



Snapshot Day Report May 1st 2004



Can you name these waterbodies? Answers are in report.

Results of a Sanctuary-Wide Water Quality Monitoring Event

Author:

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This report is available for download at www.montereybay.noaa.gov/monitoringnetwork/events.html



Executive Summary

Snapshot Day began on the Central Coast within the boundaries of the Monterey Bay National Marine Sanctuary on Earth Day 2000. The Monterey Bay National Marine Sanctuary (MBNMS) covers nearly 300 miles of California's Coast, stretching from the Marin headlands in the north to Cambria in the south. In the past three years, Snapshot Day has spread to the entire coast of California. Numerous non-profits as well as federal, state and local agencies work together to create the largest set of unified citizen monitoring data for California.

To compliment state and local monitoring efforts, the Monterey Bay Sanctuary Citizen Watershed Monitoring Network (Network), in collaboration with the Coastal Watershed Council, has been coordinating an annual Snapshot Day event on the Central Coast for the past 5 years. The Coastal Watershed Council coordinates San Mateo and Santa Cruz counties while the Network coordinates Monterey County, south to Morro Bay.

On the morning of May 1st, 2004, most volunteers gathered at one of six centralized Hubs, strategically placed in each of the four counties bordering the Sanctuary (San Mateo (2 Hubs), Santa Cruz (2 Hubs), Monterey, San Luis Obispo). The Hubs are a valuable component of Snapshot Day for logistical ease and providing a sense of comradery for the volunteers. The Hubs facilitated the tracking of equipment, lab sample chain of custody, verification of complete and accurate data sheets, and post calibration measurements. They also provided a means for volunteers to gather and feel part of a larger event.

In 2004, 201 volunteers monitored 168 sites. Results show that the majority of sites met the water quality objectives (WQO) intended to support cold water fish habitat. Eighty-seven sites (52%) had no exceedences of the WQOs for any of the parameters measured.

However, when samples did not attain water quality objectives, turbidity and dissolved oxygen were the most common field measurement to not meet the WQOs at 15% and 23% of the sites respectively.

The laboratory analysis indicated that bacteria from warm-blooded animals (*E. coli*), and orthophosphate exceeded the WQO at 24% of the sites. The *E. coli* exceedences were evenly distributed through all four counties while the orthophosphate exceedences were found primarily in the Watsonville Slough and Lower Salinas Valley.

This year, 18 Areas of Concern were identified down from fourteen last year. For three of these sites, it was the first time they were monitored on Snapshot Day. Of the 31 stations identified as Areas of Concern over the past five years, six have been Areas of Concern twice, nine were Areas of Concern three times and one (Alisal Creek, Salinas) was an Area of Concern every year.



Volunteers, at the Hub in Monterey, check their equipment.

A pattern is emerging from year to year with the results from this program. The same sites continue to be Areas of Concern and the same pollutants continue to be problematic. Also, the percentages of sites that exceed water quality objectives for each parameter are very similar from year to year.

There is tremendous opportunity to take this information and target available resources towards implementing best management practices, educating the local population and revising public policy, with the goal of improving water quality.

The volunteers collecting the data were well trained, and the rigorous quality assurance gives confidence that the results presented in this report are accurate. For the majority of sites, Snapshot Day is the only time they are ever monitored. We are grateful to the volunteers and all of our partners listed on the following page for making this event possible.

Central Coast Snapshot Day 2004 was organized by:

The **Monterey Bay Sanctuary Citizen Watershed Monitoring Network** (Network) supports citizen monitoring programs throughout the Monterey Bay National Marine Sanctuary. (831) 883-9303.

www.montereybay.noaa.gov/monitoringnetwork/welcome.html

The **Coastal Watershed Council** is a public education non-profit advocating the preservation and protection of coastal watersheds through establishment of community-based watershed stewardship programs.

(831) 426-9012. <http://www.coastal-watershed.org/>

The **California Coastal Commission** is proud to help support the Central Coast Snapshot Day as an important educational program linking land & water quality stewardship with coastal resource protection.

(831) 427-4863. <http://www.coastal.ca.gov/>

The **Monterey Bay National Marine Sanctuary (MBNMS) Water Quality Protection Program** works to protect the watersheds along nearly 300 miles of the Sanctuary's coastline. (831) 647-4201

<http://www.mbnms.nos.noaa.gov/>

The **Ocean Conservancy** (Center for Marine Conservation) is the largest national nonprofit organization committed solely to protecting ocean environments and conserving the global abundance and diversity of marine life through science-based advocacy, research, and public education, as well as informed citizen participation. (831) 425-1363

<http://www.cmc-ocean.org/>



Training in Cambria

Participating Agencies and Organizations

Arana Gulch Watershed Alliance
Beckman's Bakery
Big Creek Reserve
California Coastal Commission
Central Coast Regional Water Quality Control Board
City of Monterey
City of Pacifica
City of Pacific Grove
City of Santa Cruz
City of Watsonville
Coastal Watershed Council
Creek Environmental Laboratory
Crystal Geysers Water
DeAnza College
Earth Systems Science and Policy Program (CSUMB)
Elkhorn Slough National Estuarine Research Reserve
Garrapata Watershed Council
Greenspace
Gulf of the Farallones National Marine Sanctuary
Monterey Bay Analytical Services
Monterey Bay National Marine Sanctuary
Monterey Bay Sanctuary Foundation
Monterey County Community Links
Monterey Regional Water Pollution Control Agency
Morro Bay Volunteer Monitoring Program
New Leaf Market
Noah's Bagels
Nob Hill
Pacific Cookie Company
Peet's Coffee
Sanctuary Cruises
San Gregorio Environmental Resource Center
San Lorenzo Urban Restoration Project
San Lorenzo Valley High School
San Luis Obispo County Environmental Health
San Mateo County Environmental Health
Santa Cruz County Environmental Health
Santa Cruz Safeway
Scott Creek Watershed Council
Sewer Authority Mid-Coastside (SAM)
Starbucks Coffee
State Water Resources Control Board Clean Water Team
Surfrider Foundation
The Ocean Conservancy
Trader Joe's
United States Environmental Protection Agency
University of California at Santa Cruz
Upper Salinas Las Tablas RCD
Upper Salinas Watershed Coalition
Watershed Institute, CSUMB

