

# Water Quality Report Card

## for the Cities of Santa Cruz and Capitola

### First Flush Monitoring Event

November 1, 2012



COASTAL-WATERSHED.ORG

*Preserving and protecting  
our coastal watersheds*



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## Introduction

As part of a regional effort throughout the Monterey Bay, the Coastal Watershed Council (CWC) conducted the 2012 First Flush Program in Santa Cruz County in the fall of 2012. As CWC's program partner, the Monterey Bay National Marine Sanctuary conducted similar activities in Monterey and San Mateo Counties. CWC's work was partially funded by contracts with the City of Capitola and City of Santa Cruz.

The goals of the First Flush Event are twofold: First, to serve as a tool for education and outreach to the community regarding the impacts citizens have on local water quality through urban runoff; and secondly, to collect scientifically valid water quality data to support environmental management decisions at the local and state levels.

First Flush is an annual volunteer monitoring event that samples storm drain runoff during the first significant rainfall of the wet season. During the first rainfall, water washes significant levels of pollution off street surfaces, driveways, and curbs directly into storm drains. This concentrated mix of often polluted water flows from these storm drains into creeks, rivers and the Monterey Bay.

This report card shows the results of water quality monitoring conducted at four storm drain sites in the City of Santa Cruz and three creek sites and five storm drain sites in the City of Capitola. CWC and staff from the Public Works Department at each city chose the storm drain and stream sites based on drainage basin characteristics and safe access for volunteer monitoring teams. Sites were also chosen to represent the upper, middle and lower reaches of Soquel Creek and its tributaries within the boundaries of the City of Capitola.

CWC volunteer teams follow scientific protocols to ensure that data are reliable and can be compared to water quality objectives. Water quality objectives, or "WQOs" is a term regulators use to determine if a water body can safely support human uses, such as swimming, drinking, or irrigating. When a WQO is exceeded, the water is not considered safe for various "beneficial" uses, such as those listed above.

CWC encourages everyone to learn more about water quality in the river or creek nearest your home, school or office. More information and the full set of historical data are available on the CWC Data and Stewardship Portal website <http://coastal-watershed.org/stewardship/stewardship-portal/> In addition, CWC's First Flush program partner, the Monterey Bay National Marine Sanctuary prepares an Annual First Flush Report that includes the Counties of San Mateo, Santa Cruz and Monterey. Reports from each year's event can be downloaded from: <http://montereybay.noaa.gov/monitoringnetwork/reports.html>.

Table 1 provides site ID's, names, descriptions and latitude/longitude information for all sites.

**Table 1: First Flush 2012 Sites**

Site ID	Site Name	Site Description	Latitude	Longitude
<b>City of Capitola</b>				
304-CSD-03	Auto Plaza	Under freeway overpass at Creekside Plaza	36.9827	-121.9593
304-CSD-05	Capitola Center	Behind Nob Hill on Bay Avenue	36.9806	-121.9578
304-CSD-06	Creekside	Storm Drain at Creekside Plaza	36.9834	-121.9588
304-CSD-08	Monterey Avenue	At Noble Gulch Park on Monterey Ave	36.9770	-121.9500
304-CSD-09	Capitola Pier	Under the Capitola Pier	36.9713	-121.9538
304-SOQUE-22	Lagoon	At mouth of Soquel Creek	36.9726	-121.9520
304-SOQUE-26	Soquel Creek - upstream	At Creekside Plaza	36.9835	-121.9590
304-SOQUE-28	Soquel Creek - mid	Behind Nob Hill on Bay Avenue	36.9804	-121.9578
<b>City of Santa Cruz</b>				
304-SCSD-02	Merced	Merced at West Cliff Drive	36.9496	-122.0484
304-SCSD-03	Bay	Bay Street, headed toward UCSC campus	36.9694	122.0462
304-SCSD-04	Woodrow	Woodrow at West Cliff Drive	36.9531	-122.0377
304-SCSD-05	Arroyo Seco	Near Grandview off Bay Street	36.9612	-122.0526

## Methods

### Training

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 the U.S. Environmental Protection Agency and California State Water Resources Control Board procedures. All trainings stress the importance of volunteer safety above all other considerations.

Volunteers were trained in the classroom on field monitoring techniques, including how to perform basic field water quality tests such as measuring pH, electrical conductivity, transparency and water temperature. They were also taught how to properly collect, handle, and preserve water samples using appropriate containers and clean techniques. Water samples were collected for laboratory analysis of nutrients (nitrate and orthophosphate), bacteria (*Escherichia coli*, total coliform and enterococcus), metals (copper, lead and zinc), total suspended solids and hardness.

During a follow-up field training called the “Dry Run” volunteers went to their sites, performed field tests and collected water samples for laboratory analysis. The Dry Run served to familiarize volunteers with their team members and provided an opportunity to visit their monitoring site(s) in daylight and during good weather. This is an important safety measure because the First Flush storm often comes during the night and the familiarity that volunteer teams gain during the Dry Run prepares them to visit their site(s) during First Flush, when conditions are wet and possibly dark. In addition, Dry Run results offer a comparison between pollutant concentrations in dry weather flows and flows during the First Flush storm.

