

Snapshot Day

May 4TH, 2013

Final Report



**Central Coast Snapshot Day 2013
was 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

Executive Summary

Since Earth Day 2000, volunteers have assembled on a Saturday morning in spring each year to collect water quality data from the water bodies entering the Monterey Bay National Marine Sanctuary (MBNMS). Snapshot Day (SSD) has become an annual event that has created partnerships, drawn over 2000 volunteers to date, and has helped foster an ethic of watershed stewardship for local citizens. The fourteen years of data collected by volunteers has become a valuable source of water quality data for the region.

SSD is organized by the Monterey Bay National Marine Sanctuary's Citizen Watershed Monitoring Network and the Coastal Watershed Council (CWC). CWC coordinates the northern half of the MBNMS—San Mateo and Santa Cruz Counties—while MBNMS focuses on Monterey County south to Morro Bay in San Luis Obispo County.

This year, volunteers gathered on the morning of May 4th at one of four hubs located in the 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.

In 2013, 216 citizens volunteered between four and six hours of their time to monitor 175 sites. This year, 42% of the sites met all of the water quality objectives (WQO) that were measured, indicating vibrant healthy water bodies.

Results reveal that dissolved oxygen is the most common **field** measurement to exceed the WQO and *E. coli* was the most common **lab** measurement to exceed the WQOs. Dissolved oxygen exceeded the WQO at 28% of sites as compared to 19% in 2012 and 22% of site in 2011. *E. coli* exceeded the WQO at 29% of sites up from 20% in 2012 and 2011; nitrate exceeded the WQO at 11% of sites continuing down from 13% in 2012 and 14% in 2011. This year, orthophosphate had an exceedance rate of 11% which is similar to 13% in 2012, 12% in 2011 but overall down from 27% in 2010.

There were sixteen Areas of Concern (sites that exceeded three or more WQOs) identified this year, compared to 2012 and 2011 when there were eighteen each year and 2010 when there were twenty-four sites. The Areas of Concern spanned twelve water bodies: Calera Creek, Merced Street Storm Drain in Santa Cruz, Pilkington Creek, Watsonville Slough, Struve Slough, Moro Cojo Slough, Santa Rita Creek, Tembladero Slough, Alisal Slough, Natividad Creek, the Salinas Reclamation Ditch and San Simeon Creek.

Fourteen years of data gathered by trained SSD volunteers is used to help resource managers focus attention on areas that need it the most. Programs such as SSD are an important link for residents to their local waterways and actions to help improve water quality. SSD data are also 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.

Methods

Each year, trainings are conducted in all four counties bordering the sanctuary. Trainings cover the Snapshot Day (SSD) program and history, how to take field measurements, and how to collect lab samples. Many volunteers have never taken field measurements or collected water samples before, so the training is important in developing the skills necessary to proficiently participate.

During the SSD event, volunteers take field measurements for air and water temperature, dissolved oxygen, conductivity, pH, and transparency or turbidity. Grab samples are also collected for lab analysis of bacteria (*E. coli*) and nutrients (nitrate as N, phosphate as P). Each monitoring team is equipped with a bucket “kit” that includes thermometer(s), 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, a trash bag, pencils, sample bottles, and a clipboard with data sheets, instructions, and maps with direction to each site. Each team monitors two or more sites. In one case, one team monitors 9 sites covering over 25 miles of the southern Big Sur coastline.

All monitoring results are compared with water quality objectives (WQOs) designated by the Central Coast Ambient Monitoring Program (CCAMP), the California Basin Plan, or the US Environmental Protection Agency (see Table 1). For this event a state approved Quality Assurance Project Plan and Monitoring Plan (QAPP) is followed.



Taking a sample mid stream, facing up stream.



The scene at the lab, with only half the samples.