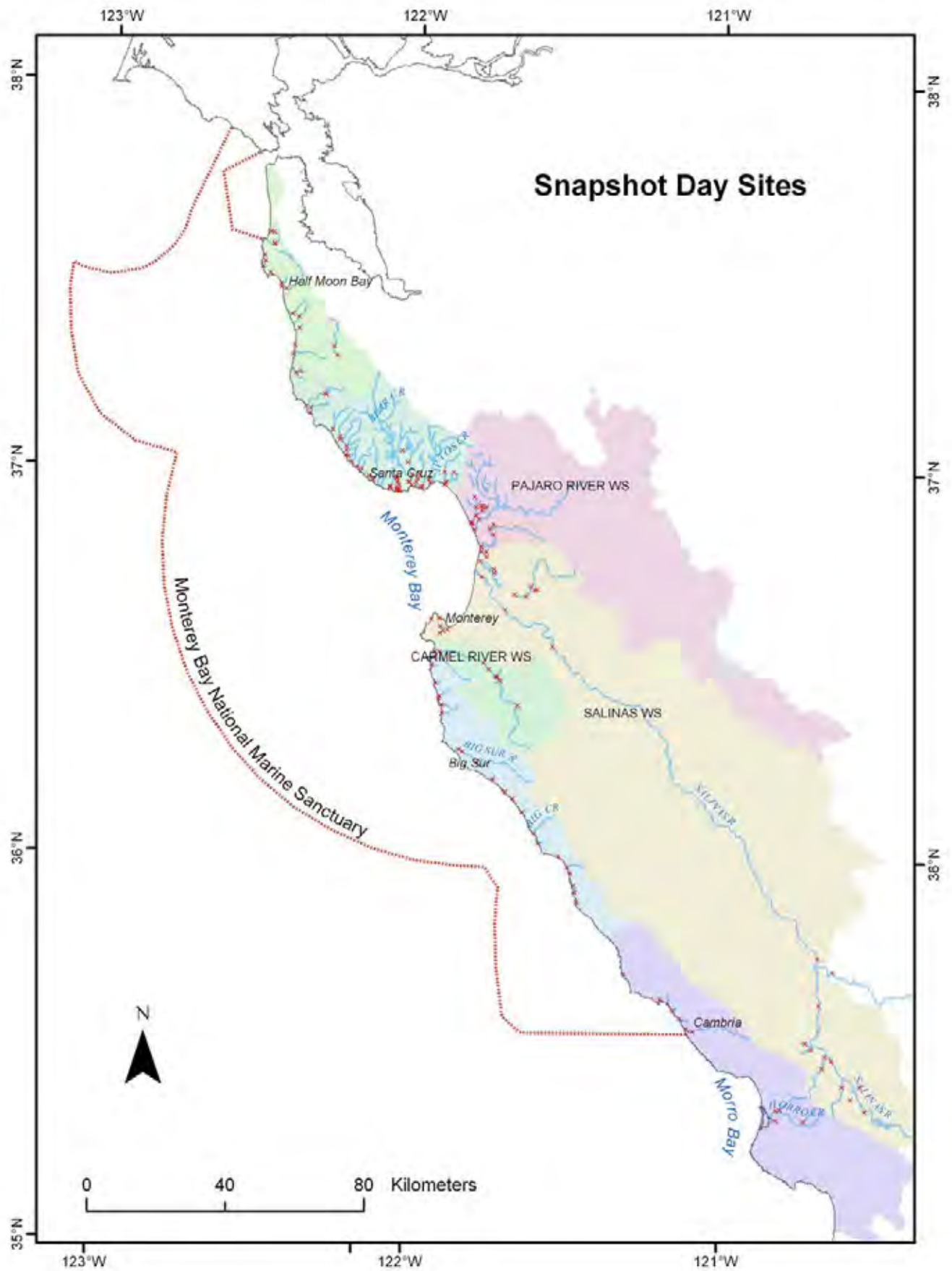


Figure 1. Map of Central Coast monitoring sites

Methods

On Snapshot Day, teams measured dissolved oxygen, water and air temperature, conductivity, pH, and transparency or turbidity. They also collected water samples for lab analysis of nitrate, orthophosphate, total coliform and *E. coli*. Monitoring teams were provided with a bucket “kit” that included either a Winkler or CHEMets Dissolved Oxygen kit, two bulb thermometers (for air and water) or one digital thermometer, Oakton conductivity meter, Machery-Nagel non-bleeding pH strips and a transparency tube or dual cylinder turbidity kit. The bucket also included distilled water, gloves, paper towels, trash bag, pens/pencils, sample bottles and clipboard with data sheets, instruction, maps, and photo documentation forms.



PJ Webb and Mary Kate Morabito at San Carpoforo Creek

The sample collection and field measurements were taken using the protocols developed by the State Water Resources Control Board’s Clean Water Team and detailed in the 2003 California Coast Wide Snapshot Day Monitoring Plan. The results were compared with general WQOs designated by the Central Coast Ambient Monitoring Program (CCAMP), the General Basin Plan or the US Environmental Protection Agency (see Table 1).

In order to ensure valuable data, a state approved Quality Assurance Project Plan and Monitoring Plan were developed specifically for this event. The volunteers collecting the data were well trained, and the rigorous quality assurance gives confidence that the results presented in this report are accurate.

Table 1. Water Quality Objectives

<u>Parameter (reporting units)</u>	<u>Water Quality Objectives</u>	<u>Source of Objective</u>
Dissolved Oxygen (ppm)	Not lower than 7 or greater than 12	Basin Plan Objective for Cold Water Fish
pH	Not less than 6.5 or more than 8.5	General Basin Plan objective
Water Temperature (°C)	Not more than 22	Basin Plan Objective for Cold Water Fish
Transparency (cm)	Not less than 25	Central Coast Ambient Monitoring Program (CCAMP)
Nitrate as N (ppm)	Not to exceed 2.25	Central Coast Ambient Monitoring Program (CCAMP)
Orthophosphate as P (ppm)	Not to exceed 0.12	Central Coast Ambient Monitoring Program (CCAMP)
<i>E. coli</i> (MPN/100ml)	Not to exceed 400	EPA Ambient Water Quality Criteria



David Norris, Kim Ha, Rachel Garret, and Jeff Johnson at the Carmel River

Results

On the Central Coast, 201 volunteers monitored 168 sites on 100 water bodies. Each year this event continues to grow with more volunteers participating and the addition of new monitoring sites. This was the largest turnout of volunteers and the most sites monitored in the five-year history of Snapshot Day on the Central Coast. Air temperatures averaged 18.7 °C (65.7 °F) along the coast.

Most stations met the water quality objectives as detailed in Table 1. Eighty-seven sites had no exceedence for any of the water quality objectives. Orthophosphate and *E. coli* were the two parameters that most often exceeded their water quality objectives at 24% of the sites.

All of the data from Snapshot Day 2004 can be found in tabular form in Attachment 3, which lists the results of every parameter by site. The data are also reported visually on the maps on pages 9-11. Map #1 shows nitrate-N results. Map #2 shows orthophosphate-P results. Map # 3 shows *E. coli* results.

The following describes the parameters evaluated during this event and their importance in the aquatic ecosystem. Please refer to Table 2 for statistical summaries.

Water Temperature

Water temperature is an important environmental factor for fish and other aquatic life, as many species need specific temperatures to survive and reproduce. Temperature also affects the concentration of dissolved oxygen in the water column and the rate of photosynthesis for aquatic

plants. Human activities such as water diversions that decrease flows or removal of streamside vegetation that shades the water, can lead to elevated water temperatures.

It is important to keep in mind that much of the data was collected in the morning hours; therefore water temperature results likely do not reflect the maximum daily or annual temperature for the water body.

The Basin Plan Objective for Cold Water Fish is no greater than 22 degrees Celsius (22°C). Temperatures above 22°C can be stressful for coho and steelhead and other aquatic organisms. The average temperature for Central Coast sites was 15.6°C. This year, twelve sites exceeded the temperature objective with values between 22.1 and 27.7 °C. Stations with elevated temperatures were primarily located in the Santa Cruz and Watsonville Slough areas. In 2003, there were just 3 exceedences of this water quality objective in the Moro Cojo, Tembladero Slough and Estrella River.

Dissolved Oxygen

All aquatic animals require dissolved oxygen to breath. The concentration of dissolved oxygen in the water column affects a wide range of behaviors such as feeding, spawning, and incubation. Excess nutrients can cause algal blooms and increased vegetation. Organisms then eat the vegetation and respire, which in turn depletes the amount of oxygen available in the water column.

The General Basin Plan Objective for dissolved oxygen is not less than 5 milligrams per liter (mg/l), however, on the Central Coast we use the

Table 2. Snapshot Day Statistics

Parameter	WQO	Stations Sampled	Number of Exceedences	Percent of Sites with Exceedences	Minimum Result	Maximum Result	Average Result
AirTemp	none	158	N/A	N/A	5	29.5	19
WaterTemp	≤ 22	158	12	8%	9.5	27.7	16
Dissolved Oxygen	≥ 7	164	37	23%	0	22	9
pH	≥ 6.5, ≤ 8.5	162	3	2%	6	9.5	7
Conductivity	none	157	N/A	N/A	30	34000	N/A
Transparency	≥ 25	94	13	14%	1.41	130	92
Turbidity	≤ 20	65	10	15%	0	370	20
<i>E. coli</i>	≤ 400	164	40	24%	10	24192	N/A
Total coliform	≤ 10000	164	29	18%	63	24198	N/A
Nitrate-N	≤ 2.25	164	23	14%	0.025	48.2	2.13
Orthophosphate-P	≤ 0.12	164	39	24%	0.025	2.72	0.15

Water Quality Objective for Cold Water Fish, which is not less than 7 mg/l or greater than 12 mg/l, based on the amount of dissolved oxygen needed by migrating steelhead trout. The average dissolved oxygen level for Central Coast sites was 8.5 mg/l, down from 8.9 mg/l last year. Twenty-three percent of the sites ranged from 6.8 mg/l to as low as 0.0 mg/l. Eight sites in the Upper Salinas watershed reported dissolved oxygen levels less than 7 mg/l. Two sites in the Watsonville Slough and one in the Elkhorn Slough had saturated oxygen concentrations between 12.8 and 22 mg/l of dissolved oxygen.

