By Team Marine (www.teammarine.org and http://www.teammarine.blogspot.com/)

Single-use Plastics Plague Santa Monica Bay Beaches: Team Marine Characterizes Pollutants Adjacent to Storm Drains

Right Bottom Photo left to right: Kou Collins, Devany Garcia, Valerie Wacker and Eileen Flores

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On Sunday December 20, 2009 Santa Monica High School's Team Marine visited the Venice Storm Drain at the end of Rose Avenue and the Pico-Kenter Storm Drain at Pico Blvd. to investigate the incidence of plastic pollution in the debris zone around stagnant pools of storm drain water. In a twenty-five minute beach cleanup at the Venice storm drain, three Team Marine members collected 12.5 pounds of plastic trash consisting of 128 colored wrappers, 127 Styrofoam pieces, 101 clear wrappers, 68 bottle caps, 35 straws, 23 misc. hard plastic pieces, 14 food containers and lids, 9 grocery store bags, 5 water bottles, and 2 utensils.

A more detailed study was performed at the Pico-Kenter site. Using 50 meter measuring tapes, 1081 plastic bottle caps, 240 straws, and 30 utensils were collected from a 643.25 m^2 debris zone around the storm drain pool (Figures 1 and 2). These total abundances amounted to an average of 1.68 bottle caps, 0.37 straws, and 0.05 utensils per m^2. For Pico-Kenter, Team Marine also sorted a random selection of plastic pollutants into categories to help identify exactly what is coming out of the storm drains and will be entering the ocean upon the next flush (Table 1).

Eileen Flores from Team Marine comments, "We identified that plastic bottle caps are a huge part of urban runoff and the plastic debris zone around storm drains."

Team Marine member Kou Collins says, "Looking at all the plastic disgusts me and makes me feel bad because it shows our apathy toward our environment. In class we studied how plastic is non-biodegradable, and pieces are mistaken for food by animals, such as albatross birds, which die from starvation, since the plastic clogs their bellies and leaves little room for fish[1]."

Benjamin Kay, scientist, instructor, and coach of Team Marine says, "The students' research is different from past beach cleanup studies because it focuses on the narrow damp area around a storm drain pool, an area whose contents get scoured by urban runoff when it rains and catapulted into the ocean. Sadly, the variable topography of this area seems to preclude city cleaning trackers from gaining access."

Team Marine's assistant coach, Renee Klein, adds "These storm drains are direct taxis for plastic pollutants, many of which float and either get washed back onto the shore or make their way into the North Pacific Gyre."

According to research by the Algalita Marine Research Foundation and 5 Gyres, human plastic waste streams contribute to the North Pacific Garbage Patch, now estimated to be twice the size of the USA (AMRF staff, pers. comm.). Between 1999 and 2008, the surface density in one area of the Pacific Ocean doubled, while the dry weight ratio of plastic to plankton rose from 6:1 to 46:1 in some locations (AMRF staff, pers. comm.). According to the United Nations Environment Program (2006), there are an estimated 46,000 plastic particles swirling around in every square mile of the ocean[2]. "Marine litter is now 60–80% plastic, reaching 90–95% in some areas"[3]. Plastic particles also adsorb hydrophobic persistent organic chemicals, such as PCBs and DDE, up to 1,000,000 times higher in concentration than the surrounding seawater, which may increase biomagnification of toxins up the food chain as plastics are ingested by marine life[3,6].

Santa Monica City Council drafted an ordinance to ban single-use plastic bags almost two years ago[4], but implementation was halted by a lawsuit threatened by the plastic bag industry[5]. Meanwhile, many students and Santa Monica residents eagerly await the outcome of the city's environmental review, which council members claimed is needed for legal shielding.

Team Marine promotes many solutions to the plastic pollution issue including banning single-use plastic products like water bottles and grocery store bags, refusing to purchase disposable plastic products, switching to reusable products like bamboo utensils, pushing plastic bottle companies to leash caps to their bottles, installing screens and other advanced plastic filtration devices in curbside catch basins, increasing fines for littering, increasing storm water reclamation projects, educating youth at all grade levels about conservation and proper waste disposal, and manufacturing all necessary single-use items from bio-degradable materials.

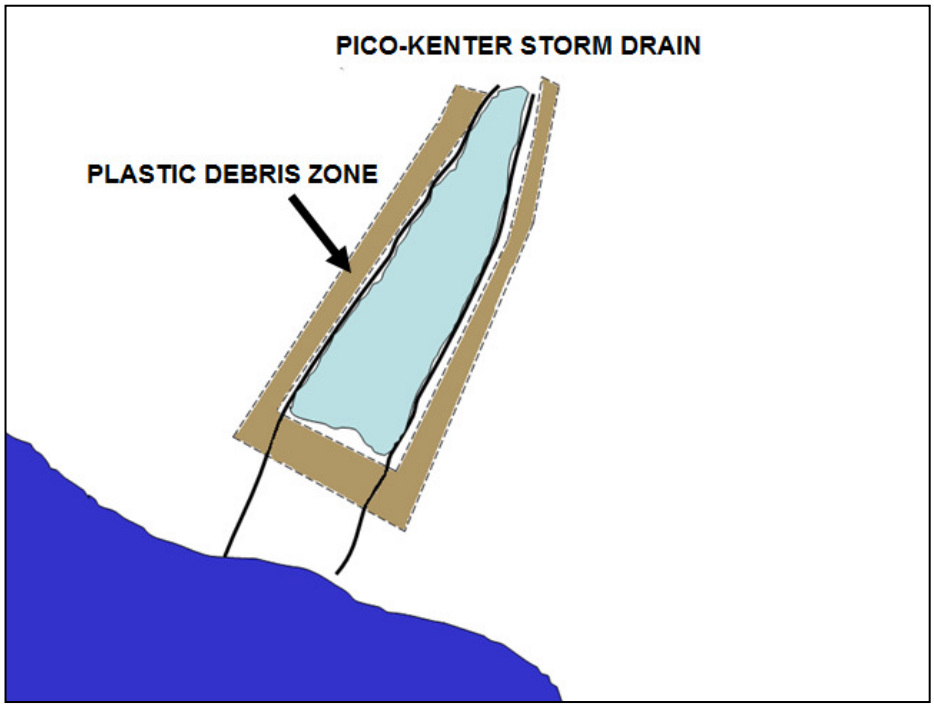

Fig. 1. Diagram of Pico-Kenter storm drain (not to scale).

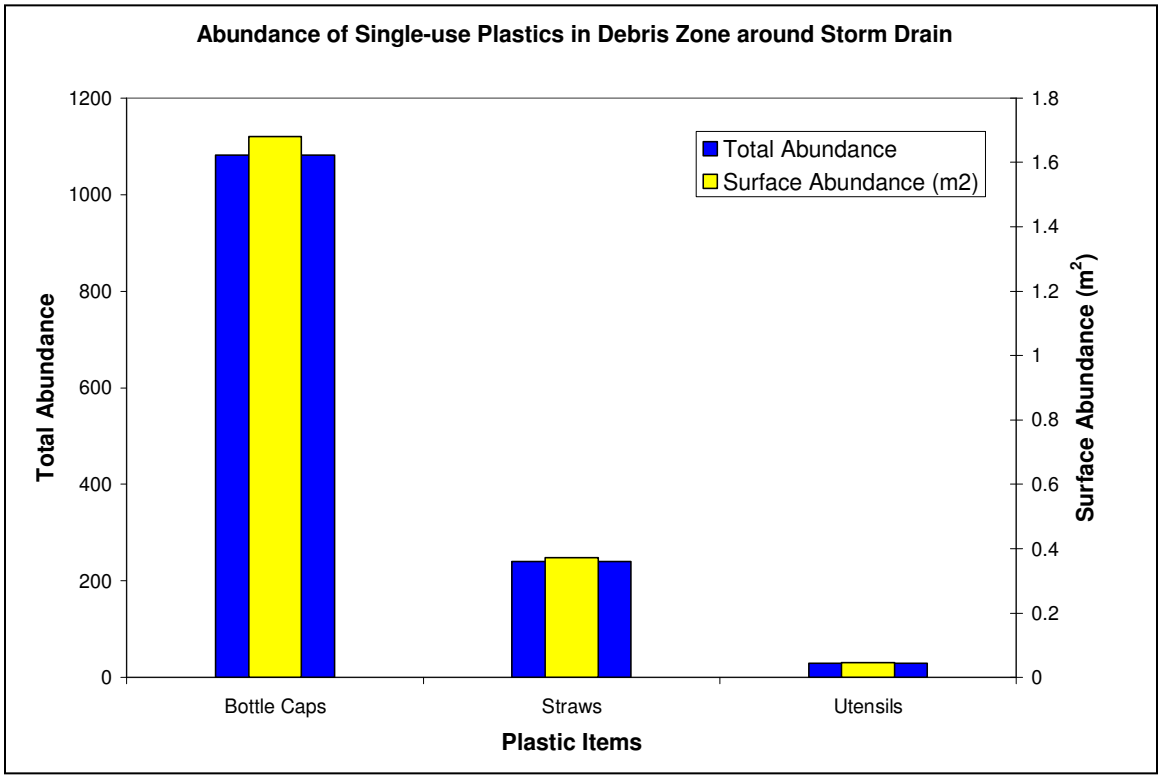

Fig. 2. Abundance of single-use plastics in debris zone around Pico-Kenter storm drain. Total abundance is the number of particles collected from the 643.25 m^2 plastic debris zone study site.

Table 1: Photos of plastic debris categories showing waste collected from plastic debris zone adjacent to Pico-Kenter storm drain pool. Items shown next to 15” ruler.

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