Snapshot Day

May 5TH, 2012

Final Report

Coastal Watershed Council

National Marine Sanctuaries
Monterey Bay

Monterey Bay Sanctuary Citizen Watershed Monitoring Network

Central Coast Snapshot Day 2012 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 twelve 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 monitoring of watersheds in 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 5th 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 2012, 214 citizens volunteered between four and six hours of their time to monitor 180 sites. This year, 43% of the sites met all of the water quality objectives (WQO) that were measured, indicating healthy vibrant water bodies.

Results reveal that dissolved oxygen was the most common **field** measurement to exceed the WQOs and *E. coli* was the most common **lab** measurement to exceed the WQOs.

- Dissolved oxygen exceeded the WQO at 19% of the sites in 2012 as compared to 33% in 2011 and 18% in 2010.
- *E. coli* exceeded the WQO at 20% of sites, similar to 20% in 2011 and 17% in 2010; nitrate exceeded the WQO at 13% of sites down from 14% in 2011 and 15% in 2010.
- Orthophosphate exceeded the WQO at 13% of the sites, up from 12% in 2011 but down from 27% in 2010.

There were eighteen Areas of Concern (sites that exceeded three or more WQOs) identified this year, similar to eighteen in 2011 and down from twenty-four in 2010. The Areas of Concern spanned thirteen water bodies: Branciforte Creek, Calera Creek, Corn Cob Creek, Carneros Creek, Watsonville Slough, Struve Slough, West Struve Slough, Moro Cojo Slough, Santa Rita Creek, Tembladero Slough, Alisal Slough, the lower Salinas River and the Salinas Reclamation Ditch.

Thirteen 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 a valuable way to connect residents to their local waterways and actions to help improve water quality. SSD data are also used to inform public policy contributing to the 303(d) listing of impaired water bodies

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

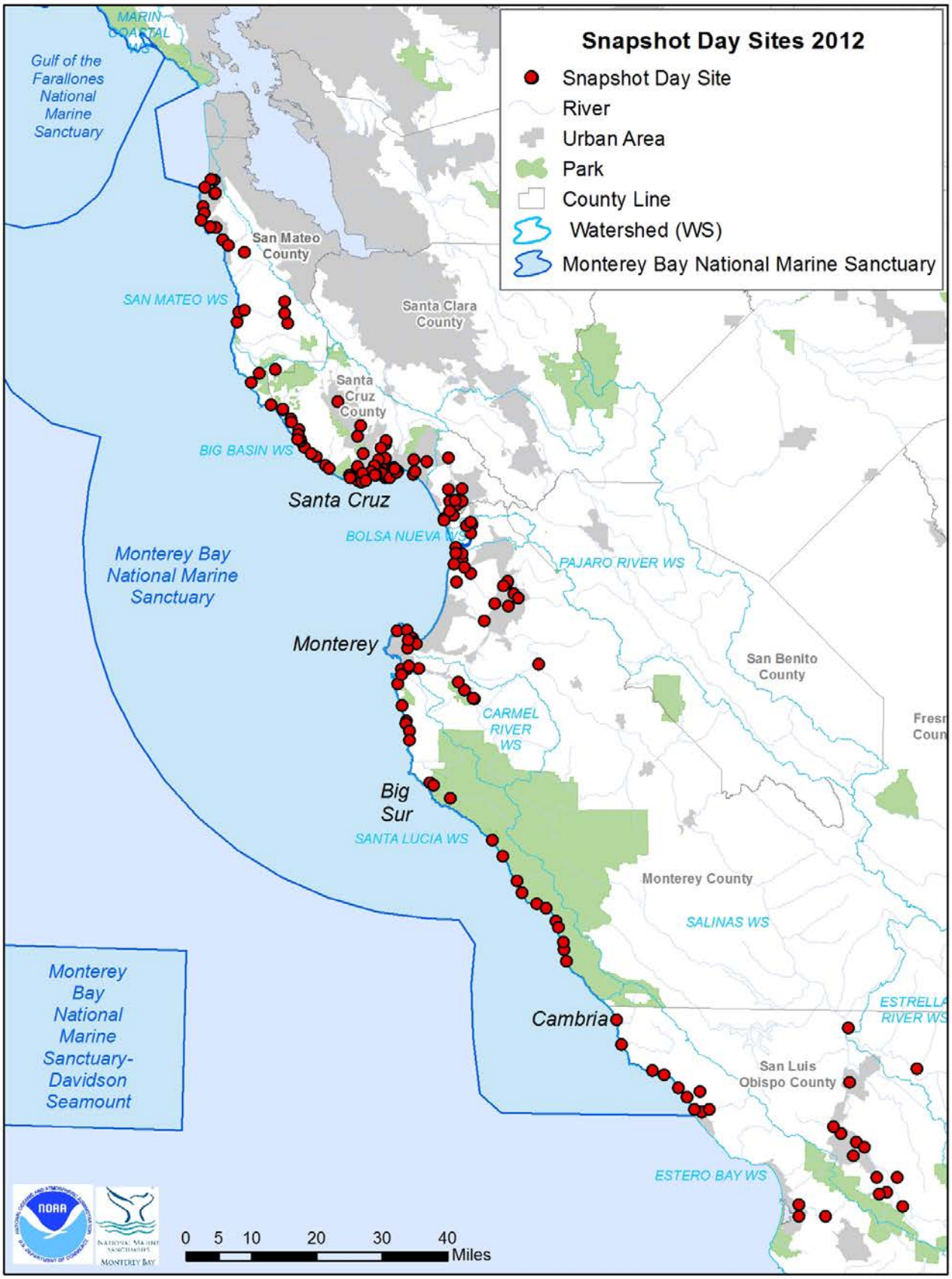

Figure 1. Map of Snapshot Day 2012 monitoring sites

Methods

Each year, trainings are conducted in all four counties bordering the sanctuary. Training topics include: 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.

