

Water Quality Report Card
for the Cities of Santa Cruz and Capitola
First Flush Monitoring Event
September 21, 2013 & November 19, 2013



Prepared by:
Debie Chirco-Macdonald
Monitoring Coordinator
Coastal Watershed Council
345 Lake, Suite F, Santa Cruz, CA 95062
(831) 464-9200, djchirco@coastal-watershed.org
www.coastal-watershed.org



COASTAL-WATERSHED.ORG

*Preserving and protecting
our coastal watersheds*

Introduction

As part of a regional effort throughout the Monterey Bay, the Coastal Watershed Council (CWC) conducted the 2013 First Flush Program in Santa Cruz County in the fall of 2013. As CWC's program partner, the Monterey Bay National Marine Sanctuary conducted similar activities in Monterey County. CWC's work was funded by contracts with the City of Capitola and City of Santa Cruz.

The goal of the First Flush Event is 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 involves monitoring of storm drain runoff during the first significant rainfall of the wet season. During the first rainfall, runoff washes significant levels of pollution off street surfaces, driveways, vehicles, and buildings into storm drains. This concentrated mix of constituents then flows from the storm drains directly into creeks, rivers, and the Monterey Bay.

The 2013 First Flush Event covered eight sites in the City of Capitola and three sites in the City of Santa Cruz. During the event trained teams of volunteers recorded field observations and measurements. In addition, samples were collected for laboratory analysis of nutrients, bacteria, metals, and total suspended solids.

CWC teams follow scientific protocols to ensure that our data are reliable and can be compared to regulatory water quality objectives. Water quality objectives ("WQOs") are set by regulators to help ensure that ambient water quality is sufficient to support the "beneficial uses" of each ambient water body, as designated in the regional Water Quality Control Plan (usually referred to as the "Basin Plan"). With respect to human activities, common beneficial uses include swimming, fishing, drinking water, or irrigation. When a WQO is exceeded, it indicates that the water quality may not be protective of one or more beneficial uses and the water body may be designated as "impaired". The designated beneficial uses of Soquel Creek, per Chapter II of the Basin Plan, are:

- MUN – Municipal and Domestic Supply
- AGR – Agricultural Supply
- IND – Industrial Service Supply
- GWR – Ground Water Recharge
- REC1 – Water Contact Recreation
- REC2 – Non-Contact Water Recreation
- WILD – Wildlife Habitat
- COLD – Cold Fresh Water Habitat
- MIGR – Migration of Aquatic Organisms
- SPWN – Spawning, Reproduction, and/or Early Development
- BIOL – Preservation of Biological Habitats of Special Significance
- FRESH – Freshwater Replenishment
- COMM – Commercial and Sport Fishing

More information and data about water quality in the river or creek nearest your home or business are available on the CWC website at <http://coastal-watershed.org/>.

In addition to this report card, CWC's First Flush program partner, the Monterey Bay National Marine Sanctuary, prepares an Annual First Flush Report that includes the Counties of Santa Cruz and Monterey. Those reports can be downloaded from:

<http://montereybay.noaa.gov/monitoringnetwork/reports.html>.

Methods

Training

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

Prior to the 2013 First Flush Event, volunteers received a hands-on classroom training for basic field water quality tests, including measurements of water temperature, electrical conductivity, pH, and transparency. They were also taught how to properly collect and preserve water samples for laboratory analysis of nutrients (nitrate and orthophosphate), bacteria (*Escherichia coli*, enterococcus, and total coliform), 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 measurements and observations 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 the First Flush Event, 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 4, 2013 and Dry Run field training on September 7, 2013. For the City of Capitola, CWC trained 22 volunteers; 21 participated in the actual storm event monitoring on Tuesday, November 19, 2013. For the City of Santa Cruz, CWC trained 12 volunteers; ten participated in the actual storm event monitoring on Saturday, September 21, 2013.

Sites

This report card shows the results of water quality monitoring conducted at five storm drain sites (Auto Plaza, Capitola Center, Creekside, Monterey Avenue, and Capitola Pier) and three Soquel Creek sites in the City of Capitola, and three storm drain sites in the City of Santa Cruz (Bay, Woodrow, and Arroyo Seco). 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. Creek sites were chosen to represent the upper, middle,

and lower reaches of Soquel Creek and its tributaries within the boundaries of the City of Capitola. Details on site characteristics are shown in Appendix A.

Data Collection

Field equipment included a digital thermometer to measure water temperature, an Oakton EC Testr to measure electrical conductivity, Macherey-Nagel non-bleeding pH strips to measure pH, and 120 cm transparency tubes to measure transparency. pH and transparency were collected during the Dry Run and only during the rain event if there was daylight. Field measurements and physical observations such as presence of trash, scum, bubbles, odor, oil sheen, flow, and weather conditions were recorded on field data sheets.

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

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 the initial portion of the rising limb of the rainfall/runoff hydrograph, to capture the heaviest pollutant load and highest concentrations of measured constituents. In the City of Capitola two time series water samples for laboratory analysis were collected from storm drain sites, at “time zero” and 60 minutes. A single sample was collected from the City of Capitola creek sites and at the City of Santa Cruz storm drain sites at “time zero”. Field measurements and visual observations were conducted three times (at “time zero”, 30 minutes, and 60 minutes) at all storm drain sites, and once (concurrent with the single lab sample collection) at the creek sites.

Appendices B and C provide Dry Run and FF Event field and laboratory constituents for each site.

