SAN MATEO
RESOURCE
CONSERVATION
DISTRICT

FIRST RAIN 2020 RESULTS

In partnership with the Monterey Bay National Marine Sanctuary, Surfrider Foundation, County of San Mateo Public Health System, Sewer Authority Mid-Coastside, and the San Mateo County Harbor District, the San Mateo Resource Conservation District (RCD) held the 2020 First Rain (First Flush) program in San Mateo County in 2020.

Thank you to our partners, funders, and volunteers for their dedication to clean water on the Coastside of San Mateo County!

Introduction

The First Rain (First Flush) program is held in San Mateo, Santa Cruz, and Monterey Counties. Each of these counties has watersheds that discharge to the Monterey Bay National Marine Sanctuary. Data collected in this program provides important information on the types and amounts of contaminants flowing off land and into the ocean during the first big rain of the year. The First Rain (First Flush) provides a snapshot of a once a year worst-case scenario for water quality when, after months of dry weather, contaminants that have built up on roads and parking lots and fields, are washed away by the first big rain of the year.

On November 17, 2021, 20 volunteers sampled creeks and stormwater outfalls between Montara and Half Moon Bay on the Coastside of San Mateo County. Water samples were collected from 12 sites (see map below) and taken to the San Mateo Public Health Laboratory and to Monterey Bay Analytical Services and analyzed for Fecal Indicator Bacteria (FIB; *E. coli* & *Enterococcus*), Nutrients (nitrates and Orthophosphates), Metals (copper, lead, zinc), and Total Suspended Solids (Additional information on the pollutants tested for are provided in Table 1).

Approximately 0.5" of rain had fallen by the time sampling was completed. Data for each contaminant were compared to water quality objectives (WQOs), designed to protect human and ecological health (see appendix 1 for a complete list of WQOs).

Figure 1. San Mateo County First Rain (First FLush) 2020 Site Map

Table 1. What did we test for?

Pollutant	Potential Sources	Effects
Fecal Indicator Bacteria (FIB) (*E. coli*, *Enterococcus*)	Feces of warm-blooded animals (humans, dogs, horses, wildlife, etc.)	Indicator for pathogens that can harm human health
Nutrients (nitrates and orthophosphates)	Fertilizers, pesticides, detergents	Ecosystem and recreation impacts
Metals (copper, lead, zinc)	Gutters/roofs, brake pads, tires, industrial waste, paint, fires	Human health impacts, reduced reproduction, and mortality of marine organisms
Total Suspended Solids	Construction, erosion, agricultural runoff, fires	Marine organism impacts (ex. Respiratory effects in aquatic organisms

Results Summary

- *E. coli* was above recommended levels in 100% of sites.
- *Enterococcus* were above recommended levels in 100% of sites.
- Nitrates, zinc, and lead concentrations were within recommended ranges in all but one site.
- Copper concentrations were within recommended ranges in all but two sites.
- Orthophosphates were above recommended ranges in all but one site.
- Total Suspended Solids were within recommended ranges in all but one site.

Table 2. First Rain 2020 Results Table.

Site Code	Site	E.coli 1:10	E. coli 1:100	Entero (1:10)	Entero (1:100)	Copper, Total	Nitrate as N	Lead, Total	Orthophosphate as P	Total Suspeed Solids	Zinc, Total
202-MOSD-04	Montara Creek	269	310	1850	1750	ND	3.1	4.7	1.32	144	74
202-MBSD-05	San Vicente Creek	4106	4200	4611	3540	6	0.2	1	ND	175	ND
202-MBSD-04	West point ave ditch	11199	11530	24196	77010	49	1.9	17.9	0.44	223	165
202-EGSD-04	Vassar Ave	3076	3990	24196	28510	52	1.1	33.1	0.41	210	202
202-EGSD-03	Capistrano	14136	13740	17329	17850	21	0.3	2	0.14	27	43
202-PPSD-04	St. Augustine Creek	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
202-PPSD-05	Inner Harbor	11199	10220	15531	10920	13	0.1	2.4	0.47	15	76
202-EGSD-01	El granada	24196	24890	24196	24890	20	0.5	2.6	0.29	40	31
202-EGSD-02	Surfers South	24196	29870	24196	57940	11	0.4	1.9	0.27	37	40
202-HMB-08	Dunes Parking Lot Drainage	241	310	11199	17230	10	1.1	1.9	0.55	847	107
202-FRENC-11	Frenchmans	24196	86640	24196	51720	12	0.2	2.5	0.22	115	22
202-PILAR-12	Pilarcitos	241	200	269	200	ND	0.1	ND	0.32	ND	ND
202-HMB-11	Kelly ave	12997	11000	24196	22240	18	0.2	ND	0.18	18	23

Note: Two standard dilutions were used for E. coli and Enterococcus to provide more accurate data. Data from both dilutions (1:10 & 1:100) are included in the table above. ND = non detect meaning that a sample was collected but the contaminant was below the limit of detection. NS = no sample meaning that volunteers visited the site during the first rain but were not able to collect a sample – in the case of St. Augustine, the tide was above the outfall and so no freshwater sample could be collected. Red = sample exceeded water quality objective