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.

Volunteers gather at the Monterey area hub before heading out to 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
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 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

May 5th, 2012 was a clear sunny day along most of the coast when 214 volunteers monitored 180 sites (Figure 1). This year, 43% of sites met the water quality objectives for all lab and field parameters.

A San Simeon Team at San Carpoforo Creek.

Volunteers collect samples at Carneros Creek.

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 (°C). Temperatures above 21°C can harm cold water fish such as salmon and steelhead, as well as other aquatic organisms. Nine sites (5%) exceeded the WQO for water temperature this year. The highest result was 29.6 °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. Once the plants die, decomposition further depletes the oxygen available to aquatic organisms.

Although the General 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, thirty-five (19%) of the sites exceeded the WQO for dissolved oxygen. Of those that exceeded the WQO, 94% were below the WQO, creating an oxygen deprived environment. The remaining two sites, had saturated oxygen levels. The lowest dissolved oxygen result was in Alisal Slough (Monterey County) with a result of 3 mg/L; the highest was 16.1 mg/L in Corn Cob Creek (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 pH range 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 2012, five (3%) of the sites did not meet the WQO. The lowest pH result of 5.5 was in the Carmel River and the highest was 9 in the Moro Cojo (both sites are in Monterey 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 is for transparency not less than 25 centimeters. Transparency was measured at 175 sites with 23 (13%) not meeting the Action Level, the lowest measurement of 1.1 cm was taken in Paso Robles Creek (Monterey County).

Turbidity is determined using a turbidity meter which measures the amount of light that can penetrate a sample tube of water. CCAMP's Action Level for turbidity is not greater than 25 Nephelometeric Turbidity Units (NTU's). Turbidity was measured at 3 sites; none of these sites exceeded the WQO.

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

Salinas Team 3 at the Chualar Bridge.

San Mateo CountyTeam 4 group shot in the redwoods- ole!

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. Elevated 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-three (13%) 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 30.4 mg-N/L in the Tembladero Slough (Monterey County). A total of 81 sites (45%) had non-detectable concentrations of nitrate.

Orthophosphate

Twenty-three (13%) sites exceeded the action level of 0.12 mg/l for orthophosphate-P. The highest concentration of orthophosphate was in the upper Salinas River (Monterey County) with a concentration of 1.38 mg-P/L. A total of 151 sites (84%) had non-detectable concentrations of orthophosphate. (Figure 3).

Bacteria

E. coli

Coliform bacteria in the environment originates 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. Sixty-two sites (34%) exceeded of the *E. coli* WQO for Snapshot Day 2012. The highest result for *E. coli* was in Santa Rita Creek (Monterey County) with a result of 10,950 MPN/100 ml (Figure 4). Ten sites (6%) had non-detectable concentrations.

