

2001 Urban Watch Monitoring Program City of Pacific Grove, California

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For:

The City of Pacific Grove Public Works Department

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City of Pacific Grove Urban Watch Monitoring Program

PROGRAM OVERVIEW

The City of Pacific Grove Urban Watch storm drain monitoring program was initiated in June 1999 and is a collaborative effort between the Coastal Watershed Council, the City of Pacific Grove, the City of Monterey, and the Water Quality Protection Program of the Monterey Bay National Marine Sanctuary. The purpose of this project is twofold. First is to serve as a tool for education and outreach to the general community regarding the impacts that the citizens have on local water quality. And secondly, to collect useful data to support local environmental management decisions. This is accomplished through the use of trained volunteers to monitor dry-season storm drain discharges at selected outflow areas from June through October of each monitoring year.

Working with staff from the Monterey Bay National Marine Sanctuary (MBNMS), five sampling sites (Figure 1) were selected based on drainage basin and safe access for volunteers. The five sampling sites are referred to as (1) **8th and Ocean** located at the intersection of Oceanview Blvd and 8th Street; (2) **Greenwood Park** located at 13th Street and Central Avenue, (3) **Lover's Point** at Forest Ave. (4) **Pico** on Sunset Drive, near Asilomar, between Arena Ave. and Pico Ave. directly across from the house with orange door and window frames at 1745 Sunset and Oceanview Blvd; and (5) **Asilomar** on Oceanview Blvd near the Asilomar Convention Center under the bridge at the last turnoff before passing the golf course.

