



May 17th 2003

Results of a Sanctuary-Wide Water Quality Monitoring Event

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- This report is available for download at www.montereybay.noaa.gov/monitoringnetwork/events.html
- The Coast Wide Report is available at <http://www.coastforyou.org/>

Introduction

On May 17th 2003, citizen monitoring groups along the entire coast of California joined forces to sample California's coastal water bodies including bays, estuaries, rivers, streams, ocean and more. With funding from the State Water Resources Control Board and the U.S. Environmental Protection Agency, the Monterey Bay Sanctuary Foundation partnered with the California Coastal Commission and the Coastal Watershed Council to coordinate a single day of monitoring along the entire California coast.

The objective for Snapshot Day 2003, held on Saturday, May 17th, 2003, was to get volunteers, from the Northern California border to the Southern California border, into their coastal waterways to systematically sample the surface waters flowing off the California coast and into the Pacific ocean. Participants were trained how to monitor their watersheds using standardized protocols defined by the Snapshot Day Quality Assurance Project Plan and Monitoring Plan developed specifically for this event. Monitors measured water and air temperature, pH, conductivity or salinity, dissolved oxygen and transparency or turbidity in the field. At many of the sites, samples were collected for laboratory analysis of bacteria and nutrients.



Figure 1. Coast Wide Snapshot Day Coastal Monitoring Coordinator's area of responsibility.

The 2003 event was orchestrated by eight Coastal Monitoring Coordinators responsible for organizing the event in each of eight sections of the coast (Figure 1). The event was supported by numerous state and local agencies. Sixty-nine individual watershed and citizen monitoring groups participated along with many new volunteers, working together to monitor water quality at 546 sites along the California Coast.

Together, 637 participants worked to answer the question: What is the quality of the water flowing to the coast on May 17th 2003? The Snapshot Day Coordination Team also addressed the additional questions of, "Are the coastal waters of California meeting the water quality objectives designated by the Regional Water Quality Control Boards and does citizen monitoring events encourage environmental stewardship?"

Goals of Coast Wide Snapshot Day 2003 were to:

- Provide positive collaboration and foster continued coordination among the participating state agencies and watershed groups that are currently monitoring water quality in coastal watersheds
- Establish and enhance communications between monitoring programs throughout the coast by fostering relationships
- Enhance the abilities of new and existing monitoring programs by providing training and equipment
- Identify "areas of concern" where measured parameters do not meet water quality objectives and additional investigation is warranted
- Establish baseline water quality information for waters that would otherwise not be monitored
- Evaluate the quality of water based on general water quality objectives as established by State and Federal guidance.
- Provide water quality educational opportunities for the public

Central Coast Executive Summary

Four years ago on Earth Day, the first Snapshot day became a reality when the Monterey Bay National Marine Sanctuary, Coastal Watershed Council, California Coastal Commission and The Ocean Conservancy teamed up to evaluate water quality on the central coast from Pacifica to Cambria. Following three successful years of this program, funding was obtained to take Snapshot Day coast wide, where, for the first time, the entire coast of California would be monitored on the same day. This could not have been done without the contributions of numerous volunteers, dedicated monitoring organizations, and funding provided by the US Environmental Protection Agency and the California State Water Resources Control Board. A report summarizing the statewide event can be found at www.coastforyou.org. The following report describes the central coast component of this event.

This year, within the Monterey Bay National Marine Sanctuary, 155 people monitored 155 sites. Water



At the Monterey Hub, Bill Douros (MBNMS Superintendent), Bruce McPherson (State Senator), Bridget Hoover (MBNMS)

bodies as diverse as urban drainages, brackish sloughs, and major river systems were monitored. In-field measurements included; dissolved oxygen, pH, conductivity, temperature, and transparency/turbidity - parameters that measure the health of a water body and its ability to support fish and other aquatic organisms. Additionally, water samples were collected for laboratory analysis of nitrate, orthophosphate and bacteria at the majority of sites (see Figure 2).

The central coast effort was centered around four hubs, at two of which, we were honored with the company of several local and state elected officials. In Santa Cruz, Assemblyman John Laird, County Supervisor Ellen Pirie, and Mayor Emily Reilly spoke out in support of the Coast Wide event and declared May 17th, 2003 "Snapshot Day" in the City of Santa Cruz. In Monterey, Senator Bruce McPherson, Assemblyman Laird's Aid, Gary Shalcross,

and Sanctuary Superintendent Bill Douros were present to inspire and thank all of the volunteers for their commitment to this event.

Results show that the majority of sites met the water quality objectives intended to support cold water fish habitat. However, when samples did not attain water quality objectives, dissolved oxygen was the most common field measurement to miss the mark at 10% of the sites. Most of these sites were located in the Watsonville slough and scattered locations in Santa Cruz, Monterey and San Luis Obispo county streams. The laboratory analysis indicated that, bacteria from warm-blooded animals (*E. coli*), exceeded water quality objectives (WQO) at 27% of the sites and orthophosphate WQO were exceeded at 23% 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.



At the Santa Cruz Hub, (L to R) Rachel Saunders (MBNMS), Kaitilin Gaffney (The Ocean Conservancy), Ellen Pirie (County Supervisor), Emily Reilly (Mayor), Tamara Doan (Coastal Watershed Council), John Laird (State Assemblyman)

Fourteen Areas of Concern were identified this year as compared to eleven last year. These sites are all located within the Gabilan watershed, Watsonville sloughs and one site in the Upper Salinas watershed. Of the 25 stations identified as Areas of Concern during the last three Snapshot Days, eleven were Areas of Concern twice and three have qualified as Areas of Concern for the last three years of this program. The three are all located in Salinas on Natividad Creek and Alisal Slough.

The volunteers collecting the data were well trained, and the rigorous quality assurance gives confidence that the results presented in this report are accurate. This was the fourth annual Snapshot Day on the Central Coast. Each year has provided data that has been used to establish annual trends and identify locations that require investigation by local jurisdictions. For the majority of sites, Snapshot Day is the only time they are ever monitored.

Central Coast Snapshot Day 2003 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.
<http://www.mbnms.nos.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/>

“Funding for this project has been provided in part by the U.S. Environmental Protection Agency (USEPA) pursuant to Assistance Agreement No. C9-98998901-0 and any amendments thereto which has been awarded to the State Water Resources Control Board (SWRCB) for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the USEPA or the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.”

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
Creekside Environmental Laboratory
Crystal Geysers Water
DeAnza College
Earth Systems Science and Policy Program (CSUMB)
Elkhorn Slough National Estuarine Research Reserve
Garrapata Watershed Council
Greenspace
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
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
Starbuck's 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 GIS Lab
Upper Salinas Las Tablas RCD
Upper Salinas Watershed Coalition
Watershed Institute, CSUMB

Background

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. The MBNMS encompasses more than 5300 square miles of water including many diverse ecosystems and nearly 500 different species of fish, seabirds, and marine mammals. Eleven major watershed areas, including over 7000 square miles of land, drain into the MBNMS.

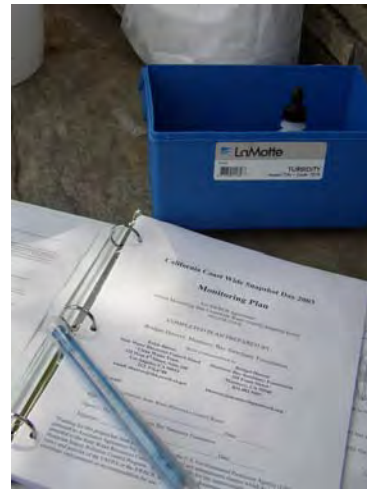
Land use in the Sanctuary's watersheds includes urban and suburban development, extensive areas of irrigated croplands, managed timber lands, grazing lands, and other agricultural activities. Extensive public lands with diverse multiple uses are also present, including lands under the management of the federal, state, and local governments. As water passes over any of the lands in these watersheds, it can pick up a variety of pollutants including sediments, oils and grease, nutrients, pesticides, and pathogens which can be transported to the region's rivers, wetlands, harbors, and nearshore waters.

To fill the gaps in state monitoring efforts, the Sanctuary, in partnership with the Coastal Watershed Council and The Ocean Conservancy, created the **Monterey Bay Sanctuary Citizen Watershed Monitoring Network** (Network). The Network is a consortium of citizen monitoring groups that monitor the health of the watersheds flowing into the Monterey Bay National Marine Sanctuary. It was established in 1998 and has since provided support, training, and a central forum for citizen monitoring programs. The Network arose out of one of the Sanctuary's objectives of establishing comprehensive monitoring of the health of the Sanctuary and its watersheds. The goal of the Network is to work towards comprehensive monitoring by helping to create integrated, long-term, volunteer-based water quality and watershed monitoring programs within the Monterey Bay National Marine Sanctuary and its accompanying watersheds.