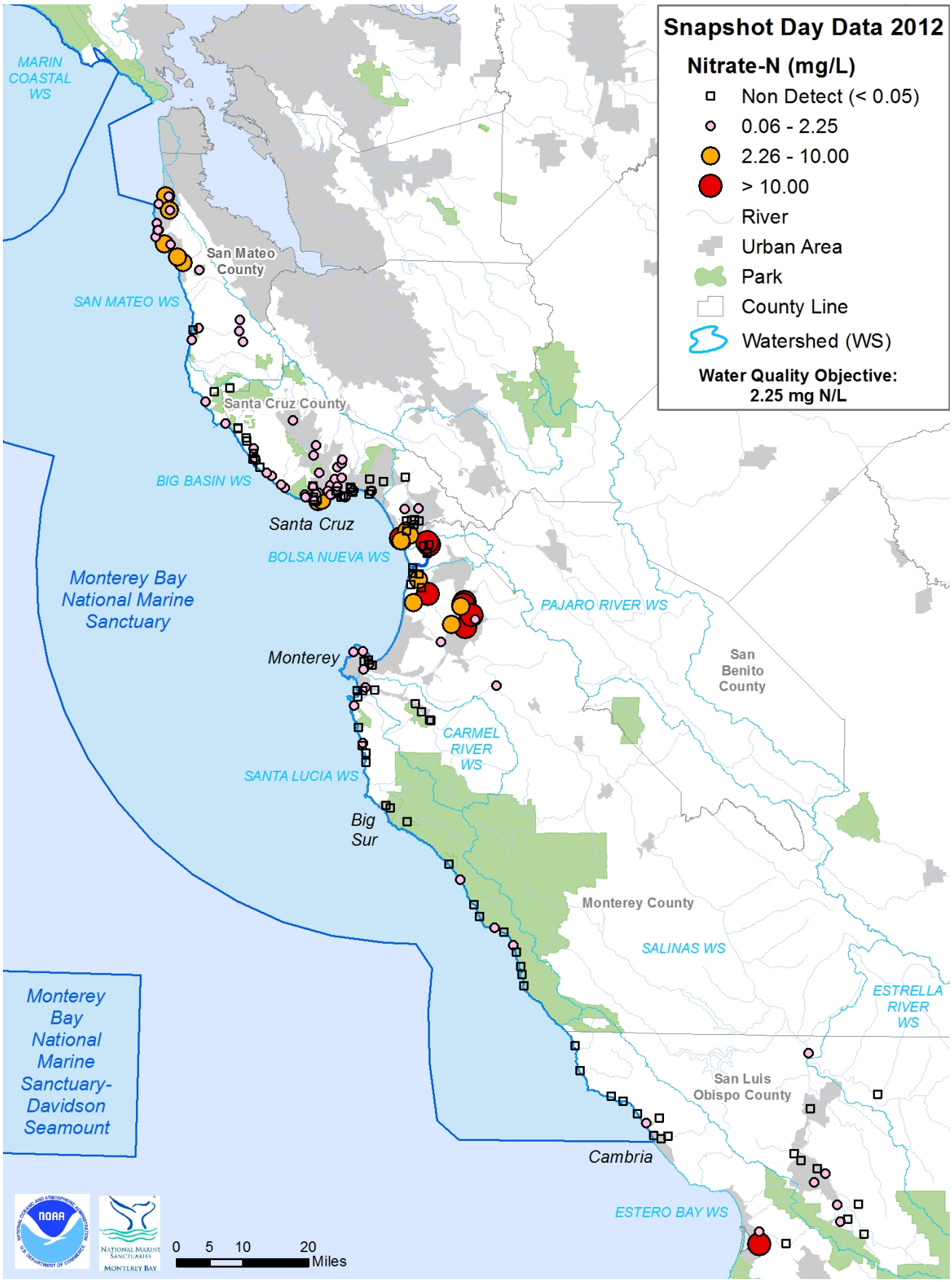

Figure 2. Nitrate as N Results for Snapshot Day 2012.

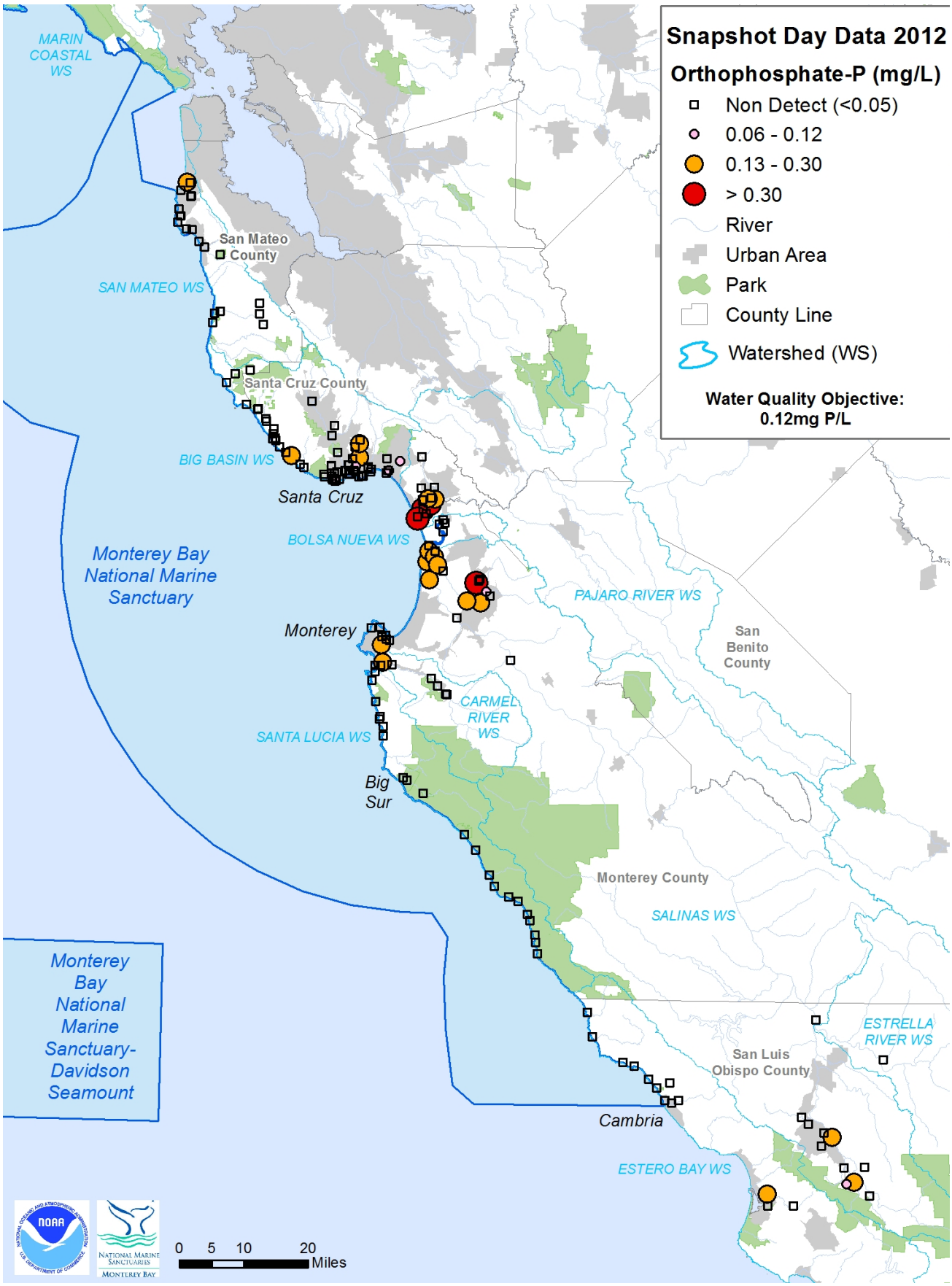

Figure 3. Orthophosphate-P Results for Snapshot Day 2012.

