Snapshot Day

May 5th, 2018

Final Report

NATIONAL MARINE SANCTUARIES
MONTEREY BAY

Monterey Bay Sanctuary Citizen Watershed Monitoring Network

Central Coast Snapshot Day 2018
organized by:

The Monterey Bay Sanctuary Citizen Watershed Monitoring Network:
Supporting citizen monitoring programs throughout the Monterey Bay National Marine Sanctuary.
(831) 647-4227
www.montereybay.noaa.gov

The Coastal Watershed Council
A public education non-profit advocating the preservation and protection of coastal watersheds through the establishment of community-based stewardship programs.
(831) 464-9200
www.coastal-watershed.org

The Monterey Bay National Marine Sanctuary (MBNMS) Water Quality Protection Program
Promoting clean water in the watersheds along nearly 300 miles of the Sanctuary's coastline.
(831) 647-4201
www.montereybay.noaa.gov

With assistance from:

San Mateo County Resource Conservation District
Helping people help the land since 1939.
(650) 712-7765
www.sanmateorcd.org

Watsonville Wetlands Watch
Advocating for wetlands, teaching school students, restoring habitats and preserving what remains.
(831) 728-1156
www.watsonvillewetlandwatch.org

Executive Summary

Since Earth Day 2000, volunteers have assembled on the first Saturday morning of May each year to collect water quality samples from the water bodies entering Monterey Bay National Marine Sanctuary (MBNMS). Snapshot Day (SSD) has become an annual event that has created partnerships, drawn over 3,700 volunteers to date, and has helped foster an ethic of watershed stewardship for local citizens. The nineteen years of data collected by volunteers has become a valuable source of water quality data for the region. Monterey Bay National Marine Sanctuary's Citizen Watershed Monitoring Network and the Coastal Watershed Council organize Snapshot Day.

In 2018, volunteers gathered on the morning of May 5th at one of four hubs located in four counties bordering the Sanctuary (San Mateo, Santa Cruz, Monterey, and San Luis Obispo). At the hubs, volunteers picked up sample equipment and containers, received last minute instructions, and met fellow team members. This year 143 citizen scientists donated between four and six hours of their time to monitor 124 sites. Of the 124 sites with flowing water, 21% met all of the water quality objectives (WQO) that were measured, indicating vibrant healthy water bodies.

Results reveal that dissolved oxygen was the most common field measurement to not meet the Water Quality Objectives (WQO) and orthophosphate was the most common lab measurement to not meet the WQOs. Dissolved oxygen did not meet the WQO at 31% of the sites where it was measured in 2018, as compared to 28% of sites in 2017, and 29% of sites in 2016. Orthophosphate exceeded the WQO in 27% of sites in 2018 as compared to 14% in 2017 and 19% in 2016.

Twenty-two Areas of Concern (sites that exceeded three or more WQOs) were identified this year compared to 25 in 2017 and 21 in 2016. The twenty-two Areas of Concern for 2018 spanned sixteen water bodies in three counties: Santa Cruz, Monterey, and San Luis Obispo. The Santa Cruz County Areas of Concern were on six water bodies: Arana Gulch, Lidel Creek, Moore Creek, Beach Street Ditch, Harkins Slough, and Watsonville Slough. Monterey County's Areas of Concern were on eight water bodies: Moro Cojo Slough, Alisal Slough, Gabilan Creek, Natividad Creek, Lower Salinas River, Santa Rita Creek, Tembladero Slough, and the Salinas Reclamation Ditch. San Luis Obispo's Areas of Concern were on just two waterbodies, Trout Creek and San Simeon Creek.

Nineteen years of data gathered by trained Snapshot Day volunteers is used to help resource managers focus attention on problem areas. Programs such as Snapshot Day are an important link for residents to their local waterways and actions focused on improving water quality. Snapshot Day data is used to inform public policy through incorporation into the 303(d) listing of impaired water bodies by the Central Coast Regional Water Quality Control Board.

We would like to thank our volunteers and all of our partners for making this event a success.