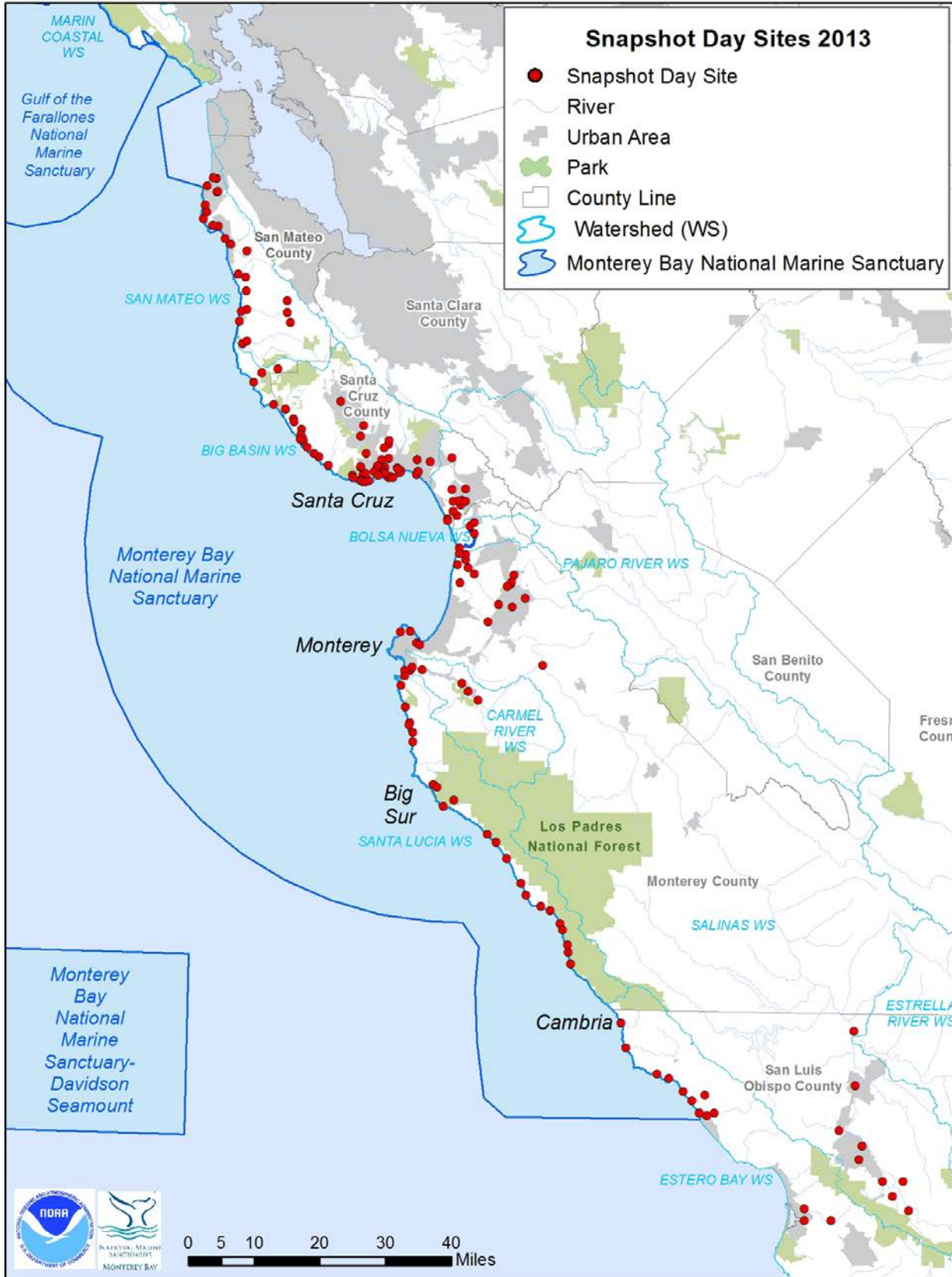


Figure 1. Map of Snapshot Day 2013 monitoring sites

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	California Basin Plan Objective
<i>E. coli</i> (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 6.5 or greater than 8.5	California Basin Plan Objective
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 4th 2013, 214 volunteers gathered at four hubs across the central California coastline. From those four hub the volunteers spread out to monitor 174 sites along creeks and rivers that flow into the Monterey Bay National Marine Sanctuary (MBNMS) (Figure 1). This year, 41% of sites met the water quality objectives for all lab and field parameters.



A Salinas team along the Reclamation Ditch in Salinas.



Volunteer collects water in transparency tube.

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 temperatures 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 can 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 water temperatures at 21 degrees Celsius ($^{\circ}\text{C}$). Temperatures above 21°C can harm cold water fish such as salmon and steelhead, as well as other aquatic organisms. Ten sites (6%) exceeded the WQO for water temperature this year. The highest result was 23.5°C in the Moro Cojo.

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 uses up oxygen in the water. Additionally once the plants die, decomposition further depletes the oxygen available to aquatic organisms.

Although the California Basin Plan Objective for dissolved oxygen is not less than 5 milligrams per liter (mg/l), we use the WQO for Cold Water Fish, which is not less than 7 mg/l or greater

than 12 mg/l. These numbers are based on the amount of dissolved oxygen needed by migrating steelhead.

This year, forty-nine (28%) of the sites exceeded the WQO for dissolved oxygen. Of those that exceeded the WQO, all were below the WQO, indicating an oxygen deprived environment. The lowest dissolved oxygen result was in Arana Creek (Santa Cruz County) with a result of 0.8 mg/L.

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 can harm fish gills and fins.

The California Basin Plan Objective for pH is between 6.5 and 8.5. In 2013, four (2%) of the sites did not meet the WQO. The lowest pH result of 4.5 was in Watsonville Slough (Santa Cruz County).

Transparency/Turbidity

Transparency and turbidity are a measure of the amount of suspended solids in 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 similar characteristics, 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 not less than 25 centimeters. Transparency was measured at 157 sites with 16 (10%) not meeting the Action Level for transparency. The lowest transparency measurement of 6 cm was taken in Moro Cojo (Monterey County).

Turbidity is determined using a turbidity meter that measures the amount of light that can penetrate a sample tube of water. CCAMP's Action Level for turbidity is not greater than 25 Nephelometric Turbidity Units (NTU's). Turbidity was measured at 15 sites, non exceeded the water quality objective.

The remaining three sites did not have transparency or turbidity measurements taken.



A team checks transparency.



Interesting things at Gypse Camp along the Salinas River.

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 depletes the amount of oxygen available in the waterway.

Nitrate

Twenty (11%) of the sites exceeded the CCAMP action level of 2.25 mg-N/l for nitrate as N (Figure 2). The highest result for nitrate as N was 314 mg-N/L in Santa Rita Creek (Monterey County). A total of 53 sites (30%) had non-detectable levels of nitrate.

Orthophosphate

Twenty-one (12%) sites exceeded the action level of 0.12 mg/l for orthophosphate-P. The highest concentration of orthophosphate was in Alpine Creek (San Mateo County) with a concentration of 0.7 mg-P/L. A total of 142 sites (82%) 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 (from sewage) 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. Fifty-one (29%) exceeded of the *E. coli* WQO on Snapshot Day 2013 (Figure 4). The highest result for *E. coli* was from Santa Rita Creek (Monterey County) with a result of 13,734 MPN/100 ml (Figure 8). Forty (23%) sites had results less than 20 MPN/ 100 ml.

