2011 Central Coast Regional Snapshot Day Summary Report

Prepared for:

City of Santa Cruz
Department of Public Works

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Introduction

Snapshot Day is a one-day annual community water quality monitoring event that occurs the first Saturday in May and provides a one-day "snapshot" of the health of rivers and streams that flow into the Monterey Bay. The Coastal Watershed Council (CWC), in partnership with the Monterey Bay National Marine Sanctuary (MBNMS) and hundreds of community volunteers, monitor sites covering more than 300 miles of coast from Pacifica in the north to Morro Bay in the south. During the event, volunteers systematically sample sites from over 100 freshwater streams and rivers across 4 counties.

The first Snapshot Day occurred on Earth Day 2000 and has become a widely recognized volunteer event in which important water quality information is gathered. 2011 marked the 12th annual Central Coast Regional Snapshot Day event.

In 2011, eighteen sites were monitored in the City of Santa Cruz, as outlined in Table 1 and Figure 1. Fifty-five sites outside of the City limits were monitored by CWC volunteers in Santa Cruz County and 27 sites in San Mateo County. Eighty-five sites were monitored by MBNMS volunteers in Monterey and San Luis Obispo Counties. A total of 185 sites were monitored by 178 volunteers in 2011 across all four counties. Twenty-one volunteers making up seven teams monitored the City of Santa Cruz sites.

Table 1: City of Santa Cruz Snapshot Day Sites & Locations

Site ID	Site Description
304-ARANA-21	Arana Creek At Harbor High fish ladder
304-ARANA-22	Arana Creek at North Harbor
304-ARROY-21	Meder Park
304-ARROY-22	Delaware Avenue
304-ARROY-23	West Cliff, near Auburn & Sacramento Avenues
304-BRANC-21	Branciforte above confluence w/SLR
304-BRANC-23	Branciforte @ 434 Market St.
304-CARBO-21	Carbonera Creek (trib to Branciforte Creek, Trib to San Lorenzo)
304-MOORE-21	Moore Creek At the outflow of Antonelli Pond
304-MOORE-22	UCSC grounds; Just below Arboritum bldg. Closest to Empire grade Road
304-MOORE-24	Moore Creek above Antonelli Pond
304-MOORE-25	UCSC grounds
304-MOORE-26	Moore Creek at mouth
304-SANLO-21	San Lorenzo River Downtown, near County Building
304-SANLO-22	San Lorenzo River Mouth
304-SCSD2	Merced
304-SCSD3	Bay
304-SCSD4	Woodrow