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, mineral, acids, 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.

Alkalinity/Acidity (pH)

pH is a measure of the percent of hydrogen ions in a water column. Water with a pH value of 7 is neutral, above 9 is alkaline and below 5 is acidic. Many chemical reactions in aquatic organisms that are important for survival and growth occur only within a very narrow pH range. Also, fish gills and fins can be damaged in extreme pH conditions.

The General Basin Plan Objective for pH are levels less than 8.5 or greater than 6.5. The average pH level for all Central Coast sites was 7.3, down from 7.6 in 2003. Waddell Creek in Santa Cruz had a

pH of 6. The Moro Cojo Slough and Corcoran Lagoon in Santa Cruz had a pH greater than 9.0. These were the same sites to exceed the water quality objective in 2003.

Turbidity/Transparency

Turbidity is a measure of the amount of suspended particles in water. Natural turbidity levels vary from stream to stream. Excessive turbidity may indicate erosion, nutrient loading, or artificial algae growth. Snapshot Day volunteers assessed area water bodies using either a transparency tube or the dual cylinder method. Approximately half of the teams used 120 cm transparency tubes and the other half of the teams used dual cylinder turbidity kits and a few turbidimeters.

Thirteen (14%) sites using the transparency tubes fell below the CCAMP Action Level for transparency of 25 cm (see Table 2). That means that the water was so turbid that a miniature secchi disc could not be viewed through 25 centimeters of water. As was the case in 2003, almost all of these sites were located in the lower Salinas Valley watershed. The site with the worst transparency however was at Butano Creek in San Mateo with a measurement 1.41 cm.

There is not an established water quality objective for turbidity measured by the dual cylinder method, however, a typical turbidity value for muddy water after a storm is between 20-50 Jackson Turbidity Units (JTU). Ten sites (15%) reported turbidity above this range, up from just one site in 2003. Moore Creek in Santa Cruz reported 100 JTU, up from 40 JTU last year. The other nine sites ranged between 25 – 370 JTU, primarily located in the Watsonville Slough region.

Volunteers also recorded turbidity by a visual analysis, classifying water clarity at a given site as: clear, cloudy, or turbid. Based on the completed data sheets, over 75% of the sites were described to have clear water, which is exactly the same as in 2003.

Nutrients

Nitrate and orthophosphate are nutrients that occur naturally in water bodies and promote aquatic plant growth. Excessive nutrient levels can lead to algal blooms and extensive aquatic weed growth that in turn depletes the amount of oxygen available in the water column. Runoff, containing detergents, fertilizers, animal waste, industrial waste, or sewage, contribute to elevated nutrient levels.

Twenty-three sites (14%), up from 18 in 2003 exceeded the CCAMP action level for nitrate (as N) of 2.25 mg/l (see Table 2). Nitrate results ranged from non-detect at many of the sites to 48.2 mg-N/l. The nitrate exceedences were found in many of the watersheds within the sanctuary. The highest concentrations were at Beach Road in Watsonville (35.85 mg-N/l), Tembladero Slough (37.3 mg-N/l) and Elkhorn Slough (48.2 mg-N/l). The Beach Road site in Watsonville had one of the highest nitrate concentrations in 2003 as well.

Thirty-nine (24%) sites reported concentrations above the General Basin Plan Objective for orthophosphate set at 0.12 mg-P/l (see Table 2). Orthophosphate results ranged from non-detect at many sites to 2.72 mg-P/l in Calera Creek, Pacifica, CA. Many of the exceedences were in the lower Salinas and Watsonville Slough watersheds. Other locations with exceedences included; one site in San Mateo County, eleven sites in Santa Cruz County, one site on the Monterey Peninsula, and seven sites in San Luis Obispo County.

Coliform

Most coliform bacteria originates from the feces of warm-blooded animals and are an indicator for human sewage or wildlife contamination, as well as feces-born organisms that can cause diseases such as hepatitis A, bacterial meningitis, and encephalitis. Excessive coliform counts can thus indicate potential problems for both aquatic and human health.

E. coli is a member of the fecal coliform group. The EPA Water Quality Criteria of 400 MPN/100 ml was used as the water quality objective. *E. coli* concentrations exceeded the water quality objective in approximately 24% of the sites monitored, down from 27% in 2003 (see Table 2). The two highest concentrations were found in San Bernardo Creek near Morro Bay (24,192 MPN/100ml) and in Moore Creek in Santa Cruz (5,172 MPN/100ml).



Cara O'Brien and Greg Saunders conduct the Winkler dissolved oxygen test.

Areas of Concern

By identifying stations that exceed three or more of the seven parameter as Areas of Concern, we can direct attention to a subset of water bodies. In addition, Snapshot Day has now implemented the same model for five years, which enables us to provide trends by water body and highlight those persistent problem areas.

This year, eighteen Areas of Concern were identified on the Central Coast, up from 14 identified in 2003, 11 identified in 2002, and 17 identified in 2001. Of the 31 stations identified as Areas of Concern, during any of those four annual events, six were Areas of Concern twice, nine were Areas of Concern three times and one was an Area of Concern every year (see Figure 3).