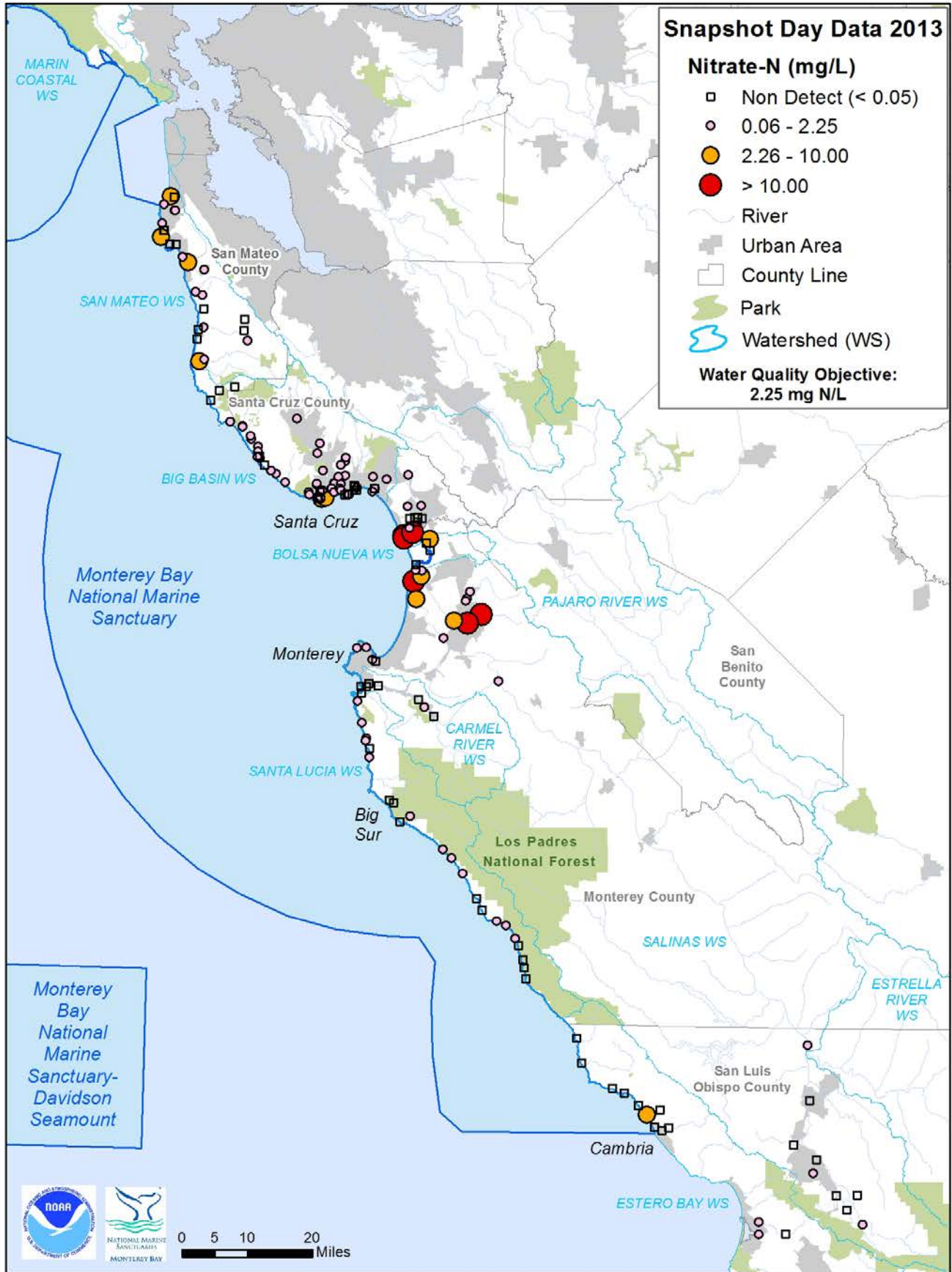


Figure 2. Nitrate as N Results for Snapshot Day 2013.

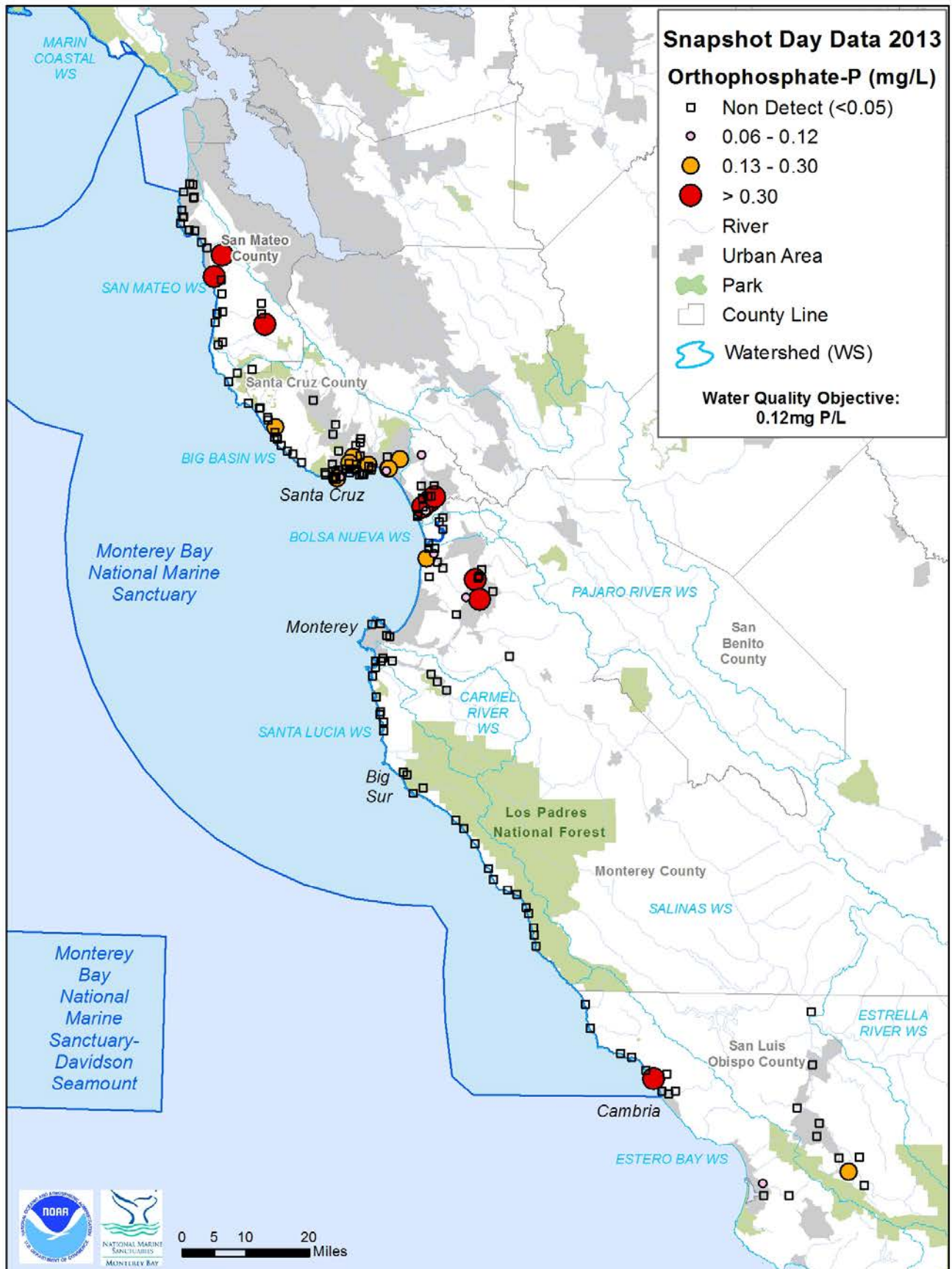


Figure 3. Orthophosphate-P Results for Snapshot Day 2013.

