



**2004 Urban Watch Monitoring Program**  
City of Monterey, California

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## **PROGRAM OVERVIEW**

The City of Monterey Urban Watch storm drain monitoring program was initiated in June 1997 as a collaborative effort between the Coastal Watershed Council (CWC), 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 November of each monitoring year.

Working with staff from the City of Monterey Public Works Department, five sampling sites were selected based on drainage basin and safe access for volunteers. Figure 1 shows the locations of these sites. The five sampling sites were referred to as: (1) *Steinbeck Plaza* located at the end of Prescott Street on Cannery Row; (2) *Twin 51* located near the recreation trail at Heritage Harbor, west of Fisherman's Warf; (3) *San Carlos* at San Carlos Beach near the Breakwater; (4) *El Dorado* on Major Sherman Lane at El Dorado Street, North of Highway 1, Del Monte Shopping Center and Don Dahvee Park; and (5) *Library*, corner of Pacific Street and Madison Street.

Each site of the 2004 Urban Watch program is characterized as follows:

<b>Station Name</b>	<b>Station ID</b>	<b>Drainage Area (acres)</b>	<b>Primary Land Use</b>	<b>Description</b>	<b>Location</b>	<b>Receiving Water</b>
El Dorado (aka Major Sherman) (Monterey)	MSD1		80% residential 20% commercial	Drainage ditch	Intersection of Major Sherman Lane El Dorado Street	Lake
Twin's (Monterey)	MSD3	365	90% residential 10% commercial	Two 51' diameter concrete pipes	Below walking path at Heritage Harbor-adjacent to Wharf I, west ~500ft.	Ocean
San Carlos (Monterey)	MSD4	70	40% commercial 35% residential 25% public land	36' diameter concrete pipe	On the beach adjacent to the west side of Coast Guard pier.	Ocean
Steinbeck (Monterey)	MSD5	37	90% commercial 10% residential	36' diameter concrete pipe	At Steinbeck Plaza on Cannery Row at the end of Prescott Street	Ocean
Library (Monterey)	MSD6	467	100% residential	Drainage ditch	665 Pacific Street adjacent to the Monterey Public Library on the Northeast side of Pacific Street.	Ocean



**Figure 1.** Locations of monitoring sites in the Monterey 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 and the US EPA in 1990. The 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 storm drain connections and discharges. To this pre-assembled kit we added the Oakton 'ECTestr' conductivity meters and a Hanna Instruments Low Reading Orthophosphate hand-held meter for measuring orthophosphates, and replaced the Oakton 'pHTestr' meter with pH strips for ease of use by volunteers.

Following a half-day training, volunteers were instructed to conduct sampling on a bimonthly schedule. Volunteers were divided into two teams with 3-5 members each. Samples times and dates were randomized through a flexible schedule with the volunteers. Parameters monitored included detergent surfactants, orthophosphates, 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. They also 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 methods used for monitoring.

The Urban Watch Program culminates with the First Flush monitoring wherein the volunteers capture water samples from the storm drains monitored for the Urban Watch program during the first significant rain of the wet season. This rain covers the streets and flushes the gutters and storm drains of collected materials and pollutants that accumulate throughout the dry-season. Infield measurements of water temperature, conductivity, pH, and an assessment of transparency are taken by volunteers at the site, and samples are collected and sent to a professional lab where analysis for nitrate, orthophosphates, zinc, copper, lead, hardness, 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.

## **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, calibration records are available.
- Use of Instrument ID numbers to track equipment used by teams
- Monitoring of reagent stores and expiration dates, waste management.
- Periodic review of data sheets to determine inconsistency in data entry.
- Continued supervision until the trainer was confident in the volunteers' sampling and analysis skills.
- Standard Operation Procedure for volunteers to use in the field while monitoring.
- Processing and analysis of data for report.

