Annual Water Quality Report for
City of Capitola
2015 Urban Watch Results

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Preserving and protecting our coastal watersheds

Introduction

The 2015 Capitola Urban Watch monitoring program was conducted by the Coastal Watershed Council (CWC) for the City of Capitola as part of their National Pollutant Discharge Elimination System (NPDES) Phase II Storm Water Management Program.

The goal of the Urban Watch Program is twofold: First, to serve as a tool for education and outreach to the community regarding the impacts that citizens have on local water quality through urban runoff; and secondly, to collect scientifically valid water quality data to support environmental management decision-making at the local and state levels.

The 2015 dry-season monitoring program covered seven monitoring sites in the City of Capitola and included fifteen water quality monitoring events, from June through the end of September. During each event CWC staff led trained teams of volunteers to record observations and measurements in the field. In addition, samples were collected on a monthly basis for laboratory analysis of nutrients and bacteria indicators, and once during the dry season for copper analysis.

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 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 are available on the CWC website at http://coastal-watershed.org/.

The Urban Watch Program started regionally in 1997 as a joint effort between CWC, the City of Monterey, and the Monterey Bay National Marine Sanctuary. Since 2000, the City of Capitola Urban Watch Program has trained citizen volunteers to collect water samples and conduct water quality assessments, following established state and federal protocols.

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.

The 2015 Urban Watch monitoring program volunteers received hands-on, in-the-field trainings for basic field water quality tests, including measurements of temperature, pH, dissolved oxygen, electrical conductivity, salinity, total dissolved solids (TDS), chlorine, detergent, and turbidity. They were also taught how to properly collect and preserve water samples for laboratory analysis of nutrients (nitrate, ammonia, and orthophosphate), bacteria (*Escherichia coli* and total coliform), and copper.

Sites

This report shows the results for samples collected at seven sites in the City of Capitola: three Soquel Creek stream sites, two Noble Gulch Creek sites, and two storm drainages. CWC and staff from the Public Works Department at the City of Capitola chose the stream and outflow/storm drain 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. Details on site characteristics are shown in Appendix A.

Data Collection

Field equipment included a YSI 556 multi-meter, which was used to measure water temperature, pH, specific and electrical conductivity, salinity, TDS, and dissolved oxygen (both total mg/L and as a percentage of saturation), and a Hach turbidimeter to measure turbidity. A digital thermometer was used to measure air temperature. A portable field monitoring kit was used to test for the presence of chlorine, detergent, odor, and color. Physical observations such as flow depth, wetted width, weather, and site conditions (trash, oil sheen, scum, sewage sited or smelled, and wildlife) were also recorded on field data sheets.

Sample containers were filled with creek or storm drain water for laboratory analysis of nitrate, orthophosphate, ammonia, *E.coli*, total coliform, and copper. All collected water

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

Data Analysis

Monitoring results for nitrate, ammonia, copper, dissolved oxygen, pH, and turbidity were compared to the WQOs in Chapter III of the Central Coast Regional Water Quality Control Board's Basin Plan. *E.coli* 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 reporting purposes the WQO for total coliform in the neighboring San Francisco Bay Basin Plan is referenced. There are no applicable WQO's or attention levels for air temperature, water temperature, electrical conductivity, or salinity. Details regarding the applicable WQOs and other criteria are shown in Appendix B.

Exceedances of WQOs and other criteria are noted in the presentations of field results in Appendix C and lab results in Appendix D.

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.

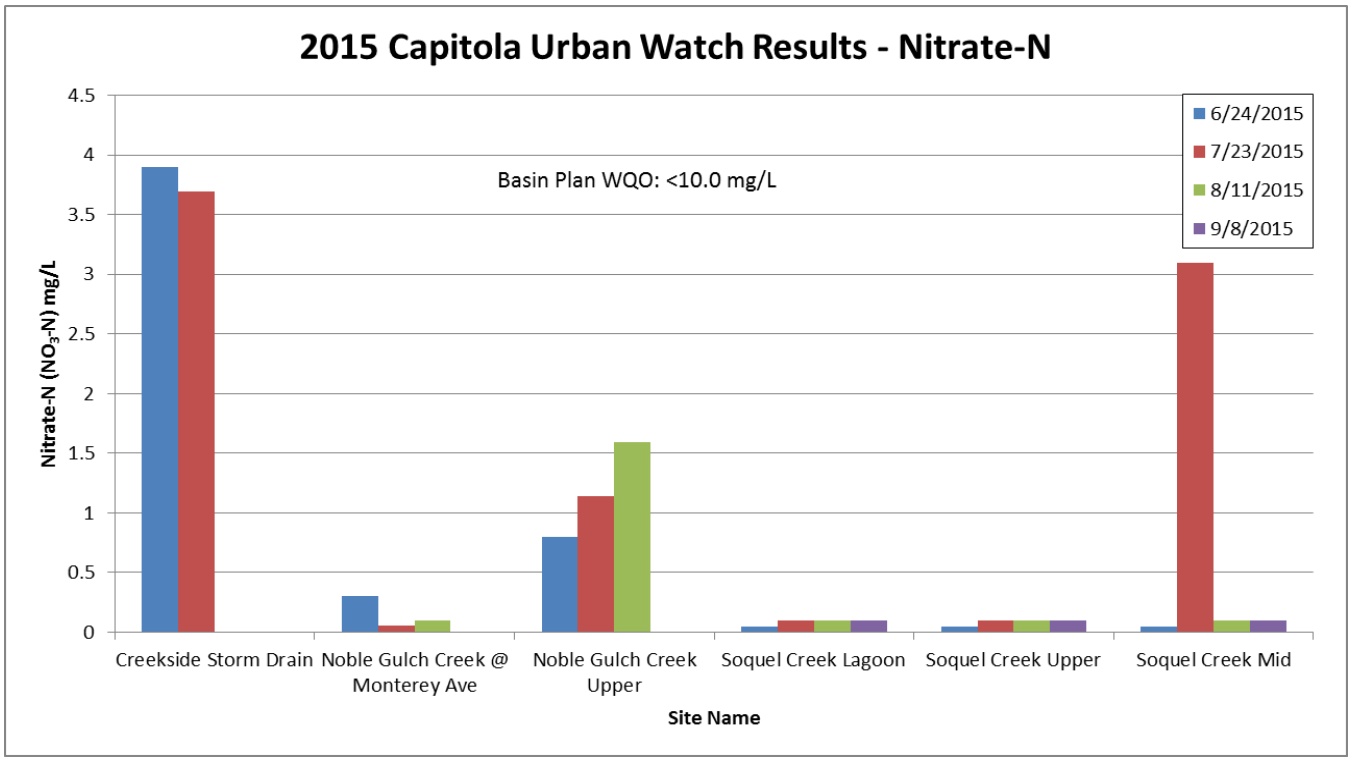
Results

The 2015 Urban Watch annual report is designed to facilitate public education and awareness and to engage residents in best management practices to reduce urban runoff pollution in our local watersheds. The Urban Watch Annual Report can also be viewed online at: http://coastal-watershed.org/cwc-reports/

The analytical results from 2015 are provided in Appendix C for the field-measured parameters and in Appendix D for the laboratory-measured constituents.

