

# Snapshot Day

May 1<sup>st</sup>, 2021

Draft Final Report



**Central Coast Snapshot Day 2021  
organized by:**

**The Monterey Bay National Marine Sanctuary (MBNMS)  
Water Quality Protection Program  
[www.montereybay.noaa.gov](http://www.montereybay.noaa.gov)**

With assistance or funding from:

**California Marine Sanctuary Foundation  
[www.Californiamsf.org](http://www.Californiamsf.org)**

**Central Coast Ambient Monitoring Program (CCAMP)  
[www.ccamp.org](http://www.ccamp.org)**

**City of Salinas  
[www.cityofsalinas.org](http://www.cityofsalinas.org)**

**City of Santa Cruz  
[www.cityofsantacruz.com](http://www.cityofsantacruz.com)**

**City of Scotts Valley  
[www.scottsvalley.org](http://www.scottsvalley.org)**

**Coastal Watershed Council  
[www.coastal-watershed.org](http://www.coastal-watershed.org)**

**County of Santa Cruz  
[www.co.santa-cruz.ca.us](http://www.co.santa-cruz.ca.us)**

**Monterey Stormwater Education Alliance  
[www.montereysea.org](http://www.montereysea.org)**

**San Mateo County Public Health Lab  
[www.smchealth.org/publichealthlab](http://www.smchealth.org/publichealthlab)**

**San Mateo Resource Conservation District  
[www.sanmateorcd.org](http://www.sanmateorcd.org)**

**Sewer Authority Mid-Coastside  
[samcleanswater.org](http://samcleanswater.org)**

**Upper Salinas-Las Tablas Resource Conservation District  
[www.us-ltrcd.org](http://www.us-ltrcd.org)**

**Watsonville Wetlands Watch  
[www.watsonvillewetlandswatch.org](http://www.watsonvillewetlandswatch.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 water bodies entering Monterey Bay National Marine Sanctuary (MBNMS). Snapshot Day has become an annual event that has created partnerships, drawn over 3,462 volunteers to date, and has helped foster an ethic of watershed stewardship for local citizens. The twenty-one years of data collected by volunteers has become a valuable source of water quality data for the region. MBNMS and California Marine Sanctuary Foundation (CMSF) organized and implemented Snapshot Day 2021.

In 2021, volunteers ventured out on the morning of May 1<sup>st</sup> to watershed sites in four counties bordering MBNMS (San Mateo, Santa Cruz, Monterey and San Luis Obispo). On their journey to specific sites along creeks and rivers, volunteers carried with them sample equipment and lab containers to collect water samples and field measurements at assigned sites. This year 67 citizen scientists donated between four and six hours of their time to monitor 85 sites. Of the 75 sites with flowing water, 31% met all of the Water Quality Objectives (WQO) or Action Levels that were measured, indicating vibrant healthy water bodies.

Results reveal that dissolved oxygen was the most common field measurement to not achieve its WQO and orthophosphate as P was the most common lab measurement to exceed its WQO. Dissolved oxygen did not achieve its WQO at 27% of the sites where it was measured as compared to 23% in 2019 and 31% of sites in 2018. Orthophosphate as P exceeded the WQO at 39% of sites in 2021 as compared to 14% in 2019 and 27% of sites in 2018.

Just eleven Areas of Concern (sites that exceeded three or more WQOs or Action Levels) were identified this year compared to twelve in 2019, twenty-two in 2018 and twenty-five in 2017. The eleven Areas of Concern for 2021 spanned eight water bodies in three of the four counties: Santa Cruz, Monterey and San Luis Obispo. The Santa Cruz County Areas of Concern were on two water bodies: San Lorenzo River and Watsonville Slough. Monterey County's Areas of Concern were on five water bodies: Alisal Slough, lower Salinas River, Santa Rita Creek, Tembladero Slough and the Salinas Reclamation Canal. The one San Luis Obispo County Area of Concern site was on Trout Creek.

The twenty-one 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.

