Snapshot Day
May 7TH, 2011

Final Report

Coastal Watershed Council

NATIONAL MARINE SANCTUARIES ™
MONTEREY BAY

Monterey Bay Sanctuary Citizen Watershed Monitoring Network

Central Coast Snapshot Day 2011
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

Figure 1. Map of Snapshot Day 2011 monitoring sites

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 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 7th 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 pick up sample equipment and containers, receive last minute instructions, and meet fellow team members.

In 2011, 178 citizens volunteered between four and six hours of their time to monitor 181 sites. This year, over half (54%) of the sites met all of the water quality objectives (WQO) that were measured. This has improved since 2009 when 34% of sites met all WQOs and in 2010 when 43% of sites met all WQOs.

Results reveal that transparency/turbidity and dissolved oxygen were the most common **field** measurement to exceed the WQOs; *E. coli* exceeded the WQO at 20% of sites (compared to 17% in 2010 and 37% in 2009); nitrate exceeded the WQO at 14% of sites (compared to 15% in 2010 and 13% in 2009). This year, orthophosphate had an exceedance rate of 12%, down from 27% in 2010 and 19% in 2009.

There were 18 Areas of Concern (sites that exceeded three or more WQOs) identified this year, compared to 2010 when there were 24 sites and 2009 when 21 sites were Areas of Concern. The Areas of Concern spanned eleven water bodies: Corn Cob Creek, Carneros Creek, Watsonville Slough, Elkhorn Slough, Moro Cojo Slough, Santa Rita Creek, Tembladero Slough, Alisal Slough, Natividad Creek, the Salinas Reclamation Ditch, and new this year the Greenwood Park storm drain.

Twelve years of data gathered by trained Snapshot Day 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. Water quality data collected by SSD volunteers has been invaluable for determining the health of waterways. Snapshot Day 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 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 becomes invaluable 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*, enterococcus) 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 General 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.

Table 1: Water Quality Objectives

Parameter (reporting units)	Water Quality Objectives	Source of Objective
pH	**Not lower than 6.5 or greater than 8.5**	**General Basin Plan Objective**
Water Temperature (°C)	**Not more than 21**[1]	**Central Coast Ambient Monitoring Program (CCAMP)**
Transparency (cm)	**Not less than 25**	**Central Coast Ambient Monitoring Program (CCAMP)**
Turbidity	**Not to exceed 10 NTU or 20% change in background**	**Basin Plan Objective**
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)**
***E. coli* (MPN/100ml)**	**Not to exceed 235** [4]	**EPA Ambient Water Quality Criteria**
Enterococcus (MPN/100ml)	**Not to exceed 104**	**EPA Ambient Water Quality Criteria**
Zinc (ppb)	**Not to exceed 200**	**Basin Plan Objective**
Copper (ppb)	**Not to exceed 30**	**Basin Plan Objective**
Lead (ppb)	**Not to exceed 30**	**Basin Plan Objective**
Total Suspended Solids (TSS) (ppm)	**Not to exceed 500** [5]	**Central Coast Ambient Monitoring Program (CCAMP)**

[1] Moyle, P. 1976. Inland Fisheries of California. University of California Press.
[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] Environmental Protection Agency, Updated WQO.
[5] Central Coast Ambient Monitoring Program, Salinas River Watershed Characterization Report 1999, rev. 2000.

Results

May 7th, 2011 was a clear sunny day along most of the coast when 178 volunteers monitored 181 sites (Figure 1). This year, 54% of sites met the water quality objectives for all lab and field parameters.

Figure 2. The Carmel 3 Team at Hatton Canyon in Carmel Valley.

Figure 3. Volunteers on the Elkhorn Slough team collect water samples from upper Elkhorn Slough.

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, decreasing it with increasing temperature. Decreasing water flow or removing streamside vegetation which provides shade can cause water temperatures to increase to undesirable levels that can harm aquatic life. Snapshot Day 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. Only one site exceeded the WQO for water temperature this year (Moro Cojo) with a result of 23.9°C.

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, they use oxygen in their decomposition, further depleting 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-nine (22%) sites exceeded the WQO for dissolved oxygen. Of those that exceeded the WQO, 92% were below the WQO, creating an oxygen deprived environment. The remaining three sites, had saturated oxygen levels. The lowest dissolved oxygen result was in Harkins Slough (Santa Cruz County) with a result of 1 mg/L; the highest was 13.76 mg/L in Corn Cob Creek (Santa Cruz County).

Conductivity

Conductivity is a measure of the ability of water to conduct electrical current. Measuring conductivity gives an indication of the amount of total solids (such as salts, minerals, and metals) dissolved in the water. Conductivity varies with water source and geographic region.

There is no water quality objective for conductivity. However, once a baseline of conductivity values is established, variations may signal a change in the waterbody's composition. For example, a decline in conductivity may be caused by rainwater and an increase in conductivity may signal sources of pollution such as agricultural runoff or municipal wastewater. Snapshot Day volunteers measured conductivity to establish a baseline for future comparisons.

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 General Basic Plan Objective for pH is between 6.5 and 8.5. In 2011, eight (4%) of sites did not meet the WQO. The lowest pH result of 6 were in Denniston and Little Creeks (San Mateo and Santa Cruz Counties).

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 upstream such as erosion, nutrient loading, or extraordinary algae growth. While transparency and turbidity are describing the similar characteristics, the way in which they are each measured is different. Transparency measures the ability to see a secchi disk through a column of water. Turbidity is determined using a turbidity meter which measures the amount of light that can penetrate a sample of water. CCAMP's Action Level is for transparency >25 centimeters.

