

Benthic Macrofaunal Recovery After the 1976 Hypoxia off New Jersey

by

Robert N. Reid and David J. Radosh

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Sandy Hook Laboratory
Highlands, New Jersey 07732

In summer 1976, bottom waters over a large portion of the inner continental shelf off New Jersey became hypoxic (here defined as less than 2 ml/l dissolved oxygen). Complete lack of oxygen, and presence of hydrogen sulfide, were noted in the center of the hypoxic area (Sharp, 1976). Impacts to the benthic macrofauna, and initial recolonization, have been described (Boesch et al., 1977; Steimle and Radosh, in press). Impacts varied from taxon to taxon; as a rule crustaceans and echinoderms were affected to a greater extent than were most polychaetes. Some small molluscan species were resistant to the hypoxia, although extensive mortalities of megabenthic bivalves (surf clams, sea scallops and ocean quahogs) were reported (Ropes and Chang, 1976).

We have followed the recovery process by sampling on an approximately quarterly basis in the hypoxic area, and now have information available

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on recovery patterns through October 1978. Initial recolonization at several stations was by the tube-dwelling polychaetes, Ampharete arctica, Asabellides oculata, Polydora socialis, and Spiophanes bombyx. Dense aggregations of these tubeworms sometimes fouled the nets of fishermen, who termed the substance "spaghetti mud". In November 1976, we encountered populations as dense as 3600 Asabellides/0.1 m² (mean of three Smith-McIntyre grab samples), an extremely high figure for the sandy inner shelf environment. Patches of these tubeworms were still fairly common in summer 1978. Presence of such dense populations could significantly affect further recolonization (it must be noted, however, that "spaghetti mud" is sometimes found in areas of the New York Bight apparently unaffected by hypoxia). We have also observed patches of black, reduced sediments, 5-10 cm below the sediment surface in grab samples from the center of the hypoxia area. This condition persisted at least until July 1978. A reduced layer is rarely seen in grabs from the sandy inner shelf, and may further affect the recovery pattern.

Among other early recolonizers were several additional polychaetes, as well as rhynchocoels and the anthozoan, Ceriantheopsis americana. Juveniles of the sand dollar, Echinarachnius parma, which had been a major constituent of the coastal benthos before the hypoxia, were again common by summer 1977. Members of another important group, the peracarid crustaceans (including cumaceans, amphipods and isopods), had only partially recolonized the severely impacted area after two years. This may be due to the fact that peracarids brood their young rather

than producing widely dispersed planktonic larvae; limited dispersal powers increase the time necessary to recolonize any large area from which species have been eradicated. Also of note was the finding of a dense set of surf clams, to 79/0.1 m², in April 1978. By the following July populations of juvenile surf clams were again low, approximately 1/0.1 m².

We are continuing to study the recolonization sequence as part of the Northeast Fisheries Center's Ocean Pulse environmental assessment and monitoring program. Information generated will be of predictive value should hypoxia recur, and will give insights into potential responses of inner shelf benthos to other catastrophes, such as a large oil spill reaching the sediments.

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STATEMENT OF CONTENT

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Recolonization by some species, mainly polychaetes, was rapid, while populations of other groups, especially peracarid crustaceans, had not recovered after two years.