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Southern California Bight 2013 Regional Monitoring Program: Volume III. Trash and Marine Debris

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EXECUTIVE SUMMARY

Background

The accumulation of discarded objects (a.k.a. trash and debris) in the environment has become an issue of significant, global concern. On land and in freshwater habitats, these objects are typically referred to as trash, and in the marine environment, these objects are referred to as marine debris. Trash and marine debris affect aesthetics and/or aquatic life across every habitat they touch. Marine debris in southern California significantly influences the decision of the public to go to beaches, costing Orange County residents alone an estimated $148 million per year just to travel to cleaner beaches. Debris presents entanglement and ingestion dangers for marine organisms. And plastics in the environment can transport other contaminants, creating a bioaccumulation pathway by which aquatic organisms take up contaminants as they inadvertently consume plastic.

Southern California's management community has proposed and implemented a number of measures to minimize trash in waterways, including recycling programs, plastic bag bans, and other regulations, including establishing total maximum daily loads (TMDLs) for the Los Angeles River that specify that the river contain zero trash pieces greater than 5 mm in diameter by 2025. Despite these recent efforts, southern California had never conducted a comprehensive assessment of the magnitude and extent of trash and marine debris in streams and the nearshore Southern California Bight. In fact, the best regionwide data on trash and marine debris in southern California has historically come from California's Coastal Clean Up Day, a volunteer effort that has resulted in more than a quadrupling of the mass of trash and debris collected from 1989 to 2015. Data inconsistencies, however, have made it difficult to determine quantitative baselines and to estimate trends over time.

Goals of This Study

This study aimed to create southern California's first regionalized assessment of trash and marine debris, with a goal to assess the extent and magnitude of trash and marine debris in southern California waterways. Three key questions were asked:

- **Does the extent and magnitude of trash and marine debris vary among freshwater and marine habitats?**
- **Does the extent and magnitude of trash and marine debris vary over time?**
- **What types of trash and marine debris are most extensive or abundant?**

Marine macro-debris on the surface of the Bight seafloor was quantified comparably to similar Bight surveys dating back to 1994. In addition, Bight marine micro-debris (i.e., particles of 5 millimeters or less in diameter) embedded in seafloor sediment was quantified for the first time, as was trash collected across

7,400 kilometers of Southern California coastal streams. A probability-based stratified-random design sampling more than 795 sites was used to attain unbiased estimates.

Study Findings

Integrated study results indicate that trash and marine debris were found in more than three-fourths of Southern California wadeable streams and along about one-third of the Bight seafloor. Plastic was the most prevalent object found across all habitats, with four of the five most abundant trash items in streams identified as being made of plastic, and about one-third of the Bight seafloor containing plastic particles. The extent of seafloor macro-debris nearly doubled from 1994 to 2013, and the extent of plastic increased threefold.

The study could not conclusively link marine debris to land-based sources, as sampling took place at a discrete point in time, but multiple lines of evidence indicate that land-based trash is a major contributor to debris in the Bight and that marine habitats serve as a sink for plastic accumulation.

Next Steps

The study offers recommendations to both the management community about potential policy implications and to scientists in support of future technical needs.
With billions of dollars spent over the past five years implementing BMPs (Best Management Practices) to comply with trash environmental regulations, as well as controversial source-reduction measures such as bans on single-use plastic shopping bags, trash and marine debris should continue to be monitored in the environment to quantify the effectiveness of these management actions and to guide future action. Furthermore, managers should continue to pursue partnerships that bring together regulatory and regulated agencies, advocacy organizations and plastic industry representatives; collaboration will create the most powerful monitoring program and the resulting dialogue will likely forge the most effective policies.

Managers should continue monitoring for trash and marine debris, with an eye toward improving sampling methods and study design, optimizing monitoring to be more responsive to management questions and metrics, and establishing clear linkages between land-based trash and Bight seafloor debris. In particular, attention should be paid to micro-plastics, given their ubiquity across the Bight.

Full Text:

http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/928_B13_Debris.pdf