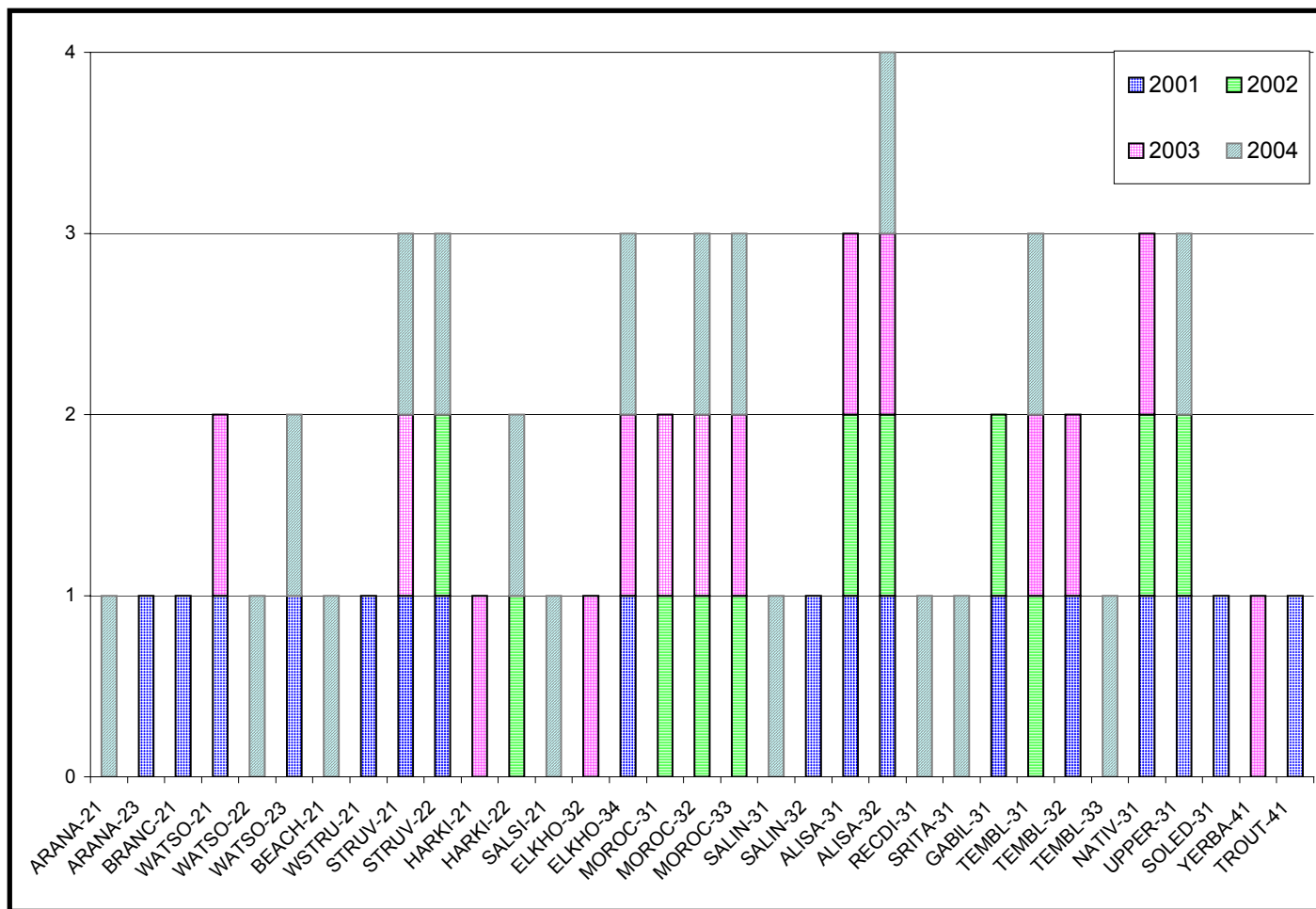


Figure 3. Areas of Concern from the most recent Snapshot Days across the Monterey Bay area

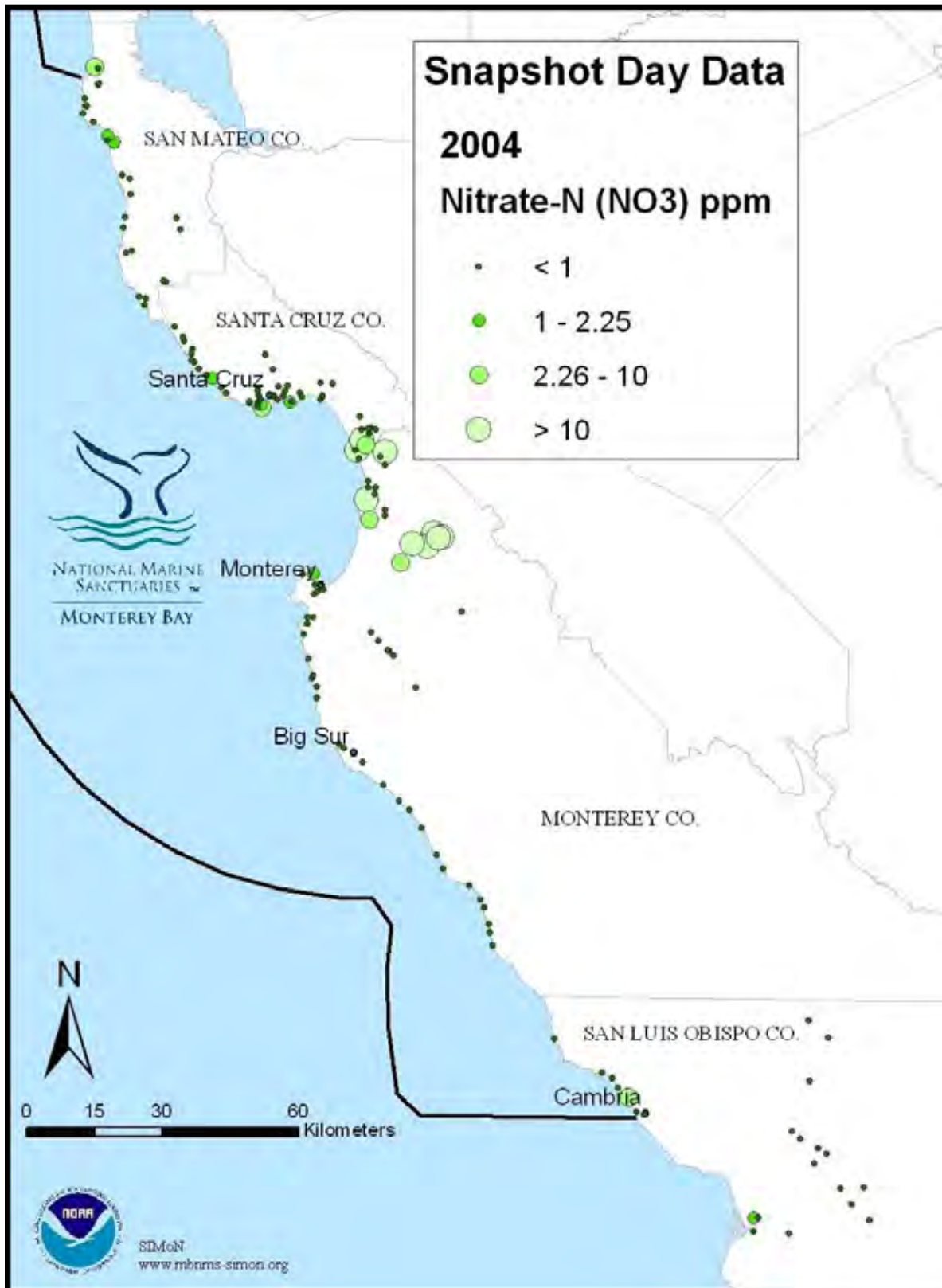
The 2004 Central Coast Areas of Concern were compared with California’s list of impaired water bodies. This list (2002 “303(d) list”) was generated by the Regional and State Water Quality Control Board and identifies impaired waterways. The methodology for this listing is available on the State Board web site (www.swrcb.ca.gov).

This comparison between the Snapshot Day sampling events and the 303(d) list is intended to compare Snapshot Day results with other studies to determine whether the results are similar and also to identify areas where further investigation is warranted. Of the

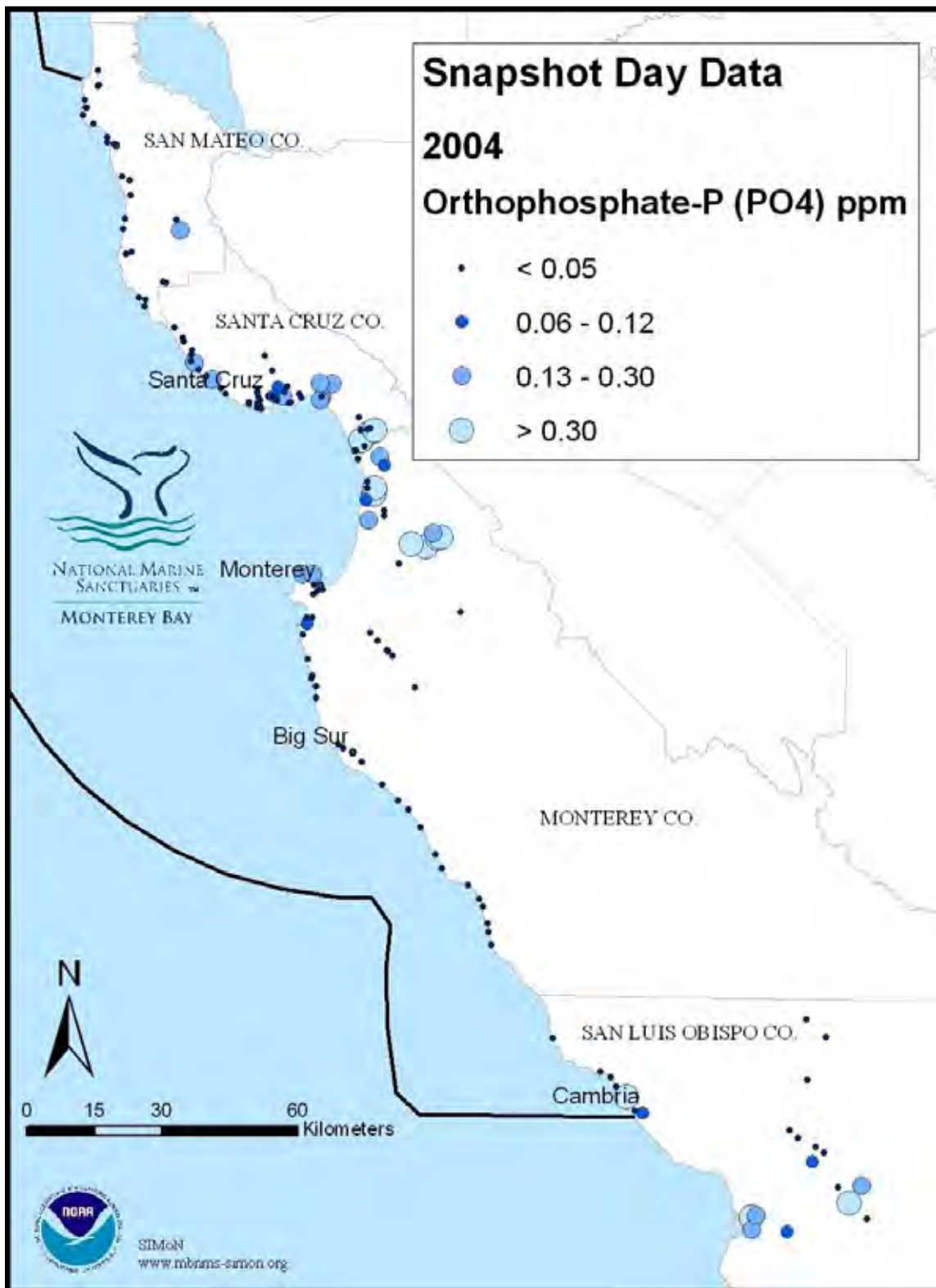
18 Areas of Concern identified in 2004 on the Central Coast, all but five were on the 303(d) list. The two sites on Natividad Creek in Salinas have been identified as Areas of Concern for three of four years that Snapshot Day has been implemented. Natividad Creek is not listed on the 303(d) list. For those that were on the 303(d), the Snapshot Day results correlate well with the impairments for which they are listed.