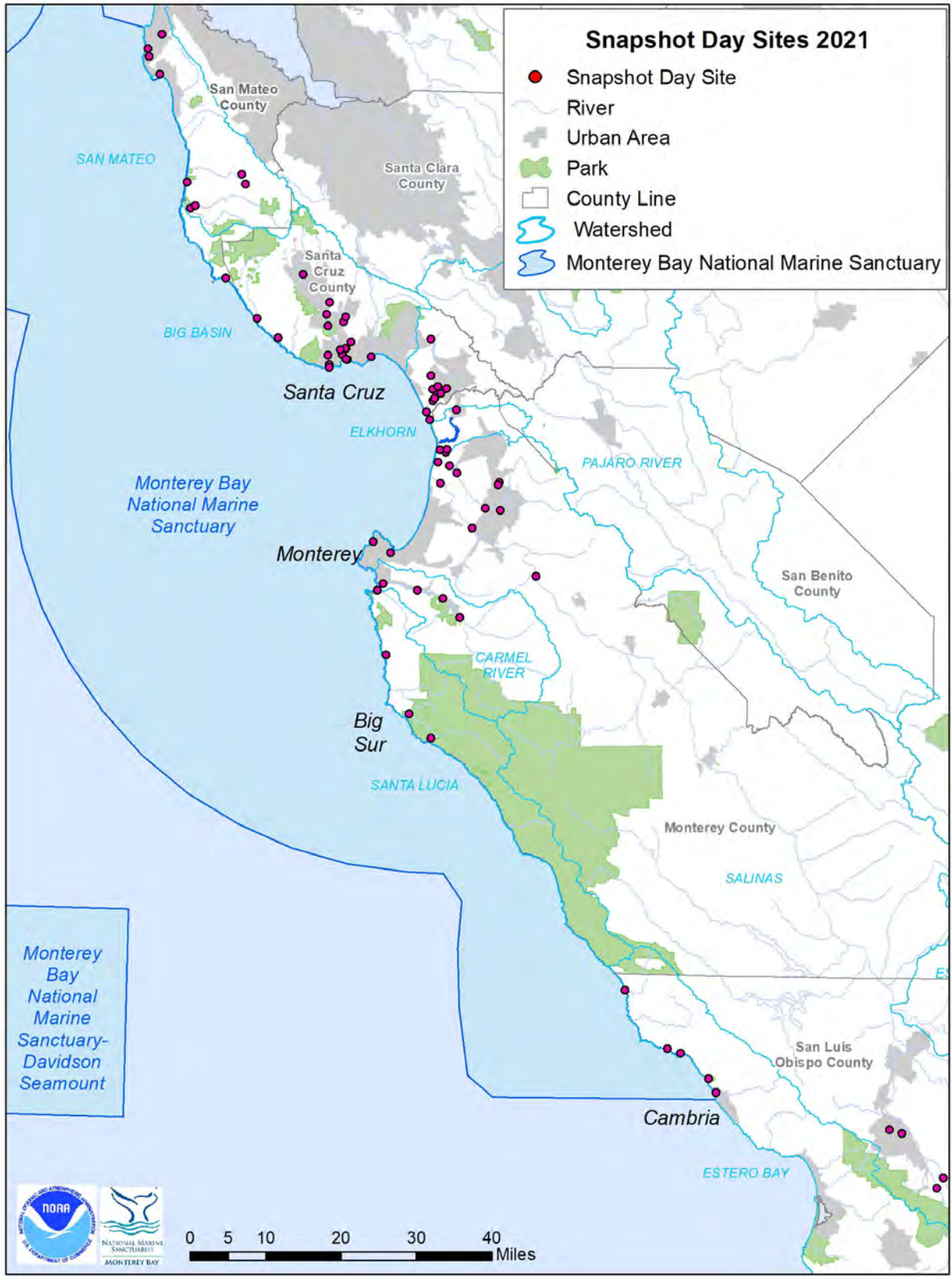


Figure 1. Map of Snapshot Day 2021 monitoring sites

## Introduction

---

Water quality monitoring is an important tool for watershed management as 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. Unfortunately, a lack of funding for watershed monitoring results in a lack of information about many waterways and important information about watershed health is also missing. In order to gather data about creeks and rivers flowing into Monterey Bay National Marine Sanctuary (MBNMS), we work with volunteers, local agencies and non-profits to monitor the health of streams and rivers during an annual water quality monitoring event: Snapshot Day. The focus of Snapshot Day is to determine the health of watersheds flowing into MBNMS, inspire volunteers to engage with local watershed groups, and to collect long-term data focused on assessing the health of central California creeks and rivers.

## Methods

---

Each April, Snapshot Day trainings are usually conducted in all four counties bordering the sanctuary: San Mateo, Santa Cruz, Monterey and 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. Due to the COVID pandemic, the number of sites and volunteers were greatly reduced to keep the event small and focused on critical sites while also providing a safe environment for volunteers. Only previous Snapshot Day volunteers were invited to participate in the event. The refresher training was conducted entirely online. After training, sets of equipment and sample bottles were delivered to a member of each Snapshot Day team. At the time of delivery, team members were provided a quick run-through of critical equipment such as dissolved oxygen kits, transparency tubes and sample bottles.

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

**Table 1: Water Quality Objectives**

<b>Parameter (reporting units)</b>	<b>Water Quality Objectives</b>	<b>Source of Objective</b>
Dissolved Oxygen (mg/L)	Not lower than 7 or greater than 12	Water Quality Control Plan for the Central Coast Basin (RWQCB)
<i>E. coli</i> (MPN/100ml)	Not to exceed 235 <sup>1</sup>	U.S. EPA Ambient Water Quality Criteria
Nitrate as N (ppm)	Not to exceed 1.00 <sup>2</sup>	Central Coast Ambient Monitoring Program (CCAMP)
Orthophosphate as P (ppm)	Not to exceed 0.12 <sup>3</sup>	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 (RWQCB)
Transparency (cm)	Not less than 25	Central Coast Ambient Monitoring Program (CCAMP)
Water Temperature (°C)	Not more than 21 <sup>4</sup>	Central Coast Ambient Monitoring Program (CCAMP)

<sup>1</sup> Environmental Protection Agency, Updated WQO.

<sup>2</sup> Central Coast Ambient Monitoring Program, Pajaro River Watershed Characterization Report 1998, rev 2003.

<sup>3</sup> Williamson, The Establishment of Nutrient Objectives, Sources, Impacts and Best Management Practices for the Pajaro River and Llagas Creek, 1994.

<sup>4</sup> Moyle, P. 1976. Inland Fisheries of California. University of California Press.

## Results

---

On May 1<sup>st</sup> 2021, 67 volunteers comprising 23 teams, monitored 85 sites along creeks and rivers that flowed into MBNMS (Figure 1). This year, ten sites were either completely dry or had water that was stagnant, while seventy-five sites (88%) had flowing water. Twenty-three (31%) sites with flowing water met the water quality objectives for all lab and field parameters. Snapshot Day 2021 results reveal that no analyte had its highest number of WQO exceedances as compared to the past twenty years (Table 2). All data is available in Appendix 1.

**Table 2. Number of sites that exceeded the WQO or Action Level for field and lab measurements each year.**

Year	<i>E. coli</i>	Nitrate as N	Orthophosphate as P	Dissolved Oxygen	pH	Transparency	Water Temperature
2021	17	12	29	17	4	13	0
2020	No Snapshot Day due to COVID pandemic						
2019	36	20	15	25	16	11	3
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

## Field Measurements

### 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 plants die and bacteria deplete the oxygen available to aquatic organisms as they decompose plant material.

The Basin Plan Objective for dissolved oxygen is for results to fall between 7 mg/L and 12 mg/L, an optimal range for cold water fish. In 2021, seventeen (27%) of the sixty-two sites where dissolved oxygen was measured did not meet the WQO. The lowest dissolved oxygen result of 0.5 mg/L was from the Montara Creek at Harte Street (San Mateo County). No site had a dissolved oxygen level above 12 mg/L.

The sites that did not meet the dissolved oxygen WQO were:

- San Mateo County had just one site that did not meet the WQO objective: Montara Creek at Harte.
- Santa Cruz County, where dissolved oxygen was measured at some but not all sites, had three sites that did not meet the WQO:
  - Arroyo Creek at Meder Park
  - Pilkington Creek at SC Natural History Museum
  - San Lorenzo River mouth
- Monterey County had seven sites that did not meet the WQO for dissolved oxygen:
  - Carmel River at Garland Park
  - Big Sur River at Andrew Molera
  - Sycamore Creek
  - Majella Creek at Asilomar State Beach
  - Salinas River at Hwy 1
  - Salinas River at Davis Road
  - Tembladero Slough at Molera Road
- San Luis Obispo County had six sites that did not meet the WQO for dissolved oxygen:
  - Atascadero Creek at West Mall
  - Salinas River at Hwy 58
  - Trout Creek
  - Arroyo Laguna
  - San Simeon Creek at Hwy 1
  - Santa Rose Creek at Windsor



## **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 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 2021, five (8%) of the sixty-two sites where pH was measured did not meet the WQO. The lowest pH result of 6.0 was found at Tembladero Slough at Molera Road (Monterey County). The highest pH result of 8.75 was found in upper Moro Cojo Slough (Monterey County).