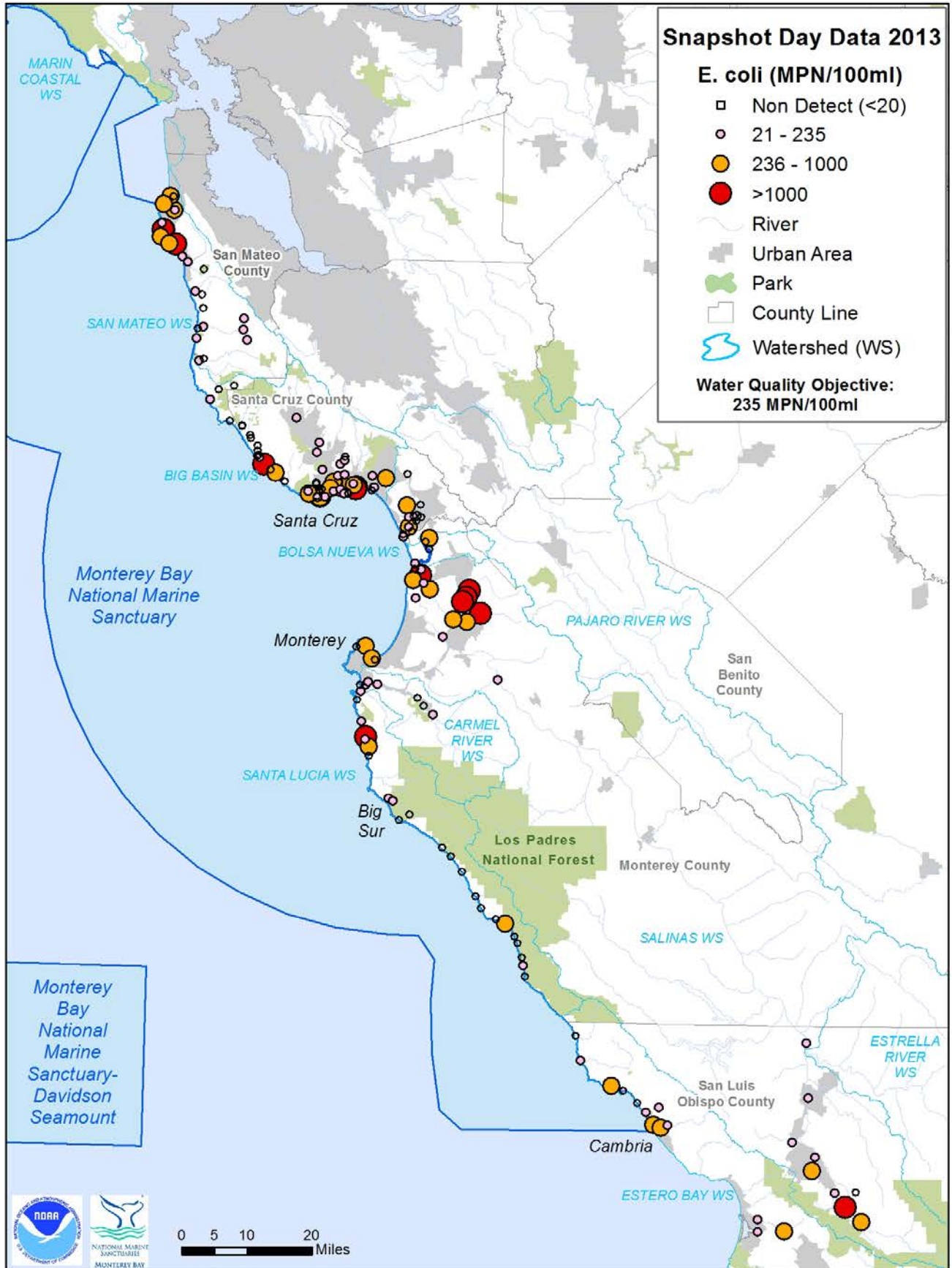


Figure 4. *E. coli* Results for Snapshot Day 2013.

Areas of Concern

When lab and/or field results for a single site exceed three or more water quality objectives, the site is designated 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 Slough have more than one site that is an AoC along the same waterway. For this reason we have chosen to display the AoC data two ways: by water body (Figure 9) and by site (Figure 10).

In 2013, sixteen sites (9%) were designated Areas of Concern on twelve water bodies (Figure 5). For the most part, AoC are designated and stay on the list for many years. However, Harkins Slough was not on the 2013 AoC list even though it had been for the past ten out of twelve years (Figure 6). New to the AoC list this year is, Pilkington Creek in Santa Cruz. It is a fairly urbanized area and is listed for exceedances in *E. coli*, orthophosphate (as P), dissolved oxygen and pH. Also back on the AoC list this year after a one year hiatus is Natividad Creek in Salinas due to exceedances in *E. coli*, nitrate (as N) and water temperature. All data is available in Appendix 1.