Three of the Areas of Concern were monitored for the first time in 2004. They are Salsipuedes Creek (Watsonville), Santa Rita Creek (Salinas), and the Tembladero Slough in Castroville.

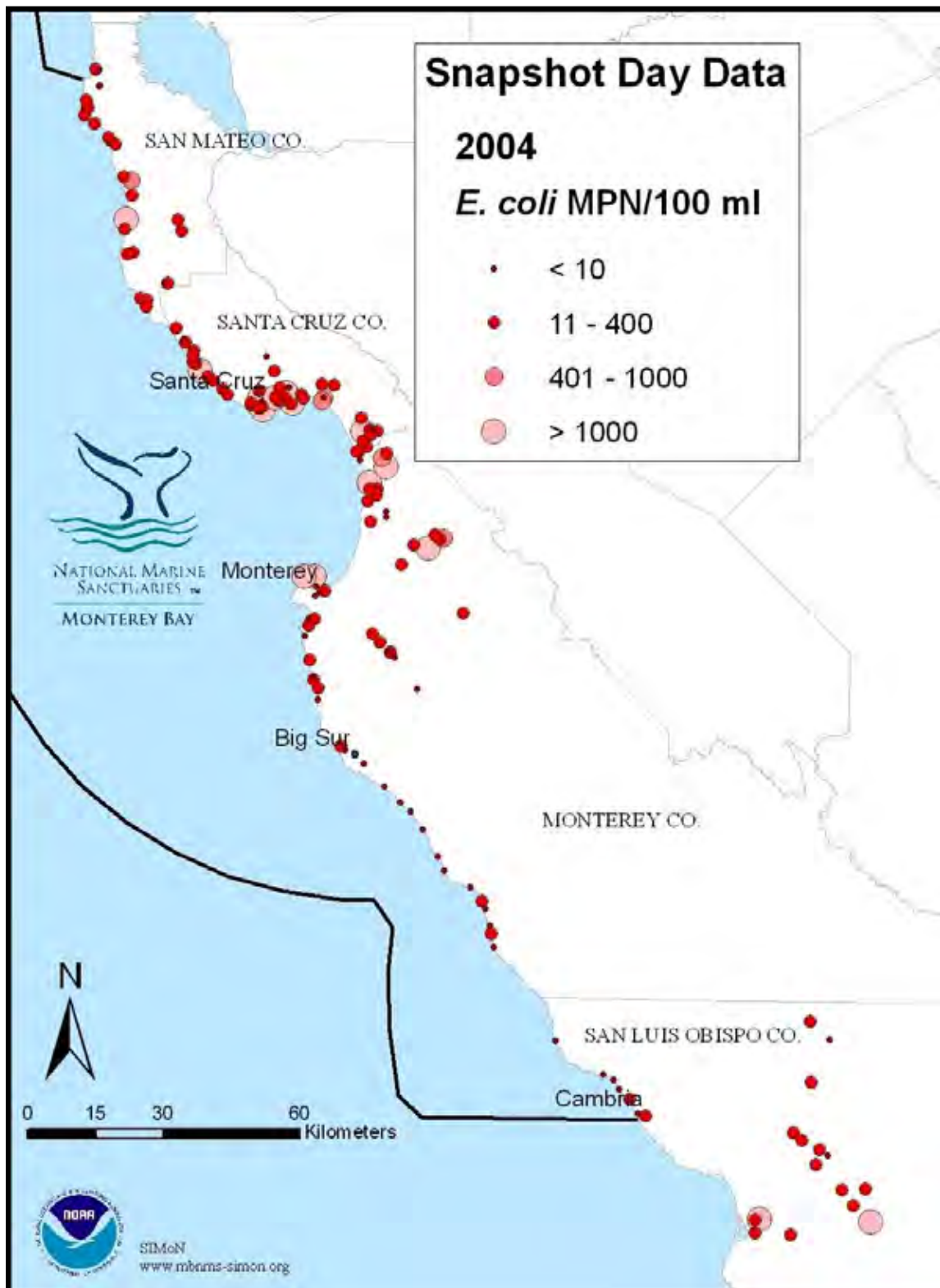
#1 Snapshot Day Nitrate-N Results



#2 Snapshot Day Orthophosphate-P Results



#3 Snapshot Day *E. coli* Results



Conclusion

Based on the data from this annual one-day monitoring event, the water quality of many of the coastal streams was in good condition. Eighty-seven sites (52%) did not have a single water quality impairment at the time the volunteers monitored. Results for each parameter were very similar to previous years both in the concentration and the number of exceedences of each parameter. The sites where those exceedences were detected were also similar to previous years.



Volunteers at the San Gregorio Hub

The results of the volunteer Snapshot Day event also supports other monitoring efforts and data sets. This one-day event is confirming some information that is already known. The coastal creeks in less populated areas with little agriculture seem to be in good condition. These creeks were found along the San Mateo coast, Big Sur coast and San Luis Obispo coast. Other creeks and sloughs are not so fortunate. We have identified 18 Areas of Concern within the sanctuary boundaries which continue to be impacted by various land uses including urban residential and agriculture.

It is important to acknowledge that there is an inherent bias toward the identification of Areas of Concern that are impacted by agriculture. This is partly by design; picking water quality parameters that represent the major issues on the central coast (nutrients and turbidity), and partly based on the greater ability of citizen groups to

<p>Waterbody names on cover:</p> <ol style="list-style-type: none"> 1. Big Creek 2. Vicente Creek 3. Carmel River 4. San Simeon Creek

monitor certain parameters (e.g. nutrients and dissolved oxygen) over other contaminants (oils and grease). The number of sites defined as Areas of Concern within agriculture areas is also influenced by the strong agriculture presence on the central coast. Fortunately, many efforts are currently underway to address agriculture impacts from nutrients and sediment. So, we hope to identify decreases in water quality problems as those efforts are implemented

There are other monitoring sites that were not Areas of Concern but reported a high measurement of one or more parameters. These locations include:

- For the second year in a row, Calera Creek in San Mateo County had the highest orthophosphate result of 2.72 mg-P/l, up from 1.6 mg-P/l in 2003. The nitrate value was 5.0 mg-N/l, up from 4.3 mg-N/l last year.
- Butano Creek, near Pescadero Marsh, had a transparency measurement of 1.41 cm.
- Eight sites in the Upper Salinas watershed reported dissolved oxygen concentrations less than 7.0 mg/l. Of these 8 sites, the following had concentrations less than 4.0 mg/l: Yerba Buena Creek, Salinas River, Rinconada Creek, Graves Creek and Trout Creek.
- San Bernardo Creek in Morro Bay reported an *E. coli* concentration of greater than 24,192 MPN/100 ml, the highest of all the sites.