The Network, in collaboration with the Coastal Watershed Council, has been coordinating an annual Snapshot Day event on the Central Coast for the past 4 years. The Coastal Watershed Council coordinated San Mateo and Santa Cruz counties while the Network coordinated Monterey County, south to Morro Bay.

Methods

In order to ensure valuable data, a state approved Quality Assurance Project Plan and Monitoring Plan were developed specifically for this event. Each of the documents were reviewed by the Coast Wide Coordination Team, Coastal Monitoring Coordinators and the Technical Advisory Committee. They were designed to include monitoring protocols and pertinent quality assurance requirements for all coastal water bodies that flow to the ocean, including marine waters.



Early in the morning on May 17th, 2003, most of the volunteers gathered at one of four centralized locations, called hubs, strategically placed in each of the four counties bordering the Sanctuary (San Mateo, Santa Cruz, 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. At the hubs, volunteers signed in to receive their official Snapshot Day t-shirt and bucket of equipment. Final instructions were given and safety precautions reiterated.

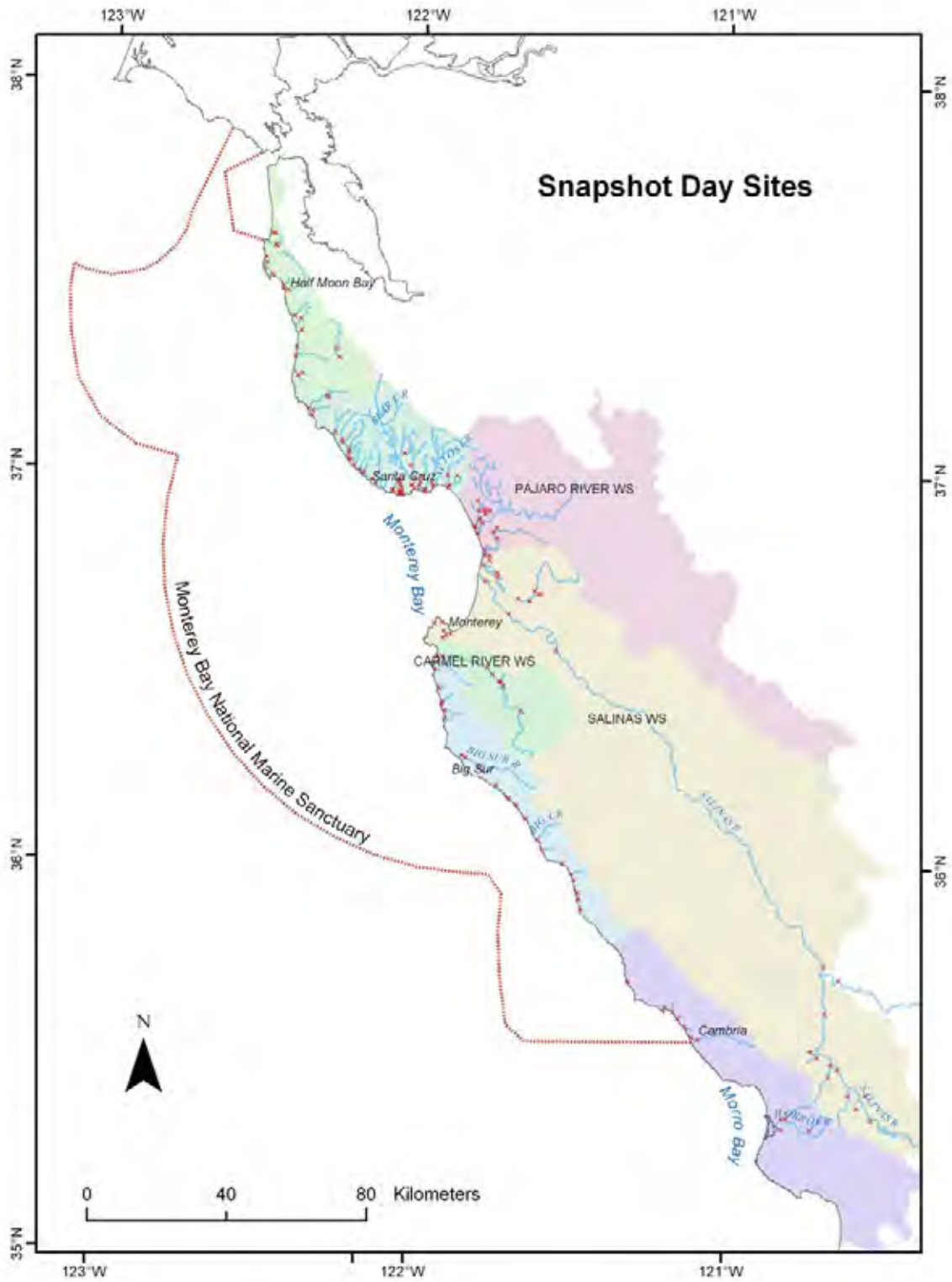


Figure 2. Map of Central Coast monitoring sites



Volunteers showing off their new t-shirts at the Santa Cruz Hub.

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, photo documentation form.

Every team 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*. The only sites that were not sampled for nitrate and orthophosphate were the nine streams between Big Sur and Lucia.

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 California Coast Wide Snapshot Day Monitoring Plan. The results were compared with general “Water Quality Objectives” (WQO) designated by the Central Coast Ambient Monitoring Program (CCAMP), the General Basin Plan or the US Environmental Protection Agency (see Table 1).

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	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 0.10	General Basin Plan objective
<i>E. coli</i> (MPN/100ml)	Not to exceed 235	EPA Ambient Water Quality Criteria



David Norris collects water at the Carmel River

Quality Assurance

An important component of the Snapshot Day event was the training of volunteer teams and the

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assurance that the data they collected was complete and accurate. The Snapshot Day program has continued to expand the quality assurance protocols, which provide the authors and the data users with the assurance that the data presented truly represent the quality of the waters sampled. For the Central Coast region, the efforts of the monitoring teams and participating labs paid off with all of the quality assurance protocols being followed and most of the objectives met.

The Central Coast implemented and met the objectives of the Quality Assurance Project Plan and Monitoring Plan developed for this event. Quality assurance/quality control (QA/QC) was accomplished through a pre-monitoring training and equipment calibration session prior to Snapshot Day. Four regional training sessions occurred throughout the Monterey Bay Sanctuary in May. The trainings were intended to familiarize all volunteer group leaders and coordinators with monitoring protocols, sampling equipment, datasheets and safety measures. All meters were calibrated prior to the event and those in the control of the Coastal Watershed Council or Network were calibrated after the event to document accuracy (drift). Other instruments such as thermometers and pH strips were compared to known standards and documented prior to the event.

The following is a list of the results of the laboratory QA required by the QAPP.

Table 2. Central Coast statistics

Parameter	WQO	Stations Sampled	Number of Exceedences	Percent of Sites with Exceedences	Minimum Result	Maximum Result	Average Result
AirTemp	none	153			12	31	17.95
WaterTemp	≤ 22	154	3	2%	9.5	26	15.01
Dissolved Oxygen	≥ 7	153	16	10%	0.32	16.4	8.88
pH	≥ 6.5, ≤ 8.5	154	6	4%	6.25	9.5	7.59
Conductivity	none	138			30	7560	
Transparency	≥ 25	62	11	18%	2	120	85.66
Turbidity	≤ 20	65	1	2%	0	40	
E. coli	≤ 235	153	41	27%	0	24192	
Total coliform	≤ 10000	143	23	16%	1	199000	
Ammonia-N	none	5			0.02	0.03	0.03
Nitrate-N	≤ 2.25	142	18	13%	0.01	78.3	4.03
Orthophosphate-P	≤ 0.10	142	34	24%	0.01	1.72	0.16

Lab samples

- Over 6% of the lab samples collected were duplicate samples for both bacteria and nutrient analysis.
- Four of the five labs running bacteria samples processed a field blank. Results for all blanks were less than the dilution factor.
- Four of the laboratories analyzed the nitrate standard (0.18 ppm NO₃-N) that was sent to each region on the coast for coast wide comparison.
- Three composite samples were analyzed by four labs for nitrate and orthophosphate (split sample).