Volunteers in Santa Cruz County received the classroom training on September 5, 2012 and Dry Run field training on September 8, 2012. For the City of Capitola, CWC trained 22 trained volunteers; 17 participated in the actual storm event monitoring. For the City of Santa Cruz, CWC trained 23 volunteers; fourteen participated in the actual storm event monitoring.

### Monitoring Protocols

At each site during both the Dry Run and the First Flush Event the following field measurements were recorded: electrical conductivity (salinity), water temperature, pH and transparency. In

addition field observations were also recorded for the presence of trash, scum, bubbles, odor and oil sheen, as well as flow and weather conditions. Sample containers were filled with storm drain runoff or creek water for laboratory analysis of nitrate, orthophosphate, *E.coli*, enterococcus, total coliform, copper, lead, zinc, hardness and total suspended solids.

Field equipment included an Oakton EC Testr to measure electrical conductivity, a spirit bulb or digital thermometer to measure water temperature, Macherey-Nagel non-bleeding pH strips to measure pH, and 120 cm transparency tubes to measure transparency.

The First Flush event includes water sample collection for laboratory analysis and field measurements during the first hour of significant runoff. This is intended to cover multiple points along the rising limb of the rainfall/runoff hydrograph to capture the heaviest pollutant load and highest concentrations of measured constituents. Two time series water samples for laboratory analysis were collected from storm drain sites, at “time zero” and 60 minutes, and a single sample was collected from creek sites. Field measurements and visual observations were conducted three times (at time zero, 30 minutes, and 60 minutes) at the storm drain sites, and once (concurrent with the single lab sample collection) at the creek sites.

All collected water samples were analyzed as individual grab samples rather than as a composite of samples.

## **Data Analysis**

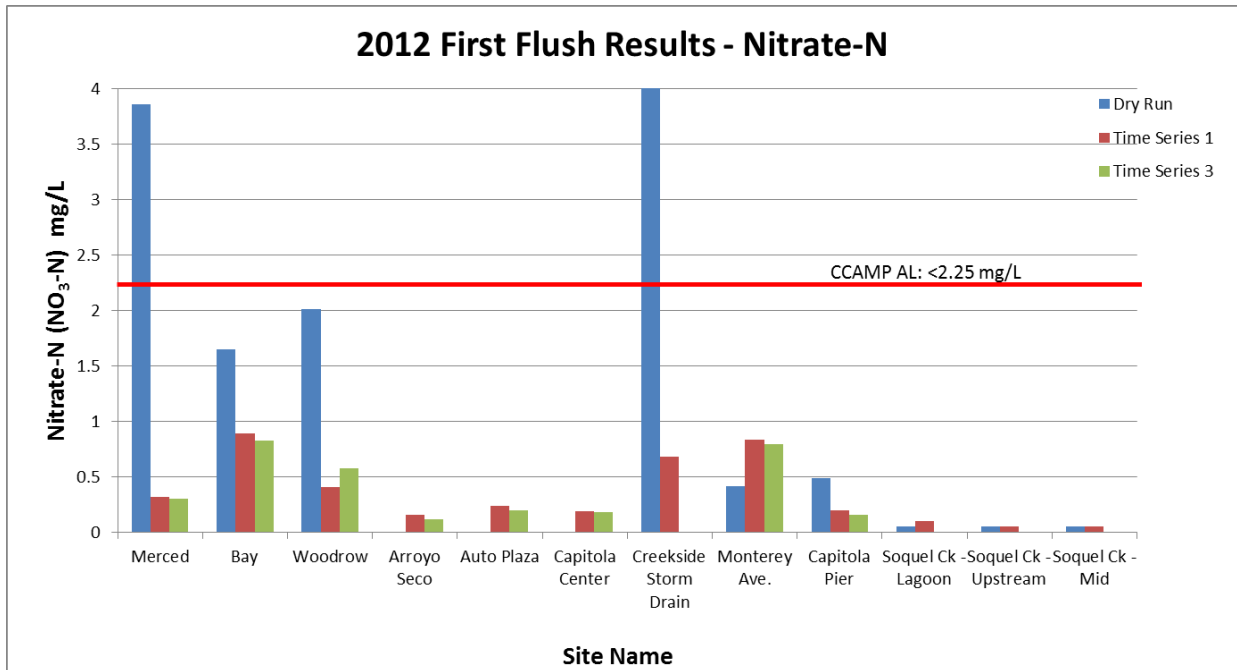
Nitrate, orthophosphate and total suspended solids (TSS) results were compared to the Central Coast Ambient Monitoring Program’s (CCAMP) attention levels or evaluation guidelines. Bacteria and metals results were compared to Water Quality Objectives (WQOs) in the Central Coast Regional Water Quality Control Board’s Basin Plan.

While it is essential to note that WQOs apply only to receiving waters (such as named creeks, rivers, and the Bay) and not to urban runoff discharges, comparisons of urban runoff monitoring results to WQOs provide a frame of reference by which results can be evaluated. Absent other objective standards to use as a comparison, these WQOs are the most appropriate values to compare to environmental results.