Snapshot Day is a successful program on many fronts. Many of the sites are never monitored, except on Snapshot Day. Volunteers get the opportunity to learn how to monitor water quality and the importance of clean water. In addition, the value of this annual event continues to grow as we continue to build a long-term data set from which we hope to be able to identify trends and improvements in water quality. We are grateful to the volunteers and our partners for making this event possible.

Attachment 1 Snapshot Day Participants

Hub Participants	
Anne Jensen	
Bridget Hoover	
Erica Burton	
Gerry Doan	
Kelley Higgason	
Maris Sidenstecker	
Michelle Roest	
Rachel Saunders	
Tamara Doan	
Whelan Gilkerson	
Team Leader	Team Members
Angela Stuart	Evan Gasby, Matt Johnson, Abigail Sheets
Ann Gillespie	George Wright
Anna Cummins	Ross Clark
Annette Jackson	Jeff Hayes
Annie Schmidt	Sandy Ayala, Joey Arcoleo
Ben Bouldin	Cara O'Brien, Greg Sanders, Pat Bouldin
Bobby Jo Close	Phil LaFollete
Bonnie Van Hise	Sylvia Shih, John Fischer
Brian Fulfrost	Jennifer Stern, Bruce Willey
Burt Crapo	Colin Crapo
Chantell Royer	Sally Rayn, Michelle Fuller, Shelly Hoeft
Chris Berry	Chrissan Wells
Chris Coburn	Leonard Woren, Peggy Ruse
Chris Long	Ellen Long, Brian Long
Chuck Kozak	Mary Dunlop, Daniel Jue, Jean Fife
David Ludin	Ben Ludin, Claire Phillips
David Norris	Kim Ha, Rachel Garrett, Warren Yogi, Jeff Johnson
Debie Chirco-Macdonald	Rosalee Hackett
Dennis Norton	Kristin Sullivan, Dave Norton, Stu Sapia
Denyse Frischmuth	Gary Lasky, Robert Frischmuth, Sandy Lake, Ed Lake
DJ Funk	Tony Morales, Marti Johnson, Adriana Morales
Don Hoover	Brian Hoover, Tera Hoover
Drew Loganbill	Pat McIntyre
Dusten Dennis	Valentine Hemingway, Pete Lane

Attachment 1 Snapshot Day Participants cont.

<u>Team Leader</u>	<u>Team Members</u>
Gary Smith	Dan Hernandez, Richard Hernandez, Alejandro Valencia, Pat Fitz
Gregg Kerlin	Hilary Melarek, Fabian Alvarado, Pat Quarato
Heidi Klingel	Adrienne Deveny, Mike Pirolo, Jason Pirolo
Holly Tretten	Ann Kitajima
Huff McGonigal	Jason Nachamkin, Colleen McGonigal
Jan Hill	Ben Gregg, Alyson Tom, Jason Nee
Jean Marie Peterson	Rebecca Zuckerman, Jessica Pusser, Naomi Pusser
Jim Patterson	Sue Christian
Judd Perry	Mary Scannel
Kelleen Harter	Marlene Tise, Carey Dickerson
Kelly Palacios	Daniel Palacios
Kurt Merg	
Larry Johnson	Connie Jensen, Susan Ferrel, Javier Gonzalez, Cecile Mills
Lisa Emanuelson	Dave Parara
Lisa Harper Henderson	Sue Sawade
Liz Hightower	Larry Detloff, Anne Hightower
Lorenzo Rota	Rachel Levine, Joyce Levine
Loro Patterson	Scott Cotterel, Andrea Zuur
Mary Kate Morabito	Margaret (PJ) Webb
Michelle Franklin	Iris Wallace, Nick Wallace, Ty Wallace
Mike Powers	Jacquy Griffith, Rob Maclean, Jennifer Walton
Natalie Zayas	Don Jakody, Erica Taylor, Jose Zawala, Gonzalo Nunez
Neil Panton	Mary Panton, Suzana Gulmert, Julien Gulmert, Li Miao
Patti Long	Marisa Grosnick, Elliot Rubin, Noah McCormack
Paul Winn	Aaron Petray, Shaylla Chess, Lisa Circulo, Shannon Walsh
Pete Lane	Dustin Dennis, Valentine Hemingway
Rick Rollins	Wendi Shafir, Cheryl McGovern, Heather Holden, Will Taylor, Dieter Oviedo
Robin Lee	Claudia Pineda, Leslie Foote, Colin Ahern
Sara Godfrey	Breana George, Aubrey Belgard, Rebecca T., Deborah Nares
Scott Bogen	Dennis Long, Evan Lynch
Stephanie Olsen	Rick Lawrence, Barbara Hodson, Allen Achor
Tom LaHue	Gabe LaHue
Tony Pullin	Brenda Donald, Darcey Iwashita

Attachment 2

<h1 style="margin: 0;">Monterey Bay National Marine Sanctuary</h1> <h2 style="margin: 0;">Field Data Sheet</h2>					DOC ID# : _____																
					Datum																
Please Use one sheet for each Station. Use back for comments.					GPS Coordinates: W: _____																
					N: _____																
Watershed: _____					GPS ID: _____																
					Hydrologic Unit ID: _____																
Watershed Group Name: _____					Station (Site) ID: _____																
					Waterbody: _____																
Site map is attached to this data sheet, please update if necessary.					Waterbody Type: _____																
Flow discharge (circle one): Stagnant (NOT Flowing), Trickle (< 1 quart/sec). Moderate (< 5 gal/sec), High (> 5 gal/sec)			Volunteer Monitors TEAM LEADER (list full name & phone #): _____																		
Weather Conditions (circle): Has it rained within the last 24 hours? Y / N			Phone () _____																		
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">--SKY--</td> <td style="text-align: center;">--PRECIPITATION--</td> <td style="text-align: center;">--WIND--</td> </tr> <tr> <td>no clouds</td> <td>none</td> <td>none</td> </tr> <tr> <td>partly cloudy</td> <td>foggy</td> <td>breezy</td> </tr> <tr> <td>heavy clouds</td> <td>misty</td> <td>windy</td> </tr> <tr> <td>overcast</td> <td>rain</td> <td>blustery</td> </tr> </table>			--SKY--	--PRECIPITATION--	--WIND--	no clouds	none	none	partly cloudy	foggy	breezy	heavy clouds	misty	windy	overcast	rain	blustery	2) _____ 3) _____ 4) _____ 5) _____ (list additional names on back)			
--SKY--	--PRECIPITATION--	--WIND--																			
no clouds	none	none																			
partly cloudy	foggy	breezy																			
heavy clouds	misty	windy																			
overcast	rain	blustery																			
Time of Field Measurements: _____																					
INSTRUMENT ID	PARAMETER	RESULT	Replicate	UNITS	(circle appropriate unit)																
	Air Temperature			F or C	Water Clarity (circle one):																
	H2O Temperature			F or C	clear	cloudy murky															
	pH			pH units	<small>(water itself, not scum)</small>																
	Dissolved Oxygen			mg/l (ppm)																	
	Conductivity			µS mS	Sampling device used? Y N																
	Turbidity			JTU NTU	If so, what kind? Kemmerer bottle																
	Transparency			cm	other: _____																
				UNIT _____																	
				UNIT _____																	
				UNIT _____																	
Notes and Observations : (include any equipment comments/problems or observations such as water color, trash composition, etc. .)				Fish or Wildlife Observed: (describe number seen, length of fish, and behavior)																	
Sample Collection:																					
Sample ID:	Time Collected:	Collected by:	Type:	Container type :																	
			Bacteria																		
			Nutrient																		
Sample Custody:																					
Relinquished By:			Received By:																		
Date / Time:			Date / Time:																		
This event sponsored by the California Coastal Commission and Monterey Bay National Marine Sanctuary In collaboration with the MBS Citizen Watershed Monitoring Network, Coastal Watershed Council and The Ocean Conservancy.																					
Do not jeopardize your personal safety to complete this datasheet.																					

