CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

33078

Project Title

Copper Concentration in Stormwater Runoff South of Carmel

Abstract

Objectives/Goals

A current environmental concern is the level of copper concentration in storm drainage runoff water into the ocean. Much of this copper originates from brake pad dust on streets and also common architectural materials leaching into storm drainage. The copper is washed into the ocean during rains, especially during the first heavy rains of the wet season. Copper levels above the Central Coast Basin's Water Quality Objective for the protection of marine life have been frequently found in the southern more urbanized area of Monterey County. This project measured the levels of copper at two previously unmonitored drainage sites south of the area of any earlier study. The sites were in the Carmel Highlands/North Big Sur area - one site more urban, and one less so.

Methods/Materials

Two previously unmonitored runoff sites were selected south of Carmel - one with more surface streets. Three samples were taken at each site on four different days: one day at the end of the dry season; the next on the day of the first heavy rain of the wet season; and on two days post the first heavy rain. Samples were collected in 100ml collection bottles which were previously washed and then rinsed with distilled water. The samples were tested to insure the pH was between 2 and 6. Reverse-osmosis cleansed vials were used for testing in the colorimeter. Each sample was tested using the Porphyrin Method with an HACH Colorimeter.

Results

The test results indicated a substantial increase in the copper concentration level in the runoff water from the more urbanized site after the first heavy rainfall. Copper levels did not rise in samples from the less urbanized site on the same date. All but one sample from both sites were still well below the Water Quality Objective for copper.

Conclusions/Discussion

There was a lower level of copper concentration in each of the selected sites than found in many of the previously monitored sites in south Monterey County. Both of the selected sites are more rural than the previously monitored south county sites, so there appears to be a relationship between greater urbanization and copper concentration levels in storm drainage runoff water. The next steps in this project will be to monitor more southern sites, taking a greater number of samples at each site, and possibly using a Spectrophotometer. Another idea would be to compare sites with more surface versus subsurface drainage.

Summary Statement

This project measured the copper concentration levels in storm drainage runoff water entering the ocean at two previously unmonitored sites south of Carmel - one site with more surface streets.

Help Received

Mom assisted with some of the typing and gluing. Dad aided in retrieving the stormy weather runoff samples. Roger Phillips, Dir. of Applied Research, Monterey Bay Aquarium, advised with topic and site selection. Eric Kingsley, Water Quality Lab Mngr., Monterey Bay Aquarium, loaned some lab materials.