City of Capitola-Soquel Creek
Urban Watch Monitoring Program

PROGRAM OVERVIEW

The City of Capitola's storm drain monitoring program was initiated in August 2000 and is a collaborative effort between the Coastal Watershed Council, the City of Capitola, and the Water Quality Protection Program of the Monterey Bay National Marine Sanctuary. The purpose of this project is twofold: First, to use trained volunteers to monitor dry weather storm drain activity in selected outflow areas of Soquel Creek from August through October, 2000; Second, to identify common urban pollutants entering the study area through the storm drain system.

The Coastal Watershed Council and a representative of the City of Capitola chose eight sampling sites based on drainage basin and safe access for volunteers (Figure 1). The monitoring sites established for this program are referred to as: **Capitola Village Bridge**, right bank drain at base of NW end of bridge at corner of Cliff Dr. and Warf Dr.; **Nob Hill**, left bank drain from parking lot and loading areas behind Nob Hill Market and Longs Drugs; **Upper Nob Hill**, left bank drain from area behind commercial area, upstream of the Nob Hill parking lot; **Auto Plaza**, right bank outfall with dissipater draining Auto Plaza Road; **Highway 1**, right bank outfall from surface of Highway 1 at NW edge of Soquel Creek overpass bridge; **Creekside Plaza**, left bank drain behind Creekside plaza parking lot; **Texaco**, left bank outfall behind Texaco gas station, at Porter Street and Main Street; and **Soquel Drive Bridge**, right bank spillway internal to Soquel Drive bridge.

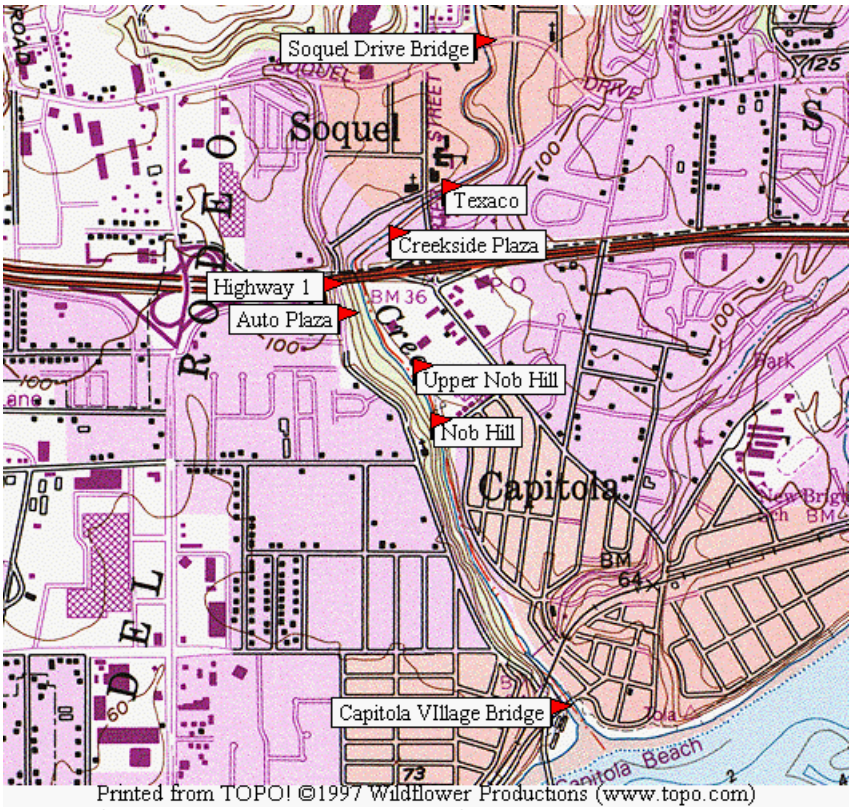

Figure 1. Locations of monitoring sites in the City of Capitola-Soquel Creek Urban Watch Program.

This program used the "Urban Watch" monitoring kit manufactured by the LaMotte Company, which was designed in association with the City of Fort Worth, Texas. The Urban Watch monitoring kit is designed to provide a method for using volunteers to monitor dry-season storm drain discharges. The kit was developed according to National Pollutant Discharge Elimination System (NPDES) Phase I dry weather monitoring requirements and is designed to detect illegal stormdrain connections and discharges.

Following a one-day training, conducted by the Coastal Watershed Council, nine volunteers began to sample on a weekly schedule. Volunteers were divided into four teams with two to three members each. Volunteers conducted sampling twice within a 24-hour period with at least 4 hours between each sampling event. Parameters monitored included detergents, phenols, ammonia nitrogen, chlorine, turbidity, pH, water and air temperature, odor, and color. Volunteers also noted if there was oil sheen, sewage, trash, or surface scum present, as well as any other observations of note. Table 1 includes information on each of the parameters monitored and method used for monitoring.

VOLUNTEER TRAINING

Volunteer training included six hours of classroom lecture and product training and in field "hands-on learning" facilitated by a trained CWC staff person. Volunteers were presented with training materials detailing site locations, procedural instructions and test protocols, as well as ancillary information on the subject of urban pollutants. Topics emphasized by CWC included monitoring concepts, sampling procedures, test protocols, the meaning of each parameter monitored, use of kits in the field, and safety procedures. Volunteers were placed in teams and scheduled for monitoring over the three-month period. A CWC staff person accompanied each team in the field until the groups had a full understanding of the sampling methodology, data recording and analytical skills outlined in the training packet given to them.

Randomized sample collections were achieved by incorporating a flexible weekly schedule with volunteers. Volunteers sampled during daylight hours both on weekdays and weekends. A monitoring event consisted of two observations within the 24-hour period. One observation was made for each of the two visits whether or not there was storm drain outfall on that occasion. One monitoring event was canceled due to rain.

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

The Quality Assurance/Quality Control (QA/QC) program included the following components:

- Training in monitoring concepts, safety, sampling methods, and hands-on use of equipment.
- Training in use of data sheets and data entry for volunteers.
- Calibration of the pH meter within 24 hours of use.
- Continued supervision until staff was confident in the volunteers' sampling and analysis skills.
- Weekly follow up and review of data sheets to ensure consistency in data.
- CWC prepared a Standard Operation Procedure for volunteers to review and use in the field during each monitoring event.

Table 1: Water Quality Parameters
Urban Watch Monitoring Program

Parameter	Possible Sources	Associated Problems	Method/Accuracy
Temperature	illegal discharges	affects rates of chemical and biochemical reaction in water.	Method - Digital thermometer Accuracy - 1% full scale
Turbidity	microorganisms, sediment, erosion	interferes with fish and aquatic life	Method - Visual Octa-Slide Viewer against turbidity standard slide bar
PH	aerosols and dust in air, mineral substances, sewer overflows, animal wastes, pesticides & fertilizers, photosynthesis	interferes with fish and aquatic life	Method - Electrometric pH probe calibrated Accuracy ± 0.2 pH units
Detergents	Illicit discharges, car washing, cleaning of screens and grills, leaking sanitary sewers	can be toxic to many aquatic insects, plants, and fish; can lower dissolved oxygen available to aquatic life	Method - solvent extraction/ bromphenal blue indicator Accuracy ± 0.1 ppm
Copper	Illicit discharge into the storm drain system; also can occur naturally in surface waters	concentrations over 0.025 ppm are toxic to most freshwater fish	Method - Diethyldithiocarbamate Octa-Slide Comparator against color standard Accuracy ± 10%
Phenols	Disinfectants, toothpaste, mouthwashes from domestic wastewater	interferes with fish and aquatic life	Method - Aminoantipyrine Octa-Slide Comparator against color standard Accuracy ± 10%
Chlorine	Illicit connection into a stormdrain or draining of a swimming pool	toxic to aquatic life, can create a "sterile" environment	Method - DPD Octa-Slide Comparator against color standard Accuracy ± 10%
Ammonia-Nitrogen	Illegal connections into stormdrain systems, poorly functioning septic systems, wildlife	at certain concentrations can be toxic to aquatic organisms	LaMotte Code 5864 Colo-Ruler against a color standard
Color	Dyes or chemicals	interferes with aquatic insects	Method - Visual Borger Color System
Odor	Illicit flows; "clean" drainage water should have no distinctive odor	can indicate presence of contaminants	Scent
Oil sheen	hydrocarbons such as oil, gasoline, and grease; leaking underground petroleum storage tanks	toxic to aquatic organisms	Method - Visual
Trash, sewage, scum	Illegal connections into stormdrain systems, poorly functioning septic systems, illegal dumping	interferes with fish and aquatic life	Method - Visual