Key findings

Fecal Indicator Bacteria

Fecal indicator bacteria (FIB) provide an indicator of the presence of the feces of warm-blooded animals which in turn may indicate the presence of pathogens that can make people sick. Two FIB species were tested for in 2020, *E. coli* and *Enterococcus* (note, these are not the same species of *E. coli* that were found on lettuce in California a few years ago, the species of interest here are not pathogenic themselves). 100% of sites sampled in San Mateo County in 2020 were above recommended levels for *E. coli* and all sites were above recommended levels for enterococcus. It should be noted that the First Rain (First Flush) provides a snapshot of a worst-case scenario for water quality and while concentrations of fecal indicator bacteria collected in San Mateo County are above recommended ranges they are not typically as high as in other participating counties.

Heavy Metals: Copper, Lead, and Zinc

The heavy metals copper, lead, and zinc can come from gutters/roofs, brake pads, tires, industrial waste, paint, and fires as well as other sources and have been linked to human and ecological health impacts.

Two sites in Princeton (West Point Ave Ditch and Vassar Ave) showed elevated levels of heavy metals in 2020. This was the first time that heavy metals exceeded recommended levels in the First Rain program in San Mateo County. Concentrations of some metals are more commonly found in other participating counties. Heavy metals have been linked to human health impacts as well as reduced reproduction, and mortality of marine organisms. Note that the WQO objective used here (30 ppb) pertains to marine aquatic life.

Nutrients: Nitrates and Orthophosphates

Nitrates and orthophosphates are important for plant growth but can cause ecosystem and recreation impacts in elevated levels. Nitrates and orthophosphates in elevated concentrations can be naturally occurring or be linked to fertilizers, pesticides, detergents, and failing septic and sewer systems.

In 2020, only one site (Montara Creek) saw elevated levels of nitrates. Since 2003, there have been very few instances where nitrates exceeded recommended levels in San Mateo County. Nitrates are more commonly found above recommended levels in other participating counties.

Orthophosphates exceeded recommended levels in all but one site in San Mateo County in 2020. Historically, during the First Rain (First Flush) orthophosphates are commonly found in elevated levels in all three participating counties while levels in San Mateo County are often lower than in the other two participating counties.

Total Suspended Solids

Total Suspended Solids in water can come from natural or accelerated rates of erosion, construction sites, agricultural runoff, fires, and other sources and can negatively impact ecological health. In addition to direct impacts from suspended material in the water column, Total Suspended Solids are often

associated with other contaminants such as fecal indicator bacteria or heavy metals. Only one site (Dunes Parking Lot – Drainage) had levels of Total Suspended Solids above recommended ranges. Dunes Parking Lot Drainage is a sandy path from a parking lot leading to Dunes Beach, volunteers observed sand in the sample likely contributing to the high suspended solids at this site in 2020.

Partner Acknowledgement

The RCD appreciates the partnerships that include funding from Sewer Authority Mid-Coastside (SAM) and San Mateo County Harbor District, laboratory services from the San Mateo County Public Health Laboratory, the Surfrider Foundation for use of their lab (donated by SAM) as a meeting hub for water quality sampling, the Monterey Bay National Marine Sanctuary for their continued efforts in coordinating this program across three counties whose watersheds discharge to the Monterey Bay National Marine Sanctuary. We would also like to thank our volunteers who attended an online training, waiting on call for there to be enough rain, and braved the weather to collect water samples during the first big rain of the year.

For More Information

- A table of the results from the 2020 program are included below. For those who wish to take a deeper dive into the results and into the program you can view an interactive tour of the results at each site via this link: First Rain 2020 Virtual Tour
- See https://montereybay.noaa.gov/resourcepro/reports.html for First Flush (First Rain) reports from the Monterey Bay National Marine Sanctuary summarizing findings from all participating counties for years 2000-2018. Note, as of this writing, the 2019 report has yet to be uploaded to this site. First

Appendix 1. Water Quality Objectives

Parameter (reporting units)	Water Quality Objectives	Source of criterion
Copper (ppb)	Not to exceed 30	Water Quality Control Plan for the Central Coast- RWQCB
E. coli (MPN/100ml)	Not to exceed 235	U.S. EPA Ambient Water Quality Criteria
Enterococcus (MPN/100ml)	Not to exceed 104	U.S. EPA Ambient Water Quality Criteria
Lead (ppb)	Not to exceed 30	U.S. EPA Ambient Water Quality Criteria
Nitrates (mg/L)	Not to exceed 2.25	Central Coast Ambient Monitoring Program (CCAMP)
Orthophosphate (mg/L)	Not to exceed 0.12	Central Coast Ambient Monitoring Program (CCAMP)
Total Suspended Solids (TSS) (ppm)	Not to exceed 500	Central Coast Ambient Monitoring Program (CCAMP)

Note: adapted from Table 2 in MBAS 2019 First Flush Report