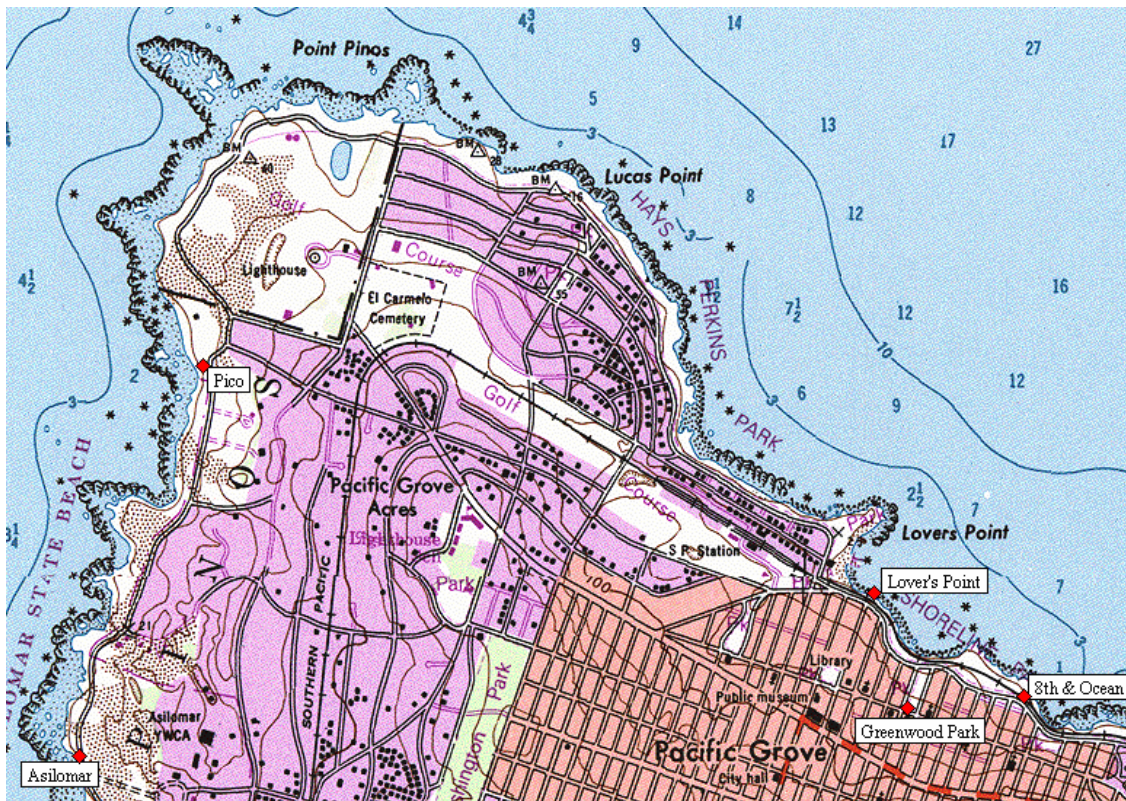


Figure 1. Locations of monitoring sites in the Pacific Grove Urban Watch Program

PROGRAM DESIGN

The program used the storm drain monitoring kit manufactured by the LaMotte Company (SSDK 7446) and designed in association with the City of Ft. Worth, Texas. The Urban Watch monitoring kit is designed to provide a method for volunteers to monitor dry-season storm drain discharges to identify common urban pollutants and contaminants within the study area. 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. To this pre-assembled kit we add an Oakton 'ECTestr' conductivity meter and replace the Oakton 'pHTestr' meter with pH strips for ease of use by volunteers.

Following a one-day training, volunteers were instructed to conduct sampling on a semimonthly schedule. Volunteers were divided into two teams with 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, conductivity, water and air temperature, odor, and color. Volunteers also noted if there was oil sheen, sewage, trash, and surface scum present, and determined turbidity visually using a "Low-Medium-High" designation, as well as any other observations of note. Table 1 includes information on each of the parameters monitored and method used for monitoring.

Samples were randomized through a flexible semimonthly schedule with the volunteers. Scheduling of field time was left up to the monitoring teams.

The Urban Watch Program culminates with the First Flush monitoring event wherein the volunteers capture water samples from the Urban Watch program's storm drains during the first significant rain of the wet season. This rain washes the streets and cleans the gutters and storm drains of collected materials and pollutants that accumulate throughout the dry-season. Infield measurements of water temperature, conductivity, pH, and a visual assessment of turbidity called 'transparency' are taken by volunteers, and samples are then sent to a professional lab where analysis for nitrate, orthophosphate, zinc, copper, lead, total coliform, *E. coli.*, total dissolved solids, and total suspended solids are performed. The results are compared to the Central Coast Ambient Monitoring Program's (CCAMP) Action Levels. These action levels are not for regulatory purposes. Rather, they provide guidance on potential impacts to the health of the marine ecosystem.

VOLUNTEER TRAINING

CWC staff Susanna Danner, and Tamara Clinard, along with Bridget Hoover of the Monterey Bay Sanctuary Citizen Monitoring Network and Maris Sidenstecker Water Quality Education Consultant for the city of Monterey, provided a six-hour hands-on training for volunteers on May 19, 2001. Topics included monitoring concepts, sampling procedures, the meaning of each parameter monitored, use of kits in the field, and safety procedures.

Volunteers were placed in teams according to general skill level, interest and time availability. An experienced monitor from the Coastal Watershed Council or the Citizen Monitoring Network went out with each team until staff felt that the groups had a good understanding of the sampling and analytical skills outlined in the training packet given to them. A program coordinator was chosen to lead the team and provide feedback to CWC.

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

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

- Training on monitoring concepts, safety, sampling methods, and hands-on use of equipment.
- Training in use of data sheets and data entry for volunteers.
- Periodic calibration of test equipment.
- Monitoring of reagent stores and expiration dates.
- Continued supervision until the trainer was confident in the volunteers' sampling and analysis skills.
- Weekly follow up and review of data sheets to determine inconsistency in data.
- CWC prepared a Standard Operation Procedure for volunteers to use in the field while monitoring.
- Processing and analysis of data for report.