RESULTS

I. Quantitative Parameters

Site Visits
Over the period of August 8, through October 20, 2000, all eight sites were visited twice for each of the nine monitoring events, less one visit canceled due to rain, resulting in seventeen records per site. Some qualitative data was not recorded when no flow was present. A total of 136 monitoring observations occurred. Notation for observations were recorded as "1V" for the first visit, and "2V" for the second visit within the 24 hour period. Please see Appendix I for tables of averages, maximum values, and frequency of parameters tested.

Flow
In the eight stormdrains sampled, flow was only detected during 26 of the 136 observations. Flow was present during all visits to the Creekside Plaza site, where it was collected in 100% of the sampling events. The Auto Plaza outfall had water samples collected in seven out of seventeen sampling events. Evidence of prior water presence was detected in most visits to this site. Water was collected at the Highway 1 outfall twice and from the Nob Hill outfall once. No flow was detected at any of the other four sites.

Detergents
Detergents were detected at two sites, Auto Plaza and Nob Hill. At Auto Plaza, detergents were detected in seven of seven sampling events. Results ranged from >0.8 ppm to >7.2 ppm. At the Nob Hill site, detergents were detected once in seventeen sampling events with a result of >0.7ppm.

Phenols
Phenols were not detected at any of the eight sites on the dates tested.

Ammonia nitrogen
Ammonia nitrogen was not detected at any of the eight sites on the dates tested.

Copper
Copper was not detected at any of the eight sites on the dates tested.

Chlorine
Chlorine was not detected at any of the eight sites on the dates tested.

Turbidity
Turbidity measurements above "low" were detected at the Auto Plaza once as "medium," and Nob Hill once as "high." All other sites where tests were conducted were consistently recorded as "low."

II. Qualitative Parameters

The following parameters were recorded as detected. Site observations may have been recorded when a water sample was not collected. "Frequency" therefore is the relationship of the number of times the parameter was recorded as other than normal, out of the number of times an observation for that parameter was recorded. Please see Appendix I for frequency of detection of these parameters.

Odors
Odors were detected at the Auto Plaza, Texaco, Upper Nob Hill, and Capitola Village Bridge sites. At Auto Plaza volunteers reported a putrid odor once, and a musty-septic odor three times. Volunteers reported a gasoline odor once at the Texaco site and a putrid smell once at the Upper Nob Hill site. At the Capitola Village Bridge site, a musty-septic was detected once. It is to be noted that the location of the Texaco site is directly behind a gas station, and the Upper Nob Hill is located upstream of a sewage pumping station in the Nob Hill Market-Longs Drug Store parking lot.

Color
Water color was found to be transparent for 21 of the 26 samples. The exceptions were as follows: At Auto Plaza color other than transparent was detected in four of the seven sampling events; Three times as a pale yellow, and once as a light gray-brown. In the only sample taken at the Nob Hill site, water color was recorded as a light orange-yellow.

Oil sheen
Oil sheen was noticed in the pool at the Nob Hill site, at the base of the drain flow at the water's edge, during six of the twelve sampling events. It was observed at the Upper Nob Hill site on two occasions. Oily sheen was absent from all other sites.

Surface scum
Surface scum was recorded at the Auto Plaza site twice, in the pool at the Nob Hill site during five of twelve sampling events and at the Upper Nob Hill twice. No surface scum was recorded for the other sites.