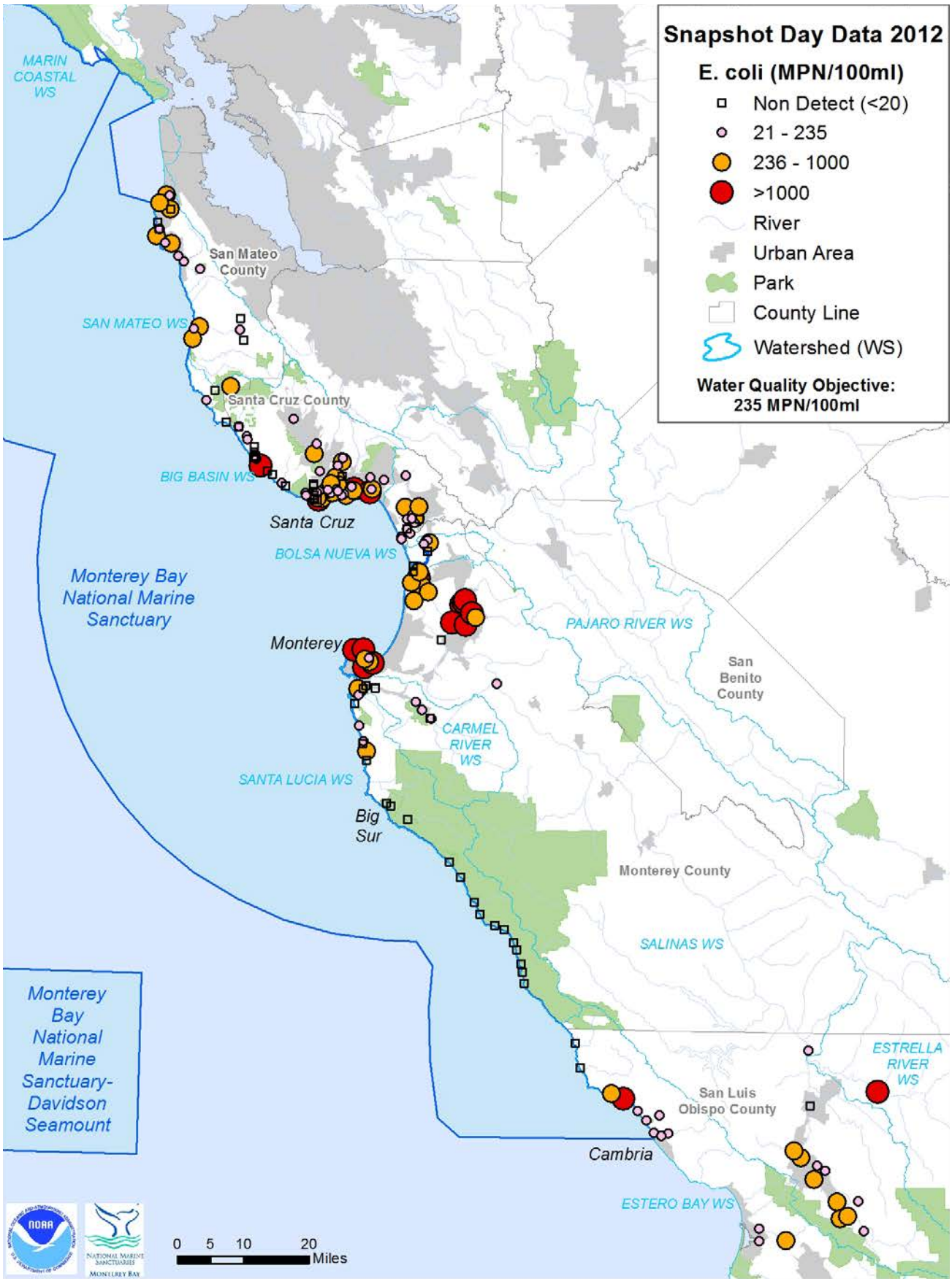

Figure 4. ***E. coli*** **Results for Snapshot Day 2012.**

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 5) and by site (Figure 6).

In 2012, eighteen sites (10%) were designated Areas of Concern on 13 water bodies (Figure 5). Many of the AoC are designated and stay on the list for many years. However in 2012, Harkins Slough, Elkhorn Slough and Natividad Creek were not identified as an AoC even though they had been for the past ten years (Figure 5). New to the AoC list this year is a site along Branciforte Creek in Santa Cruz, which is a fairly urbanized water body and is listed for exceedances in *E. coli*, orthophosphate (as P) and transparency. Also back on the AoC list this year is Calera Creek in San Mateo County after being off of the list for three years. Calera Creek is on the AoC list for 2012 due to exceedances in *E. coli*, nitrate (as N) and orthophosphate (as P). All data is available in Appendix 1.