All of the laboratories reported similar results for the field split samples as well as the Nitrate standard (0.18 ppm N). In addition, bacteria labs analyzed field blanks, which confirmed that no samples were contaminated during collection.

The monitoring teams also were tasked with completing rigorous quality assurance protocols including repeating the measurements collected in the field at one of their monitoring locations. These field replicates enabled us to ensure that field results were analyzed properly and that results were repeatable. For field replicates, only a few stations did not meet the objective for those measurements. Specifically, four dissolved oxygen samples had large variability between the two samples and ten turbidity/transparency replicates exceeded the objective.



Denyse and Robert Frischmuth with Bill Baird at the San Jose Creek

Results

On the Central Coast, 155 participants monitored 155 sites on 101 water bodies. This was the largest turnout of volunteers and the most sites monitored in the four-year history of Snapshot Day on the Central Coast. It was a beautiful day with temperatures ranging between 12 and 31 °C.

Most samples met the water quality objectives as detailed in Table 2. Orthophosphate and *E. coli* were the two parameters that most often exceeded their water quality objectives.

All of the data from Snapshot Day 2003 can be found in tabular form in Attachment 3. Please refer to the table for results of every parameter listed by site. The data are also reported visually on the maps on pages 13 and 14. Map #1 shows sites where physical water quality conditions are poor. Map #2 shows sites where high levels of nutrients and bacteria occurred. Map # 3 shows Areas of Concern. The data are also available online at www.montereybay.noaa.gov/monitoringnetwork/welcome.html

The following describes the parameters evaluated during this event and their importance in the aquatic ecosystem.

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. The average temperature for Central Coast sites was 15°C. This year, three sites exceeded the temperature objective with values between 24 and 26 °C. Stations with elevated temperatures were located on the Moro Cojo and Tembladero Slough in Monterey County and the Estrella River near Paso Robles in San Luis Obispo County.

Dissolved Oxygen

All aquatic animals require dissolved oxygen to breathe. The concentration of dissolved oxygen in the water column affects a wide range of behaviors such as feeding, spawning, and incubation. Nutrients found in sewage, fertilizers, and manure provides a food source for algae and aquatic weeds, causing blooms and increased vegetation. This 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 Water Quality Objective for Cold Water Fish, which is not less than 7 mg/l, based on the amount of dissolved oxygen needed by migrating steelhead trout. The average dissolved oxygen level for Central Coast sites was 8.9 mg/l. Ten percent of the sites ranged from 6.4 mg/l to as low as 0.3 mg/l. Two sites in Santa Cruz (Robs Creek and Branciforte Creek) and one in the Elkhorn Slough had saturated oxygen concentrations greater than 13 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 7.6. Six sites did not meet the water quality objective, with most

of them being greater than 8.6. These sites were located in the Elkhorn and Moro Cojo Sloughs and Corcoran Lagoon in Santa Cruz.

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.

Eleven (18%) sites using the transparency tubes fell below the CCAMP Action Level for transparency of 25 cm. That means that the water was so turbid that a miniature secchi disc could not be viewed through 25 centimeters of water. These sites were all located in the lower Salinas Valley and Watsonville Slough area.

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). Just one site reported turbidity in this range: Moore Creek in Santa Cruz reported 40 JTU.

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.

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. All sites except for the Big Creek area in Big Sur were tested for nutrients.

Eighteen (13%) sites exceeded the CCAMP action level for nitrate (as N) of 2.25 mg/l. Nitrate results ranged from non-detect at many of the sites to 78.3 mg/l. The majority of nitrate exceedences were found in the lower Salinas and Watsonville watersheds. The two highest concentrations were at Beach Road in Watsonville (52.4 mg/l) and Alisal slough in Salinas (78.3 mg/l).

Thirty-four (24%) sites tested above the General Basin Plan Objective for orthophosphate (as P) set at 0.10 mg/l. Orthophosphate results ranged from non-detect at many sites to 1.7 ppm in the Elkhorn Slough. Many of the exceedences were in the lower Salinas and Watsonville watersheds. Other locations with exceedences included; one site in San Mateo, eight sites in Santa Cruz county, one site on the Monterey Peninsula, three sites in the Upper Salinas watershed and two sites in the Morro Bay area.

Coliform

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.

All Central Coast sites were tested for Total coliform and *E. coli*. *E. coli* is a member of the fecal coliform group. The EPA Water Quality Criteria of 235 MPN/100 ml was used as the water quality objective. *E. coli* concentrations exceeded the water quality objective in approximately 27% of the sites monitored. The two highest concentrations were found near Morro Bay (24,192 MPN/100ml) and Pacific Grove (19,200 MPN/100ml). Two locations in the Watsonville area reported values of 3,076 and 9,208

MPN/100ml and one site upstream of Natividad Creek Park in Salinas reported 5,650 MPN/100ml.



Robin Lee and Alan Bilinski at the Rec Ditch in Salinas

Interesting to note, approximately .5 mile downstream through a highly vegetated riparian restoration area on Natividad Creek, the *E. coli* concentration was just 410 MPN/100ml.

Areas of Concern

By itself, a single day sampling program can provide only a glimpse into the quality of the state's coastal creeks and rivers. The Central Coast program has now implemented the same model for four years. Stations that exceed three or more of the seven parameters with Water Quality Objectives are identified as Areas of Concern.

This year, fourteen Areas of Concern were identified on the Central Coast (See Map #3), up from 11 identified in 2002, but down from the 17 observed in 2001. Of the 25 stations identified as Areas of Concern, during any of the three annual events, eleven were Areas of Concern twice and three have qualified as Areas of Concern for the last three years of this program (see Figure 3).

The 2003 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

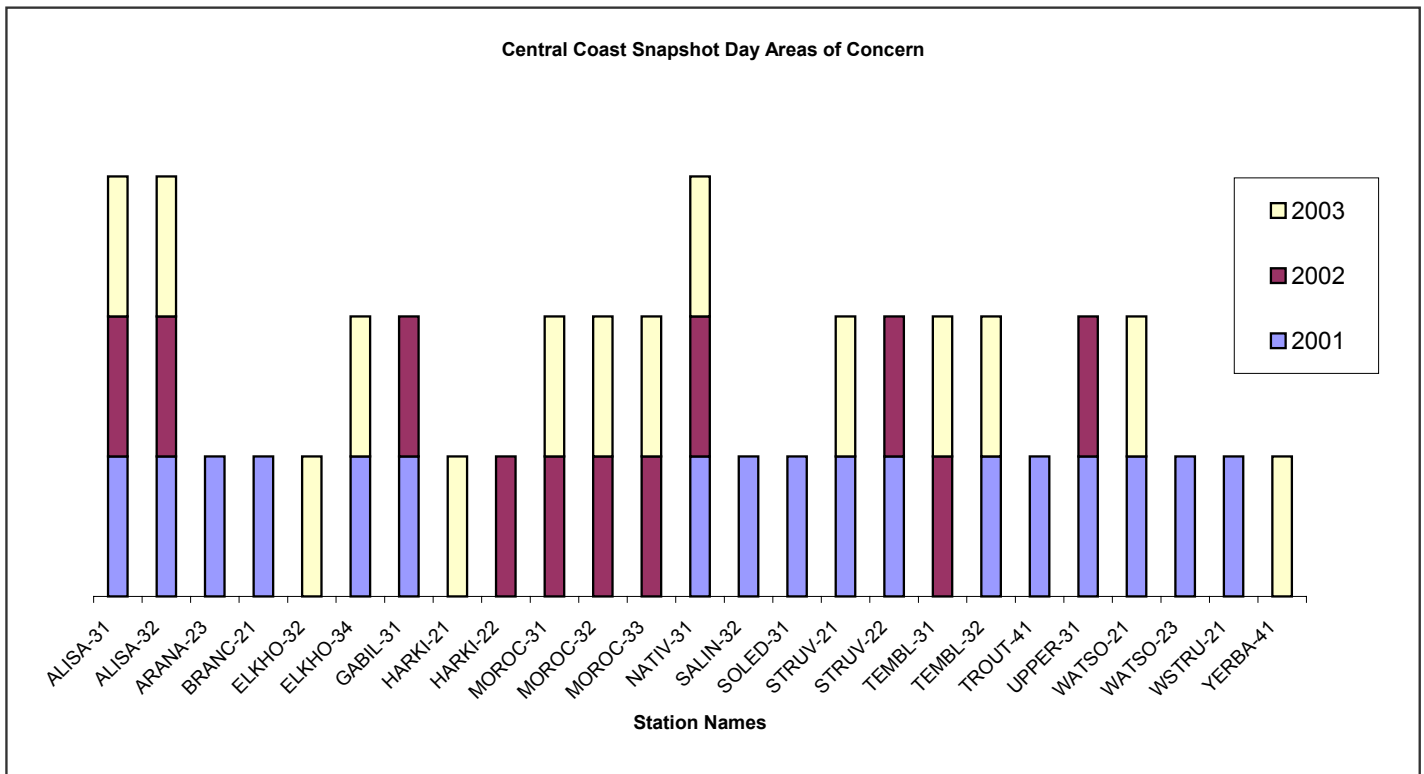


Figure 3. Areas of Concern from the three most recent Snapshot Days across the Monterey Bay area

Control Board and identifies impaired waterways. The methodology for this listing is available on the State Board web site (www.swrcb.ca.gov).