While most WQOs for constituents are constant across watersheds, some constituent WQOs are dependent on the background levels within the watershed. For instance, the copper Basin Plan WQO is dependent on the hardness of the receiving water. When the hardness level is >100 mg/L, the Basin Plan WQO is <30 µg/L; when hardness levels are <100 mg/L, the Basin Plan WQO is <10 µg/L. Measured hardness levels at all three Soquel Creek sites were greater than 100 mg/L during the First Flush event; therefore the applicable copper WQO is 30 µg/L.

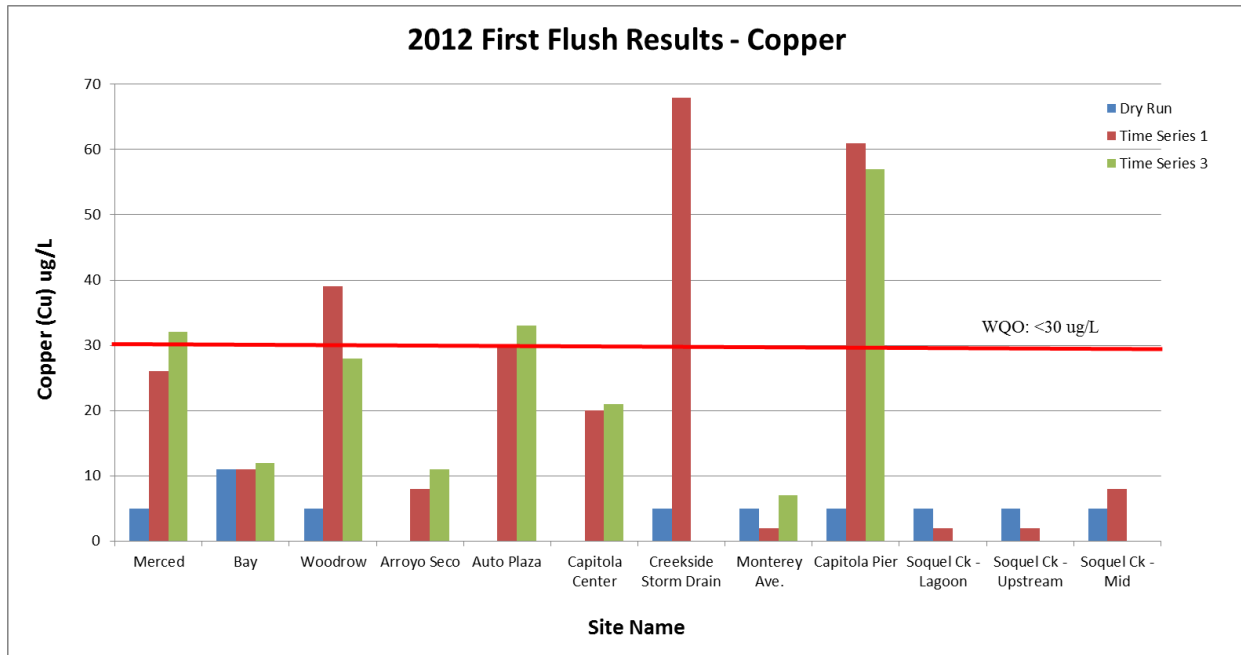
## **Results**

The following report cards are designed toward public education and awareness and to engage residents in best management practices in our local watersheds. The full First Flush report card can be viewed online at: <http://coastal-watershed.org/cwc-reports/>