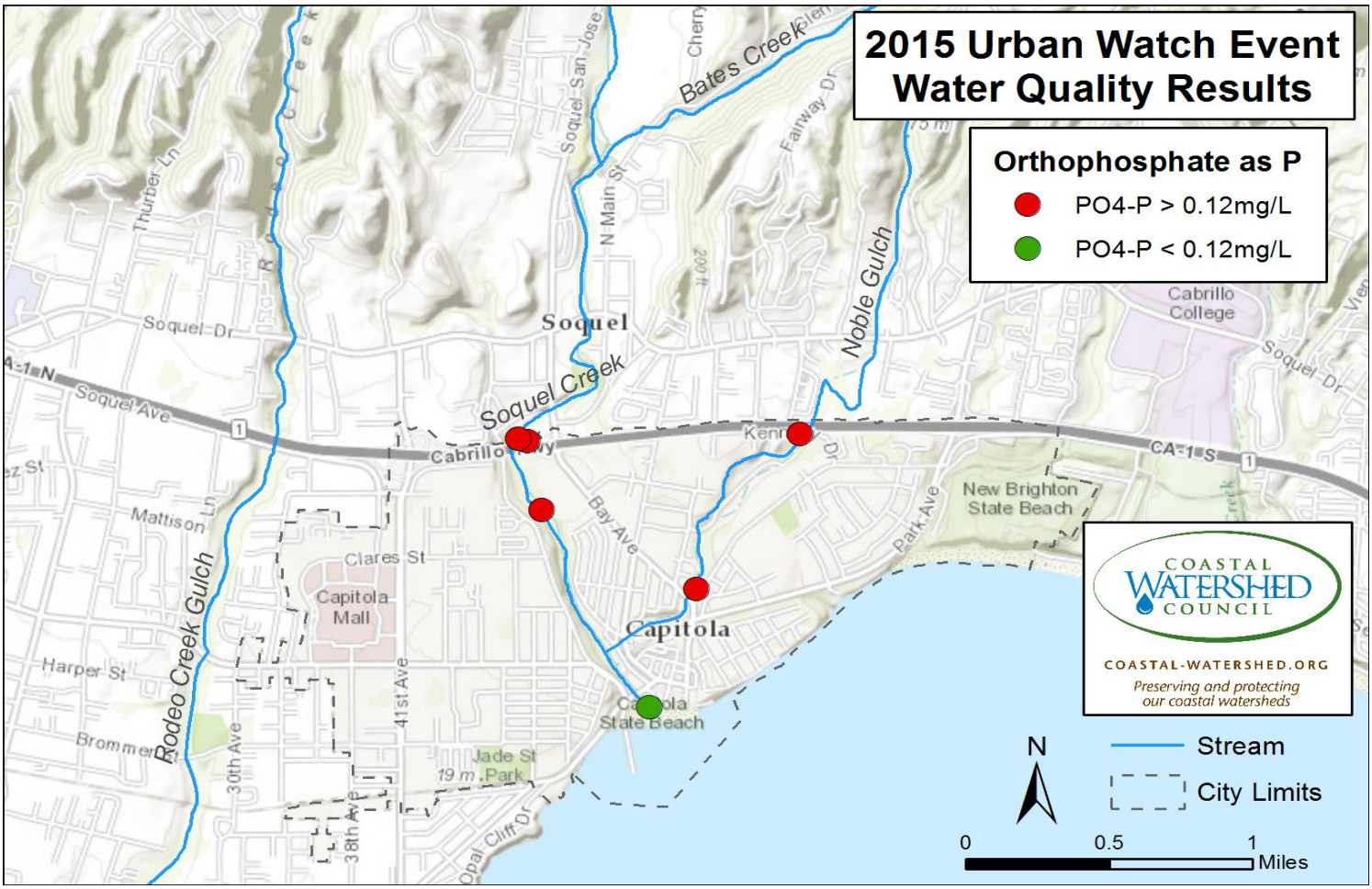
The data were evaluated and combined with historical data to illustrate temporal and spatial trends or patterns, as reflected in the following graphs, map, and discussion.

Note that the Capitola Pier Storm Drain site is not shown in the graphics that follow because flow was generally not present at that site.



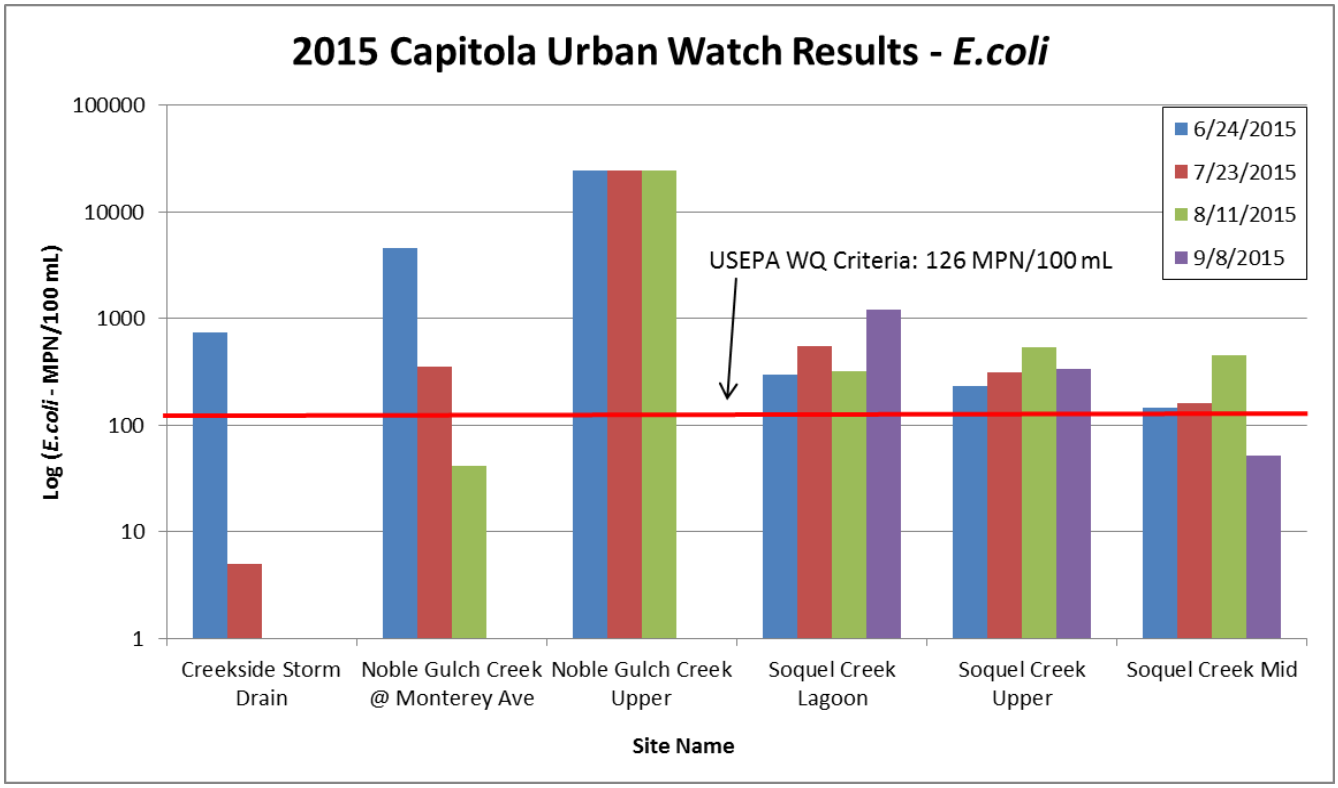
Nitrate Results:

- **100% of sites met the Basin Plan Water Quality Objective (WQO) of <10 mg/L during the 2015 season**
  - **Historically, only three of 202 results exceeded the WQO over a twelve-year period; the exceedances were at the Creekside Storm Drain site. Overall, results at Creekside are much higher than the other sites with results ranging from 1.25 – 12.08 mg/L; all other sites ranged from non-detect – 3.1 mg/L.**
- **Nitrate is necessary for healthy plant growth, but too much can lead to algal blooms that deplete oxygen in water**
- **Sources: runoff from lawns or fields containing fertilizers, animal waste, wash water, leaking sewer lines or failing septic systems, 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/**



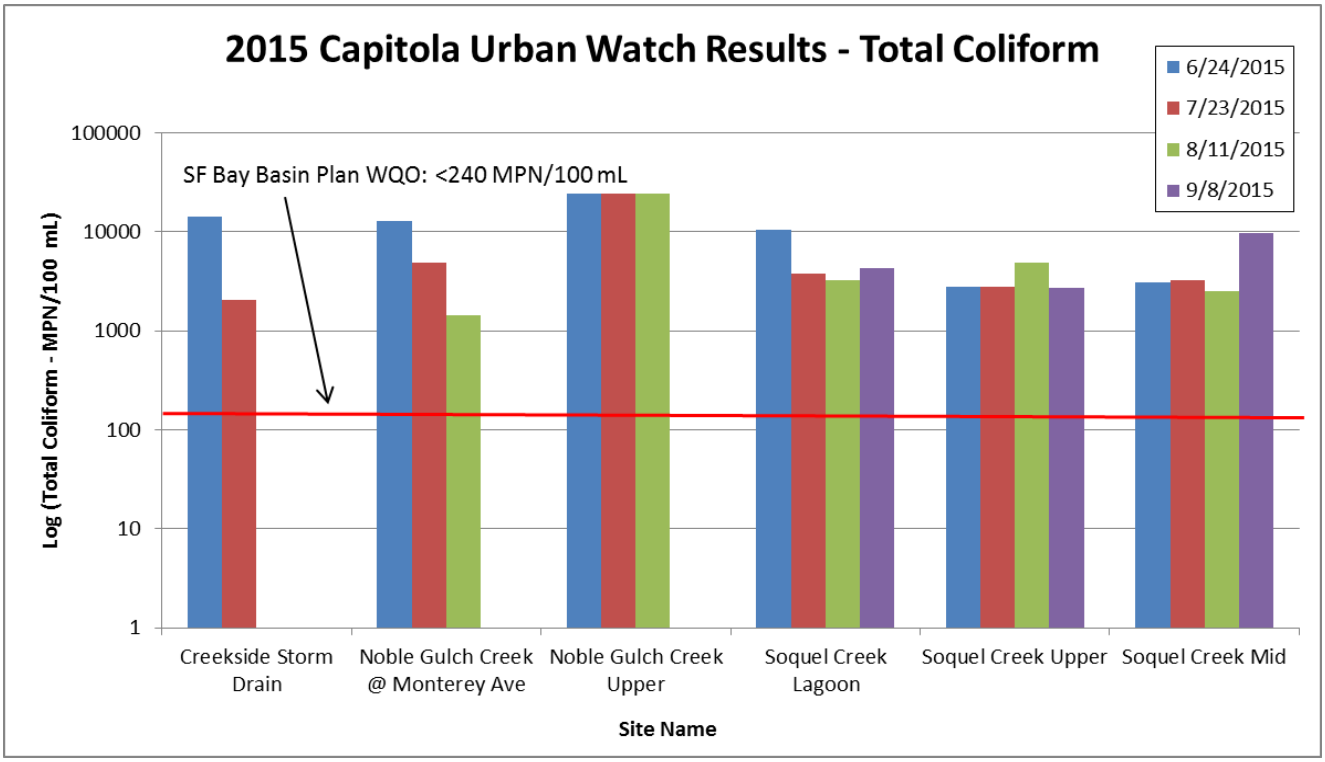
Orthophosphate Results:

- **70% (14 of 20) of 2015 samples met the former CCAMP attention level of <0.12 mg/L; 30% (6 of 20 samples) exceeded the former attention level.**
  - **Any exceedance from the four lab events is reflected on the map; exceedances occurred in one of 2 lab events at Creekside, in 1 of 3 at Noble Gulch at Monterey Avenue, in 2 of 3 at Noble Gulch Upper, and in 1 of 4 at both Soquel Creek Mid and Upper. There were no exceedances at Soquel Creek Lagoon during any event.**
  - **Historically, 193 of 217 samples (89%) across 11 years met the attention level. Of the 24 historical exceedances, 22 occurred from 2012–2015 (Creekside: 7 times, Noble Gulch Creek at Monterey Avenue: 2 times, Noble Gulch Upper: 4 times, Soquel Creek Lagoon: 1 time, Soquel Creek Upper: 4 times, & Soquel Creek Mid: 4 times); two exceedances occurred in 2008 (Soquel Creek Upper & Mid, respectively).**
  - **Noble Gulch Creek at Monterey Avenue and Soquel Creek Lagoon had the least exceedances; there have been no exceedances at the Capitola Pier Storm Drain site.**
- **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, fields, or animal manure storage areas; leaking sewer lines; failing septic systems; commercial cleaning products**
- **What you can do: maintain septic systems, limit the use of chemical fertilizers (especially before a rain), use non-phosphate detergents**
- **Learn more at: http://coastal-watershed.org/stewardship/**