Transparency was measured at 158 sites (87%), with 15 sites (9%) not meeting the Action Level for transparency. The lowest transparency measurement of 1.8 cm was taken in Santa Rita Creek (Monterey County).

Another 19 sites had turbidity measurements with either a Dual Cylinder kit with units in Jackson Turbidity Units (JTU); or a turbidity meter with units in Formazin Turbidity Units (FTU); or Nephelometeric Turbidity Units (NTU's). The WQO for these methods is based upon baseline data specific to each site but generally does not exceed 10 NTU. For 2011 only 5 (26%) sites measured using these other methods, did not meet the WQO.

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

Figure 4. The Big Sur Team at Willow Creek.

Figure 5. Team Tembladero taking a sample.

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-five (14%) sites exceeded the CCAMP action level of 2.25 mg-N/l for nitrate as N. The average result for nitrate as N was 2.26 mg-N/l. There was a large range in concentrations from non-detect (from 34% of the sites) to the highest result of 51.2 mg-N/L in the Tembladero (Monterey County).

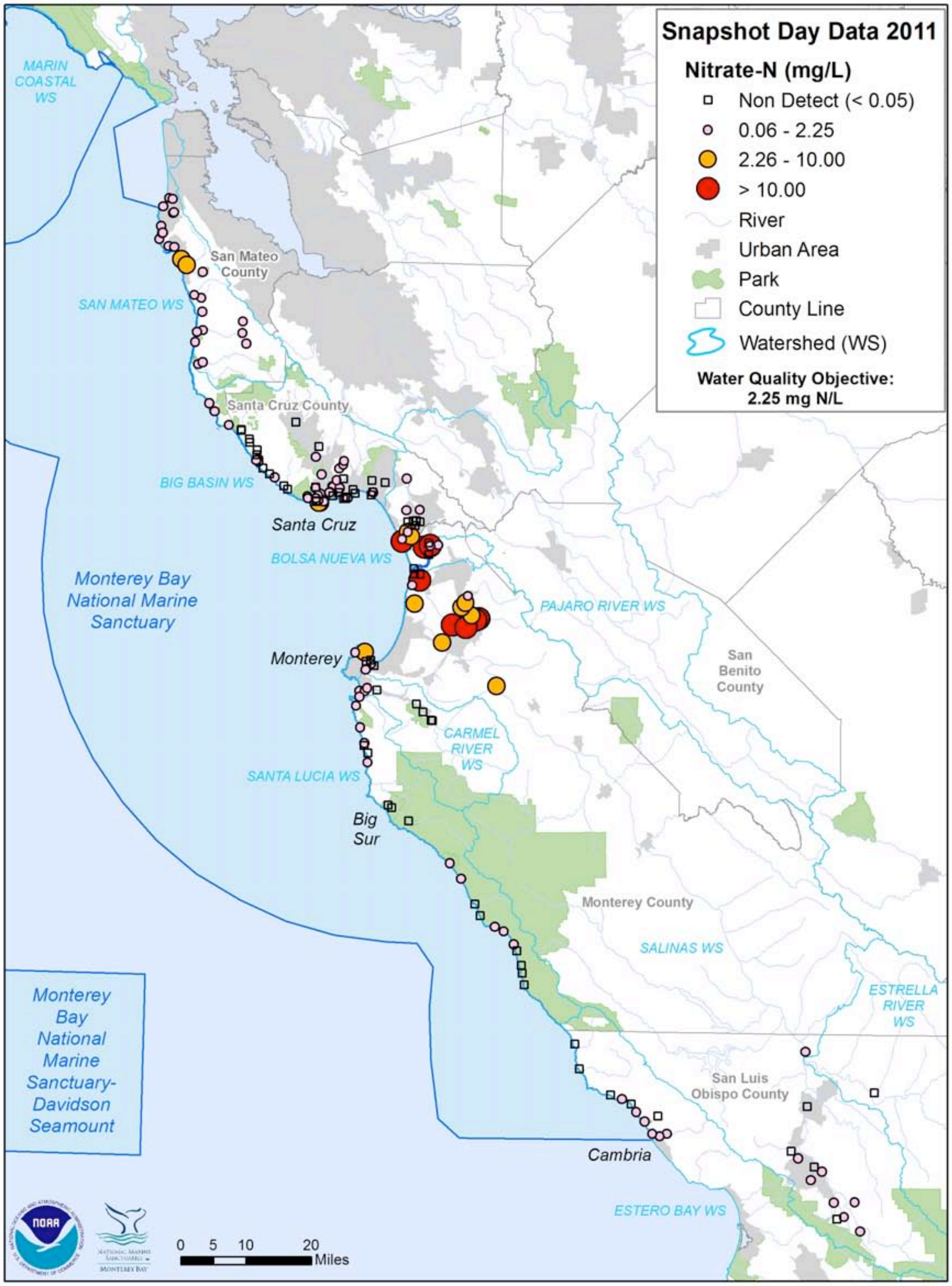

Figure 6. Nitrate as N Results for Snapshot Day 2011.

Orthophosphate

Twenty-one (12%) sites exceeded the action level of 0.12 mg/l for orthophosphate-P. The average result for orthophosphate was 0.06 mg-P/L. Many sites (76%) had non-detectable levels of orthophosphate. The highest concentration of orthophosphate was in the Alisal Slough (Monterey County) with a concentration of 0.42 mg-P/L. (Figure 7).