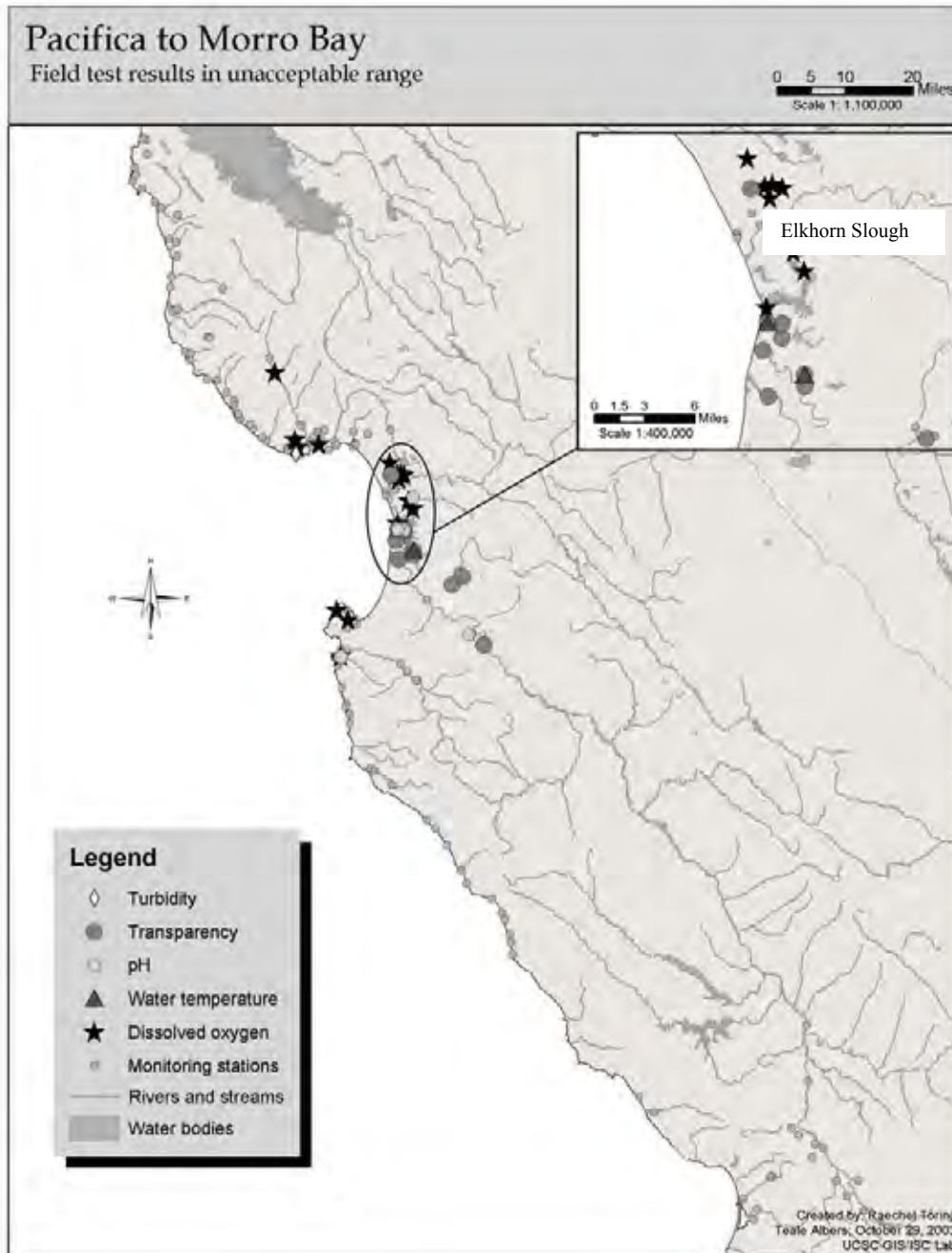
This comparison between the Snapshot Day sampling events and the 303d list is intended to compare Snapshot Day results with other studies to determine whether the results are similar and also to identify areas where further investigation is warranted. Of the 14 Areas of Concern identified in 2003 on the Central Coast, all but five were on the 303(d) list. For the nine that were listed, the Snapshot Day results correlate well.

Further investigation of the five locations not presently listed on the 303d list should be a priority for future monitoring; especially the two water bodies, Alisal Slough and Natividad Creek, which were identified as Areas of Concern all three years

of the Central Coast Snapshot Day program.

It was noted earlier in the section on Quality Assurance that ten transparency replicate measurements did not meet the criteria established in the QAPP. Three of these field replicates were taken at the Moro Cojo Slough. All three of the Moro Cojo stations were identified as Areas of Concern. While the transparency values were questioned, each of the three Moro Cojo stations exceeded four of the seven Water Quality Objectives and would therefore remain an Area of Concern regardless of the transparency value.

#1 Snapshot Day Locations with Poor Physical Conditions



Map 1 illustrates areas where physical measurements indicated a potential water quality problem. Snapshot Day 2003 results were compared with water quality objectives described in Table 2 for each parameter (temperature, dissolved oxygen, pH, transparency, turbidity) .

#2 Snapshot Day Locations with High Nutrient and Bacteria Concentrations

Map 2 illustrates areas where laboratory analysis indicated a potential water quality problem. Snapshot Day 2003 results were compared with water quality objectives described in Table 2 for each parameter (nitrate, orthophosphate, E. coli and total coliform) .

#3 Snapshot Day Areas of Concern

Map 3 illustrates Areas of Concern. If the water quality objective was exceeded for three or more of the seven parameters listed, it was deemed an Area of Concern. The parameters include dissolved oxygen, water temperature, pH, transparency/turbidity, nitrate, orthophosphate, and E.coli./fecal coliform.

Conclusion

Valuable data were obtained on Snapshot Day 2003. The majority of the sites would never be monitored if it was not for this one-day event. Snapshot Day provides a baseline of information on a large geographic scale. It helps resource managers to more effectively prioritize the water bodies that show some signs of environmental degradation. Some people question whether a single sample taken once a year can provide valuable information regarding the true health and quality of local water bodies. After four years of this program, the same Areas of Concern continue to appear. Water bodies which exceed water quality objectives at any time, especially Areas of Concern, should be prioritized to find and mitigate the sources of pollution.

Coast Wide

The Coast Wide Snapshot Day event surpassed all expectations. Stations were monitored from Del Norte County to Baja Mexico, all on the same day using the same protocols in order to answer a simple question.

- Throughout the coast, 265 stations (49%) met all of the water quality objectives.
- The northern most region, spanning from the Northern California border to the Navarro River, reported exceedences in dissolved oxygen, pH and turbidity only.
- The next region to the south, (Navarro River to Marin Headlands) reported exceedences of every WQO except nitrate.
- The other six regions reported exceedences for all parameters with water quality objectives.
- Out of the 277 stations that were monitored for every parameter, 33 or 6%, were identified as Areas of Concern.

Central Coast

The Central Coast had more Areas of Concern than any other region on the California Coast. This may be due to the fact that the most comprehensive monitoring on the entire coast was conducted in this region. All of the Areas of Concern that were identified are located in the lower Salinas Valley and Watsonville Slough area and one site near Atascadero. These two areas have received a considerable amount of grant funding to restore habitat and reduce pollutant sources. In future



Rebecca Thistlethwaite and Renee Flower at Arroyo Seca Creek

years, Snapshot Day should demonstrate that water quality on the Central Coast is improving as a result of the restoration and source mitigation projects that are ongoing in these areas.