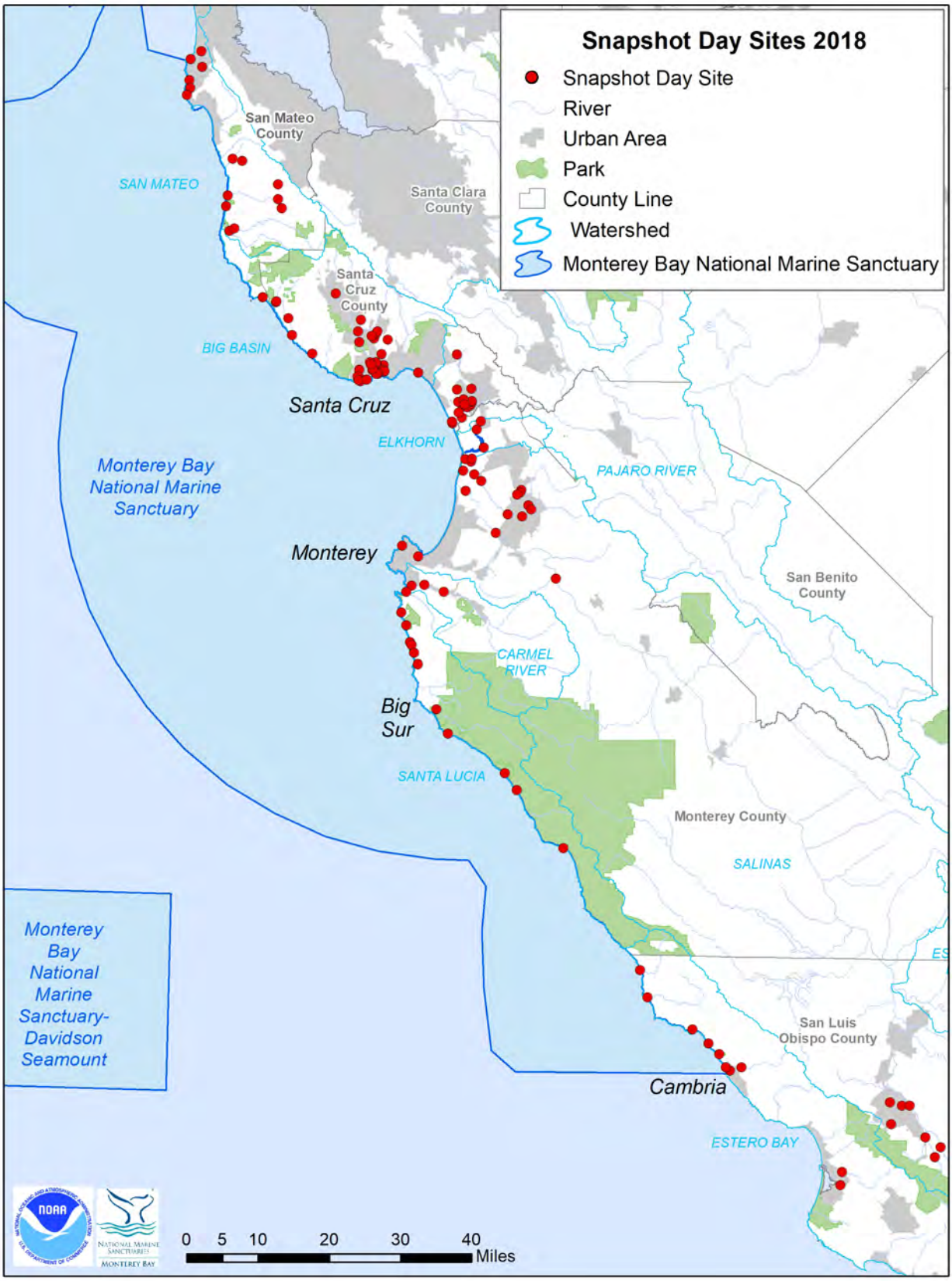


Figure 1. Map of Snapshot Day 2018 monitoring sites

Introduction

Water quality monitoring is an important tool for watershed management. Strategies focused on addressing pollutants and their sources require monitoring to determine if targets have been met. Monitoring provides necessary data on the health of a stream or river that can be analyzed spatially and temporally, however the lack of funding for watershed monitoring results in a lack of information about many waterways. In order to gather data about large and small creeks and rivers flowing into Monterey Bay National Marine Sanctuary (MBNMS), MBNMS works with volunteers, local agencies, and other non-profits to monitor the health of streams and rivers during an annual monitoring event: Snapshot Day. Snapshot Day's focus is to determine the health of watersheds flowing into MBNMS, inspire volunteers to engage with local watersheds and watershed groups, and to collect long-term data focused on assessing the health of central California creeks and rivers.

Snapshot Day has been conducted since 2000. A program such as Snapshot Day could not function without volunteers who simultaneously monitor sites on the same morning. Throughout the past nineteen years, 3,783 volunteers have donated more than 18,000 hours to monitor sites along creeks and rivers that flow to Monterey Bay National Marine Sanctuary.

Methods

Each April, Snapshot Day trainings are conducted in all four counties bordering the sanctuary: San Mateo, Santa Cruz, Monterey, San Luis Obispo. Because many Snapshot Day volunteers have never taken field measurements or collected water samples before, training is important in developing these necessary skills. Snapshot Day training covers the program's history, how to take field measurements, and how to collect lab samples. During training, volunteers are encouraged to use the equipment to become familiar with it prior to heading out in the field.

During Snapshot Day each monitoring team is equipped with a kit that includes a 5-gallon bucket, a 2-gallon bucket, a digital thermometer, a CHEMets dissolved oxygen kit, an Oakton conductivity meter, Machery-Nagel non-bleeding pH strips, and a transparency tube or turbidity kit. The kits also include distilled water, gloves, paper towels, trash bags, pencils, sample bottles, clipboard with data sheets, field and instrument instructions, and directions with maps to each site. Volunteers take field measurements for air and water temperature, dissolved oxygen, conductivity, pH, and transparency or turbidity. Grab samples are collected for lab analysis of bacteria (*E. coli*) and nutrients (nitrate as N, orthophosphate as P). Each team monitors two or more sites.

All monitoring results (lab and field) are compared with receiving water standards established for beneficial uses in a stream, lake, or the ocean. Water Quality Objectives (WQOs) and Action Levels are designated by the Central Coast Ambient Monitoring Program (CCAMP), the Water Quality Control Plan for the Central Coast Basin (Basin Plan), or the US Environmental Protection Agency (U.S.EPA) (Table 1). Because there are no numerical water quality objectives

in the RWQCB Basin Plan for *E. coli*, nitrate, orthophosphate, turbidity and total suspended solids (TSS), those results are compared with the U.S. EPA WQOs and CCAMP's Action Levels. The U.S. EPA objectives are for the protection of human health while CCAMP's Action Levels are benchmarks that are set for receiving water concentrations at which pollutants may impact cold-water fish. Action Levels typically represent existing regulatory standards, levels derived from the literature or other agency references, or from data that shows levels are elevated relative to the data distribution for that parameter on the Central Coast. For this event a state approved Quality Assurance Project Plan and Monitoring Plan (QAPP) is followed.

Monterey Bay National Marine Sanctuary volunteers before they head out to monitor for Snapshot Day 2018 in Monterey County.

Coastal Watershed Council volunteers gather for Snapshot Day 2018 in Santa Cruz.

Table 1: Water Quality Objectives

Parameter (reporting units)	Water Quality Objectives	Source of Objective
Dissolved Oxygen (mg/L)	Not lower than 7 or greater than 12	Water Quality Control Plan for the Central Coast Basin
E. coli (MPN/100ml)	Not to exceed 235 [1]	EPA Ambient Water Quality Criteria
Nitrate as N (ppm)	Not to exceed 2.25 [2]	Central Coast Ambient Monitoring Program (CCAMP)
Orthophosphate as P (ppm)	Not to exceed 0.12 [3]	Central Coast Ambient Monitoring Program (CCAMP)
pH	Not lower than 7 or greater than 8.5	Water Quality Control Plan for the Central Coast Basin
Transparency (cm)	Not less than 25	Central Coast Ambient Monitoring Program (CCAMP)
Turbidity (NTU)	Not to exceed 25	Central Coast Ambient Monitoring Program (CCAMP)
Water Temperature (°C)	Not more than 21[4]	Central Coast Ambient Monitoring Program (CCAMP)

[1] Environmental Protection Agency, Updated WQO.
[2] Central Coast Ambient Monitoring Program, Pajaro River Watershed Characterization Report 1998, rev 2003.
[3] Williamson, The Establishment of Nutrient Objectives, Sources, Impacts and Best Management Practices for the Pajaro River and Llagas Creek, 1994.
[4] Moyle, P. 1976. Inland Fisheries of California. University of California Press.

Results

On May 5th 2018, 134 volunteers monitored 124 sites along creeks and rivers that flowed into MBNMS (Figure 1). This year, 21% of sites met the water quality objectives for all lab and field parameters.