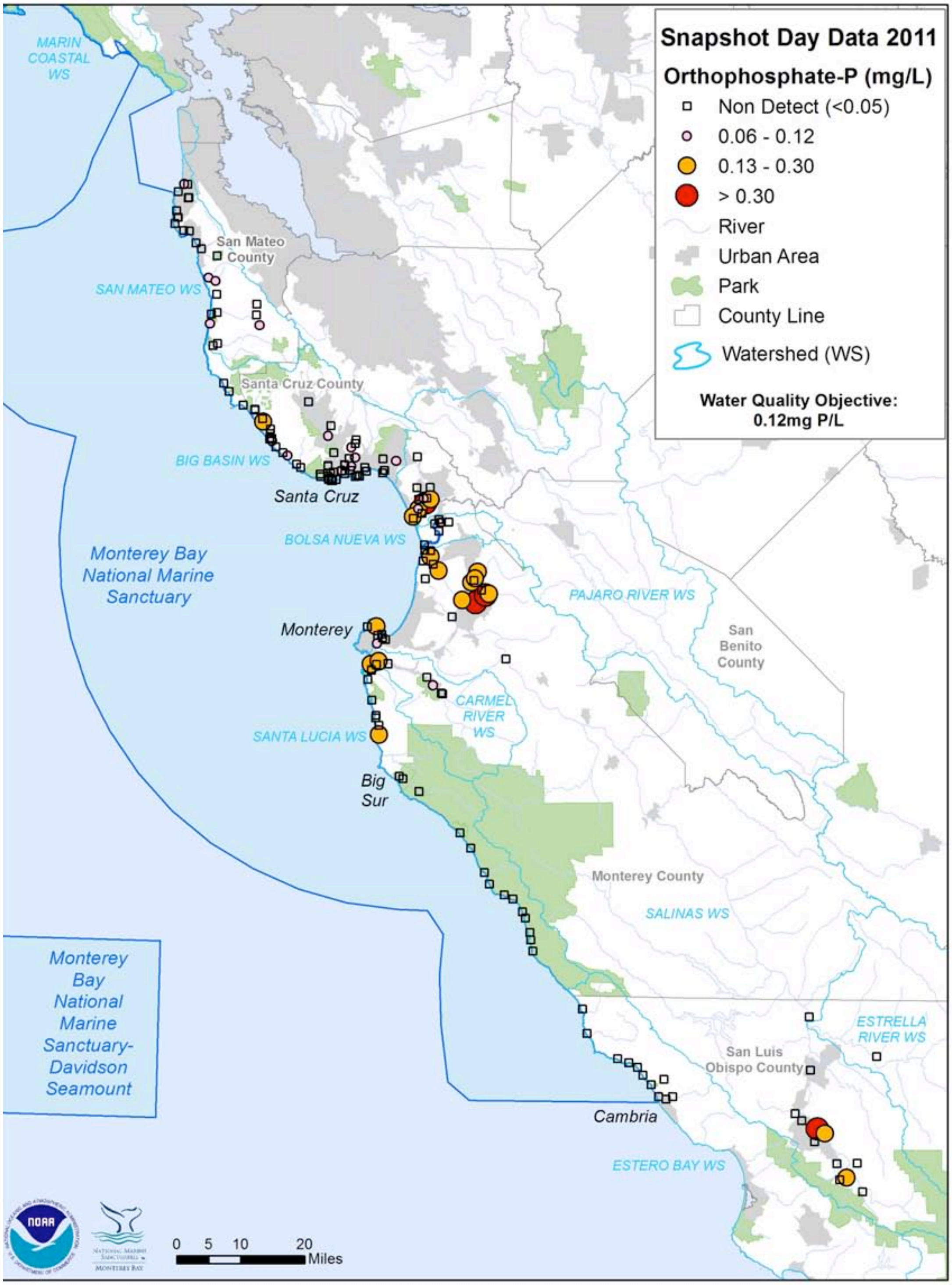

Figure 7. Orthophosphate-P Results for Snapshot Day 2011.

E. coli

Coliform bacteria generally originate from the feces of warm blooded animals, which may originate from human sewage or wildlife. While coliform bacteria are usually not the cause of sickness, their presence can indicate that other pathogens are present. The EPA has set a WQO for *E. coli,* at 235 MPN/100ml. Thirty-seven sites (20%) were in exceedance of the *E. coli* WQO. The average result was 361 MPN/100 ml and 40 sites (22%) had non-detects. The highest result for *E. coli* was from Arroyo Laguna (San Luis Obispo County) with a result of 5,794 MPN/100 ml (Figure 8).

