Snapshot Day

May 7th, 2022

Final Report

NATIONAL MARINE SANCTUARIES ™

MONTEREY BAY

CMSF CALIFORNIA MARINE SANCTUARY FOUNDATION

Monterey Bay Sanctuary Citizen Watershed Monitoring Network

COASTAL WATERSHED COUNCIL

COASTAL-WATERSHED.ORG

Preserving and protecting our coastal watersheds

Central Coast Snapshot Day 2022
organized by:

The Monterey Bay National Marine Sanctuary (MBNMS)
Water Quality Protection Program
www.montereybay.noaa.gov

With assistance from:

California Marine Sanctuary Foundation (CMSF)
www.californiamsf.org

Central Coast Ambient Monitoring Program (CCAMP)
www.ccamp.org

City of Salinas
www.cityofsalinas.org

City of Santa Cruz
www.cityofsantacruz.com

City of Scotts Valley
www.scottsvalley.org

Coastal Watershed Council
www.coastal-watershed.org

County of Santa Cruz
www.co.santa-cruz.ca.us

Monterey Stormwater Education Alliance
www.montereysea.org

Morro Bay National Estuary Program
https://www.mbnep.org

San Mateo County Public Health Lab
www.smchealth.org/publichealthlab

San Mateo Resource Conservation District
www.sanmateorcd.org

Sewer Authority Mid-Coastside
samcleanswater.org

Upper Salinas-Las Tablas Resource Conservation District
www.us-ltrcd.org

Watsonville Wetlands Watch
www.watsonvillewetlandswatch.org

Executive Summary

Since Earth Day 2000, volunteers have assembled on the first Saturday morning of May each year, except for 2020 due to the COVID pandemic, 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 3,000 volunteers, and has helped foster an ethic of watershed stewardship for local citizens. The 22 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 Snapshot Day 2022 with regional support from the San Mateo Resource Conservation District (RCD), Upper Salinas Las Tablas RCD, and the Coastal Watershed Council.

In 2022, volunteers ventured out on the morning of May 7th 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, 91 citizen scientists donated between four and six hours of their time to monitor 83 sites. Of the 73 sites with flowing water, 23 sites or 32% met all of the Water Quality Objectives (WQOs) or Action Levels that were measured.

Results reveal that dissolved oxygen was the most common field measurement to exceed WQOs and *E. coli* was the most common lab measurement to exceed WQOs. Dissolved oxygen exceeded the WQO at 31% of the sites where it was measured as compared to 27% in 2021 and 23% of sites in 2019. *E. coli* exceeded the WQO at 32% of sites in 2022 as compared to 23% in 2021 and 32% of sites in 2019.

Fourteen Areas of Concern, or sites that exceeded three or more WQOs or Action Levels, were identified this year as compared to 11 in 2021, 12 in 2019, and 22 in 2018. The 14 Areas of Concern for 2022 spanned 12 water bodies in three of the four counties: Santa Cruz, Monterey, and San Luis Obispo. The Santa Cruz County Areas of Concern were on three water bodies: Arroyo Creek, Corralitos Creek, and Harkins Slough. Monterey County Areas of Concern were on eight water bodies: Elkhorn Slough, Moro Cojo Slough, Alisal Creek, Asilomar Creek, Salinas Reclamation Canal, Salinas River, Santa Rita Creek, and Tembladero Slough. The one San Luis Obispo County Area of Concern site was on Trout Creek.

The 22 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 way for residents to connect to their local waterways and to inspire actions focused on improving water quality. Snapshot Day is used to inform public policy through inclusion of data collected by volunteers into the pool of data used to determine 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!

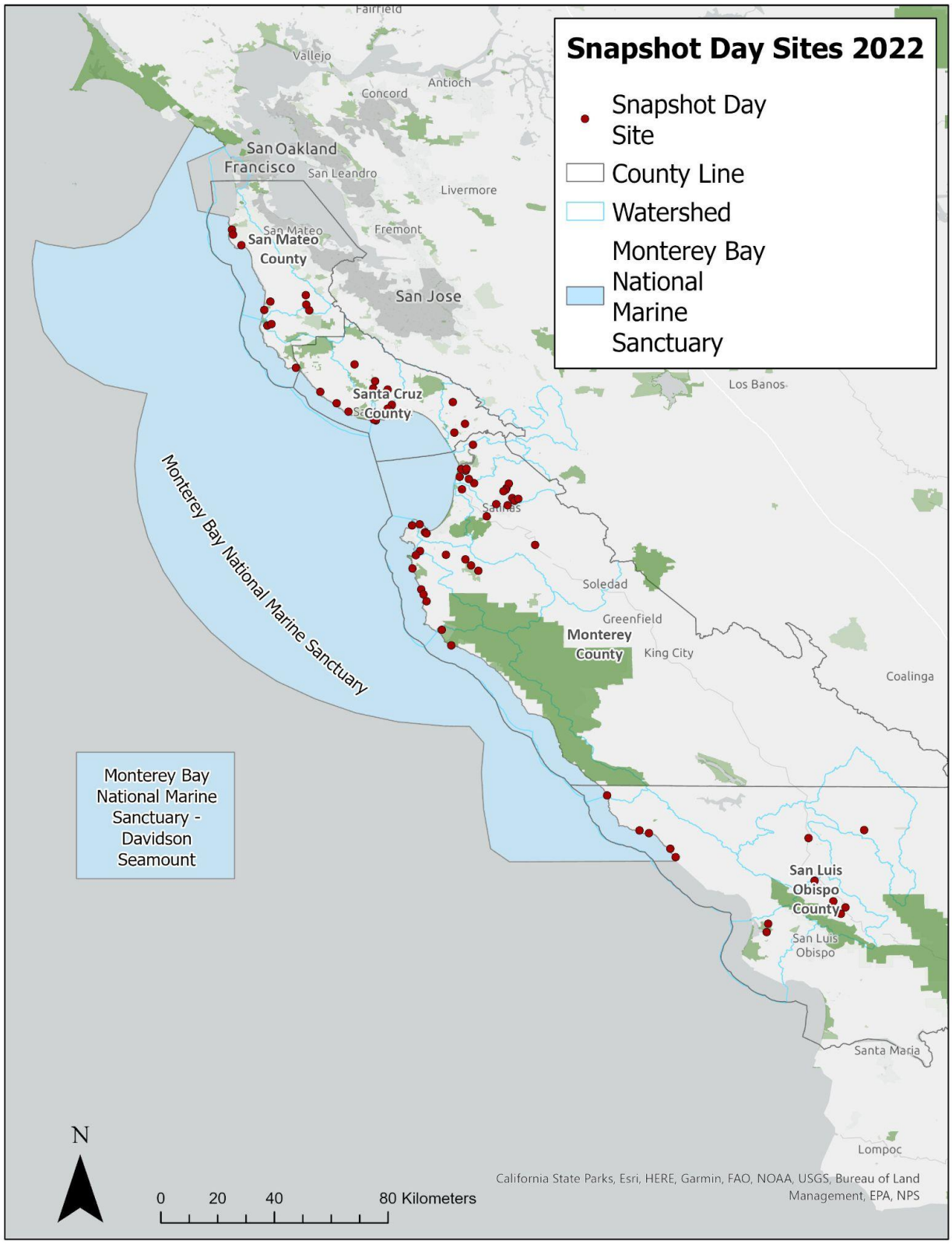

Figure 1. Map of Snapshot Day 2022 monitoring sites.

Introduction

Water quality monitoring is an important tool for watershed management because its focus is to identify pollutants and their sources. Monitoring is required to determine if targets have been met for beneficial uses and whether water quality is improving or deteriorating. Monitoring also provides necessary data on the health of a stream or river and can be analyzed spatially and temporally. Unfortunately, a lack of funding for watershed monitoring results in a lack of information about many waterways and their health. In order to gather data about creeks and rivers flowing into Monterey Bay National Marine Sanctuary (MBNMS), MBNMS works with volunteers, local agencies, and nonprofits to monitor the health of streams and rivers during an annual water quality monitoring event called Snapshot Day. The focus of Snapshot Day is to inspire volunteers to care for their local watersheds, and to collect long-term data focused on assessing the health of Central California creeks and rivers flowing into MBNMS.

Methods

Each April, Snapshot Day training is usually conducted in all four counties bordering the sanctuary: San Mateo, Santa Cruz, Monterey, and San Luis Obispo. Since many Snapshot Day volunteers have never taken field measurements or collected water samples before, training is important in developing the necessary skills. Snapshot Day training covers the program's history, how to take field measurements, and how to collect lab samples.

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, a 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 and orthophosphate as P). Each team monitors a minimum of two sites, while 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**). Since there are no numerical WQOs 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 represent existing regulatory standards that are 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 (WQOs) and Action Levels

Parameter (reporting units)	Water Quality Objectives/Action Levels	Source of Objective
Dissolved Oxygen (mg/L)	Not lower than 7 or greater than 12	Water Quality Control Plan for the Central Coast Basin (RWQCB)
E. coli (MPN/100ml)	Not to exceed 235 [1]	U.S. EPA Ambient Water Quality Criteria
Nitrate as N (ppm)	Not to exceed 1.00 [2]	Central Coast Ambient Monitoring Program (CCAMP)
Orthophosphate as P (ppm)	Not to exceed 0.12 [3]	Central Coast Ambient Monitoring Program (CCAMP)
pH	Not lower than 7 or greater than 8.5	Water Quality Control Plan for the Central Coast Basin (RWQCB)
Transparency (cm)	Not less than 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

In 2022, due to the COVID pandemic, the number of sites and volunteers were still reduced from pre-pandemic levels to keep the event small and focused on critical, long-term sites while also providing a safe environment for volunteers. The refresher training was conducted entirely online. After training, sets of equipment and sample bottles were available for pick up by a member of each Snapshot Day team. If requested, team members were provided a quick run-through of equipment such as dissolved oxygen kits, transparency tubes, and sample bottles.