Water Temperature

Just as temperature on land impacts terrestrial plants and animals, the temperature of the water can affect the life and health of aquatic organisms. Many fish species and other aquatic life need specific temperature ranges within which to survive and reproduce. Water temperature can also affect the amount of dissolved oxygen: increasing temperature causes a decrease in dissolved oxygen. Slowing water flow or removing streamside vegetation which provides shade can also cause water temperatures to rise to undesirable levels that may harm aquatic life. SSD data is collected during the morning hours, so temperatures do not necessarily reflect the daily maximum temperatures for the water body.

The Basin Plan Objective sets the upper limit of acceptable water temperature at 21 degrees Celsius (°C). Temperatures above 21°C can harm cold water fish such as salmon and steelhead, as well as other aquatic organisms. In 2018, four sites (3%) exceeded the WQO for water temperature. The highest result was 23.7 °C in Watsonville Slough near San Andreas Road (Santa Cruz County).

Dissolved Oxygen

Aquatic organisms rely on sufficient amounts of dissolved oxygen to perform regular behaviors like feeding, spawning, and incubating. Excessive nutrients in water can cause an increase in plant growth, which use up oxygen in the water once plants die. This decomposition further depletes the oxygen available to aquatic organisms.

The Basin Plan Objective for dissolved oxygen is for results to *not* be less than 7 milligrams per liter (mg/L) or greater than 12 mg/L, for cold water fish. This year, thirty-seven (30%) of the sites did not meet the WQO for dissolved oxygen. The lowest dissolved oxygen result of 3.61 mg/L was from Watsonville Slough near Harkins Slough Road (Santa Cruz County). The highest dissolved oxygen result of 17.67 mg/L was from Pajaro River at Thurwacher Bridge (Santa Cruz County).

pH

pH is a measure of the percent of hydrogen ions in water. A value of 7 is neutral, above 9 is alkaline (or basic) and below 5 is acidic. Many aquatic organisms require a very specific range of pH to carry out necessary chemical and biological reactions, extremely low or high pH levels impede essential functions for survival or damage tissues.

The Basin Plan Objective for pH is for results to fall between 7 and 8.5. In 2018, thirty-five (28%) of the sites did not meet the WQO. The lowest pH result of 6.0 was found at eleven sites in San Mateo, Santa Cruz, and Monterey Counties. The highest pH result of 9 was found at two sites Garrapata Creek (Monterey County) and the lower Salinas River (Monterey County).

Transparency/Turbidity

Transparency and turbidity are a measure of the clarity of a liquid. Normal transparency/turbidity measurements vary for different water bodies, but in general, low transparency or high turbidity levels can indicate problems such as erosion, nutrient loading, or extraordinary algae growth. While transparency and turbidity are describing a similar characteristic of water, the way in which they are measured is different. Transparency measures the ability to see a secchi disk through a column of water. CCAMP's Action Level for transparency is not less than 25 centimeters. Transparency was measured at 105 sites with 12 (12%) not meeting the Action Level. The lowest transparency measurement of 4.2 cm was taken in Alisal Creek (Monterey County).

Turbidity is determined using a turbidity meter that measures the amount of light that can penetrate a tube of sample water. CCAMP's Action Level for turbidity is not greater than 25 Nephelometeric Turbidity Units (NTU's). Turbidity was measured at fourteen sites and four (29%) exceeded the water quality objective. The highest turbidity measurement of 79.3 NTU was from the Beach Street ditch at West Beach and Rio Boca Roads (Santa Cruz County).

Three sites did not have transparency or turbidity measurements taken, these sites were Carmel River at Hwy 1 (Monterey County), Malpaso Creek (Monterey County), and Watsonville Slough at San Andreas Road (Santa Cruz County).

Nutrients

Nitrate (as N) and orthophosphate (as P) are measured for SSD. While these nutrients are naturally occurring in streams and rivers, other sources can come from fertilizers, pesticides, detergents, animal waste, sewage, or industrial wastes. Heightened levels of nutrients can lead to excessive algal or aquatic plant growth which ultimately deplete the amount of oxygen available in a waterway.

Nitrate

Nineteen of the sites (15%) exceeded the CCAMP Action Level of 2.25 mg-N/l for nitrate as N (Figure 2). The highest result for nitrate as N of 53.1 mg-N/L was from the Tembladero Slough at Preston Road (Monterey County). A total of thirty-five sites (28%) had non-detectable levels of nitrate as N.

Orthophosphate

Thirty-four sites (27%) exceeded the CCAMP Action Level of 0.12 mg/l for orthophosphate-P. The highest concentration of orthophosphate of 1.36 mg/L was from Hanson Slough near Lee Road (Santa Cruz County). A total of 60 sites (48%) had non-detectable levels of orthophosphate (Figure 3).

Bacteria

E. coli

Coliform bacteria generally originate from the feces of warm-blooded animals such as humans or wildlife. While coliform bacteria are usually not the cause of sickness, their presence can indicate that other illness causing pathogens are present. The EPA has set a WQO for *E. coli* at 235 MPN/100ml. Twenty-eight (23%) sites exceeded the *E. coli* WQO on Snapshot Day 2018 (Figure 4). The highest *E. coli* result of 1550 MPN/ 100ml was from Alisal Creek (Monterey County) (Figure 8).

Snapshot Day volunteers are one of a kind!

