



**City of Santa Barbara**  
Parks and Recreation Department

**Memorandum**

**DATE:** December 12, 2012

**TO:** Creeks Restoration/Water Quality Improvement Program  
Citizen Advisory Committee

**FROM:** Jill Murray, Water Quality Research Coordinator

**SUBJECT:** **Water Quality Monitoring and Research Program Fiscal Year 2012 Report and Source Tracking Protocol Project**

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COMMITTEE DIRECTION – FOR ACTION

That the Committee receive a presentation and discuss the results from the Water Quality Monitoring and Research Program Fiscal Year 2012 Report and the Source Tracking Protocol Development Project.

DISCUSSION

Background

In June 2011, the Committee concurred with the staff recommendation to implement the Research Plan for Fiscal Year 2012 (FY12). In December 2011 the Committee received an update on the Source Tracking Protocol Development Project and concurred with the staff recommendation to postpone some portions of the FY12 Research Plan due to a focus on the Source Tracking Protocol Development Project. In June 2012, the Committee received a mid-year update on FY12 sampling, along with recommended changes for the Fiscal Year 2013 (FY13) Research Plan. The Committee concurred with staff recommendation to implement the Research Plan. At this time, the Committee will receive an update on the FY12 Annual Report, focusing on the completion of the Source Tracking Protocol Development Project.

The goals of the monitoring program are to:

1. Quantify the levels (concentration and flux, or load) of microbial contamination and chemical pollution in watersheds throughout the city.
2. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.
3. Evaluate the effectiveness of the City's restoration and water quality treatment projects, which includes collecting baseline data for future projects.

4. Identify sources of contaminants and pollution in creeks and storm drains.
5. Evaluate long-term trends in water quality.

The underlying motivation behind the monitoring program is to obtain information that the City can use to:

1. Develop strategies for water quality improvement, including prioritization of capital projects and outreach/education programs.
2. Communicate effectively with the public about water quality.

The monitoring program consists of eight key elements, with associated research questions. City staff, Committee members, and community members provide input to shape the questions. In addition, some monitoring is required by grants the City has received. All sample collection and monitoring partnerships are geared toward answering these questions.

#### *Watershed Assessment*

1. Is overall water quality, in terms of indicator bacteria and field properties, getting better over time?
2. How contaminated and/or toxic is sediment at creek sites, particularly those below storm drain outfalls?
3. What is the impact of eutrophication on Santa Barbara creeks?
4. What is the impact of recycled water on water quality, including irrigation runoff and water line breaks?
5. What is the impact of groundwater pumping (sump discharge to storm drain) on water quality?
6. What is the source of the 303(d) impairment for Salinity on Sycamore Creek?
7. What is the source of the 303(d) impairment for Unknown Toxicity on Mission Creek?

#### *Storm Monitoring*

1. What are the highest concentrations of pollutants of concern during storm events, particularly seasonal first flush storms? Do creeks and/or storm drains in Santa Barbara have problems with toxicity during storm events?
2. What are the loads of pollutants discharged from Santa Barbara creeks during storms?
3. What are the sources of toxicity and routes of pollutants to storm drains during storms?
4. How do concentrations and loads vary during storms and from site to site?
5. How do restoration/treatment projects impact water quality and restoration during storm events?

#### *Restoration and Water Quality Project Assessment*

1. Do Creeks Division projects result in improved water quality, as reflected in pre- and post-project, and/or, upstream to downstream, conditions?
2. What is the baseline water quality at future restoration/treatment sites?
3. What are the mechanisms of project success?

4. Are installed projects functioning correctly?

*Beach water quality*

1. How do creeks and storm drains relate to beach water quality and warnings?
2. How do other factors (kelp, tides, temperature, and beach use) relate to beach warnings?
3. What are the causes of persistent beach warnings that occur?
4. What is the risk to human health from recreation in creeks and beaches in Santa Barbara?

*Source Tracking/Illicit Discharge Detection*

1. Which drainages and/or subdrainages contribute the greatest loads of pollutants to creeks in Santa Barbara?
2. Where, when and how is human waste and/or sewage entering storm drains and creeks?
  - a. What happens to the signals of human waste and indicator bacteria levels as water moves downstream away from the source?
  - b. How does presence of human waste relate to beach warnings?
3. Do rotting plant material and sediment contribute to high FIB levels in storm drains?
4. What are the impacts of reservoir flushing on metals?
5. Are new hot spots emerging?

*Creeks Walks/Clean ups*

1. Are there new problems in creeks that need to be addressed?
2. Is the amount of trash in creeks decreasing over time?
3. Were decreases in trash observed between 1999 and 2005 due to creek flow histories or the impact of City programs?
4. Will the installation of catch basin screens lead to decreased trash observed in creeks?
5. Can we see any impairment to San Roque Creek, leading to drop in bioassessment scores?

*Bioassessment*

1. What is the baseline of biological integrity for benthic macroinvertebrates in creeks?
2. Are there differences between upper watershed and lower watershed sites?
3. Are there differences among watersheds?
4. How does the biological integrity in our creeks change over time?
5. How does the biological integrity respond to water quality and restoration projects?

*Methods Development*

1. Can we use the following potential new tools?
2. Can a chemical fingerprint be used to identify types of sources?
3. Can field kits be used for enforcement?

## Fiscal Year 2012 Annual Water Quality Monitoring Report

The Annual Report describes sampling and results that were based on the FY 12 Research and Monitoring Plan. Compared to previous years, the FY 12 report is reduced in scale due to the focus on completing the Source Tracking Protocol Development Project. A summary of water quality sampling and data analysis in FY 12 includes:

### *First Flush Monitoring: Chemistry and Toxicity*

Each fall the Creeks Division samples the first storm of the season, as this “first flush” is known to produce the highest concentrations of contaminants in stormwater runoff. In most previous years, creek “integrator sites” (lowest sites on creeks, integrating water quality issues across the entire watershed) have been sampled during every first flush event. Following the changes to the FY11 Research Plan, storm drains and gutters were included in first flush sampling, which took place on October 5, 2011. Runoff was collected from street gutters and storm drains at Montecito/Olive Sts., Laguna/Cota Sts., Gutierrez/Quarantina Sts., and Salsipueds/Cota. Sts., along with the integrator sites Laguna Channel at Chase Palm Park, Mission Creek at Montecito Street, Arroyo Burro at Cliff Drive, and Sycamore Creek at the railroad bridge.

These sites were sampled early in the morning, when 0.02” to 0.68” of rain had fallen. Water was tested for metals, pesticides, hydrocarbons, surfactants, and toxicity. Metals and hydrocarbons were not detected at elevated concentrations; however some other results were concerning.

In previous years, very few detections of pesticides have been found in creek samples, during both dry and wet weather. Based on a recommendation by the State-funded UP3 Priority Pesticide list, several pesticides were added to the testing suite in FY11. The wood preservative pentachlorophenol was found in almost every sample the first flush of fall 2010, albeit at low levels. This result was corroborated in first flush 2011 samples, when pentachlorophenol was found in five of nine samples. In addition, 2,4-D, an ingredient in some weed killers, was detected for the first time, and in several samples. The detection limit for this compound was ten times lower than in previous years, which is the likely reason behind the sudden detections. Pyrethroids were also detected, with bifenthrin found at elevated levels in four of nine samples. Unlike in 2010, organochlorine pesticides, including DCPA (dacthal), were not detected in drain samples. It is thought that faulty laboratory procedures led to false positives of dacthal in previous samples.

Continuing a change made in FY11, storm water toxicity in creeks was tested using invertebrates and algae, which are thought to be more sensitive to some constituents than the vertebrate fathead minnow, which had been used in most previous tests. No toxicity was observed in creek sites. Storm drain and catch basin sites were tested with fathead minnows. Results showed high toxicity in some drain samples. These results

show that while Santa Barbara creeks are generally not toxic to aquatic organisms during storm events, due to large amounts of dilution with clean runoff, runoff that is sampled closer to the site of urban activities exhibits toxicity to sensitive species.

#### *Mission Creek Toxicity*

Mission Creek is listed under the Clean Water Act as impaired for “Unknown Toxicity.” The Creeks Division has worked to understand the original basis for the listing, and any potential current toxicity problems in Mission Creek. After conducting many toxicity tests with fathead minnows and invertebrates, the City found no signs of toxicity in Mission Creek. However, the Regional Water Board conducted tests at Mission Creek at Montecito Street which showed toxicity to the algae *Selenastrum*, suggesting the presence of herbicides in creek water. In Fiscal Year 2012, the Creeks Division collected samples from several locations along Mission Creek and found no toxicity to *Selenastrum*. High conductivity in Santa Barbara creeks may lead to false positives with test results, and Creeks Division staff will continue to investigate this possibility.

#### *Sycamore Creek Sodium and Chloride*

Sycamore Creek was recently listed as impaired for Sodium and Chloride under the Clean Water Act, based on potential agricultural use of creek water,. The Creeks Division conducted creek walks with associated conductivity tests and tested creek samples for sodium and chloride. Based on results obtained thus far, it appears that Sycamore Creek is high in sodium and chloride due to the natural process of groundwater movement through marine deposits into the creek. One tributary with the highest conductivity, sodium, and chloride ever observed in Creeks Division monitoring will be investigated more thoroughly in FY 13. If results show that the source of sodium and chloride in Sycamore Creek is natural, the Regional Board may de-list the Sycamore Creek from the 303(d) impaired list.

#### *Source Tracking Protocol Development Project*

In July 2012 the Creeks Division completed work on the Source Tracking Protocol Development Project. The project was funded by a grant from the State Water Board’s Prop 50 Clean Beaches Initiative Grant Program, and the work was conducted in partnership with Dr. Patricia Holden at the University of California Santa Barbara.

The Creeks Division proposed and completed the project because there was a gap in available guidance on how to find sources of human fecal pollution entering storm drains, creeks and beaches. In previous years, the City has taken an aggressive approach to eliminating fecal indicator bacteria by installing capital projects such as low-flow storm drain diversions and a storm drain UV disinfection project. Concurrent with the capital program, the City partnered with Dr. Patricia Holden at the University of California, Santa Barbara (UCSB), whose research group recruited and tested cutting edge microbial markers, and developed other approaches, to investigate sources of indicator bacteria. Results from this research showed that some storm drain outfalls in

Santa Barbara discharged water with consistent DNA-based signals of human waste. The City of Santa Barbara, with support of the Committee, decided to prioritize the goal of locating and eliminating human waste contributions to fecal indicator bacteria loads due to the potential associated health risks. However, despite substantial effort, tracking human-waste specific signals up storm drain networks to the points of input remained impossible for several years.

The City and UCSB developed and tested tools to locate inputs of human waste to storm drains. As part of the grant agreement, the City and UCSB produced a non-technical guide for coastal managers and a more detailed, technical report to communicate the information to other coastal communities facing similar challenges. The Committee will receive a presentation on the coastal managers guide. Both documents, and the Final Grant Report, are available on the Creeks Division website ([www.sbcreeks.com](http://www.sbcreeks.com)).

During the course of the work, four sites with persistently leaking sewage were identified and repaired immediately. A set of potentially high-risk locations for sewage leaking into storm drains has also been slated for preventative rehabilitation by the Wastewater Division.

cc: Cameron Benson, Creeks Restoration/Clean Water Manager  
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