

Pillar Point Harbor Water Quality Assistance Program Report FY17-FY19+

This report summarizes work performed and deliverables under the Water Quality Assistance Program between the San Mateo County Harbor District (HD) and the San Mateo Resource Conservation District (RCD) for the period of July 1st 2016-January 31st 2020. This work was authorized under the Water Quality Assistance Project Agreement (6/6/16) and three subsequent amendments, including no cost extensions to continue work past FY19. This report does not discuss data, results or findings. This will be provided in a report to HD in the summer of 2020.

Background

Since 2002, Pillar Point Harbor (PPH) has been on a statewide list of contaminated water bodies due to its high fecal indicator bacteria (FIB) concentrations. This contamination continues to cause beach postings that warn the public that the water is contaminated and not suitable for contact. Other pollutants such as metals and nutrients that can impact human health, aquatic life and recreation have also been documented at certain times of the year and in certain locations.

In 2008, the RCD initiated the Pillar Point Harbor Source Identification Project to characterize bacterial contamination in the harbor. As a follow up to this study, the RCD entered into an Interagency Agreement with the HD in 2012 to continue monitoring bacteria within certain areas of the harbor. This agreement was expanded upon and amended several times between FY13 and FY16 to continue monitoring the inner harbor, to monitor various pollutants from stormwater outfalls, assist with emergency spill response planning, conduct education and outreach, and provide general water quality technical assistance.

By 2016, it was clear that bacteria was the highest pollutant of concern and additional information was needed to understand potential sources and hot spots within the watersheds. A new multi-year agreement (FY17-FY19) between HD and the RCD was subsequently put into place to focus on this work as well as continue education/outreach and technical assistance. This report summarizes the work performed and deliverables under this agreement.

Summary of Work Performed

- Identified hot spots and sources of bacterial pollution in watersheds flowing to PPH
- Implemented stormwater best practices and water pollution prevention measures
- Inspected, cleaned, and mapped the HD stormwater system at PPH and replaced failing stormwater infrastructure
- Enhanced community engagement, citizen science, and education/outreach about watersheds, water quality, and solutions to water pollution

Program Oversight and Administration

Work under this task involved communicating with HD about key priorities, needs, and solutions to water quality issues. Initiatives and projects were developed, adaptively managed, and key partnerships and additional resources were secured. Administrative tasks such as invoicing, budget-tracking, and record-keeping were completed. Lastly, four presentations to the Board of Commissioners were given summarizing work performed, results, status, and next steps.

Presentation dates: March 15th, 2017, June 21st 2017, February 21st 2018, and October 17th 2018.

Data Integration, Analysis and Research

This task involved desktop analysis as well as field surveys to better understand sources of bacterial pollution to PPH, as well as to target future monitoring and remediation efforts. Field surveys involved documenting conditions (ex: land use/activities, flow rates), as well as potential sources and mechanisms of contamination at different points in time. Desktop analysis involved reviewing and evaluating relevant qualitative and quantitative data, including existing and current monitoring data. PPH water quality monitoring data can be summarized as follows:

- ***San Mateo County Beach and Creek Mouth AB411 Monitoring (ongoing):*** Weekly FIB data for four locations in PPH
- ***Surfrider Bacteria Sampling (2012-present):*** FIB data for Capistrano outfall, collected periodically
- ***Pillar Point Harbor Source Identification Project (2014):*** FIB (*E.coli*, *Enterococcus*, Total Coliform) and *Bacteroidales* (various species) data for 10 sites within PPH and in PPH watersheds
- ***RCD Water Quality Assistance Monitoring (2013-2019):***
 - PPH Stormwater Outfall Monitoring (2014-2015): Data for a wide variety of pollutants collected during wet and dry weather.
 - PPH Inner Harbor Monitoring (2013-2015). Data for *Enterococcus* collected from the inner harbor, near live-aboard boats during wet and dry weather
 - Capistrano Beach Monitoring (2016-2017): See description in next section
 - Adaptive Monitoring (2017-2019): See description in next section
- ***Pillar Point Harbor Source Stressor Identification Study (2018):*** See description in next section
- ***First Flush Program (2008-present):*** See description in next section