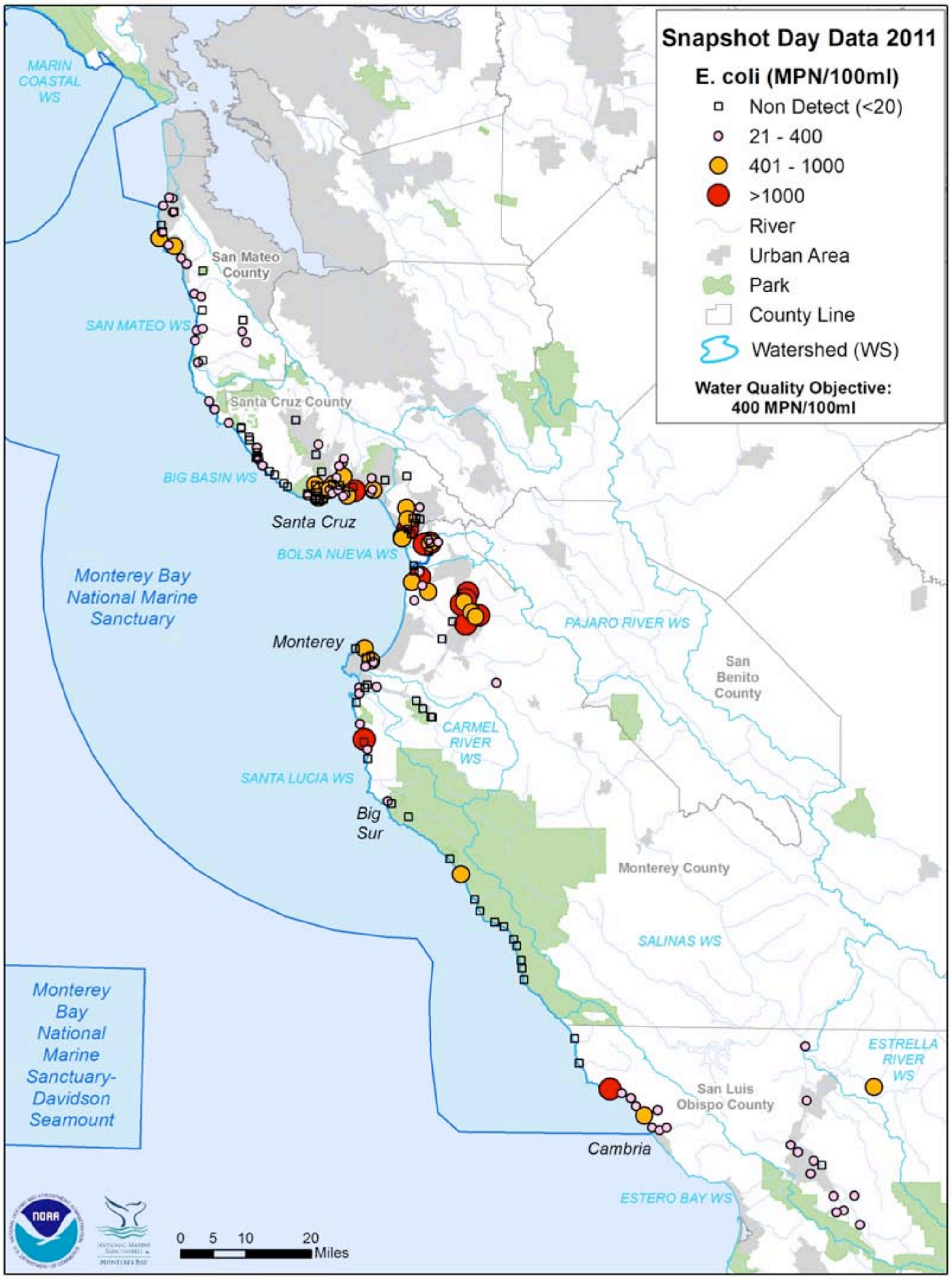

Figure 8. ***E. coli*** **Results for Snapshot Day 2011.**

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. Over the past several years, a trend has emerged of more than one Area of Concern per water body. For example, this year the Reclamation Ditch, Santa Rita Creek, and the Tembladero Slough all have more than one site that is an Area of Concern and are represented as water bodies in order to more fully depict the impact of these areas.

For 2011, 21 sites were designated Areas of Concern on 12 waterbodies (Figure 10). Three of these water bodies have never been designated as Areas of Concern before: Corn Cob Creek, Carneros, Creek and Greenwood Park (Figure 9). Corn Cob is listed as an Area of Concern due to exceedances in nitrate, dissolved oxygen, pH and turbidity. Carneros Creek is listed as an Area of Concern due to exceedances in *E. coli*, nitrate, dissolved oxygen, pH, and turbidity. Greenwood Park, an urban drainage, is listed as an Area of Concern due to exceedances in *E. coli*, nitrate, and orthophosphate (Appendix1).