On May 7th, 2022, 91 volunteers comprising 14 teams, monitored 83 sites along creeks and rivers that flowed into MBNMS (**Figure 1**). This year, 10 sites were either completely dry, had water that was stagnant, or were unsafe to access. Seventy-three sites (88%) had flowing water. Twenty-three sites (32%) with flowing water met the WQOs for all lab and field parameters. Snapshot Day 2022 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	*E. coli*	Nitrate as N	Orthophos-phate as P	Dissolved Oxygen	pH	Transparency	Water Temperature
2022	23	19	18	23	9	9	3
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 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 2022, 23 (31%) of the 74 sites where dissolved oxygen was measured did not meet the WQO. The lowest dissolved oxygen result of 2 mg/L was from the Hartnell Gulch behind Monterey City Library in Monterey County. No site had a dissolved oxygen level above 12 mg/L.

- San Mateo County had one site that did not meet the WQO objective:
    - Montara Creek downstream at Date and Harte Streets
- Santa Cruz County, where dissolved oxygen was measured at some but not all sites, had five sites that did not meet the WQO:
    - Arana Creek at North Harbor
    - Arroyo Creek at Delaware Ave
    - Pilkington Creek at Forbes Road
    - Corralitos Creek at Thicket Lane and Green Valley Road
    - Harkins Slough at Harkins Slough Road
- Monterey County, where dissolved oxygen was measured at some but not all sites, had 12 sites that did not meet the WQO for dissolved oxygen:
    - Elkhorn Slough at Garin Road
    - Malpaso Creek
    - San Jose Creek at Highway 1
    - Lower Sycamore Canyon
    - Upper Alisal Creek
    - Asilomar State Park at the bridge
    - Greenwood Park at Central and 13th Streets in Pacific Grove
    - Hartnell Gulch behind Monterey City Library
    - Natividad Creek at Las Casitas Road
    - Tembladero Slough at Monterey Dunes
    - Tembladero Slough Hwy 183
    - Tembladero Slough at Preston Bridge
- San Luis Obispo County had five sites that did not meet the WQO for dissolved oxygen:
    - Atascadero Creek at West Mall Bridge
    - Trout Creek at 3 bridges
    - San Carpoforo Creek upstream of mouth
    - San Simeon Creek at campground bridge
    - Santa Rosa Creek at Windsor

The sites that did not meet the WQO for dissolved oxygen are listed in **Table 3** with the respective dissolved oxygen measurement in mg/L for a total of 23 sites.

Table 3. Sites from Snapshot Day 2022 that exceeded the WQO for dissolved oxygen with the respective county and dissolved oxygen measurement.

Site ID	Site Name	Dissolved Oxygen (mg/L)	County
202-MONTA-12	Montara Creek Downstream at Date and Harte Streets	6	San Mateo
304-ARANA-22	Arana Creek at North Harbor	5	Santa Cruz
304-ARROY-22	Arroyo Creek at Delaware Ave	5	Santa Cruz
304-PILKI-21	Pilkington Creek at Forbes Road	6	Santa Cruz
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	6	Santa Cruz
305-HARKI-21	Harkins Slough at Harkins Slough Road	6	Santa Cruz
306-ELKHO-34	Elkhorn Slough at Garin Road	6	Monterey
308-MALPA-31	Malpaso Creek	5	Monterey
308-SANJO-31	San Jose Creek at Highway 1	6	Monterey
308-SYCAM-32	Lower Sycamore Canyon	5	Monterey
309-ALISA-32	Upper Alisal Creek	5.5	Monterey
309-ASILO-31	Asilomar State Park at Bridge	5	Monterey
309-CENTR-31	Greenwood Park at Central and 13th Streets in Pacific Grove	4	Monterey
309-LIBRA-31	Hartnell Gulch behind Monterey City Library	2	Monterey
309-NATIV-31	Natividad Creek at Las Casitas Road	5.5	Monterey
309-TEMBL-31	Tembladero Slough at Monterey Dunes	5	Monterey
309-TEMBL-32	Tembladero Slough at Hwy 183	5.5	Monterey
309-TEMBL-33	Tembladero Slough at Preston Bridge	4.5	Monterey
309-ATASC-41	Atascadero Creek at West Mall Bridge	5	San Luis Obispo
309-TROUT-41	Trout Creek at 3 Bridges	5	San Luis Obispo
310-CARPO-41	San Carpoforo Creek Upstream of Mouth	5	San Luis Obispo
310-SANSI-41	San Simeon Creek at Campground Bridge	5	San Luis Obispo
310-SANTA-43	Santa Rosa Creek at Windsor	6	San Luis Obispo

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 2022, nine (12%) of the 74 sites where pH was measured did not meet the WQO. The lowest pH result of 5.0 was found at Montara Creek downstream at Date and Harte Streets in San Mateo County. The highest pH result of 9.25 was found in the Salinas River at Salinas River Trestle in Monterey County. No sites from San Luis Obispo exceeded the WQO for pH.

- San Mateo County had two sites that did not meet the WQO for pH:
    - Deer Creek at Ave Alhambra
    - Montara Creek downstream at Date and Harte Streets
- Santa Cruz County, where pH was measured at some but not all sites, had only one site that did not meet the WQO:
    - Moore Creek at the mouth
- Monterey County had six sites that did not meet the pH WQO:
    - Castroville Slough above the confluence with the Moro Cojo Slough
    - Carmel River at Highway 1
    - San Jose Creek at Highway 1
    - Upper Alisal Creek
    - Asilomar State Park at the bridge
    - Salinas River at Salinas River Trestle

The sites that did not meet the WQO for pH are listed in **Table 4** with the respective pH measurement for a total of nine sites.

Table 4. Sites from Snapshot Day 2022 that exceeded the WQO for pH with the respective county and pH measurement.

Site ID	Site Name	pH	County
202-DEERC-12	Deer Creek at Ave Alhambra	6	San Mateo
202-MONTA-12	Montara Creek Downstream at Date and Harte Streets	5	San Mateo
304-MOORE-26	Moore Creek at Mouth	9	Santa Cruz
306-MOROC-34	Castroville Slough above the Confluence with the Moro Cojo Slough	9	Monterey
307-CARME-38	Carmel River at Highway 1	6.5	Monterey
308-SANJO-31	San Jose Creek at Highway 1	6.5	Monterey
309-ALISA-32	Upper Alisal Creek	6.75	Monterey
309-ASILO-31	Asilomar State Park at Bridge	6.5	Monterey
309-SALIN-31	Salinas River at Salinas River Trestle	9.25	Monterey

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 67 sites, nine (13%) did not meet the Action Level. The lowest transparency measurement of 5.0 cm was taken at Harkins Slough at Harkins Slough Road in Santa Cruz County. No sites from San Mateo and San Luis Obispo counties exceeded the Action Level for transparency.

- Santa Cruz County, where transparency was measured at some but not all sites, did not meet the Action Level at one site:
    - Harkins Slough at Harkins Slough Road
- Monterey County had eight sites that did not meet the Action Level for transparency:
    - Upper Moro Cojo Slough
    - Castroville Slough above the confluence with the Moro Cojo Slough
    - Upper Alisal Creek
    - Reclamation Ditch at Davis Road
    - Salinas River at Salinas River Trestle
    - Santa Rita Creek at Van Buren Avenue
    - Tembladero Slough at Monterey Dunes
    - Upper Natividad Creek

The sites that did not meet the WQO for transparency are listed in **Table 5** with the respective transparency measurement in centimeters for a total of nine sites.

Table 5. Sites from Snapshot Day 2022 that exceeded the WQO for transparency with the respective county and transparency measurement.

Site ID	Site Name	Transparency (cm)	County
305-HARKI-21	Harkins Slough at Harkins Slough Road	5	Santa Cruz
306-MOROC-31	Upper Moro Cojo Slough	20	Monterey
306-MOROC-34	Castroville Slough above the Confluence with the Moro Cojo Slough	6	Monterey
309-ALISA-32	Upper Alisal Creek	7.4	Monterey
309-RECDI-31	Reclamation Ditch at Davis Road	10.8	Monterey
309-SALIN-31	Salinas River at Salinas River Trestle	19.2	Monterey
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	5.9	Monterey
309-TEMBL-31	Tembladero Slough at Monterey Dunes	6.2	Monterey
309-UPPER-31	Upper Natividad Creek	10.4	Monterey

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 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 2022, three of the 72 sites (4%) where water temperature was measured exceeded the WQO. No sites measured in San Mateo County exceeded the WQO for temperature.

- Santa Cruz County did not meet the Basin Plan Objective for water temperature at one site:
    - Harkins Slough at Harkins Slough Road
- Monterey County did not meet the objective for water temperature at one site:
    - Santa Rita Creek at Bellinzona
- San Luis Obispo County did not meet the objective for water temperature at one site:
    - Santa Ysabela Creek on Turri Road

The sites that did not meet the WQO for temperature are listed in **Table 6** with the respective temperature measurement in degrees Celsius for a total of three sites.

Table 6. Sites from Snapshot Day 2022 that exceeded the WQO for temperature with the respective county and temperature measurement.

Site ID	Site Name	Temperature (Deg C)	County
305-HARKI-21	Harkins Slough at Harkins Slough Road	21.2	Santa Cruz
309-SRITA-32	Santa Rita Creek at Bellinzona	22	Monterey
310-SYB-41	Santa Ysabela Creek on Turri Road	22.84	San Luis Obispo

Lab Analysis

E. coli Bacteria

Coliform bacteria generally originate from the feces of warm-blooded animals such as humans, pets, livestock, or wildlife. While coliform bacteria are usually not the cause of sickness, their presence can indicate that other illness causing pathogens are present.