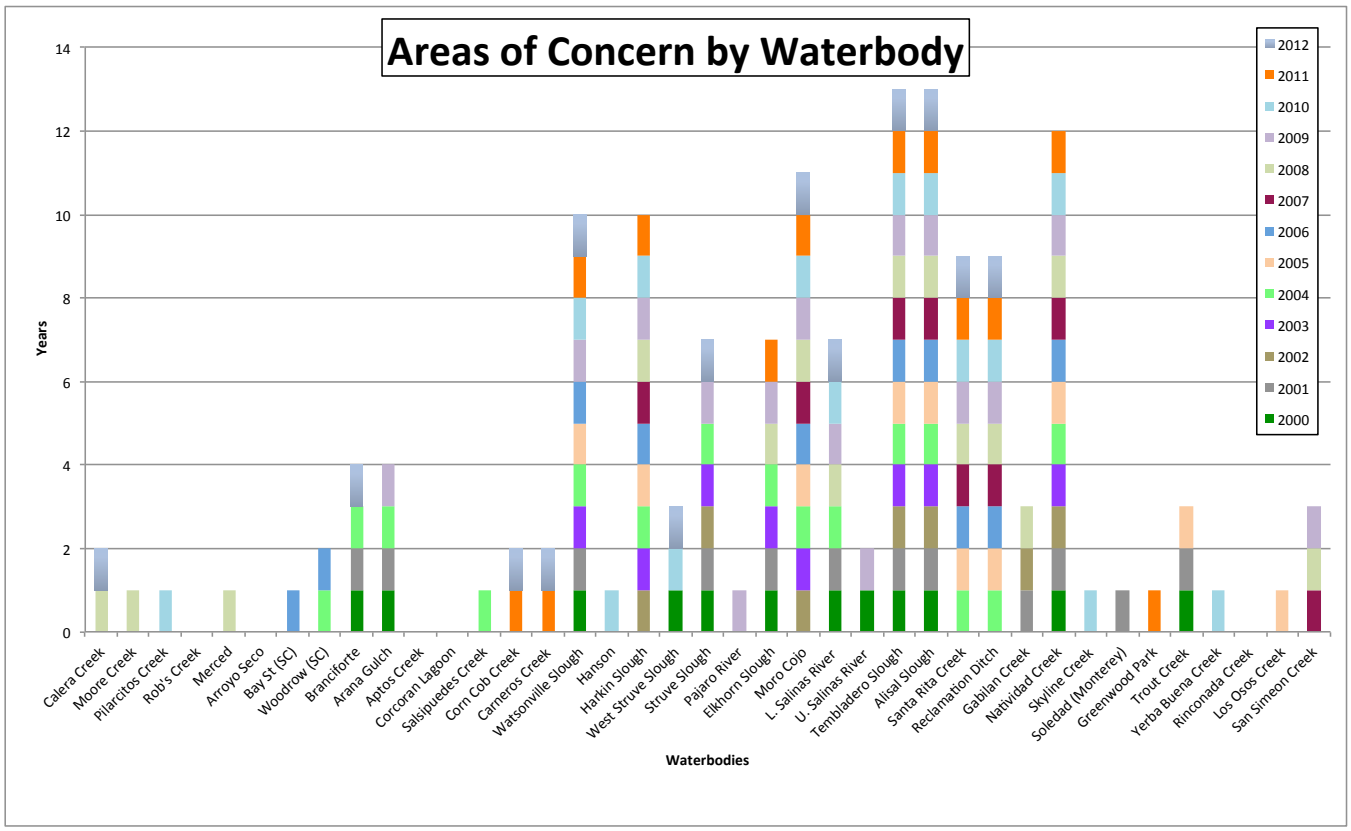

Figure 5. Areas of Concern by water body 2000-2012.