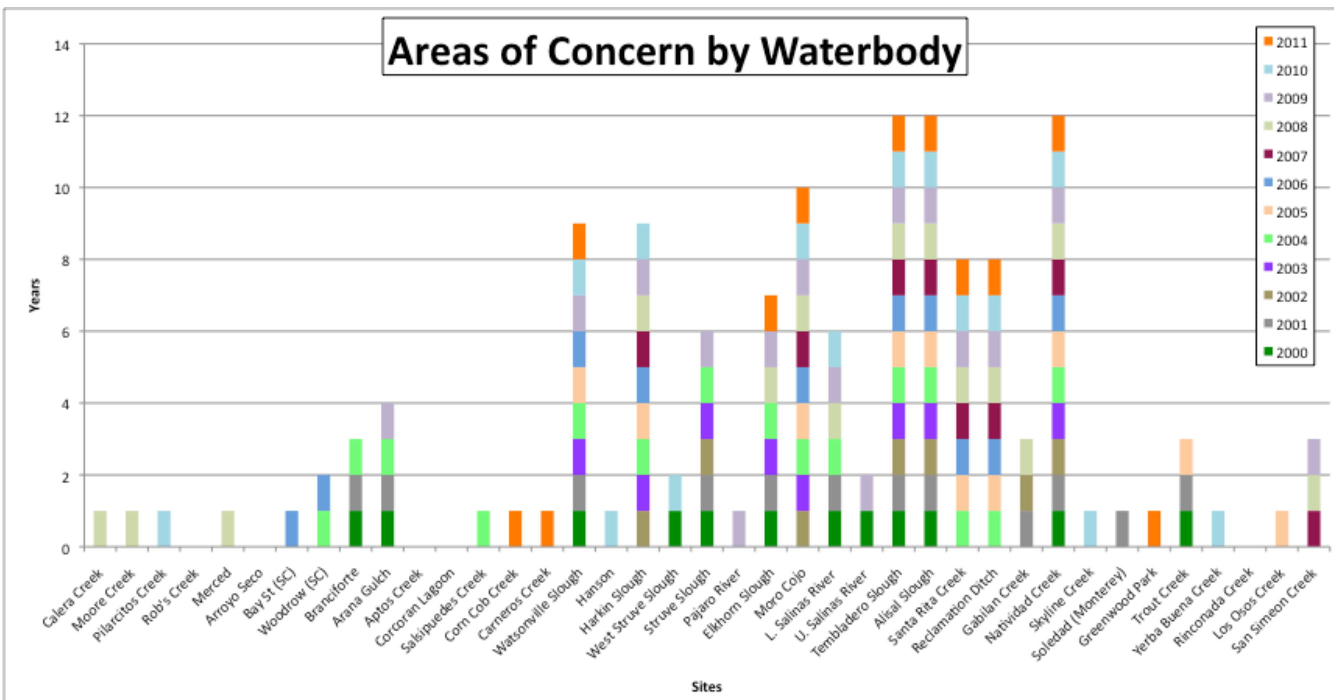

Figure 9. Areas of Concern by waterbody 2001-2011.

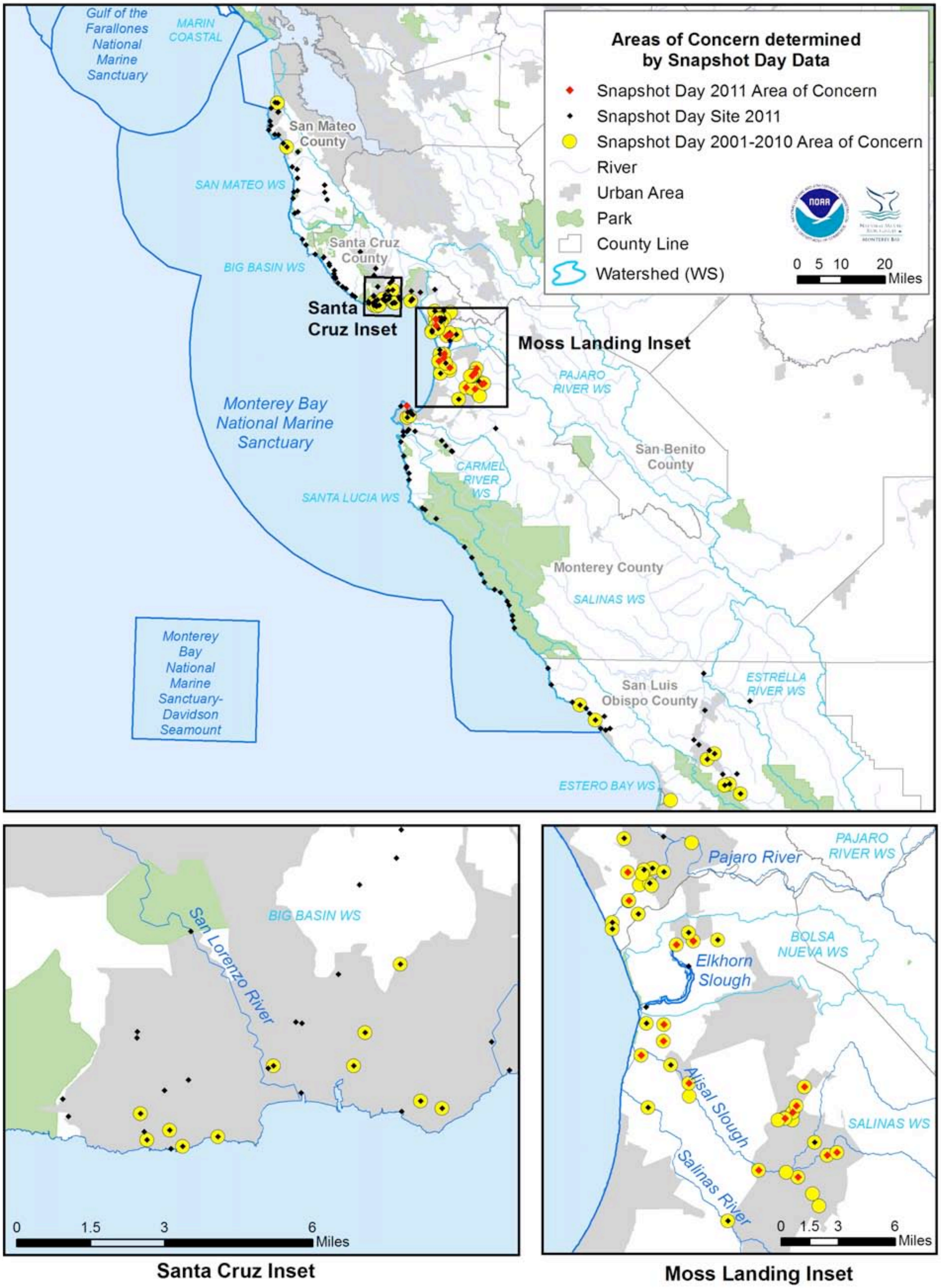

Figure 10. Areas of Concern for Snapshot Day 2011

Conclusion

In its twelfth year, Snapshot Day 2011 brought together 178 citizens to monitor the water quality of 181 different sites along creeks and rivers draining into the MBNMS. More than half of the sites monitored (54%) had no exceedances for any parameter and provided good conditions for cold-water fish, one beneficial use by which SSD data is compared. This is an improvement over 2009 when 34%, and in 2010 when 43% of sites met all water quality criteria. For the sites that did not meet these expectations, most continue to exceed the same constituents and are listed as Areas of Concern year after year.