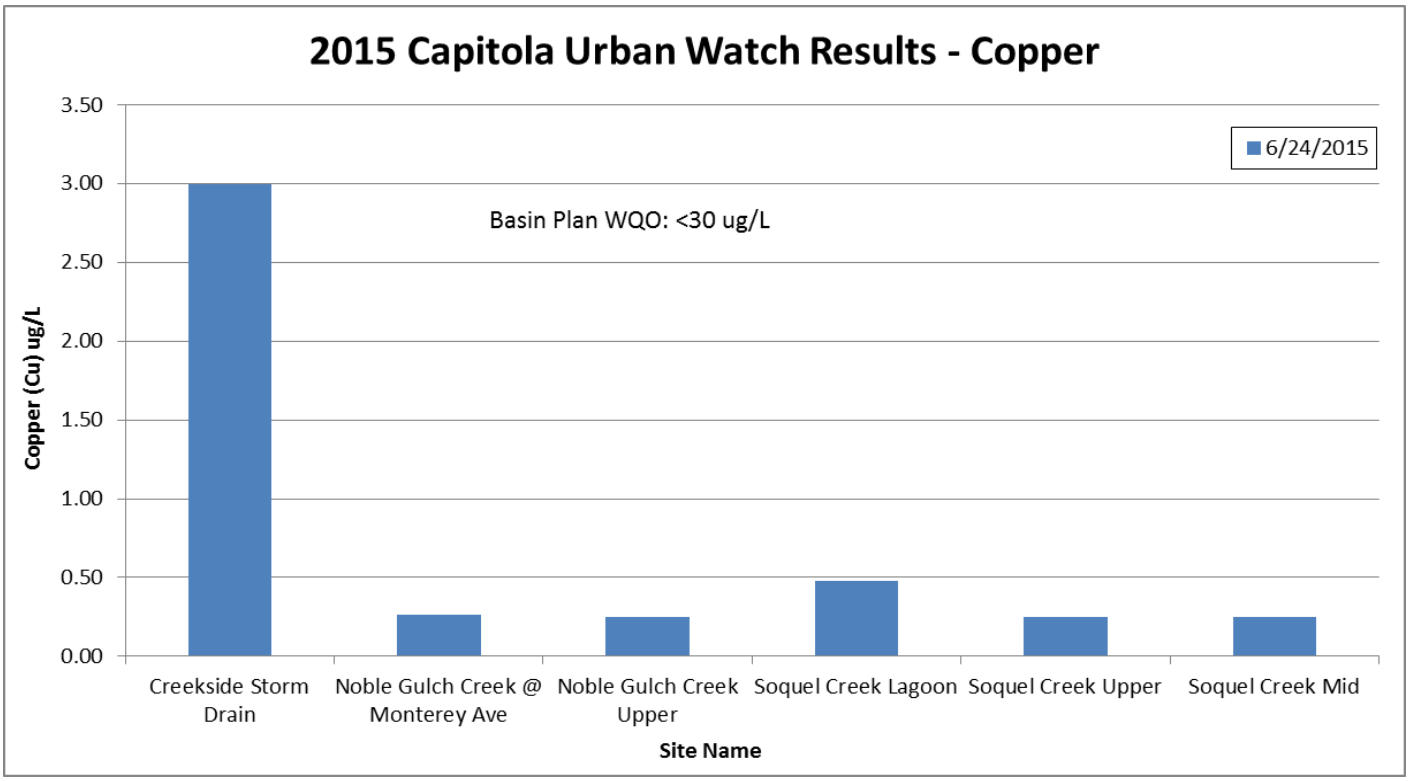
E.coli Results:

- **15% (3 of 20) of samples met the USEPA Water Quality (WQ) Criterion of 126 MPN/100 mL; 85% (17 of 20 samples) exceeded the USEPA WQ Criterion during the 2014 season**
  - **The Creekside Storm Drain, Noble Gulch Creek at Monterey Avenue and Soquel Creek Mid sites each met the USEPA WQ Criterion once during the 2015 season**
  - **Historically, the highest *E.coli* results are from Noble Gulch Creek at Monterey Avenue (90% across eleven years), Noble Gulch Creek Upper (95% across six years), Soquel Creek Lagoon (100% across eight years), and Soquel Creek Upper (91% across eight years)**
- ***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, and report leaking sewer lines**
- **Learn more at: http://coastal-watershed.org/stewardship/**



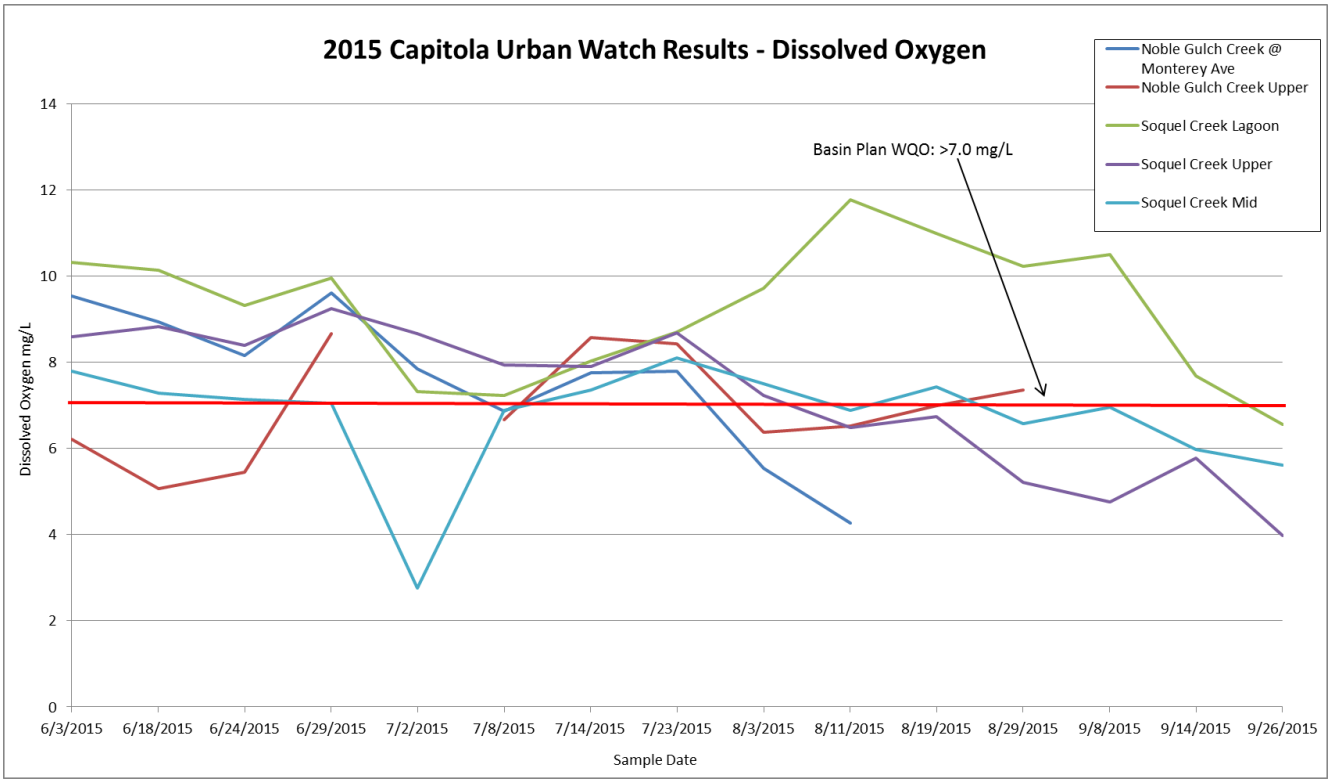
Total Coliform Results:

- **100% of sites exceeded the SF Bay Basin Plan Water Quality Objective (WQO) of <240 MPN/100 mL during the 2015 season**
  - **Historically, the highest total coliform results are from Noble Gulch Creek at Monterey Avenue (2005-2015), Noble Gulch Creek Upper (2010-2015), and Capitola Pier Storm Drain (2005-2013)**
  - **Note: there is no applicable WQO in the Central Coast Basin Plan; for reporting purposes total coliform in the neighboring San Francisco Basin Plan is referenced**
- **Total Coliform 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, and report leaking sewer lines**
- **Learn more at: http://coastal-watershed.org/stewardship/**



Copper Results:

- **All 6 sites with flow met the Basin Plan Water Quality Objective (WQO) of <30 µg/L in annual samples taken on 6/24/2014**
  - **Historically, only one sample has exceeded the WQO (Soquel Creek Lagoon in 2009)**
- **Copper occurs naturally at low levels, but too much can be toxic to fish and other aquatic organisms**
- **Sources: vehicle brake and tire wear, vehicle wash-water, building materials, fungicides**
- **What you can do: wash cars where water won't run into a storm drain (use the lawn); avoid use of copper-containing pesticides; (Legislation has addressed brake pad issue)**
- **Learn more at: http://coastal-watershed.org/stewardship/**



Dissolved Oxygen Results:

- **65% of results met the Basin Plan Water Quality Objective (WQO) level of >7 mg/L; 35% failed to meet the WQO during the 2015 season**
  - **In comparison, 63% and 13% of results failed to meet the WQO in 2014 and 2013, respectively, so 2015 was mid-range for the past 3 years. Low flows in Soquel Creek and Noble Gulch Creek could help explain higher numbers of low dissolved oxygen results**
  - **Historically, on average 80% of results met the WQO from 2010-2015**
- **Dissolved Oxygen is the amount of oxygen present in the water**
- **Essential for survival and growth of nearly all aquatic organisms & a good indicator of stream health**
- **Low levels can be caused by excess nutrients, warm water temperatures, and/or poor water circulation**
- **Learn more at: http://coastal-watershed.org/what-do-we-monitor/**

Discussion/Conclusions

This report summarizes results for the 2015 City of Capitola Urban Watch Program, with comparisons to the historical Urban Watch data set where feasible.

Presence of Flowing Water

Typically the Capitola Pier Storm Drain site experiences consistent flow throughout most of the monitoring season. However, in the 2013 – 2015 seasons, visible flow was observed only once (on 6/18/13); during the 2014 season evidence of earlier flow was noted six times during June-August; there was no flow during any of the 2015 season events. Normally flowing all season, the Creekside Storm Drain site experienced low flows in June and July; during the rest of the season there was only one instance on 8/29/15 where enough flow allowed most field measurements to be taken. The Noble Gulch Creek at Monterey Avenue site ran dry between the 8/11/2015 and 8/19/2015 monitoring events. The Noble Gulch Creek Upper site experienced no connectivity to the lower Noble Gulch site (at Monterey Ave.) due to decreasing flow upstream of the culvert between the 8/29/2015 and 9/8/2015 monitoring events.

Comparisons to WQOs

As noted above, exceedances of WQOs are common for both fecal and total coliform. This is typical of urban runoff and urban creeks systems generally, as the sources of these indicator bacteria are ubiquitous in the urban environment.

The orthophosphate attention level also was exceeded about one third of the time. Dissolved oxygen also fell below the Basin Plan minimum on about one third of the measurements. These two issues may be related, as higher nutrient levels can lead eventually to depleted oxygen in the water. However, the lower flows during the drought period are also likely to be a factor in the lower dissolved oxygen levels.

As shown above, nitrate and copper regularly met their respective WQOs.

Ammonia results were <0.03 mg/L in all samples and therefore met the Basin Plan WQO of <0.025 mg/L in 100% of all samples during the 2015 monitoring program. Historically, ammonia has met the attention level in 99% of all samples across twelve years.

One pH result at the Soquel Creek Mid site on 7/14/15 exceeded the Basin Plan WQO of >7.0 and <8.5 pH (see Appendix B).

Other Field-measured Parameters

Turbidity levels were relatively low at all sites. Odor was noted in three instances; once at the Creekside Storm Drain site with a mild “musty” smell and twice at the Soquel Creek Upper site with a mild “musty” and “algae” smell.

Detergent was detected at the Noble Gulch Creek at Monterey Avenue site in 2 of 6 tests, and at the Noble Gulch Creek Upper site in 1 of 8 tests. There were no detections of chlorine at any of the sites during the 2015 season.

Trash continued to be a fairly regular observation by field teams, with most observances at the Capitola Pier Storm Drain site (14 of 15 monitoring events) and the Soquel Creek Lagoon site (13 of 15 events).

Oil sheen was observed 21% of the time, but it was only noted once at the Soquel Creek Upper site as possibly petroleum based. Scum was observed 37% of the time, with most observances at the Noble Gulch Creek at Monterey Avenue (5 of 10 events), the Noble Gulch Creek Upper (7 of 11 events), and Soquel Creek Mid (9 of 15 events) sites.

Summary/Follow-up

Where WQOs or attention levels are exceeded, a need for additional investigative and/or remedial work is indicated. While the City's pollution reduction efforts are likely preventing even higher levels of pollution, a particular challenge for coastal communities involves educating visitors, as opportunities for shaping visitor behavior are limited. As in the past, the City is encouraged to focus on visible signage with educational messages and instructions, and strategic placement of waste bins for these audiences.

Soquel Creek is a key natural asset to the local community, and to the larger region. The City of Capitola is acknowledged for its leadership and efforts in striving to not just reduce but eliminate non-point source pollution in the Creek. The approach of partnering with other organizations and engaging the community through citizen-based monitoring is an excellent example for other communities to follow.

Key recommendations to improve water quality for the future include:

1) Investigate the potential watershed sources of elevated indicator bacteria levels throughout the study area.
2) Investigate the potential watershed sources of the observed orthophosphate Attention Level exceedances, and the slightly elevated nitrate levels in the Creekside Storm Drain drainage area.
3) Continue water quality monitoring involving volunteers from the public at the selected stations. Data from continued monitoring offer opportunities to measure improvements or degradation in water quality over time, and volunteer-based monitoring in particular helps to raise public awareness of local water quality issues.
4) Continue and expand pollution prevention outreach programs targeting local populations and visitors to the City, such as strategic signage, educational water tours, environmental film series, efficient utilization of

social media networks and new media (e.g., CWC's Stewardship Toolkit), continued implementation of school-based stormwater education programs, and expansion of public participation in existing monitoring programs.

5) Collaborate with other cities and counties in the region to collectively fund monitoring and education efforts related to NPDES permit requirements, achieving efficiency in funding and sharing of success stories and challenges.

CWC will continue to partner with the City in water quality monitoring to engage the public and generate useful data to measure the effectiveness of public education and infrastructure investments. With support from the City of Capitola Public Works Department, CWC hosts a series of environmental water tours free to the public, to facilitate greater public understanding and appreciation of local water resources.

