Historical Review of Monitoring in Southern California for the NRC

The National Research Council (NRC) determined that there was a national need for a comprehensive study of marine monitoring programs. Their study design included at least two case studies of specific regions of the United States where there were public concern and strong historical data bases on marine environmental monitoring. The Southern California Bight was selected as one such region, and SCCWRP scientists compiled a review of monitoring in the region.

Only those programs for which samples were taken at the same locations for at least three years were included in the study. Parameters that were used in the compilation were bacteriological contamination, water column quality, sediment contaminants and infauna, and epifauna including fish. Three primary categories of monitoring programs were noted during this study: (1) municipalities that discharge to the ocean, (2) power plants that are cooled with seawater, and (3) state and federal agencies that collect marine life to determine the dynamics of marine resources.

Historically, monitoring in California began in 1914 with the organization of the Department of Commercial Fisheries, whose responsibilities were to collect statistics; study fishing methods and processing; and learn about fishes, their habits, migrations, and spawning (Clark 1982). Many species were overfished during World War II to try to meet the increased demand for food. After the war, California's tremendous population growth increased water pollution and destruction of the aquatic habitat, and generally put a strain on all marine resources (Croker 1982).

The collapse of the sardine fishery in 1947 prompted the industry to propose and fund the Marine Research Committee (MRC). Revenue that was collected from taxes levied on the purchase or capture of certain species of fish went into the Fish and Game Preservation Fund. This money was dispensed by the MRC to finance research in developing the commercial fisheries of the Pacific Ocean and in developing marine products to be made available to Californians.

In 1948 the MRC established the California Cooperative Sardine Research Program to pursue research on physical and chemical oceanography, productivity, spawning and recruitment of sardines, availability of sardines to the fishery, fishing methods, and dynamics of the sardine population and fishery. In 1953, the program was renamed the California Cooperative Oceanic Fisheries Investigation (CalCOFI) to recognize the expansion of the sardine program to other species (Talbot 1973, Baxter 1982).

By 1960 the objectives of CalCOFI had been reformulated from understanding the sardine's behavior, availability, and abundance to understanding the factors that govern the abundance, distribution, and variations of pelagic marine fishes, emphasizing the oceanographic and biological factors affecting