The EPA has set a WQO for *E. coli* at 235 MPN/100mL. Twenty-three (32%) of the 71 sites where *E. coli* was measured did not meet the WQO (**Figure 2**). The highest *E. coli* result of 2,306 MPN/ 100mL was from Pilkington Creek at Forbes Road in Santa Cruz County.

- San Mateo County had two sites that did not meet the WQO for *E. coli*:
    - Alpine Creek at Alpine Road
    - San Gregorio Creek at Stage Road
- Santa Cruz County had 11 sites that did not meet the WQO for *E. coli*:
    - Arana Creek at North Harbor
    - Arroyo Creek at Delaware Ave
    - Arroyo Creek at West Cliff Drive
    - Branciforte Creek above the confluence with the San Lorenzo River
    - Branciforte at DeLaveaga Park
    - Branciforte Creek at 434 Market Street
    - Carbonera Creek
    - Pilkington Creek at Forbes Road
    - San Lorenzo River at Junction Park
    - Mouth of Soquel Creek
    - Corralitos Creek at Thicket Lane and Green Valley Road
- Monterey County had seven sites that did not meet the WQO for *E. coli*:
    - Upper Moro Cojo Slough
    - Upper Alisal Creek
    - Asilomar State Park at Bridge
    - Greenwood Park at Central and 13th Streets in Pacific Grove

    - Reclamation Ditch at Davis Road
    - Santa Rita Creek at Bellinzona
    - Santa Rita Creek at Van Buren Avenue
- San Luis Obispo County had three sites that did not meet the WQO for *E. coli*:
    - Atascadero Creek at West Mall Bridge
    - Trout Creek at 3 Bridges
    - Arroyo del Puerto at Bridge in San Simeon

The sites that did not meet the WQO for *E. coli* are listed in **Table 7** with the respective *E. coli* lab result in MPN/100mL for a total of 23 sites.

Table 7. Sites from Snapshot Day 2022 that exceeded the WQO for *E. coli* with the respective county and lab result.

Site ID	Site Name	*E. coli* (MPN/100mL)	County
202-ALPIN-11	Alpine Creek at Alpine Road	275	San Mateo
202-SANGR-12	San Gregorio Creek at Stage Road	504	San Mateo
304-ARANA-22	Arana Creek at North Harbor	436	Santa Cruz
304-ARROY-22	Arroyo Creek at Delaware Ave	1866	Santa Cruz
304-ARROY-23	Arroyo Creek at West Cliff Drive	864	Santa Cruz
304-BRANC-21	Branciforte Creek above Confluence with San Lorenzo River	486	Santa Cruz
304-BRANC-22	Branciforte at DeLaveaga Park	244	Santa Cruz
304-BRANC-23	Branciforte Creek at 434 Market Street	382	Santa Cruz
304-CARBO-21	Carbonera Creek (Trib to Branciforte Creek, Trib to San Lorenzo)	394	Santa Cruz
304-PILKI-21	Pilkington Creek at Forbes Road	2306	Santa Cruz
304-SANLO-27	San Lorenzo River at Junction Park	268	Santa Cruz
304-SOQUE-22	Soquel Creek at Mouth	690	Santa Cruz
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	319	Santa Cruz
306-MOROC-31	Upper Moro Cojo Slough	1382	Monterey
309-ALISA-32	Upper Alisal Creek	1764	Monterey
309-ASILO-31	Asilomar State Park at Bridge	292	Monterey
309-CENTR-31	Greenwood Park at Central and 13th Streets in Pacific Grove	1980	Monterey
309-RECDI-31	Reclamation Ditch at Davis Road	1560	Monterey
309-SRITA-32	Santa Rita Creek at Bellinzona	240	Monterey
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	728	Monterey

309-ATASC-41	Atascadero Creek at West Mall Bridge	908	San Luis Obispo
309-TROUT-41	Trout Creek at 3 Bridges	495	San Luis Obispo
310-ARROY-41	Arroyo del Puerto at Bridge in San Simeon	563	San Luis Obispo

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, and/or industrial wastes. Heightened levels of nutrients can lead to excessive algal or aquatic plant growth which can ultimately deplete the amount of oxygen available in a waterway when plants die off and bacteria decompose plant material.

Nineteen (27%) sites of the 70 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 82 mg-N/L was from the Tembladero Slough at Monterey Dunes in Monterey County. Thirty-one (47%) sites had non-detectable levels of nitrate as N (**Figure 3**). No sites in San Mateo county exceeded the action level.

- Santa Cruz County had four sites that did not meet the Action Level for nitrate:
  - Arroyo Creek at Delaware Ave
  - Arroyo Creek at West Cliff Drive
  - Carbonera Creek (Trib to Branciforte Creek, Trib to San Lorenzo)
  - Corralitos Creek at Thicket Lane and Green Valley Road
- Monterey County had 13 sites that did not meet the nitrate Action Level:
  - Elkhorn Slough at Garin Road
  - Upper Moro Cojo Slough
  - Lower Moro Cojo Slough
  - Big Sur River at Andrew Molera Park
  - Upper Alisal Creek
  - Reclamation Ditch at Davis Road
  - Salinas River at Salinas River Trestle
  - Salinas River at Davis Road
  - Santa Rita Creek at Bellinzona
  - Santa Rita Creek at Van Buren Avenue
  - Tembladero Slough at Monterey Dunes
  - Tembladero Slough Highway 183
  - Tembladero Slough at Preston Bridge
- San Luis Obispo county had two sites that did not meet the nitrate Action Level:
  - Santa Ysabela Creek on Turri Road
  - Upper Chorro Flats at Chorro Creek and Morro Creek Roads

The sites that did not meet the Action Level for nitrate are listed in **Table 8** with the respective nitrate lab result in mg/L for a total of 19 sites.

Table 8. Sites from Snapshot Day 2022 that exceeded the Action Level for nitrate with the respective county and lab result.

Site ID	Site Name	Nitrate as N (mg/L)	County
304-ARROY-22	Arroyo Creek at Delaware Ave	1.3	Santa Cruz
304-ARROY-23	Arroyo Creek at West Cliff Drive	1.4	Santa Cruz
304-CARBO-21	Carbonera Creek (Trib to Branciforte Creek, Trib to San Lorenzo)	5.9	Santa Cruz
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	5.9	Santa Cruz
306-ELKHO-34	Elkhorn Slough at Garin Road	26.4	Monterey
306-MOROC-31	Upper Moro Cojo Slough	16.8	Monterey
306-MOROC-33	Lower Moro Cojo Slough	8.3	Monterey
308-BIGSU-31	Big Sur River at Andrew Molera Park	17.8	Monterey
309-ALISA-32	Upper Alisal Creek	58.6	Monterey
309-RECDI-31	Reclamation Ditch at Davis Road	46	Monterey
309-SALIN-31	Salinas River at Salinas River Trestle	15.4	Monterey
309-SALIN-32	Salinas River at Davis Road	24.5	Monterey
309-SRITA-32	Santa Rita Creek at Bellinzona	3.1	Monterey
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	9.5	Monterey
309-TEMBL-31	Tembladero Slough at Monterey Dunes	82	Monterey
309-TEMBL-32	Tembladero Slough Highway 183	27.9	Monterey
309-TEMBL-33	Tembladero Slough at Preston Bridge	50.6	Monterey
310-SYB-41	Santa Ysabela Creek on Turri Road	8	San Luis Obispo
310-UCF-41	Upper Chorro Flats at Chorro Creek and Morro Creek Roads	1.2	San Luis Obispo

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, and/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.

Eighteen (26%) of the 70 sites measured for orthophosphate as P did not meet the CCAMP Action Level of 0.12 mg/L. The highest orthophosphate concentration of 1.6 mg/L was from Elkhorn Slough at Garin Road in Monterey County. Twenty-three sites (33%) had non-detectable levels of orthophosphate (**Figure 4**).

- San Mateo County had one site that did not meet the Action Level for orthophosphate:
    - Alpine Creek at Alpine Road
- Santa Cruz County had four sites that did not meet the Action Level for orthophosphate:
    - Arroyo Creek at Delaware Ave
    - Branciforte at DeLaveaga Park
    - Liddell Creek on Bonny Doon Road
    - Zayante Creek at Quail Hollow Road bridge
- Monterey County had ten sites that did not meet the Action Level for orthophosphate:
    - Elkhorn Slough at Garin Road
    - Upper Moro Cojo Slough
    - Lower Moro Cojo Slough
    - Big Sur River at Andrew Molera Park
    - Upper Alisal Creek
    - Reclamation Ditch at Davis Road
    - Salinas River at Salinas River Trestle
    - Santa Rita Creek at Van Buren Avenue
    - Tembladero Slough at Monterey Dunes
    - Tembladero Slough at Preston Bridge
- San Luis Obispo had three sites that did not meet the Action Level for orthophosphate:
    - Trout Creek at 3 Bridges
    - San Simeon Creek at Campground Bridge
    - Upper Chorro Flats at Chorro Creek and Morro Creek Roads

The sites that did not meet the Action Level for orthophosphate are listed in **Table 9** with the respective orthophosphate lab result in mg/L for a total of 18 sites.

Table 9. Sites from Snapshot Day 2022 that exceeded the Action Level for orthophosphate with the respective county and lab result.