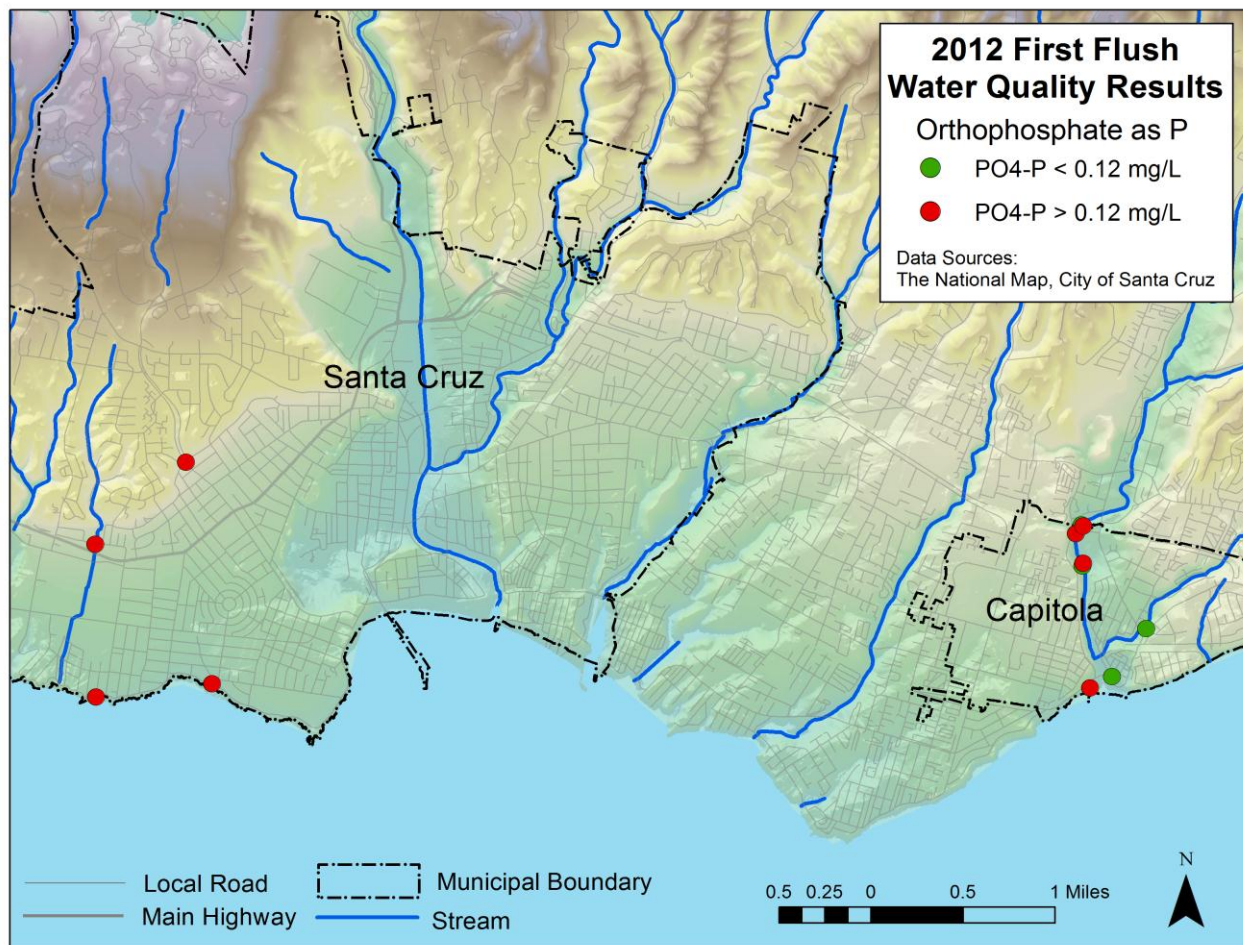
### About Nitrate:

- **Merced and Creekside exceeded the CCAMP attention level during the Dry Run; 100% of sites met the attention level during the Event**
- **Nitrate is necessary for healthy plant growth, but too much can lead to algal blooms that deplete oxygen in water**
- **Sources: runoff containing fertilizers, animal waste, wash water, industrial waste or sewage, or excess dumping of vegetative material**
- **What you can do: limit the use of chemical fertilizers; wash cars where water won't run into a storm drain (use the lawn); place cut/dead vegetation in yard waste can or compost it. Learn more at: <http://coastal-watershed.org/stewardship/>**



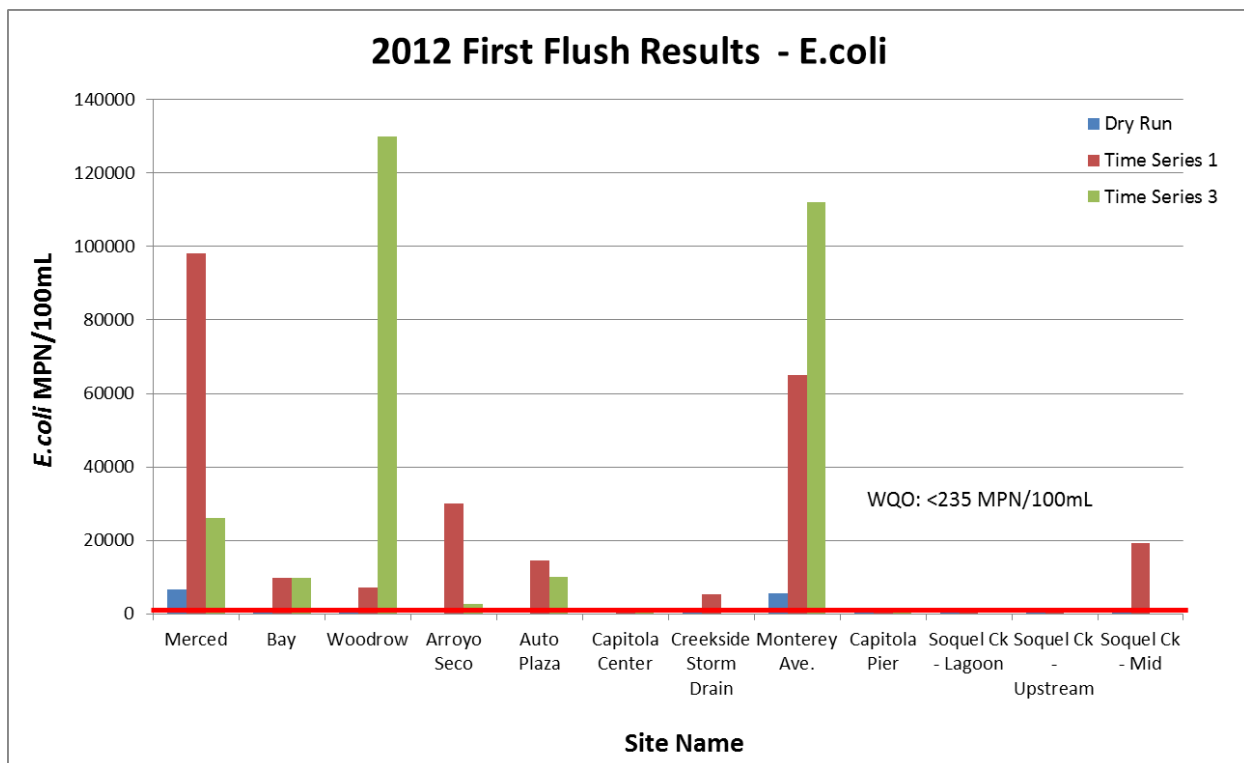
## About Copper:

- **100% of sites met the Basin Plan Water Quality Objective (WQO) during the Dry Run; 65% of sites met the Basin Plan WQO during the Event**
- **Copper occurs naturally at low levels, but too much can be lethal to fish and other aquatic organisms**
- **Sources: industrial and municipal waste sites, areas of rock and coal mining, brake and tire wear, vehicle wash-water**
- **What you can do: consider alternatives brake pads (such as ceramic) & wash cars where water won't run into a storm drain (use the lawn). Learn more at: <http://coastal-watershed.org/stewardship/>**



### About Orthophosphate:

- **89% of sites met the CCAMP attention level during the Dry Run; 30% of sites met the CCAMP attention level during the Event**
- **Orthophosphate is a necessary nutrient for aquatic plants, but excess amounts can cause algal blooms, oxygen depletion, and death of fish, invertebrates & other aquatic species.**
- **Sources: runoff from fertilized lawns, field, or animal manure storage areas; wastewater treatment plants; failing septic systems; commercial cleaning products**
- **What you can do: maintain septic systems, limit the use of chemical fertilizers (especially before a rain).**  
Learn more at: <http://coastal-watershed.org/stewardship/>



### About *E.coli*:

- **56% of sites met the Basin Plan Water Quality Objective (WQO) during the Dry Run; 5% of sites met the Basin Plan WQO during the Event**
- ***E.coli* is a type of bacterium found naturally in the intestines of animals & humans; it is an indicator of fecal pollution in water**
- **Sources: leaky sewer pipes, failing septic systems, pets, and wildlife (esp. birds)**
- **What you can do: maintain septic systems, clean up after pets, report leaking sewer lines. Learn more at: <http://coastal-watershed.org/stewardship/>**



Table 2 provides a summary of field and laboratory results for the City of Santa Cruz Dry Run. Results that exceed the applicable attention level or WQO are shaded in order to highlight these results. Not all tests were performed during every monitoring event (e.g., no water at Arroyo Seco; urea not tested during Dry Run) and are listed as “NA” when the test was not performed.

**Table 2: City of Santa Cruz Dry Run 2012 - Summary of Results**

Parameter	Units	WQO/Attn Level:	SCSD-02	SCSD-03	SCSD-04	SCSD-05
			Merced	Bay	Woodrow	Arroyo Seco
Nitrate-N (NO <sub>3</sub> -N)	mg/L	<2.25	3.86	1.65	2.01	NA
Orthophosphate-P (PO <sub>4</sub> -P)	mg/L	<0.12	0.17	0.10	0.11	NA
Urea-N	ug/L	NA	NA	NA	NA	NA
<i>E.coli</i>	MPN/100mL	<235	6,511	104	125	NA
Total Coliform	MPN/100mL	<10,000	34,658	17,329	4196	NA
Enterococci	MPN/100mL	<104	2,161	61	618	NA
Copper (Cu)	ug/L	<30 or <10 *	ND	11	ND	NA
Lead (Pb)	ug/L	<30	ND	16	ND	NA
Zinc (Zn)	ug/L	<200	ND	240	ND	NA
Total Suspended Solids (TSS)	mg/L	<500	ND	3	ND	NA
Hardness (as CaCO <sub>3</sub> )	mg/L	NA	176	258	183	NA
Calcium	mg/L	NA	36	90	47	NA
Magnesium	mg/L	NA	21	8	16	NA
Water Temperature	°C	<22°	19.8	16.4	15.3	NA
pH	units	6.5-8.5	7.0	7.5	6.5	NA
Electrical Conductivity	uS	<2000	780	540	760	NA
Transparency	cm	NA	>120	111	117	NA
Flow	H/M/L	NA	L	L	F	NA
Trash	T/F	NA	T	F	T	NA
Sewage	T/F	NA	F	F	F	NA
Oil Sheen	T/F	NA	F	F	F	NA
Scum	T/F	NA	F	F	F	NA
Shaded values indicate discharge value exceeds receiving water WQO or Attention Level						
ND = Non-detect result						
NA = No data available/test not performed						
NR = Not recorded						
* Copper Basin Plan WQO is dependent upon receiving water hardness; WQO is 30 ug/L when hardness is >100 mg/L						

Table 3 provides a summary of field and laboratory results for the City of Capitola Dry Run. Results that exceed the applicable attention level or WQO are shaded in order to highlight these results.