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

- Calera Creek in San Mateo county with an orthophosphate-P result of 1.6 ppm and nitrate-N of 4.3 ppm.
- Los Osos Creek in Morro Bay reported a nitrate concentration of 9.2 ppm.
- Two urban sites on the Monterey Peninsula had *E. coli* values of 4,350 MPN/ 100 ml (library site in Monterey) and 19,200 MPN/ 100 ml (Greenwood Park in Pacific Grove).

These individual locations warrant more investigation. Already, on the Monterey Peninsula, upstream monitoring is being conducted in drainages with high bacteria concentrations to try to track the sources of the *E. coli* found both on Snapshot Day and in another citizen water quality monitoring program called Urban Watch.

Overall, the Snapshot Day event provides an opportunity for hundreds of citizens to spend a day in a local stream and collect data that is important to protecting and restoring our rivers and streams.

Attachment 1. CENTRAL COAST PARTICIPANTS

Alan	Bilinski	Tera	Hoover	Roger	Zachary
Bonnie	Van Hise	Don	Hoover	DJ	Funk
Clari	Binder	Van	Nguyen	Adriana	Morales
David	Norris	Lisandro	Gonzalez	Tony	Morales
David	Dilworth	Christela	Castro	Bill	Arkfeld
Denyse	Frischmuth	Zach	Washburn	Ivy	Arkfeld
Robert	Frischmuth	Annie	Schmidt	Jim	Patterson
Eduardo	Jalles	Oren	Trower	Jeff	Palmeter
Erica	Burton	Nat	Rojanasathira	Kara	Hagedom
Gabriel	Jost	Alexandra	Moore	Pat	Renshaw
Huff	McGonigal	Josh	Gardiner	George	Wright
Colleen	McGonigal	Katy	Imel	Annie	Gillespie
Jason	Watts	Dennis	Long	Gary	Allen
Jason	Nachamkin	Gary	Shallcross	Chris	Berry
John	Fischer	Patricia	Fernandez	Goerge	Cattermole
Judd	Perry	Paul	Swinderman	Brenda	Donald
Kelly	Palacios	William	Baier	Dave	Fichtner
Daniel	Palacios	Evonne	Elisondo	David	Fichtner
Ken	Ekelund	Sara	Dowe	Jean	Fife
Lisa	Emanuelson	Tim	Bolle	Jon	Harman
Mary	Scannel	Breonna	Tiffany	Chuck	Kozak
Mike	King	Miguel	Pantoja	Neil	Panton
Natalie	Zayas	Danny	Ceja	Richard	Rollins
Rick	Hawley	Steve	Todd	Sharon	Squire
Robin	Lee	Joseph	Torres	Ken	Tetzel
Rohanna	Mayer	Ricky	Cortez	Sharon	Towe
Ross	Clark	Sara	Sanchez	Zack	Alter
Suzanne	Gilmore	Dawn	Hayes	Jon	Anderson
Teresa	Middlebrook	James	Foster	Stephanie	Parker
Warren	Yogi	Krissy	Rathburn	Sara	Bauer
Anne	Hess	Bette	Mittleman	Chris	Coburn
Becky	Ohsiek	Pat	Bouldin	Carey	Cooper
Amanda	Ohsiek	Ben	Bouldin	R.E.	Crompton
Sylvia	Shih	Barbara	Schwimmer	Amy	Cross
Charles	Turk	Jeannine	Jacobs	Anna	Cummins
Brian	Hoover	Ann	Kitajima	Brad	Damitz

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Ton	Deetz
Lua	Del Campo
Marty	Demare
Ben	Fasbinder
Renee	Flower
Patrice	Friedmann
Brian	Fulfrost
Leah	Funk
Mari	Gilmore
Robin	Gysin
Gustav	Gysin
Dee	Hall
Susan	Harden
Valentine	Hemingway
Devin	Henderson
Nathan	Hendricks

Janet	Hodder
Alex	Hyden
Gareth	Jackson
Carolyn	Johnson
Matt	Johnston
Gregg	Kerlin
Benjamin	Ludin
David	Ludin
Jim	Mackenzie
Marabeth	Madsen
Charles	McClain
Marcia	Minniham
Gail	Olson
Emily	Reilly
Joel	Rintoul
Ruth	Romero

Roxanne	Rothafel
Mathers	Rowley
Robin	Springer
Jen	Stern
Tammy	Straw
Sadie	Miles
Barry	Taruks
Rebecca	Thistlethwaite
Chris	Thompson
Raechel	Toring
Melisa	Walker
Elliot	Weston
Richard	Woodbury
Tiffany	Wothington

Attachment 2

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Attachment 3. Results by County/Station