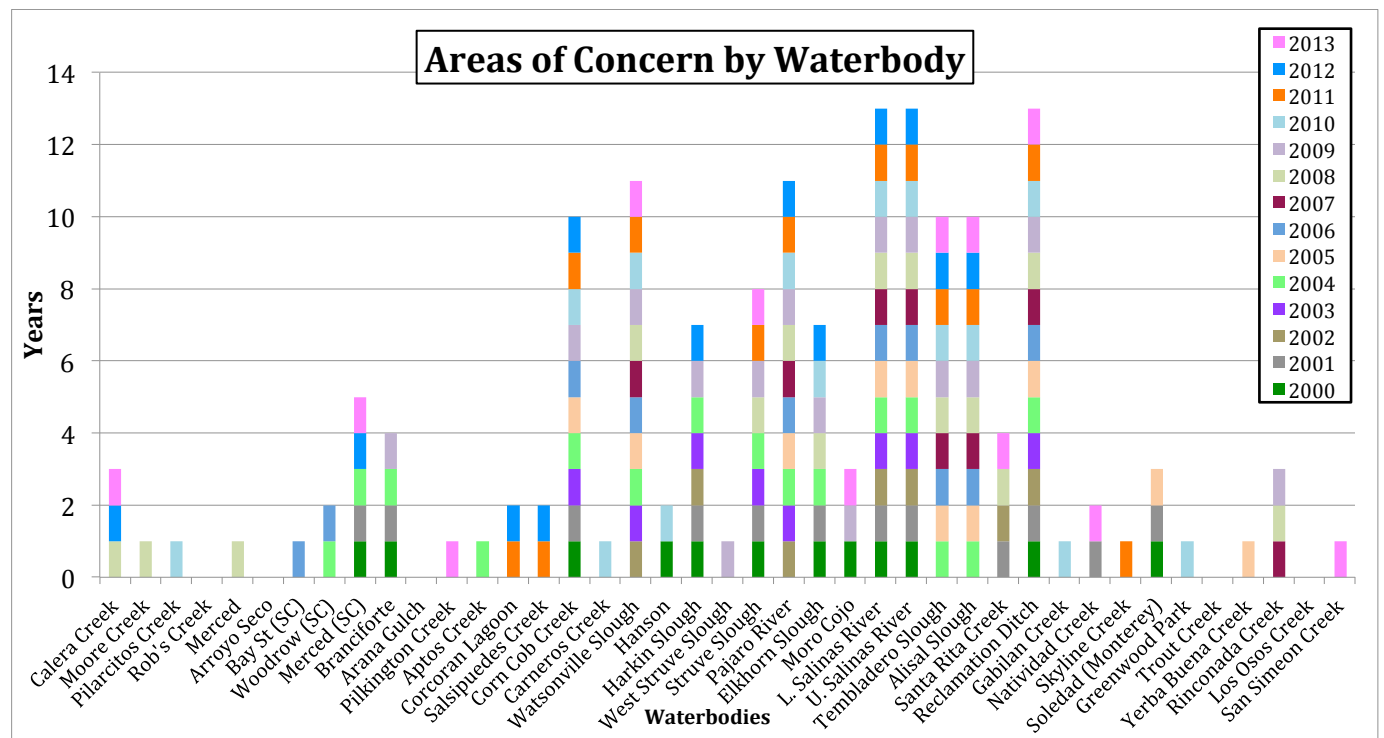
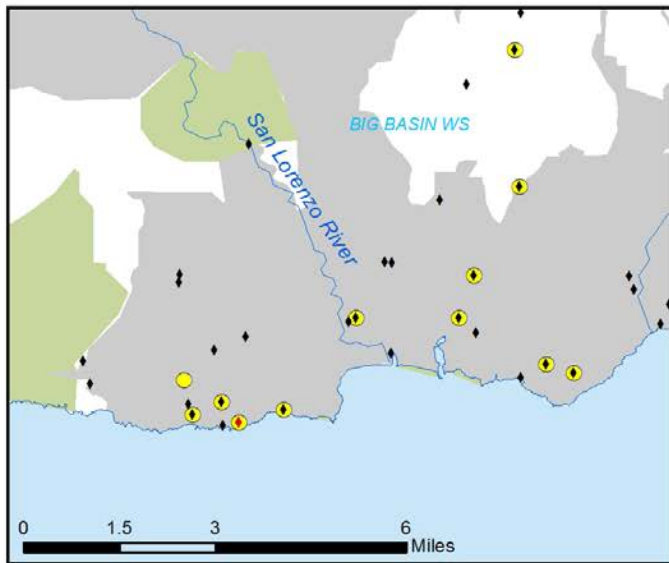
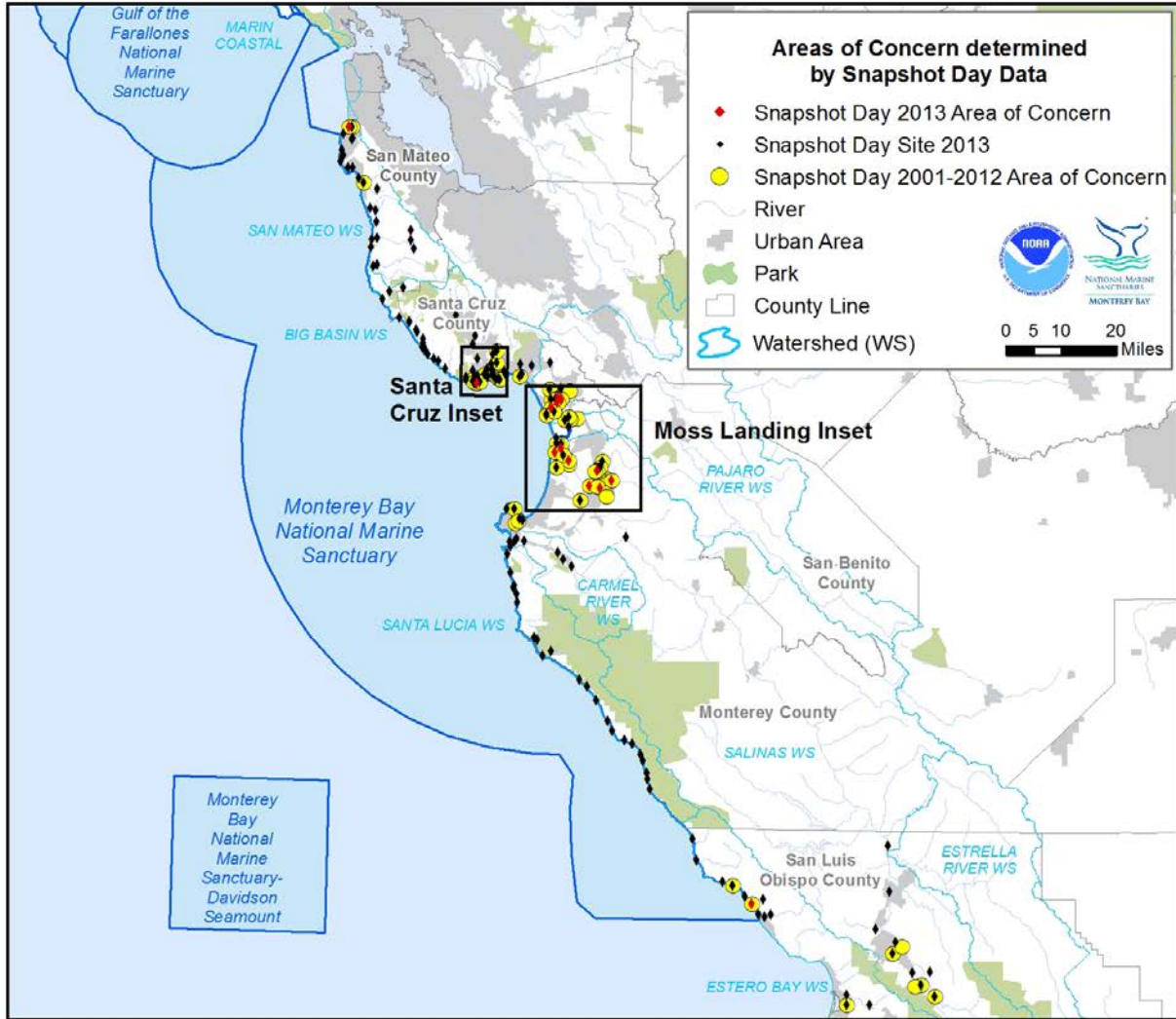
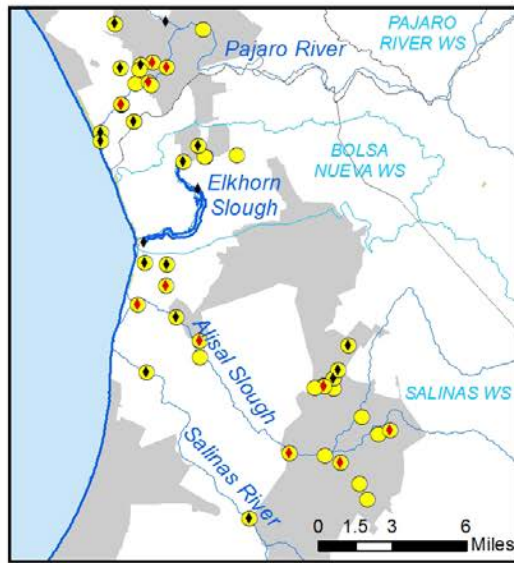