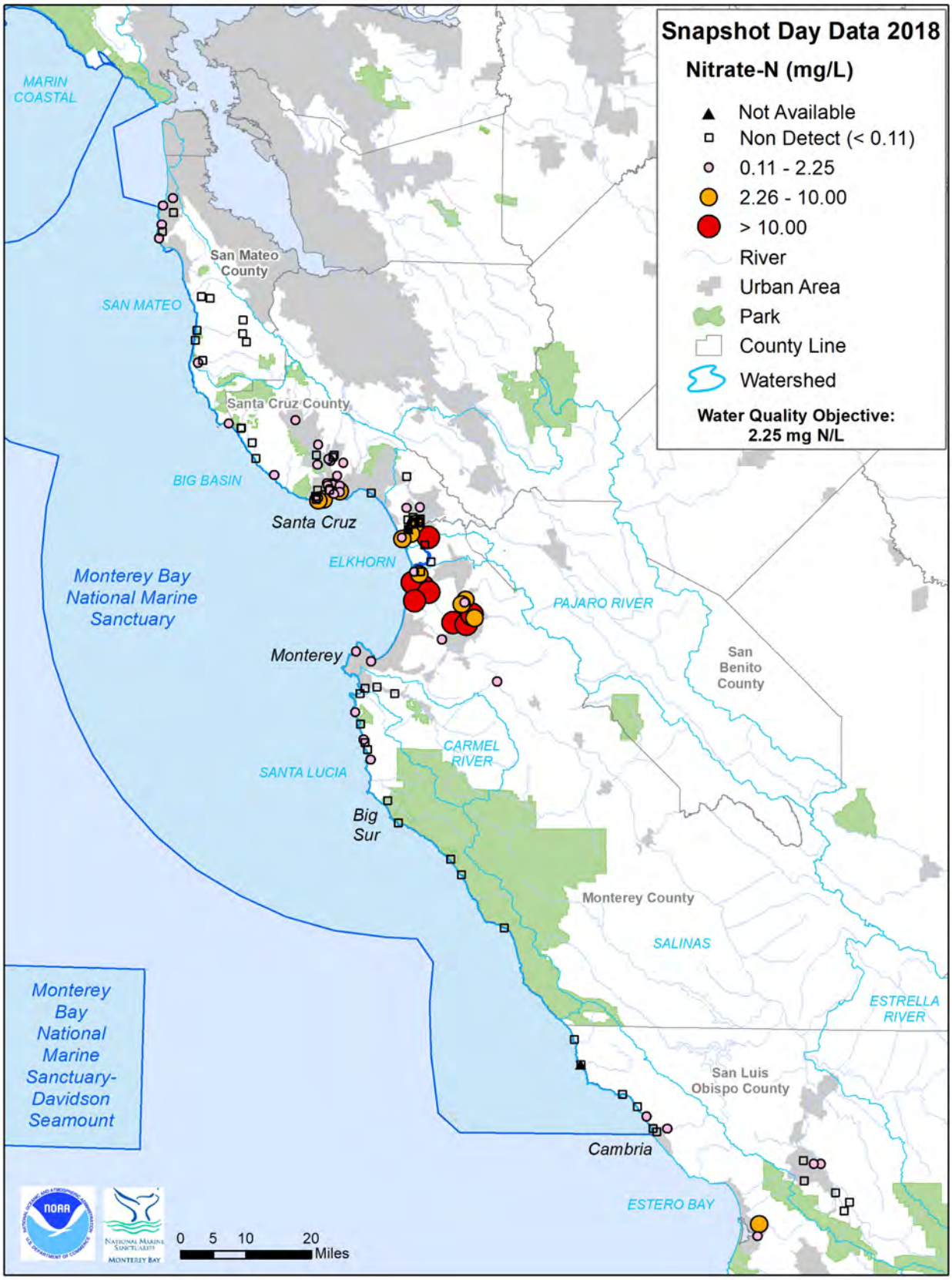


Figure 2. Nitrate as N Results for Snapshot Day 2018.

Figure 3. Orthophosphate-P Results for Snapshot Day 2018.

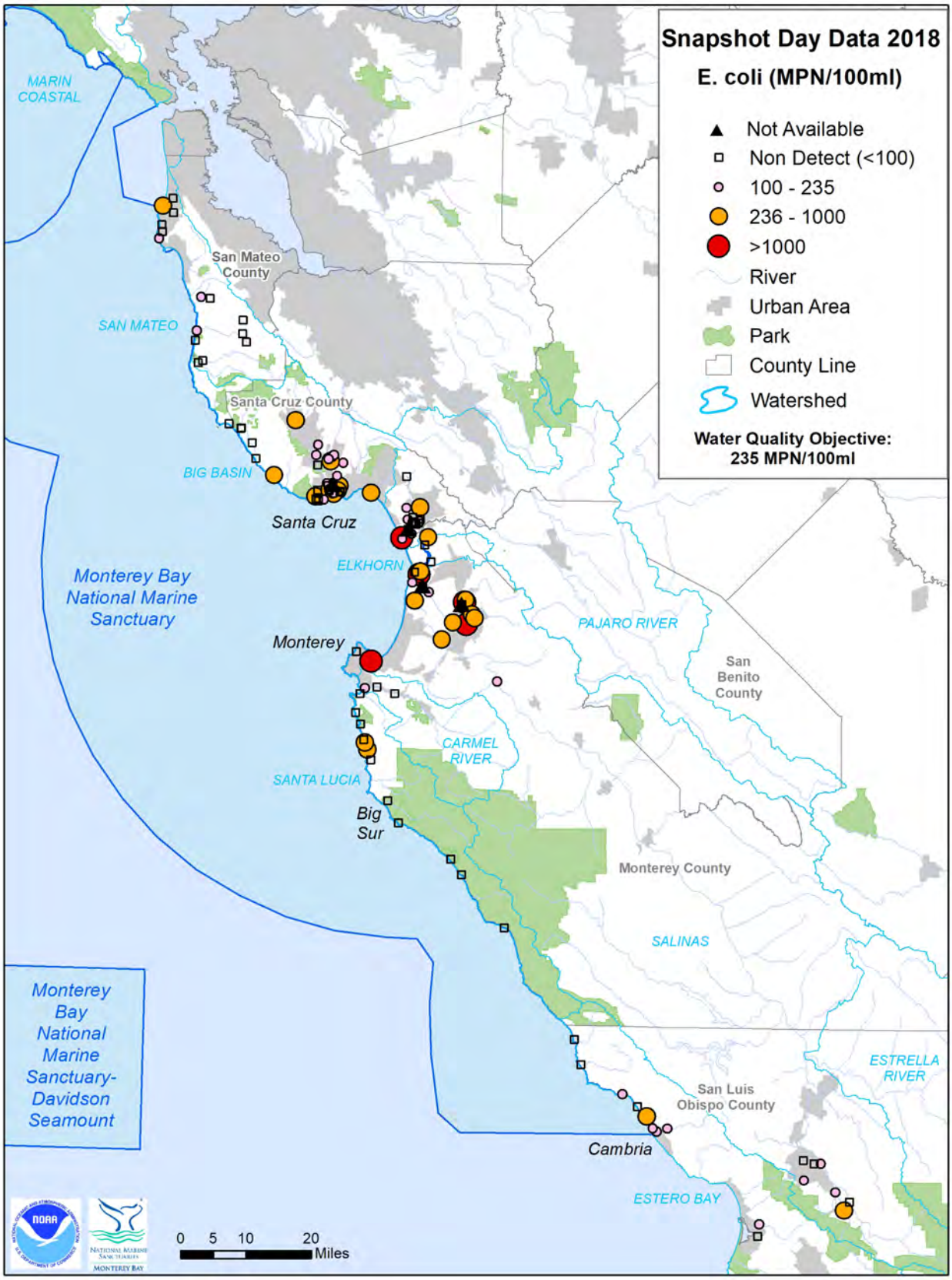


Figure 4. ***E. coli*** **Results for Snapshot Day 2018.**

Areas of Concern

When lab and/or field results for a single site exceed three or more Water Quality Objectives or Action Levels, the site is labeled an Area of Concern (AoC). Over the past several years, a trend has emerged of more than one AoC per water body. For example, the Tembladero and Moro Cojo Sloughs have more than one site that is monitored along these waterways, and also have more than one AoC along the same waterway. For this reason we have chosen to display the AoC data two ways: by water body (Figure 5) and by site (Figure 6).