County	StationID	Waterbody Name	Time of Field Measure	Flow	AirTemp (Deg C)	Conductivity (µS)	Dissolved Oxygen (ppm)	pH	Transparency (cm)	Turbidity (NTU)	Water Temp (Deg C)	E Col (MPN/100 ml)	Total Coliform (MPN/100ml)	Nitrate-N (mg/L)	Ortho-phosphate-P (mg/L)
San Mateo	202-ALPIN-11	Alpine Creek	11:45	moderate (<5 gal/sec)	15.5	830	9.6	8.0		15.0	10.5	85	197	0.12	0.00
San Mateo	202-BUTAN-11	Butano Creek	13:08	moderate (<5 gal/sec)	16.0	330	8.0	7.5		10.0	12.0	20	613	0.30	0.00
San Mateo	202-CALER-11	Calera Creek	11:56	moderate (<5 gal/sec)	19.6	363	9.6	7.0		15.0	13.2	169	3295	0.30	0.00
San Mateo	202-CALER-12	Calera Creek	14:07	moderate (<5 gal/sec)	15.6	595	7.1	7.5		5.0	18.5	63	2489	4.31	0.06
San Mateo	202-DENN-11	Denison Creek Fitchman's Creek	13:30	moderate (<5 gal/sec)	18.0	280	6.2	7.0			12.0	31	867	0.07	0.00
San Mateo	202-FRENC-11	Frederick's Creek	8:40	Stagnant water	16.5	343	11.5	7.0		13.6	10.5	110	3873	1.08	0.00
San Mateo	202-GAZOS-11	Gazos Creek	10:54	moderate (<5 gal/sec)	16.0	320	8.0	7.0		6.0	11.0	36	882	0.00	0.00
San Mateo	202-GAZOS-12	Gazos Creek	11:36	moderate (<5 gal/sec)	24.0	260	8.0	7.0		0.0	11.0	10	132	0.00	0.00
San Mateo	202-GAZOS-13	Gazos Creek	12:04	moderate (<5 gal/sec)	17.0	290	8.0	7.5		0.0	11.0	10	216	0.00	0.00
San Mateo	202-LAHON-11	La Honda Creek	12:30	moderate (<5 gal/sec)	15.0	680	9.8	8.0		5.0	10.0	142	738	0.00	0.00
San Mateo	202-LOBE-11	Lobito Creek	12:05	moderate (<5 gal/sec)	18.5	860	11.0	7.5		9.7	10.0	80	1782	0.15	0.10
San Mateo	202-MART-11	Martini Creek	10:20	trickle (<1 quart/sec)	13.0	250	8.8	7.0			11.0	132	689	0.21	0.00
San Mateo	202-MILL-11	Mill Creek	10:30	high (>5 gal/sec)	19.5	710	10.8	7.0		6.3	9.5	63	1012	0.36	0.00
San Mateo	202-MONTA-11	Montara Creek	11:15	trickle (<1 quart/sec)	14.0	370	8.4	6.5			13.0	31	3076	0.12	0.00
San Mateo	202-MONTA-12	Montara Creek	11:15	trickle (<1 quart/sec)	14.0	280		6.5			14.0	199	2723	0.00	0.00
San Mateo	202-RESCA-11	Peccadero Creek	12:45	moderate (<5 gal/sec)	12.0	570	8.0	8.0		5.0	13.0	36	850	0.14	0.00
San Mateo	202-PIJAR-11	Piñeros Creek	9:30	high (>5 gal/sec)	18.0	600	11.1	7.0		9.1	11.0	134	1354	1.57	0.00
San Mateo	202-POMPO-11	Pompano Creek	9:50	moderate (<5 gal/sec)	13.0	1670	8.0	7.5		15.0	11.0	195	3448	0.20	0.00
San Mateo	202-PURIS-11	Purismo Creek San Gregorio Creek	11:20	high (>5 gal/sec)	15.0	600	11.0	7.0		2.1	9.9	20	187	0.16	0.00
San Mateo	202-SANCR-11	San Carlos Creek	10:30	high (>5 gal/sec)	13.0	09	9.4	7.5		15.0	12.0	134	759	0.00	0.00
San Mateo	202-SANPE-11	San Pedro Creek	13:00	trickle (<1 quart/sec)	15.3	428	9.7	7.5		5.0	16.9	283	5475	0.30	0.00
San Mateo	202-SANVS-11	San Vicente Creek	12:30	trickle (<1 quart/sec)	16.0	300	9.4	7.0			13.0	96	1990	0.35	0.00
San Mateo	202-TUNB-11	Tunabo Creek Whitethorn Creek	12:50	high (>5 gal/sec)	30.0	710	10.8	7.5		2.0	10.6	10	85	0.00	0.00
San Mateo	202-WHITE-11	Whitehouse Creek	11:08	moderate (<5 gal/sec)	13.5	250	10.8	7.0		5.0	12.0	10	443	0.12	0.00
San Mateo	202-WHITE-12	Whitehouse Creek	10:00	moderate (<5 gal/sec)	14.2	300	9.2	7.5		5.0	11.6	74	934	0.06	0.00
Santa Cruz	304-APTOS-21	Aptos Creek	11:15	high (>5 gal/sec)	15.5	690	9.0	7.5	120.0		11.5	31	789	0.00	0.10
Santa Cruz	304-APTOS-22	Aptos Creek	12:27	moderate (<5 gal/sec)	15.5	640	10.0	7.5	120.0		13.0	57	546	0.00	0.00
Santa Cruz	304-APTOS-23	Aptos Creek	13:15	Stagnant water	18.5	740	9.0	7.5	48.4		15.0	36	1017	0.00	0.10
Santa Cruz	304-ARANA-21	Arana Gulch	13:25	moderate (<5 gal/sec)	23.0	490	8.6	7.5	121.0		12.5	94	2143	0.43	0.00
Santa Cruz	304-ARANA-22	Arana Gulch	11:15	moderate (<5 gal/sec)	14.5	09	9.0	8.0	40.2		13.5	74	1654	0.22	0.05
Santa Cruz	304-ARANA-23	Arana Gulch Arroyo Seco Creek	14:40	moderate (<5 gal/sec)	18.5	320	9.0	7.0	121.0		12.0	62	895	0.26	0.10
Santa Cruz	304-ARROY-21	Arroyo Seco Creek	11:00	trickle (<1 quart/sec)	17.0	530	8.4	7.0		5.0	13.0	136	677	0.00	0.00
Santa Cruz	304-ARROY-22	Arroyo Seco Creek	12:30	moderate (<5 gal/sec)	19.5	690	9.8	7.5		5.0	18.0	52	2795	1.93	0.06
Santa Cruz	304-ARROY-23	Arroyo Seco Creek	14:22	moderate (<5 gal/sec)	21.0	710	12.1	8.0		5.0	17.0	110	1996	0.36	0.05
Santa Cruz	304-BOULD-21	Boulder Creek	12:16	moderate (<5 gal/sec)	22.8	312	8.6	7.8		2.9	13.8	110	561	0.17	0.05
Santa Cruz	304-BRANC-21	Branches Creek	12:45	moderate (<5 gal/sec)	22.0	450	13.2	8.5	121.0		18.5	314	3255	0.20	0.10
Santa Cruz	304-BRANC-22	Branches Creek	11:40	moderate (<5 gal/sec)	18.0	420	8.2	7.0	120.0		14.5	320	1895	0.30	0.10
Santa Cruz	304-CARBO-21	Carbonera Creek	13:15	moderate (<5 gal/sec)	17.0	380	9.6	7.0	121.0		15.0	343	1464	0.67	0.05
Santa Cruz	304-CORCO-21	Corrigan Lagoon	11:15	Stagnant water	18.0	09	8.2	7.5		5.0	22.0	199	8664	0.02	0.10
Santa Cruz	304-CORCO-22	Corrigan Lagoon	13:38	moderate (<5 gal/sec)	20.0	09	8.6	8.0		5.0	17.5	130	2425	0.02	0.00
Santa Cruz	304-FERRA-21	Fernal Creek	12:50	moderate (<5 gal/sec)	14.5	400	7.0	7.0		0.0	13.0	59	2143	0.00	0.10
Santa Cruz	304-LAGUN-21	Lagunitas Creek	11:35	moderate (<5 gal/sec)	20.1	600	9.8	7.5		1.0	10.4	211	1236	0.00	0.00
Santa Cruz	304-LIDEL-21	Lidell Creek	10:50	moderate (<5 gal/sec)	17.0	400	8.0	7.5		0.0	11.0	42	1935	1.34	0.06
Santa Cruz	304-LITL-21	Little Creek	12:30	high (>5 gal/sec)	15.5	300	10.0	7.0		0.0	12.0	5	448	0.12	0.10
Santa Cruz	304-MAJOR-21	Major Creek	10:38	moderate (<5 gal/sec)	20.4	400	8.8	7.5		0.0	10.2	35	794	0.19	0.05
Santa Cruz	304-MOLIN-21	Molinas Creek	13:25	moderate (<5 gal/sec)	19.5	200	9.4	7.0		0.0	10.3	96	1500	0.49	0.17
Santa Cruz	304-MOORE-22	Moore Creek	12:19	trickle (<1 quart/sec)	17.4	280	10	6.5		2.0	14.1	5	199	0.00	0.00
Santa Cruz	304-MOORE-23	Moore Creek	14:02	moderate (<5 gal/sec)	20.1	500	7.0	6.5		0.0	13.2	118	932	0.63	0.05
Santa Cruz	304-MOORE-24	Moore Creek	10:50	moderate (<5 gal/sec)	15.1	540	7.0	6.5		3.0	11.9	228	1789	0.18	0.05
Santa Cruz	304-MOORE-25	Moore Creek	13:17	trickle (<1 quart/sec)	19.0	460	7.0	7.5		0.0	14.2	41	2046	0.31	0.05
Santa Cruz	304-MOORE-26	Moore Creek	13:56	moderate (<5 gal/sec)	24.0	09	10.8	8.5		8.0	22.0	85	1842	0.06	0.00
Santa Cruz	304-ROBSC-21	Roberts Creek San Lorenzo River	21:0	NR	420	13.8	8.5	8.5		5.0	22.0	94	1792	0.00	0.00
Santa Cruz	304-SANI-0-21	San Lorenzo River	11:50	moderate (<5 gal/sec)	25.1	450	8.5	8.0	121.0		15.0	135	1808	0.24	0.05
Santa Cruz	304-SANLO-22	San Lorenzo River	10:40	moderate (<5 gal/sec)	30.0	09	7.7	8.0	121.0		15.0	36	1187	0.11	0.05
Santa Cruz	304-SANLO-25	San Lorenzo River	10:00	moderate (<5 gal/sec)	17.0	600	9.0	7.0		0.0	10.5	41	744	0.26	0.10
Santa Cruz	304-SANLO-26	San Lorenzo River	14:30	high (>5 gal/sec)	21.0	400	9.0	7.0		0.0	15.0	5	546	0.00	0.00
Santa Cruz	304-SANVS-21	San Vicente Creek	12:19	high (>5 gal/sec)	17.0	300	9.8	7.5		0.0	10.2	10	249	0.14	0.05

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Attachment 3. Results by County/Station cont.

County	Station	Waterbody/Name	Time of Field Measuring Event	Flow	AirTemp (Deg C)	CONDURW (µS)	DISSOLV (mg/L)	pH	Transparency (FT)	Turbidity (NTU)	WaterTemp (Deg C)	E. COL (MPN/100 ml)	TOTAL coliform (MPN/100 ml)	AMMONI (mg/L)	Diss. Phosphorus-P (mg/L)
Santa Cruz	304-SCOTT-22	Scott Creek	12:00	high (>5 gal/sec)	16.0	100	9.2	7.0		0.0	12.0	52	563	0.10	0.05
Santa Cruz	304-SCOTT-23	Scott Creek	13:00	high (>5 gal/sec)	16.0	100	10.0	7.0		0.0	12.0	10	336	0.12	0.05
Santa Cruz	304-SCOTT-24	Scott Creek	13:30	high (>5 gal/sec)	14.0	100	10.0	7.0		0.0	13.0	5	416	0.13	0.05
Santa Cruz	304-SOQUE-21	Soquel Creek	11:10	high (>5 gal/sec)	17.0	660	9.4	7.5	121.0		13.5	156	1273	0.00	0.00
Santa Cruz	304-SOQUE-22	Soquel Creek	12:32	high (>5 gal/sec)	18.0	1170	10.0	8.0	121.0		16.0	173	1110		
Santa Cruz	304-VALEN-21	Valencia Creek	12:04	moderate (<5 gal/sec)	17.2	640	8.0	7.5	130.0		13.0			0.12	0.20
Santa Cruz	304-VALEN-22	Valencia Creek	12:45	moderate (<5 gal/sec)	17.0	570	9.0	7.5	90.6		13.5	36	2481	0.07	0.06
Santa Cruz	304-WADDE-21	Waddell Creek	11:00	high (>5 gal/sec)								30	386	0.10	0.05
Santa Cruz	304-WILDE-21	Wilder Creek	11:20	moderate (<5 gal/sec)	16.0	470	7.0	7.2		0.0	11.0	135	1223		
Santa Cruz	304-WILDE-22	Wilder Creek	12:20	trickle (<1 quart/sec)	18.0	1500	8.0	7.2		0.0	18.0	75	2090		
Santa Cruz	305-BEACH-21	Beach Reef Ditch	12:20	moderate (<5 gal/sec)		3100	10.0	7.8			16.0	173	3196	0.40	0.00
Santa Cruz	305-CORRA-21	Corralitos Creek	14:25	moderate (<5 gal/sec)	16.0	500	8.0	8.0	121.0		15.5	65	3420	0.00	0.05
Santa Cruz	305-CORRA-22	Corralitos Creek	15:00	high (>5 gal/sec)	20.5	400	7.0	7.5	121.0		14.0	45	3420	0.40	0.00
Santa Cruz	305-HARKO-21	Harkin Slough	12:30	Stagnant water	19.0	642	10.0	8.0	15.0		21.0	3075	1962	0.80	0.50
Santa Cruz	305-HARKO-22	Harkin Slough	12:50	Stagnant water	20.0	700	10.0	7.5	79.6		19.0	62	2436	1.20	1.00
Santa Cruz	305-HARKO-23	Harkin Slough	14:00	moderate (<5 gal/sec)	20.5	300	10.0	7.5	41.2		14.0	302	3604	0.30	0.10
Santa Cruz	305-PAJAR-21	Pajaro River	11:45	high (>5 gal/sec)	16.0	1136	10.3	8.4	121.0		17.5	152	6667	4.00	0.00
Santa Cruz	305-STRUW-21	Stowe Slough	10:05	Stagnant water	17.5	200	4.5	7.5	90.0		17.0	115	1297	0.20	0.40
Santa Cruz	305-STRUW-22	Stowe Slough	11:10	Stagnant water	18.5	400	4.0	7.5	121.0		19.0	106	2723	0.30	0.00
Santa Cruz	305-WATSO-21	Watsonville Slough	10:46	Stagnant water	18.0	276	10.0	7.2	88.6		14.1	100	1196	0.20	0.04
Santa Cruz	305-WATSO-22	Watsonville Slough	13:00	moderate (<5 gal/sec)	20.0	600	12.0	8.0	57.0		19.5	75	2196	4.00	0.00
Santa Cruz	305-WATSO-23	Watsonville Slough	12:06	high (>5 gal/sec)	19.0	7560	9.8	7.9	69.0		19.7	31	3196	10.40	0.20
Santa Cruz	305-WSTRU-21	West Strome Slough	9:45	Stagnant water	17.0	600	1.5	7.0	80.0		12.5	145	2607	0.30	0.40
Monterey	306-ELKHO-31	Elkhorn Slough	11:55	moderate (<5 gal/sec)	18.7		10.2	8.0		11.0	18.8	45	260	1.10	0.07
Monterey	306-ELKHO-32	Elkhorn Slough	12:15	Stagnant water	18.6		5	7.5		6.1	19.0	110	4040	0.00	0.07
Monterey	306-ELKHO-33	Elkhorn Slough	11:15	high (>5 gal/sec)	14.1		10.2	7.8		18.1	16.7	43	194	1.10	0.08
Monterey	306-ELKHO-34	Elkhorn Slough	12:32	trickle (<1 quart/sec)	21.0		16.4	8.5		4.1	19.0	180	4040	0.00	0.20
Monterey	307-CARME-310	Camel River	11:30	moderate (<5 gal/sec)	16.5	282	10.6	8.0	119.0		15.0	11	921	0.00	0.00
Monterey	307-CARME-33	Camel River	11:47	high (>5 gal/sec)	21.0	250	9.8	6.5	120.0		16.0	16	1410	0.00	0.00
Monterey	307-CARME-35	Camel River	NR	high (>5 gal/sec)	21.0	270	10.7	6.5	120.0		16.5	16	1120	0.00	0.00
Monterey	307-CARME-36	Camel River	12:36	moderate (<5 gal/sec)	16.0	275	10.6	8.0	119.0		16.0	40	1300	0.00	0.00
Monterey	307-CARME-37	Camel River	12:15	moderate (<5 gal/sec)	13.0	280	11.2	8.0	119.0		15.5	4	1120	0.00	0.00
Monterey	307-CARME-38	Camel River	10:30	moderate (<5 gal/sec)	16.0	380	10.4	8.0	119.0		14.3	11	1300	0.00	0.00
Monterey	307-CARME-39	Camel River	NR	high (>5 gal/sec)	14.0		7.0	6.5	117.0		15.0	380	2420	0.00	0.00
Monterey	307-GARZA-31	Garzas Creek	13:04	moderate (<5 gal/sec)	26.5	210	9.7	7.0	130.0		16.0	17	2420	0.00	0.00
Monterey	308-BIGCR-31	Big Creek	NR	high (>5 gal/sec)	14.6	290	10.6	8.3		5.0	12.6	5			
Monterey	308-BIGSU-31	Big Sur	10:55	moderate (<5 gal/sec)	18.3	260	10.1	7.5			13.3	25	816	0.00	0.00
Monterey	308-BIGSU-32	Big Sur	11:40	moderate (<5 gal/sec)	18.3	230	10.5	7.5			13.4	7	725	0.00	0.00
Monterey	308-DANIC-31	Dani Creek	12:55	high (>5 gal/sec)	16.0	360	10.7	8.3		5.0	12.5	0			
Monterey	308-DOUD-31	Doud Creek	12:07	moderate (<5 gal/sec)	13.0	290	8.5	7.0	119.0		10.5	20	2400	0.00	0.00
Monterey	308-GARRA-31	Garrapa Creek	12:10	high (>5 gal/sec)	15.0	150	11.5	7.0	117.0		11.0	36	1080	0.00	0.00
Monterey	308-HOTSP-31	Hot Springs Creek	13:43	high (>5 gal/sec)	15.6	310	10.0	7.0			13.5	7	727	0.00	0.00
Monterey	308-KRKC-31	Kirk Creek	14:00	high (>5 gal/sec)	16.0	410	10.7	8.4		5.0	13.0	8			
Monterey	308-LIMEK-31	Limekin Creek	13:30	high (>5 gal/sec)	16.0	280	10.6	8.3		5.0	13.2	14			
Monterey	308-MALPA-31	Mal Paso Creek	12:45	moderate (<5 gal/sec)	19.5	220	10.4	7.0	117.0		12.9	16	3420	0.45	0.00
Monterey	308-MCWAY-31	McWay Canyon Creek	13:10	moderate (<5 gal/sec)	20.0	310	10.7	7.5			13.3	1	161	0.00	0.00
Monterey	308-MILLC-31	Mil Creek	14:20	high (>5 gal/sec)	18.0	340	11.0	8.2		0.0	14.0	11			
Monterey	308-PALOC-31	Palo Colorado Cyn Creek	11:10	moderate (<5 gal/sec)	15.5	44	9.2	7.5	30.5		10.0	116	2420	0.00	0.00
Monterey	308-PARTI-31	Partington Cyn Creek	12:43	high (>5 gal/sec)	16.7	280	10.7	7.5			12.9	93	416	0.00	0.00
Monterey	308-PLASK-31	Plasket Creek	16:05	high (>5 gal/sec)	16.8	340	10.3	8.2		0.0	12.0	43			
Monterey	308-PREW-31	Prewitt Creek	15:20	high (>5 gal/sec)	16.8	290	10.7	8.1		0.0	13.5	50			
Monterey	308-ROCKY-31	Rocky Creek	11:00	high (>5 gal/sec)	14.3	140	10.7	7.0	63.0		10.3	19	545	0.00	0.00
Monterey	308-SANJO-31	San Jose Creek	NR	Stagnant water	19.0		10.2	8.3	117.0		12.0	44	1580	0.00	0.00
Monterey	308-SOBER-31	Sobrietas Creek	NR	moderate (<5 gal/sec)	18.0		8.0	6.5	117.0		13.0	8	2400	0.00	0.00
Monterey	308-SYCAM-31	Sycamore Cyn Creek	12:02	trickle (<1 quart/sec)	17.8	280	8.5	7.0			13.0	3	245	0.07	0.00
Monterey	308-VICEN-31	Vicente Creek	12:15	high (>5 gal/sec)	18.0	270	10.4	8.2		5.0	12.5	30			
Monterey	308-WILDC-31	Wild Cattle Creek	15:00	moderate (<5 gal/sec)	18.0	370	10.5	8.3		5.0	12.5	20			
Monterey	308-WILLO-31	Willow Creek	16:20	high (>5 gal/sec)	17.5	270	11.3	8.3		0.0	14.5	-3			

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Attachment 3. Results by County/Station cont.