Site ID	Site Name	Orthophosphate as P (mg/L)	County
202-ALPIN-11	Alpine Creek at Alpine Road	0.3	San Mateo
304-ARROY-22	Arroyo Creek at Delaware Ave	0.19	Santa Cruz
304-BRANC-22	Branciforte at DeLaveaga Park	0.16	Santa Cruz
304-LIDEL-21	Liddell Creek on Bonny Doon Road	0.19	Santa Cruz
304-ZAYAN-22	Zayante Creek at Quail Hollow Road bridge	0.16	Santa Cruz
306-ELKHO-34	Elkhorn Slough at Garin Road	1.6	Monterey
306-MOROC-31	Upper Moro Cojo Slough	0.48	Monterey
306-MOROC-33	Lower Moro Cojo Slough	0.64	Monterey
308-BIGSU-31	Big Sur River at Andrew Molera Park	0.15	Monterey
309-ALISA-32	Upper Alisal Creek	0.44	Monterey
309-RECDI-31	Reclamation Ditch at Davis Road	0.21	Monterey
309-SALIN-31	Salinas River at Salinas River Trestle	0.13	Monterey
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	0.34	Monterey
309-TEMBL-31	Tembladero Slough at Monterey Dunes	0.57	Monterey
309-TEMBL-33	Tembladero Slough at Preston Bridge	0.39	Monterey
309-TROUT-41	Trout Creek at 3 Bridges	0.17	San Luis Obispo
310-SANSI-41	San Simeon Creek at Campground Bridge	0.85	San Luis Obispo
310-UCF-41	Upper Chorro Flats at Chorro Creek and Morro Creek Roads	0.56	San Luis Obispo

Field Observations

As in the past 22 years Snapshot Day has been conducted, trash was noted at many sites in 2022. Trash included plastic bags, plastic bottles, plastic food wrappers, and glass bottles. Wildlife such as waterfowl, other birds such as ospreys and swallows, minnows, invertebrate animals like crayfish and banana slugs, algae, and aquatic and terrestrial plants were also noted at the sites.

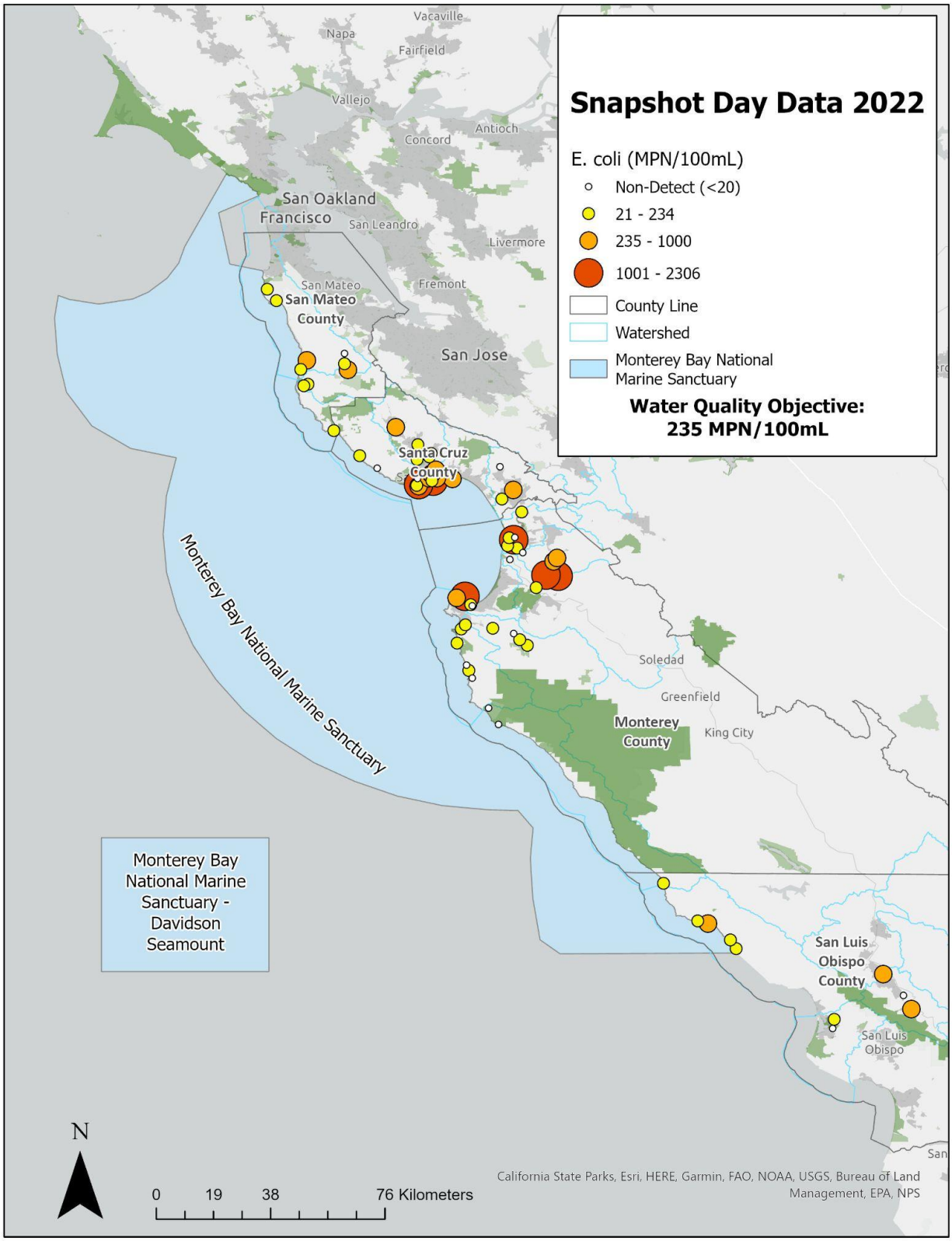

Figure 2. *E. coli* Results for Snapshot Day 2022.

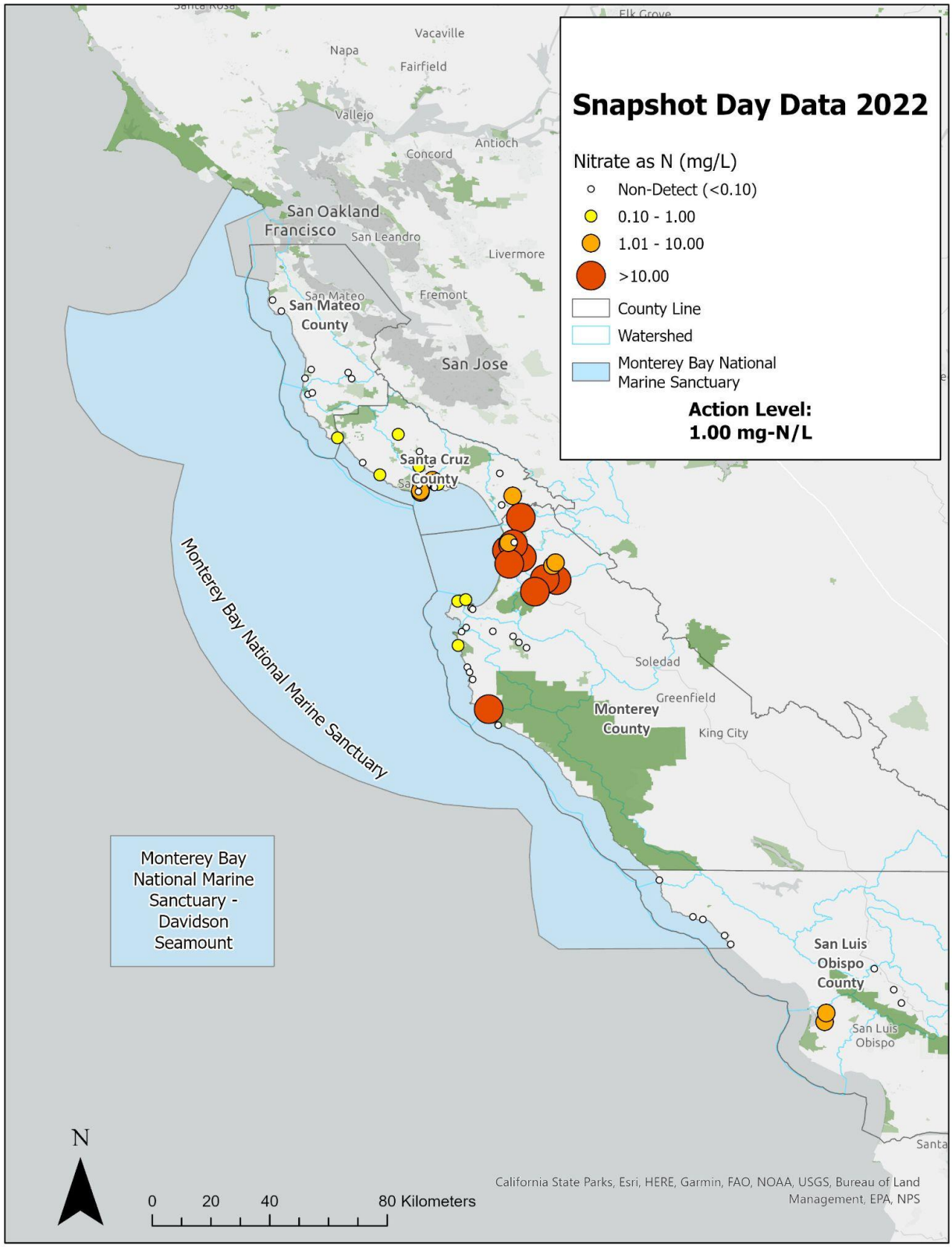

Figure 3. Nitrate as N Results for Snapshot Day 2022.