The sites that did not meet the pH WQO were:

- San Mateo County had only one site that did not meet the WQO for pH: Martini Creek.
- Santa Cruz County, where pH was measured at some but not all sites, had only one site that did not meet the WQO: San Lorenzo River at Henry Cowell State Park.
- Monterey County had three sites that did not meet the pH WQO:
  - Upper Moro Cojo Slough
  - Salinas River at River Road
  - Tembladero Slough at Molera Road

## **Transparency**

Transparency is a measure of the clarity of a liquid by quantifying the visibility of a secchi disk through a column of water. Normal transparency measurements vary for different water bodies, but in general low transparency (also known as high turbidity) can indicate problems such as erosion, nutrient loading or extraordinary algae growth.

CCAMP's Action Level for transparency is not less than 25 centimeters. Transparency was measured at sixty-three sites, thirteen (21%) did not meet the Action Level. The two lowest transparency measurements of 4.0 cm were taken in Salinas River at River Road (Monterey County) and Salinas River at Davis Road (Monterey County).

The sites that did not meet the transparency Action Level were:

- Santa Cruz County, where transparency was measured at some but not all sites, did not meet the Action Level at two sites:
  - New Years Creek mouth
  - Pilkington Creek at Forbes Street

- Monterey County had ten sites that did not meet the Action Level for transparency:
  - Castroville Slough above Moro Cojo Slough confluence
  - Upper Moro Cojo Slough
  - Alisal Slough at at N. Madiera
  - Salinas Reclamation Canal at Davis Road
  - Salinas River at Highway 1
  - Salinas River at Davis Road
  - Salinas River at River Road
  - Tembladero Slough at Molera Road
  - Tembladero Slough at Preston Road
  - Tembladero Slough at Castroville Road
- San Luis Obispo County had just one site that did not meet the Action Level for transparency: Arroyo Laguna.

## 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 with higher temperatures causing 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. Snapshot Day data is collected during the morning hours, so water temperature measurements do not necessarily reflect the maximum daily 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 2021, **none** of the sixty-three sites where water temperature was measured exceeded the WQO.

## Lab Analysis

### *E. coli* bacteria

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. Sixteen (21%) of the seventy-five sites where *E. coli* was measured did not meet the WQO (Figure 2). The highest *E. coli* result of 3,441 MPN/ 100ml was from Arroyo Del Puerto (San Luis Obispo County).

The sites that did not meet the WQO for *E. coli* were:

- San Mateo County had just one site that did not meet the WQO for *E. coli*: Deer Creek at Alhambra Avenue.
- Santa Cruz County had five sites that did not meet the WQO for *E. coli*:
  - Branciforte Creek at Dakota Avenue pedestrian bridge
  - Branciforte Creek at Market Street
  - San Lorenzo River mouth
  - San Lorenzo River at Highway 9
  - Watsonville Slough at Harkins Slough Road
- Monterey County had seven sites that did not meet the WQO for *E. coli*:
  - Alisal Slough at N. Madiera
  - Salinas Reclamation Canal at Davis Road
  - Salinas River at Highway 1
  - Santa Rita Creek at Bellinzona
  - Tembladero Slough at Molera Road
  - Tembladero Slough at Preston Road
  - Tembladero Slough at Castroville Road
- San Luis Obispo County had three sites that did not meet the WQO for *E. coli*:
  - Atascadero Creek at West Mall
  - Trout Creek
  - Arroyo Del Puerto at San Simeon bridge

## **Nitrate as N**

Nitrate (as N) is naturally occurring in streams and rivers, however other sources that can contribute nitrate to creeks and rivers include 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 when plants die off and bacteria decompose plant material.

Twelve (16%) sites of the seventy-five measured for nitrate as N did not meet the CCAMP Action Level of 1.00 mg-N/L. The highest nitrate as N result of 50.2 mg-N/L was from the Reclamation Canal at Davis Road (Monterey County). Twenty-two (29%) sites had non-detectable levels of nitrate as N (Figure 3). No sites in San Mateo or San Luis Obispo counties exceeded the action level.

The sites that did not meet the WQO for nitrate as N were:

- Santa Cruz County had four sites that did not meet the Action Level for nitrate as N:
  - Watsonville Slough mouth
  - Watsonville Slough at Harkins Slough Road
  - Watsonville Slough at Harkins Slough confluence
  - Watsonville Slough at W. Beach Road

- Monterey County had eight sites that did not meet the nitrate as N Action Level:
  - Elkhorn Slough at Hudson's Landing Road
  - Alisal Slough at N. Madiera
  - Salinas Reclamation Canal at Davis Road
  - Salinas River at Highway 1
  - Santa Rita Creek at Bellinzona
  - Tembladero Slough at Molera Road
  - Tembladero Slough at Preston Road
  - Tembladero Slough at Castroville Road

### **Orthophosphate as P**

Orthophosphate (as P) is also naturally occurring in streams and rivers, however other sources that can contribute phosphate to creeks and rivers include 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 when plants die off and bacteria decompose plant material.

Twenty-nine (39%) of the seventy-five sites measured for orthophosphate as P did not meet the CCAMP Action Level of 0.12 mg/l. The highest orthophosphate concentration of 1.83 mg/L was from Watsonville Slough at the railroad tracks (Santa Cruz County). Twenty-four sites (32%) had non-detectable levels of orthophosphate (Figure 4).