The number of Areas of Concern has dropped over the past four years; 2011 has the lowest number of Areas of Concern since 2007. SSD 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 transparency/turbidity. Water bodies in the lower Salinas, Tembladero, Moro Cojo and Elkhorn watersheds continue to be in this category and are listed as Areas of Concern year after year. In comparison, creeks and rivers on the San Mateo County and Big Sur coast have few to no exceedances. With a lot of effort focused on both urban and agricultural management measures, it is our hope that improvements in water quality will be evident.

Of the 18 Areas of Concern for 2011, 16 are also listed on the 303(d) list for impaired waterways by the Regional Water Quality Control Board. 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, 2010 is the most recently updated year.

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. SSD is a successful annual event due in large part to continued interest and support by volunteers and partner organizations. In this day and age, a monitoring effort of this magnitude could only be completed by a large group of dedicated volunteers.

Appendix 1: Results by County/Station
(Shaded cells represent exceedance of WQO's)

Site	Ecoli (MPN/100 ml)	NO3-N (mg-N/L)	PO4-P (mg-P/L)	DO (mg/L)	pH	Transparency (cm unless otherwise noted)	Temperature (°C)
202-ALPIN-11	52	0.24	0.1	8	7.5	120	10.3
202-BUTAN-11	94	1.45	ND	7	7	120	12
202-CALER-11	336	1.14	ND	9.95	6.5	125	12.27
202-CALER-12	218	1.19	0.06	9.49	6.5	67	13.06
202-DEERC-12	677	0.23	ND	8	7	49.2	10.9
202-DENNI-11	121	0.71	ND	7	6	102	11
202-FRENC-11	60	4.78	ND	6	7	33.2	11.2
202-GAZOS-11	52	0.19	ND	8	7	120	12.5
202-LAHON-11	285	0.32	ND	9	7	120	10.2
202-LOBIT-11	63	0.40	0.06	9.68	8.15	112	10.86
202-MARTI-11	<10	0.87	ND	8	6.5	36	12
202-MILLC-11	20	0.50	ND	6	7.5	>120	10.8
202-MONTA-11	20	0.15	ND	6	6.5	55	13
202-MONTA-12	52	0.15	ND	6	6.5	56	12
202-PESCA-11	20	0.55	ND	7	7	120	13
202-PILAR-11	171	4.72	ND	6	7.5	42.4	11.3
202-POMPO-11	121	0.70	0.06	9	6.5	120	13
202-PURIS-11	213	0.37	0.07	10	8.31	>120	11.06
202-SANGR-11	262	0.10	ND	10	8.19	>120	12.86
202-SANGR-12	135	0.17	0.05	9	7	>120	11.3
202-SANGR-14	20	0.54	ND	9	6.5	78.1	9.7
202-SANPE-11	74	1.65	ND	10.21	7	125	12.54
202-SANPE-12	10	0.57	ND	10.6	6.5	125	11.77
202-SANPE-13	121	1.62	ND	9.99	7	125	12.3
202-SANVI-11	520	1.07	ND	7	6.5	35	11
202-TUNIT-11	<10	1.00	ND	10.34	8.52	>120	10.73
202-WHITE-12	63	0.82	ND	6	7.5	60	12
304-APTOS-21	100	ND	ND	9.5	7	120	11.2
304-APTOS-22	100	ND	ND	11	7.2	120	12.6
304-APTOS-23	304	0.05	ND	10	7.2	120	14
304-ARANA-21	< 100	0.17	0.09	10	6.5	0 JTU	11.5
304-ARANA-22	100	ND	ND	11	7	0 JTU	14
304-ARANA-23	626	0.05	0.11	8	6.5	0 JTU	12
304-ARROY-21	< 100	0.14	ND	7	6.5	120	13.8
304-ARROY-22	409	1.28	ND	5	6.5	120	15.9
304-ARROY-23	< 100	2.41	ND	7	7	120	15.5
304-BRANC-21	304	0.32	0.07	12	6.5	0 JTU	14.5

