring sites in FY 2025. Project assessment occurred at the Bird Refuge (Figure 4). As in prior years, bioassessment was conducted by Ecology Consultants.

Andrée Clark Bird Refuge Restoration Monitoring

Figure 4: View of the bird refuge during data logger deployment.

The Creeks Division manages several data loggers in order to assess project performance of the Andrée Clark Bird Refuge Restoration Project (see Figure 5 for locations). These data loggers record temperature, conductivity, pH, chlorophyll, and dissolved oxygen (DO) every 10-20 minutes when they are deployed. The main water quality goal is to increase levels of DO and shorten periods of hypoxic (<3 mg/L) and anoxic (<1 mg/L) conditions.

Figure 5: Approximate locations of data loggers (blue circles) in the Andrée Clark Bird Refuge and lagoon. Station T1 is located in the southeast open area of the lake, T2 in the outlet arm, and Lagoon in the beach lagoon.

During FY 2025, over 55,000 total measurements for DO were recorded by data loggers in the lake and lagoon (Table 3). To compare DO concentrations pre- vs. post-restoration, results from station T2 (May 2013 through June 2025) were utilized, as it has the most complete dataset to date. The pre-restoration dataset included measurements from May 2013 through October 31, 2022, and the post-restoration dataset from November 1, 2022 through June 30, 2025. The median post-restoration DO concentration was significantly higher than before the restoration project (Figure 6) and is now above the water quality objective for warm freshwater habitat (≥5.0 mg/L). Data analysis thus far shows a decrease in the frequency of anoxic (<1.0 mg/L) conditions at all three stations.

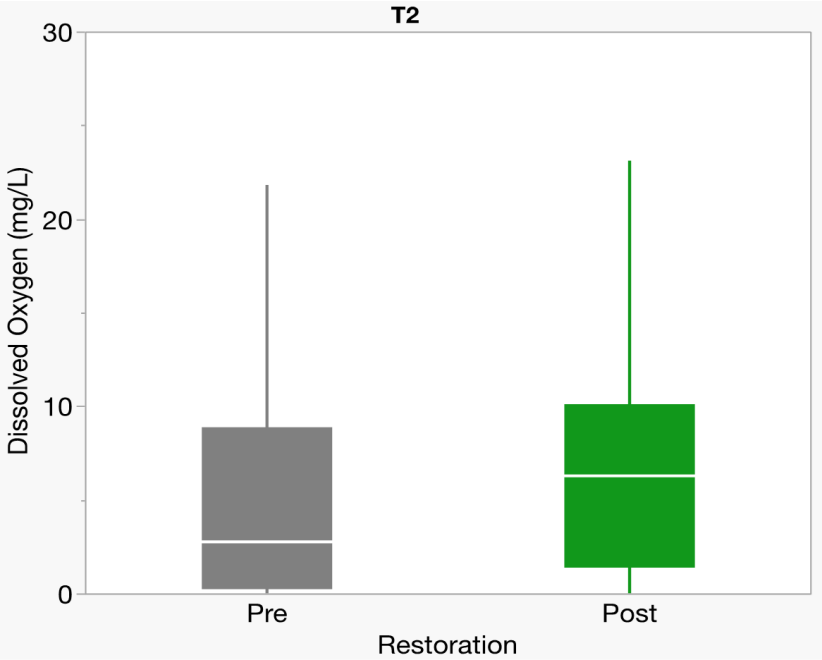
However, water clarity has not increased since the restoration took place. In addition, the period since the restoration was completed included two historically wet winters, which could be responsible for changes in water quality. Additional sampling and data analysis will

be required to thoroughly assess the impact of the restoration project and understand whether phytoplankton blooms have reduced in frequency, length, and severity.

*Table 3. Number of dissolved oxygen (DO) measurements recorded each month during FY 2025 from each data logger station. *Indicates sondes not deployed due to staffing limitations or sonde maintenance. See Figure 5 for approximate station locations.*

Month	Lagoon 2024	Lagoon 2025	T2 2024	T2 2025	T1 2024	T1 2025
Jan		2962		2966		2963
Feb		996		998		995
Mar		1269		1297		*
Apr		1487		2872		*
May		3051		2193		330
Jun		4286		4303		4301
Jul	*		*		*	
Aug	*		*		*	
Sep	*		*		*	
Oct	1290		*		360	
Nov	2857		2241		2365	
Dec	2967		2965		2964	

Figure 6: Comparison of dissolved oxygen (DO) concentrations pre- and post-restoration at station T2. Dataset ranges from May 2013 through June 2025 (n = 127,153 measurements pre-restoration (May 2013 through October 31, 2022) and 62,905 measurements post-restoration (November 1, 2022 through June 30, 2025)). There was a statistically significant increase in DO concentration post-restoration as compared to pre-restoration (p<0.0001, Wilcoxon Test).



Bioassessment

Bioassessment is the study of the biological community in a body of water to help evaluate the health of the habitat, including water quality. The Creeks Division Research and Monitoring Program uses bioassessment to compare the condition of different creek locations, track water quality changes over time, and follow progress of creek restoration projects. Bioassessment is also used to help understand impacts of development, climate variation, and wildfire on water quality and habitat conditions in Santa Barbara creeks.

Bioassessment can be considered the third tier of analysis for understanding water quality concerns. The first tier, water-quality sampling, measures concentrations of specific chemicals that are known to harm or benefit aquatic organisms. The second tier, toxicity testing, measures the response of a laboratory test organism (juvenile fish, invertebrates, and/or freshwater algae) to creek water samples, thereby summing the impacts of all toxic

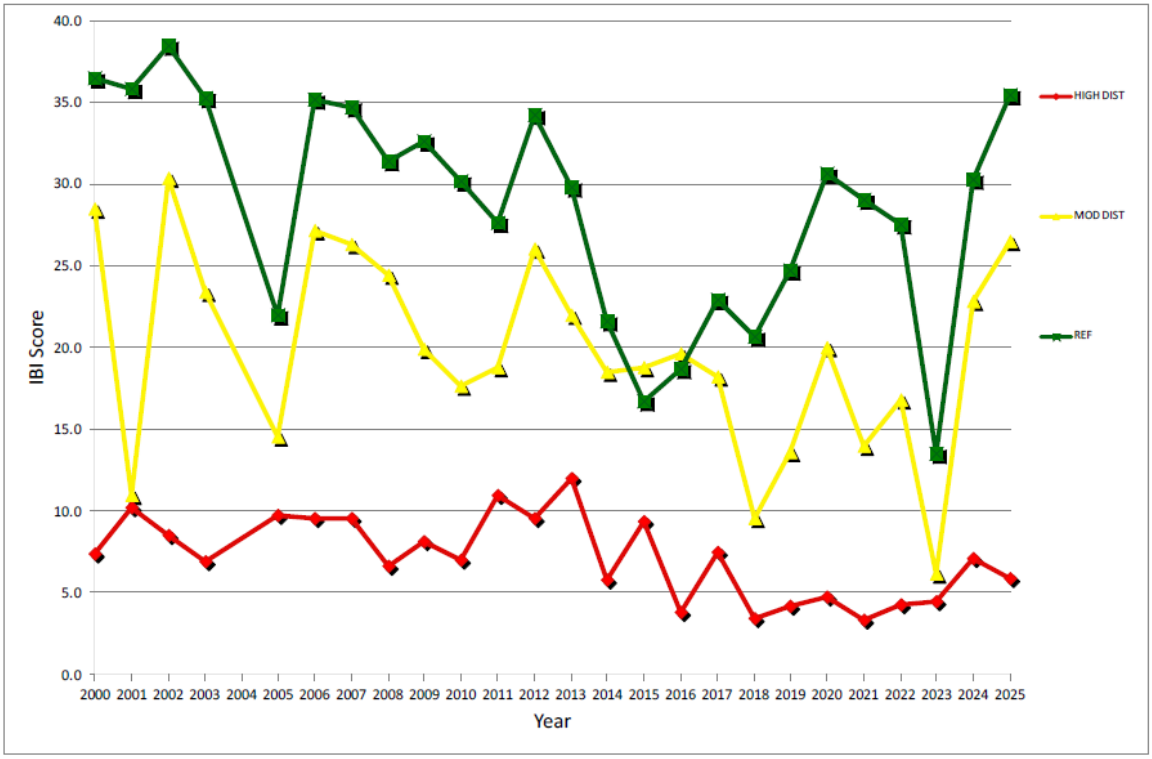
chemicals that may be present at the time of sampling. The third tier, bioassessment, quantifies the community of benthic macroinvertebrate (BMI) organisms present in the creek to determine if water quality is impaired. Bioassessment effectively integrates the effect of potential contaminants over a long period of time. Pristine sites are known to have high numbers of sensitive organisms, such as mayflies, whereas impaired sites have a higher number of organisms, such as midges, that are known to be more tolerant of pollutants.

Since 2002, the Creeks Division has utilized the services of Ecology Consultants, Inc. to conduct the field sampling, laboratory analysis, and statistical calculations required to complete bioassessment monitoring. The results are used by the consultant to generate an Index of Biological Integrity (IBI) to simplify comparisons among locations and time points (Figures 7-8). Several creek sites have been monitored every year since 2001 (the County of Santa Barbara funded the 2001 study), whereas other sites have been tested for a subset of years in response to specific research questions. For ease, results from the City and County studies have been combined in one report for the South Coast. Estuarine sites were added in 2011 in order to assess the Mission Lagoon and Laguna Channel Restoration Project area.

Figure 7: Map of bioassessment sites in Eastern Santa Barbara County, including City of Santa Barbara.

After a drop in IBI scores due to scouring in 2022-2023, in spring 2024 scores rebounded across all disturbance groups. The spring 2025 scores further improved for both the moderate disturbance (MOD) and reference (REF) groups (Figure 8).

Figure 8: Stream IBI scores throughout Santa Barbara County from 2000 - 2025. See Figure 7 for site locations.



Additional information about specific sites can be found in the 2025 Bioassessment Report.

Microbial Source Tracking

In FY 2025, microbial source tracking focused primarily on completing the risk assessment of swimming during summer dry weather (April – October), continuing work on risk assessment in winter wet and winter dry weather, and initiating sampling for the Bight '23 Microbiology Beach Human Marker Study for the Southern California Coastal Water Research Project (SCCWRP).

Beach Swimming Risk Assessment

Results from FY 2023 dry weather sampling were analyzed in FY 2024. In FY 2025, a talk on dry weather swimming risk was presented at the Annual California Stormwater Quality Association (CASQA) Conference in October 2024. Though the estimated risk to swimmers

during summer dry weather was low, the risk to swimmers during winter wet and winter dry weather is unknown.

During FY 2025, winter wet and dry weather samples were analyzed for pathogens by AP Genomic Labs, and work continued on estimating the swimming risk in winter wet and dry weather. An abstract was submitted in FY 2025 and accepted for the Annual CASQA Conference in September 2025 (FY 2026):

Is It Safe to Swim in Winter? Wet Weather Risk Assessment in Santa Barbara, CA

The City of Santa Barbara, in partnership with the University of California, Santa Barbara, and AP Genomics, carried out a quantitative risk assessment of recreational swimming at urban beaches during both dry and wet weather. Results from summer dry weather were presented at the CASQA 2024 conference. The purpose of this presentation is to update the CASQA community on results from winter weather, including both wet and dry conditions.

Throughout California, beach water quality is monitored and reported to the public based on fecal indicator bacteria, which signal the potential presence of sewage or other harmful fecal sources; these indicator bacteria are generally not pathogenic themselves. Unfortunately, fecal indicator bacteria are often not correlated with actual health risks and can misinform water quality improvement efforts. Previously, a relatively low-cost quantitative microbial risk assessment was conducted to assess beach risk during summer weather, using commercially available molecular methods and spreadsheet-based calculations.

Results showed that, depending on the model chosen and the assumptions incorporated, the average excess risk varied from 0.001% to 2% (0.01 to 20 illnesses per 1,000 swimmers) during summer dry weather—all falling below the U.S. EPA threshold. The study was updated recently with an analysis of samples collected during wet and dry weather in winter 2022–23. Results indicated approximately twice the risk in winter compared to summer. In addition, the study identified data gaps and proposed directions for future testing, which will be important to address as risk-based water quality thresholds are implemented.

This presentation provides suggestions for implementing risk assessments using commercially available laboratory analyses and in-house calculations, which will benefit agencies seeking to conduct pilot studies before investing in more costly research. This work addresses the conference theme, Resilient Watersheds, Innovative Solutions, by sharing accessible tools that can enhance the community's understanding of both the risks and the value of recreational waters. Particularly as the climate warms, beach swimming remains a valuable recreational resource that must be understood and protected.

Southern California Bight Regional Monitoring Program: Bight '23

The Southern California Bight Regional Monitoring Program is an ongoing collaboration, facilitated by SCCWRP, that studies how human activities have impacted the health of coastal waters in the Southern California Bight, which ranges from Point Conception in Santa Barbara County to Punta Colonet in Mexico. Bight '23 is the seventh cycle of the program.

The Creeks Division joined the Bight '23 Microbiology Beach Human Marker Study in FY 2023. The aim of this study is to use two human waste markers to determine the extent and magnitude of human fecal contamination at selected Southern California beaches and in the storm drains, creeks, or lagoons that discharge to them during wet and dry conditions. Each participating agency collects and processes samples according to a Quality Assurance Project Plan; results will be compiled for a regional assessment. The Creeks Division partnered with the Los Angeles County Sanitation District (LACSD) to complete the processing.

During FY 2025, Creeks Staff participated in an Interlaboratory Calibration Study, in which 21 blinded water samples, some containing added sewage (spiked) and some containing nothing (blanks) were provided, to test if participating agencies could correctly process and analyze samples to yield comparable results. Creeks Staff filtered these samples that were subsequently analyzed by the LACSD laboratory and the results interpreted by SCCWRP. Our performance was deemed successful (i.e. the spiked samples had human waste markers

detected and the blanks did not), and sample collection was initiated at Arroyo Burro (creek and surf zone) (Figure 9). During FY 2025, sampling and filtration was completed on 18 dry and 22 wet weather dates at both locations. Sample collection and analysis will continue in FY 2026, for a total of 30 dry weather and 30 wet weather events.

Figure 9: Photos from dry (top) and wet (bottom) weather sampling events for Bight '23 in Arroyo Burro Creek (left) and surf zone (right).

Clean Streets, Clean Seas Grant Project

In FY 2023, the Creeks Division applied for and was awarded a grant from NOAA's National Sea Grant program under the Marine Debris Competition. The grant efforts are in collaboration with the University of California, Santa Barbara (Dr. Patricia Holden), the San Francisco Estuary Institute, the Southern California Coastal Water Research Program, the Moore Institute for Plastic Pollution Research, and the consulting groups Wood and Cascade Pacific.

The focus of the project is quantifying how street sweeping, catch basin cleaning, and full capture trash devices may intercept and remove microplastic prior to discharge to creeks, estuaries, and the ocean. Work performed in FY 2025 related to this project included microplastics sampling during dry and wet weather at two creek locations and sampling debris picked up by street sweepers for analysis at UCSB. Details were finalized for the large-scale field experiment planned for July 25 (FY 2026) at the Donald C. Tilman Water Reclamation Plant to determine the pickup efficiency of street sweeping by particle type and size fraction.

For creek sampling, two ISCO 6712 portable samplers were modified to filter for microplastics in the field by passing sample water through a stack of sieves (355 µm, 125 µm, 63 µm) contained inside the sampler (Figure 10). Two locations were selected to span the urbanized area along Mission Creek (Rocky Nook Park and Gutierrez Street). Wet weather samples (~100 L composite) were collected at both locations during three storm events in FY 2025 (Figures 11-12), and one dry weather date. For two of the storms, one composite sample was collected while the creek level was rising (red bars in Figure 11), and one composite sample while the creek level was falling (green bars in Figure 11). Two additional dry weather sampling events will occur in FY 2026.

Figure 10: ISCO 6712 portable samples were modified and used for in situ microplastics filtration.

Figure 11: Wet weather composite microplastics samples collected during three storm events on Mission Creek in FY 2025. The two sampling locations (Rocky Nook and Gutierrez) span the urbanized portion of Mission Creek. The upper plots show the creek hydrograph at each location during the storm, and the colored bars indicate sample collection times, with bars of the same color (red or green) in the same storm constituting one composite sample. The bottom charts show the rainfall increments measured at the Santa Barbara County Building over time.

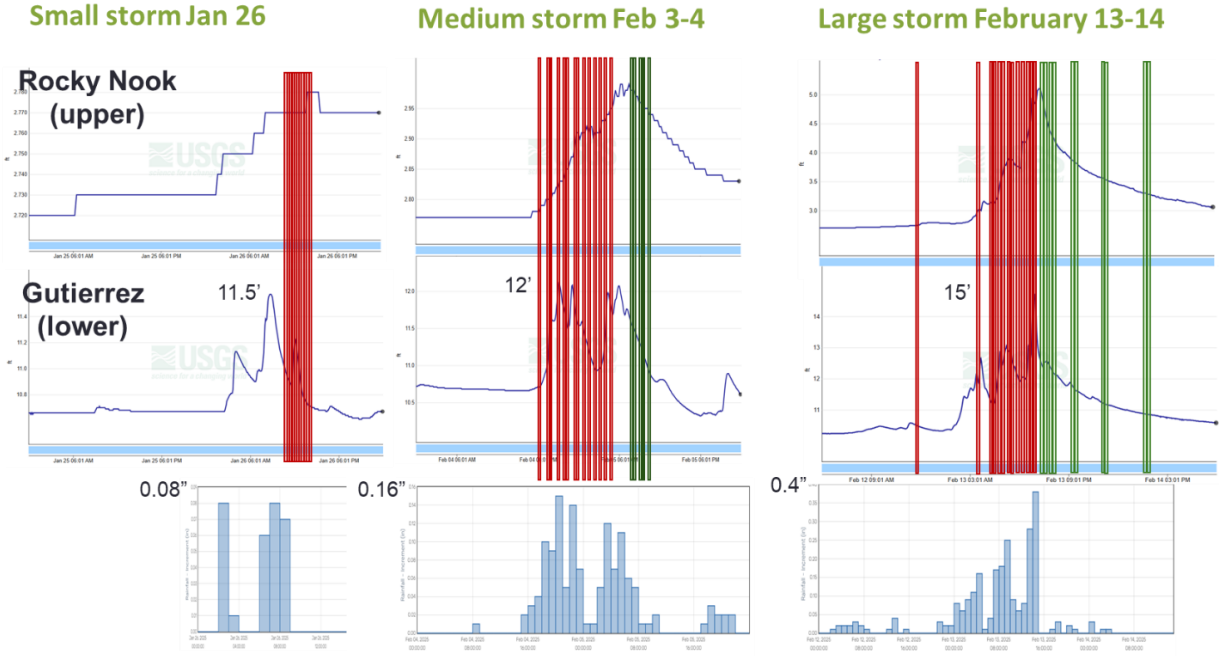
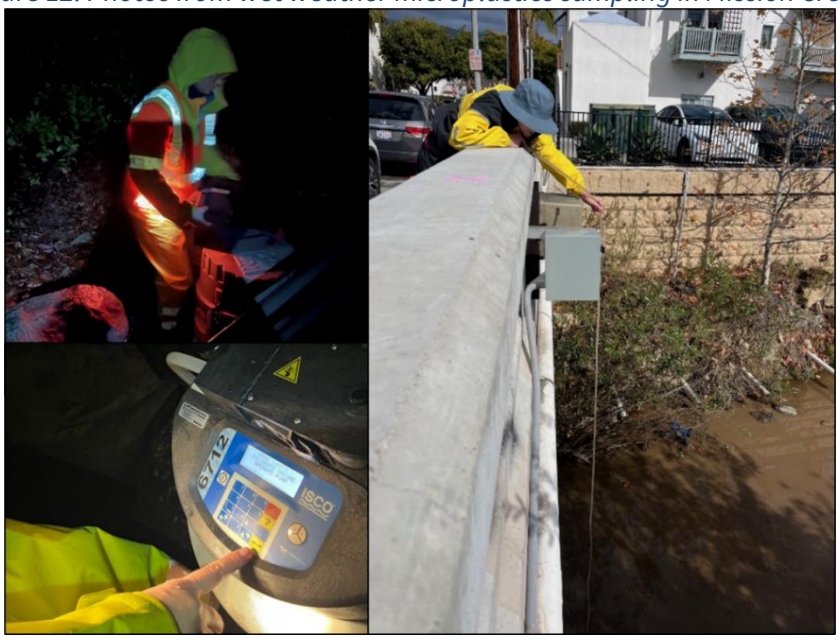


Figure 12: Photos from wet weather microplastics sampling in Mission Creek.



Street sweeping debris was collected from the City Annex Yard on five dates in FY 2025. On each date, a composite sample was collected from all areas inside the disposal container, weighed, and sifted through a mesh screen to remove large debris (Figure 13) before they were sealed and brought to UCSB for analysis. Seven additional sampling events will occur in FY 2026.

Figure 13: Street sweeping debris collection procedure.

Southern California Stormwater Monitoring Coalition

In 2024 the City of Santa Barbara joined the Southern California Stormwater Monitoring Coalition (SMC). The SMC is a regional partnership of stormwater management agencies working to develop solutions to regional challenges in stormwater management. Since its founding in 2001, the SMC has pooled resources and expertise to collaboratively develop and fund stormwater research and monitoring initiatives across coastal southern California. Creeks Division staff attend quarterly meetings and annually decide which research projects will receive Measure B funding. In FY 2025, the Creeks Division recommended contributing $37,541 to six projects in FY 2026, including studies on street sweeping, field performance of biofiltration installations, stream channel restoration, regional bioassessment, mechanisms of pollutant removal in flow-through filtration, and recreational water quality. Funding was approved for the FY 2026 budget.

Appendices: Fiscal Year 2025 Staff Reports

Appendix A: Fiscal Year 2025 Research and Monitoring Plan

City of Santa Barbara
Sustainability and Resilience Department

Memorandum

DATE: July 17, 2024

TO: Creeks Restoration/Water Quality Improvement Program
Citizen Advisory Committee

FROM: Jill Murray, Water Quality Research Analyst

SUBJECT: Annual Water Quality Research and Monitoring Plan

COMMITTEE DIRECTION – FOR ACTION

That the Committee concur with the staff recommendation to implement the proposed Research and Monitoring Plan for Fiscal Year 2025 (FY 25).

DISCUSSION

Background

Creeks Division staff have monitored water quality in local water bodies since the Division was formed in 2001. Each year, the Creeks staff review and revise as necessary the annual Research and Monitoring Plan. In July 2023, the Committee concurred with the staff recommendation to implement the Water Quality Research and Monitoring Plan (Research Plan) for Fiscal Year 2024 (FY 24). In December 2023, the Committee received an update on FY 23 results and in May 2024 the Committee received a presentation on the Beach Swimming Risk study. At this time, the Committee will review the proposed Research Plan for Fiscal Year 2025 (FY 25).

Fiscal Year 2025 Research and Monitoring Plan

The following are the goals and focus areas for FY 25.

The purpose of the monitoring program is to obtain information that can be used to:

1. Develop strategies for water quality improvement, including evaluation and prioritization of projects and programs.
2. Understand changes over time in surface water quality.
3. Communicate effectively with the public about water quality.
4. Understand the role of climate change and sea level rise in altering creek conditions.

The goals of the monitoring program are to:

1. Assess the impacts of chemical and microbial pollutants:
    a. Identify suspected pollutants of concern, including traditional pollutants such metals, organics, nutrients, fecal indicator bacteria, trash, and sediment, and emerging contaminants such as personal care products, newer pesticides, microplastics, per- and polyfluoroalkyl substance, and pathogens; and evaluate laboratories for testing opportunities. Include field properties such dissolved oxygen, pH, temperature, conductivity, and chlorophyll a.
    b. Quantify the levels (concentration, flux, and/or load) of microbial contamination and chemical pollution in watersheds.
    c. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.
        i. Compare pollutant levels to known toxicity thresholds.
        ii. Use toxicity testing and bioassessment to assess impacts.
    d. Identify sources of pollutants to creeks and storm drains, including interactions with groundwater and infrastructure.
2. Evaluate the effectiveness of the Creeks Division projects on improving water quality, which includes collecting baseline data for future projects.
3. Implement hydrologic models of creeks in order to predict alterations in flow due to climate change.
4. Evaluate the role of infiltration and groundwater movement on creek water quality and quantity, including the intersection with sea level rise.
5. Where feasible, evaluate the effectiveness of City programs such as street sweeping and outreach in reducing pollutants.
6. Evaluate long-term trends in water quality and quantity.
7. Meet monitoring requirements for grants.

8. Meet General Permit monitoring requirements.
9. Investigate 303(d)-listed waterbody impairments.
10. Employ contemporary tools to conduct advanced research and monitoring with rigorous quality standards and data management methods.

In FY 25, the Research Plan will focus on five main efforts. The Research Plan follows very closely the FY 24 Plan, as all efforts are ongoing, with a focus on long term and required monitoring, 303(d) targeted sampling, and microbial source tracking. In addition, work on the Clean Streets, Clean Seas microplastic project will be continued and methods utilizing environmental DNA will continue to be incorporated into bioassessment and restoration studies.

FY 25 Monitoring Efforts

During FY 2025, the Creeks Division will continue sampling required by the City's NPDES General Permit, including outfall testing, 303(d) sampling (biweekly indicator bacteria sampling at several locations), and Special Studies sampling, which requires calculations of load reduction based on rainfall rates. Dry-weather monitoring at long-term monitoring sites will also be conducted. Project assessment monitoring will include sampling at the Bird Refuge, Arroyo Burro Open Space, Barger Canyon, and the City's bioretention planters. Emerging contaminants and toxicity will be assessed during storm events. As in prior years, contracts will be awarded to Ecology Consultants, Inc. for bioassessment monitoring and Dr. Holden (UCSB) for annual microbial source tracking. Environmental DNA to identify invertebrate and vertebrate species will be used in bioassessment and restoration monitoring. Based on community input, a storm monitoring focus will include high levels of foam observed in Arroyo Burro; recent observations suggest that saponins produced by native plants may contribute to the observed foam.

Microbial Source Tracking

Results from dry and wet weather microbial sampling conducted by UCSB and chemical sampling conducted by the Creeks Division signal potential contamination in Laguna Channel, which discharges into Mission Lagoon and East Beach at Mission Creek. The Beach Risk Swimming study assessed potential swimming risk in the ocean during dry weather and found extremely low risk of illness from swimming. In FY 25 Creeks Division staff will review pending wet weather results from FY 24 and conduct quantitative risk assessment calculations to assess the level of concern during wet weather. Pending FY 24 results, FY 25 sampling will include additional testing in Laguna Channel Watershed and at integrator sites (the most downstream sites above tidal influence) of Arroyo Burro, Mission Creek, and Sycamore Creek to continue assessing for potential new water quality problems. In addition, the Creeks Division is sampling ocean and creek samples during dry and wet weather to contribute to the Southern California Coastal Waters Research Project's Bight '23 regional monitoring project for health risk from swimming. The samples are filtered in house and filters are delivered to Los Angeles County Sanitation District's

laboratory for processing. In a new development, the Creeks Division will test new technology allowing for samples to be processed in house for human waste markers. The “laboratory in a box” will be rented for three months and pending results, the rental price may be applied to purchase the equipment. A study will also be planned to understand the role of shallow groundwater in moving contaminants to the storm drain system.

303(d) Targeted Sampling

Based on the Clean Water Act, the Regional Water Quality Control Board (Regional Board) assesses impairments to water bodies (creeks, estuaries, and beaches) every three years for a range of pollutants. The impairments are specific to beneficial uses such as recreation, habitat, and water supply. In the most recent effort (2022), several impairments of Santa Barbara creeks were added to the list of impaired water bodies, some of which were based on very limited sampling (ten data points). Creeks staff will resume consulting with Regional Board staff to finalize a sampling plan to determine which of the new impairments are supported by additional testing. Results will be provided to the Regional Board to support triennial review of impairments.

Clean Streets, Clean Seas Grant

In FY 23, the Creeks Division applied for and has been awarded a grant from NOAA’s National Sea Grant program under the Marine Debris Competition. The grant involves collaboration among the City, the University of California, Santa Barbara (Dr. Patricia Holden), the San Francisco Estuary Institute, the Southern California Coastal Water Research Program, the Moore Institute for Plastic Pollution Research and the consulting groups Wood and Cascade Pacific. The focus of the project is quantifying how street sweeping, catch basin cleaning, and full capture trash devices may intercept and remove microplastic prior to discharge to creeks, estuaries, and the ocean. During FY 25, dry weather and wet weather samples will be collected and plans for an optimization study will be finalized.

