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Water Resources: Trash and Debris

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1.2.3 Trash and Debris

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Marine debris has become one of the most recognized pollution problems in the world's oceans and watersheds today (Lippiatt et al. 2013). About 80% of debris found in marine environments is generated from land-based sources of trash (SCCWRP 2013). Therefore, reduction of trash sources from watersheds is an important management action to reduce marine debris. To address marine debris, the Los Angeles Regional Water Quality Control Board (LARWQCB) established a Total Maximum Daily Load (TMDL) for trash for the Ballona Creek in 2002, for Malibu Creek in 2009, and for marine debris for Santa Monica Bay in 2012. Land-based trash also affects the condition of stream ecosystems, but in general there has been much less management focus on the impacts of trash on stream habitats in comparison to beaches and coastal environments.

The implementation schedule for the Ballona Creek TMDLs requires a 10% progressive reduction from the baseline waste load allocation each year. It aimed to achieve a 50% reduction by 2009, followed by a target of zero trash by 2015 (LARWQCB 2004). For Malibu Creek, the target of zero trash must be met by 2017 (LARWQCB 2008). For Santa Monica Bay, the target of zero trash must be met by 2020, except for cities that pass ordinances banning plastic bags, smoking in public places, and single-use expanded polystyrene food packaging (Styrofoam), which have until 2023 (LARWQCB 2011).

Compliance is derived from the number and type of best management practices (BMPs) employed to prevent trash from entering the storm drain system: full-capture devices, partial-capture devices, and/or institutional controls. Achieving compliance means the capture of 100% of the baseline amount of trash as estimated by the stated effectiveness of the implemented BMPs. Using this metric, the cities in the Ballona Creek Watershed achieved an estimated 96.7% reduction in the 2013/2014 reporting year, one year ahead of schedule, and appear to be on track for meeting the 2015 target (LARWQCB 2015). In April of 2015, the Los Angeles Regional Water Quality Control Board began considering an amendment to the Ballona Creek Trash TMDL that would require municipal separate storm sewer system (MS4) permittees to monitor the receiving waters for trash. According to this amendment, compliance would still be determined based on BMPs, but monitoring of receiving water would help refine assessments about the effectiveness of these BMPs (LARWQCB 2015).

Full-capture devices, such as catch basin covers and inserts, keep trash out of storm drains, and in-channel trash capture devices, such as continuous deflective separation (CDS) units and trash

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nets, collect trash within the channel before it reaches the Bay. Weekly or twice-weekly street sweeping, installation of trashcans on public streets, and public education campaigns are other strategies that have been employed. Several cities in the Santa Monica Bay Watershed have also passed ordinances banning plastic bags, smoking on the beach, and single use Styrofoam food packaging. However, additional strategies will be required to address the trash generated within state and national parklands, both by non-point sources (such as beachgoers), and from non-land based activities (such as boaters). Furthermore, the many creeks and streams in the Santa Monica Bay Watershed that do not have trash TMDLs are likely to continue serving as transport corridors for conveying land-based sources of trash to coastal ecosystems and Santa Monica Bay beaches. Ultimately, measureable trash reductions in the receiving bodies will determine whether these strategies are successful.

Data Sources

Without mandatory receiving water monitoring, few other sources of data on trash loading in the Bay exist. Data are limited, as trash removed from full or partial capture devices, the trash booms placed at the mouths of major rivers, or trash collected at beaches after grooming are not consistently weighed, measured, or categorized with standard methodology. Beach cleanups can occur annually, monthly, or sporadically. Data typically consist of counts of the different types of trash collected. Some also include information about the amount of effort expended during the cleanup (number of people, number of hours, etc.). However, beach cleanup data is typically recorded and reported by volunteers with few quality control measures in place. In addition, the trash categorization used varies widely between groups.

SMCRMP member agency staff conducting a stream trash assessment during the 2012 surveys. Photo Credit: M. Mathis, Weston Solutions, Inc.).



One of the most robust sources of beach trash data is the Ocean Conservancy's data from Coastal Cleanup Day. While the cleanup occurs one day every year, making the data sensitive to random occurrences, and the data are collected by volunteers, making them sensitive to year-to-year differences in volunteer effort, it is a consistent long-term data set that reports itemized numbers of trash by site from thousands of sites around the world. In addition, the trash categories are more detailed than most, and can be readily compared with trash data from other efforts and future receiving water monitoring programs. Another robust source of beach trash data comes from Heal the Bay's monthly beach cleanups. Like the Ocean Conservancy's data, these beach cleanups report itemized numbers of trash by site from most beaches in Santa Monica Bay. They also report the number of man-hours expended during

Heal the Bay operates an online database for their beach trash data. View their beach trash data [here](#).

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each beach cleanup, which gives an approximation of effort, although the reported amount of trash collected and effort were relatively rough estimates due to the difficulty in controlling the number of participating volunteers, among other factors.

Until recently, very few efforts have been made to measure the trash in streams. However, beginning in 2009 and ending in 2013, the Southern California Stormwater Monitoring Coalition Regional Monitoring Program (SMCRMP) conducted a regional scale pilot survey of debris in stream ecosystems. The goal was to test a standardized, relatively rapid (less than 20 minutes to complete per site) tool for assessing trash in streams in conjunction with the SMCRMP's existing stream assessment program. The program uses a probability-based sampling design to assess the ambient condition of the region's 15 major watersheds. In 2011, SMCRMP added trash to its list of indicators used to identify key stressors to stream health throughout the region. These data will improve our understanding of the spatial distribution and magnitude of the trash problem at both the regional and local levels and to examine the sources of trash and pathways into streams.

Learn more about the SMCRMP here: <http://www.socalsmc.org>

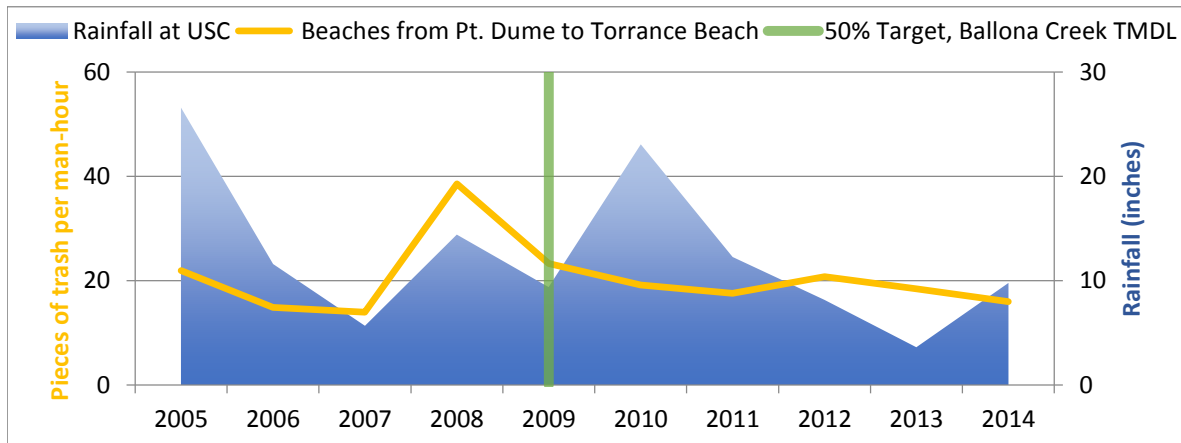
Outcomes

In general, trash found on beaches along the Bay has declined since 2008, a decline which roughly coincides with the implementation of the Ballona Creek Trash TMDL. In addition, the relationship between rainfall and trash present on beaches prior to 2009 has diminished ([Figure 1.2.3-1](#)). Although there are some differences within regions of the Bay, plastic items continue to be the most numerous items collected, followed by smoking-related items and Styrofoam ([Figure 1.2.3-2](#)). Based on annual coastal cleanup data, plastic bags and cigarette butts have declined since 2009 as well, presumably related to management actions taken by local jurisdictions, such as bans on smoking on the beach and the use of single-use plastic bags.

Results of the regional stream survey indicated that, in general, a few types of trash represent most of the quantities of trash found, and that the same types of trash are found at nearly one-half of all the sites surveyed ([Figure 1.2.3-2](#)). The distribution of trash in the creeks and streams that drain into Santa Monica Bay reflect that of the streams in the region as a whole, with a few exceptions: substantially larger proportions of cigarette butts, sports balls, and plastic bottles were observed. Furthermore, when comparing common items found in streams and on beaches, some items (plastic bags, cigarette butts, and plastic wrappers/containers) are prevalent in beaches and streams, others (plastic bottles and sports balls) appear to remain in streams, and still others (caps/lids, plastic utensils, straws, and paper bags) appear to originate on beaches ([Figure 1.2.3-2](#)).

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Figure 1.2.3-1. Annual averages of total pieces of trash per man-hour collected during monthly beach cleanups from 2005-2014. Twenty-two sites from Point Dume to Torrance Beach were sampled during the time range. Data from these sites were summed by month. Monthly totals were averaged by year. Rainfall and the year in which 50% trash reduction was targeted for the Ballona Creek watershed are also shown. Trash collected on area beaches appear to be sensitive to rainfall prior to implementation of the Ballona Creek Trash TMDL. The slight rise in trash collected since 2011 is due to an increase in trash collected per unit effort along the Malibu coastline. (Data source: Heal the Bay, Western Region Climate Center, and Los Angeles Regional Water Quality Control Board)



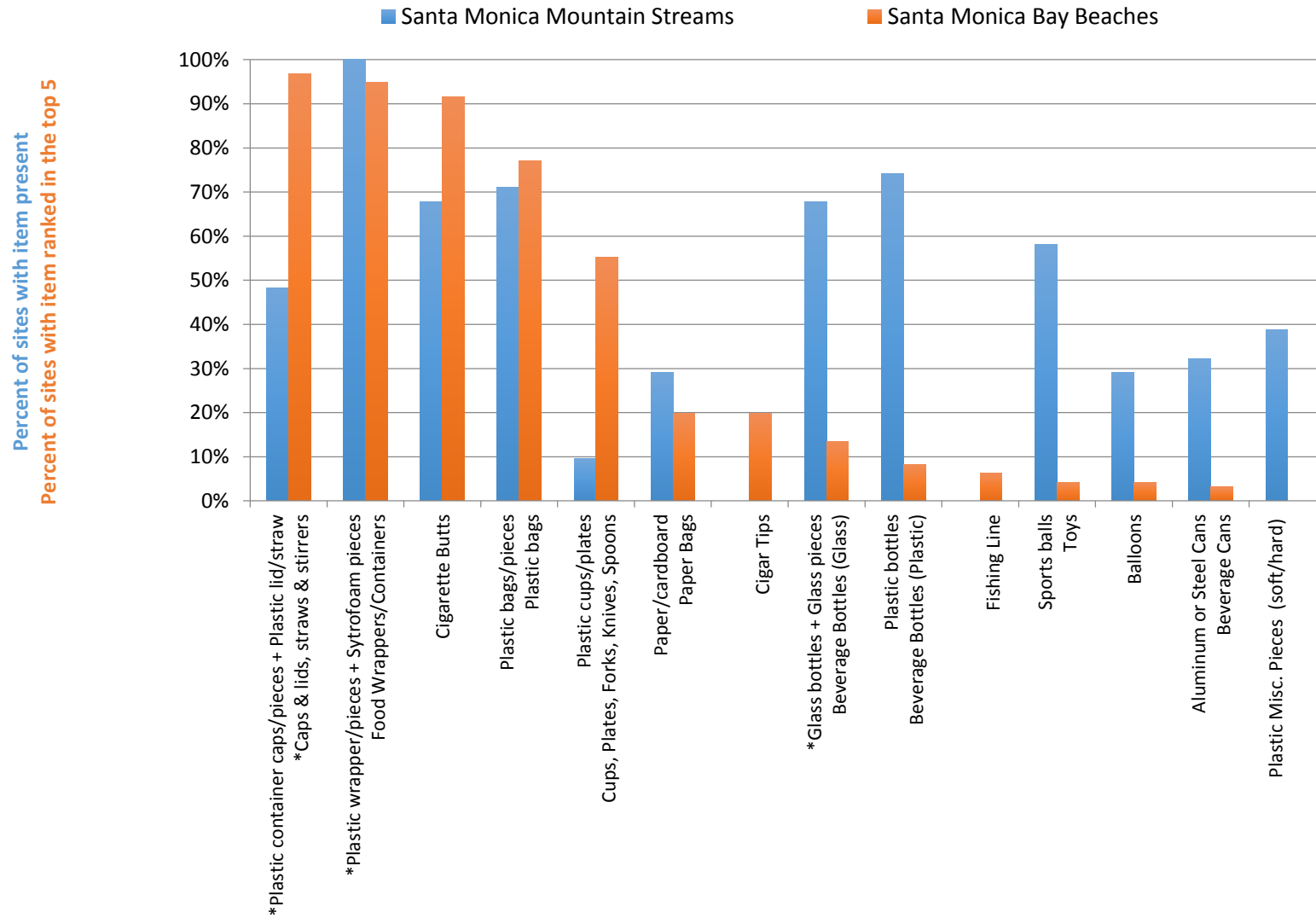
Conclusions and Next Steps

Credit and acknowledgement should go to the thousands of beach clean-up volunteers and beach management agencies' maintenance activities. Their efforts keep the Bay's beaches clean and have helped to demonstrate that management actions, such as implementing BMPs to reduce the amount of trash entering storm drains, and banning activities or products that tend to generate high amounts of trash, seem to have had a positive impact on the amount of trash collected on Santa Monica Bay beaches. In addition, new efforts to monitor trash in streams are providing insight into the sources of different types of trash and marine debris.

Another key benefit of the SMCRMP project is that for the first time, managers have been provided an unbiased analysis of the types and quantities of trash found throughout stream ecosystems across Southern California. Because of the probabilistic design, the types and quantities of trash found throughout the stream ecosystems can be extrapolated to the stream ecosystems within the Santa Monica Bay Watershed. Developing similar sampling strategies for beach cleanups and attempting to standardize trash categories across different data collection efforts would make these data more useful. Assessing the effectiveness of the many measures taken to reduce the presence of trash on beaches, in streams, and in the storm drains of the Santa Monica Bay Watershed will become a higher priority if the proposed amendments to the Ballona Creek Trash TMDL are approved. Collaboration between municipalities and existing trash monitoring efforts, like the SMCRMP and Heal the Bay, could help reduce the cost of required receiving water monitoring. Furthermore, more accurate data on the common categories of trash and where they tend to accumulate can help prioritize areas of greatest management concern and track the progress of management actions over time.

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Figure 1.2.3-2. Comparison between the most common trash items found in streams and those found on beaches from 2009-2012. Stream data represent the proportion of sites with trash present, while beach data represent the proportion of sites where a trash item ranked in the top 5. Categories are labeled as they are on the data sheets. An * indicates categories that have been combined to make them more comparable. Items such as food wrappers and containers, cigarette butts, and plastic bags are prevalent at beaches and streams. Others, such as glass and plastic bottles and sports balls, appear to remain in streams. Still others, such as plastic utensils and fishing line, appear to originate on beaches. (Stream Data Source: Southern California Stormwater Monitoring Coalition Regional Monitoring Program; Beach Data Source: Ocean Conservancy Coastal Cleanup Day).



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