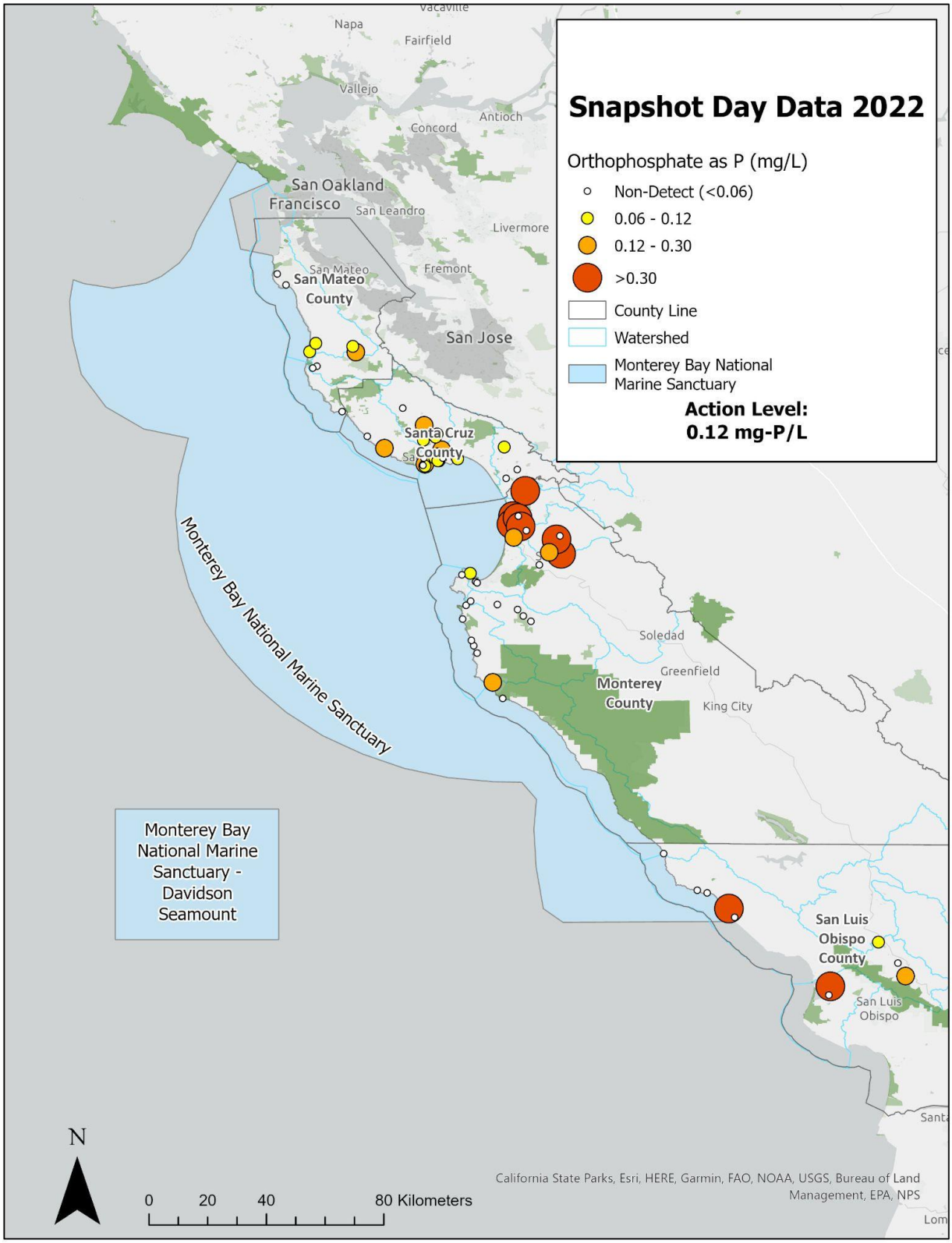

Figure 4. Orthophosphate-P Results for Snapshot Day 2022.

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 multiple sites that represent Areas of Concern. For example, this year two sites monitored on Tembladero Slough were designated as Areas of Concern on the same waterbody. For this reason we have chosen to display the Area of Concern data two ways: by water body (**Figure 5, 6, 7, and 8**) and by site (**Figure 9**).

In 2022, 14 sites (19%) were designated Areas of Concern on 12 water bodies. Six of the Areas of Concern are on four water bodies that have been designated Areas of Concern for more than ten of the past 22 years: Tembladero Slough, Alisal Creek, Santa Rita Creek, and the Salinas Reclamation Canal, all located in Monterey County. The other four Areas of Concern located in Monterey County are in Elkhorn Slough, Moro Cojo Slough, Asilomar Creek, and the Salinas River. 2022 is the first year that Asilomar Creek has been an Area of Concern over the 22 years of Snapshot Day. Three other Areas of Concern are located in Santa Cruz County in Arroyo Creek, Corralitos Creek, and Harkins Slough. Trout Creek in San Luis Obispo County has been designated an Area of Concern nine times in the past 22 years. For the sixth year in a row, San Mateo County had no Areas of Concern.

The sites that exceeded three or more of these criteria are listed in **Table 10, 11, and 12** for each county in 2022 (Monterey, San Luis Obispo, and Santa Cruz) with the corresponding water body, the standard exceeded, and the measurement for that standard.

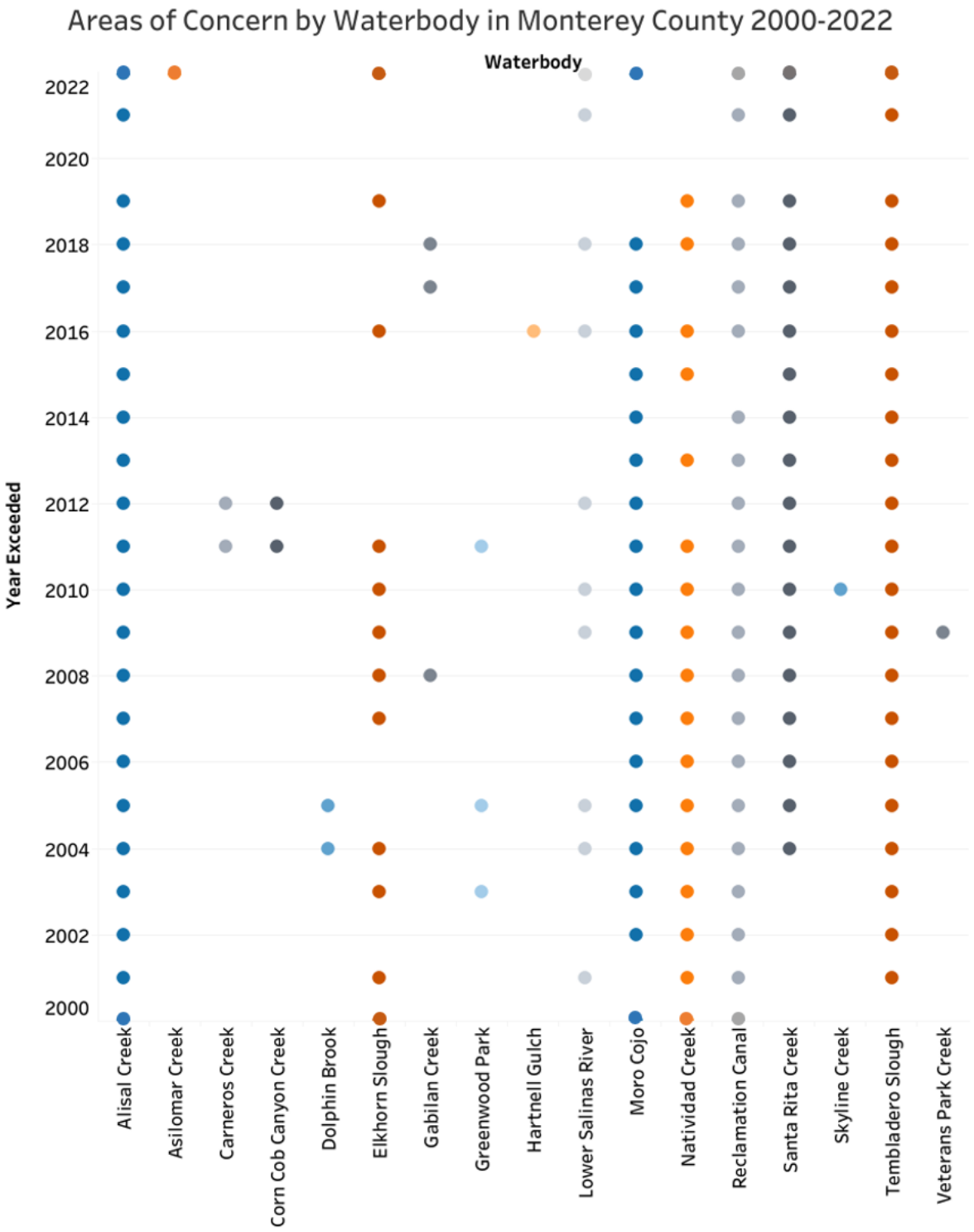

Figure 5. Areas of Concern by waterbody in Monterey County from 2000-2022 with the dots signifying the year that the waterbody exceeded three or more WQOs or Action Levels for the given year.

Table 10. Sites from 2022 in Monterey County that were designated as an Area of Concern with the corresponding water body, standard exceeded, and measurement.

