

## Biological communities near submarine outfall

Robert W. Smith and Charles S. Greene

<sup>1</sup>*Allan Hancock Foundation, University of Southern California, Los Angeles, Los Angeles, CA*

<sup>2</sup>*Southern California Coastal Water Research Project, Costa Mesa, CA*

### ABSTRACT

Large quantities of data are collected annually from the continental shelves where major municipal outfalls or barging operations discharge wastes. Many of these surveys represent well-planned ecological efforts designed to collect both biological (biotic) and physical-chemical (abiotic) data. Unfortunately, these data are usually compiled into separate tables, summarized in a preliminary way, and submitted to overseeing agencies for review. Generally, little effort is made to objectively evaluate and describe the manner in which biological communities respond to the waste materials or to integrate the biotic and abiotic data to obtain insight on potential cause and effect relationships. As a result, much potentially valuable information is not available to legislators and others responsible for setting the standards that regulate the use of marine environments.

The multivariate numerical methods most widely used by ecologists for analyzing these kinds of data are classification and ordination. Although these procedures are conceptually quite different, their results are often complementary and they both have the following advantages: (a) they effectively reduce and order large matrixes of data; (b) they are repeatable and the results from different surveys can be compared; (c) they often readily summarize trends in the data that are not immediately obvious from visual inspection or from other less powerful types of analysis; and (d) the results are usually in a form that can be easily interpreted and communicated to others.

The purpose of this study is to demonstrate the use of these numerical methods as hypothesis-generating tools. The first step will consist of delimiting the major biotic patterns in the data, and then these patterns will be related to change in the environment. Although the results of this study may not be applicable to all outfall areas, they can still help the researchers in the field become familiar with the techniques involved and provide a basis for comparison with other studies and methods.

**Due to distribution restrictions, the full-text version of this article is available by request only.**

Please contact [pubrequest@sccwrp.org](mailto:pubrequest@sccwrp.org) to request a copy.