In 2018, twenty-two sites (17%) were designated Areas of Concern on sixteen water bodies (Figure 5). The 2018 Areas of Concern include nine of the ten most common Areas of Concern: Watsonville Slough (Santa Cruz County), Harkins Slough (Santa Cruz County), Moro Cojo Slough (Monterey County), Tembaldero Slough (Monterey County), Alisal Slough (Monterey County), Lower Salinas River (Monterey County), Santa Rita Creek (Monterey County), Salinas Reclamation Ditch (Monterey County), and Natividad Creek (Monterey County). This year, Lidel Creek (Santa Cruz County) is on the list for only the second time in nineteen years due to exceedances in *E. coli*, orthophosphate, and dissolved oxygen. Moore Creek (Santa Cruz County) is also on the AoC list for only the third time in nineteen years due to exceedances in *E. coli*, orthophosphate, pH and dissolved oxygen (Figure 6). This year for the third year in a row, there are no sites from San Mateo County listed as AoC.

All data is available in Appendix 1.

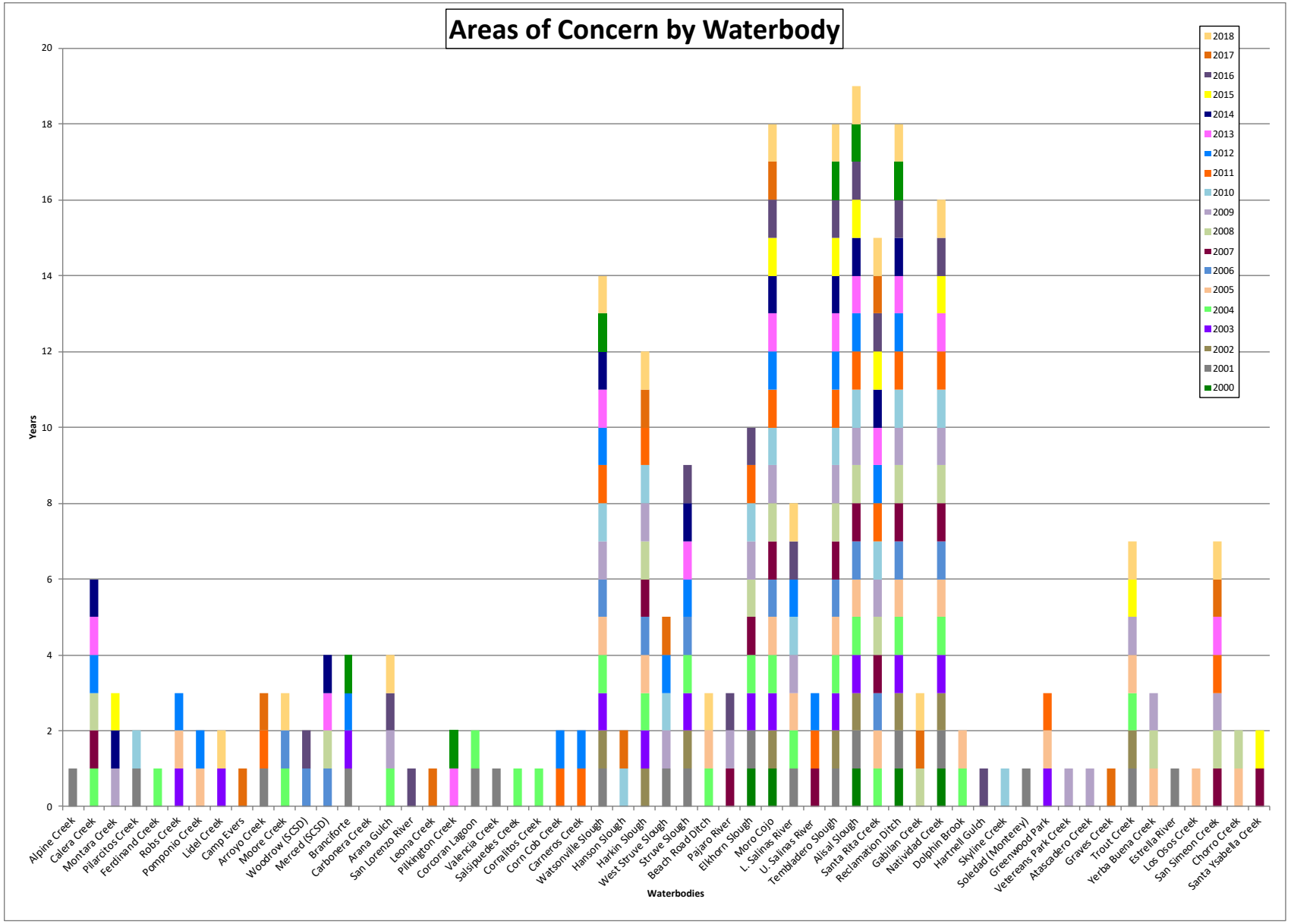
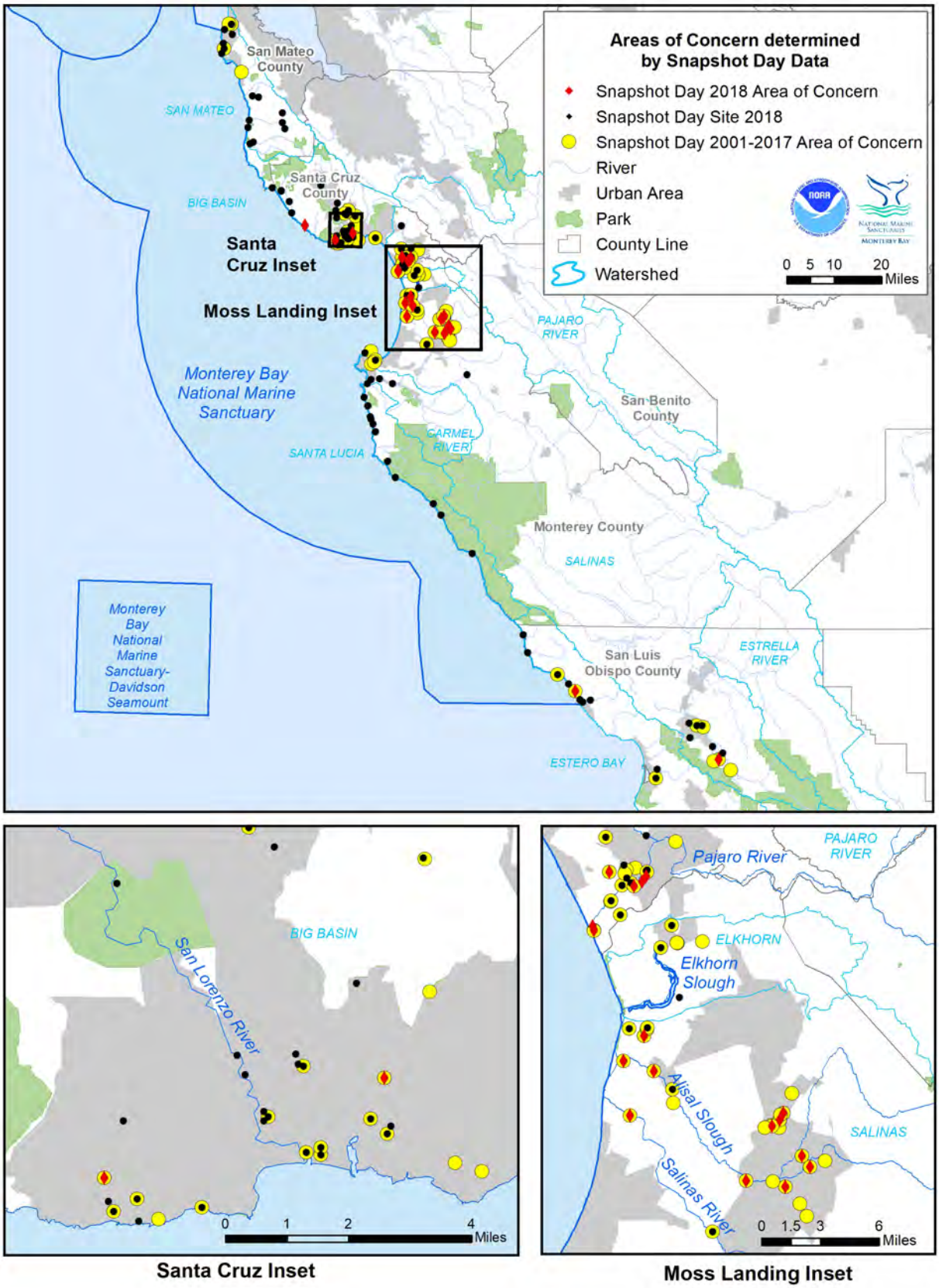