Site	Ecoli (MPN/100 ml)	NO3-N (mg-N/L)	PO4-P (mg-P/L)	DO (mg/L)	pH	Transparency (cm unless otherwise noted)	Temperature (°C)
304-BRANC-22	100	0.1	0.05	11	6.5	>62	11.7
304-BRANC-23	632	0.48	ND	12	7	>62	12.1
304-BRANC-24	202	0.16	ND	7.5	7	5 JTU	12.2
304-BRANC-25	202	0.1	ND	9	6.5	5 JTU	11.9
304-CARBO-21	< 100	0.83	ND	11	7.5	>62	12.3
304-CORCO-21	100	ND	ND	6	7	0 JTU	19.5
304-CORCO-22	202	ND	ND	8	7	0 JTU	20
304-FERRA-21	201	ND	ND	8	6.5	120	13.4
304-GRANI-21	100	0.19	0.1	7	7	5 JTU	12.1
304-LAGUN-21	< 100	ND	ND	7	6.5	>120	12.2
304-LIDEL-21	< 100	0.38	0.08	9	7	120	12
304-LITTL-21	100	0.05	ND	9	6	>120	12.5
304-MAJOR-21	< 100	ND	ND	9	6.5	>120	11.6
304-MOLIN-21	202	0.48	0.09	9.5	7	120	12.2
304-MOORE-21	< 100	ND	ND	3.5	6.5	80.2	20.4
304-MOORE-22	< 100	0.15	ND	4	6.5	98	14
304-MOORE-24	< 100	0.06	ND	6.5	6.75	70	10.6
304-MOORE-25	409	ND	ND	5	6.5	120	13
304-MOORE-26	306	ND	ND	5.5	7	33.2	19.2
304-NEWYE-11	100	0.72	ND	8	6.5	42	12.7
304-ROBSC-21	836	0.8	ND	7.5	7	0 JTU	14
304-SANLO-21	405	0.09	ND	11	7	0 JTU	15
304-SANLO-22	202	ND	ND	11.5	7	0 JTU	17
304-SANLO-26	< 100	0.13	ND	12.56	7	>62	
304-SANLO-27	< 100	ND	ND	10.9	7	>62	
304-SANVI-21	< 100	ND	ND	9.5	7	120	11.4
304-SCOTT-21	< 100	ND	ND	8.5	7	120	12.8
304-SCOTT-22	< 100	ND	0.29	NA	7	120	12.7
304-SCOTT-23	< 100	0.51	ND	9	7	115	12.8
304-SCOTT-24	< 100	ND	ND	10	7	>120	12.6
304-SCOTT-25	< 100	0.15	ND	8	7	120	13.5
304-SCSD-02	< 100	3.48	ND	8	7	>120	17.3
304-SCSD-03	409	1.82	ND	8.5	7.5	>120	NA
304-SCSD-04	< 100	1.38	ND	10	7.3	>120	16.2
304-SOQUE-21	< 100	ND	ND	8	7	0 JTU	14
304-SOQUE-22	2281	ND	ND	7	6.5	0 JTU	15
304-VALEN-21	< 100	ND	0.11	11	7	120	12
304-VALEN-22	632	0.28	ND	9	7.3	61.5	12.9

Site	Ecoli (MPN/100 ml)	NO3-N (mg-N/L)	PO4-P (mg-P/L)	DO (mg/L)	pH	Transparency (cm unless otherwise noted)	Temperature (°C)
304-WADDE-21	< 100	ND	ND	12	7.5	>120	12.7
304-WADDE-22	< 100	ND	ND	11	7.5	>120	13.2
304-WILDE-21	< 100	0.2	ND	10	6.5	>120	11.4
304-WILDE-22	100	0.18	ND	10	6.5	>120	11.5
304-ZAYAN-21	< 100	0.23	0.1	10.57	6.5	>62	
304-ZAYAN-22	306	ND	ND	10.6	7	>62	
305-BEACH-21	979	1.96	0.19	12	7.5	35	21.5
305-CORRA-21	100	1.13	ND	9	7.5	>60	13.2
305-CORRA-22	< 100	0.08	ND	8	7	>60	11.9
305-HARKI-21	626	ND	ND	4	7	15	20.1
305-HARKI-22	1187	0.17	0.1	1	6.5	42.2	16.5
305-HARKI-23	632	0.44	ND	9	7	>60	15
305-PAJAR-21	< 100	5.13	ND	12	7	58	18.1
305-STRUV-21	< 100	ND	ND	6.28	7.41		21.67
305-STRUV-22	< 100	ND	0.35	4.23	7.67		20.96
305-WATSO-21	< 100	ND	0.22	2.11	7.15		18.46
305-WATSO-22	< 100	8.18	0.3	5	6.5	60	17.3
305-WATSO-23	521	13.6	ND	12	6.5	29	21
305-WSTRU-21	< 100	ND	0.11	4.59	7.03		18.07
306-CARNE-31	405	29	0.09	8.25	7.53	33 FTU	14.57
306-CARNE-32	100	1.58	ND	6.08	6.99	27 FTU	13.25
306-CARNE-33				1.15	6.32	86 FTU	11.69
306-CARNE-36	2820	0.09	ND	4.64	6.29	129 FTU	16.66
306-CORNC-31	< 100	16.1	ND	13.76	8.64	15 FTU	19.6
306-ELKHO-31	20	ND	ND	6	8	29	18.4
306-ELKHO-32	2420	16.2	ND	11	8.5	20	21.5
306-ELKHO-33	<20	ND	ND	5.5	7.5	34.1	19.8
306-ELKHO-34	100	ND	ND	10	7.5	>120	17.7
307-CARME-33	16	ND	ND	8.5	6.8	>120	14.2
307-CARME-35	8	ND	0.1	9	6.8	>120	14.6
307-CARME-36	11	ND	ND	8	7	>120	15
307-CARME-37	100	ND	ND	9	6.5	>120	14
307-CARME-38	20	0.27	ND	10	7	>120	14.3
307-CARME-39	202	0.66	0.13	7	7	>120	15.8
307-GARZA-31	5	ND	ND	9	7	>120	14.7
307-HATTO-31	<1	0.06	0.13	4	7	104	15
308-BIGCR-31	1	ND	ND	10.13	7	>120	13.4
308-BIGSU-31	100	ND	ND	7.65	7.5	>120	12.8