Site ID	Site Name	Standard Exceeded	Measurement	County	Water Body
306-ELKHO-34	Elkhorn Slough at Garin Road	Nitrate as N (mg/L)	26.4	Monterey	Elkhorn Slough
306-ELKHO-34	Elkhorn Slough at Garin Road	Orthophosphate as P (mg/L)	1.6	Monterey	Elkhorn Slough
306-ELKHO-34	Elkhorn Slough at Garin Road	Oxygen, Dissolved (mg/L)	6	Monterey	Elkhorn Slough
306-MOROC-31	Upper Moro Cojo Slough	Nitrate as N (mg/L)	16.8	Monterey	Moro Cojo Slough
306-MOROC-31	Upper Moro Cojo Slough	Orthophosphate as P (mg/L)	0.48	Monterey	Moro Cojo Slough
306-MOROC-31	Upper Moro Cojo Slough	E. coli (MPN/100mL)	1382	Monterey	Moro Cojo Slough
306-MOROC-31	Upper Moro Cojo Slough	Transparency (cm)	20	Monterey	Moro Cojo Slough
309-ALISA-32	Upper Alisal Creek	Nitrate as N (mg/L)	58.6	Monterey	Alisal Creek
309-ALISA-32	Upper Alisal Creek	Orthophosphate as P (mg/L)	0.44	Monterey	Alisal Creek
309-ALISA-32	Upper Alisal Creek	E. coli (MPN/100mL)	1764	Monterey	Alisal Creek
309-ALISA-32	Upper Alisal Creek	pH	6.75	Monterey	Alisal Creek
309-ALISA-32	Upper Alisal Creek	Oxygen, Dissolved (mg/L)	5.5	Monterey	Alisal Creek
309-ALISA-32	Upper Alisal Creek	Transparency (cm)	7.4	Monterey	Alisal Creek
309-ASILO-31	Asilomar State Park at Bridge	E. coli (MPN/100mL)	292	Monterey	Asilomar Creek
309-ASILO-31	Asilomar State Park at Bridge	pH	6.5	Monterey	Asilomar Creek
309-ASILO-31	Asilomar State Park at Bridge	Oxygen, Dissolved (mg/L)	5	Monterey	Asilomar Creek
309-RECDI-31	Reclamation Ditch at Davis Road	Nitrate as N (mg/L)	46	Monterey	Salinas Reclamation Canal
309-RECDI-31	Reclamation Ditch at Davis Road	Orthophosphate as P (mg/L)	0.21	Monterey	Salinas Reclamation Canal

309-RECDI-31	Reclamation Ditch at Davis Road	E. coli (MPN/100mL)	1560	Monterey	Salinas Reclamation Canal
309-RECDI-31	Reclamation Ditch at Davis Road	Transparency (cm)	10.8	Monterey	Salinas Reclamation Canal
309-SALIN-31	Salinas River at Salinas River Trestle	Nitrate as N (mg/L)	15.4	Monterey	Salinas River
309-SALIN-31	Salinas River at Salinas River Trestle	Orthophosphate as P (mg/L)	0.13	Monterey	Salinas River
309-SALIN-31	Salinas River at Salinas River Trestle	pH	9.25	Monterey	Salinas River
309-SALIN-31	Salinas River at Salinas River Trestle	Transparency (cm)	19.2	Monterey	Salinas River
309-SRITA-32	Santa Rita Creek at Bellinzona	Nitrate as N (mg/L)	3.1	Monterey	Santa Rita Creek
309-SRITA-32	Santa Rita Creek at Bellinzona	E. coli (MPN/100mL)	240	Monterey	Santa Rita Creek
309-SRITA-32	Santa Rita Creek at Bellinzona	Temperature (Deg C)	22	Monterey	Santa Rita Creek
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	Nitrate as N (mg/L)	9.5	Monterey	Santa Rita Creek
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	Orthophosphate as P (mg/L)	0.34	Monterey	Santa Rita Creek
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	E. coli (MPN/100mL)	728	Monterey	Santa Rita Creek
309-SRITA-35	Santa Rita Creek at Van Buren Avenue	Transparency (cm)	5.9	Monterey	Santa Rita Creek
309-TEMBL-31	Tembladero Slough at Monterey Dunes	Nitrate as N (mg/L)	82	Monterey	Tembladero Slough
309-TEMBL-31	Tembladero Slough at Monterey Dunes	Orthophosphate as P (mg/L)	0.57	Monterey	Tembladero Slough
309-TEMBL-31	Tembladero Slough at Monterey Dunes	Oxygen, Dissolved (mg/L)	5	Monterey	Tembladero Slough
309-TEMBL-31	Tembladero Slough at Monterey Dunes	Transparency (cm)	6.2	Monterey	Tembladero Slough
309-TEMBL-33	Tembladero Slough at Preston Bridge	Nitrate as N (mg/L)	50.6	Monterey	Tembladero Slough

309-TEMBL-33	Tembladero Slough at Preston Bridge	Orthophosphate as P (mg/L)	0.39	Monterey	Tembladero Slough
309-TEMBL-33	Tembladero Slough at Preston Bridge	Oxygen, Dissolved (mg/L)	4.5	Monterey	Tembladero Slough

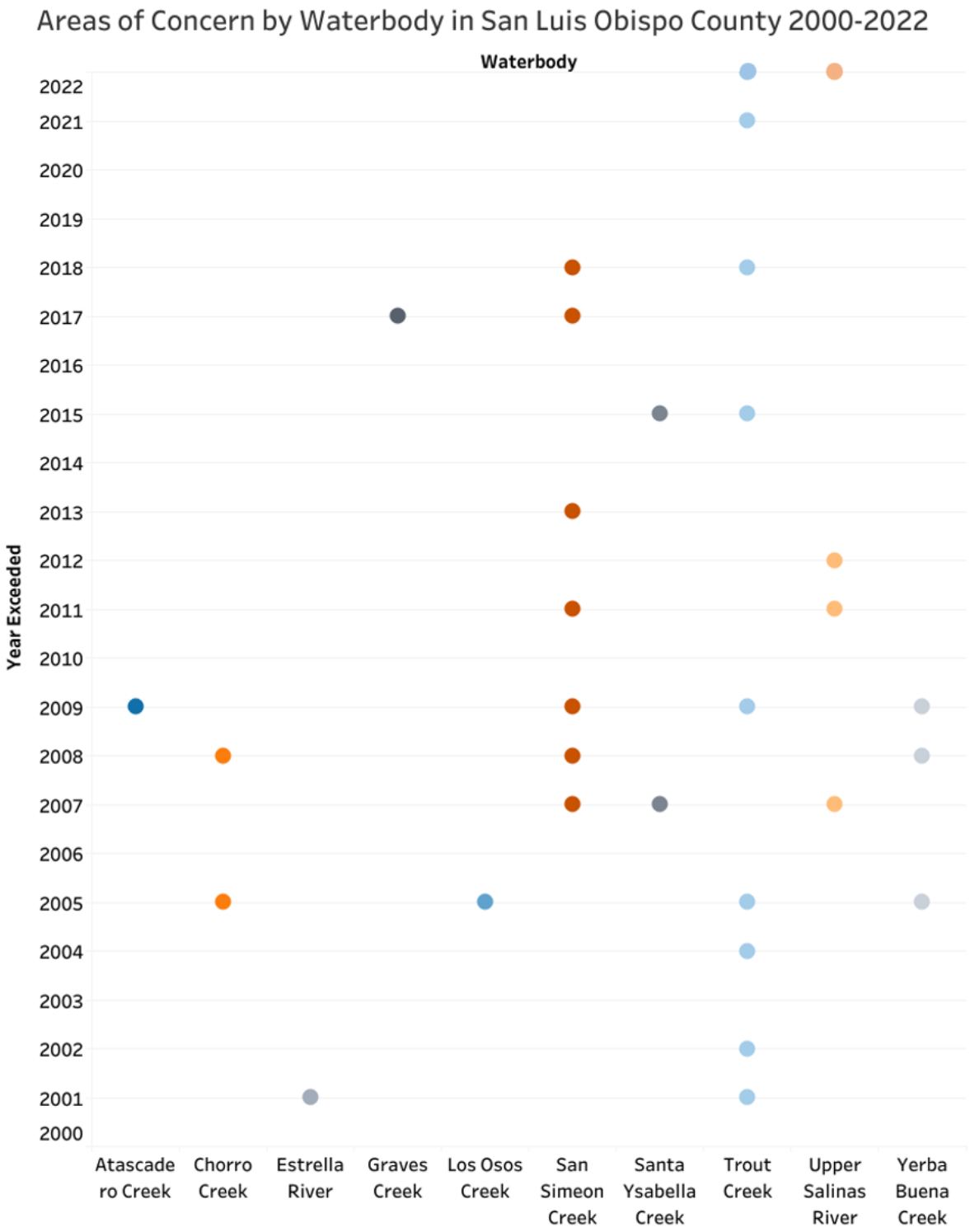

Figure 6. Areas of Concern by waterbody in San Luis Obispo County from 2000-2022 with the dots signifying the year that the waterbody exceeded three or more WQOs or Action Levels for the given year.

Table 11. Sites from 2022 in San Luis Obispo County that were designated as an Area of Concern with the corresponding water body, standard exceeded, and measurement.

Site ID	Site Name	Standard Exceeded	Measurement	County	Water Body
309-TROUT-41	Trout Creek at 3 Bridges	Orthophosphate as P (mg/L)	0.17	San Luis Obispo	Trout Creek
309-TROUT-41	Trout Creek at 3 Bridges	E. coli (MPN/100mL)	495	San Luis Obispo	Trout Creek
309-TROUT-41	Trout Creek at 3 Bridges	Oxygen, Dissolved (mg/L)	5	San Luis Obispo	Trout Creek