Trash
Trash was found at all sites, in 72 of 97 observations (74%). The highest frequency was recorded at Highway 1, and Nob Hill, where trash was detected during 100% of the visits. At Soquel Drive Bridge trash was recorded for 83% of visits; at Texaco 77%, and at Upper Nob Hill trash was recorded for 70% of visits. At Auto Plaza and Capitola Village Bridge trash was present 50% of the time. Trash was the least frequent, 25% of visits, at Creekside Plaza.

III. Additional Data

Please refer to attached data summary tables. The raw data for all sampling events are available in Excel 97 format, upon request.

CONCLUSIONS

Results from the data collected showed that detergents and trash are the most common contaminants entering storm drains within the study area. Of all the observations made, detergents were found in 8 of 26 samples collected, and trash was noted 72 times out of 97 observations for all site visits. Ammonium nitrogen, phenols, chlorine, and copper were not found in any of the samples collected.

The one sample collected from the Nob Hill site tested positive for detergent, testing at 0.7 ppm. Detergents were detected at the Auto Plaza 7 times (100% of sampling events). Of these 7 detections, concentrations were extremely high in five of the seven detections. The maximum detection was 7.1 ppm, and five of the detections were over 2 ppm, with detections of 4.0, 4.7, 5.0, 5.2 and 7.1 ppm. According to Brian Camp, the Environmental Supervisor of the Water Quality Division, Fort Worth Department of Environmental Management, detergent concentrations of only 2 ppm can cause fish to absorb double the amount of chemical [pollutants] they might normally. As well, concentrations as low as 5 ppm will kill fish eggs, and most fish will die in concentrations near 15 ppm[1]. Given the high concentrations detected at the Auto Plaza storm drain, it is our recommendation that further investigation and testing be performed at this site. Determining the source of these contributions, and targeting the inlets that flow into that specific storm drain should provide direction for eliminating this pollution source.

Trash proved to be a consistent pollutant along the stream banks and in the water. Trash was found for seventy-four percent of all visits to all sites. The Nob Hill, Highway 1 and Soquel Drive Bridge underpass sites were consistently littered with beverage cans, plastic bags, papers and food. Three-quarters of the visits to the Texaco, Nob Hill, Upper Nob Hill and the Capitola Village Bridge areas reflected high levels of paper and food containers. And although the Creekside plaza had the least frequent detections, 25%, this area still showed paper and food and beverage containers.

Trash proved to be the most prevalent and obvious 'public' pollutant in the study area. Encouragement of community 'Stream Clean-Up' days, or targeted notices posted to point out the problem could be beneficial in trash abatement. As is true in most urban environments, the presence or absence of trash receptacles directly affects the amount of trash pollution in a given area. Locating and maintaining trashcans in the areas where the community use is obvious, as well as making sure they are emptied, is an important component in reducing trash as a pollutant in our waterways. Other ideas may include working with local newspapers to publish weekly monitoring results from the Urban Watch program, and working with the Chamber of Commerce or other business associations to promote clean water practices. Development of a Public Service Announcement for the local cable channel detailing information about stormwater and urban runoff pollution is another possible avenue for outreach to a wider audience.

The 2000 City of Capitola Urban Watch Monitoring Program joined the ongoing efforts of the cities of Pacific Grove and Monterey in looking at non-point source pollutants entering the waterways of the Monterey Bay. The LaMotte Urban Watch kit, which was used by volunteers to monitor dry-weather storm drain flow, is easy to use and provides consistent data for cities and interested parties. It provides a vehicle for community involvement in data collection, which contributes critical data not otherwise collected by other programs in the City of Capitola. It is recommended that the City of Capitola continue the Urban Watch monitoring program in Soquel Creek for the coming year. Continuation of this will program will add to the data presented in this report and provide further information regarding the state of water health in Soquel Creek.

[1] Camp, B. "Detergent is our #1 Pollutant", Fort Worth Department of Environmental Management, Water Quality Division: web page: http://ci.fort-worth.tx.us/DEM/detergent_fish.htm 04/06/2000.