Figure 5. Areas of Concern by water body 2000-2013.



Santa Cruz Inset



Moss Landing Inset

Figure 6. Areas of Concern for Snapshot Day 2013

Conclusion

In its fourteenth year, Snapshot Day 2013 brought together 216 citizens to monitor the water quality of 174 different sites along creeks and rivers draining into the MBNMS. Many of the sites monitored (42%) had no exceedances for any parameter and provided good conditions for cold-water fish, one beneficial use by which Snapshot Day data is compared.

The number of Areas of Concern (sites with three or more exceedances) has continued to drop over the past five years. With sixteen Areas of Concern, 2013 continues the downward trend in the total number of Areas of Concern. Even with fewer Areas of Concern this year, 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 Areas of Concern on twelve water bodies, nine of those water bodies are listed on the 303(d) list for impaired waterways by the Regional Water Quality Control Board. Those waterbodies are: Struve Slough, Watsonville Slough, Alisal Slough, Moro Cojo Slough, Tembladero Slough, Salinas Reclamation Ditch, Santa Rita Creek, Natividad 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. The 303(d) list is updated every two years, and was updated in 2010.

Snapshot Day 2013 results reveal a decrease in nitrate concentration while *E. coli* is still a problem at many sites and needs to be addressed. At each site trash is a recurring issue requiring further work to reduce illegal dumping and control measures for trash in and around urban streets. With a lot of effort focused on both urban and agricultural management measures, it is our hope that we will continue to see improvements in water quality.

Once more, 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 Doud Creek team heads out in Big Sur.

Appendix 1: 2013 Results by County/Station

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Water temp °C	Transparency cm
202-ALPIN-11	31	0.92	0.7	8.0	7.5	14.0	>120
202-BEARG-11	<10	<0.5	ND	9.0	7.0	11.7	>120
202-BUTAN-11	145	4.23	ND	6.0	6.5	12.3	104
202-CALER-11	<10	<0.5	ND	8.9	7.7	13.9	1.03 NTU
202-CALER-12	295	2.70	ND	6.3	7.6	14.7	4.01 NTU
202-DEERC-12	2046	<0.5	ND	11.0	7.0	12.6	90
202-DENNI-11	408	<0.5	ND	8.0	7.0	13.9	65
202-FRENC-11	52	1.64	ND	10.0	7.0	13.1	>120
202-GAZOS-11	158	<0.5	ND	9.0	7.0	12.2	>120
202-GAZOS-15	10	<0.5	ND	9.5	6.5	12.7	>120
202-LAHON-11	148	<0.5	<0.5	8.0	7.0	12.0	>120
202-LOBIT-11	<10	1.52	<0.5	9.2	8.0	10.0	3.57 NTU
202-MARTI-11	30	0.79	ND	11.0	7.0	11.6	38
202-MILLC-11	20	1.04	0.5	9.0	7.0	12.5	>120
202-MONTA-11	4106	<0.5	ND	6.0	7.0	11.9	31
202-MONTA-12	3448	<0.5	ND	6.0	7.0	12.3	37
202-PESCA-11	20	1.45	ND	4.0	6.5	14.0	120
202-PILAR-11	201	3.42	ND	10.0	7.5	13.3	>120
202-POMPO-11	41	<0.5	ND	10.0	6.5	16.3	65
202-PURIS-11	63	0.88	0.52	9.1	8.5	11.3	2.47 NTU
202-SANGR-11	10	<0.5	ND	10.0	8.5	18.5	3.5 NTU
202-SANGR-12	135	0.54	<0.5	8.0	6.5	15.5	120
202-SANGR-14	41	ND	ND	8.0	7.0	11.6	>120
202-SANPE-11	420	1.61	ND	9.7	8.0	12.5	2.34 NTU
202-SANPE-12	63	0.85	ND	NA			
202-SANPE-13	285	1.44	ND	9.6	8.1	13.0	3.73 NTU
202-SANVI-11	932	8.10	ND	8.0	7.0	17.4	108
202-TUNIT-11	20	<0.5		9.8	8.5	11.0	0.78 NTU
304-APTOS-21	82	0.18	ND	10.0	7.5	12.3	120
304-APTOS-22	150	ND	0.17	10.0	7.5	13.5	120
304-APTOS-23	20	0.19	0.12	9.0	7.0	13.0	120
304-ARANA-21	320	0.6	ND	0.8	7.3	12.5	72
304-ARANA-22	422	0.3	ND	8.1	7.4	13.7	13
304-ARANA-23	40	0.4	ND	9.9	7.5	12.2	115
304-ARROY-21	<20	ND	ND	5.0	6.5	13.3	120
304-ARROY-22	1768	1	ND	5.0	6.5	14.5	>120