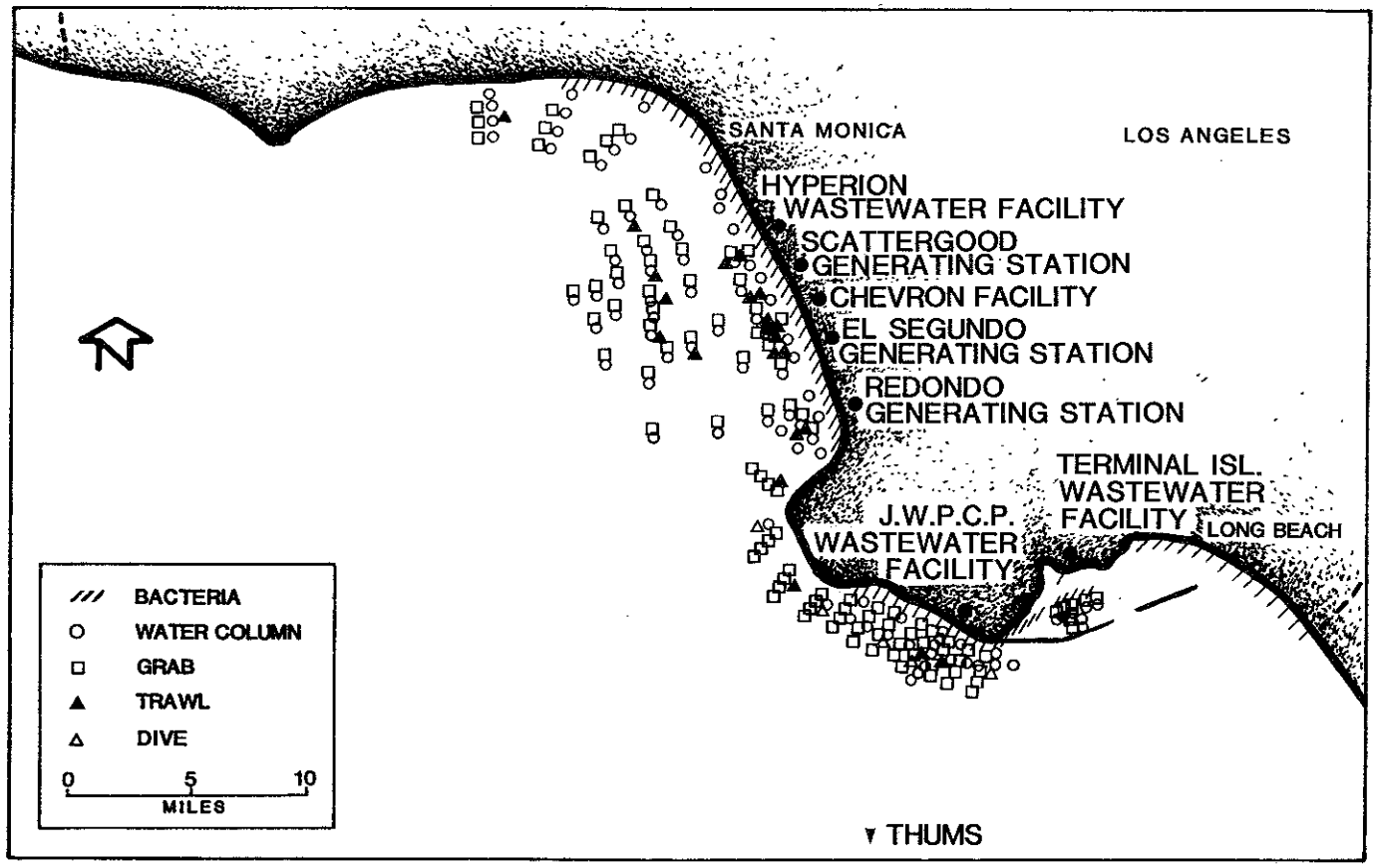

Figure 1. Monitoring efforts in Los Angeles County. Thums, Dump site for Texaco, Humble, Union, Mobil, and Shell Oil Companies.

sardines and their associates in the California Current system (Baxter 1982).

During this study for the NRC, SCCWRP scientists compiled short historical summaries of the activities related to marine monitoring conducted by the State of California and large municipal dischargers, including the Hyperion Wastewater Treatment Plant (City of Los Angeles), the Joint Water Pollution Control Plant outfall at Palos Verdes (County Sanitation Districts of Los Angeles County), CSDOC Treatment Plant No. 2 (County Sanitation Districts of Orange County), and the Point Loma Treatment Plant (City of San Diego). Also included were seven non-nuclear generating stations operated by San Diego Gas & Electric, Southern California Edison, and the Los Angeles Department of Water & Power. A list of monitoring activities and studies was compiled for the Southern California Edison San Onofre Nuclear Generating Station.

Marine monitoring objectives are to document short- and long-term effects of the discharge on receiving waters, sediment, biota, and beneficial uses of the receiving water; to determine compliance with National Pollution Discharge Elimination System (NPDES) permit terms and conditions; and to assess the effectiveness of toxic control programs.

To determine compliance with water quality standards, the receiving-water quality monitoring program must document water quality in the vicinity of the zone of initial dilution (ZID) boundary, at reference stations, and at areas beyond the ZID where discharge impacts might reasonably be expected. Monitoring must reflect conditions during all critical environmental periods.

Receiving-water monitoring comprises the following:

(1) *surf zone monitoring* to assess bacteriological conditions in

areas used for body-contact activities (such as swimming) and to assess aesthetic conditions for general recreational uses (such as picnicking),

(2) *nearshore monitoring* to assess bacteriological conditions in areas used for body-contact sports (such as scuba diving) and where shellfish or kelp may be harvested and also to assess aesthetic conditions for general boating and recreational uses,

(3) *water column monitoring* to determine if the applicant's discharge causes significant impacts on the water quality within the ZID and beyond the ZID as compared with reference stations, and

(4) *ocean current studies* to determine the potential for onshore transport of effluent and to aid in the predictions of effluent dilution and sediment accumulation.

Samples of bottom sediment are analyzed to assess the presence of pollutants and to evaluate the physical and chemical quality of the sediments.

Biological monitoring includes benthic biota monitoring to assess the presence of pollutants in organisms and to monitor the status of the benthic community; trawl sampling to assess the populations of demersal fish, to assess the bioaccumulation of toxic pollutants, and to determine whether a significant difference exists between those populations near the outfall diffuser and those in reference areas; rig fishing to monitor pollutant body burdens in fish consumed by man in order to determine whether the effects of the waste discharge may constitute a threat to public health; and kelp bed monitoring to assess the extent to which the discharge of wastes may affect the aerial extent and health of coastal kelp beds.

Municipal dischargers provide the greatest amount of monitoring data for the greatest cost. The four largest dischargers spend between $1 and 2 million per year on marine monitoring activities. Power plants spend an average of $105,000 per year, but the nuclear generating station at San Onofre requires an expenditure of $1.1 million per year, and an additional $6 million per year was given to the MRC for 10 years for a program designed to measure potential impacts of the station's discharge.

There are numerous specific monitoring programs, ranging from Santa Barbara to San Diego, compiled in this study. Copies of NPDES permits were obtained from the dischargers or the Regional Water Quality Control Boards. These permits provide much useful information including the name of the program, the reasons and objectives for monitoring, and a contact for the program. In addition to the specific monitoring programs, this compilation contains an extensive list of programs funded by dischargers and state and federal agencies that do not qualify as monitoring programs by the standards of this study because although many were conducted for several years, the same measurements at the same stations were not made. However, these programs still provide valuable reports on the physical, chemical, or biological characteristics of locations within the Southern California Bight.

Within the next year the final Southern California Bight case study and the NRC marine monitoring assessment should be available from their office in Washington, D.C. This will be a valuable analysis of the usefulness of monitoring measurements, and we look forward to their recommendations.

References

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