Southern California Stormwater Monitoring Coalition

The City of Santa Barbara has been invited to join the Southern California Stormwater Monitoring Coalition (SMC). The SMC is a regional partnership of stormwater management agencies working to develop solutions to regional challenges in stormwater management. Since its founding in 2001, the SMC has pooled resources and expertise to collaboratively conceptualize, develop and fund stormwater research and monitoring initiatives across coastal southern California. Creeks Division staff will attend quarterly meetings and decide which research projects should receive Measure B funding, totaling approximately $25,000-$40,000 per year to start in FY 26. The benefit to the Creeks Division is to join larger and more rigorous projects than could be conducted locally, with statistically relevant results that will inform stormwater best management practice and permitting.

Budget

Sufficient funds exist in the FY 25 Creeks Division Budget for the proposed research and monitoring.

Timeline

Staff will begin implementing the FY 25 Research and Monitoring Plan and perform scheduled monitoring beginning in July 2024. The FY 24 Annual Report will also be completed and presented to the Committee in December 2024.

cc: Melissa Hettrick, Interim Creeks Division Manager
Alelia Parenteau, Sustainability and Resilience Director

Appendix B: Fiscal Year 2024 Water Quality Research and Monitoring Program Summary

City of Santa Barbara

Sustainability and Resilience Department

Memorandum

DATE: December 11, 2024

TO: Creeks Restoration/Water Quality Improvement Program
Citizen Advisory Committee

FROM: Jill Murray, Creeks Supervisor

SUBJECT: **Fiscal Year 2024 Water Quality Research and Monitoring Program Summary**

COMMITTEE DIRECTION – FOR DISCUSSION

That the Committee receive a presentation and discuss results from the Fiscal Year 2024 Water Quality Research and Monitoring Program.

DISCUSSION

Background

In July 2023, the Committee concurred with the staff recommendation to implement the Water Quality Research and Monitoring Plan (Research Plan) for Fiscal Year (FY) 2023. In December 2023, the Committee received an annual update on monitoring and research, and in May 2024 the Committee received a presentation on the Dry Weather Beach Risk Study. At this time, the Committee will receive a summary of FY 2024 water quality monitoring.

FY 2024 Research and Monitoring Plan

The purpose of the monitoring program is to obtain information that can be used to:

1. Develop strategies for water quality improvement, including evaluation and prioritization of projects and programs.
2. Understand changes over time in surface water quality.
3. Communicate effectively with the public about water quality.
4. Understand the role of climate change and sea level rise in altering creek conditions.

The goals of the monitoring program are to:

1. Assess the impacts of chemical and microbial pollutants:
    a. Identify suspected pollutants of concern, including traditional pollutants such as metals, organics, nutrients, fecal indicator bacteria, trash, and sediment, and emerging contaminants such as personal care products, newer pesticides, microplastics, per- and polyfluoroalkyl substance, and pathogens; evaluate laboratories for testing opportunities. Include field properties such dissolved oxygen, pH, temperature, conductivity, and chlorophyll a.
    b. Quantify the levels (concentration, flux, and/or load) of microbial contamination and chemical pollution in watersheds.
    c. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.
        i. Compare pollutant levels to known toxicity thresholds.
        ii. Use toxicity testing and bioassessment to assess impacts.
    d. Identify sources of pollutants to creeks and storm drains, including interactions with groundwater and infrastructure.
2. Evaluate the effectiveness of the Creeks Division projects on improving water quality, which includes collecting baseline data for future projects.
3. Implement hydrologic models of creeks in order to predict alterations in flow due to climate change.
4. Evaluate the role of infiltration and groundwater movement on creek water quality and quantity, including the intersection with sea level rise.
5. Where feasible, evaluate the effectiveness of City programs such as street sweeping and outreach in reducing pollutants.
6. Evaluate long-term trends in water quality and quantity.
7. Meet monitoring requirements for grants.
8. Meet General Permit monitoring requirements.
9. Investigate 303(d)-listed waterbody impairments.
10. Employ contemporary tools to conduct advanced research and monitoring with rigorous quality standards and data management methods.

FY 2024 Monitoring Efforts

During FY 2024, the Creeks Division continued sampling required by the City's National Pollutant Discharge Elimination System (NPDES) General Permit, including outfall testing, 303(d) sampling (biweekly indicator bacteria sampling at several locations), and Special Studies sampling, which requires calculations of load reduction based on rainfall rates. Dry-weather testing at long-term monitoring sites was also conducted. Project assessment monitoring included sampling at the Bird Refuge. As in prior years, contracts were awarded to Ecology Consultants, Inc. for bioassessment monitoring and Dr. Holden (UCSB) for annual microbial source tracking.

Andree Clark Bird Refuge Restoration Monitoring

The Creeks Division manages several data loggers in order to assess project performance of the Andree Clark Bird Refuge Restoration Project. The main water quality goal is to increase levels of dissolved oxygen and shorten periods of low dissolved oxygen. Data analysis of over 70,000 data points shows a substantial and statically significant increase in median dissolved oxygen concentration and reduction in frequency of low dissolved oxygen readings. However, the period since the restoration was completed included two historically wet winters, which could be responsible for the changes in water quality. Additional sampling will be required to assess the impact of the restoration project.

Laguna Watershed Source Tracking

Prior results from dry weather microbial sampling conducted by UCSB and wet-weather chemical sampling conducted by the Creeks Division detected contamination in Laguna Channel, which discharges into Mission Lagoon and East Beach at Mission Creek. Results from FY 2022 sampling found co-occurring chemical and microbial markers in dry weather; the results informed storm sampling plans for FY 2023. Past microbial source tracking work by the Creeks Division and UCSB has been conducted primarily in dry weather due to the challenge of planning and conducting sample collection and laboratory analysis during rain events. The Creeks Division has recently overcome this challenge by developing the capacity to collect, filter, and store concentrated material for future molecular analysis by UCSB. Filtered material can be stored for months and batched to economize sample processing. Storm monitoring in FY 2023 was completed in Laguna Channel watershed and samples were delivered to UCSB for processing. In FY 24 results were delivered and showed higher values for wet weather storm drain samples than dry weather samples.