Water Quality Monitoring

Work under this task involved several key initiatives over the years and were based on previous years of data, current understanding, requests of HD management and Board of Commissioners, and opportunities to leverage resources with partners. The main initiatives and projects can be categorized as Capistrano Beach Monitoring, the Source Stressor Identification Study (SSID), Adaptive Monitoring, and the First Flush Program. The Capistrano Beach Monitoring effort and the SSID both aimed to answer certain questions about bacterial pollution in PPH. While, the Adaptive Monitoring effort was ad hoc sampling to follow leads, fill data gaps, and assess conditions before and after management changes. Lastly, the First Flush program is a citizen science program designed to establish baseline conditions for a variety of water quality parameters over time. To implement these projects the following work was conducted:

- Developed monitoring materials such as monitoring plans, field data sheets, site directions, maps etc.
- Planned and implemented water quality monitoring events:
 - Identified sample sites and secured access
 - Corresponded with labs and calibrated instruments
 - Obtained supplies and materials (gloves, buckets, ice etc)
 - Trained and coordinated field staff and volunteers
- Collected water samples and processed them or transferred them to a lab
- Entered and managed lab and field data in excel
- Performed statistical analyses and generated graphs and figures
- Created documents and presentations describing monitoring activities and results/findings
- Made recommendations, and proposed solutions and next steps to HD and partners

First Flush Program

The First Flush program was successfully implemented in 2016, 2017, 2018, and 2019. This program involves monitoring stormwater outfalls and drainages to the ocean from Montara to Moss Beach. Samples were collected during the first big rain of the season from various PPH outfalls and tested for fecal indicator bacteria, metals, nutrients and physical parameters.

Capistrano Beach

From July 2016 to May 2017, 129 samples were collected during 12 sampling events and tested for FIB and physical parameters (TDS, salinity, pH, dissolved oxygen, specific conductivity, temperature). Samples were collected during wet and dry weather conditions from the three

freshwater outfalls flowing to Capistrano Beach (Denniston, Capistrano, St. Augustine) as well as the associated receiving water in the harbor. For half of these events, the outfalls and receiving water were collected twice per day, once at high tide and once at low tide. For the other half of the sampling events, the outfalls and receiving water were sampled along with various locations upstream from each outfall.

Adaptive Monitoring

From June 2017 to February 2019, 114 samples were collected during 23 sampling events. Water quality parameters tested included FIB, *Bacteroidales* (human, horse, dog, Universal), ammonia, copper, zinc, chlorine, Bacillus spores, Methylene Blue Active Substance, optical brighteners, and physical parameters. Samples were collected during both wet and dry weather events in the Capistrano, St. Augustine, Denniston, West Point, Vassar, and Marsh watersheds as well as periodically in harbor receiving waters. Most of these samples were only tested for FIB. Thirteen FIB samples were also tested for *Bacteroidales* to provide more in depth information on sources.

Date	<i>Bacteroidales</i> Marker	Location (w/in stormwater system)
11/8/17	Universal, human, horse, dog	1 Site Capistrano North 1 Site Denniston East
1/17/18	Universal, horse	1 Site Capistrano North, Blank
3/2/18	Horse	1 Site Capistrano North, 1 Site Capistrano South
1/7/19	Human	1 Site Capistrano North, 2 Sites Capistrano South
2/13/19	Human	2 Sites Capistrano North, 1 Site Capistrano South, Capistrano Outfall

Source Stressor Identification Study

From January 2018 to July 2018, 63 samples were collected during four sampling events and tested for *E. coli*, *Bacteroidales* (human, dog, and Universal), ammonia and physical parameters. Samples were collected during two storm events and two dry weather events from 14 sample sites in the Denniston, St. Augustine, Deer Creek, Capistrano, and Marsh watersheds.