**Table 1: Water Quality Parameters**

<b>Parameter</b>	<b>Possible Sources</b>	<b>Associated Problems</b>	<b>Method/Accuracy</b>
Temperature	Illegal discharges, standing water, large paved surface areas	Affects rates of chemical and biochemical reactions in water.	Method - Digital thermometer Accuracy $\pm$ 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, soils, 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 $\pm$ 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 $\pm$ 0.1 ppm Min detection: >0.1 ppm
Copper	Brake pads, copper architectural elements such as roofs or gutters; 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 $\pm$ 10%. Min detection: >0.0ppm
Chlorine	Illegal or unintended connection to a storm drain or draining of a swimming pool; potable water line leaks	Toxic to aquatic life, can create a "sterile" environment	Method – DPD Octa-Slide Comparator against color standard. Accuracy $\pm$ 10% Min detection: >0.2ppm
Ammonia Nitrogen	Wildlife, fertilizers, Illegal connections to storm drain systems, poorly functioning septic systems	At certain concentrations can be toxic to aquatic organisms	LaMotte Code 5864 Colo-Ruler against a color standard Min detection: >0.1ppm
E. coli bacteria	Wildlife, Illegal connections to storm drain systems, poorly functioning septic systems, wildlife	Detrimental to human health and marine organisms.	IDEXX Standard Method <sup>1</sup> 9223 b Duplicates within 95% confidence limits
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 $\pm$ 1% Min detection: 10 mS
Color	Tannins from plant material, soils, dyes or chemicals	Interferes with aquatic Insects	Method - Visual Borger Color System
Odor	Product of plant decomposition; illegal discharge sources; "clean" drainage water should have no distinctive odor	Can indicate presence of contaminants	Method - Scent
Oil sheen	Hydrocarbons such as oil, gasoline, and grease; Decomposing plant materials (ie: eucalyptus); Leaking underground petroleum storage tanks	Toxic to aquatic organisms	Method - Visual
Trash, sewage, scum	Illegal discharge or illegal dumping; Scum may be result of plant material decomposition	Interferes with fish and other aquatic life	Method - Visual

## **VOLUNTEER TRAINING**

Tamara Doan of the Coastal Watershed Council, Bridget Hoover of the Monterey Bay Sanctuary Citizen Monitoring Network, and Maris Sidenstecker, Water Quality Education Consultant for the City of Monterey, provided a four-hour hands-on training for volunteers on May 19, 2004. Topics included monitoring concepts, sampling procedures, the meaning of each parameter monitored, use of kits in the field, and safety protocols.

Volunteers were placed in teams according to general skill level, interest and time availability. An experienced monitor, Ms. Sidenstecker, went out with each team until staff felt that the groups had an understanding of the sampling and analytical skills outlined in the training packet given to them. Two experienced monitors were chosen as Team Leaders to help coordinate volunteer scheduling, and provide feedback to Ms. Sidenstecker.

## **RESULTS**

Over the period of June through October 2004, monitoring took place at the five sites 20 times and a total of 100 individual monitoring events occurred. Volunteer availability and other influencing factors were taken into consideration throughout the program and not every parameter was tested on every site visit.

Of the five sites monitored throughout the duration of the program, four consistently exhibited flow to be measured. One of the monitoring sites visited, El Dorado, had exhibited no flow and thus no measurements were recorded. Therefore, the following results reflect measurements taken at the remaining four sites (for a total of 80 samples taken).

The detection criteria for each parameter is based on the minimum detection limit for each respective test kit, see Table 1 (Method/Accuracy) for each parameter. If the results of the test were above the minimum detection limit, it was considered a "hit". Please see Appendix 1 for Summary Tables 1 - 5, which provide averages, minimum-maximum values, and frequency of parameters encountered. Appendix 2 presents all raw data collected in the field. Monitoring protocols are available upon request.

### **I. Quantitative Parameters**

The parameters listed below were analyzed in the field using the LaMotte kit described in the Program Design section of this report.

#### **Detergent Surfactants**

There were 80 samples tested for detergent from the four sampling sites. Of those, 36 tested positive for detergent, or 45% of all samples tested. The site that detected the highest level of detergents was Steinbeck Plaza on both 6/23/04 and 9/1/04 (1.60 ppm). Steinbeck Plaza detergents were detected 16 of 20 times (80%), yielding the highest concentration throughout the program. Detergents ranged between 0.10 ppm to 1.60 ppm at Steinbeck Plaza; of the 16 detections, three were greater than 1.00 ppm and four were between 0.80 ppm and 0.90 ppm. At San Carlos and Twin 51, each site identified detergents in 9 of 20 samples (45%). The remaining site, Library, detergents were detected twice during the monitoring period (10%).