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Water temp °C	Transparency cm
304-ARROY-23	398	1.2	ND	12.0	6.5	14.1	100
304-BRANC-21	390	0.4	ND	8.0	6.5	17.0	71.2
304-BRANC-22	62	0.37	0.2	8.0	7.0	NA	>120
304-BRANC-23	290	0.72	0.15	9.0	7.0	13.4	>120
304-BRANC-24	82	0.4	ND	8.0	6.5	13.2	>120
304-BRANC-25	20	0.4	ND	9.0	7.0	12.8	>120
304-CARBO-21	290	0.96	ND	9.0	7.0	NA	>120
304-CORCO-21	40	ND	ND	7.0	8.0	19.0	>120
304-CORCO-22	82	ND	ND	4.5	8.5	21.0	84
304-CSD-08	5818	0.4	ND	6.0	6.5	14.2	>120
304-FERRA-21	2842	ND	ND	8.0	6.5	12.7	>120
304-GRANI-21	126	0.4	ND	9.0	6.5	12.8	>120
304-LAGUN-21	<20	0.3	ND	10.0	6.5	12.0	>120
304-LEONA-21	62	0.28	ND	5.5	6.4	13.1	>120
304-LIDEL-21	270	0.6	ND	7.0	6.5	10.6	>120
304-LITTL-21	<20	0.19	0.15	5.5	6.5	12.6	>120
304-MOLIN-21	82	0.4	ND	8.0	7.5	11.5	>120
304-MOORE-21	<20	ND	ND	7.2	7.6	20.4	120
304-MOORE-22	<20	0.3	ND	6.0	6.5	13.0	53
304-MOORE-25	20	0.2	ND	9.0	7.0	13.4	34.5
304-MOORE-26	40	ND	ND	6.4	7.2	18.4	83.6
304-NEWYE-11	<20	0.65	ND	9.0	7.2	11.4	120
304-PILKI-21	2966	0.43	ND	5.0	6.4	13.1	71.7
304-PILKI-22	400	0.46	0.27	4.5	7.0	13.0	58.4
304-ROBSC-21	20	0.2	ND	12.0	6.5	16.0	107
304-SANLO-21	264	0.5	ND	5.5	6.5	17.6	>120
304-SANLO-22	126	0.4	ND	7.0	6.5	17.6	71.2
304-SANLO-26	62	0.6	ND	9.0	7.0	17.4	3.4 NTU
304-SANLO-27	82	0.4	ND	9.4	6.5	14.3	1.55 NTU
304-SANVI-21	<20	0.3	ND	10.0	7.0	11.4	>120
304-SCOTT-21	<20	0.16	ND	6.0	6.5	12.6	>120
304-SCOTT-22	20	0.18	ND	3.0	6.0	12.5	>120
304-SCOTT-23	<20	ND	ND	3.5	7.0	11.4	>120
304-SCOTT-24	20	0.17	ND	2.5	6.5	12.6	>120

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Water temp °C	Transparency cm
304-SCOTT-25	<20	0.15	ND	4.5	6.5	14.0	>120
304-SCSD-02	962	3.95	0.14	6.0	7.0	17.5	117.4
304-SCSD-03	<20	1.87	ND	9.0	7.0	15.6	>120
304-SCSD-04	102	2.44	0.12	9.0	7.0	15.7	116
304-SOQUE-22	1024	ND	ND	5.0	7.0	15.8	>120
304-SOQUE-26	172	ND	0.2	7.0	7.5	13.9	120
304-SOQUE-28	312	ND	ND	7.0	7.0	14.2	>120
304-VALEN-21	524	0.18	0.22	10.0	7.5	12.3	120
304-VALEN-22	126	0.79	0.16	8.0	7.3	13.3	120
304-WADDE-21	<20	0.29	ND	9.0	7.0	14.0	120
304-WADDE-22	20	0.32	ND	9.0	7.0	13.1	120
304-WILDE-21	40	0.3	ND	9.0	6.5	11.3	>120
304-WILDE-22	322	0.3	ND	6.0	6.5	11.8	>120
304-ZAYAN-21	82	0.7	ND	9.5	7.0	15.4	1.87 NTU
304-ZAYAN-22	82	0.4	ND	9.5	7.0	14.8	5.12 NTU
305-BEACH-21	20	26	ND	10.0	8.0	18.2	77.2
305-CORRA-21	<20	0.91	ND	5.0	7.0	14.5	115
305-CORRA-22	<20	0.22	0.1	9.0	7.0	12.7	>120
305-HARKI-21	62	ND	ND	8.0	7.5	20.9	10
305-HARKI-22	180	0.23	ND	9.0	7.5	19.0	18.7
305-HARKI-23	244	0.17	ND	6.0	6.5	13.8	>120
305-PAJAR-21	20	12	0.1	7.0	7.0	18.6	120
305-STRUV-21	40	ND	ND	6.0	7.0	21.6	6.5
305-STRUV-22	<20	ND	0.63	9.0	7.5	22.4	7.5
305-WATSO-21	<20	ND	0.35	4.5	4.5	22.6	116
305-WATSO-22	448	0.44	0.38	5.0	7.0	17.9	79.7
305-WATSO-23	60	25.6	ND	9.0	8.0	18.2	64.9
305-WSTRU-21	<20	ND	ND	3.5	7.0	12.6	29
306-ELKHO-31	20	ND	ND	5	7.5	19.5	66.6
306-ELKHO-32	<20	ND	ND	5	7	21.4	49.4
306-ELKHO-33	40	ND	ND	9	7.4	20.3	53.2
306-ELKHO-34	406	6	ND	9	6.5	16.8	64.6