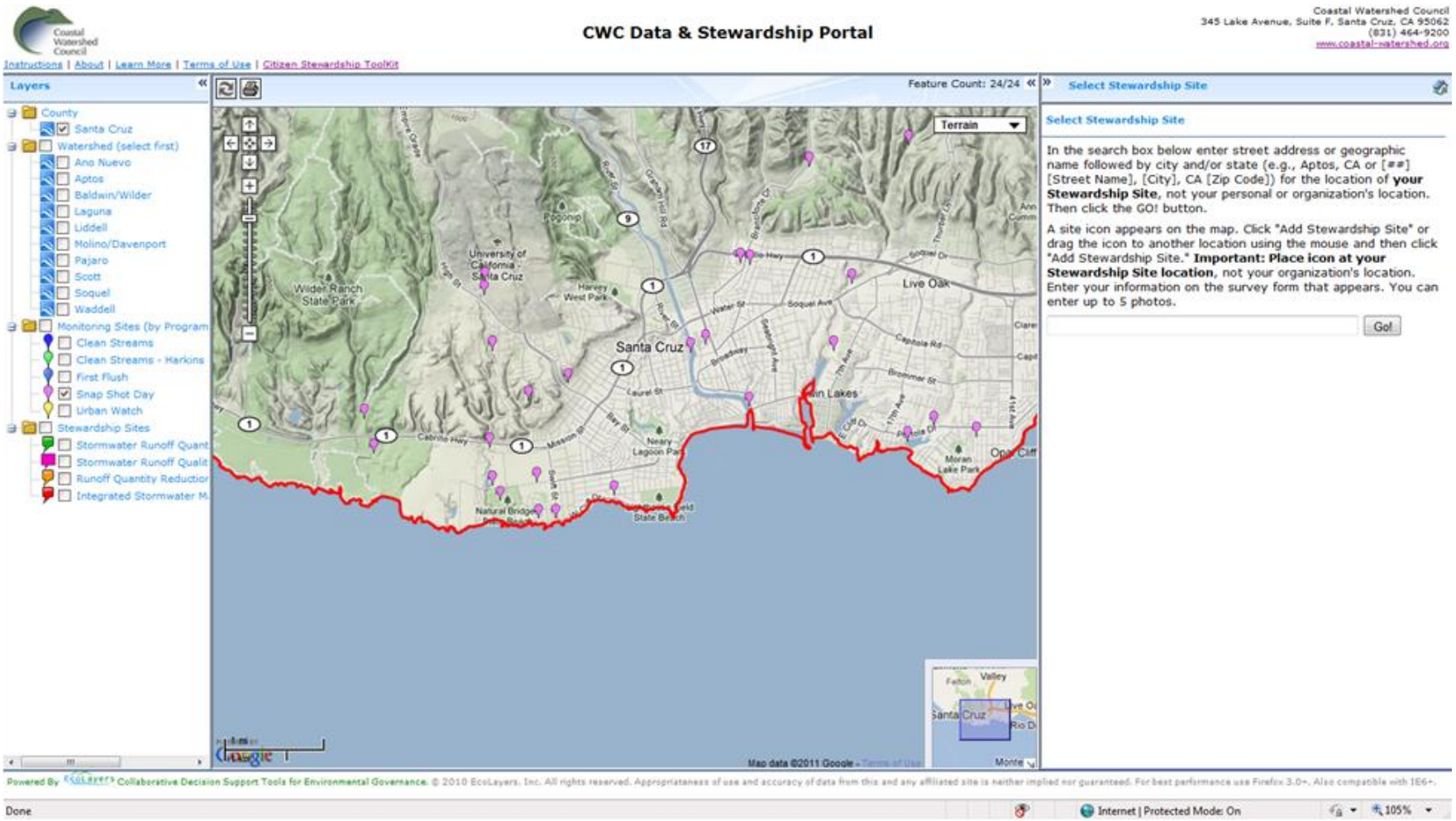

Figure 1: Map of City of Santa Cruz 2011 Snapshot Day Sites (image is a screenshot of CWC's Data & Stewardship Portal)

Methods

Training

Since 2000, the Snapshot Day event has trained citizen volunteers to collect water samples and conduct water quality assessments. Volunteers are trained to perform basic field water quality tests including measurements of temperature, dissolved oxygen, pH, electrical conductivity and transparency. They also receive training in collecting water samples for laboratory analysis of nutrients (nitrate and orthophosphate) and bacteria (*Escherichia coli* and total coliform).

All CWC trainings for water quality monitoring focus on imparting to volunteer teams the knowledge and skill required to follow quality assurance protocols consistent with USEPA and State Water Resources Control Board procedures. Most importantly, CWC's training sessions stress the importance of volunteer safety above all other considerations.

Prior to Snapshot Day, volunteers were trained in the classroom on field monitoring techniques, including how to use a dissolved oxygen kit, conductivity meter, pH strips, transparency tube, and thermometer. Volunteers were also trained with how to properly collect and preserve water samples for laboratory analysis using appropriate containers, and while wearing nitrile gloves.

Volunteers in Santa Cruz County received the training by CWC staff on Sunday, May 1, 2011; San Mateo, Monterey and San Luis Obispo volunteers received trainings from CWC and MBNMS staff on May 2, April 30 and May 3, 2011, respectively.

Monitoring

Dissolved oxygen was measured using a CHEMetrics colorimetric method test kit; conductivity was measured using an Oakton EC Testr; water temperature was measured using a spirit bulb or digital thermometer; pH was measured using Macherey-Nagel non-bleeding pH strips; and transparency was measured using 120 cm transparency tubes. Physical observations such as flow, weather conditions and site conditions (e.g., trash, wildlife) were also recorded on the field data sheet. Sample containers were filled with creek, river or slough water for laboratory analysis of nitrate, orthophosphate, *E.coli*, and total coliform. All collected water samples were analyzed as a grab sample rather than a composite of samples.