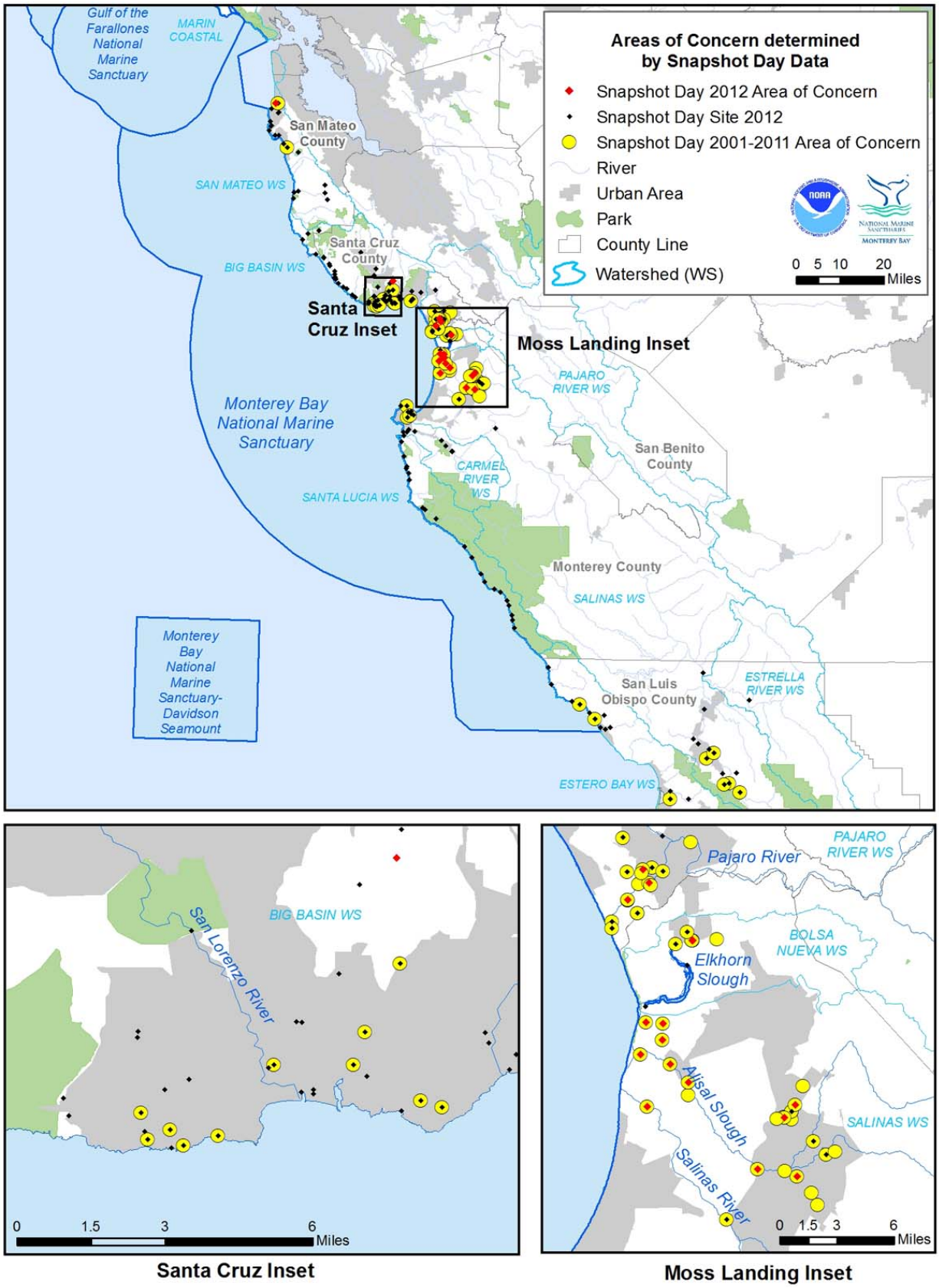

Figure 6. Areas of Concern by site for Snapshot Day 2012

Conclusion

In its thirteenth year, Snapshot Day 2012 brought together 214 citizens to monitor the water quality of 180 different sites along creeks and rivers draining into the MBNMS. Many of the sites monitored (43%) 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 has continued to drop over the past five years. With eighteen Areas of Concern each, 2011 and 2012 had the lowest number of Areas of Concern since 2007. Both Natividad Creek and Harkins Slough dropped off the AoC list for 2012. Snapshot Day sites at the bottom of large rivers or creeks that go through not only urban areas but also agricultural settings 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 coasts have few to no exceedances.

Of the 18 Areas of Concern for 2012, 16 are also listed on the 303(d) list for impaired waterways by the Regional Water Quality Control Board for similar pollutants. 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 with 2010 being the most recent.

Overall Snapshot Day 2012 results reveal a decrease in nitrate concentrations while *E. coli* is still a problem at many sites. Additionally, trash is a recurring issue at many sites requiring further work to reduce illegal dumping and trash in and around urban streets. With a lot of effort focused on both urban and agricultural management measures, it is our hope that improvements in water quality will continue.

Once more, the Network would like to thank all of the volunteers who made this event possible. 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. A monitoring effort of this magnitude could only be completed by a large group of dedicated volunteers.

Appendix 1: 2012 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	Transparency cm	Water Temp °C
202-ALPIN-11	20	0.77	ND	8.0	7.5	120	10.2
202-BEARG-11	272	ND	ND	9.0	7.0	120	9.6
202-CALER-11	120	1.70	ND	6.5	6.5	120	12.7
202-CALER-12	359	3.14	0.25	7.0	6.5	120	13.0
202-DEERC-12	341	0.77	ND	11.0	7.0	42	10.2
202-DENNI-11	135	2.49	ND	9.0	8.0	63	12.5
202-FRENC-11	52	4.07	ND	10.0	6.5	13	10.3
202-GAZOS-11	148	0.50	ND	9.0	7.0	120	11.3
202-GAZOS-15	10	ND	ND	7.0	7.0	120	10.7
202-LAHON-11	86	0.55	ND	8.0	7.5	120	9.0
202-MARTI-11	10	1.003	ND	9.0	7.0	111	11.0
202-MILLC-11	199	1.78	ND	11.0	7.0	120	10.4
202-MONTA-11	107	0.931	ND	8.0	7.0	47	12.0
202-MONTA-12	20	0.92	ND	8.0	7.0	82	12.0
202-PILAR-11	84	4.88	ND	9.0	7.0	112	11.0
202-POMPO-11	345	1.20	ND	14.7	7.5	45	14.3
202-SANGR-11	187	ND	ND	12.6	8.1	120	15.1
202-SANGR-12	437	0.55	ND	13.0	8.0	120	12.1
202-SANGR-14	20	0.53	ND	7.0	7.0	120	8.6
202-SANPE-11	275	2.33	ND	7.0	7.0	120	11.6
202-SANPE-12	20	0.82	ND	7.0	6.5	120	10.8
202-SANPE-13	243	2.23	ND	11.0	6.5	120	11.6
202-SANVI-11	670	1.70	ND	9.0	7.0	65	12.0
304-APTOS-21	61	ND	ND	11.0	7.0	120	9.5
304-APTOS-22	40	ND	ND	6.0	7.0	120	11.0
304-APTOS-23	1076	ND	ND	11.5	7.0	70	14.0
304-ARANA-21	270	0.25	0.10	7.0	6.5	115	10.5
304-ARANA-22	61	ND	ND	6.0	7.0	105	13.5
304-ARANA-23	20	0.10	0.18	7.0	6.0	120	10.2
304-ARROY-21	61	0.29	ND	7.5	6.5	73	12.3
304-ARROY-22	259	0.96	0.10	4.0	6.5	120	13.7
304-ARROY-23	ND	1.44	ND	7.0	7.0	120	14.7
304-BRANC-21	267	0.28	ND	8.0	6.9	120	13.1
304-BRANC-22	662	0.28	ND	7.0	6.5	120	10.7
304-BRANC-23	681	0.57	ND	7.0	6.5	120	11.3
304-BRANC-24	407	0.31	0.14	7.0	7.0	10	11.2
304-BRANC-25	126	0.22	ND	9.0	7.0	10	11.3
304-CARBO-21	267	0.57	ND	7.5	6.5	120	11.9
304-CORCO-21	61	ND	ND	9.0	7.5	71	15.2
304-CORCO-22	194	ND	ND	7.0	7.5	69	18.9
304-CSD-08	4028	0.43	ND	9.0	7.0	115	12.8
304-FERRA-21	6896	ND	ND	9.0	7.0	120	11.5
304-GRANI-21	220	0.39	ND	9.0	6.5	10	12.0