The sites that did not meet the Action Level for orthophosphate as P were:

- San Mateo County had two sites did not meet the Action Level for orthophosphate as P:
  - Alpine Creek at Alpine Road
  - Pomponio Creek mouth
- Santa Cruz County had seventeen sites that did not meet the Action Level for orthophosphate as P:
  - Arroyo Creek at West Cliff Drive
  - Branciforte Creek at Dakota Street pedestrian bridge
  - Carbonera Creek at Glen Canyon Road
  - Carbonera Creek at Disc Drive
  - Lidel Creek
  - San Lorenzo Creek mouth
  - San Lorenzo Creek at Highway 9
  - Soquel Creek mouth
  - Zayante Creek at Bean Creek confluence
  - Zayante Creek at Quail Hollow Road
  - Hanson Slough
  - Struve Slough at Lee Road

- Watsonville Slough mouth
- Watsonville Slough at Harkins Slough Road
- Watsonville Slough at Harkins Slough confluence
- Watsonville Slough at W. Beach Road
- Watsonville Slough at railroad tracks
- Monterey County had eight sites that did not meet the Action Level for orthophosphate as P:
  - Castroville Slough above Moro Cojo Slough confluence
  - Alisal Slough at N. Madiera
  - Salinas Reclamation Canal at Davis Road
  - Salinas River at Highway 1
  - Santa Rita Creek at Bellinzona
  - Tembladero Slough at Molera Road
  - Tembladero Slough at Preston Road
  - Tembladero Slough at Castroville Road
- San Luis Obispo had just one site that did not meet the Action Level for orthophosphate as P: Trout Creek.

### Field Observations

As in the past twenty years Snapshot Day has been conducted, trash was noted at many sites in 2021. Trash included plastic bags, plastic bottles, plastic food wrappers and glass bottles.



Snapshot Day volunteers are one of a kind! These teams of watershed “super heroes” can all be found in Santa Cruz County.

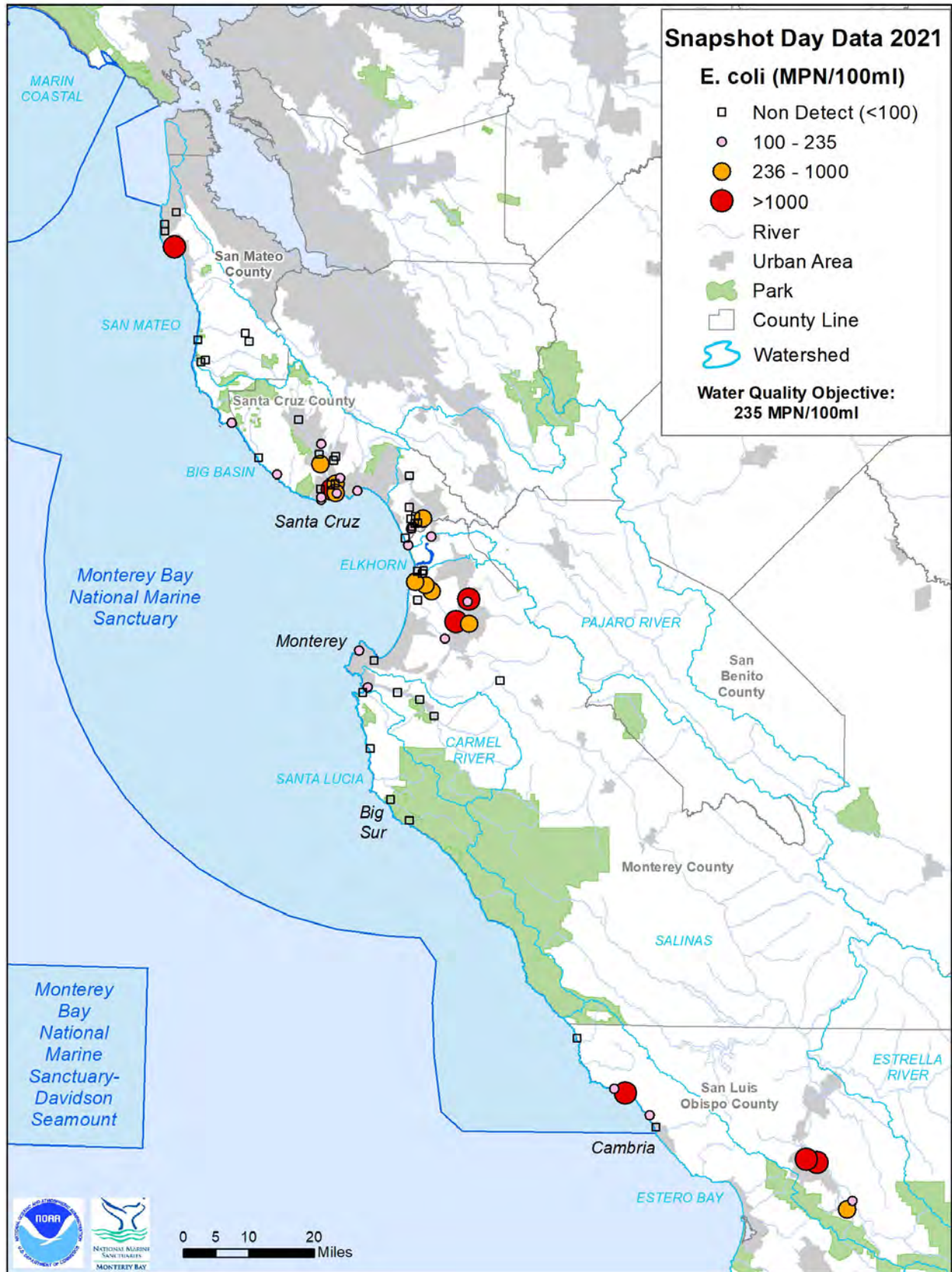


Figure 2. *E. coli* Results for Snapshot Day 2021.