Data Analysis

Monitoring results for nitrate, copper, lead, zinc, and pH were compared to the WQOs in Chapter III of the [Central Coast Regional Water Quality Control Board’s Basin Plan](#). *E.coli* and enterococcus results were compared to the [USEPA 2012 Recreational Water Quality Criteria](#). Orthophosphate results were compared to the former [Central Coast Ambient Monitoring Program \(CCAMP\)](#) Attention Level. There is no applicable WQO in the Central Coast Basin Plan for total coliform; for report purposes the neighboring San Francisco Basin Plan is referenced. There are no applicable WQO’s or attention levels for water temperature, electrical conductivity, transparency, urea, total suspended solids, or hardness (measured as the sum of calcium and magnesium).

Exceedances of the water quality objectives/criteria are noted in the presentations of field and lab results in Appendices B and C.

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

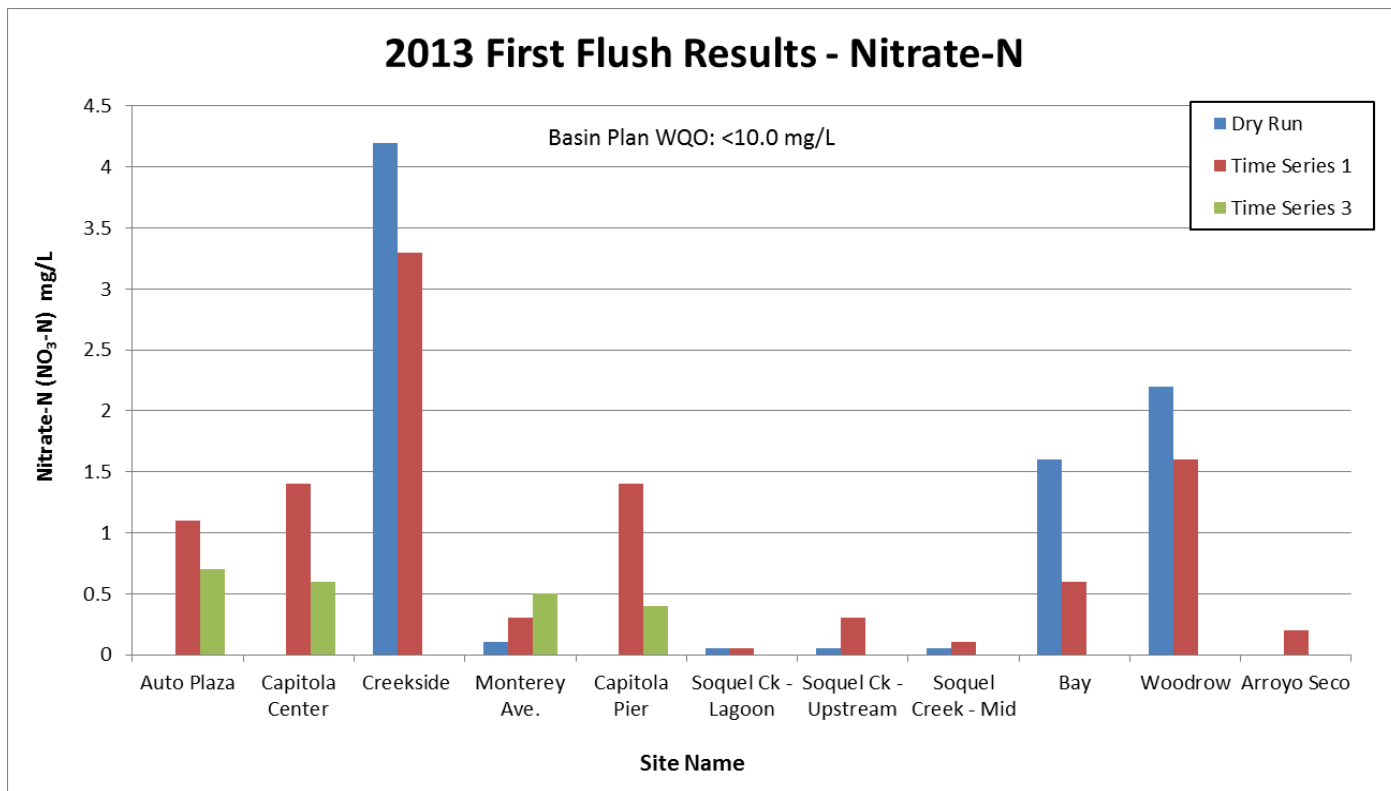
monitoring results to WQOs provide a frame of reference by which results can be evaluated. Absent other objective standards to use as a comparison, these WQOs are the most appropriate values to compare to environmental results for both receiving waters and discharges.

While most Basin Plan WQOs are constant across watersheds, some 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 (Basin Plan, Table 3-5). Measured hardness levels at all three Soquel Creek sites were greater than 100 mg/L during the Dry Run and First Flush events and during the Dry Run at the City of Santa Cruz sites; therefore the applicable copper WQO is <30 µg/L.