Key Deliverables

- Four presentations to HD Board of Commissioners (listed above)
- Seven First Flush presentations to various organizations within the community (does not include HD presentations)
- RCD PPH Raw Water Quality Data Excel 2016-2019 (available by request – it has already been shared with the County and the State Water Resources Control Board)
- PPH Source Stressor Identification Study 2019 (provided to HD electronically)

Stormwater System Management

As a result of water quality monitoring and analysis, bacteria hot spots and potential sources were identified and next steps were recommended. Many of these next steps and solutions involved investigating the underground stormwater and sewer infrastructure. The following work was completed under this task:

- Hired a contractor to CCTV the entire stormwater system on HD property at PPH. We also worked with the County to CCTV their stormwater line along Capistrano Road
- Determined the layout of all HD stormwater infrastructure at PPH, as well as the stormwater system on Capistrano Road and created associated GIS files and maps
- Worked with the contractor to clean/flush and inspect the condition of stormwater lines on HD property and along Capistrano Road
- Identified two broken stormwater pipes in the north HD parking lot. HD subsequently replaced these pipes.
- Identified leaks and cracks within the County stormwater line on Capistrano Road. The County has now agreed to fix these infiltration issues in the summer of 2020.
- Identified a large section of the HD stormwater system with a perennial creek running through it that is clogged with debris, oils, grease and sediment
- Completed the planning phase (cost, process, equipment, contractor etc) to clean/flush this stormwater line in the summer of 2020
- Hired a contractor to install a new manhole along this stormwater line to accommodate cleaning equipment
- Identified a misplaced pipe from a sink/wash area that was connected to this stormwater line and sealed it off to prevent further contamination
- Dye tested the sewer line to and from the HD pump station and along Capistrano Road to see if there was cross-contamination into the stormwater system (no evidence of this)

Key Deliverables to HD

- Map of HD stormwater system (electronic)
- Inspection Results (CDs, hard copies, electronic)
- CCTV videos (CDs)
- RCD Inspection Results Summary and Recommendations/Next Steps (hard copy)

Technical Assistance¹

Pet Waste Solutions

- Added pet waste information on the RCD, HD, and partner websites (SAM, County etc). This included the Scoop the Poop pledge, which the RCD helped the County develop
- Created social media posts (Facebook and Instagram) and emails blasts about pet waste as a pollutant and encouraged HD and partners to forward and share. Here is an example: <https://mailchi.mp/218d04bb344d/wet-weather-alertpick-up-your-pet-wasteand-protect-water-quality-1368885>.
- Created flyers, mailers, and brochures about pet waste and local water quality and distributed them around the community (including HD offices). These files were also provided to HD electronically:
 - 75 flyers were posted from Half Moon Bay to Pacifica
 - 225 brochures were distributed to local businesses and partners
 - 1,910 were mailed to residences in neighboring watersheds
- Conducted one pet waste and trash clean-up near Mavericks Beach and several clean-ups in nearby watersheds
- Recommended that HD harbor patrol also pick up pet waste when picking up trash on PPH property
- Encouraged installation of pet waste stations on HD property and several have subsequently been installed. New pet waste stations have also been installed in nearby watersheds.
- Helped initiate, organize, and staff booths/tables at local events which included pet waste informational materials (See Appendix 1)

Other Solutions

- Installed storm drain stickers (no dumping/flows to ocean messaging) on all HD stormwater drains at PPH
- Developed a project to do storm drain art for improved messaging and visibility about no dumping/flows to ocean. The planning phase is complete and a Whale Tail grant proposal has been drafted. There have been preliminary discussions with HD about doing this project on HD property at PPH and potential storm drain locations have been identified.

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- Researched technological solutions to bacteria pollution such as absorbents and filter media in stormwater systems
 - Provided HD with environmental/stormwater information for website (Ex: Clean It Right, Restaurant BMPs, and Stormwater Guidelines for Food Facilities)
 - Made suggestions to HD staff related to power washing, grease and garbage can management, pet waste, trash, and signage to promote best stormwater practices
 - Spoke with several local businesses and residences in PPH watersheds about stormwater best practices and how to reduce water pollution
 - Began developing an interpretive sign to be placed next to Johnston Pier about PPH watersheds and local sources of pollution and solutions
 - Represented HD and engaged with the State Water Resources Control Board about development of the Total Maximum Daily Load regulation for bacteria at PPH. Provided background, resources, data, and current status and understanding
 - Helped initiate a new community group called Coastside 1 Water. This group consists of local water related agencies to keep each other in the loop, share resources, and work on common goals. The biggest initiative was tabling at local events and distributing educational materials about best practices (stormwater, sewer, water conservation etc)

Education/Outreach Events

See Appendix 1

¹Funding and resources for work under the Technical Assistance task was also provided by the RCD and members of Coastside 1 Water such as San Mateo County and Sewer-Authority Mid-Coastside.