#### **Ammonia Nitrogen**

Ammonia nitrogen was detected on 44 of the 80 samples collected (55%). The highest detected value across all sites was 4.0 ppm, located at Steinbeck Plaza on 8/19/04 and 10/12/04. Twin 51 had the highest frequency of detections, indicating ammonia nitrogen was present in 17 of the 20 samples (85%). Steinbeck Plaza detected ammonia nitrogen 11 of 20 times (55%), the highest detected ranged between

0.10 ppm and 4.0 ppm. Of the remaining sites, the range of ammonia nitrogen detected was between 0.10 ppm and 0.50 ppm. Across all four sites, there were 10 measurements of 0.50 ppm (13%). Of the 20 samples collected at Steinbeck Plaza, 2 measurements of 0.75 ppm (10%), 5 measurements of 1.0 ppm (25%) and 2 measurements of 2.0 ppm (10%) were detected.

### **Copper**

Copper was detected twice in the 80 samples, once at Twin 51 on 6/11/04 (0.25 ppm), and once at San Carlos on 7/6/04 (0.10 ppm).

### **Chlorine**

Chlorine was detected once in 80 tests during the monitoring period on 8/6/04 at Twins 51 (0.60 ppm).

### **Orthophosphates**

Orthophosphate measurements were taken using a Hanna Instruments Low Reading Orthophosphate hand-held meter, range is 0.00-2.50 mg/L as phosphates. Of the 63 measurements taken, 32 of the samples (51%) indicated the presence of phosphates over the criteria of 0.37 mg/L. The largest finding of phosphates over this level was at Twin 51, detected 14 of 16 times (88%). Steinbeck Plaza also revealed a high frequency of phosphates (81%), as well as contributing the single highest measurement of phosphates (0.90 mg/L) on 9/14 and 9/16. The remaining sites, San Carlos and Library, detected phosphates 3 of 15 (20%) and 2 of 16 (13%) samples, respectively. The average values across all sites ranged between 0.04 mg/L and 0.90 mg/L.

### **pH**

The values for pH throughout the program averaged from 7.2 (Twin 51) to 7.5 (San Carlos). The highest measurement was 8.0, which was recorded 3 of 19 times (16%) at San Carlos. The most common pH measurement for all four sites was 7.5, which was recorded 45 of 79 times (57%). The remaining pH measurements of 7.0 were recorded 31 of 79 times (39%).

## **II. Measured Values**

### **Flow Presence**

No flow was detected at El Dorado throughout the duration of the monitoring program. Therefore, flow was detected in 80 of 100 remaining site visits (90%). Although the site values cannot be compared to one another, depth and width values varied a great deal between visits to a particular site. Average, min-max and frequency can be found in Appendix 1, Summary Table 1. The greatest variance in flow depth was found at Steinbeck Plaza, where depth ranged between 0.1 cm and 6.0 cm, and the greatest difference in flow width was found at Library that ranged between 3.0 cm and 87.0 cm.

### **Air Temperature**

Air temperature averaged about 20°C across all four sampling sites. The lowest recorded temperature was 14.9°C at the Library site at 1:00 pm on 6/11/04, and the highest recorded temperature was 27.8°C at Twin 51 at 3:00 pm on 9/14/04. Averages for each site were: Twin 51 (20.2°C), San Carlos (20.6°C), Steinbeck (20.7°C) and Library (19.1°C).

### **Water Temperature**

Water temperature average ranged between 16.4°C (Library) and 20.3°C (Twin 51) for all sites throughout the program. The lowest recorded temperature was 14.1°C at the Library site at 1:00 pm on 6/11/04, and the highest recorded temperature was 27.8°C at Steinbeck Plaza at 12:20 pm on 6/11/04. Averages for each site were: Twin 51 (20.3°C), San Carlos (18.7°C), Steinbeck (19.6°C) and Library (16.4°C).