Beach Swimming Risk Assessment

Many years of water quality research conducted by UCSB have focused on finding sources of human waste entering storm drains, creeks, and beaches in Santa Barbara. Recent work has found mostly low, or undetected, levels of human waste markers and infrequent detections of human pathogens in the surf zone during dry weather. In addition, recent scientific advances have identified seagull waste as potentially harboring bacteria that can cause infections in swimmers. The expected risk to swimmers from these findings is currently unknown. Funding was provided to UCSB in FY 2022 to perform a quantitative microbial risk assessment study to answer this question.

In summer 2022, Creeks Division staff collected and filtered samples from five beaches on four sample dates and delivered frozen filters to UCSB for analysis of molecular markers, and to Weston, Inc. for analysis of microbial pathogens. In FY 2023 results were obtained from the pathogen analysis and preliminary results were obtained for human and gull markers. A quantitative microbial risk assessment, which uses the pathogen results and known dose-response curves to identify potential health risk, was completed by UCSB and Creeks Staff in FY 2024 and presented to the Committee. An abstract summarizing the project was accepted to the California Stormwater Quality Association Annual Conference and accepted as a technical presentation. The presentation was given in October 2024.

In FY 2024, wet weather surf zone samples that had already been collected by UCSB were analyzed for human waste and gull markers. The samples are currently being analyzed for pathogens by AP Genomic Labs. Results will be analyzed for wet weather swimming risk assessment in FY 2025.

In addition, the Creeks Division is sampling ocean and creek samples during dry and wet weather to contribute to the Southern California Coastal Waters Research Project's Bight '23 regional monitoring project for health risk from swimming. The samples are filtered in house and filters are delivered to Los Angeles County Sanitation District's laboratory for processing.

Microplastics and Trash Study Update

The Clean Streets, Clean Seas project involves a collaboration among the Creeks Division, UCSB, the San Francisco Estuary Institute, the Southern California Coastal Water Research Project (SCCWRP), the Moore Institute for Plastic Pollution Research, USC Sea Grant, and Cascade Water Resources. Work completed in FY 2024 related to this project included contracting, dry weather sampling, and establishment of a technical advisory committee. In addition, SCCWRP completed a simulated rainfall study of street sweeping effectiveness, with results suggesting that regenerative air sweepers can significantly reduce microplastic concentrations in urban runoff.

Southern California Stormwater Monitoring Coalition

In 2024 the City of Santa Barbara joined the Southern California Stormwater Monitoring Coalition (SMC). The SMC is a regional partnership of stormwater management agencies working to develop solutions to regional challenges in stormwater management. Since its founding in 2001, the SMC has pooled resources and expertise to collaboratively conceptualize, develop and fund stormwater research and monitoring initiatives across coastal southern California. Creeks Division staff will attend quarterly meetings and decide which research projects should receive Measure B funding, totaling approximately $25,000-$40,000 per year beginning in FY 2026.

Chemicals of Emerging Concern

One of the goals of the monitoring program is to sample for contaminants of emerging concern in storm water. In FY 2024 grab samples were collected in wet weather from the four “integrator” (most downstream) sites at Arroyo Burro, Mission Creek, Laguna Channel and Sycamore Creek, and tested for per- and polyfluoroalkyl substances (PFAS) and a suite of pharmaceutical and personal care products (PPCPs). Several PFAS compounds were detected in all samples. Levels were orders of magnitude below the US EPA’s newly released ecotoxicity benchmarks. Several PPCPs were detected; although these compounds are known endocrine disruptors, no criteria exist for ecotoxicity.

Next Steps

Sampling under the FY 2025 Research Plan is ongoing. The FY 2024 Water Quality Report will be completed and posted online by March 31, 2025. An update on FY 2025 results and the proposed FY 2026 Research Plan will be presented in June 2025.

cc: Erin Markey, Creek Restoration/Clean Water Manager
Alelia Parenteau, Sustainability and Resilience Director

Appendix C: Clean Streets, Clean Seas Research Project

City of Santa Barbara
Sustainability & Resilience Department

Memorandum

DATE: February 19, 2025

TO: Creeks Restoration/Water Quality Improvement Program
Citizen Advisory Committee

FROM: Jill Murray, Creeks Supervisor

SUBJECT: **Clean Streets, Clean Seas Research Project**

COMMITTEE DIRECTION – FOR DISCUSSION

That the Committee receive a presentation on Year 1 of the Clean Streets, Clean Seas Research Project.

DISCUSSION

Microplastic pollution is a quickly escalating threat to marine ecosystems, and recent studies show that stormwater runoff transports the bulk of land-based microplastic to the sea. The Clean Street, Clean Seas Project is a three-year research project funded by the Marine Debris Competition of the National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant Program.

The Creeks Division is collaborating with researchers from the University of California, Santa Barbara (UCSB), the San Francisco Estuary Institute, the Southern California Coastal Water Research Project (SCCWRP), the Moore Institute for Plastic Pollution Research, the University of Southern California (USC) Sea Grant, and Cascade Water Resources to study the impact of street sweeping, catch basin cleaning, and trash capture devices to reduce the concentration of microplastics in urban runoff. By sampling creeks, catch basins, full capture devices, and street sweeper debris, the project will quantify the amount of microplastics that can be prevented from being discharged to the ocean.

Field work will take place in Santa Barbara, the San Francisco Bay Area, and the Los Angeles area, although findings will be applicable nationally. A robust outreach program to be largely conducted by USC Sea Grant will engage the stormwater community and the public throughout the project.

Progress in Year 1 (2024)

In the first year of the project, the Creeks Division finalized the grant agreement, awarded subcontracts to SCCWRP, UCSB, and Cascade Water Resources, improved sampling methodologies and began the collection of street sweeper debris samples. Early in Year 2 (2025), Creeks staff completed the stormwater sampling phase and began dry-weather creek sampling. These samples have been delivered to UCSB for microplastic identification and quantification.