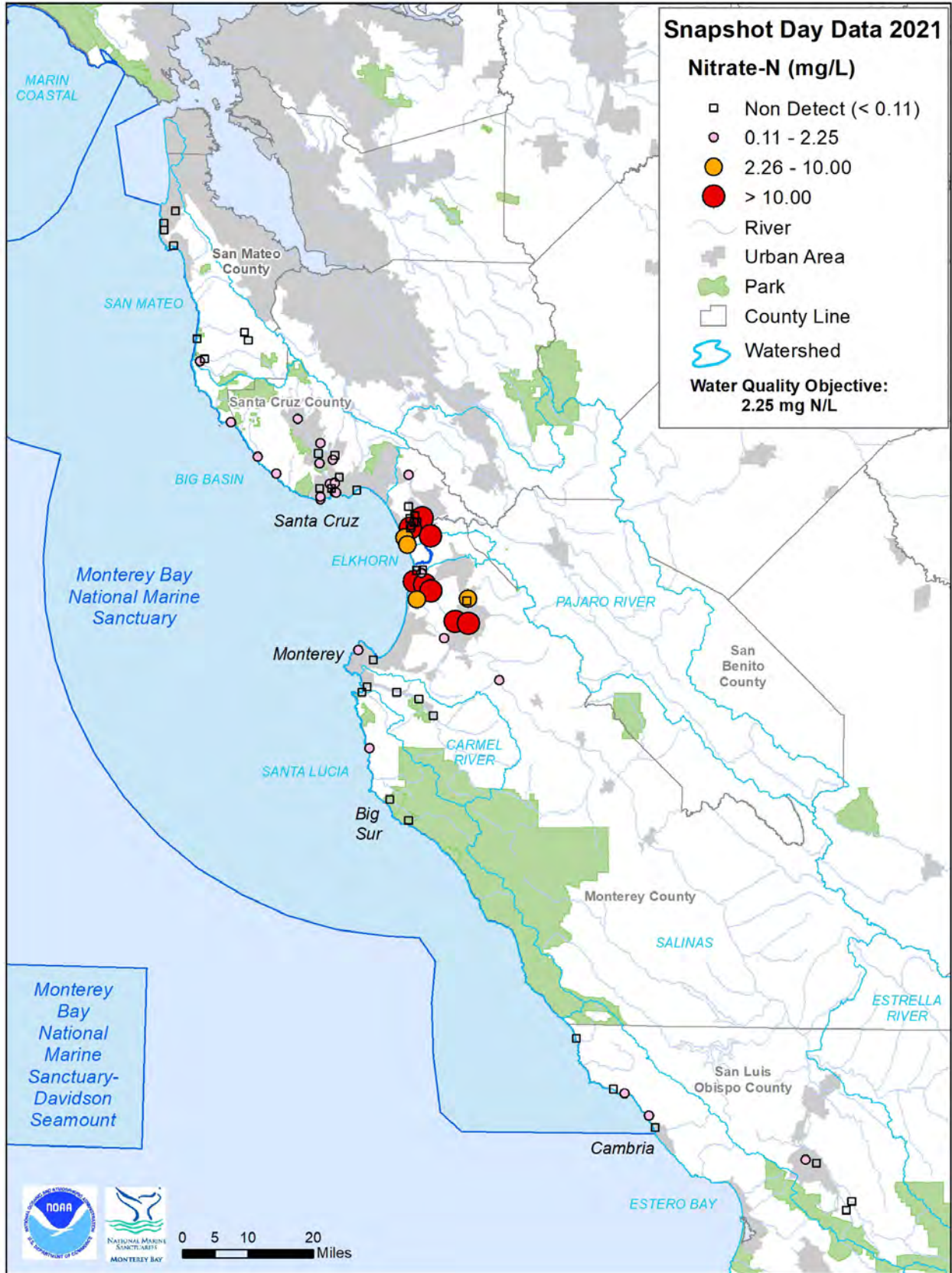


Figure 3. Nitrate as N Results for Snapshot Day 2021.

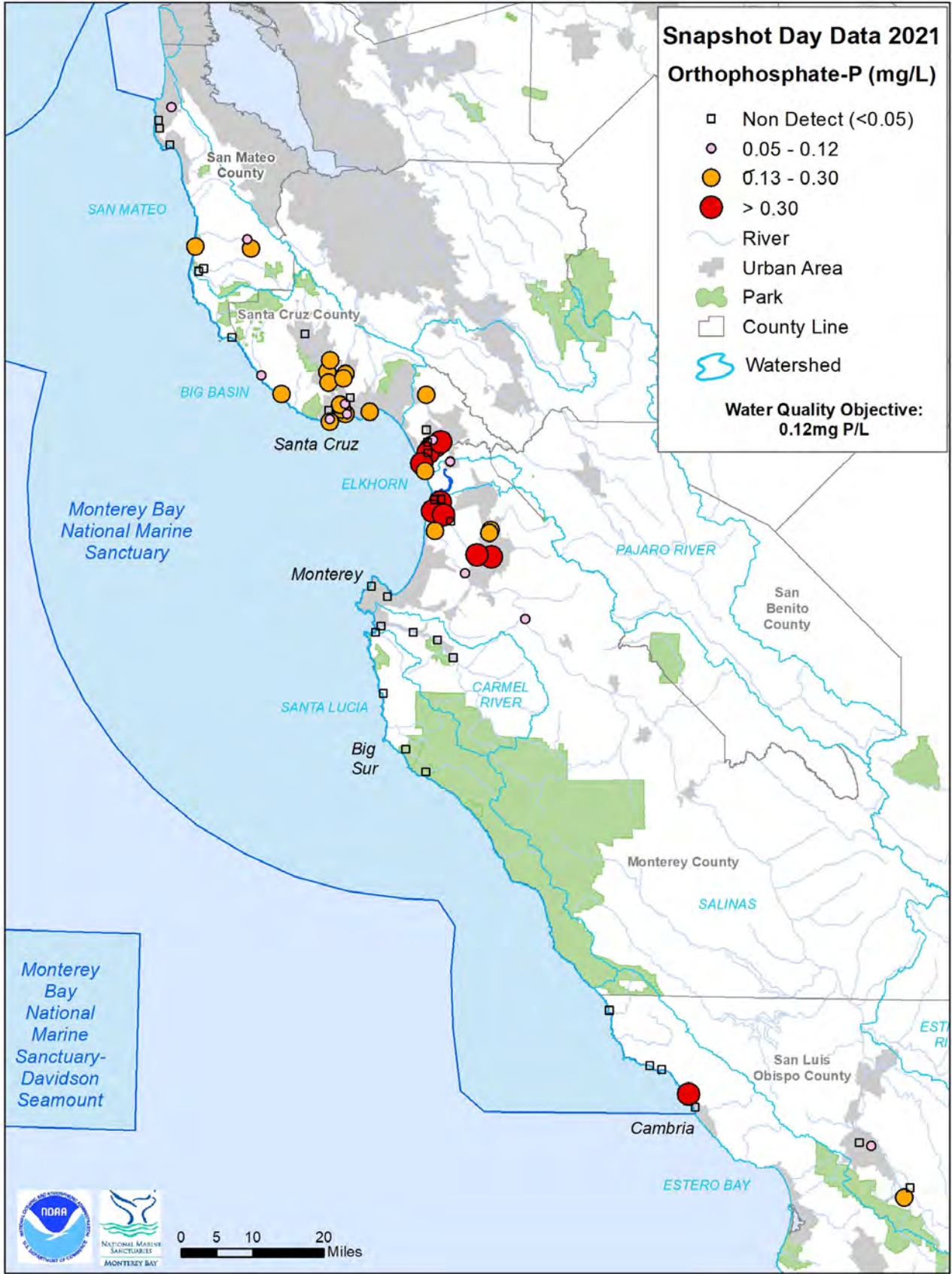


Figure 4. Orthophosphate-P Results for Snapshot Day 2021.