Attachment 3. Results by County/Station cont. (Yellow represents exceedence of WQOs)

County	StationID	Waterbody Name	Sampling Collection Time	Flow Discharge	Air Temp (deg C)	Conductivity (µS)	Dissolved Oxygen (ppm)	E.coli (MPN/100ml)	NO3-N (mg-N/L)	pH	P04-P (µg-P/L)	Total coliform (MPN/100ml)	Transparency (cm)	Turbidity (JTU)	Water Temp (deg C)
Santa Cruz	305-HARKI-21	Harkins Slough	11:45 AM	not recorded	26.5	500	8	1785	0.025	7	0.025	2242		55	
Santa Cruz	305-HARKI-22	Harkins Slough	11:45 AM	stagnant	20.0	1000	6.4	20	11.83	7	0.38	24192		30	17.0
Santa Cruz	305-HARKI-23	Harkins Slough	10:16 AM	trickle (<1 quart/sec)	23.0	400	6	245	0.07	7	0.025	5475		15	
Santa Cruz	305-PAJAR-21	Pajaro River	10:15 AM	trickle (<1 quart/sec)	21.0	1300	8.4	31	7.09	7.5	0.025	8664		10	18.0
Santa Cruz	305-SALSJ-21	Salsipuedes Creek	10:55 AM	moderate (<5 gal/sec)	21.0	670	7	573	0.88	8	0.14	3654		370	15.0
Santa Cruz	305-STRUV-21	Struve Slough	10:40 AM	stagnant	25.5	300	3.4	10	0.025	7	0.025	148		100	24.0
Santa Cruz	305-STRUV-22	Struve Slough	12:58 PM	trickle (<1 quart/sec)	19.0	500	3.8	10	0.025	7.5	0.90	512		5	24.0
Santa Cruz	305-WATSO-21	Watsonville Slough	11:15 AM	stagnant	20.3	440	4	98	0.025	7.5	0.30	5475		15	17.0
Santa Cruz	305-WATSO-22	Watsonville Slough	12:25 PM	trickle (<1 quart/sec)	22.0	1200	10.8	52	18.44	7.5	0.41	24192		15	23.0
Santa Cruz	305-WATSO-23	Watsonville Slough	1:30 PM	moderate (<5 gal/sec)	20.5	11200	22	160	0.025	8.5	0.025	24192		150	24.0
Santa Cruz	305-WSTRU-21	Struve Slough	12:00 PM	stagnant	23.5	700	0	63	0.025	7	0.025	2909		15	13.0
Santa Cruz	306-CARNE-1	Carneros Creek	1:18 PM	stagnant	20.5	920	5	10	0.025	7.5	0.025	1223		40	20.0
Monterey	306-ELKHO-32	Elkhorn Slough	11:50 AM	moderate (<5 gal/sec)	25.0	1990	7.6	935	0.025	8	0.18	1182	42		23.5
Monterey	306-ELKHO-33	Elkhorn Slough	1:45 PM	high (>5 gal/sec)	20.0	1990	9.8	2143	0.025	8.5	0.025	2247	36		22.0
Monterey	306-ELKHO-34	Elkhorn Slough	10:26 AM	moderate (<5 gal/sec)	24.0	1680	12.8	231	48.20	8	2.21	11199	118		16.0
Monterey	306-MOROC-31	Moro Coho Slough		trickle (<1 quart/sec)	22.0	1991	10	141	0.87	8.5	1.44	24192		100	20.0
Monterey	306-MOROC-32	Moro Coho Slough	10:40 AM	moderate (<5 gal/sec)	24.0	1991	12	313	0.20	9	0.98	24192		90	24.0
Monterey	306-MOROC-33	Moro Coho Slough	10:16 AM	moderate (<5 gal/sec)	23.2	1991	7	1113	0.10	8.5	0.38	8664	11		22.1
Monterey	307-CARME-33	Carmel River	11:12 AM	high (>5 gal/sec)	29.5	330	8	37	0.025	7	0.025	980	100		14.9
Monterey	307-CARME-35	Carmel River	12:10 PM	high (>5 gal/sec)	25.0	320	8	32	0.08	7.5	0.025	980	100		16.0
Monterey	307-CARME-36	Carmel River	11:42 AM	moderate (<5 gal/sec)	24.0	390	9	40	0.09	7.5	0.025	1046	125		17.0
Monterey	307-CARME-37	Carmel River	11:07 AM	moderate (<5 gal/sec)	21.0	360	8	187	0.025	7.5	0.025	921	125		17.0
Monterey	307-CARME-38	Carmel River	10:19 AM	moderate (<5 gal/sec)	20.0	440	8	27	0.025	7.5	0.025	649	125		18.0
Monterey	307-CARME-39	Carmel River	11:00 AM	stagnant	20.0	2400	7	727	0.025	7.5	0.025	2419	120		17.5
Monterey	307-GARZA-31	Garzas Creek	11:47 AM	dry	27.0										
Monterey	308-BIGCR-31	Big Creek	12:13 PM	high (>5 gal/sec)	18.0	340	10	7	0.025	7.5	0.025	649		0	14.0
Monterey	308-BIGSU-31	Big Sur River	9:50 AM	moderate (<5 gal/sec)	25.0	300	9.83	17	0.025	7	0.025	1300	117		13.4
Monterey	308-BIGSU-32	Big Sur River	10:30 AM	high (>5 gal/sec)	23.0	280	9.85	7	0.025	7	0.025	387	116.84		13.7
Monterey	308-DOUD-31	Doud Creek	11:27 AM	trickle (<1 quart/sec)	16.6	390	7.7		0.36	7.5	0.025	120			13.2
Monterey	308-ELKHO-31	Elkhorn Slough	12:35 PM	moderate (<5 gal/sec)	22.0	1990	7	1414	0.12	8.5	0.05	1414	21.5		20.5
Monterey	308-GARRA-31	Garrapata Creek	11:45 AM	high (>5 gal/sec)	17.5	290	10.5	28	0.71	7	0.025	770	117		12.5
Monterey	308-HOTSP-31	Hot Springs Creek	12:38 PM	moderate (<5 gal/sec)	21.0	370	9.82	3	0.05	8	0.025	225	117		13.9
Monterey	308-LIMEK-31	Limekin Creek	10:17 AM	high (>5 gal/sec)	15.0	340	10	3	0.12	7.5	0.025	387		0	13.0
Monterey	308-LSUR-31	Little Sur River	1:11 PM	high (>5 gal/sec)	24.5	200	9.2	1	0.025	6.5	0.025	579	116		14.0
Monterey	308-LSUR-32	Little Sur River	10:22 AM	high (>5 gal/sec)	15.0	200	9.6	9	0.10	6.5	0.025	276	116		13.0
Monterey	308-MALPA-31	Malpasos Creek	1:20 PM	moderate (<5 gal/sec)	18.3	370	9.75	7	0.71	7	0.025	2419	117		14.1
Monterey	308-MCWAY-31	McWay Canyon	12:10 PM	moderate (<5 gal/sec)	21.0	340	9.85	3	0.025	7.5	0.025	219	117		14.0
Monterey	308-MILLC-31	Mill Creek	9:54 AM	high (>5 gal/sec)	18.5	420	10	10	0.08	7.5	0.025	549		0	13.0
Monterey	308-PALOC-31	Palo Colorado Cyn.	10:26 AM	moderate (<5 gal/sec)	14.2	520	8.4	41	0.025	7	0.025	1553	120		12.3
Monterey	308-PARTI-31	Partington Canyon	11:50 AM	high (>5 gal/sec)	23.5	340	10.26	1	0.025	7.5	0.025	135	117		13.5
Monterey	308-PLASK-31	Plaskett Creek	8:44 AM	moderate (<5 gal/sec)	15.0	410	8	15	0.025	7.5	0.025	1120		0	11.5