Table 3: City of Capitola Dry Run 2012 - Summary of Results

StationID	Units	WQO/Attn Level:	CSD-03	CSD-05	CSD-06	CSD-08	CSD-09	SOQUE-22	SOQUE-26	SOQUE-28
			Auto Plaza	Capitola Center	Creekside Storm Drain	Monterey Ave.	Capitola Pier	Soquel Creek - Lagoon Outlet	Soquel Creek - Upstream	Soquel Creek - Mid
Nitrate-N (NO <sub>3</sub> -N)	mg/L	<2.25	NA	NA	4.08	0.42	0.49	ND	ND	ND
Orthophosphate-P (PO <sub>4</sub> -P)	mg/L	<0.12	NA	NA	0.10	ND	ND	ND	0.10	0.10
Urea-N	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
<i>E.coli</i>	MPN/100mL	<235	NA	NA	<20	5,702	1,423	1,024	148	196
Total Coliform	MPN/100mL	<10,000	NA	NA	5225	12,588	48,391	6511	1,476	,2355
Enterococci	MPN/100mL	<104	NA	NA	20	6,896	402	61	148	41
Copper (Cu)	ug/L	<30 or <10 *	NA	NA	ND	ND	ND	ND	ND	ND
Lead (Pb)	ug/L	<30	NA	NA	ND	ND	ND	ND	ND	ND
Zinc (Zn)	ug/L	<200	NA	NA	16	ND	14	ND	ND	ND
Total Suspended Solids (TSS)	mg/L	<500	NA	NA	2	ND	10	ND	ND	ND
Hardness (as CaCO <sub>3</sub> )	mg/L	NA	NA	NA	161	211	136	274	282	282
Calcium	mg/L	NA	NA	NA	38	50	33	70	75	75
Magnesium	mg/L	NA	NA	NA	16	21	13	24	23	23
Water Temperature	°C	<22°	NA	NA	NA	14.0	19.5	18.7	15.5	16.3
pH	units	6.5-8.5	NA	NA	NA	7.0	7.0	8.2	7.7	7.9
Electrical Conductivity	uS	<2000	NA	NA	NA	680	540	563	737	745
Transparency	cm	NA	NA	NA	NA	120	NR	>120	>120	>120
Trash	T/F	NA	NA	NA	NA	F	F	F	F	F
Sewage	T/F	NA	NA	NA	NA	F	F	F	F	F
Oil Sheen	T/F	NA	NA	NA	NA	F	F	F	F	F
Scum	T/F	NA	NA	NA	NA	T	F	F	F	F
Flow	L/M/H	NA	NA	NA	NA	L	L	NR	NR	NR
Shaded values indicate discharge value exceeds receiving water WQO or Attention Level										
ND = Non-detect result										
NA = No data available/test not performed										
NR = Not recorded										
*Copper Basin Plan WQO is dependent upon receiving water hardness; WQO is 30 ug/L when hardness is >100 mg/L										

Table 4 provides a summary of field and laboratory results for the City of Santa Cruz First Flush Event. Results that exceed the applicable attention level or WQO are shaded in order to highlight these results.

**Table 4: City of Santa Cruz First Flush 2012 - Summary of Results**

			SCSD-02	SCSD-02	SCSD-02	SCSD-03	SCSD-03	SCSD-03	SCSD-04	SCSD-04	SCSD-04	SCSD-05	SCSD-05	SCSD-05	
			Merced	Merced	Merced	Bay	Bay	Bay	Woodrow	Woodrow	Woodrow	Arroyo Seco	Arroyo Seco	Arroyo Seco	
Parameter	Units	WQO/Attn Level:	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	
Nitrate-N (NO <sub>3</sub> -N)	mg/L	<2.25	0.32	NA	0.30	0.89	NA	0.83	0.41	NA	0.58	0.16	NA	0.12	
Orthophosphate-P (PO <sub>4</sub> -P)	mg/L	<0.12	0.28	NA	0.28	ND	NA	0.26	0.48	NA	0.52	0.31	NA	0.53	
Urea-N	ug/L	N/A	121	NA	NA	38	NA	NA	166	NA	NA	73	NA	NA	
E.coli	MPN/100mL	<235	98,039	NA	26,125	9,867	NA	9,867	7,173	NA	129,965	30,151	NA	2,785	
Total Coliform	MPN/100mL	<10,000	155,312	NA	155,312	86,644	NA	120,333	241,957	NA	241,957	34,480	NA	77,010	
Enterococci	MPN/100mL	<104	14,830	NA	20,142	77,010	NA	61,314	46,111	NA	120,333	27,551	NA	15,001	
Copper (Cu)	ug/L	<30 or <10*	26	NA	32	11	NA	12	39	NA	28	8	NA	11	
Lead (Pb)	ug/L	<30	ND	NA	9	ND	NA	ND	9	NA	7	ND	NA	ND	
Zinc (Zn)	ug/L	<200	147	NA	169	41	NA	44	92	NA	81	39	NA	71	
Total Suspended Solids (TSS)	mg/L	<500	16	NA	27	35	NA	36	85	NA	49	5	NA	45	
Water Temperature	°C	<22°	16.7	16.5	16.5	16.1	16.1	16.1	15.3	15.4	15.7	16.0	15.9	16	
pH	units	6.5-8.5	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	7.0	6.5	6.5	6.5	
Electrical Conductivity	uS	<2000	160	150	160	350	320	310	330	290	NR	90	70	70	
Transparency	cm	N/A	33	27	20	18	18	14	NR	16	14	17.35	26	19.5	
<b>Visual Observations:</b>															
Flow	H/M/L	N/A	M	NR	M	M	M	M	M	M	M	NR	L	L	L
Trash	T/F	N/A	T	T	F	F	F	F	F	F	F	F	T	T	T
Sewage	T/F	N/A	F	F	F	F	F	F	F	F	F	F	F	F	F
Oil Sheen	T/F	N/A	T	T	T	F	F	F	F	F	F	F	F	F	F
Scum	T/F	N/A	T	T	T	F	F	F	T	T	F	T	T	T	
Shaded values indicate discharge value exceeds receiving water WQO or Attention Level															
ND = Non-detect results															
NA = No data available/test not performed															
NR = Not recorded															
* Copper Basin Plan WQO is dependent upon receiving water hardness; WQO is 30 ug/L when hardness is >100 mg/L															