**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 reactions in water.	Method - Digital thermometer Accuracy - 1% full scale
Turbidity	Microorganisms, Sediment, erosion	interferes with fish and other 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 other aquatic life	Method – MacHery-Nagel pH-Fix 4.5-10.0 color-fixed indicator strips Accuracy ± 0.25 units Min detection: 4.5
Detergent surfactants	illegal or unintended 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 Min detection: >0.1 ppm
Copper	illegal discharge into the storm drain system; also can occur naturally in surface waters	concentrations over 0.025 parts per million are toxic to most freshwater fish	Method-Diethyldithiocarbamate Octa-Slide Comparator against color standard. Accuracy± 10%. Min detection: >0.0ppm
Phenols	disinfectants, toothpaste, mouthwashes from domestic wastewater	interferes with fish and other aquatic life	Method - Aminoantipyrine Octa-Slide Comparator against color standard. Accuracy ± 10%. Min detection: 0.5ppm
Chlorine	illegal or unintended connection to 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% Min detection: >0.2ppm
Ammonia Nitrogen	illegal connections to 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 Min detection: >0.1ppm
Conductivity	Discharges high in salts and minerals or metals, water moving through local geology	Possible agricultural, industrial or municipal wastewater runoff	Method –Electrode probe module. Accuracy ± 1% Min detection: 10 µS
Color	dyes or chemicals	Interferes with aquatic Insects	Method - Visual Borger Color System
Odor	illegal discharge or product of decomposition; "clean" drainage water should have no distinctive odor	can indicate presence of contaminants	Method - 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 discharge or illegal dumping	Interferes with fish and other aquatic life	Method - Visual

RESULTS

I. Quantitative Parameters

Over the period of June through October 2001, monitoring took place at five sites on ten dates. Each site was visited twice over a 24-hour period; therefore, a total of 100 monitoring events occurred. Volunteer availability and other influencing factors were taken into consideration throughout the program and not every parameter was tested for on every site visit. Please see Appendix 1 for Summary Tables 1-4, which provide averages, minimum-maximum values, and frequency of parameters encountered. Appendix 2 presents all raw data collected in the field.

Detergents

Detergents were found at all sites and were the most frequently detected of the chemically analyzed parameters. There were 30 detections out of 98 recorded results (31%), and twenty of these were 0.1ppm, the lowest detectable value. The highest frequency of detergents was found at the 8th and Ocean outfall, where detergents were detected on 8 of 18 total visits (44%). Concentrations detected ranged from 0.1 ppm to 0.6 ppm. The highest concentration, 0.6 ppm, was found at 8th and Ocean, where the measurement was detected on 10/2/01 at 5:20pm.

Phenols

Phenols were not detected in water samples during the 2001 monitoring program.

Ammonia Nitrogen

Ammonia nitrogen was found at all sites. There were 26 detections out of 98 recorded results (27%). The highest frequency of ammonia nitrogen was found at the Lover's Point outfall, where there were 8 detections in 20 total visits (40%). Concentrations detected ranged from 0.1 ppm to 1.0 ppm. The highest concentration, 1.0 ppm, was found at Greenwood Park, where the measurement was detected on 8/9/01 at 9:36am.

Copper

Copper was not detected in water samples during the 2001 monitoring program.

Chlorine

Chlorine was detected one time during the program, as 0.5 ppm, at the 8th and Ocean site on 10/20/01 at 9:35am.

II. Qualitative Parameters

Trash

Trash was found at all sites, and was the parameter most frequently detected of all in this program; Trash was reported on 50 of 97 site visits (52%). At both the 8th and Ocean, and the Greenwood Park site trash was detected in 17 of 19 observations (89%), at Lovers Point trash was detected on 12 of 20 observations

(60%), at the Pico site trash was detected on 3 of 20 observations (15%), and only one observation of trash was recorded for the Asilomar site.

Sewage

'Sewage' or 'sewage smell' was noted on 1 of 97 monitoring events (1%), at the Lover's Point site on 6/12/01 at 4:48 pm. 'Sewage' or 'sewage smell' was not noted under *odor* from the water sample for this observation. Sewage was absent from all other site observations for this program.

Surface scum

Surface scum was noticed a total of 3 times at Pico (7/9/01 at 5:45 pm, on 8/6/01 at 3:24 pm and on 8/7/01 at 9:55 am, and 1 time at Greenwood Park on 7/28/01 at 1:45 pm. Surface scum was not noted on any other recorded observations. In most cases, algae or organic matter were reported to be a component of the surface scum.

Oil sheen

Oil sheen was recorded twice at Greenwood Park, on 6/27 at 6:09pm, and on 8/6/01 at 2:55pm, and was absent from all other site observations.

Turbidity

Turbidity greater than 'low' was detected one time during the program but was consistently low for all other site visits. Turbidity was recorded as 'medium' at the Lover's Point site on 8/7/01 at 9:30am.

Odors

Odors were not detected in the water samples during the 2001 monitoring program.

Color

Volunteers matched water samples to a Borger Color System (BCS) booklet used to identify colors in nature. Water color was found to be transparent at all sites with the exception of one time at 8th and Ocean on 10/20/01 at 9:35 am, water color was recorded as "peachy" (BSC-58), and one time at Lover's Point on 8/7/01, at 9:30 am, water color was recorded as 'brown' (BCS-91). On 8/22/01 at the Greenwood Park site volunteers detected a paint spill during their monitoring cycle. Water color was recorded as 'white' (BCS-107).

III. Additional Data

On August 22, 2001, the Pacific Grove Urban Watch volunteers observed the water flowing out of the large culvert at the Greenwood Park site and throughout the park downstream of the culvert to be a milky "white". The volunteers monitored the water as usual, and found no detectable level of detergent, phenol, chlorine, copper, or ammonia nitrogen. Conductivity was recorded, as 1730 μ S (the highest recorded for that site which averaged 1538 μ S throughout the 2001 program), and pH was measured as neutral, 7.0. No odors were detected and the color was recorded as "white." They notified officials, who responded immediately, and pumped the water from the open channel to the sanitary sewer system, none of the "white" water was released to the Monterey Bay National Marine Sanctuary. During monitoring on the following day volunteers encountered a local painter at the site who asked about proper procedures for cleaning his equipment. This situation proved to be an opportunity to educate the public on proper paint clean-up procedures as well as to protect the environment.

IV. First Flush Event

The First Flush monitoring event for 2001 occurred on October 30th at approximately 4:30 am, in the Urban Watch cities of Monterey, Pacific Grove, and Santa Cruz. Storm drain outfalls were monitored for conductivity, water temperature, pH, turbidity, nitrate, orthophosphate, zinc, copper, lead, total coliform, *E. coli.*, total dissolved solids, and total suspended solids and the results were compared to the Central Coast Ambient Monitoring Program's (CCAMP) Action Levels. These action levels are not for regulatory purposes; rather they provide guidance on potential impacts to the health of the marine ecosystem.

In Pacific Grove, the Asilomar site had the highest concentrations of pollutants. Copper and lead concentrations were much higher than all of the other sites. This site was also very turbid. 8th Street was the only other site in all three cities that exceeded the CCAMP action level for lead. Lover's Pt and Greenwood Park sites exceeded action levels for *E. coli.*, orthophosphate, zinc and copper, while the Pico site tests exceeded *E. coli.*, orthophosphate, copper, and transparency. Nitrate concentrations, total dissolved solids and total suspended solids were all very low in Pacific Grove and there were no sites that exceeded CCAMP action levels for oil and grease.

A separate report will be written for the 2001 First Flush monitoring event and sent to local area governments and agencies. The data will be made available to interested organizations, and will be used in the assessment of the pollutant load in the waters flowing into the Monterey Bay National Marine Sanctuary. The results of First Flush are available by contacting Bridget Hoover, Coordinator of the Monterey Bay Sanctuary Citizen Watershed Monitoring Network at (831) 883-9303.

DISCUSSION

The parameters tested for in this program should all be absent from our local waterways. Results from the data collected showed that trash was the most frequently recorded parameter, observed 50 times of 97 recorded observations (52%). Detergent was the most common contaminant within the samples collected from the storm drains within the study area. Of the 98 monitored events recorded for all site visits, detergent was found 30 times (30%), ammonia nitrogen was found 26 times (27%), phenols were found 9 times (10%), chlorine was found 6 times (7%), and copper was found 1 time (1%). These data demonstrate the possibility of illicit discharges into the drains monitored.

Data from Pacific Grove in 2001 show a greater than 50% increase in the frequency of detergent detection at all sites than was measured in the City of Pacific Grove during the Urban Watch 2000 program (2001 - 31%; 2000 - 14%). Also, there was a significant reduction in the number of ammonia nitrogen detections in 2001 from 2000 (2001 - 28%, 2000 - 43%), and a reduction in Phenols (10% in 2000 and no detections in 2001). There was a reduction of chlorine detections from 6 in 90 tests in 2000 to no detections in 2001, and an increase in copper detections to 1 detection in 2001 from none in 2000. Consistent low-level detections of these constituents illustrate the need for continued dry-season monitoring.

CONCLUSIONS

The 2001 Pacific Grove Urban Watch Monitoring Program continued piloting the Urban Watch kit first used in the City of Pacific Grove in 1999. The Urban Watch kit was developed for use by volunteers to monitor dry-weather storm drain flow. The kit is easy to use and provides consistent data throughout the

monitoring period. It is recommended that project organizers develop a relationship with a certified lab to periodically run QA/QC checks on the equipment. It is also recommended that when positive results are found for constituents that volunteers collect an additional sample for processing by a lab. Program coordinators would then inform the City of Pacific Grove of findings as soon as they are recorded.

The First Flush event proved a useful event for data collection and showed a great need to do further monitoring in the systems currently looked at with the Urban Watch monitoring. This program also is a great tool for volunteers to see what the storm drain system is meant to do. Even though the event took place in the early morning hours feedback from participating volunteers was extremely favorable. Their experience will surely be shared with family and friends.

The data results continue to show the need for a targeted public outreach program for urban runoff control within the city limits as well as in the neighborhoods that feed these drains. There is currently an outreach campaign going on in Pacific Grove that has distributed over 8000 brochures to local residences and businesses, and is distributing a 'Best Management Practices' video to restaurants, and running a general water quality campaign targeting local businesses. The restaurant survey and outreach program conducted by the city of Monterey and the Sanctuary in 1998 and being repeated this year, is a good step towards this goal and further outreach to neighborhoods and businesses in the drainage area of the storm drains being tested should be investigated. Other ideas include working with local newspapers to publish weekly monitoring results from the storm drain monitoring program, and collaborating with the Chamber of Commerce and other business associations to promote clean water practices.

An outreach component during the school year could also be investigated. Volunteers from the Urban Watch Program could visit local elementary and high schools to present information about urban runoff and results from the last season's program. This would require some materials development that could be cooperatively accomplished by the City of Pacific Grove, the Monitoring Network and the Coastal Watershed Council.

In conclusion, it is recommended that the City of Pacific Grove: 1) continue the Urban Watch monitoring program for a fourth season to augment the data presented here; 2) assess upstream sources of illicit discharges and pollutant sources; 3) investigate additional parameters for study and look for new sites 'upstream' of past detections (perhaps above the 8th & Ocean, Lover's Point or Greenwood Park sites); and 4) continue its outreach programs targeting local businesses, schools and residents to further reduce detergent concentrations entering the Monterey Bay National Marine Sanctuary.