## Areas of Concern

When lab and field results for a single site do not meet three or more Water Quality Objectives or Action Levels the site is labeled an Area of Concern. A single waterbody can have more than one Area of Concern when multiple sites along that waterbody are sampled. For example, this year three sites were monitored on Tembladero Slough that were independently designated as Areas of Concern but are all on the same waterbody. For this reason we have chosen to display the Area of Concern data two ways: by water body (Figure 5) and by site (Figure 6).

In 2021, eleven sites (13%) were designated Areas of Concern on eight water bodies. Seven of the Areas of Concern are on five waterbodies that have been designated Areas of Concern for more than ten of the past twenty-one years: Watsonville Slough (Santa Cruz County), Tembladero Slough (Monterey County), Alisal Slough (Monterey County), Santa Rita Creek (Monterey County), and Salinas Reclamation Canal (Monterey County). Two Areas of Concern are from the San Lorenzo River (Santa Cruz County) which is on the list for the second time since 2000. The two remaining Area of Concern sites are in Monterey County on the lower Salinas River, which has been designated an Area of Concern nine times in the past twenty-one years. Trout Creek has been designated an Area of Concern eight times in the past twenty-one years. For the fifth year in a row, San Mateo County had no Areas of Concern.

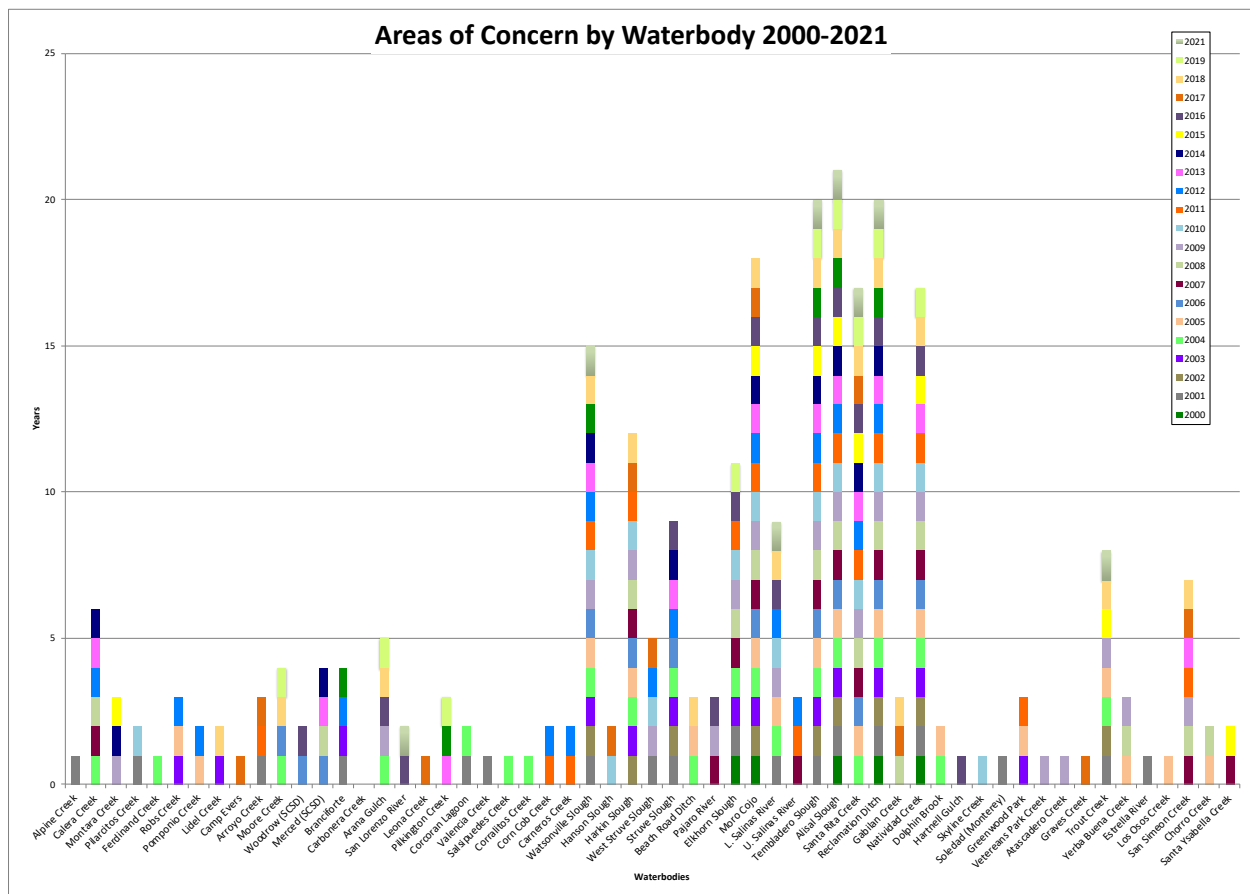


Figure 5. Areas of Concern by water body 2000-2021 arranged from north to south.