Data Analysis

Lab results were compared to ambient water quality standards to provide an indication of relative pollutant levels. These standards apply only to ambient concentrations within "receiving waters," i.e., a stream, lake, or ocean - they do not apply to end-of-pipe water such as storm drain discharges. Absent any applicable standard for those sites, these ambient water quality standards provide some means of comparison for the results. There are such three storm drain discharge sites within the City of Santa Cruz.

Nitrate and orthophosphate results were compared with the Central Coast Ambient Monitoring Program's (CCAMP) "attention levels." *E.coli* and total coliform results were compared to the Central Coast Basin Plan Water Quality Objectives (WQOs) for the protection of aquatic life. These WQOs indicate receiving water concentrations at which pollutants may impact cold-water fish or human health. Again, both the Basin Plan water quality objectives and CCAMP attention levels are established for receiving waters and *not* for end of pipe discharges. Dilution via mixing with ambient water usually occurs in the receiving waters within a short distance of each storm drain outfall.

Results/Discussion

The 2011 Snapshot Day event occurred on Saturday, May 7. 2011. Volunteer teams monitored a total of eighteen sites within the City of Santa Cruz. The eighteen City sites include fifteen creeks, rivers and/or lagoons and three storm drain sites.

Nutrients: Nitrate-N and Orthophosphate-P

Two of the 18 (11%) City sites monitored on Snapshot Day did not comply with the attention level for nitrate: ARROY-23 (West Cliff Drive near Auburn and Sacramento Avenues) and SCSD-02 (Santa Cruz Storm Drain at Merced Avenue), with results of 2.41 mg/L NO_3-N and 3.48 mg/L NO_3-N, respectively. All City of Santa Cruz Snapshot Day results for orthophosphate complied with the CCAMP attention level of <0.12 mg/L.

Bacteria: *E.coli* and Total Coliform

Seven of 18 results (39%) for *E.coli* did not comply with the Basin Plan Water Quality Objective of <235 MPN/100mL; those sites included: ARROY-22, BRANC-21 and -23, MOORE-25 and -26, SANLO-21 and SCSD-03. Results for total coliform show that two of 18 sites (11%) did not comply with the Basin Plan Water Quality Objective of <10,000 MPN/100mL: MOORE-21 and -26.

Field Measurements

Results for dissolved oxygen (DO) show that fourteen of 18 sites (78%) complied with the Water Quality Objective (WQO) of >7.0 mg/L DO for cold water habitats during the Snapshot Day event. All results for water temperature and pH complied with the WQOs of <22˚C and 6.5-8.0, respectively.

Table 2 provides summary of results for each parameter at each site.