### **Conductivity**

Conductivity measurements were taken with the Oakton ECTester low range meter (0-1990  $\mu$ S) and with the Oakton ECTester high range meter (0-19.90 mS). A total of 78 samples were measured across the four actively flowing sites. Conductivity averaged between 1495  $\mu$ S (Steinbeck Plaza) and 2868  $\mu$ S (Library) for all 78 samples collected. The lowest recorded conductivity was 500  $\mu$ S at Twin 51 at 3:55 pm on 6/23/04, and the highest measurable conductivity value was 5000  $\mu$ S collected at the same site at 9:48 am on 9/30/04. Sites recording the widest range of conductivity measurements were at the following: Twin 51 (500 – 5000  $\mu$ S), San Carlos (900 – 4300  $\mu$ S) and Steinbeck Plaza (800 – 3200  $\mu$ S). Library had the narrowest range of conductivity (1900 – 3500  $\mu$ S).

### **III Qualitative Parameters**

Volunteers were asked to make ‘presence or absence’ observations of the following parameters. More detailed descriptions were noted on the data sheet, and can be provided upon request. “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 throughout the program.

#### **Odor**

No distinct odors were detected from the 80 samples collected over the four actively flowing sites.

#### **Color**

Water samples were compared to a Borger Color System (BCS) booklet used to identify colors in nature. Fifty of the 80 samples were reported as colorless (63%). Of the remaining 30 samples, volunteers indicated the water samples to be a pale yellow and pale tan, to drab grays and drab browns.

#### **Oil sheen**

No oil sheens were detected from the 80 samples collected over the four actively flowing sites. However, at Steinbeck Plaza, volunteers indicated that the sandy area around the storm drain as “black and saturated with oil” on 8/17/04, even though the sample collected was colorless.

#### **Sewage**

Sewage smell was noted on 5 of 80 monitoring events (6%). Four of those detected were reported from Steinbeck Plaza (6/23, 6/25, 7/20, and 8/17), and one was reported from Twin 51, which volunteers indicated as “a dead organic matter smell” (6/25).

#### **Surface scum**

Surface scum was reported 11 times of 80 monitored events at the four sites (14%). In most cases ‘bubbles,’ ‘soapy water’ and ‘foam’ were reported to be a component of the surface scum. The highest indicator of surface scum was detected at the Library site, which volunteers noted as an “algae bloom on surface.” Even though algae is not considered a characterization of surface scum, it was indicated present in 6 of the 20 site visits (7/20, 7/21, 8/4, 8/6, 8/17, and 8/19).

#### **Trash**

Trash was reported in 66 of 80 site visits (83%), a decrease from (89%) in 2003. Trash was noticed at the four sites with great frequency: Twin 51 and Steinbeck Plaza had trash sited in 19 of 20 visits (95%); San Carlos and Library had trash sited in 14 of 20 visits (70%). The most common trash observations included Styrofoam, aluminum, cigarette butts, and plastic wrappers.

#### **Turbidity**

Out of the 80 samples, turbidity was consistently low for all sites, with the exception of one medium measurement reported on 6/23/04 and one high measurement reported on 7/20/04 at San Carlos.

#### **IV. Additional Data**

##### **Bacteria (*E. coli*)**

Field samples were collected from each site that exhibited flow during three separate monitoring events on 7/28, 8/17, and 9/7/2004. One of the monitoring sites visited, El Dorado, had exhibited no flow and thus no samples were collected. Therefore, the following results reflect measurements taken at the remaining four sites. Once the samples were collected, they were sent to Monterey Bay Analytical Laboratories to be tested for bacteria counts (*E.coli*) and total coliform.

Results from the lab indicated the presence of *E.coli* and total coliform to be over the water quality objective in 23 of the 24 samples tested (96%). Across all four sites, the values for *E.coli* ranged from 422 MPN/100ml (Twin 51 on 7/28) to >241,920 MPN/100ml (Steinbeck Plaza on 8/17). The values for total coliform ranged from 8,164 MPN/100ml (Library on 7/28) to >241,920 MPN/100ml (Steinbeck Plaza on 8/17 & Twin 51 on 9/7).

##### **Day of Week/Time of Day**

Volunteer monitoring occurred between Monday and Friday. No weekend data was collected for the 2004 program. Most events occurred in the middle of the week with the most common monitoring day being Tuesday; 2 on Monday (10%), 6 on Tuesday (30%), 4 on Wednesday (20%), 5 on Thursday (25%), and 3 on Friday (15%).

The monitoring times varied; however, they were consistently in the afternoon hours for the 100 times recorded. The earliest monitoring time was 9:18 am (9/30/04), and the latest was 5:43 pm (6/8/04).