County	StationID	Waterbody Name	Time of Field Measure (mst)	Flow	AirTemp (Deg C)	Conductivity (uS)	Dissolved Oxygen (ppm)	pH	Transparency (cm)	Turbid (NTU)	WaterTemp (Deg C)	E Coli (MPN/100 ml)	Total coliform (MPN/100ml)	Ammonia (mg/L)	Ortho-phosphate-P (mg/L)
Monterey	309-AJISA-31	Ajisa Creek	11:30	trickle (<1 quart/sec)	17.2	3000	8.0	8.5	14.0		21.0	310	17300	0.31	0.31
Monterey	309-AJISA-32	Ajisa Creek	11:20	trickle (<1 quart/sec)	17.6	480	7.0	7.5	14.0		18.0	100	3700	11.94	0.56
Monterey	309-ASILO-31	Asilomar Creek	11:30	Not recorded	15.0	1737	8.0	7.0	130.0		16.0	310	11900	0.70	0.00
Monterey	309-CENTR-31	Greenwood Park	10:30	moderate (<5 gal/sec)	15.0	1608	10.0	7.0	130.0		15.0	1600	4000	1.71	0.16
Monterey	309-GABIL-31	Gabilan Creek	10:36	Stagnant water	16.9	980	8.0	7.0	122.0		18.0	10	17300	32.10	0.00
Monterey	309-LIBRA-31	Library	11:02	trickle (<1 quart/sec)	14.6	1680	11.0	7.5	106.0		13.0	380	38000	0.25	0.00
Monterey	309-MAJOR-31	Major Sherman	10:25	trickle (<1 quart/sec)	15.0	1240	8.0	8.0			13.0	113	2400	0.00	0.00
Monterey	309-MOROC-31	Moro Cojo	10:45	trickle (<1 quart/sec)	21.5	30	9.4	8.5	17.7		18.0	300	3100	6.04	0.91
Monterey	309-MOROC-32	Moro Cojo	11:27	trickle (<1 quart/sec)	17.0	32	8.0	8.0	1.0		22.0	3480	18000	0.00	0.90
Monterey	309-MOROC-33	Moro Cojo	NR	trickle (<1 quart/sec)	17.0	33	7.4	8.0	0.6		26.0	100	19600	0.00	0.21
Monterey	309-NATIV-31	Natividad Creek	11:50	moderate (<5 gal/sec)	19.4	940	7.0	6.5	16.0		14.2	410	13000	0.00	0.76
Monterey	309-SALIN-31	Salinas River	10:30	moderate (<5 gal/sec)	15.5	668	10.0	8.0	23.6		19.9	10	4350	3.28	0.00
Monterey	309-SALIN-32	Salinas River	11:25	moderate (<5 gal/sec)	12.9	527	12.0	8.5	32.4		21.0	20	4610	0.89	0.00
Monterey	309-SALIN-33	Salinas River	10:34	moderate (<5 gal/sec)	17.7	680	11.0	7.5	14.1		17.5	57	3870	1.45	0.00
Monterey	309-SKYLI-31	Skyline	11:40	trickle (<1 quart/sec)	16.0	520	10.0	8.5			20.0	10	2490	0.00	0.00
Monterey	309-TEMBL-31	Tembleson Slough	10:30	moderate (<5 gal/sec)	12.2	2200	9.0	8.0	0.7		16.0	100	11100	25.91	0.86
Monterey	309-TEMBL-32	Tembleson Slough	11:00	trickle (<1 quart/sec)	14.4	2300	12.0	8.0	0.6		14.0	600	139000	13.40	0.00
Monterey	309-UPPER-31	Upper Natividad Creek	11:05	trickle (<1 quart/sec)	18.9	770	7.0	7.0	30.0		19.3	990	6400	2.00	0.00
Monterey	309-VETER-31	Veteran's Creek	12:25	trickle (<1 quart/sec)	18.0	1447	8.0	7.0	120.0		15.0	10	8840	0.09	0.00
SLO	309-ATASC-41	Atascadero Creek	10:22	high (>5 gal/sec)	17.5	790	7.0	7.5			16.5	216	4611	0.00	0.06
SLO	309-ATASC-42	Atascadero Creek	9:00	high (>5 gal/sec)	15.0	460	7.0	7.0			14.5	331	4313	0.00	0.00
SLO	309-GRAVE-41	Graves Creek	11:20	high (>5 gal/sec)	21.0	810	9.0	7.5			16.0	1229	11190	0.00	0.00
SLO	309-PASOR-41	Paso Robles Creek	9:45	high (>5 gal/sec)	19.0	640	7.0	8.6			17.0	201	1725	0.00	0.00
SLO	309-RINCO-41	Rinconada Creek	11:35	moderate (<5 gal/sec)	31.0		8.0	8.2			19.0	269	2255	0.00	0.00
SLO	309-SALIN-44	Salinas River	10:50	high (>5 gal/sec)	27.0	810	10.0	7.5			19.5	63	1628	0.00	0.00
SLO	309-SALIN-45	Salinas River	NR	trickle (<1 quart/sec)	29.0		7.0	8.2			20.0	41	1354	0.00	0.00
SLO	309-SALIN-46	Salinas River	11:20	high (>5 gal/sec)	21.0	1030	9.3	8.5			22.0	52	1935	0.40	0.40
SLO	309-SALIN-47	Salinas River	10:15	high (>5 gal/sec)	25.0	740	8.5	8.3			17.0	31	2014	0.00	0.00
SLO	309-SMARG-41	Santa Margarita Creek	9:50	high (>5 gal/sec)	17.5	730	7.0	8.0			17.5	36	4106	0.00	0.00
SLO	309-TROUT-41	TROUT Creek	11:00	moderate (<5 gal/sec)	27.0		7.5	8.2			15.5	88	3654	0.00	0.40
SLO	309-YERBA-41	Yerba Buena Creek	10:25	trickle (<1 quart/sec)	26.0	1605		7.8			15.0	89	4352	0.00	0.16
SLO	310-CARPO-41	San Carlo Pono	9:55	high (>5 gal/sec)	16.0	360	8.0	7.5	116.0		14.5	41	512	0.00	0.00
SLO	310-DAL-41	Dairy Creek	NR	trickle (<1 quart/sec)	17.0	940	10.0	7.9		0.5	16.6	97	1789	0.00	0.00
SLO	310-PENN-41	Pennington Creek	NR	moderate (<5 gal/sec)	13.0	780	8.5	7.7		0.7	13.5	104	1850	0.00	0.06
SLO	310-SANSI-41	San Simeon Creek	NR	moderate (<5 gal/sec)	15.0	670	9.2	7.5	130.0		16.0	40	3076	1.40	0.08
SLO	310-SANTA-41	Santa Rosa Creek	NR	moderate (<5 gal/sec)	15.5	770	12.6	8.0	130.0		15.5			0.00	0.00
SLO	310-SBE-41	San Bernardo Creek	11:45	trickle (<1 quart/sec)	16.4	880	9.7	7.9		1.6	16.3	34190	34190	0.20	0.15
SLO	310-SYB-41	Los Geos Creek	10:40	Stagnant water	19.3	5300	9.9	8.1		12.3	16.6	10	1850	9.20	0.76
SLO	310-UCF-41	Chono Creek	9:58	moderate (<5 gal/sec)	14.3	1010	8.5	7.7		0.9	15.4	161	2851	9.80	0.99
SLO	317-ESTRE-43	Estrella River	12:15	moderate (<5 gal/sec)	26.0	1270	9.5	8.3			14.0	1274	6489	0.00	0.00