Grant funds have facilitated the acquisition and installation of advanced analytical equipment at UCSB's Material Research Laboratory. This new instrumentation, including Optical Photothermal Infrared Spectroscopy, will significantly improve the accuracy and efficiency of microplastic analysis.

One project component which created simulated rainfall events and measured pollutants in runoff from street surfaces with and without street sweeping, found that street sweeping did, in fact, reduce pollutants, including microplastic particles. This proof-of-concept study will be followed with additional sampling over two years, to be funded by the SoCal Stormwater Monitoring Coalition.

In addition, a Technical Advisory Committee was formed and members provided expertise and input on sampling strategies.

NEXT STEPS

Year 2 will include completion of dry weather sampling by the Creeks Division and completion of microplastic analysis by UCSB. In addition, a street sweeper optimization study will be completed by UCSB and Cascade Water Resources. Trash capture devices will be studied by San Francisco Estuary Institute. An Outreach and Education Working Group will also be formed, and outreach materials will be created.

BUDGET/FINANCIAL INFORMATION:

The Creeks Division was awarded $590,481 through the Marine Debris Competition of the NOAA's National Sea Grant Program to fund a three-year study of microplastic pollution in urban runoff. The City allocated the grant award to its partners to execute major elements of the project, including $492,281 to UCSB for and $80,200 to Cascade Water Resources. An additional $18,000 of grant funds will be provided to UCSB's Bren School of Environmental Science and Management, pending selection of a student group project in the third year of the project. Measure B provided matching funds of $40,000 to SCCWRP, along with in-kind staff time for managing the awards, coordinating research, conducting field work, and contributing to outreach efforts. Leveraged research activities valued at $154,000 were contributed by SCCWRP.

cc: Erin Markey, Creeks Division Manager
Alelia Parenteau, Sustainability & Resilience Director

Appendix D: Southern California Stormwater Monitoring Coalition

City of Santa Barbara
Sustainability & Resilience Department

Memorandum

DATE: May 21, 2025

TO: Creeks Restoration/Water Quality Improvement Program
Citizen Advisory Committee

FROM: Jill Murray, Creeks Water Quality Supervisor

SUBJECT: **Southern California Stormwater Monitoring Coalition**

COMMITTEE DIRECTION – FOR DISCUSSION

That the Committee receive presentation on the Southern California Stormwater Monitoring Coalition (SMC).

DISCUSSION

The Creeks Division recently joined the Southern California Stormwater Monitoring Coalition (SMC) in order to leverage Measure B funding and staff resources toward large-scale, impactful stormwater research projects. The SMC voted to approve the City of Santa Barbara membership on June 4, 2024. On September 17, 2024, City Council adopted a resolution authorizing formal entry into the SMC. At this time, the Committee will receive a presentation providing an overview of the SMC and its research program.

The Creeks Division operates a robust Water Quality Research and Monitoring Program. The goals of the program are to develop strategies for water quality improvement, evaluate and prioritize projects and programs, understand changes over time in surface water quality, and communicate effectively with the public about water quality. Routine monitoring and more complex

research projects are reviewed annually by Creeks Division staff and the Creeks Advisory Committee. Progress on complex topics has been made by partnering with academic scientists and consultants, using funding from Measure B and various grants. One of the greatest challenges in conducting meaningful research is the scale of sampling and analysis required to answer stormwater questions due to the immense variability in sample results and difficulty in collecting sufficient samples during storm events.

In order to expand the scale of analysis, the Creeks Division joined the Southern California Stormwater Monitoring Coalition (SMC) to leverage Creek Division resources toward larger projects. The mission of the SMC is to solve stormwater management challenges across Southern California by building regional consensus around best-in-class tools, methods, and monitoring strategies. The SMC consists of stormwater management agencies from regulated and regulatory sectors working to improve stormwater management practices across coastal Southern California.

Every five years the SMC develops a comprehensive Research Agenda that guides its priorities and directions. Developed by an independent expert advisory panel, the SMC Research Agenda is a forward-looking document that lays out the SMC's strategic research priorities. The SMC Research Agenda serves as a roadmap and a guide to help Steering Committee members decide which projects to prioritize and fund over the coming five years. In January 2025 the SMC Steering Committee voted to fund seven projects over the next fiscal year. The City elected to contribute to six projects, as shown in the table below.

In addition to acquiring results that can be used immediately in prioritizing City projects and programs, the City will benefit from learning cutting-edge science from SMC members, contributing to the research direction of the SMC, and gaining insight into how results will be used by regulatory agencies. Notably, the Central Coast Regional Water Quality Control Board has also been approved to join the SMC.

BUDGET/FINANCIAL INFORMATION

All SMC projects are funded collaboratively by SMC member agencies and other partners. The SMC does not collect dues from its member agencies and does not maintain a general fund or financial reserves. Instead, the SMC uses a co-funding model, where SMC member agencies voluntarily pay for only the projects that the Steering Committee has agreed to fund for the fiscal year. This co-funding model enables SMC member agencies to select which projects they fund; it also allows non-SMC member agencies to provide funding and in-kind support for a wide range of SMC projects. If projects do not align with a member agency's mission and goals, there is no obligation to fund projects, and SMC members can withdraw from the coalition at any time.

In Fiscal Year 2026, Measure B will provide $37,541 toward projects identified in the 2026-2030 Research Plan, as shown in the table below.

Project	Measure B Contribution
Regional Stream Monitoring	$ 8,750
Communication Plan	$ 1,430
Mechanistic Studies on Pollutant Removal by Stormwater BMPs	$ 4,545
HF183 Management Implementation	$ 2,725
Water Quality vs. Restoration	$ 6,300
Non-Structural BMP Implementation/Street Sweeping	$ 12,410
SMC Officer	$ 1,316
SCCWRP Contract Administration	$ 65
Total Funded in FY 2026	$ 37,541

In future years, funding may increase or decrease as projects are completed and additional projects are initiated. The expected budget is approximately $40,000 per year.

cc: Erin Markey, Creeks Division Manager

Alelia Parenteau, Sustainability & Resilience Director