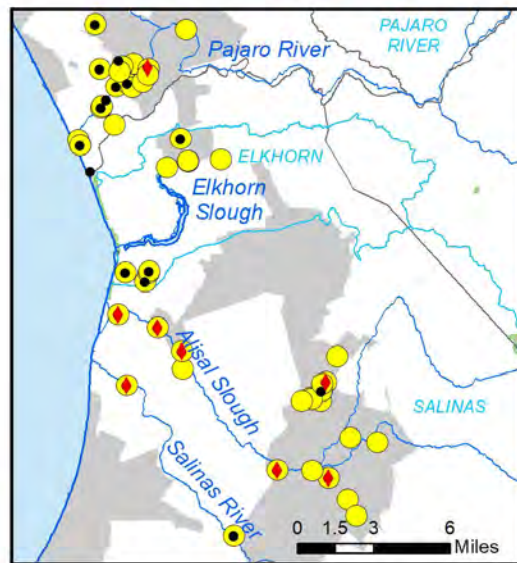
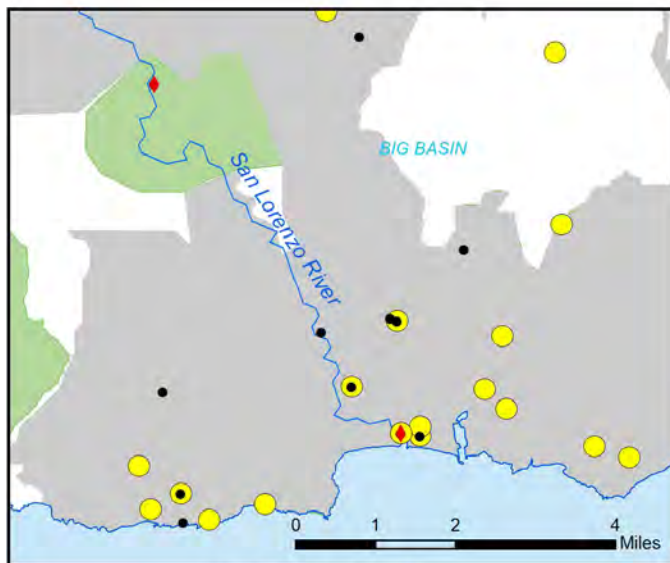
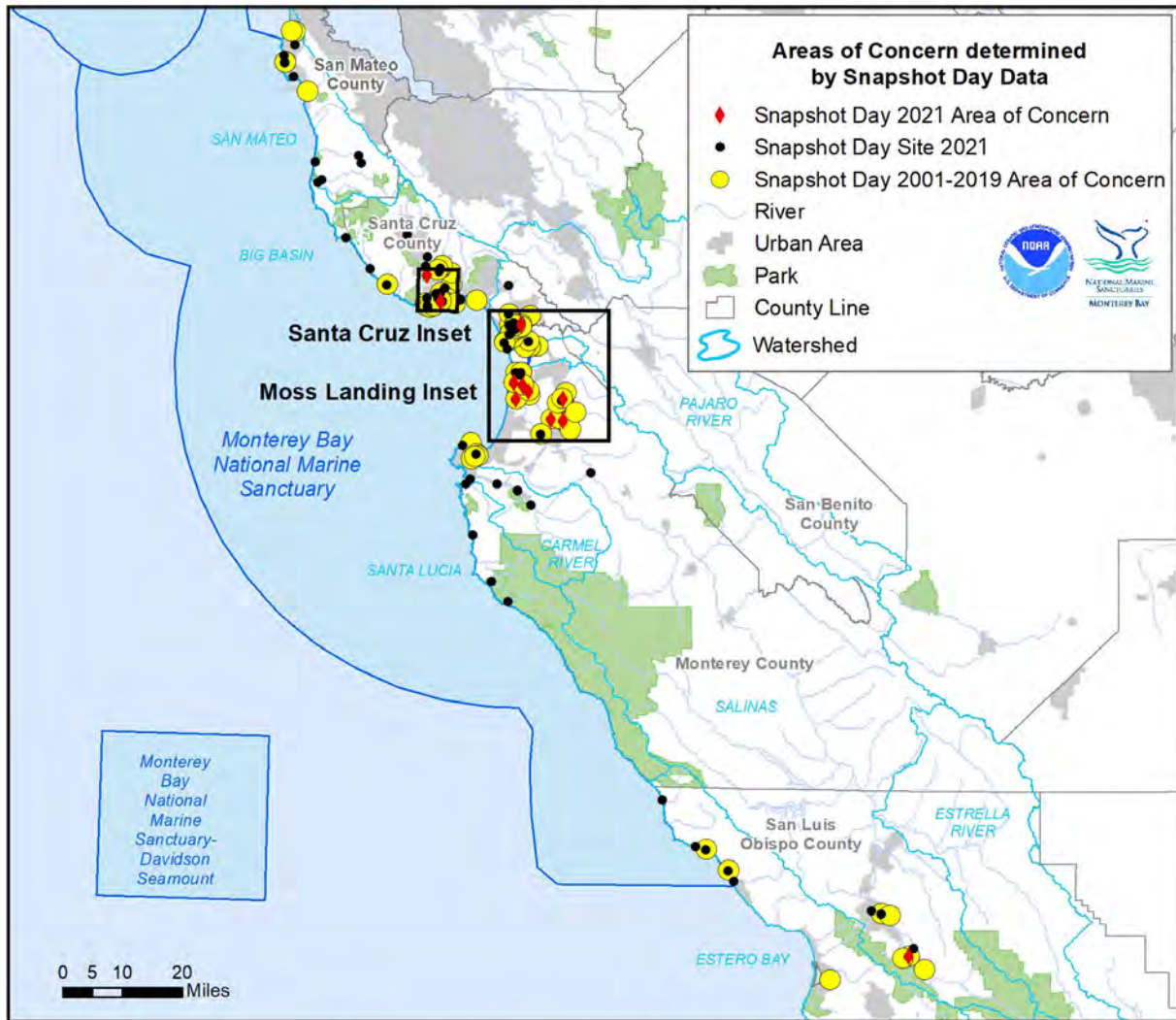


Figure 6. Areas of Concern for Snapshot Day 2021.

## Conclusion

---

In its twenty-first year, Snapshot Day 2021 brought together 67 committed citizens to monitor the water quality of 85 sites in creeks and rivers draining into Monterey Bay National Marine Sanctuary. Throughout the past twenty-one years 3,462 volunteers have donated more than 17,000 hours to monitor creeks and rivers as part of Snapshot Day. In 2021, thirty-seven percent of the sites monitored had no Water Quality Objective or Action Level exceedances for any parameter and provided good conditions for cold-water fish, one beneficial use by which Snapshot Day data is compared.

Eleven sites along eight waterbodies were listed as Areas of Concern (sites with three or more Water Quality Objective or Action Level exceedances) for 2021. Snapshot Day sites at the bottom of large rivers or creeks that have urban areas and/or agricultural influences show the most significant concentrations and exceedances of orthophosphate, 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 eight water bodies listed as Areas of Concern, seven are also listed on the 303(d) list for impaired waterways by the Regional Water Quality Control Board. The 303(d) listed water bodies are: San Lorenzo River, Watsonville Slough, Alisal Slough, Salinas Reclamation Canal, lower Salinas River, Tembladero Slough and Santa Rita Creek. Only Trout Creek is not listed on the 303(d) list. The methodology for this listing can be found at the State Board web site: [www.swrcb.ca.gov](http://www.swrcb.ca.gov).