Figure 5. Areas of concern by waterbody 2000-2018



Santa Cruz Inset

Moss Landing Inset

Figure 6. Areas of Concern for Snapshot Day 2018.

Conclusion

In its nineteenth year, Snapshot Day 2018 brought together 134 committed citizens to monitor the water quality of 124 different sites along creeks and rivers draining into MBNMS. Twenty-one percent of the sites monitored had no water quality objective exceedances for any parameter and provided good conditions for cold-water fish, one beneficial use by which Snapshot Day data is compared.

In 2018, twenty-two sites along sixteen waterbodies were listed as Areas of Concern (sites with three or more water quality objective exceedances). Snapshot Day sites at the bottom of large rivers or creeks that have urban areas and agricultural influences show the most significant problems in regards to nutrients, bacteria and dissolved oxygen. In comparison, creeks and rivers on the San Mateo County and Big Sur coast have few to no exceedances. Of the sixteen water bodies listed as Areas of Concern, fourteen of those water bodies are listed on the 303(d) list for impaired waterways by the Regional Water Quality Control Board. The 303(d) listed water bodies are: Arana Gulch, Moore Creek, Beach Road Ditch, Harkins Slough, Watsonville Slough, Alisal Slough, Gabilan Creek, Moro Cojo Slough, Natividad Creek, Salinas Reclamation Ditch, Lower Salinas River, Tembladero Slough, Santa Rita Creek and San Simeon Creek. The 303(d) list was created to identify impaired state waterways. The methodology for this listing can be found at the State Board web site, www.swrcb.ca.gov.

Snapshot Day 2018 results reveal that no analyte had the highest number of water quality objective exceedances this year (Table 2). For lab measurements of *E.coli* and orthophosphate as P both continue to be an issue at many sites with the number of water quality objective exceedances increasing slightly since 2000. The lab measurements of nitrate as N appear to have a very slight decreasing trend in water quality objective exceedances since 2008. For all field measurements except water temperature, the number of water quality objective exceedances appear to be declining with pH and dissolved oxygen having the steepest decline since 2001. Water temperature does not show this same declining trend however, the number of water quality objective exceedances are so few it is less of a concern than other measured parameters with exceedances at more sites. The seven-year drought (2011 – 2018) most likely reduced flows in creeks and rivers which could have created more concentrated flow that led to more exceedances, however it is difficult at this time to determine.

Table 2. Number of sites that exceeded the WQO for field and lab measurements by year.

Year	E. coli	Nitrate as N	Orthophos-phate as P	Dissolved Oxygen	pH	Transparency	Water Temperature
2018	28	19	34	37	35	12	4
2017	38	16	19	38	70	17	5
2016	44	21	19	29	22	19	0
2015	34	13	20	28	37	12	3
2014	29	15	8	34	25	15	11
2013	51	20	20	48	46	16	10
2012	62	23	23	38	49	23	9
2011	49	25	21	39	53	19	5
2010	47	29	52	34	66	21	6
2009	87	23	34	64	57	18	3
2008	60	34	19	24	38	16	6
2007	54	25	21	37	28	16	6
2006	49	27	35	33	7	21	3
2005	52	18	28	21	31	17	8
2004	55	23	39	37	31	13	18
2003	36	19	33	17	16	11	9
2002	30	14	30	26	15	7	1
2001	70	12	40	15	8	13	0
2000	16	1	8	13	16	NR	3

NR= Not collected or recorded

As in the past eighteen years, trash was noted at many sites in 2019. The presence of trash in the water and on the banks is a persistent issue in many watersheds, not just in urban areas, and warrants special attention to reduce the amount of trash that finds its way to waterways and Monterey Bay National Marine Sanctuary. It is our hope that improvements in water quality continue through efforts focused on both urban and agricultural management measures that control trash, orthophosphate, *E. coli* and conditions that lead to harmful pH and dissolved oxygen levels.