#### **V. First Flush Event**

The First Flush monitoring event occurred on Saturday, October 16, 2004 at approximately 11:30 pm, and was held in the cities of Monterey, Pacific Grove, Seaside, Capitola, Santa Cruz, and Half Moon Bay. Storm drain outfalls were monitored for conductivity, water temperature, pH, transparency, and field samples were collected for analysis of nitrate, orthophosphates, zinc, copper, lead, hardness, total coliform, *E. coli.*, total dissolved solids, and total suspended solids. 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.

A separate report has been written for the 2004 First Flush monitoring event and sent to local area governments and agencies. First Flush results illustrate the impact of non-point source pollution generated through our daily interactions in the environment. The pollutants detected, in part, are a result of the daily activities of the local population as well as the many visitors that come to this region each year - high metal concentrations can be attributed to car brake linings, high nutrient concentrations can be linked to fertilizers, and high bacteria concentrations are generated by failing sewer and septic lines, wildlife and pet waste.

Notable findings include:

##### **Bacteria**

- All of the Monterey sites, except El dorado, exceeded the *E. coli* water quality objective of 400 MPN/100 ml during the First Flush.

## Metals

- All of the sites, except for El Granada, exceeded the Basin Plan Water Quality Objective for copper (< 30 µg/l) and zinc (< 200 µg/l).
- Steinbeck Plaza had the highest zinc (678 µg/l) concentrations of all the sites this year and the majority of sites in previous years.
- San Carlos outfall was the only site to exceed the zinc WQO at 306 µg/l for the dry weather event. Zinc concentrations in the First Flush ranged from 120 – 678 µg/l.
- The Library had the highest lead concentration of all of the sites (58 µg/l) and has had high lead concentrations historically.

## Nutrients

- All of the sites were well below the action level except for five sites, Steinbeck Plaza, which were all below 3.0 mg-N/L. The action level established by CCAMP for nitrate (NO<sub>3</sub> -N) is 2.25 mg-N/L.
- Overall, Steinbeck Plaza had the second highest orthophosphate concentration (4.1 mg-P/L), well above the CCAMP action level for orthophosphate (PO<sub>4</sub><sup>3-</sup> -P) is 0.12 ppm).

## Total Suspended Solids

- The Library (790 mg/L), Woodrow (645 mg/L), and El Grenada (689 mg/L), were the only sites to exceed the action level of 500 mg/l.

## Total Dissolved Solids

- All of the total dissolved solids (TDS) samples except for Library and Twin 51, were at or below 1500 mg/l. The Twin 51 site had the highest concentrations with the first sample measuring 1570 mg/l, then quickly dropping to 341 mg/l. The Library site had the second highest concentrations with the first sample measuring 1420 mg/l and the second sample 976 mg/l.

This data is available to interested organizations, and will be used to assess 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. Previous First Flush reports can be downloaded from the Internet at: <http://www.mbnms.nos.noaa.gov/monitoringnetwork/events.html>

## **DISCUSSION**

Results from the 2004 Urban Watch Program data showed that detergent surfactants and ammonia nitrogen were the most common pollutants detected. Copper was detected twice, Chlorine detected once and turbidity was found to be above 'low' once during the 2004 program.

Detergent surfactants have consistently been detected in the storm drains monitored in this program for all monitoring years. However, this year revealed a slight decrease in detergent detections across all four active sites; in 2004 detergents tested positive in 45% of the samples as opposed to 56% in 2003. The most frequent site for detergent in 2004 was Steinbeck Plaza, which also yielded the highest concentrations of detergents throughout the program (1.6 ppm). Also in 2004, a site known for its high frequency of detergent, Twin 51, decreased from 100% in 2003 to 45% during the 2004 program.

Ammonia nitrogen was detected in 55% of all the samples tested and concentrations varied from 0.10 ppm to 4.0 ppm, an overall increase from 32% in 2003. According to the Santa Cruz County Department of Environmental Health Services as much as 0.50 ppm of ammonium nitrogen can be expected in the native system as background levels, and detections above 0.50 ppm should be looked at more carefully

(Peters 2001). At Steinbeck Plaza, the highest detected value (4.0 ppm) occurred on two separate monitoring events (8/19 & 10/12/04). However, even though ammonia nitrogen detection has increased overall in 2004, values reported higher than concentrations greater than 0.50 ppm across all sites was only 13%. As in previous monitoring seasons, Steinbeck Plaza and Twin 51 sites continue to be the largest contributors of ammonium nitrogen to the marine environment. Since ammonia nitrogen continues to be detected throughout the history of the Urban Watch monitoring program, we will investigate the use of lower detection limit kit for monitoring in future years.

