UNIVERSITY OF CALIFORNIA, SAN DIEGO

Variability of water quality data collected near three major Southern California sewage outfalls

A dissertation submitted in partial satisfaction of the requirements

for the degree Doctor of Philosophy

in Oceanography

by

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1992

Abstract of the Dissertation

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Currently about 4500 million liters of treated sewage effluent are discharged daily in the Southern California Bight, mostly through four major submarine outfalls; an input greater than the natural input from rivers, runoff and storms. It is however unclear whether these artificial rivers are affecting the Bight water quality. Because oceanic properties vary naturally, it is essential to distinguish natural from man-induced variability, prior to assessing a human impact.

In this research I examine the temporal and spatial variability of four water quality properties (Secchi disc transparency, percent transmissivity, temperature, dissolved oxygen),

measured monthly for 15 years at stations near three of the major outfalls, and of two anthropogenic properties (sewage flow and suspended solid discharge), measured daily for 15 years inside the sewage treatment plants.

The purposes of this research are: 1) to examine the variability of these water quality and anthropogenic properties; 2) to identify whether this variability is caused by natural or anthropogenic factors, and 3) to identify problems inherent in the monitoring programs and to suggest possible solutions.

Chapter 1 gives the overall introduction to the research.

Chapter 2 describes the temporal and spatial variability of Secchi depth transparency between stations within one area, Point Loma, and its relation to the local sewage variables.

Chapter 3 describes the time-series analyses performed on transparency, percent light transmissivity at 15 m, sewage flow and suspended solid discharge. Information on the history of the three treatment plants and on the physical oceanography of the Bight is also included here.

Chapter 4 identifies the problems encountered while using these historical water quality data sets, and uses this knowledge to make recommendations for ocean water quality monitoring programs. This chapter also provides some of the background on which many data handling decisions were made.

Chapter 5 summarizes the results for oxygen and temperature.

Chapter 6 draws together the overall conclusions of this research.

Graduate Department, in particular Harry Grow, Betty Stover and Susan, for their help when I was in dire straits. All the personnel of the Coastal Studies, and particularly Joy May Anselmo, Mark Freeman and Jennifer Davis, made the task of managing bureaucracy more pleasant. Sadie Gonzalez and the Marine Life Research Group provided support and kindness. My admirations goes to John Stevens, who in his spare time was able to extract music from these sewage data. And I am thankful to the people in the Division of Ocean Sciences at the National Science Foundation for their understanding, and in particular to Lester Wiegers for his crucial help in the formatting of the dissertation and to Stacy Swartwood for editing.

Last, I want to add a word for the people whom I met here and made this experience enjoyable beyond science: Daniel, who added color to my life, Ruedi, who taught me the beauty of the deserts, Montse, with whom I shared two years of life and feminine respect. And Robin, John, Walter, Ashley, Giulietta, Rusty, Annalisa and all the others with whom I shared adventures and love.

This research is a result of research sponsored in part by NOAA, National Sea Grant College Program, Department of Commerce, under grant number NA89AA-D-SG138, project number R/CZ-92, through the California Sea Grant College, and in part by the California State Resources Agency. The U.S. Government is authorized to reproduce and distribute for governmental purposes. This work has also been supported by the San Diego County Water Authority via the UCSD Water Research Project, by Los Angeles County Sanitation Districts, and by the City of Los Angeles, Dept. of Public Works, Bureau of Sanitation.