The Network would like to thank all of the volunteers who made this event possible. A monitoring effort of this magnitude could only be completed by a large group of dedicated volunteers. The data generated by volunteers is a valuable resource for identifying long-term trends in central California coastal water bodies. Snapshot Day is a successful annual event due in large part to continued interest and support by volunteers and partner organizations.

The Elkhorn Slough team checks dissolved oxygen in Elkhorn Slough, Monterey County.

A volunteer checks pH at a San Mateo County site.

Volunteer checks temperature and dissolved Oxygen in a Big Sur creek.

Rinsing off the conductivity meter in the Upper Salinas watershed.

Appendix 1: 2018 Results by County/Station

SiteTag	E. coli	Nitrate N	Orthophosphate P	Dissolved Oxygen	pH	Transparency	Water Temperature	Turbidity
202-ALPIN-11	63	ND	0.13	8.5	7.5	>120	11.8	NR
202-BUTAN-11	52	0.2	ND	8.0	6.5	>120	12.5	NR
202-CALER-11	41	0.4	ND	7.0	6.0	120	12.7	NR
202-LAHON-11	20	ND	ND	9.0	6.5	>120	11.2	NR
202-LOBIT-11	134	0.1	ND	9.0	6.5	>120	11.2	NR
202-MARTI-11	10	0.2	ND	8.0	6.0	79.5	12.1	NR
202-MONTA-12	63	ND	ND	8.0	6.0	50.7	12.9	NR
202-PESCA-11	52	ND	ND	8.0	6.0	>120	14.1	NR
202-POMPO-11	97	0.1	ND	7.0	6.0	82.5	13.2	NR
202-SANGR-11	161	ND	ND	8.0	6.5	>120	14.1	NR
202-SANGR-14	86	ND	ND	8.0	6.5	>120	10.5	NR
202-SANPE-12	31	ND	ND	7.0	6.3	120	12	NR
202-SANPE-13	328	0.4	ND	9.0	6.8	120	13.2	NR
202-SANVI-11	110	0.3	ND	8.0	6.0	45.8	12.5	NR
202-TUNIT-11	86	ND	ND	8.0	7.0	>120	10.9	NR
304-APTOS-23	410	0.09	0.14	9.0	7.0	120	14.1	NR
304-ARANA-21	473	0.31	0.20	5.5	7.5	114	12.9	NR
304-ARANA-22	465	0.33	0.10	7.0	7.5	68	15.4	NR
304-ARROY-21	ND	ND	ND	6.0	7.0	96	13.1	NR
304-ARROY-22	52	2.17	0.22	12.0	8.0	88	16.1	NR
304-ARROY-23	31	3.81	0.10	12.0	8.0	76	15.3	NR
304-BRANC-21	305	0.10	0.10	11.0	7.0	120	16	NR
304-BRANC-23	NA	0.42	0.13	11.0	7.0	120	12	NR
304-BRANC-25	116	0.21	0.15	8.0	6.5	120	12.6	NR
304-BRANC-26	110	0.22	0.12	7.0	6.5	120	12.6	NR
304-CARBO-21	226	0.69	0.05	7.0	7.0	120	13.3	NR
304-CARBO-22	213	0.70	0.09	7.0	6.5	120	13.3	NR
304-CARBO-23	959	0.40	0.12	9.0	7.5	120	17	NR
304-CARBO-24	201	ND	0.12	7.0	7.0	120	14.5	NR
304-CARBO-25	183	0.06	0.13	8.0	7.5	120	13.1	NR
304-EVERS-21	107	0.12	0.12	7.0	6.5	98	21.2	NR
304-LEONA-21	31	0.26	0.08	5.0	7.0	95.7	13.6	NR
304-LEONA-22	63	2.48	0.08	5.5	7.0	64	14	NR

SiteTag	E. coli	Nitrate N	Orthophosphate P	Dissolved Oxygen	pH	Transparency	Water Temperature	Turbidity
304-LIDEL-21	479	0.49	0.20	5.5	7.0	120	11.7	NR
304-MOORE-21	31	ND	ND	8.0	6.0	60	19.7	NR
304-MOORE-24	313	0.02	0.14	6.0	6.0	55	11.7	NR
304-MOORE-26	32	ND	0.20	7.0	6.0	47	19.3	NR
304-NEWYE-11	10	0.52	ND	7.0	7.0	120	12	NR
304-PILKI-21	266	0.17	0.10	6.0	7.0	120	13	NR
304-PILKI-23	175	0.59	ND	6.0	7.0	120	12.9	NR
304-POGO-21	206	0.40	0.22	8.0	7.0	110.6	14.5	NR
304-SANLO-21	55	0.19	0.10	8.0	7.0	120	16	NR
304-SANLO-22	209	0.20	0.09	8.0	7.0	120	16.4	NR
304-SANLO-23	116	0.21	0.13	10.0	6.5	120	14.8	NR
304-SANLO-24	63	0.27	0.15	10.0	7.0	110	14.5	NR
304-SANLO-26	100	0.38	0.12	8.0	7.0	120	15.2	NR
304-SANLO-27	323	0.21	0.05	10.9	6.5	120	12.1	NR
304-SCOTT-22	63	0.03	0.09	5.5	7.5	120	11.8	NR
304-SCOTT-25	52	0.07	0.12	6.5	7.0	120	12.4	NR
304-SCSD-04	216	4.04	0.12	10.0	8.0	70	17	NR
304-WADDE-21	20	0.05	0.13	9.0	7.0	120	12.7	NR
304-WADDE-22	52	0.05	0.12	9.0	7.0	120	12.9	NR
304-ZAYAN-21	145	0.10	0.12	11.1	7.5	120	12.6	NR
304-ZAYAN-22	110	0.49	0.08	8.0	7.0	120	13.3	NR
305-BEACH-21	146	2.4	0.4	8.5	7.9	NR	21.3	79.3
305-CORRA-21	327	1.94	0.08	9.0	8.0	120	14	NR
305-CORRA-22	52	0.06	0.20	7.0	8.0	120	12.1	NR
305-HANSO-21	10	0.03	1.36	3.7	7.1	NR	20.6	6.2
305-HARKI-21	109	<0.2	<0.2	13.5	7.9	NR	21.4	46.2
305-HARKI-23	145	0.77	0.14	9.8	8.2	NR	13.7	5.67
305-PAJAR-21	146	5.24	0.1	17.7	8.0	NR	NR	4.53
305-STRUV-22	<10	0.04	0.84	8.0	7.5	NR	20.5	6.82
305-WATSO-22	NR	NR	NR	7.5	7.9	NR	23.7	NR
305-WATSO-24	73	8.23	0.05	5.5	6.4	NR	17.2	16.6
305-WATSO-26	10	<0.02	0.14	5.3	6.4	NR	18.6	11.5
305-WATSO-27	120	<0.02	0.13	4.1	6.6	NR	19.1	36.8