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Transparency cm	Water Temp °C
304-LAGUN-21	40	0.10	ND	9.0	7.0	120	10.2
304-LEONA-21	61	0.38	ND	4.5	6.5	93	11.9
304-LIDEL-21	ND	0.42	0.13	8.0	6.5	120	11.4
304-LITTL-21	ND	0.10	ND	8.0	7.0	120	10.5
304-MAJOR-21	20	0.13	ND	8.0	6.5	120	10.2
304-MOLIN-21	40	0.78	ND	8.5	6.5	120	10.4
304-MOORE-21	ND	ND	ND	7.0	6.5	87	18.9
304-MOORE-22	ND	0.37	ND	4.0	6.5	60	11.9
304-MOORE-24	ND	ND	ND	3.5	6.5	55	9.1
304-MOORE-25	20	ND	ND	6.0	7.0	120	11.0
304-MOORE-26	20	0.12	ND	6.0	7.0	60	17.7
304-NEWYE-11	20	0.17	ND	10.0	6.5	120	10.8
304-PILKI-21	342	0.54	ND	6.0	6.5	78	11.7
304-PILKI-22	293	0.66	ND	5.5	6.5	50	12.0
304-ROBSC-21	662	1.07	ND	9.0	6.0	120	12.8
304-SANLO-21	83	0.29	ND	6.0	7.0	120	12.4
304-SANLO-22	104	0.25	ND	7.0	6.5	112	13.4
304-SANLO-26	61	0.38	ND	12.2	7.0	120	14.2
304-SANLO-27	82	0.26	ND	11.0	7.0	120	11.2
304-SANVI-21	ND	0.10	ND	8.0	7.0	120	11.0
304-SCOTT-21	61	ND	ND	7.0	6.5	120	10.2
304-SCOTT-22	61	ND	ND	7.0	7.0	120	10.0
304-SCOTT-23	ND	0.10	ND	9.0	7.0	111	10.5
304-SCOTT-24	20	ND	ND	8.0	7.0	120	10.2
304-SCOTT-25	20	ND	ND	10.0	6.5	120	11.0
304-SCSD-02	1182	3.43	ND	9.0	7.0	120	17.0
304-SCSD-03	218	1.56	ND	10.0	6.5	120	14.6
304-SCSD-04	313	2.92	ND	9.0	7.0	100	15.8
304-SOQUE-22	240	ND	ND	9.0	7.0	120	15.5
304-SOQUE-26	125	ND	ND	9.0	7.5	120	11.0
304-SOQUE-28	61	ND	ND	9.0	7.5	120	12.5
304-VALEN-21	83	ND	0.10	8.0	7.0	120	11.0
304-VALEN-22	626	0.26	0.10	7.0	7.0	61	12.0
304-WADDE-21	ND	ND	ND	11.0	6.5	120	11.6
304-WADDE-22	40	ND	ND	9.0	6.5	120	11.2
304-WILDE-21	125	0.11	ND	9.0	6.5	120	11.1
304-WILDE-22	83	0.10	ND	8.0	6.5	120	11.0
304-ZAYAN-21	296	0.43	ND	10.8	7.0	120	10.9
304-ZAYAN-22	194	0.21	ND	11.1	7.0	120	10.9
305-BEACH-21	170	22.60	ND	12.0	8.0	55	24.0
305-CORRA-21	316	0.78	ND	8.0	7.0	120	12.0
305-CORRA-22	61	ND	ND	10.0	7.0	120	10.5
305-HARKI-21	104	ND	ND	11.0	7.0	11	22.0
305-HARKI-22	196	ND	ND	9.0	7.2	19	16.0
305-HARKI-23	461	0.46	ND	5.0	7.0	57	13.0