Results

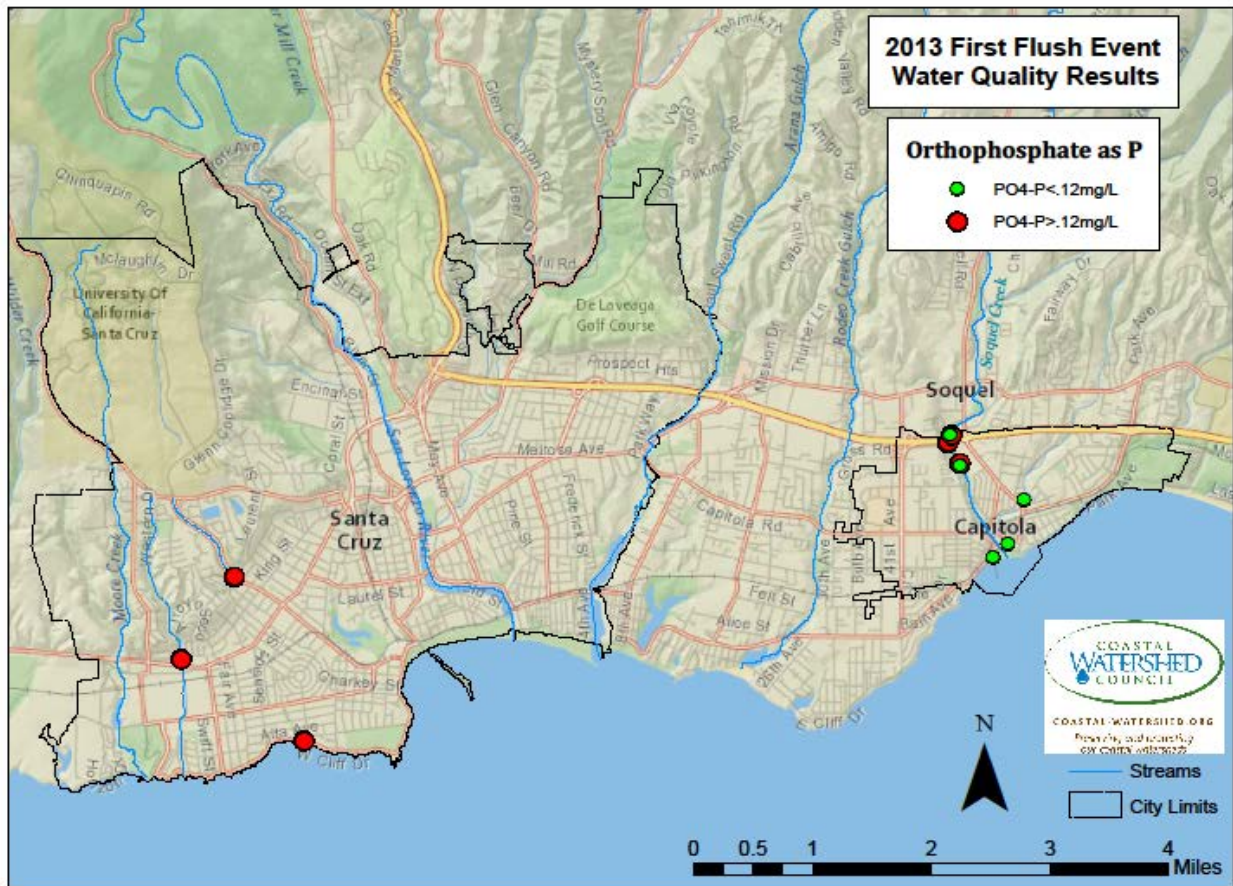
The analytical results from the 2013 Dry Run and FF Event are provided in Appendix B for the City of Capitola and in Appendix C for the City of Santa Cruz. The data were evaluated and are displayed in the following graphs and map.

The 2013 First Flush report cards that follow are designed to facilitate public education and awareness and to engage residents in best management practices in our local watersheds. The First Flush Report Card can also be viewed online at: <http://coastal-watershed.org/cwc-reports/>



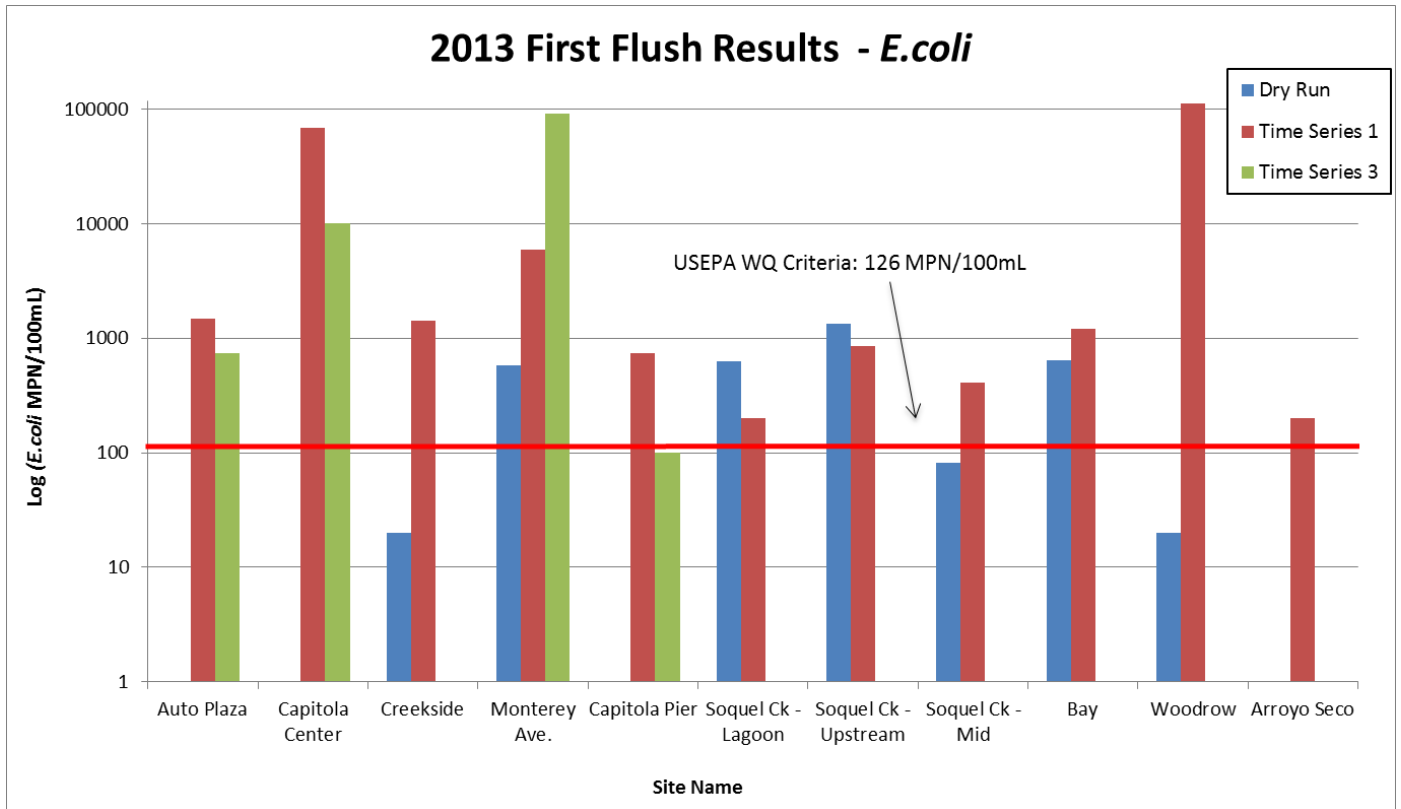
About Nitrate:

- **None of the sites exceeded the Basin Plan WQO of 10 mg/L during the Dry Run or FF 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/>**



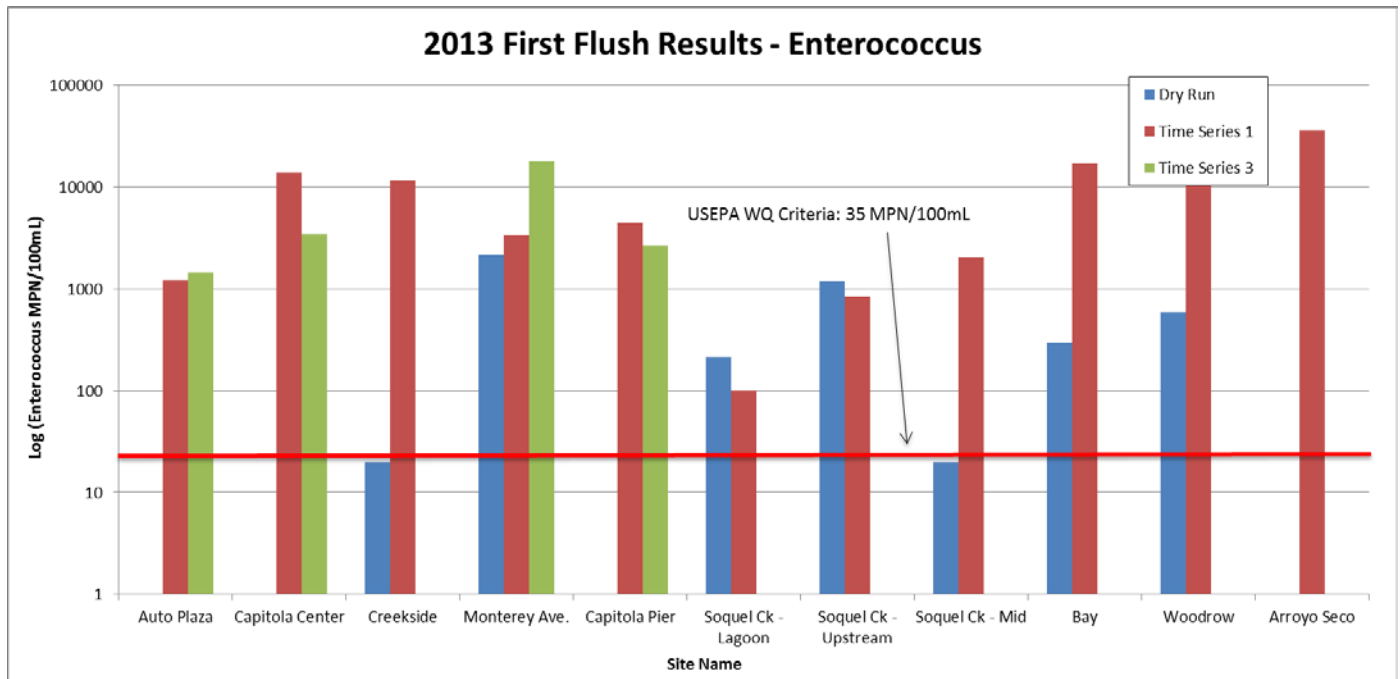
About Orthophosphate:

- **100% of sites met the former CCAMP attention level during the Dry Run; 6 of 11 sites exceeded the former CCAMP attention level during the FF 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/>**



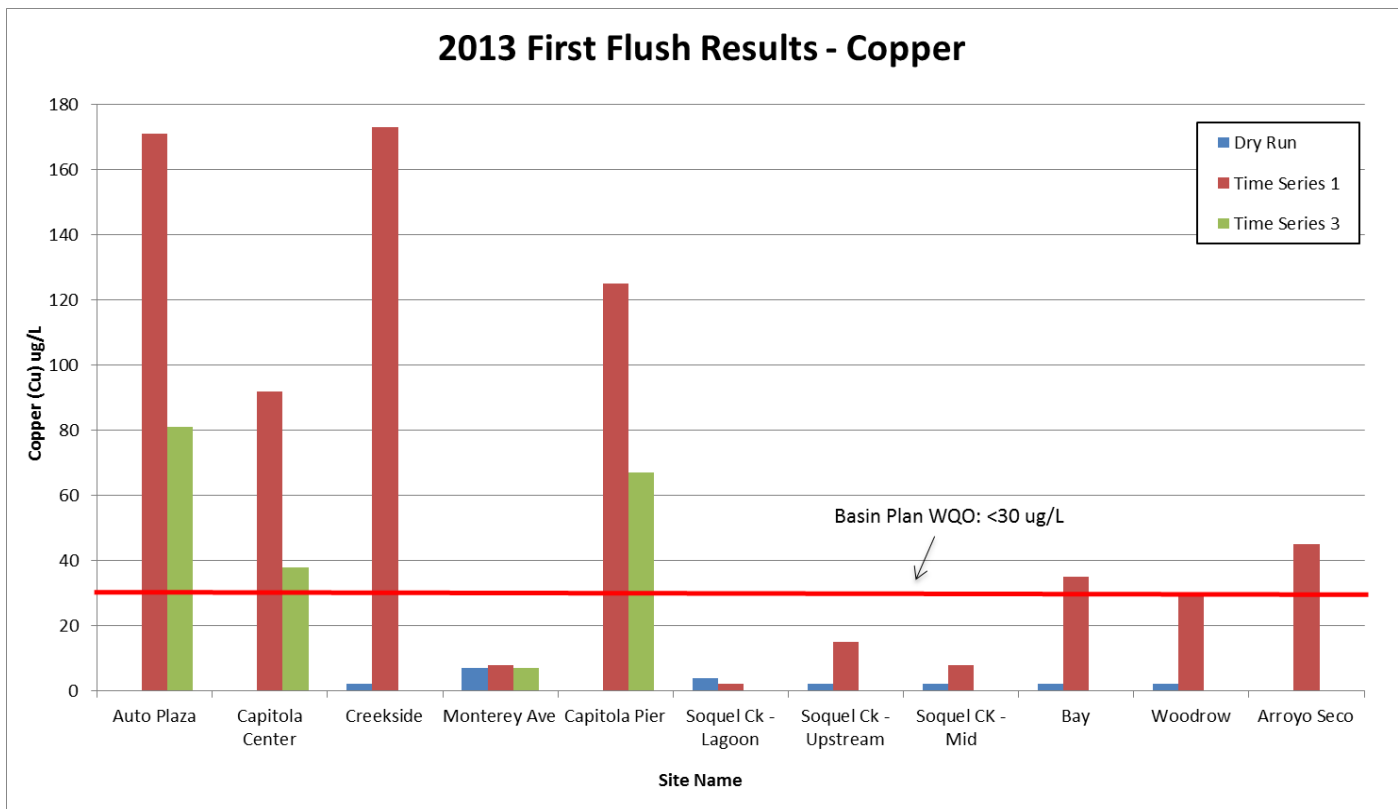
About *E.coli*:

- **Four of 7 sites with flow exceeded the USEPA Water Quality (WQ) Criteria during the Dry Run; 100% of sites exceeded the USEPA WQ Criteria during the FF Event**
- ***E.coli* is an indicator of fecal pollution in water that may originate from animals or humans**
- **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/>**



About Enterococcus:

- Five of 7 sites with flow exceeded the USEPA Water Quality (WQ) Criteria during the Dry Run; 100% of sites exceeded the USEPA WQ Criteria during the FF Event
- Enterococcus is an indicator of fecal pollution in water that may originate from animals or humans
- 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/>



About Copper:

- **100% of sites met the Basin Plan Water Quality Objective (WQO) during the Dry Run; 6 of 11 sites exceeded the Basin Plan WQO during the FF Event**
- **Copper occurs naturally at low levels, but too much can be lethal to fish and other aquatic organisms**
- **Sources: brake and tire wear, vehicle wash-water, industrial and municipal waste sites, areas of rock and coal mining,**
- **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/>**

Discussion/Conclusions

This report summarizes results for the 2013 First Flush Dry Run and Event conducted in the Cities of Capitola and Santa Cruz. Exceedances of WQOs or attention levels were documented for nutrients (orthophosphate), bacteria (*Escherichia coli*, enterococcus, and total coliform), metals (copper and lead), and pH at eight sites in the City of Capitola and three sites in the City of Santa Cruz.

Laboratory Constituents

- No nitrate samples exceeded the Basin Plan WQO of 10 mg/L for nitrate as N.
- Orthophosphate met the former CCAMP attention level of <0.12 mg/L PO₄-P in 100% of all samples during the Dry Run. During the FF Event in Capitola, Auto Plaza exceeded the former attention level during the second time series, Capitola Center during both time series, and Creekside during the first time series. In Santa Cruz all sites reported exceedances during the FF Event.
- *E.coli* exceeded the USEPA WQ Criteria of 126 MPN/100 mL at 4 of 7 sites with flow during the Dry Run (*Capitola*: Monterey Avenue, Soquel Creek Lagoon, Soquel Creek Upstream; *Santa Cruz*: Bay) and at all sites during the FF Event.
- Enterococcus exceeded the USEPA WQ Criteria of 35 MPN/100 mL at 5 of 7 sites with flow during the Dry Run (*Capitola*: Monterey Avenue, Soquel Creek Lagoon, Soquel Creek Upstream; *Santa Cruz*: Bay, Woodrow) and in 100% of all samples during the FF Event.
- Total coliform exceeded the San Francisco Basin Plan WQO of <240 MPN/100 mL in 100% of all samples during both the Dry Run and FF Event (note: there is no applicable WQO in the Central Coast Basin Plan; for report purposes the neighboring San Francisco Basin Plan is referenced). 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.
- There were no copper exceedances of the Basin Plan WQO in any samples during the Dry Run. During the FF Event 3 of 8 sites in Capitola (Auto Plaza, Capitola Center, and Capitola Pier) exceeded the Basin Plan WQO of <30 µg/L Cu during both time series and at Creekside (Capitola), Bay (Santa Cruz), and Arroyo Seco (Santa Cruz) during the first time series.
- There were no exceedances of the lead WQO in any samples during the Dry Run; during the FF Event only the Creekside site (Capitola) exceeded the Basin Plan WQO of <30 µg/L Pb.
- There were no exceedances of zinc in any samples during the Dry Run; during the Capitola FF Event, Auto Plaza and Capitola Center exceeded the Basin Plan WQO of <200 µg/L Zn during both time series; Creekside (Capitola), Capitola Pier, and Arroyo Seco (Santa Cruz) exceeded the WQO during the first time series.

Field-measured Parameters

There were five exceedances of the Basin Plan WQO during the FF Event in Santa Cruz for pH (Bay during the first and second time series and Arroyo Seco during all three time series).

Trash was observed during the Dry Run at Woodrow (Santa Cruz) and at 3 of 8 Capitola sites (Creekside, Capitola Pier, and Soquel Creek Upstream), and 2 of 3 Santa Cruz sites (Woodrow and Arroyo Seco) during the FF Event.

Sewage was neither sighted nor smelled at any sites during the Dry Run. A slight sewage smell was noted at the Soquel Creek Mid and Capitola Center sites during the FF Event; it was likely the transfer station nearby.

Oil sheen was reported at the Soquel Creek Mid and Upstream sites during the Dry Run and at Soquel Creek Lagoon during the FF Event; it was likely biogenic in nature.

There was no scum reported at any site during the Dry Run. During the FF Event 6 of 8 sites in Capitola (Auto Plaza, Capitola Center, Capitola Pier, Soquel Creek Lagoon, Upstream, and Mid) and one site in Santa Cruz (Bay) observed scum.

Summary/Follow-up

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 results in this report and from other monitoring programs can be used to facilitate pollution prevention efforts by identifying which constituents are of greatest concern. Environmental data, by their very nature, are extremely variable, and conclusions 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. The First Flush program and the partnership between CWC and the Cities of Capitola and Santa Cruz represent a collaboration that supports the goals of each organization and benefits the overall community.

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.

Appendix A: First Flush 2013 Sites

Site ID	Site Name	Site Description	Latitude	Longitude
City of Capitola				
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
City of Santa Cruz				
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

Appendix B provides the field and laboratory results for the City of Capitola Dry Run and FF Event. Results that exceed the applicable WQO or attention level are shaded in order to highlight these results. Not all tests were performed during every monitoring event (no flow at Auto Plaza, Capitola Center, and Capitola Pier during the Dry Run and a one-time series at Creekside during the FF Event); these instances are listed as “NA” when the test was not performed or “NR” if the datum was not recorded. Applicable WQOs and attention levels are as follows:

Field & Laboratory WQOs & AL's				
Analyte	WQO or Attention Level	Averaging Period	Units	Source of WQO/AL
Field:				
Water Temperature	Not Evaluated	Inst. Value	°C	CCRWQCB Basin Plan Objective for Cold Water Habitat
Electrical Conductivity	NA			NA
pH	>7.0 and <8.5	Inst. Value	pH units	CCRWQCB Basin Plan Objective for Cold Water Habitat
Transparency	NA			NA
Laboratory:				
<i>E.coli</i>	126	Geo Mean/30 day	MPN/100 mL	USEPA 2012 Recreational WQ Criteria
Total Coliform*	<240	Median/30 day	MPN/100 mL	SF Bay Region Basin Plan for Water Contact Recreation
Enterococcus	35	Geo Mean/30 day	MPN/100 mL	USEPA 2012 Recreational WQ Criteria
Nitrate (NO ₃ -N)	<10.0	Inst. Value	mg/L	CCRWQCB Basin Plan
Orthophosphate (PO ₄ -P)**	<0.12	Inst. Value	mg/L	Former CCAMP Attention Level
Copper (Cu) ***	<30	Inst. Value	µg/L	CCRWQCB Basin Plan
Lead (Pb)	<30	Inst. Value	µg/L	CCRWQCB Basin Plan
Zinc (Zn)	<200	Inst. Value	µg/L	CCRWQCB Basin Plan
Total suspended solids (TSS)	NA			NA

* Total coliform: there is no applicable WQO in the CCRWQCB Basin Plan; for report purposes the neighboring SF Basin Plan is referenced.

** Orthophosphate: there is no applicable WQO in the Basin Plan; for report purposes the former CCAMP Attention Level is referenced.

*** Copper receiving water WQO is Hardness dependent.

+ (Urea, Conductivity, Magnesium, Calcium, and Calcium Carbonate (CaCO₃) do not have a specific receiving water WQO or Attention Level).

Appendix B: City of Capitola Dry Run 2013 - Summary of Results

	CSD-03	CSD-05	CSD-06	CSD-08	CSD-09	SOQUE-22	SOQUE-26	SOQUE-28
StationID	Auto Plaza	Capitola Center	Creekside Storm Drain	Monterey Ave.	Capitola Pier	Soquel Creek - Lagoon Outlet	Soquel Creek - Upstream	Soquel Creek - Mid
Nitrate-N (NO ₃ -N)	NA	NA	4.2	0.1	NA	ND	ND	ND
Orthophosphate-P (PO ₄ -P)	NA	NA	ND	ND	NA	ND	ND	ND
Urea-N	NA	NA	NA	NA	NA	NA	NA	NA
<i>E.coli</i>	NA	NA	<20	576	NA	636	1,340	82
Total Coliform	NA	NA	1,076	18,416	NA	>48,392	10,950	2,374
Enterococci	NA	NA	<20	2,162	NA	216	1,188	<20
Copper (Cu)	NA	NA	ND	7	NA	4	ND	ND
Lead (Pb)	NA	NA	ND	ND	NA	ND	ND	ND
Zinc (Zn)	NA	NA	27	23	NA	140	11	ND
Total Suspended Solids (TSS)	NA	NA	ND	26	NA	ND	6	8
Hardness (as CaCO ₃)	NA	NA	174	191	NA	268	279	296
Calcium	NA	NA	40	45	NA	63	74	79
Magnesium	NA	NA	18	19	NA	27	23	24
Water Temperature	NA	NA	NR	14.6	NA	22.3	16.3	19.0
pH	NA	NA	7.5	7.0	NA	8.0	7.0	7.5
Electrical Conductivity	NA	NA	560	700	NA	1,120	840	900
Transparency	NA	NA	NR	6	NA	120	60	>120
Visual Field Observations:								
Flow	NA	NA	L	L	NA	M	M	M
Trash	NA	NA	F	F	NA	F	F	F
Sewage (sited or smelled)	NA	NA	F	F	NA	F	F	F
Oil Sheen	NA	NA	F	F	NA	F	T	T
Scum	NA	NA	F	F	NA	F	F	F
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								
T/F = True/False								
H/M/L = High/Medium/Low								

Appendix B: City of Capitola First Flush 2013 - Summary of Results

	Auto Plaza	Auto Plaza	Auto Plaza	Capitola Center	Capitola Center	Capitola Center	Creekside 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	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 2	Time Series 3	Time Series 1	Time Series 2	Time Series 3	Time Series 1	Time Series 1	Time Series 1
Nitrate-N (NO ₃ -N)	1.10	NA	0.70	1.40	NA	0.60	3.30	0.30	NA	0.50	1.40	NA	0.40	ND	0.30	0.10
Orthophosphate-P (PO ₄ -P)	ND	NA	0.30	0.60	NA	0.30	0.40	ND	NA	ND	ND	NA	ND	ND	ND	ND
Urea-N	640	NA	NA	389	NA	NA	382	151	NA	NA	1,360	NA	NA	133	103	86
<i>E.coli</i>	1,480	NA	738	68,667	NA	10,101	1,435	5,908	NA	92,084	745	NA	100	202	852	409
Total Coliform	>241,960	NA	72,699	>241,960	NA	129,965	>241,960	51,721	NA	141,361	26,125	NA	22,468	2,157	34,480	21,416
Enterococci	1,223	NA	1,449	13,958	NA	3,451	11,446	3,405	NA	17,890	4,455	NA	2,665	<100	852	2,034
Copper (Cu)	171	NA	81	92	NA	38	173	8	NA	7	125	NA	67	ND	15	8
Lead (Pb)	13	NA	ND	8	NA	ND	41	ND	NA	ND	26	NA	5	ND	ND	ND
Zinc (Zn)	640	NA	270	695	NA	302	665	35	NA	24	486	NA	193	ND	55	38
Total Suspended Solids (TSS)	81	NA	19	86	NA	23	192	48	NA	20	600	NA	38	6	14	11
Hardness (as CaCO ₃)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	283	265	263
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72	70	69
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25	22	22
Water Temperature	15.0	15.0	14.7	16.3	15.6	15.2	15.2	11.9	11.9	12.2	14.4	14.3	14.2	12.6	11.9	12.4
pH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Electrical Conductivity	370	270	200	330	330	280	460	590	600	540	400	200	200	1040	910	890
Transparency	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Visual Field Observations:																
Flow	Med	Med	Med	High	High	High	High	Med	High	High	Med	Med	Med	Low	Low	Low
Trash	F	F	F	F	F	F	T	F	F	F	F	T	F	F	T	F
Sewage (sited or smelled)	F	F	F	T	T	T	F	F	F	F	F	F	F	F	F	T
Oil Sheen	F	F	F	F	F	F	F	F	F	F	F	F	F	T	F	F
Scum	T	T	T	T	T	T	F	F	F	F	T	T	T	T	T	T
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																
T/F = True/False																
H/M/L = High/Medium/Low																

Appendix C provides the field and laboratory results for the City of Santa Cruz Dry Run and FF Event. Results that exceed the applicable WQO or attention level are shaded in order to highlight these results. Not all tests were performed during every monitoring event (no flow at the Arroyo Seco site during the Dry Run,); these instances are listed as “NA” when the test was not performed or “NR” if the datum was not recorded. Applicable WQOs and attention levels are as follows:

Field & Laboratory WQOs & AL's				
Analyte	WQO or Attention Level	Averaging Period	Units	Source of WQO/AL
Field:				
Water Temperature	Not Evaluated	Inst. Value	°C	CCRWQCB Basin Plan Objective for Cold Water Habitat
Electrical Conductivity	NA			NA
pH	>7.0 and <8.5	Inst. Value	pH units	CCRWQCB Basin Plan Objective for Cold Water Habitat
Transparency	NA			NA
Laboratory:				
<i>E.coli</i>	126	Geo Mean/30 day	MPN/100 mL	USEPA 2012 Recreational WQ Criteria
Total Coliform*	<240	Median/30 day	MPN/100 mL	SF Bay Region Basin Plan for Water Contact Recreation
Enterococcus	35	Geo Mean/30 day	MPN/100 mL	USEPA 2012 Recreational WQ Criteria
Nitrate (NO ₃ -N)	<10.0	Inst. Value	mg/L	CCRWQCB Basin Plan
Orthophosphate (PO ₄ -P)**	<0.12	Inst. Value	mg/L	Former CCAMP Attention Level
Copper (Cu) ***	<30	Inst. Value	µg/L	CCRWQCB Basin Plan
Lead (Pb)	<30	Inst. Value	µg/L	CCRWQCB Basin Plan
Zinc (Zn)	<200	Inst. Value	µg/L	CCRWQCB Basin Plan
Total suspended solids (TSS)	NA			NA

* Total coliform: there is no applicable WQO in the CCRWQCB Basin Plan; for report purposes the neighboring SF Basin Plan is referenced.

** Orthophosphate: there is no applicable WQO in the Basin Plan; for report purposes the former CCAMP Attention Level is referenced.

*** Copper receiving water WQO is Hardness dependent.

+ (Urea, Conductivity, Magnesium, Calcium, and Calcium Carbonate (CaCO₃)) do not have a specific receiving water WQO or Attention Level).

Appendix C: City of Santa Cruz Dry Run 2013 - Summary of Results

	SCSD-03	SCSD-04	SCSD-05
Parameter	Bay	Woodrow	Arroyo Seco
Nitrate-N (NO ₃ -N)	1.6	2.2	NA
Orthophosphate-P (PO ₄ -P)	ND	ND	NA
Urea-N	NA	NA	NA
<i>E.coli</i>	646	20	NA
Total Coliform	10,950	2,402	NA
Enterococci	296	588	NA
Copper (Cu)	ND	ND	NA
Lead (Pb)	ND	ND	NA
Zinc (Zn)	ND	11	NA
Total Suspended Solids (TSS)	3	4	NA
Hardness (as CaCO ₃)	234	191	NA
Calcium	82	47	NA
Magnesium	7	18	NA
Water Temperature	18.1	17.7	NA
pH	7.0	7.0	NA
Electrical Conductivity	530	620	NA
Transparency	120	>120	NA
Visual Field Observations:			
Flow	M	L	NA
Trash	F	T	NA
Sewage (sited or smelled)	F	F	NA
Oil Sheen	F	F	NA
Scum	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			
T/F = True/False			
H/M/L = High/Medium/Low			

Appendix C: City of Santa Cruz First Flush 2013 - Summary of Results

	SCSD-03	SCSD-03	SCSD-03	SCSD-04	SCSD-04	SCSD-04	SCSD-05	SCSD-05	SCSD-05
	Bay	Bay	Bay	Woodrow	Woodrow	Woodrow	Arroyo Seco	Arroyo Seco	Arroyo Seco
Parameter	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 ₃ -N)	0.60	NA	NA	1.60	NA	NA	0.20	NA	NA
Orthophosphate-P (PO ₄ -P)	0.20	NA	NA	0.20	NA	NA	0.50	NA	NA
Urea-N	83	NA	NA	173	NA	NA	120	NA	NA
<i>E. coli</i>	1,210	NA	NA	111,985	NA	NA	201	NA	NA
Total Coliform	198,628	NA	NA	>241,920	NA	NA	>241,920	NA	NA
Enterococci	17,230	NA	NA	14,140	NA	NA	36,540	NA	NA
Copper (Cu)	35	NA	NA	29	NA	NA	45	NA	NA
Lead (Pb)	7	NA	NA	5	NA	NA	6	NA	NA
Zinc (Zn)	166	NA	NA	167	NA	NA	318	NA	NA
Total Suspended Solids (TSS)	58	NA	NA	34	NA	NA	133	NA	NA
Water Temperature	19.8	19.6	NR	17.6	19.8	19.9	18.1	19.9	19.9
pH	6.0	6.5	NR	7.0	7.0	7.0	6.0	6.5	6.5
Electrical Conductivity	90	180	NR	880	1,040	990	150	170	170
Transparency	15	8	NR	14	9	10.75	12.1	9.6	9.9
Visual Field Observations:									
Flow	NR	NR	NR	L	M	H	L	M	M
Trash	F	F	NR	T	F	F	F	T	T
Sewage (site or smelled)	F	F	NR	NR	F	F	F	F	F
Oil Sheen	F	F	NR	NR	F	F	F	F	F
Scum	T	F	NR	NR	F	F	F	F	F
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									
T/F = True/False									
H/M/L = High/Medium/Low									