It is our hope that improvements in water quality continue through efforts focused on both urban and agricultural management measures that control trash, nitrate as N, orthophosphate as P, *E. coli* and conditions that lead to harmful dissolved oxygen levels.

We 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 water bodies. Snapshot Day is a successful annual event due in large part to continued interest and support by volunteers and partner organizations.

## **Appendix 1: 2021 Results by County and Site**

	Site	E. coli	Nitrate as N	Orthophosphate as P	Dissolved Oxygen	pH	Transparency	Water Temp
<b>San Mateo County Sites</b>	202-ALPIN-11	<10	0.1	0.3	8	7	120	11.2
	202-BUTAN-11	20	0.2	ND	9	7	110	12.9
	202-DEERC-11	2014	ND	ND	8	7	54	13
	202-LAHON-11	41	ND	0.1	8	7	120	11.6
	202-MARTI-11	41	ND	ND	10	6.5	46	11.7
	202-MONTA-12	<10	ND	ND	0.5	7	120	12.2
	202-PESCA-11	20	ND	ND	NR	7	120	13.9
	202-POMPO-11	10	ND	0.2	9	7	120	15.2
	202-SANGR-12	10	ND	0.1	9	NR	120	12.6
<b>Santa Cruz County Sites</b>	304-ARROY-21	74	<0.01	<0.01	5	7.5	97.5	13.1
	304-ARROY-22	121	0.52	0.10	7	7	120	14.7
	304-ARROY-23	173	0.84	0.15	8	7.25	120	13.9
	304-BRANC-21	1,198	0.08	0.17	10	7.5	65	18.3
	304-BRANC-22	146	<0.01	0.00	10	7	80	13.1
	304-BRANC-23	820	0.22	0.11	8	7.5	120	13.7
	304-CARBO-21	52	0.44	0.08	9	7	120	13.2
	304-CARBO-23	52	0.38	0.14	7.5	7	120	12.5
	304-CARBO-24	85	0.04	0.20	7	7	120	13.9
	304-LIDEL-21	201	0.41	0.15	8	7	122	11.8
	304-NEWYE-11	109	0.31	0.04	8	7	21.2	12.5
	304-PILKI-21	121	0.13	0.09	5	7	7	12.8
	304-SANLO-22	379	0.48	0.18	5	7	120	15.9
	304-SANLO-24	41	0.36	0.12	9	7	102	17.3
	304-SANLO-26	309	0.46	0.16	8	6.5	120	14
	304-SANLO-27	52	0.37	0.04	8	7	120	12.3
	304-SCOTT-25	10	0.11	0.06	7	7	122	15.5
	304-SOQUE-22	156	<0.02	0.14	7	7.5	120	14.9
	304-ZAYAN-21	52	0.09	0.30	10	7.5	120	13
	304-ZAYAN-22	122	0.13	0.19	12	7	120	13.5
	305-CORRA-22	<10	0.26	0.12	7	7.5	120	12.6
	305-HANSO-21	<10	0.04	1.63				
305-HARKI-21	20	<0.02	0.05					
305-HARKI-22	41	<0.02	<0.02					

	Site	E. coli	Nitrate as N	Orthophosphate as P	Dissolved Oxygen	pH	Transparency	Water Temp
<b>Santa Cruz County Sites continued</b>	305-HARKI-23	20	<0.02	<0.02				
	305-STRUV-22	31	<0.01	1.54				
	305-WATSO-20	134	2.83	0.22				
	305-WATSO-21	539	21.86	0.32				
	305-WATSO-22	160	11.44	0.40				
	305-WATSO-23	20	3.25	0.33				
	305-WATSO-25	<10	0.04	1.83				
	305-WSTRU-22	<10	<0.01	0.06				
<b>Monterey County Sites</b>	306-ELKHO-34	200	20.1	0.1	8	7.5	117	16.6
	306-MOROC-31	20	0.2	1.8	7	7.5	10.2	19.6
	306-MOROC-33	24	ND	ND	10	8.5	35.3	19.6
	306-MOROC-34	<20	ND	ND	12	8.75	6.2	20.8
	307-CARME-33	80	ND	ND	8	7	120	14.1
	307-CARME-35	40	ND	ND	6	7	120	14
	307-CARME-36	60	ND	ND	10	7	120	14.6
	307-CARME-38	200	ND	ND	8	7	120	14.5
	308-BIGSU-31	40	ND	ND	6	7	120	13.5
	308-PALOC-31	15	0.3	ND	11	7	115	12.2
	308-SANJO-31	40	0.1	ND	7	7.5	120	11.5
	308-SYCAM-31	<1	ND	ND	3	7	120	11.8
	309-ALISA-32	600	25.7	0.9	9	7	5.8	18.8
	309-ASILO-31	180	0.6	ND	6.5	7	121	13.5
	309-LIBRA-31	1120	0.2	ND	8	7.5	121	13.5
	309-MAJOR-31	6	ND	ND	7	7.5	121	13.4
	309-RECDI-31	2960	50.2	0.4	12	8.5	11.2	17.9
	309-SALIN-31	80	5.9	0.3	5	7	22	16.8
	309-SALIN-32	220	0.9	0.1	6	7	4	17.5
	309-SALIN-33	60	0.5	0.1	9	6.75	4	16
	309-SRITA-32	3240	2.9	0.3	12	8	39.2	20.6
	309-SRITA-34	100	0.1	0.2	10	8	28	17.2
	309-TEMBL-31	340	37.2	0.5	4	6	7.2	18.6
309-TEMBL-32	480	34.3	ND	11	7	8	17.1	
309-TEMBL-33	480	36.2	0.5	7	7	8	16.6	

	Site	E. coli	Nitrate as N	Orthophosphate as P	Dissolved Oxygen	pH	Transparency	Water Temp
<b>San Luis Obispo County Sites</b>	309-ATASC-41	3076	ND	0.1	6	7.5	120	15.5
	309-SALIN-45	135	ND	ND	6	7	120	18
	309-TROUT-41	495	ND	0.2	6	7	120	12.5
	310-ARROY-41	3441	0.2	ND	9	8	120	20
	310-CARPO-41	10	ND	ND	8	7	120	16.3
	310-LAGUN-41	120	ND	ND	6	8	17	19.8
	310-SANSI-41	183	0.6	0.7	3	7	95	14.6
	310-SANTA-43	62	ND	ND	5	7	120	15.2