Table 5 provides a summary of field and laboratory results for the City of Capitola First Flush Event. Results that exceed the applicable attention level or WQO are shaded in order to highlight these results.

**Table 5: City of Capitola First Flush 2012 - Summary of Results**

			Auto Plaza	Auto Plaza	Auto Plaza	Capitola Center	Capitola Center	Capitola Center	Creskide Storm Drain	Monterey Ave.	Monterey Ave.	Monterey Ave.	Capitola Pier	Capitola Pier	Capitola Pier	Soquel Creek - Lagoon Outlet	Soquel Creek - Upstream	Soquel Creek - Mid
			CSD-03	CSD-03	CSD-03	CSD-05	CSD-05	CSD-05	CSD-06	CSD-08	CSD-08	CSD-08	CSD-09	CSD-09	CSD-09	SOQUE-22	SOQUE-26	SOQUE-28
Parameter	Units	WQO/Attn Level:	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 1	Time Series 1	Time Series 1
Nitrate-N (NO <sub>3</sub> -N)	mg/L	<2.25	0.24	NA	0.20	0.19	NA	0.18	0.68	0.84	NA	0.80	0.20	NA	0.16	0.1	ND	ND
Orthophosphate-P (PO <sub>4</sub> -P)	mg/L	<0.12	0.27	NA	0.17	0.20	NA	0.27	0.21	ND	NA	ND	0.31	NA	0.23	ND	ND	ND
Urea-N	ug/L	NA	207	NA	NA	131	NA	NA	138	22	NA	NA	210	NA	NA	24	10	60
E.coli	MPN/100mL	<235	14,497	NA	10,168	304	NA	521	5,208	64,882	NA	111,987	1,464	NA	516	100	860	19,349
Total Coliform	MPN/100mL	<10,000	104,624	NA	129,965	>241,960	NA	198,629	173,289	241,957	NA	241,957	241,957	NA	64,882	3,051	15,001	61,314
Enterococci	MPN/100mL	<104	7,380	NA	13,914	4,135	NA	6,766	23,593	173,289	NA	>241,960	11,370	NA	8,574	100	1,464	3,013
Copper (Cu)	ug/L	<30*	30	NA	33	20	NA	21	68	ND	NA	7	61	NA	57	ND	ND	8
Lead (Pb)	ug/L	<30	ND	NA	ND	ND	NA	ND	10	ND	NA	ND	26	NA	20	ND	ND	ND
Zinc (Zn)	ug/L	<200	167	NA	178	161	NA	186	234	ND	NA	25	213	NA	210	ND	16	31
Total Suspended Solids (TSS)	mg/L	<500	34	NA	40	20	NA	27	71	10	NA	38	376	NA	124	ND	ND	4
Hardness (as CaCO <sub>3</sub> )	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	307	291	247
Calcium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	80	77	66
Magnesium	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26	24	20
Water Temperature	°C	<22°	16.2	16.3	16.3	17.0	16.8	16.8	16.4	14.4	14.5	14.9	16.2	16.2	16.3	15.5	14.0	14.5
pH	units	6.5-8.5	6.8	6.5	6.8	6.5	6.5	6.5	7.6	6.5	6.5	7.0	7.0	7.0	7.0	7.7	7.7	7.7
Electrical Conductivity	uS	<2000	90	80	80	100	120	110	145	650	640	460	170	160	150	873	756	656
<b>Visual Observations:</b>																		
Transparency	cm	NA	7	9.8	10.2	NR	NR	NR	NA	61	43.5	29	5	3	6	120	NR	73.5
Trash	T/F	NA	T	T	T	F	F	F	T	F	F	F	T	T	T	T	T	T
Sewage	T/F	NA	F	NR	NR	F	F	F	F	F	F	F	NR	NR	NR	F	F	F
Oil Sheen	T/F	NA	F	NR	NR	T	T	F	F	F	F	F	NR	NR	NR	F	F	F
Scum	T/F	NA	T	NR	T	F	F	F	F	T	Y	T	T	T	T	F	F	F
Flow	H/M/L	NA	H	H	H	M	M	M	H	M	M	M	M	M	M	M	M	M
Shaded values indicate discharge value exceeds receiving water WQO or Attention Level																		
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*Copper Basin Plan WQO is dependent upon receiving water hardness; WQO is 30 ug/L when hardness is >100 mg/L.																		