Table 2: City of Santa Cruz Snapshot Day Results - Lab Results

Parameter	Unit	WQO/Attention Level	Site	Result	MDL	RL
Coliform, E. coli (Quantitray)	#/100ml	<235	304-ARANA-21	< 100	100	1
			304-ARANA-22	100		
			304-ARROY-21	< 100		
			304-ARROY-22	409		
			304-ARROY-23	< 100		
			304-BRANC-21	304		
			304-BRANC-23	632		
			304-CARBO-21	< 100		
			304-MOORE-21	< 100		
			304-MOORE-22	< 100		
			304-MOORE-24	< 100		
			304-MOORE-25	409		
			304-MOORE-26	306		
			304-SANLO-21	405		
			304-SANLO-22	202		
			304-SCSD-02	< 100		
			304-SCSD-03	409		
			304-SCSD-04	< 100		
Coliform, Total (Quantitray)	#/100ml	<10,000	304-ARANA-21	100	100	1
			304-ARANA-22	4798		
			304-ARROY-21	1712		
			304-ARROY-22	2976		
			304-ARROY-23	2559		
			304-BRANC-21	852		
			304-BRANC-23	1712		
			304-CARBO-21	979		
			304-MOORE-21	14972		
			304-MOORE-22	860		
			304-MOORE-24	3280		
			304-MOORE-25	1323		
			304-MOORE-26	86644		
			304-SANLO-21	718		
			304-SANLO-22	1310		
			304-SCSD-02	1989		
			304-SCSD-03	2281		
			304-SCSD-04	1211		
Nitrate as NO3-N	mg/L	<2.25	304-ARANA-21	0.17	0.05	0.05
			304-ARANA-22	Not Detected		
			304-ARROY-21	0.14		
			304-ARROY-22	1.28		
			304-ARROY-23	2.41		
			304-BRANC-21	0.32		
			304-BRANC-23	0.48		
			304-CARBO-21	0.83		
			304-MOORE-21	Not Detected		
			304-MOORE-22	0.15		
			304-MOORE-24	0.06		
			304-MOORE-25	Not Detected		
			304-MOORE-26	Not Detected		
			304-SANLO-21	0.09		
			304-SANLO-22	Not Detected		
			304-SCSD-02	3.48		
			304-SCSD-03	1.82		
			304-SCSD-04	1.38		
o-Phosphate-P	mg/L	<0.12	304-ARANA-21	0.09	0.05	0.05
			304-ARANA-22	Not Detected		
			304-ARROY-21	Not Detected		
			304-ARROY-22	Not Detected		
			304-ARROY-23	Not Detected		
			304-BRANC-21	0.07		
			304-BRANC-23	Not Detected		
			304-CARBO-21	Not Detected		
			304-MOORE-21	Not Detected		
			304-MOORE-22	Not Detected		
			304-MOORE-24	Not Detected		
			304-MOORE-25	Not Detected		
			304-MOORE-26	Not Detected		
			304-SANLO-21	Not Detected		
			304-SANLO-22	Not Detected		
			304-SCSD-02	Not Detected		
			304-SCSD-03	Not Detected		
			304-SCSD-04	Not Detected		

Shaded Values = Non-compliance with WQO or Attention Level

Table 2: City of Santa Cruz Snapshot Day Results - Field Measurements

Paremater	Unit	WQO/Attention Level	Site	Result
Air Temperature	°C	N/A	304-ARANA-22	16
			304-ARROY-21	15.2
			304-ARROY-21	17.1
			304-ARROY-22	17.9
			304-ARROY-23	17.7
			304-BRANC-21	17.5
			304-BRANC-23	14.9
			304-CARBO-21	65.7
			304-MOORE-21	17.9
			304-MOORE-22	16.3
			304-MOORE-24	14.7
			304-MOORE-24	15
			304-MOORE-25	16.1
			304-MOORE-26	19.5
			304-SANLO-21	13.5
			304-SANLO-22	16
			304-SANLO-22	16
			304-SCSD-02	17.8
			304-SCSD-03	NA
			304-SCSD-03	NA
			304-SCSD-04	14.9
Conductivity	uS	<2000	304-ARANA-21	500
			304-ARANA-22	OR
			304-ARROY-21	670
			304-ARROY-21	670
			304-ARROY-22	660
			304-ARROY-23	680
			304-BRANC-21	510
			304-BRANC-23	500
			304-CARBO-21	470
			304-MOORE-21	400
			304-MOORE-22	390
			304-MOORE-24	570
			304-MOORE-24	580
			304-MOORE-25	480
			304-MOORE-26	470
			304-SANLO-21	510
			304-SANLO-22	1940
			304-SANLO-22	1990
			304-SCSD-02	760
			304-SCSD-03	560
			304-SCSD-03	550
			304-SCSD-04	510
Dissolved Oxygen	mg/L	>7.0	304-ARANA-21	10
			304-ARANA-22	11
			304-ARROY-21	7
			304-ARROY-21	7
			304-ARROY-22	5
			304-ARROY-23	7
			304-BRANC-21	12
			304-BRANC-23	12
			304-CARBO-21	11
			304-MOORE-21	3.5
			304-MOORE-22	4
			304-MOORE-24	6
			304-MOORE-24	7
			304-MOORE-25	5
			304-MOORE-26	5.5
			304-SANLO-21	11
			304-SANLO-22	12
			304-SANLO-22	11
			304-SCSD-02	8
			304-SCSD-03	9
			304-SCSD-03	8
			304-SCSD-04	10