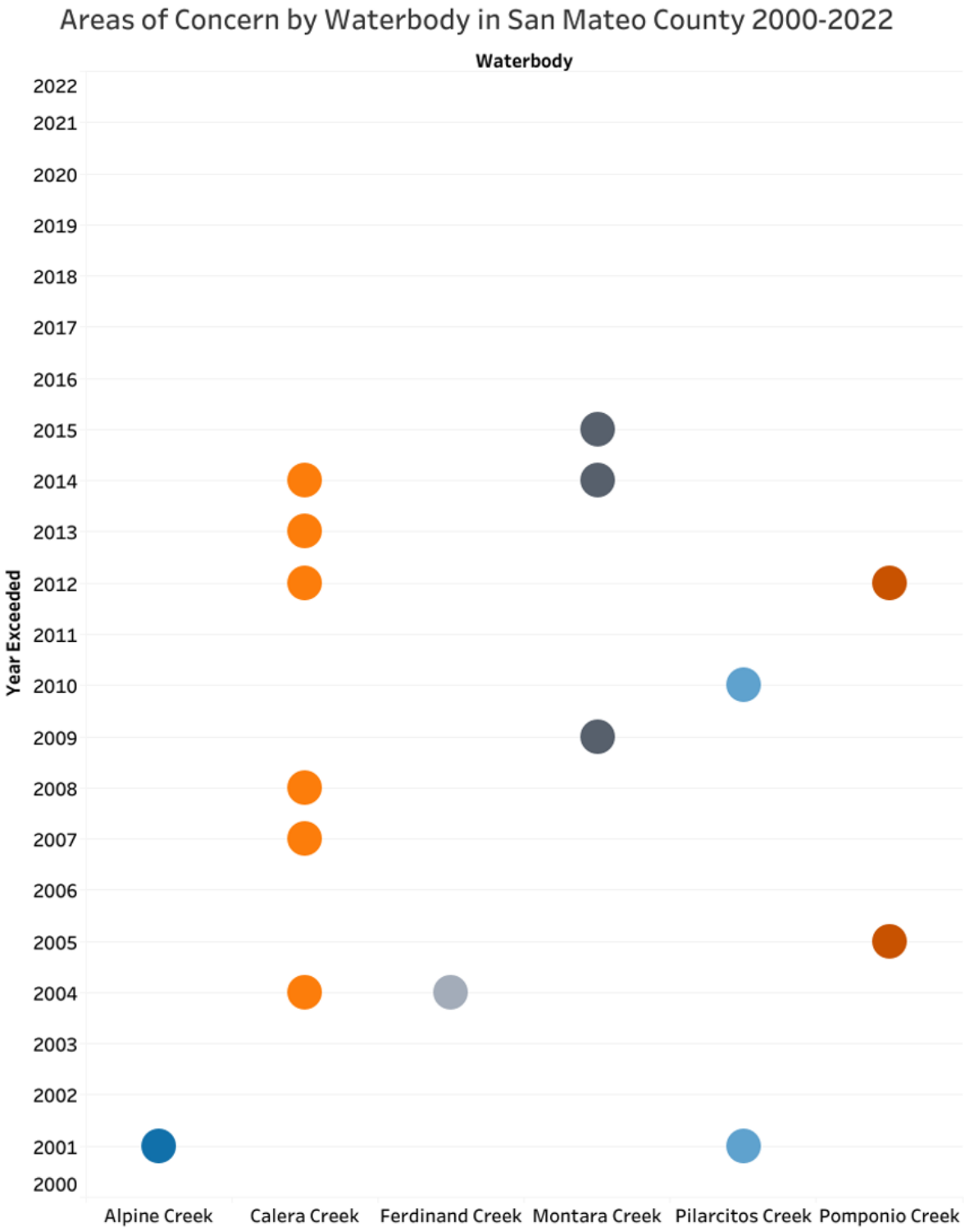

Figure 7. Areas of Concern by waterbody in San Mateo County from 2000-2022 with the dots signifying the year that the waterbody exceeded three or more WQOs or Action Levels for the given year. No waterbody in San Mateo County in 2022 was designated as an Area of Concern.

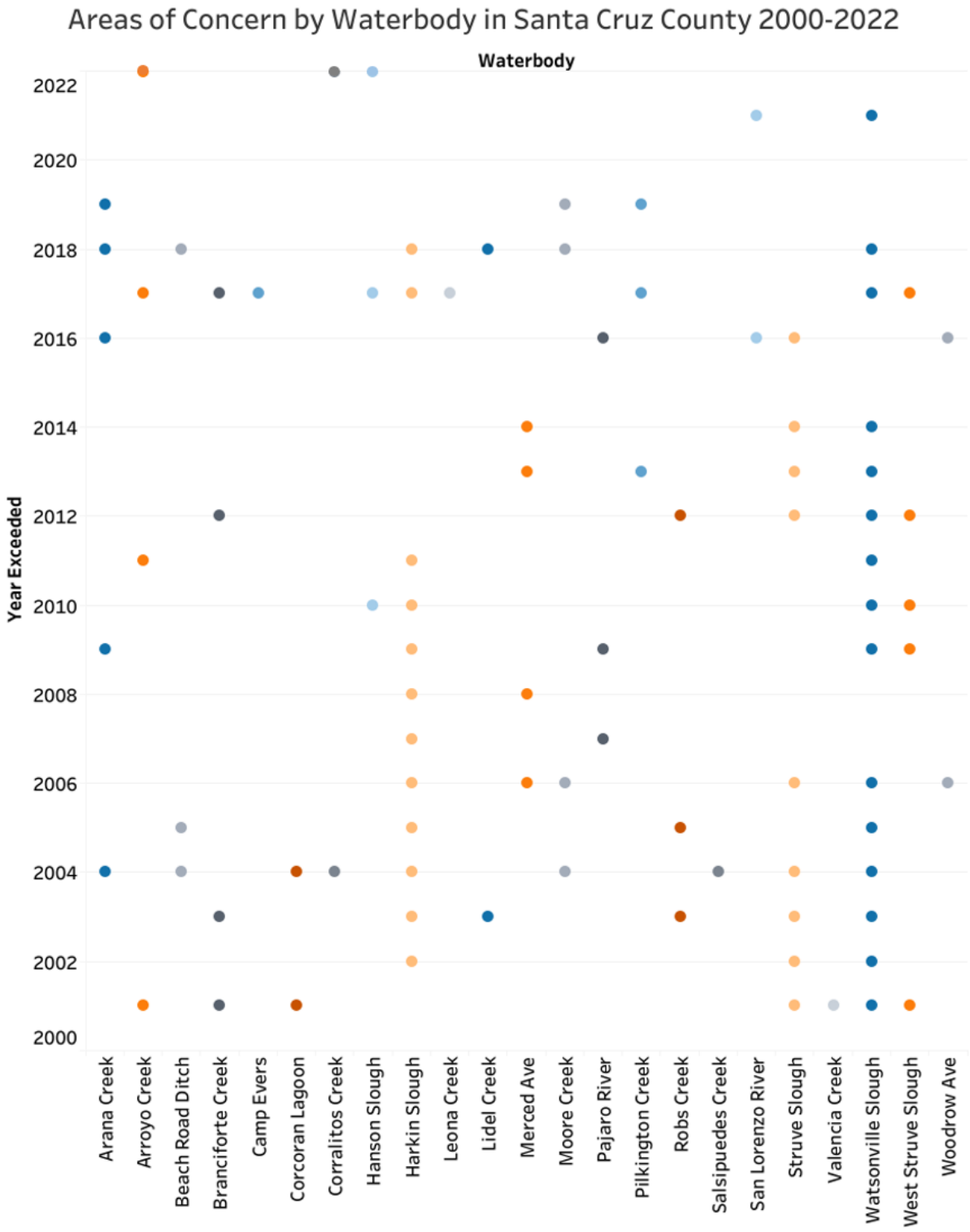

Figure 8. Areas of Concern by waterbody in Santa Cruz County from 2000-2022 with the dots signifying the year that the waterbody exceeded three or more WQOs or Action Levels for the given year.

Table 12. Sites from 2022 in Santa Cruz County that were designated as an Area of Concern with the corresponding water body, standard exceeded, and measurement.

Site ID	Site Name	Standard Exceeded	Measurement	County	Water Body
304-ARROY-22	Arroyo Creek at Delaware Ave	Nitrate as N (mg/L)	1.3	Santa Cruz	Arroyo Creek
304-ARROY-22	Arroyo Creek at Delaware Ave	Orthophosphate as P (mg/L)	0.19	Santa Cruz	Arroyo Creek
304-ARROY-22	Arroyo Creek at Delaware Ave	E. coli (MPN/100mL)	1866	Santa Cruz	Arroyo Creek
304-ARROY-22	Arroyo Creek at Delaware Ave	Oxygen, Dissolved (mg/L)	5	Santa Cruz	Arroyo Creek
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	Nitrate as N (mg/L)	5.9	Santa Cruz	Corralitos Creek
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	E. coli (MPN/100mL)	319	Santa Cruz	Corralitos Creek
305-CORRA-21	Corralitos Creek at Thicket Lane and Green Valley Road	Oxygen, Dissolved (mg/L)	6	Santa Cruz	Corralitos Creek
305-HARKI-21	Harkins Slough at Harkins Slough Road	Temperature (Deg C)	21.2	Santa Cruz	Harkins Slough
305-HARKI-21	Harkins Slough at Harkins Slough Road	Oxygen, Dissolved (mg/L)	6	Santa Cruz	Harkins Slough
305-HARKI-21	Harkins Slough at Harkins Slough Road	Transparency (cm)	5	Santa Cruz	Harkins Slough