SiteTag	E. coli	Nitrate N	Orthophosphate P	Dissolved Oxygen	pH	Transparency	Water Temperature	Turbidity
305-WATSO-28	41	<0.02	0.06	4.1	7.2	NR	17.3	6.37
305-WATSO-29	<10	<0.02	0.04	3.6	7.0	NR	14.5	11.4
WATSO at Shell Road	1520	2	0.4	NR	NR	NR	NR	53.2
305-WSTRU-22	75	<0.02	<0.02	6.9	8.4	NR	18.3	8.93
305-WSTRU-24	20	<0.02	0.78	9.9	7.6	NR	20.6	10.4
306-ELKHO-32	20	ND	ND	5.5	7.0	24.2	18.3	NR
306-ELKHO-33	20	ND	ND	4.5	7.0	54.9	19.7	NR
306-ELKHO-34	737	25.7	ND	9.0	7.0	>120	15.8	NR
306-MOROC-31	1020	3.4	0.18	6.4	7.3	19	20	NR
306-MOROC-33	<20	0.8	ND	14.7	8.0	22.4	19.3	NR
306-MOROC-34	563	ND	ND	11.2	8.0	7.1	18.02	NR
307-CARME-36	40	ND	ND	9.0	7.5	120	15.3	NR
307-CARME-37	ND	ND	ND	7.0	8.0	120	15.2	NR
307-CARME-38	103	ND	ND	7.0	7.0	NR	14.5	NR
308-BIGSU-31	4	ND	ND	8.0	7.0	>120	15.8	NR
308-DOUD-31	8	0.2	ND	7.0	7.0	120	13.2	NR
308-GARRA-31	245	0.1	ND	9.0	9.0	>120	12.5	NR
308-HOTSP-31	1	ND	ND	10.4	7.5	120	13	NR
308-LIMEK-31	5	ND	ND	10.6	7.3	120	13.3	NR
308-MALPA-31	20	0.4	ND	9.0	7.0	NR	12.6	NR
308-MCWAY-31	5	ND	ND	10.2	7.5	120	13.6	NR
308-PALOC-31	618	ND	ND	7.0	8.0	60	12.4	NR
308-ROCKY-31	20	0.2	ND	9.0	8.0	114	12.5	NR
308-SANJO-31	20	ND	ND	7.5	7.5	>120	11.9	NR
308-SOBER-31	16	0.1	ND	7.0	7.5	>120	12.8	NR
308-SYCAM-32	83	ND	ND	5.5	7.0	>120	14.1	NR
309-ALISA-32	1550	27.5	0.34	7.0	7.5	4.2	20.7	NR
309-ASILO-31	9	0.8	ND	5.5	6.5	120	13.8	NR
309-ATASC-41	10	0.3	ND	4.5	7.5	>120	17	NR
309-ATASC-42	173	ND	ND	6.0	7.0	>120	15.7	NR
309-GABIL-31	427	26.3	ND	8.0	6.5	70	18.3	NR

SiteTag	E. coli	Nitrate N	Orthophosphate P	Dissolved Oxygen	pH	Transparency	Water Temperature	Turbidity
309-GRAVE-41	41	ND	ND	6.0	7.0	>120	15.9	NR
309-LIBRA-31	1010	0.3	ND	9.0	7.0	76	13.4	NR
309-NATIV-31	374	4.1	ND	4.5	7.0	85	13.9	NR
309-RECDI-31	346	32.8	0.32	7.0	8.0	9	20.1	NR
309-SALIN-31	313	12.6	ND	9.0	9.0	61.2	19.7	NR
309-SALIN-32	370	1.8	ND	5.5	7.5	65.2	18.7	NR
309-SALIN-33	104	0.2	ND	7.0	7.5	5.4	17.7	NR
309-SALIN-44	110	0.6	ND	6.0	7.0	>120	21	NR
309-SALIN-45	41	ND	ND	6.0	7.0	120	18.3	NR
309-SMARG-41	108	ND	ND	6.0	7.0	120	15.6	NR
309-SRITA-32	942	4.1	0.93	11.0	6.0	24	18.6	NR
309-SRITA-34	1260	0.7	0.21	8.0	6.0	26.1	17.6	NR
309-SRITA-35	NR	3	0.22	9.0	6.5	12.4	19.3	NR
309-TEMBL-31	218	46.9	0.23	8.0	7.0	7.2	18.9	NR
309-TEMBL-32	172	33.2	ND	10.0	7.0	8.5	18.4	NR
309-TEMBL-33	NR	53.1	0.19	10.0	7.0	7.5	17.4	NR
309-TROUT-41	341	ND	0.14	6.0	7.0	120	12.8	NR
310-ARROY-41	108	ND	ND	7.0	6.5	>120	16.1	NR
310-ARROY-42	<10	NR	ND	6.0	7.5	>120	15.6	NR
310-CARPO-41	<10	ND	ND	8.0	7.0	>120	15.4	NR
310-PICOC-41	75	ND	ND	6.0	6.5	>120	15.5	NR
310-SANSI-41	285	0.3	0.18	6.0	6.5	56	16	NR
310-SANTA-41	131	ND	ND	8.0	8.0	120	15.1	NR
310-SANTA-42	213	0.2	ND	7.5	7.5	120	15.1	NR
310-SANTA-43	122	ND	ND	7.0	8.0	>120	15.2	NR
310-SYB-41	20	0.9	0.21	NR	NR	NR	NR	NR
310-UCF-41	109	6.4	ND	NR	NR	NR	NR	NR

ND= Non-detect; NR= Not Recorded