Appendix 1: Education/Outreach Events

Date of Event	Event Location	Event Name	Type of Event	Estimated Event Attendance	Estimated Reach	Type of Information/Material
9/10/2016	Half Moon Bay	First Flush Training	Citizen Involvement	10	10	Stormwater/pollution info, WQ sampling training
04/30/2017	Half Moon Bay	Snapshot Day Training	Citizen Involvement	10	10	Stormwater/pollution info, WQ sampling training
5/6/2017	Coastal San Mateo County	Snapshot Day Event+Hub	Citizen Involvement + Public Outreach	25	1,000	Recruitment (social media, email distribution, flyers), WQ sampling, and tabling event (hub)
8/26/2017	Pillar Point Harbor	National Marina Day	Public Outreach	100	15	Table with EPA stormwater stickers, Clean Boating Habits Pamphlet, Mobile Pump Out Service Card, SMCWPP Stormwater Tip Card, PPH WQ status summary
9/16/2017	Pacifica to Half Moon Bay	Coastal Clean-up Day	Citizen Involvement	60,000	500	Provided a memo about dog waste as a pollutant and dog waste bags to encourage volunteers to pick up pet waste as well as trash
9/20/17	El Granada	First Flush Training	Citizen Involvement	7	7	Stormwater/pollution info, WQ sampling training
9/23/17 & 9/24/17	Pacifica	FogFest	Public Outreach	6,000	Never received stats from City of Pacifica	SMCWPP Stormwater Tip Card
10/20/2017	Montara to Half Moon Bay	First Flush Event	Citizen Involvement	6	1,000	Recruitment (social media, email distribution, flyers) and WQ sampling
10/23/2017	Half Moon Bay	Sewer Science Field Trips	Public Outreach	240	250	SMCWPP Stormwater Tip Card
1/23/17	Half Moon Bay	Sewer Authority Mid-Coastside Presentation	Public Outreach	15	50	Stormwater/pollution info, First Flush Sampling Results
4/12/17	El Granada	Midcoast Community Council Presentation	Public Outreach	8	50	Snapshot Day and Pet Waste Clean-Up Recruitment. First Flush Results
2/12/18	Half Moon Bay	Sewer Authority Mid-Coastside Presentation	Public Outreach	15	50	Stormwater/pollution info, First Flush Sampling Results
4/25/18	El Granada	Midcoast Community Council Presentation	Public Outreach	8	50	Snapshot Day and Pet Waste Clean-Up Recruitment. First Flush Results.
4/28/18	El Granada	Snapshot Day Training	Citizen Involvement	8	8	Stormwater/pollution info, WQ sampling training
4/29/18	Half Moon Bay	Pacific Coast Dream Machines	Public Outreach	4,000	500	SMCWPP Stormwater Tip Card, green infrastructure and pet waste education materials