Monterey	308-PREWJ-31	Prewitt Creek	9:02 AM	high (>5 gal/sec)	15.5	340	10	3	0.025	7	0.025	1553		0	12.0
Monterey	308-ROCKY-31	Rocky Creek	10:45 AM	high (>5 gal/sec)	15.8	300	9	6	0.07	7	0.025	517	69.5		11.8
Monterey	308-SANJO-31	San Jose Creek	12:00 PM	stagnant	20.0	250	7	201	0.025	7.3	0.07	980	120		15.0
Monterey	308-SOBER-31	Soberanes Creek	12:40 PM	moderate (<5 gal/sec)	20.5	360	7	25	0.025	7.3	0.025	1414	120		15.0
Monterey	308-SYCAM-31	Sycamore Canyon	11:08 AM	trickle (<1 quart/sec)	24.0	330	6.5	1	0.11	7	0.025	162	117		12.7
Monterey	308-VICEN-31	Vicente Creek	10:34 AM	high (>5 gal/sec)	15.5	350	10	3	0.025	7.5	0.025	411		0	13.0
Monterey	308-WLDC-31	Wild Cattle Creek	9:30 AM	moderate (<5 gal/sec)	12.5	460	10	2	0.025	7.5	0.025	130		0	12.0
Monterey	308-WILLO-31	Willow Creek	8:21 AM	high (>5 gal/sec)	14.0	390	8	7	0.025	7.5	0.025	517		0	12.0
Monterey	309-ALISA-32	Alisal Slough	12:24 PM	not recorded	28.5	1390	8.4	1169	17.60	7.5	1.00	24192	8.5		21.5
Monterey	309-ASLO-31	Aslomar	11:02 AM	trickle (<1 quart/sec)		1750	5	1014	0.65	7	0.12	24192	117		
Monterey	309-CENTR-31	Central and 13th	10:15 AM	moderate (<5 gal/sec)		1440	8	1450	1.57	6.5	0.12	24190	117		
Monterey	309-DOLPH-31	Dolphin Brook	11:50 AM	moderate (<5 gal/sec)	19.2	1640	10	649	1.38	7.5	0.17	24190	130		13.0
Monterey	309-GABIL-31	Gabilan Creek	11:02 AM	trickle (<1 quart/sec)	23.5	990	8	60	17.90	7	0.14	2419	122		20.3
Monterey	309-LIBRA-31	Storm Drain	11:05 AM	trickle (<1 quart/sec)	20.6	10000	8	780	0.39	7.5	0.025	12033	91.4		14.0
Monterey	309-MAJOR-31	Major Sherman	10:15 AM	trickle (<1 quart/sec)	16.3	1260	8	17	0.06	7.5	0.025	2419	120		12.4
Monterey	309-NATIV-31	Natividad Creek	11:24 AM	stagnant	25.7	1020	6	305	11.50	6.5	0.49	8164	27.6		15.1
Monterey	309-RECDI-31	Rec Ditch	1:17 PM	moderate (<5 gal/sec)	26.5	1450	10.6	4352	17.40	8	0.92	24192	17		21.5
Monterey	309-SALIN-31	Salinas River	11:30 AM	moderate (<5 gal/sec)	19.2	5160	8	76	8.51	8	0.27	2419	19		21.2
Monterey	309-SALIN-32	Salinas River	10:26 AM	moderate (<5 gal/sec)	23.1	700	6	195	2.83	7.5	0.025	2419	40		17.9
Monterey	309-SALIN-33	Salinas River	10:38 AM	high (>5 gal/sec)	20.0	490	9	77	0.57	7.5	0.025	613	15.2		17.0
Monterey	309-SRITA-31	Santa Rita Creek	10:26 AM	trickle (<1 quart/sec)	22.6	1070	8	1850	9.83	7.5	1.45	24192	3.4		17.6
Monterey	309-TEMBL-31	Tembladero Creek	10:15 AM	high (>5 gal/sec)	20.0	1990	10	135	10.70	8	0.54	24192	13		19.0
Monterey	309-TEMBL-32	Tembladero Slough	11:55 AM	stagnant	23.0	1990	12	341	19.30	8.5	0.05	24192	15.2		21.0
Monterey	309-TEMBL-33	Tembladero Slough	11:05 AM	moderate (<5 gal/sec)	19.0	1991	12	620	37.30	8.5	0.53	24192	14.2		19.0
Monterey	309-UPPER-31	Upper Natividad Ck	11:44 AM	moderate (<5 gal/sec)	25.8	880	10	836	12.10	7	0.42	24192	4.2		21.5
San Luis Obispo	309-ATASC-41	Atascadero Creek(309)	8:00 AM	moderate (<5 gal/sec)	9.0		6	185	0.025	7	0.09	7270			14.0
San Luis Obispo	309-ATASC-42	Atascadero Creek(309)	8:35 AM	trickle (<1 quart/sec)	11.0	109	109	0.025	7.4	0.025	1046				12.5
San Luis Obispo	309-GRAVE-41	Graves Creek	9:05 AM	stagnant	15.0		3	52	0.025	6.6	0.025	2359			13.0
San Luis Obispo	309-PASOR-41	Paso Robles Creek		not recorded	14.0	890	6.5	197	0.025	7.4	0.025	4106	61	0	15.0
San Luis Obispo	309-RINCO-41	Rinconada		trickle (<1 quart/sec)	17.0	740	3	4884	0.025	6.5	0.025	19863			13.5
San Luis Obispo	309-SALIN-44	Salinas River	7:38 AM	trickle (<1 quart/sec)	9.0		10	63	0.20	7.8	0.025	2755			15.0
San Luis Obispo	309-SALIN-45	Salinas River	10:30 AM	trickle (<1 quart/sec)	24.0	600	3	20	0.025	6.5	0.025	5172			17.0
San Luis Obispo	309-SALIN-47	Salinas River		not recorded	13.0	1440	5	10	0.025	7.9	0.17	2613	61	3.2	16.0
San Luis Obispo	309-SMARG-41	Santa Margarita Creek	6:48 AM	moderate (<5 gal/sec)	5.0		10	74	0.025	8.3	0.025	4352			15.5
San Luis Obispo	309-TROUT-41	Trout Creek		trickle (<1 quart/sec)	15.0	650	3.5	265	0.025	7	0.41	2359			13.0
San Luis Obispo	309-YERBA-41	Yerba Buena Creek		stagnant	11.0	1320	1	107	0.025	7.5	0.27	4611			14.0
San Luis Obispo	310-CARPO-41	San Carpoforo	10:22 AM	high (>5 gal/sec)	14.2	440	9.4	10	0.025	7.5	0.025	512	118		15.6
San Luis Obispo	310-DAL-41	Dairy Cree	12:02 PM	trickle (<1 quart/sec)	9.40	7.41	85	0.025	7.7	0.06	3441		0.39		17.5
San Luis Obispo	310-PENN-41	Pennington Creek	11:45 AM	moderate (<5 gal/sec)	7.30	10.94	389	0.025	7.8	0.05	1576		0.39		15.6
San Luis Obispo	310-SANSI-41	San Simeon Creek	9:40 AM	trickle (<1 quart/sec)	13.2	1040	7.2	63	5.30	7.5	0.47	5475	120		15.7
San Luis Obispo	310-SANTA-41	Santa Rosa Creek	9:30 AM	moderate (<5 gal/sec)	17.0	940	8.2	73	0.025	8	0.06	6131	114		15.5
San Luis Obispo	310-SBE-41	San Bernardo Creek	1:00 PM	moderate (<5 gal/sec)	9.00	10.26	24192	0.20	7.7	0.13	24192			0.63	17.4
San Luis Obispo	310-SYB-41	Los Osos Creek	11:20 AM	moderate (<5 gal/sec)	34000	9.6	10								