Shaded Values = Non-compliance with WQO or Attention Level

Table 2: City of Santa Cruz Snapshot Day Results - Field Measurements

Parameter	Unit	WQO/Attention Level	Site	Result
Units	pH	6.5-8.0	304-ARANA-21	6.5
			304-ARANA-22	7
			304-ARROY-21	6.5
			304-ARROY-21	6.5
			304-ARROY-22	6.5
			304-ARROY-23	6.5
			304-BRANC-21	7
			304-BRANC-23	6.5
			304-CARBO-21	6.5
			304-MOORE-21	7
			304-MOORE-22	6.5
			304-MOORE-24	6.5
			304-MOORE-24	6.5
			304-MOORE-25	6.75
			304-MOORE-26	6.5
			304-SANLO-21	7
			304-SANLO-22	7
			304-SANLO-22	7
			304-SCSD-02	7
			304-SCSD-03	7
			304-SCSD-03	7.5
			304-SCSD-04	7.3
Transparency	cm	N/A	304-ARROY-21	120
			304-ARROY-21	120
			304-ARROY-22	120
			304-ARROY-23	120
			304-BRANC-23	62
			304-CARBO-21	62
			304-MOORE-21	80.2
			304-MOORE-22	98
			304-MOORE-24	74
			304-MOORE-24	70
			304-MOORE-25	120
			304-MOORE-26	33.2
			304-SCSD-02	120
			304-SCSD-03	120
			304-SCSD-03	120
			304-SCSD-04	120
Turbidity	JTU	N/A	304-ARANA-21	0
			304-ARANA-22	0
			304-BRANC-21	0
			304-SANLO-21	0
			304-SANLO-22	0
			304-SANLO-22	0
Water Temperature	°C	<22°C	304-ARANA-21	11.5
			304-ARANA-22	14
			304-ARROY-21	13.8
			304-ARROY-21	13.9
			304-ARROY-22	15.9
			304-ARROY-23	15.5
			304-BRANC-21	14.5
			304-BRANC-23	12
			304-CARBO-21	12.2
			304-MOORE-21	20.4
			304-MOORE-22	14
			304-MOORE-24	10.6
			304-MOORE-24	10.7
			304-MOORE-25	13
			304-MOORE-26	19.2
			304-SANLO-21	15
			304-SANLO-22	17.5
			304-SANLO-22	17
			304-SCSD-02	17.3
			304-SCSD-03	NA
			304-SCSD-03	NA
			304-SCSD-04	16.2

Conclusion

This report summarizes results for the 2011 Snapshot Day event conducted on Saturday, May 7, 2011. As a summary of the results section non-compliance of water quality objectives or attention levels were documented for nutrients (both nitrate and orthophosphate) and bacteria (*E. coli*, total coliform and enterococcus) at the eighteen City sites.

For nutrients, nitrate levels were relatively low with the exception of two sites; however, it should be noted that one of the sites was a storm drain site (SCSD-02, Merced) and that for all water quality objectives and attention levels, those values are intended to be applied to receiving waters. Discharges from storm drains will mix with the receiving waters as they enter the receiving waters, resulting in a dilution of the concentrations found in the storm drain discharge.

For pathogens, *E.coli* did not comply with the WQO at 39% of City sites; again, one of those sites was a storm drain site (SCSD-03, Bay Avenue) and values are intended to be applied to receiving waters not storm drain discharges.

The volunteers collecting this valuable information play a key role in our community as stewards of our watersheds. The information they provide is used by resource agencies, local governments and community groups to protect and improve the health of our local streams.

The City's financial support of the Snapshot Day Event and other dry weather monitoring activities, both by the City itself, CWC and other partners, are other examples of the City's leadership in pollution prevention. The fullest understanding of urban runoff issues requires a marriage of both wet and dry season water quality monitoring, as different parameters exhibit different levels according to the seasonal differences.

CWC hopes that the results in this report and from other monitoring programs will aid the City's prevention efforts by identifying which constituents are of greatest concern. Environmental data, by its very nature, is extremely variable, and conclusions are often difficult to make based on limited data points. Nonetheless, these results are of use in shaping the City's programs to inform the public about environmental stewardship. CWC's mission is to preserve and protect coastal watersheds through community stewardship, education and monitoring. CWC staff welcome every possible opportunity to assist the City in achieving our goals together and serving the community. We thank the City for their continued partnership with CWC to improve the health of local watersheds.