5/4/18	Coastal San Mateo County+Pillar Point Harbor	Snapshot Day Event + Hub	Citizen Involvement + Public Outreach	25	1,000	Recruitment (social media, email distribution, flyers), WQ sampling, and tabling event at Pillar Point Harbor (hub) and handed out SMCWPP 'Stormwater Tip Card'
5/30/18	Half Moon Bay	Half Moon Bay High School Lesson	Public Outreach	16	16	Stormwater/pollution info, First Flush Results, and SMCWPP 'You are the Solution' Graphic in presentation. And handed out 'Stormwater Tip Card'
6/28/18	Moss Beach	Princeton Task Force Presentation	Public Outreach	11	11	Stormwater/pollution info, First Flush Results, and SMCWPP 'You are the Solution' Graphic
8/4/18	Pacifica	World Dog Surfing Championship	Public Outreach	5,000	250	Handed out the RCD's Poop Pollutes Post Cards and SMCWPP's Pet Waste Bag Dispensers
9/10/18	Half Moon Bay	First Flush Training	Citizen Involvement + Public Outreach	25	25	Training includes lessons about watersheds, stormwater, pollution, and WQ sampling training
9/29/18 & 9/30/18	Pacifica	Pacific Coast Fogfest	Public Outreach	6,000	500	SMCWPP Stormwater Tip Card and RCD's Poop Pollutes Post Card (50 copies of each a table)
10/13/18 & 10/14/18	Half Moon Bay	Pumpkin Festival	Public Outreach	200,000	10,000	RCD's Pet Poop Pollutes Post Cards and SMCWPP's Stormwater Tip Card
Oct 2018	Half Moon Bay	High School Sewer Science Field Trips	Public Outreach	300	300	RCD's Pet Poop Pollutes and SMCWPP's Stormwater Tip Cards
11/21/18	Montara to Half Moon Bay	First Flush Event	Citizen Involvement	14	1,000	Recruitment outreach (social media, email distribution, flyers) and WQ sampling
12/1/18	Half Moon Bay	Rain Barrel Workshop	Public Outreach	38	38	Offered RCD/NRCS technical assistance with residential stormwater management.
2/25/19	Half Moon Bay	Sewer Authority Mid-Coastside Presentation	Public Outreach	15	50	Watersheds, stormwater, pollution and First Flush Sampling Results
3/27/19 & 3/29/19	Half Moon Bay	Half Moon Bay High School Lessons	Public Outreach	35	35	Presented to 2 classes of AP Environmental Science students about watersheds, stormwater, pollution, and solutions
4/28/19	Half Moon Bay	Snapshot Day Training	Citizen Involvement	12	12	Training includes info about watersheds, pollution, and WQ sampling training
4/28/19	Half Moon Bay	Pacific Coast Dream Machines	Public Outreach	4,000	500	Coastside One Water outreach table that included SMCWPP Stormwater Tip card, You Are the Solution to Water Pollution brochure, and the RCD's Poop Pollutes post card.

5/4/19	Coastal San Mateo County+Pillar Point Harbor	Snapshot Day Event + Hub	Citizen Involvement +Public Outreach	25	1,500	Recruitment outreach (social media, email distribution). WQ sampling and tabling event with SMCWPP Stormwater Tip Card, Scoop the Poop Pledge and dog bag dispensers.
5/14/19	Redwood City	North Star Academy Middle School Lessons	Public Outreach	95	150	Presented to fifth graders about the water cycle, watersheds, stormwater, water quality, and local pollutants. Interactive activities included the Enviroscape watershed model, a rainfall simulation demonstration, and a soil texturing exercise. SMCWPP Stormwater Tip Cards were also distributed to each student.
5/31/19	Half Moon Bay	Sea Crest School Lessons	Public Outreach	35	50	Presented to fifth graders about watersheds, stormwater, water quality, and local pollutants.
6/9/19	La Honda	La Honda Fair and Music Festival	Public Outreach	350	40	RCD outreach table with SMCWPP Stormwater Tip card and Scoop the Poop Pledge
8/3/19	Pacifica	San Pedro Watershed Coalition Event	Public Outreach	40	500	Water quality outreach table with pet waste brochures, the Scoop the Poop Pledge, dog bag dispensers, You Are the Solution to Water Pollution Brochure and Rain Barrel Tip Cards
8/3/19	Pacifica	World Dog Surfing Championship	Public Outreach	5,000	250	Walked around with the Scoop the Poop Pledge and 61 people took the pledge and received a dog bag dispenser
8/17/19	Pescadero	Pescadero Arts and Fun Festival	Citizen Involvement +Public Outreach	5,000	1,500	Outreach table with the Scoop the Poop Pledge, dog bag dispensers, Stormwater Tip Card, BAWSCA's Ran Barrel Rebate, and the Enviroscape watershed model
9/21/19	Pacifica to Half Moon Bay	Coastal Clean-up Day	Citizen Involvement	60,000	500	Provided a memo about dog waste as a pollutant and dog waste bags to encourage volunteers to pick up pet waste as well as trash
10/12/19	Half Moon Bay	Rain Barrel Workshop	Public Outreach	25	25	Offered RCD/NRCS technical assistance with residential stormwater management.