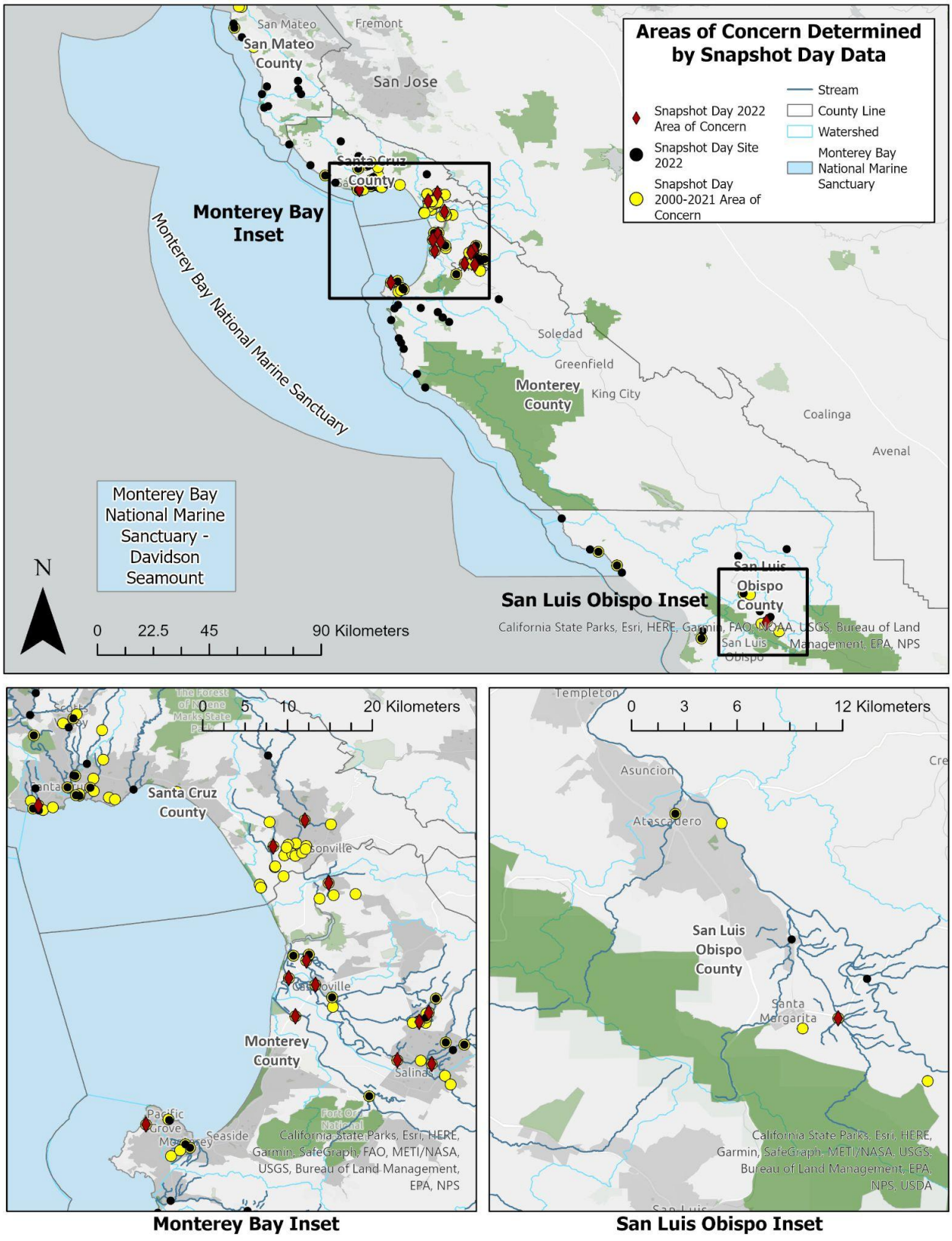

Figure 9. Areas of Concern for Snapshot Day 2022.

Conclusion

In its 22nd year, Snapshot Day 2022 brought together 91 committed citizens to monitor the water quality of 83 sites in creeks and rivers draining into the Monterey Bay National Marine Sanctuary. Throughout the past 22 years over 3,000 volunteers have donated more than 17,000 hours of their time to monitor creeks and rivers as part of Snapshot Day. In 2022, 32% 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.

Fourteen sites along 12 water bodies were listed as Areas of Concern (sites with three or more Water Quality Objective or Action Level exceedances) for 2022. Snapshot Day sites at the end 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 12 water bodies listed as Areas of Concern, ten 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: Arroyo Creek, Corralitos Creek, Harkins Slough, Elkhorn Slough, Moro Cojo Slough, Alisal Creek, Salinas Reclamation Canal, Salinas River, Santa Rita Creek, and Tembladero Slough. Only Asilomar Creek and Trout Creek are not listed on the 303(d) list. The methodology for this listing can be found at the State Board website: 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, orthophosphate, *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: 2022 Results by County and Site

	Site	E. coli (MPN/100mL)	Nitrate as N (mg-N/L)	Orthophosphate as P (mg-P/L)	Dissolved Oxygen (mg/L)	pH	Transparency (cm)	Water Temperature (Deg C)
Monterey County Sites	309-ALISA-32	1764	58.6	0.44	5.5	6.75	7.4	17.8
	309-ASILO-31	292	0.7	ND	5	6.5	105	13.3
	308-BIGSU-31	20	17.8	0.15	7	7	120	14.2
	307-CARME-33	62	ND	ND	9	7	120	15.7
	307-CARME-35	20	ND	ND	8	7	120	14.5
	307-CARME-36	62	ND	ND	8.5	7	120	14.8
	307-CARME-38	40	ND	ND	8.5	6.5	120	15
	306-MOROC-34	20	ND	ND	10	9	6	20.02
	306-ELKHO-34	216	26.4	1.6	6	7	120	16.2
	309-GABIL-31	NC	NC	NC	NR	NR	NR	NR
	308-GARRA-31	20	ND	ND	8	7.5	120	12.5
	307-GARZA-31	62	ND	ND	8	7	120	15.2
	309-CENTR-31	1980	0.7	0.08	4	7.5	120	14.5
	309-LIBRA-31	218	0.1	0.05	2	7	72	13.4
	309-MAJOR-31	20	ND	ND	8	7	120	12.7
	308-MALPA-31	62	0.4	0.02	5	7.5	120	12.6
	306-MOROC-31	1382	16.8	0.48	10	7.5	20	17.3
	306-MOROC-33	40	8.3	0.64	8	8	55.5	18.7
	309-NATIV-31	NC	NC	NC	5.5	7	78	13.3
	309-UPPER-31	NC	NC	NC	9	7	10.4	15
	308-PALOC-31	150	ND	0.03	9	7.5	103	12.8
	309-RECDI-31	1560	46	0.21	12	7.5	10.8	18.1
	308-ROCKY-31	20	0.1	ND	9	7.5	120	12.1
	309-SALIN-31	20	15.4	0.13	9	9.25	19.2	18.2
	309-SALIN-32	40	24.5	ND	8	7.5	52.3	18.4
	309-SALIN-33	NC	NC	NC	NR	NR	NR	NR

	308-SANJO-31	62	ND	0.05	6	6.5	120	13
	309-SRITA-32	240	3.1	0.02	9	7.5	31	22
	309-SRITA-33	NC	NC	NC	NR	NR	NR	NR
	309-SRITA-34	NC	NC	NC	7	7.5	NR	18.4
	309-SRITA-35	728	9.5	0.34	9	8	5.9	16.4
	308-SYCAM-32	20	ND	ND	5	7	120	13.4
	309-TEMBL-31	60	82	0.57	5	7.5	6.2	16.9
	309-TEMBL-32	20	27.9	ND	5.5	7.5	61	18.6
	309-TEMBL-33	82	50.6	0.39	4.5	8.5	35.1	17.7
San Luis Obispo County Sites	310-ARROY-41	563	ND	ND	9	7.5	NR	20
	310-LAGUN-41	173	0.1	ND	7	7.1	NR	19
	309-ATASC-41	908	ND	0.07	5	7.5	120	16.3
	310-UCF-41	63	1.2	0.56	9.44	8.48	NR	15.12
	317-ESTRE-43	NC	NC	NC	NR	NR	NR	NR
	309-SALIN-45	NC	NC	NC	NR	NR	NR	NR
	309-SALIN-47	NC	NC	NC	NR	NR	NR	NR
	310-CARPO-41	62	ND	ND	5	7	NR	14.2
	310-SANSI-41	31	ND	0.85	5	7.5	120	14.6
	309-SMARG-41	20	ND	ND	7	7	120	18.2
	310-SANTA-43	98	ND	0.03	6	7.25	120	14.2
	310-SYB-41	10	8	ND	7.11	8.29	NR	22.84
	309-TROUT-41	495	ND	0.17	5	7.5	120	14
San Mateo County Sites	202-ALPIN-11	275	0.1	0.3	7	8	130	12.5
	202-BUTAN-11	31	0.1	ND	9.5	7	52	13.6
	202-DEERC-12	199	ND	0.03	12	6	71.5	NR
	202-SANGR-14	10	NC	NC	8	7.5	120	11.6
	202-MARTI-11	NC	NC	NC	NR	NR	NR	NR
	202-MONTA-12	62	ND	ND	6	5	120	NR
	202-PESCA-11	63	ND	0.06	8	7	120	15.2
	202-POMPO-11	41	ND	0.1	10	7	115	16.5
	202-LAHON-11	98	ND	0.11	8	8	120	12.6
	202-SANGR-12	504	ND	0.09	9	7	120	13.7

Santa Cruz County Sites	304-NEWYE-11	82	0.4	0.03	10	7	130	13.06
	304-ARANA-22	436	0.2	ND	5	7.5	120	16.17
	304-ARROY-21	20	ND	ND	8	7	120	14.9
	304-ARROY-22	1866	1.3	0.19	5	7	120	15.1
	304-ARROY-23	864	1.4	0.09	7	7	120	13.5
	304-BRANC-21	486	0.1	0.09	8	7	120	17.3
	304-BRANC-22	244	0.1	0.16	11	7	120	12.89
	304-BRANC-23	382	0.2	0.12	7	7	120	14.44
	304-CARBO-21	394	5.9	0.05	9	7	120	13.9
	304-CARBO-23	148	0.1	0.1	9	7	NR	13
	304-CARBO-24	196	ND	0.11	7.5	7	120	14.3
	305-CORRA-21	319	5.9	0.06	6	8	112	13.9
	305-CORRA-22	20	0.1	0.07	8	8	121	13
	305-HARKI-21	104	ND	ND	6	8	5	21.2
	304-LIDEL-21	20	0.3	0.19	12	7	130	12.06
	304-MAJOR-21	NC	NC	NC	NR	NR	NR	NR
	304-MOORE-26	40	ND	0.06	7	9	55.8	14.5
	304-PILKI-21	2306	ND	0.1	6	7	120	12.8
	304-SANLO-22	218	0.1	0.08	12	7.5	111	17.3
	304-SANLO-26	82	0.4	0.1	8	7	120	14.5
	304-SANLO-27	268	0.2	0.04	9	7.5	120	13.4
	304-SCOTT-25	82	ND	0.04	10	7	130	14.72
	304-SOQUE-22	690	ND	0.09	7	7.25	120	18.83
	304-ZAYAN-21	NC	NC	NC	NR	NR	NR	NR
	304-ZAYAN-22	172	0.1	0.16	9.1	7.5	120	14

NC = Not Collected
NR = Not Recorded
ND = Non-Detect