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Water temp °C	Transparency cm
307-CARME-33	82	ND	ND	11	6.5	15.1	>120
307-CARME-35	20	0.2	ND	8	6.5	15.2	>120
307-CARME-36	<20	ND	ND	7	6.5	15.2	>120
307-CARME-37	40	ND	ND	9	7.5	17.9	>120
307-CARME-38	62	ND	ND	9	7.5	17.3	>120
307-CARME-39	20	ND	ND	7	7	18.7	>120
307-HATTO-31	40	ND	ND	4	7.75	14.6	>120
308-BIGCR-31	<20	ND	ND	9.68	6.5	13.9	>120
308-BIGSU-31	62	ND	ND	10.14	6.5	14.1	>120
308-BIGSU-32	62	ND	ND	9.33	7.75	14.5	>120
308-DANIC-31	<20	0.4	ND	10.03	7	13.3	>120
308-DOUD-31	1714	0.5	ND	11	6.5	12.6	>120
308-GARRA-31	82	0.3	ND	11	6.5	12.5	>120
308-HOTSP-31	<20	0.3	ND	10.18	7.5	13.2	>120
308-LIMEK-31	432	0.3	ND	10.13	7	13.2	>120
308-MALPA-31	20	0.7	ND	7.5	6.5	12.5	>120
308-MCWAY-31	<20	0.3	ND	10.16	7.5	13.1	>120
308-MILLC-31	20	0.3	ND	10.12	7.25	12.8	>120
308-PALOC-31	270	ND	ND	11	6.5	12	>120
308-PARTI-31	<20	0.3	ND	10.17	7.5	12.9	>120
308-PLASK-31	82	ND	ND	9.63	7.25	11.9	>120
308-PREWI-31	<20	ND	ND	9.71	7	12	
308-ROCKY-31	<20	0.3	ND	11	7	12.4	>120
308-SANJO-31	196	ND	ND	9	7	12.9	>120
308-SOBER-31	62	0.3	ND	9	6.5	14.4	112
308-SYCAM-31	<20	0.3	ND	5.25	6.5	12.1	>120
308-SYCAM-32	<20	ND	ND	7.66	7.75	13.3	>120
308-VICEN-31	<20	ND	ND	10.03	7.5	13.1	>120
308-WILDC-31	20	ND	ND	10.00	7.5	12.1	>120
308-WILLO-31	<20	ND	ND	9.53	7.5	12.8	>120
309-ALISA-32	350	14	0.3	12	7	22.5	25
309-ASILO-31	20	0.4	ND	8	7	14.9	79.4
309-ATASC-41	538	0.2	ND	7	7.5	15.2	120
309-ATASC-42	97	ND	ND	8	7.25	15.6	120
309-CENTR-31	828	1.2	ND	9	6.5	14.5	76
309-LIBRA-31	778	0.7	ND	10	7.5	13.9	120
309-MAJOR-31	<20	ND	ND	7.5	8.5	12.2	>120

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Water temp °C	Transparency cm
309-MOROC-31	1196	6.8	0.1	10	8.5	23.5	8.5
309-MOROC-32	164	2	ND	9	8	20.9	6
309-MOROC-33	<20	1	ND	5	7	19.6	82
309-PASOR-41	52	ND	ND	7	8	17	120
309-RECDI-31	290	7.1	0.1	11	7	23.4	17
309-RINCO-41	275	0.4	ND	6	7.5	16.5	120
309-SALIN-31	62	9.8	ND	12	8	20.8	12.8
309-SALIN-32	82	1.2	ND	11	7.0	18.6	11.8
309-SALIN-33	104	0.6	ND	9	7.0	18.5	11.5
309-SALIN-44	211	0.3	ND		7.0	18.6	105
309-SALIN-45	31	ND	ND	5	7.5	19.4	120
309-SALIN-47	20	ND	ND	2	7.5	19.7	120
309-SMARG-41	109	ND	ND	3	7.5	16.1	120
309-SRITA-32	7746	0.2	ND	12	7	20.9	50.4
309-SRITA-33	13734	0.3	ND	11	7	17.9	19.8
309-SRITA-34	4764	2.1	ND	12	7	20.1	48
309-SRITA-35	4620	314	0.6	11	7	23.0	8.2
309-TEMBL-31	296	13.4	0.2	5	7	17.8	14
309-TEMBL-32	602	51.6	ND	10	7	17.9	11.8
309-TEMBL-33	168	74.7	ND	8	7.0	18.8	10.8
309-TROUT-41	1374	ND	0.2	8	7.5	13.1	120
309-UPPER-31	8320	28.2	ND	10	7	21.1	30
310-ARROY-41	10	ND	ND	9	6.5	17.2	>120
310-ARROY-42	30	ND	ND	5	7.0	14	>120
310-CARPO-41	10	ND	ND	5	7.5	13.1	>120
310-LAGUN-41	908	ND	ND	5	7.0	19.1	30
310-PENN-41	906	ND	ND	9.31	6.5	14.2	3.57 NTU
310-PICOC-41	<10	ND	ND	8	7	16.8	>120
310-SANSI-41	62	7.6	0.6	5.5	7.5	15.1	>120
310-SANSI-42	202	ND	ND	6	7.5	20.5	>120
310-SANTA-41	315	ND	ND	6	7.5	14.4	>120
310-SANTA-42	148	ND	ND	6	7.5	14.1	>120
310-SANTA-43	341	ND	ND	7	7.55	14.6	>120
310-SYB-41	41	0.6	ND	1.98	8.06	22.3	16.9 NTU
310-UCF-41	173	1	0.1	10.18	8.02	14.5	2.32 NTU

ND= Non detect