## Discussion/Conclusions

This report summarizes results for the 2012 First Flush event conducted in the Cities of Santa Cruz and Capitola. Non-compliance with water quality objectives or attention levels was documented for nutrients (nitrate and orthophosphate), bacteria (*Escherichia coli*, total coliform and enterococcus), metals (copper, lead and zinc), total suspended solids and hardness at four sites in the City of Santa Cruz and eight sites in the City of Capitola.

Nitrate levels during the Dry Run exceeded the CCAMP attention level of <2.35 mg/L at Merced (Santa Cruz) and Creekside (Capitola); there were no exceedances of the CCAMP attention level during the Event in either city. For orthophosphate, Merced was the only site in either city that exceeded the CCAMP attention level of <0.12 mg/L PO<sub>4</sub>-P during the Dry Run. During the First Flush event in the City of Santa Cruz all sites reported exceedances during one or both time series. And in the City of Capitola, Auto Plaza, Capitola Center, Creekside and Capitola Pier exceeded the attention level during both time series.

For pathogens, *E.coli*, total coliform and enterococcus exceeded the Basin Plan WQO at 44% of all sites during the Dry Run and at 95% of all sites during the Event. The more highly elevated bacteria levels indicate possible contributions to stormwater from a variety of potential anthropogenic sources such as leaky sewage pipes or septic systems, fecal waste from pets, and/or runoff from livestock areas, as well as natural sources such as feces from birds and other wild animals.

Bacteria are microscopic, single celled organisms that are ubiquitous throughout the environment and have essential functions within watersheds, including functioning as decomposers by breaking down plant and animal remains. While many bacteria perform beneficial functions in healthy natural systems, some forms of bacteria are pathogens, and cause disease in humans and other organisms. *E.coli*, total coliform and enterococcus are common types of bacteria that are used by stormwater professionals and public health officials as “indicators” of potential negative impacts to human health, and are measured during events such as First Flush.

There were no copper exceedances at any sites during the Dry Run; 65% of all sites exceeded the Basin Plan WQO of <30 µg/L Cu during the Event. Zinc exceeded the Basin Plan WQO of <200 µg/L Zn in the City of Santa Cruz at Bay during the Dry Run; during the Event, Creekside and Capitola Pier in the City of Capitola exceeded the Basin Plan WQO. There were no exceedances of lead at any sites during the Dry Run or First Flush Event.

Copper is a naturally-occurring mineral element; however it is also used in many industrial applications and is a common urban runoff pollutant, with a wide range of sources in urban environments. Lead is a metal found in natural deposits and zinc is found naturally in water. Surface runoff and stormwater flows pick up copper and zinc from brake and tire wear, vehicle wash-water, and building materials.

Hardness is measured analytically as the sum of calcium and magnesium, and is used to help interpret the Basin Plan water quality objectives for metals. Calcium is abundant naturally in rocks and soil throughout much of the earth, and is a vital mineral in animal and plant cellular, metabolic

and nervous system functions. Magnesium is necessary for photosynthesis and basic cell functions for living organisms and is found in both fresh and salt water. Sources of magnesium include fertilizers, water softeners and soaps/detergents. No Basin Plan, CCAMP or other attention levels exist for calcium, magnesium, or hardness.

There were no exceedances of the CCAMP attention level of <500 mg/L for total suspended solids (TSS) at any sites during the Dry Run or First Flush event.

Suspended solids derive from particulate matter that can include plankton, algae, organic detritus, and inorganic sand, silt and clay particles. There are many sources of solids within the urban environment, including soil erosion and particulate matter generated by both natural and anthropogenic processes. Certain toxic compounds, including some commonly used urban pesticides stick to the surface of solid particles, making elevated total solids levels a concern for watershed health.

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.

CWC hopes that the results in this report and from other monitoring programs will aid in pollution prevention efforts by identifying which constituents are of greatest concern. Environmental data, by its very nature, is extremely variable and conclusions and management recommendations are often difficult to make based on limited data points. Nonetheless, these results are of use in shaping regional 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 local leaders and the community in achieving our goals together.

More information about local water quality data is available at <http://coastal-watershed.org> or by contacting Debie Chico-Macdonald at (831) 464-9200 or [djchirco@coastal-watershed.org](mailto:djchirco@coastal-watershed.org).