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PRELIMINARY REPORT ON TECHNIQUES FOR MARINE MONITORING SYSTEMS

USC SEA GRANT TECHNICAL NOTE
USC-SG-1T-71

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A SEA GRANT TECHNICAL NOTE

by

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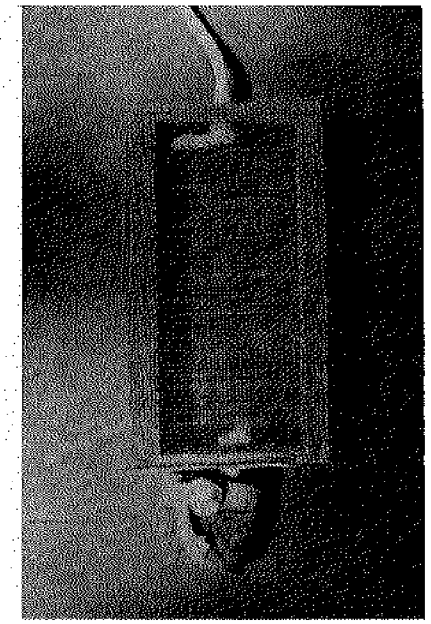
PLATE I

Figure 1 : Clean trap

Figure 2 : Clean trap (screen on one side removed)

Figure 3 : Clean trap showing the positions of weights and ropes

Figure 4
5
6 Traps after being submerged one month



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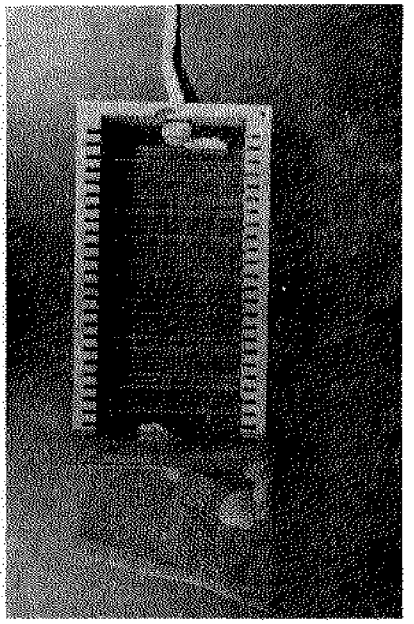

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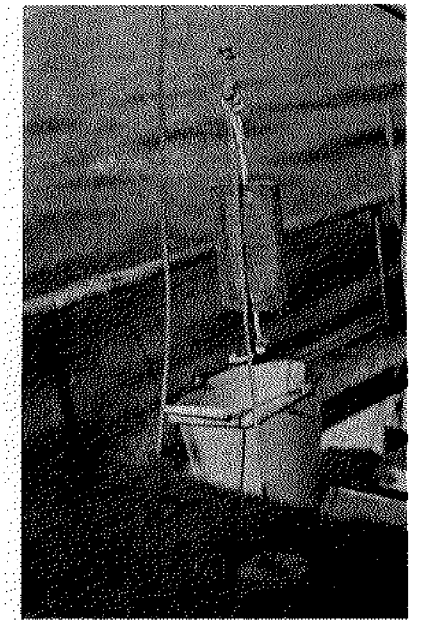

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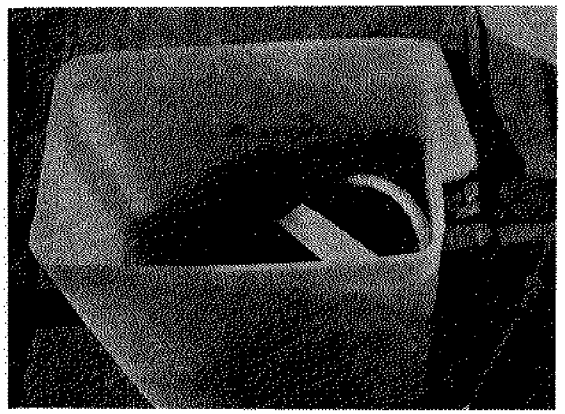

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TECHNIQUES FOR MARINE MONITORING SYSTEMS

by

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The need for monitoring systems to assist in assessing the impact of pollution on marine biotic communities has become critical in recent years. New requirements for baseline surveys, periodic studies or continuous monitoring of public and private coastal installations makes development of simpler, more effective techniques imperative.

In conjunction with the University of Southern California - Sea Grant Program for Harbors and Beaches, the authors have tested a system consisting of attaching small settling racks to docks, floats and buoys, which has proven to be very effective in evaluating the biotic content of the water column. In harbor areas where the bottom has a thick layer of mud, organic debris and reducing bacteria, dredge and grab sampling sometimes indicates that the area is dead, or nearly so. However, settling racks suspended well above the bottom show that many organisms can survive in the area if provided with adequate substrate.