Site	Ecoli (MPN/100 ml)	NO3-N (mg-N/L)	PO4-P (mg-P/L)	DO (mg/L)	pH	Transparency (cm unless otherwise noted)	Temperature (°C)
308-DANIC-31	1	0.21	ND	9.97	7	>120	13.7
308-DOUD-31	2011	0.19	ND	12	7	>120	13
308-GARRA-31	6	ND	ND	10	7	>120	3.1
308-HOTSP-31	979	0.88	ND	7.7	7.5	NA	13.1
308-LIMEK-31	2	0.15	ND	8.9	7	>120	13.5
308-MALPA-31	10	0.62	ND	10	7	>120	11.5
308-MCWAY-31	2	0.16	ND	7.48	7	>120	13
308-MILLC-31	2	0.22	ND	9.61	7.25	>120	12.2
308-PALOC-31	100	ND	ND	10	7	29.5	12.5
308-PLASK-31	5	ND	ND	9.7	6.75	>120	11.6
308-PREWI-31	2	ND	ND	9.89	6.5	>120	12.2
308-ROCKY-31	2	0.19	0.16	10	7	>120	10.3
308-SANJO-31	46	0.09	ND	11	7	>120	11.9
308-SOBER-31	23	0.67	ND	9	7	>120	12
308-SYCAM-31	<1	ND	ND	7.13	7	>120	12.6
308-VICEN-31	<1	ND	ND	10.44	6.75	>120	13
308-WILDC-31	4	ND	ND	9.8	6.5	>120	12.1
308-WILLO-31	2	ND	ND	10.66	6.75	>120	12.7
309-ALISA-32	3170	12.7	0.42	8	7	12	17.8
309-ASILO-31	3	1.22	ND	7	7	>120	13.7
309-ATASC-41	86	0.23	ND	7	7.5	120	15.3
309-ATASC-42	201	ND	0.34	9	7.5	>120	12.9
309-CENTR-31	731	5.77	0.18	7	7	>120	14.5
309-DOLPH-31	4	ND	ND	2.5	7	37.2	13.6
309-GABIL-31	632	7.22	ND	10	6.5	120	15.4
309-GRAVE-41	187	0.19	ND	7	7	>120	14.6
309-LIBRA-31	632	0.4	ND	8.5	6.5	97.2	13.5
309-MAJOR-31	100	ND	ND	8	7	121	13.4
309-MOROC-31	201	0.05	ND	5	7.5	3.2	19.7
309-MOROC-32	13	ND	ND	>12	9	5.1	23.9
309-MOROC-33	3734	17.6	0.14	9	9	5.2	20.9
309-NATIVE-31	413	19.9	0.37	5	6.5	75.4	13.4
309-PASOR-41	110	ND	ND	7	6.5	120	15.3
309-RECDI-31	9	32.2	0.24	8	7.3	23.2	17.4
309-RINCO-41	216	0.39	ND	8	7	>120	15.7
309-SALIN-31	22	4.7	ND	9	7	29.5	18.7
309-SALIN-32	12	3.34	ND	10	7.5	13.3	17.8
309-SALIN-33	24	3.87	ND	8	7	26.2	16.4

Site	Ecoli (MPN/100 ml)	NO3-N (mg-N/L)	PO4-P (mg-P/L)	DO (mg/L)	pH	Transparency (cm unless otherwise noted)	Temperature (°C)
309-SALIN-44	41	0.24	ND	7	7.5	>120	16.7
309-SALIN-45	63	ND	ND	8	7	>120	19.2
309-SALIN-46	20	1.05	0.16	6	7	120	17.7
309-SALIN-47	41	0.19	ND	8	7	120	14.5
309-SKYLI-31	81	0.38	0.1	9	6.5	7.6	15.4
309-SMARG-41	369	0.31	ND	8	7	>120	15.7
309-SRITA-32	969	8.38	ND	6	7	39	18.6
309-SRITA-33	4585	0.74	0.27	8	7	1.8	18.4
309-SRITA-34	4077	3.53	0.22	10	7.5	2.5	19.3
309-SRITA-35	2307	7.22	0.23	10	7.5	2.6	15
309-TEMBL-31	626	1.29	ND	5	7.5	4	19
309-TEMBL-32	632	44.6	0.22	12	7.6	9.8	17
309-TEMBL-33	89	51.2	ND	7	7.2	9.4	17
309-TROUT-41	301	0.29	0.15	8	7	>120	13.5
309-UPPER-31	2405	32.5	0.15	6	7	30	16
309-VETER-31	8	ND	ND	7	7	>120	14.8
309-YERBA-41	241	ND	ND	6	7.5	>125	15.8
310-ARROY-41	345	0.08	ND	8	7	>120	13.6
310-ARROY-42	20	ND	ND	8	7	>120	15
310-CARPO-41	20	ND	ND	9	7	>120	14
310-LAGUN-41	5794	ND	ND	9	7.5	>120	17
310-LITTL-41	216	ND	ND	7	7	>120	14.2
310-PICOC-41	183	0.06	ND	8	7	>120	15.6
310-SANSI-41	591	1.08	ND	6	7	>120	14.8
310-SANSI-42	336	ND	ND	6	7	>120	14.6
310-SANTA-41	52	0.3	ND	7	7.5	>120	16.4
310-SANTA-42	52	0.37	ND	8	7	>120	15.3
310-SANTA-43	201	0.28	ND	9	7	>120	15.4
317-ESTRE-43	712	ND	ND	10	8	>120	22