

Chapter 1. General Introduction

INTRODUCTION

The South Bay Ocean Outfall discharges treated effluent to the Pacific Ocean that originates from two separate sources, including the International Wastewater Treatment Plant (IWTP) operated by the International Boundary and Water Commission (IBWC), and the City of San Diego's South Bay Water Reclamation Plant (SBWRP). Wastewater discharge from the IWTP began on January 13, 1999 and is performed under the terms and conditions set forth in Order No. 96-50, Cease and Desist Order No. 96-52 for NPDES Permit No. CA0108928. Discharge from the SBWRP began on May 6, 2002 and is currently performed according to the provisions set forth in Order No. R9-2006-0067 for NPDES Permit No. CA0109045. The Monitoring and Reporting Program (MRP) included in each of the above permits and orders defines the requirements for monitoring receiving waters in the South Bay coastal region, including sampling designs, compliance criteria, types of laboratory analyses, and data analysis and reporting guidelines.

All receiving waters monitoring for the South Bay outfall region with respect to the above MRPs has been performed by the City of San Diego since wastewater discharge began in 1999. The City also conducted 3½ years of pre-discharge monitoring in order to characterize background environmental conditions for the region (City of San Diego 2000a). The results of this baseline study provide background information against which post-discharge data and conditions may be compared. In addition, the City has conducted annual region-wide surveys off the coast of San Diego since 1994 either as part of regular South Bay monitoring requirements (e.g., City of San Diego 1998, 1999, 2000b, 2001-2003, 2006-2008) or as part of larger, multi-agency surveys of the entire Southern California Bight (e.g., Bergen et al. 1998, 2001; Noblet et al. 2002, Ranasinghe et al. 2003, 2007; Schiff et al. 2006). Such large-scale surveys are useful in characterizing the ecological

health of diverse coastal areas and may help to identify and distinguish reference sites from those impacted by wastewater or stormwater discharges, urban runoff, or other sources of contamination.

Finally, the City and IBWC also contract with Ocean Imaging of Solana Beach, California to conduct a remote sensing program for the San Diego/Tijuana region as part of the ocean monitoring programs for the Point Loma and South Bay outfall areas. Imagery from satellite data and aerial sensors produce a synoptic picture of surface water clarity that is not possible using shipboard sampling alone. However, a major limitation of aerial and satellite images is that they only provide information about surface or near-surface waters (~0-15 m) without providing direct data regarding the movement, color, or clarity of deeper waters. In spite of these limitations, one objective of this project is to ascertain relationships between the various types of imagery and data collected in the field. With public health issues being a paramount concern of ocean monitoring programs, any information that helps to provide a clearer and more complete picture of water conditions is beneficial to the general public as well as to program managers and researchers. Having access to a large-scale overview of surface waters within a few hours of image collection also has the potential to bring the monitoring program closer to real-time diagnoses of possible contamination, and adds predictability to the impact that natural events such as storms and heavy rains may have on shoreline water quality. Results from the remote sensing program for calendar year 2009 are summarized in Svejkovsky (2010).

This report presents the results of all receiving waters monitoring activities conducted as part of the South Bay ocean monitoring program in 2009. Included are results from all fixed stations that comprise a grid surrounding the South Bay outfall, as well as results from the summer 2009 regional benthic survey of randomly selected sites off San Diego. The results of the remote sensing surveys conducted

during the year as reported by Svejksky (2010) are also considered and integrated into interpretations of oceanographic and water quality data (e.g., fecal indicator bacteria, total suspended solids, oil and grease). Comparisons are also made herein to conditions present during previous years in order to evaluate changes that may be related to wastewater discharge and transport or to other anthropogenic or natural factors. The major components of the monitoring program are covered in the following chapters: Oceanographic Conditions, Water Quality, Sediment Characteristics, Macrobenthic Communities, Demersal Fishes and Megabenthic Invertebrates, Bioaccumulation of Contaminants in Fish Tissues, Regional Sediment Conditions, and Regional Macrobenthic Communities. Some general background information and procedures for the regular fixed-grid monitoring and regional surveys and associated sampling designs are given below and in subsequent chapters and appendices.

REGULAR FIXED-GRID MONITORING

The South Bay Ocean Outfall is located just north of the border between the United States and Mexico. The outfall terminates approximately 5.6 km offshore at a depth of about 27 m. Unlike other southern California ocean outfall structures that are located on the surface of the seabed, the pipeline first begins as a tunnel on land and then continues under the seabed to a distance of about 4.3 km offshore. From there it connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the seabed. This subsurface pipeline then splits into a Y-shaped multiport diffuser system, with the two diffuser legs extending an additional 0.6 km to the north and south. The outfall was originally designed to discharge effluent via a total of 165 diffuser ports and risers, which included one riser located at the center of the “Y” and 82 others spaced along each diffuser leg. However, consistent low flows have required closure of all ports along the northern diffuser leg and many along the southern diffuser leg as well since discharge began in order to maintain sufficient back pressure within the drop shaft so that the outfall can operate in accordance with

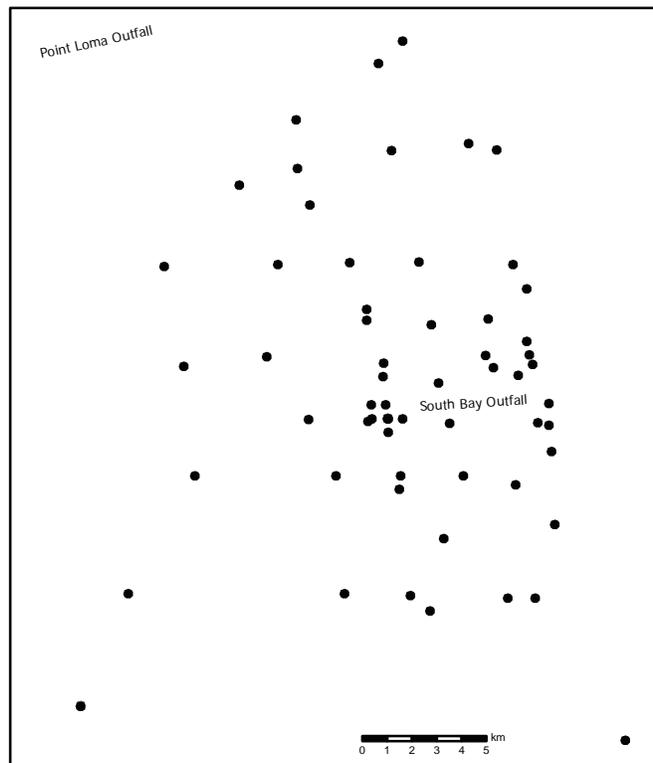


Figure 1.1

Receiving waters monitoring stations for the South Bay Ocean Outfall Monitoring Program.

the theoretical model. Consequently, wastewater discharge has been generally limited to the distal end of the southern diffuser leg, with the exception of a few intermediate points at or near the center of the diffuser legs.

The regular sampling area for the South Bay outfall region extends from the tip of Point Loma southward to Playa Blanca, northern Baja California (Mexico), and from the shoreline seaward to a depth of about 61 m (Figure 1.1). The offshore monitoring stations are arranged in a grid that spans the terminus of the outfall, with each site being monitored in accordance with NPDES permit requirements. Sampling at these fixed (core) stations includes monthly seawater measurements of physical, chemical, and bacteriological parameters in order to document water quality conditions in the area. Benthic sediment samples are collected semiannually to monitor macrobenthic invertebrate communities and sediment conditions. Trawl surveys are performed quarterly to monitor communities of demersal fish and large, bottom-dwelling invertebrates

(megabenthos). Additionally, analyses of fish tissues are performed semiannually to assess the bioaccumulation of chemical constituents that may have ecological or human health implications.

RANDOM SAMPLE REGIONAL SURVEYS

In addition to the core fixed-station sampling, the City typically conducts a summer benthic survey of sites distributed throughout the entire San Diego region as part of the monitoring requirements for the South Bay program. These surveys are based on an array of stations that are randomly selected by the United States Environmental Protection Agency (U.S. EPA) using the probability-based EMAP design. Surveys conducted in 1994, 1998, 2003, and 2008 involved other major southern California dischargers, were broader in scope, and included sampling sites representing the entire Southern California Bight (SCB) from Cabo Colonet, Mexico to Point Conception, USA. These surveys included the Southern California Bight Pilot Project (SCBPP) in 1994, and the 1998, 2003 and 2008 SCB Regional Monitoring Programs (i.e., Bight'98, Bight'03, and Bight'08, respectively). Results of the 1994–2003 regional programs are available in Bergen et al. (1998, 2001), Noblet et al. (2002), Ranasinghe et al. (2003, 2007), and Schiff et al. (2006), whereas analysis of data for Bight'08 is currently underway. A separate regional survey for San Diego was not conducted in 2004 in order to conduct a special “sediment mapping” study pursuant to an agreement with the San Diego Regional Water Quality Control Board (RWQCB) and U.S. EPA (see Stebbins et al. 2004, City of San Diego 2005).

The same randomized sampling design was used to select 40 new stations per year for each of the summer surveys restricted to the San Diego region in 1995–1997 and 1999–2002. Beginning in 2005, however, an agreement was reached between the City, RWQCB and EPA to revisit the same sites successfully sampled 10 years earlier in order to facilitate comparisons of long-term changes in benthic conditions. Unsuccessful sampling during all of these surveys was typically due to the presence

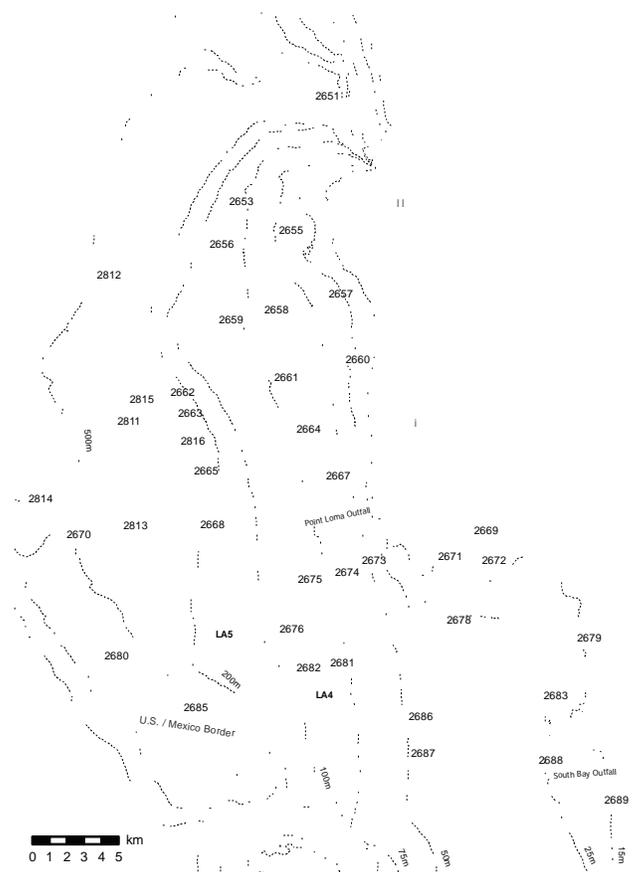


Figure 1.2

Regional benthic survey stations for the South Bay Ocean Outfall Monitoring Program.

of rocky substrates that made it impossible to collect benthic grab samples. Thus, 36 sites were revisited in 2005, 34 sites in 2006, and 39 sites in 2007. As indicated above, no separate survey for the San Diego region was conducted in 2008 due to participation in Bight'08. The summer 2009 regional survey covered an area ranging from La Jolla in northern San Diego County south to the U.S./Mexico border, and extending offshore from depths of about 11 m to 413 m (Figure 1.2). This included revisiting the 34 continental shelf stations sampled successfully in 1999, as well as 6 new stations located in waters deeper than 200 m. These latter upper slope stations were added to provide information on deeper benthic habitats off San Diego.

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