Although the Twin 51, San Carlos, and Steinbeck outfalls drain to the ocean, none are inundated with seawater during the dry-season monitoring period. The affect of ocean 'spray' may be a contributing factor in higher conductivity findings than in other locations; therefore, upstream measurements are recommended to clarify this factor. The El Dorado and Library sites are inland a mile or more and would therefore not have any sea influence. Identifying the source(s) of water flowing through the storm drains in question and understanding the local geological and environmental influences would provide a more detailed insight to the conductivity of the water flowing at these sites to determine if this is a natural state or if some anthropogenic influence is artificially raising conductivity at these sample collection sites.

For the 2004 monitoring program, the detection of phosphates in the form of orthophosphates has been added. Phosphates can accumulate from runoff of fertilizers or car washing chemicals, and can be toxic to aquatic flora and fauna at concentrations of 0.37 mg/L or higher (using CCAMP action levels for PO<sub>4</sub>). The presence of phosphates over this criterion across all four sites was 51%. Volunteers reported the highest frequency of phosphates (88%) at Twin 51, and found the highest concentration of phosphates (0.90 mg/L) at Steinbeck Plaza. Once again, Steinbeck Plaza and Twin 51 sites continue to be the largest contributors of phosphates to the marine environment during the 2004 monitoring program.

From a qualitative observational standpoint, no distinct odor or intense color was detected in all 80 samples. Although volunteers reported low findings of the presence of oil sheen (0%), sewage (6%), or surface scum (14%), a high frequency of trash (83%) was noted. The presence of trash can severely affect water quality as it interferes with the natural cycle of fish and other aquatic life, thereby reducing the chance of survival in a depleted habitat.

## **CONCLUSION**

The 2004 Urban Watch monitoring program findings for the City of Monterey revealed a change in trend results from past monitoring events. Historically over the past seven years, volunteers at Twin 51 have detected some of the highest frequencies of detergents throughout the program. During the 2004 monitoring season, however, detections of detergents at Twin 51 have decreased from 100% in 2003 to 45% during the 2004 program. Although this is a positive finding during the 2004 program, it is important to stress the recurrent detection of detergents and ammonia nitrogen at Twin 51 as well as at Steinbeck Plaza. Storm drain water from these two sites continues to be the largest contributors of detergents and ammonia nitrogen found during the monitoring program. In addition, there should continue to be further investigation by the City of Monterey Public Works Department with the CWC Coordinator for Monterey to strategically locate some new sites "up the watershed" so as to determine where these pollutants enter the system. With seven years of data collected, we recommend looking further into the drain system to identify more localized sources of flow. Furthermore, outreach should continue to be directed at businesses and increase in the neighborhoods that drain into this part of the storm drain system.

In order to increase in the quality and/or quantity of data collected during the Urban Watch Program, steps may need to be taken in order to modifying the current tests to include new parameters, expand the detection ranges with new monitoring equipment, or to eliminate parameters that have never been detected over the eight-year period. Suggestions include purchasing new and improved test kits for

ammonia, oil and grease, nitrate, and kits needed to detect for lower limits of copper. This should be done as the result of a data review with the city of Monterey Public Works Department and the Coastal Watershed Council as the first step of establishing the 2005 program.

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. The City of Monterey does an excellent job utilizing specific marketing techniques (i.e. bus ads, posters) and other outreach materials as public education tools in pollution prevention. Other prevention methods could include working with the Chamber of Commerce and other business associations to promote clean water practices.

In conclusion, it is commend the City of Monterey for continuing the Urban Watch monitoring program for a ninth season to augment the data presented here. Recommendation for the 2005 program include: 1) assess upstream sources of illicit discharges and pollutant sources; 2) support the investigation of additional parameters for study; and 3) continue outreach programs targeting local businesses, schools and residents to further reduce detergent concentrations and other sources of pollution from entering the Monterey Bay National Marine Sanctuary.

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