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, and evaluating trends in water quality for key constituents over time. 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 Urban Watch program and the partnership between CWC and the City of Capitola 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 the CWC office at (831) 464-9200 or info@coastal-watershed.org.

Appendix A – Monitoring Site Locations

Site ID	Site name	Drainage Type	Site Description	Latitude	Longitude
304-CSD-06	Creekside Storm Drain	Storm Drain Outfall	Storm Drain at Creekside Plaza	36.983419	-121.958828
304-CSD-08	Noble Gulch @ Monterey Avenue	Noble Gulch Creek	At Noble Gulch Park on Monterey Ave	36.976970	-121.950040
304-CSD-09	Capitola Pier Storm Drain	Storm Drain Outfall	Storm Drain under the Capitola Pier	36.971280	-121.953780
304-CSD-10	Noble Gulch Upstream	Noble Gulch Creek	Downstream of culvert off Kennedy Drive, near City Corporation Yard	36.983667	-121.944806
304-SOQUE-22	Soquel Creek Lagoon Outlet	Soquel Creek	At mouth of Soquel Creek	36.971897	-121.952406
304-SOQUE-26	Soquel Creek Upper	Soquel Creek	At Creekside Plaza, just upstream of Creekside storm drain	36.983500	-121.959000
304-SOQUE-28	Soquel Creek Mid	Soquel Creek	Behind Nob Hill on Bay Avenue	36.980400	-121.957800

Appendix B: Water Quality Objectives and Other Criteria

Applicable WQOs for field-measured parameters are as follows:

Analyte	WQO or Attention Level	Averaging Period	Units	Source of WQO/AL
Air Temperature	NA	NA		NA
Water Temperature	Not Evaluated	Instantaneous Value	°C	CCRWQCB Basin Plan Objective for Cold Water Habitat
Specific Conductivity	NA	NA		NA
TDS	NA	NA		NA
Salinity	NA	NA		NA
Dissolved Oxygen	>7	Instantaneous Value	mg/L	CCRWQCB Basin Plan Objective for Cold Water Habitat
pH	>7.0 and <8.5	Instantaneous Value	pH units	CCRWQCB Basin Plan Objective for Cold Water Habitat
Turbidity	Not Evaluated	Instantaneous Value	NTU	CCRWQCB Basin Plan

Applicable WQOs and other criteria for laboratory-measured parameters are as follows:

Analyte	WQO or Attention Level	Averaging Period	Units	Source of WQO/AL
Nitrate (NO_3-N)	<10.0	Instantaneous Value	mg/L	CCRWQCB Basin Plan
Orthophosphate (PO_4-P)	<0.12	Instantaneous Value	mg/L	Former CCAMP Attention Level
Ammonia (NH_3)	<0.025	Annual Average Mean	mg/L	CCRWQCB Basin Plan
E.coli	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
Copper (Cu) **	<30	Instantaneous Value	µg/L	CCRWQCB Basin Plan

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

* Listed copper WQO pertains to hard water, with hardness of >100 mg/L CaCO3

Appendix C – 2015 Field Observations and Measurements

Appendix C provides the summary of field results for each parameter at each site. 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 (detergent tests were only performed at Storm Drain/CSD sites & typically during every other event, the Creekside Storm Drain site had measureable water during nine of fifteen events, the Capitola Pier Storm Drain site had no flowing water during any events, and the Noble Gulch Creek Upper site was inaccessible on July 2, 2015 due to a fire hydrant break on Kennedy Drive which caused water to flood the site & had no connected water after 8/19/2015); these instances are listed as "NA" when the test was not performed or "NR" if the datum was not recorded.

CSD-06: Creekside Storm Drain

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	pH	Turbidity	Flow Depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Detergent	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	ppm	T/F	BCS#
6/3/2015	16.30	14.19	674	0.438	0.33	8.22	0.34	0.2	0.073	T	F	F	F	<0.1	<0.2	0	91
6/18/2015	15.80	14.65	679	0.441	0.33	8.21	0.73	0.2	0.120	F	F	F	F	NA	<0.2	0	91
6/24/2015	14.10	14.04	668	0.434	0.33	8.25	0.20	0.2	0.070	T	F	F	F	<0.1	<0.2	0	93
6/29/2015	20.70	15.96	659	0.428	0.32	8.09	2.20	0.2	0.065	F	F	F	F	<0.1	<0.2	0	120
7/2/2015	17.20	15.69	702	0.457	0.34	7.89	1.24	0.2	0.042	F	F	F	F	NA	<0.2	0	93
7/8/2015	17.80	15.89	690	0.449	0.34	8.03	1.69	0.3	0.155	F	F	F	F	NA	<0.2	4	91
7/14/2015	18.80	16.26	683	0.444	0.33	8.23	2.84	0.3	0.075	F	F	F	F	<0.1	<0.2	0	92
7/23/2015	18.30	15.92	730	0	0.36	7.33	0.46	0.3	0.065	F	F	F	F	NA	<0.2	0	93
8/3/2015	18.40	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
8/11/2015	17.50	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
8/19/2015	17.90	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
8/29/2015	20.30	18.14	917	0.596	0.45	7.92	NA	0.25	0.075	F	F	T	F	NA	<0.2	0	93
9/8/2015	22.01	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/14/2015	16.30	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/26/2015	18.2	NA	NA	NA	NA	NA	N	NA	NA	F	NA	NA	NA	NA	NA	NA	NA

CSD-08: Noble Gulch Creek at Monterey Avenue

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	Dissolved Oxygen	pH	Turbidity	Flow Depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Detergent	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt	mg/L		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	ppm	T/F	BCS#
6/3/2015	18.30	17.06	597	0.388	0.29	9.53	8.06	5.38	8.000	0.360	T	F	F	T	<0.1	<0.2	0	94
6/18/2015	16.30	17.45	599	0.390	0.29	8.93	7.98	5.62	1.000	0.270	F	F	F	T	NA	<0.2	0	91
6/24/2015	16.00	14.90	591	0.384	0.29	8.16	7.73	2.48	0.500	0.280	F	T	T	F	<0.1	<0.2	0	91
6/29/2015	20.10	22.85	538	0.350	0.26	9.61	8.18	2.43	1.490	0.225	F	F	F	F	<0.1	<0.2	0	120
7/2/2015	19.70	16.90	608	0.395	0.30	7.85	7.80	5.18	1.000	0.270	F	F	F	F	NA	<0.2	0	93
7/8/2015	18.40	17.25	627	0.407	0.31	6.87	7.67	3.86	2.000	0.240	F	F	F	F	NA	<0.2	0	36
7/14/2015	18.70	17.23	601	0.391	0.29	7.75	8.21	2.74	1.250	0.230	F	F	F	F	<0.1	<0.2	0	93
7/23/2015	18.90	17.02	611	0.397	0.30	7.79	7.84	7.25	0.900	0.235	T	F	T	T	NA	<0.2	0	93
8/3/2015	20.60	17.77	584	0.380	0.28	5.54	7.73	6.32	0.001	0.260	F	F	F	T	<0.2	<0.2	0	91
8/11/2015	17.70	17.59	528	0.343	0.26	4.26	7.66	2.15	0.001	0.150	T	F	F	T	<0.2	<0.2	0	92
8/19/2015	20.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
8/29/2015	21.60	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/8/2015	27.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/14/2015	16.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/26/2015	22.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA

CSD-09: Capitola Pier Storm Drain

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	pH	Turbidity	Flow Depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Detergent	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	ppm	T/F	BCS#
6/3/2015	15.10	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
6/18/2015	14.90	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
6/24/2015	14.60	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
6/29/2015	20.00	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
7/2/2015	16.50	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
7/8/2015	17.10	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
7/14/2015	17.50	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
7/23/2015	18.20	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
8/3/2015	17.60	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
8/11/2015	16.70	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
8/19/2015	16.60	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
8/29/2015	19.76	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/8/2015	19.30	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
9/14/2015	16.00	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA
9/26/2015	18.70	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA

CSD-10: Noble Gulch Creek Upper

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	Dissolved Oxygen	pH	Turbidity	Flow Depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Detergent	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt	mg/L		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	ppm	T/F	BCS#
6/3/2015	18.60	14.36	603	0.392	0.29	6.21	7.92	2.63	1.00	0.230	T	F	F	T	<0.1	<0.2	0	91
6/18/2015	15.70	14.21	688	0.447	0.34	5.07	7.88	3.25	1.00	0.202	T	F	F	T	NA	<0.2	0	36
6/24/2015	14.90	15.39	616	0.400	0.30	5.44	7.67	1.78	0.20	0.225	F	F	F	T	<0.1	<0.2	0	92
6/29/2015	20.50	13.87	789	0.513	0.39	8.67	7.84	1.49	0.30	2.413	F	F	T	T	<0.1	<0.2	0	97
7/2/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/8/2015	18.30	15.88	645	0.419	0.32	6.67	7.84	1.07	0.20	0.080	T	F	F	T	NA	<0.2	0	92
7/14/2015	19.00	15.87	568	0.369	0.28	8.57	8.25	1.52	0.65	0.660	T	F	T	T	<0.1	<0.2	0	92
7/23/2015	16.90	15.84	548	0.356	0.27	8.42	7.94	2.64	0.40	1.847	T	F	T	F	NA	<0.2	0	93
8/3/2015	19.80	16.80	536	0.349	0.26	6.38	8.05	4.86	0.20	1.000	F	F	F	F	<0.1	<0.2	0	91
8/11/2015	17.40	16.94	541	0.352	0.26	6.52	7.98	1.43	0.30	1.000	F	F	F	F	<0.1	<0.2	0	93
8/19/2015	17.61	16.95	330	0.214	0.16	7.00	8.03	4.24	0.10	1.447	F	F	F	F	<0.1	<0.2	0	92
8/29/2015	21.10	18.42	505	0.328	0.24	7.36	8.16	9.30	0.00	1.700	T	F	T	T	<0.2	<0.2	0	93
9/8/2015	26.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/14/2015	16.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	F	NA	NA	NA	NA	NA	NA	NA
9/26/2015	20.90	NA	NA	NA	NA	NA	NA	NA	NA	NA	T	NA	NA	NA	NA	NA	NA	NA

SOQUE-22: Soquel Creek Lagoon

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	Dissolved Oxygen	pH	Turbidity	Flow depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt	mg/L		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	T/F	BCS#
6/3/2015	17.00	20.14	1016	0.660	0.50	10.32	8.20	1.27	NA	NA	T	F	F	T	<0.2	0	104
6/18/2015	16.30	20.00	984	0.640	0.49	10.14	8.31	2.08	NA	NA	T	F	F	F	<0.2	0	36
6/24/2015	15.80	20.08	1018	0.662	0.50	9.31	8.15	1.45	NA	NA	T	F	F	F	<0.2	0	91
6/29/2015	21.60	21.47	1015	0.660	0.50	9.96	8.08	1.69	NA	NA	F	F	F	F	<0.2	0	120
7/2/2015	17.40	21.67	1034	0.672	0.51	7.32	7.72	1.93	NA	NA	T	F	F	F	<0.2	0	93
7/8/2015	17.30	22.38	767	0.498	0.37	7.23	7.77	1.72	NA	NA	T	F	F	F	<0.2	0	91
7/14/2015	19.60	22.76	1007	0.654	0.50	8.02	8.15	1.80	NA	NA	T	F	F	F	<0.2	0	93
7/23/2015	18.60	22.44	1051	0.683	0.52	8.70	8.12	1.52	NA	NA	T	F	F	T	<0.2	0	93
8/3/2015	18.70	22.69	1038	0.675	0.51	9.72	8.08	1.32	NA	NA	T	F	F	F	<0.2	0	93
8/11/2015	18.20	22.16	1073	0.698	0.53	11.77	8.11	1.05	NA	NA	T	F	F	F	<0.2	0	92
8/19/2015	18.50	23.09	981	0.638	0.48	10.99	8.21	1.05	NA	NA	T	F	F	T	<0.2	0	92
8/29/2015	21.50	22.51	1064	0.692	0.53	10.23	8.29	1.22	NA	NA	T	F	F	F	<0.2	0	93
9/8/2015	21.50	20.60	1068	0.694	0.53	10.49	8.38	0.83	NA	NA	T	F	F	F	<0.2	0	92
9/14/2015	16.00	20.64	1135	0.738	0.56	7.69	7.90	1.49	NA	NA	T	F	F	F	<0.2	0	93
9/26/2015	21.60	20.92	897	0.583	0.44	6.55	8.24	1.17	NA	NA	F	F	F	F	<0.2	0	93

SOQUE-26: Soquel Creek Upper

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	Dissolved Oxygen	pH	Turbidity	Flow depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt	mg/L		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	T/F	BCS#
6/3/2015	16.30	16.17	839	0.545	0.41	8.59	8.12	0.78	35.0	11.400	T	F	F	F	<0.2	0	55
6/18/2015	15.80	16.29	387	0.251	0.19	8.83	8.25	0.94	14.4	10.150	F	F	F	F	<0.2	0	36
6/24/2015	14.10	15.68	688	0.447	0.34	8.39	8.11	0.76	37.4	11.290	F	F	F	F	<0.2	0	93
6/29/2015	20.70	18.60	793	0.516	0.39	9.25	7.98	0.94	39.0	11.308	F	F	F	F	<0.2	0	93
7/2/2015	17.20	17.28	834	0.542	0.41	8.67	7.94	1.24	38.9	11.232	F	F	F	F	<0.2	0	93
7/8/2015	17.80	18.16	627	0.408	0.31	7.94	7.68	0.92	35.2	11.100	F	F	F	F	<0.2	0	106
7/14/2015	18.80	17.85	757	0.492	0.37	7.91	8.18	1.27	36.5	11.180	F	F	F	F	<0.2	0	93
7/23/2015	18.30	16.94	809	0.526	0.40	8.68	8.10	0.96	34.6	10.870	F	F	T	F	<0.2	0	93
8/3/2015	17.80	17.74	779	0.507	0.38	7.23	7.23	0.92	34.0	11.100	F	F	F	F	<0.2	0	93
8/11/2015	17.50	17.68	787	0.512	0.39	6.49	7.92	0.95	33.0	11.050	F	F	T	F	<0.2	0	93
8/19/2015	18.00	17.46	731	0.475	0.36	6.73	7.42	1.02	34.0	10.800	F	F	F	T	<0.2	0	92
8/29/2015	20.30	17.96	751	0.488	0.37	5.21	7.92	1.36	34.5	11.120	F	F	F	T	<0.2	0	93
9/8/2015	22.01	15.39	762	0.495	0.37	4.76	7.43	1.50	30.5	10.970	F	F	T	F	<0.2	0	92
9/14/2015	16.30	16.62	809	0.526	0.40	5.77	7.33	1.31	32.4	11.100	F	F	F	T	<0.2	0	93
9/26/2015	18.30	15.93	788	0.512	0.39	3.97	7.41	1.85	28.0	11.050	T	F	T	T	<0.2	0	93