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Transparency cm	Water Temp °C
305-PAJAR-21	61	5.48	ND	12.0	7.7	65	17.0
305-STRUV-21	370	ND	ND	8.0	7.0	23	20.7
305-STRUV-22	125	ND	0.42	4.5	7.0	7	21.3
305-WATSO-21	20	ND	0.29	5.5	7.0	120	20.0
305-WATSO-22	ND	7.53	0.70	6.0	7.0	120	16.0
305-WATSO-23	125	3.00	0.35	7.0	7.5	29	21.0
305-WSTRU-21	61	ND	0.17	6.0	7.0	7	16.9
306-CARNE-36	557	ND	ND	6.5	6.3		16.3
306-CORNC-31	313	29.60	ND	16.1	7.7		15.7
306-ELKHO-31	20	ND	ND	5.5	7.5	50.6	17
306-ELKHO-32	40	ND	ND	7	7.5	16.8	20.7
306-ELKHO-33	20	ND	ND	7	7	53.4	17.6
306-ELKHO-34	216	23.4	ND	11	7	108.8	14.2
307-CARME-33	61	ND	ND	9	7	125	12.5
307-CARME-35	194	ND	ND	9	7	125	13.2
307-CARME-36	148	ND	ND	9	7	120	13.3
307-CARME-37	20	ND	ND	11	7	120	13.6
307-CARME-38	<20	ND	ND	6	7	120	13.6
307-CARME-39	346	ND	ND	7	5.5	92	13.8
307-GARZA-31	20	ND	ND	7	6.5	125	11.6
307-HATTO-31	20	0.1	0.16	5.5	6.5	120	15.1
308-BIGCR-31	<20	ND	ND	8.12	7	120	15.4
308-BIGSU-31	<20	ND	ND	10.57	7	120	11.8
308-BIGSU-32	<20	ND	ND	10.2	6.5	120	12.4
308-DANIC-31	<20	0.17	ND	7.49	7	120	17.6
308-DOUD-31	40	0.15	ND	7	6.5	120	11.1
308-GARRA-31	<20	ND	ND	10	7	120	11.4
308-HOTSP-31	<20	0.1	ND	9.73	6.5	120	12.3
308-LIMEK-31	20	ND	ND	9.05	7	120	13.5
308-MALPA-31	20	0.29	ND	8	7	120	12.2
308-MCWAY-31	<20	ND	ND	10.42	6.5	120	12.9
308-MILLC-31	20	0.1	ND	7.94	7	120	13.2
308-PALOC-31	487	ND	ND	9	7	72.8	11.1
308-PARTI-31	<20	0.1	ND	10.56	7	120	12.3
308-PLASK-31	<20	ND	ND	8.94	7	120	11
308-PREWI-31	<20	ND	ND	8.88	7	120	11.6
308-ROCKY-31	<20	ND	ND	12	7	120	10.8
308-SANJO-31	61	ND	ND	8	6.5	120	11.5
308-SOBER-31	61	ND	ND	9	6.5	120	11.2
308-SYCAM-31	<20	ND	ND	9.97	6.5	120	12.1
308-VICEN-31	<20	ND	ND	10.02	7.5	120	12.6
308-WILDC-31	<20	ND	ND	9.52	7	120	12.3
308-WILLO-31	20	ND	ND	9.52	7	120	11.2
309-ALISA-32	3193	14.4	0.26	3	7.25	17.2	18.3

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Transparency cm	Water Temp °C
309-ASILO-31	2108	0.23	ND	7	6.5	48	12.5
309-ATASC-41	836	0.1	ND	6	7.5	120	15.2
309-ATASC-42	52	ND	ND	6	7.5	120	12.3
309-CENTR-31	1632	1.01	ND	7	6.5	120	13.6
309-DOLPH-31	40	ND	ND	3	7	88	13.7
309-GABIL-31	1301	10.1	0.12	7	6.5	95	18.1
309-GRAVE-41	488	ND	ND	6	7	120	12.6
309-LIBRA-31	747	0.13	ND	8	7	120	12.8
309-MAJOR-31	1024	ND	ND	6	7.5	120	11.2
309-MOROC-31	2024	6.95	0.2	10	8.5	7	24.4
309-MOROC-32	370	ND	ND	7	8.5	5	25.7
309-MOROC-33	<20	ND	0.21	5.5	9	9	29.6
309-NATIV-31	265	0.1	ND	7	7	68	15.1
309-PASOR-41	282	ND	ND	7	7.5	1.1	14.9
309-RECDI-31	4962	6.94	0.26	12	7.5	15	20.2
309-RINCO-41	145	ND	ND	7	7	120	14.2
309-SALIN-31	427	6.69	0.13	6	7.5	27.3	17.5
309-SALIN-32	20	1.49	ND	7	7.5	10.1	16.8
309-SALIN-33	83	1.2	ND	9	6.5	13	15.9
309-SALIN-44	145	0.21	ND	10	7	120	15.8
309-SALIN-45	<10	ND	1.38	7	7.5	120	17.3
309-SALIN-46	85	1.31	0.24	12	8	80	21.9
309-SALIN-47	135	ND	ND	11	7.5	110	16.1
309-SKYLI-31	2028	0.1	0.27	8	7	28	12.9
309-SMARG-41	537	0.1	ND	8	7	120	14.6
309-SRITA-32	4764	12.4	ND	7	7	37	15.4
309-SRITA-34	1971	14.2	ND	9	7	10.2	18.4
309-SRITA-35	10950	8.03	0.67	7	7.5	2.5	25
309-TEMBL-31	904	ND	0.24	8	7	9	17.6
309-TEMBL-32	700	30.4	ND	11	8	19.4	18
309-TEMBL-33	992	ND	0.13	12	7.5	10.21	16.4
309-TROUT-41	259	ND	0.16	7	7	120	11.9
309-VETER-31	293	ND	ND	7	7	120	13.4
309-YERBA-41	331	0.1	0.1	5	7.5	120	13.4
310-ARROY-41	1086	ND	ND	7	7.5	120	11.5
310-ARROY-42	20	ND	ND	5	7	120	16.1
310-CARPO-41	<10	ND	ND	6	7	120	13.6
310-LAGUN-41	288	ND	ND	6	7	120	15.5
310-PENN-41	243	ND	ND	9.55	8.33	1.19 NTU	16.1
310-PICOC-41	173	ND	ND	7	7	120	13.3
310-SANSI-41	121	1.86	ND	7	7	120	13.5
310-SANSI-42	75	ND	ND	10	7	120	13.7
310-SANTA-41	73	ND	ND	9	7	120	15.8
310-SANTA-42	179	ND	ND	9	7.5	120	14.4

Site ID	E. coli MPN/100ml	NO3-N mg-N/L	PO4-P mg-P/L	Dissolved Oxygen mg/L	pH	Transparency cm	Water Temp °C
310-SANTA-43	109	ND	ND	9	7	120	15
310-SYB-41	52	10.3	ND	11.75	7.97	18.7 NTU	18.8
310-UCF-41	83	0.98	0.27	11.9	8.4	2.18 NTU	16.4
317-ESTRE-43	5172	ND	ND	12	8	60	26.7

ND= Non detect