Settling racks consist of wooden microscope slide boxes (25 slide capacity, 3 1/2" x 6 3/4") from which the bottom panel is removed. A wire brad is driven into each corner, and 1/4" holes are drilled at both ends of the box. A short length of rope is attached at one end and a small weight at the other.(figs. 1,2) Glass microscope slides are placed in the notches and plastic (saran) screening of 1/16" mesh is stapled over the bottom and the top. The short rope is tied to a heavier polypropylene rope and a concrete or lead weight is placed well below the rack level. (fig. 3)

The settling racks described have been used by the authors in surveys of fouling organisms and faunal communities for some twenty years, but have not previously been tested in comparison with other survey techniques performed simultaneously. In the present study, racks were installed at eight locations in the Los Angeles Harbor and adjacent coastal waters and changed monthly. At the same time racks were changed, plankton tows were made at each location and productivity measurements were conducted. Benthic samples were taken with either an orange peel or small Campbell grab, and sediment samples were taken. Temperature and oxygen readings were made at each station.

Settling racks have acted as effective substrates for good growth of several species of hydroids, tunicates, polychaete worms, caprellids, amphipods and other crustaceans, bryozoans, mollusks, and echinoderms,

as well as the algae Ulva and Enteromorpha. The racks have provided a more diverse assemblage of organisms in every instance than the benthic samples taken at the same time, though the latter have occasionally contained larger mollusks and crustaceans than are found on the racks after a one-month exposure.

Sifting of muds and sorting of benthic samples is found to be slower and more difficult than processing the racks. On removal from the field sites, the racks are immersed in plastic gallon containers filled with 10% formal-seawater. Later in the laboratory the screen is removed, the loose non-sedentary organisms rinsed into containers, and slides are dealt with as necessary. They may easily be scraped for biomass determinations or sorted for qualitative species identification.

If live laboratory experimentation is desired, exposed racks may be transported in sea water and transferred to aquaria. Studies of temperature tolerance limits of small faunal assemblages were initiated in this way to determine the feasability for future investigations.

Some of the sites in the harbor are in highly polluted areas; one is opposite the outfall of a primary sewage treatment plant. Visibility is poor in the water and observation by divers is quite limited. The bottom at several stations is reducing, with a strong hydrogen sulfide odor. Bacterial cultures done on several occasions showed high counts.

Thus it is an unpleasant, if not risky, task to sift such muds for biotic specimens. At several sites, the bottoms indicate that no fauna is present other than micro-organisms; yet the racks suspended above the muds bear good growths of a variety of invertebrates.

Optimum depth for the racks appears to be 12 feet; it is necessary to see that the weight hangs well below the rack but not dragging on the bottom, where it would stir the muds into suspension.

The settling rack technique offers several advantages for long term continuous monitoring requirement or baseline surveys. It is simple to perform, easy to analyze and reveals a greater diversity of organisms than other common monitoring techniques. Furthermore, it does not disturb stressed benthic communities which might be destroyed by repeated sampling with grabs and dredges such as might be performed in continuous monitoring. In some fouling studies it has been the custom to use large metal, asbestos or composition shingle plates. Such plates may be effective in gathering larger samples, but they are more difficult to preserve, store, or examine under the microscope. The smaller glass slides make possible a variety of treatments, including histological and histo-chemical analyses, as well as species identifications.

Cooperation from various agencies, corporations and individuals is most welcome during these on-going studies. Mikihiko Oguri is performing

plankton and productivity studies. Others cooperating include: The Los Angeles Harbor Department water testing laboratory, Frank Steiger and Jeffrey Naumann; the Port Warden's Office, Don Muchmore and Rodney Lundin; Pacific Lighting, Robert Hohne and Keith C. McKinney. From the University of Southern California, Dr. Ronald Kolpack and Kendall Robinson, Geology Department; Allan Hancock Foundation ships personnel Paul Irving, Arne Uhr and James McSweeney; Dr. B.C. Abbott, Director of the Allan Hancock Foundation; Dr. R.B. Tibby, Director of the Catalina Marine Science Center, Ronald Linsky, Director of the Sea Grant Program and Dr. June Siva, Sea Grant Assistant Coordinator. The United States Coast Guard, through Commander W. W. White and Lt. Davis, granted permission to suspend racks from their buoys, as did the Los Angeles Port Warden's Office. Telemetry equipment on buoys in the harbor is prohibited because of possible interference with navigation, so that continuous water quality monitoring cannot be performed on site.