SOQUE-28: Soquel Creek Mid

Date	Air Temperature	Water Temperature	Specific Conductivity	TDS	Salinity	Dissolved Oxygen	pH	Turbidity	Flow depth	Wetted Width	Trash	Sewage	Oil Sheen	Scum	Chlorine	Odor	Color
	°C	°C	uS/cm	g/L	ppt	mg/L		NTU	cm	m	T/F	T/F	T/F	T/F	ppm	T/F	BCS#
6/3/2015	NA	16.90	829	0.539	0.41	7.79	8.03	1.87	26.0	10.850	T	F	F	F	<0.2	0	91
6/18/2015	13.30	15.92	554	0.360	0.27	7.29	7.75	1.35	27.3	10.600	T	F	F	F	<0.2	0	91
6/24/2015	15.40	16.09	837	0.544	0.41	7.13	7.92	0.70	26.6	10.450	F	F	F	T	<0.2	0	93
6/29/2015	21.90	18.42	106	0.069	0.05	7.04	7.80	1.09	28.5	10.820	F	F	F	T	<0.2	0	91
7/2/2015	11.90	18.03	841	0.546	0.41	2.76	7.86	2.53	27.3	10.650	T	F	F	T	<0.2	0	93
7/8/2015	18.70	18.03	725	0.471	0.36	6.89	7.43	1.07	27.5	10.650	F	F	F	T	<0.2	4	92
7/14/2015	18.30	18.15	794	0.516	0.39	7.36	8.73	1.04	27.4	10.470	F	F	F	T	<0.2	0	92
7/23/2015	17.40	18.00	816	0.530	0.40	8.11	7.78	1.00	26.8	10.500	F	F	T	T	<0.2	0	93
8/3/2015	19.90	18.59	674	0.438	0.33	7.50	7.81	0.87	34.0	10.550	F	F	T	T	<0.2	0	93
8/11/2015	18.00	18.09	794	0.516	0.39	6.89	7.73	1.04	27.4	10.650	F	F	T	T	<0.2	0	93
8/19/2015	19.80	19.11	772	0.502	0.38	7.43	7.75	3.71	23.8	10.200	F	F	F	F	<0.2	0	93
8/29/2015	21.00	18.95	784	0.510	0.39	6.58	7.96	1.97	25.5	10.650	F	F	T	T	<0.2	0	93
9/8/2015	22.01	17.57	776	0.504	0.38	6.95	7.64	1.47	26.8	10.460	F	F	T	F	<0.2	0	91
9/14/2015	16.30	17.00	803	0.522	0.40	5.97	7.34	1.25	27.5	10.500	T	F	F	F	<0.2	0	93
9/26/2015	22.50	18.41	794	0.516	0.39	5.61	7.46	1.86	28.0	10.350	T	F	F	F	<0.2	8	93

Appendix D: 2015 Laboratory Results

Appendix D provides a summary of laboratory results for each constituent at each site. Results that exceed the applicable WQO or attention level are shaded in order to highlight these results. Not all tests were performed during every lab event (the Creekside Storm Drain site had measureable flow twice during the 2015 season, the Noble Gulch Creek at Monterey Avenue and Noble Gulch Creek Upper sites had measureable flow three times, and the Capitola Pier Storm Drain site did not have any measureable flow during the 2015 season); these instances are listed as "NA" when the test was not performed.

Constituent	WQO or Attention Level	Site Name	Creekside Storm Drain	Noble Gulch Creek @ Monterey Ave.	Capitola Pier Storm Drain	Noble Gulch Creek Upper	Soquel Creek Lagoon	Soquel Creek Upper	Soquel Creek Mid
		Site ID	CSD-06	CSD-08	CSD-09	CSD-10	SOQUE-22	SOQUE-26	SOQUE-28
		Type	Storm Drain	Creek	Storm Drain	Creek	Creek	Creek	Creek
		Date							
Nitrate (NO_3-N)	<10.0 ppm	6/24/2015	3.9	0.3	NA	0.8	0.05	0.05	0.05
		7/23/2015	3.7	0.1	NA	1.1	0.1	0.1	3.1
		8/11/2015	NA	0.1	NA	1.59	0.1	0.1	0.1
		9/8/2015	NA	NA	NA	NA	0.1	0.1	0.1
Orthophosphate (PO_4-P)	<0.12 ppm	6/24/2015	ND	ND	NA	ND	ND	ND	ND
		7/23/2015	0.30	0.15	NA	0.22	0.10	0.22	0.20
		8/11/2015	NA	0.10	NA	0.13	0.10	0.10	0.10
		9/8/2015	NA	NA	NA	NA	0.10	0.10	0.10
Ammonia (NH_3)	0.025 ppm	6/24/2015	ND	ND	NA	ND	ND	ND	ND
		7/23/2015	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
		8/11/2015	NA	<0.03	NA	<0.03	0.03	<0.03	<0.03
		9/8/2015	NA	NA	NA	NA	<0.03	<0.03	<0.03
E.coli	126 MPN/100 mL	6/24/2015	744	4611	NA	>24196	295	231	146
		7/23/2015	5	350	NA	>24196	554	309	160
		8/11/2015	NA	41	NA	>24196	318	530	448
		9/8/2015	NA	NA	NA	NA	1223	336	52
Total Coliform	<240 MPN/100 mL	6/24/2015	14136	12996	NA	>24196	10462	2755	3076
		7/23/2015	2046	4884	NA	>24196	3784	2755	3255
		8/11/2015	NA	1437	NA	>24196	3282	4884	2489
		9/8/2015	NA	NA	NA	NA	4352	2723	9804
Copper (Cu)	30.0 µg/L	6/24/2015	3	J 0.26	NA	0.25	J 0.48	0.25	0.25

Shading indicates results above WQO
ND = Non-detect result
NA = Not analyzed/no sample
J = reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL)