

The California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches

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Introduction

California's beaches represent an important recreational and economic resource. Almost 300,000 jobs relate to coastal tourism and recreation, accounting for 75% of employment in the state's ocean economy sector and contributing \$12 billion to the state's gross domestic product. Fecal pollution at beaches poses both aesthetic and health concerns for visitors. Beach advisories or closures due to fecal contamination detection may result in local economic losses of up to \$100,000 per day.

Recognizing the value of beaches to California residents and the state's economy, the California Clean Beaches Initiative (CBI) Program has provided approximately \$100 million since 2001 for projects to improve beach water quality at many of the state's most contaminated beaches. These funds have gone toward implementing best management practices, such as diverting storm drains to reduce runoff flows during the dry season, repairing aging sewer lines, and creating natural runoff filtration areas.

Despite the CBI's successes, a number of beaches still frequently exceed water quality standards for fecal indicator bacteria (FIB) and lack cleanup strategies, largely because the fecal contamination sources are unknown. FIB can originate from numerous sources, including human sewage; manure from livestock operations, wildlife, or urban runoff; and even growth in the environment. In any given water body, effective management and mitigation requires knowledge of the source(s) of fecal contamination and of FIB, which are not always the same.

Microbial source tracking (MST) methods can identify FIB host sources, including those that carry the greatest human health risk. Some new MST methods discriminate between human and non-human fecal sources, and others distinguish among several animal sources. However, these methods do not perform equally well. Within the plethora of methods, each has a different set of advantages. To improve understanding of method performance, the CBI funded a comprehensive MST method evaluation study in 2011, referred to as the Source Identification Protocol Project (SIPP). The SIPP quantified specificity and sensitivity for 41 MST methods.

Still, many questions remain: how to employ different marker types and how new genetic source identification methods might be combined with traditional methods, such as dye testing of pipe networks. Thus, agencies charged with identifying FIB sources to beaches may hesitate to move forward with studies or, conversely, deploy too many techniques, which can be prohibitively expensive.

To address these information gaps, the CBI supported the SIPP in developing this source identification manual. It provides guidance for cost-effectively identifying sources of fecal contamination within a watershed. The manual is based on a hypothesis-driven and tiered approach, in which the user implements the least expensive options first and more expensive tools only when sufficient uncertainty warrants their use.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/804_SIPP_MST_ManualPag.pdf