

Coastal Engineering Technical Note

MIGRATION OF FISH AND INVERTEBRATES ACROSS A WEIR OF A WEIR JETTY

PROBLEM: Corps construction of jetty systems has raised environmental concern about their influence on the movement of aquatic species to and from estuarine nursery grounds. This note provides information for preparing an environmental assessment and impact statement on the effect of a weir jetty on fish and invertebrates.

BACKGROUND: The recently constructed jetty system at Murrells Inlet, South Carolina (Figure) utilizes the quarrystone weir concept. This project is one of several comparable jetty projects planned as navigation improvement in United States coastal areas. Construction of quarrystone jetties may have an impact on the migration of fish and mobile invertebrates such as

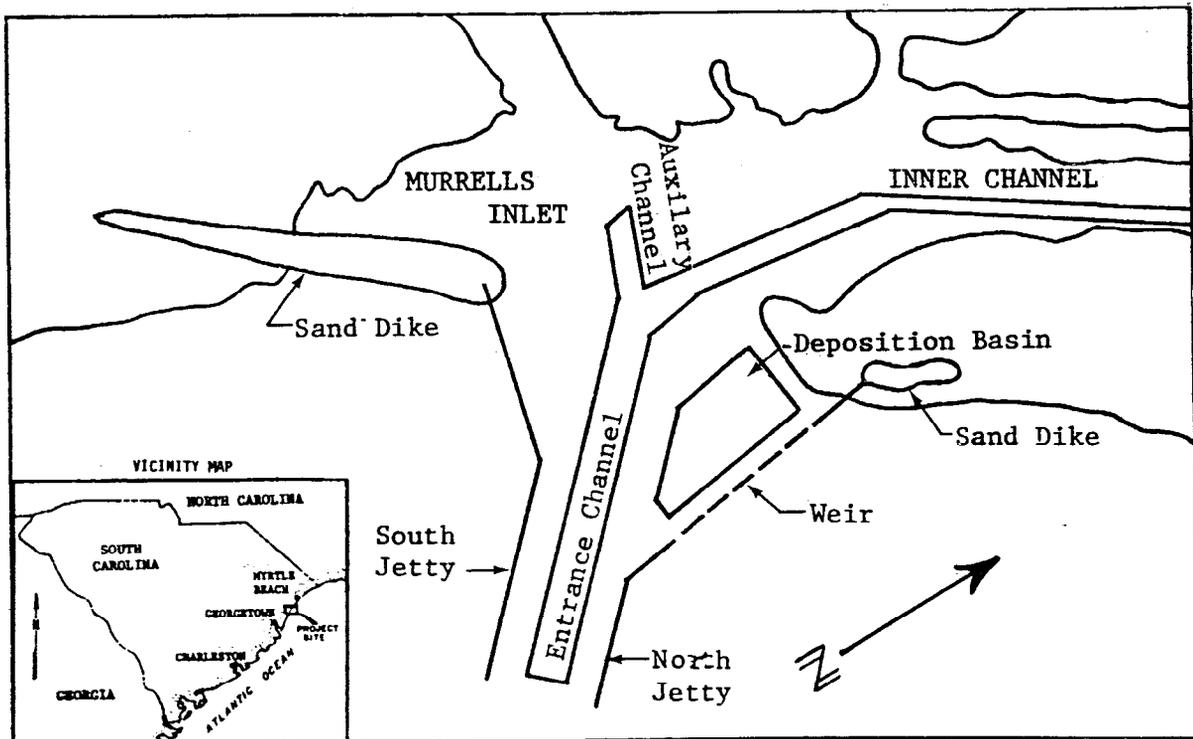


Figure. Murrells Inlet Weir Jetty

crabs and shrimp through an inlet into estuaries, thus affecting the commercial and sport fisheries of an area.

Because the crest of the weir section is generally submerged during a portion (usually half) of the tidal cycle, this jetty design conceivably presents less of a barrier to free swimming (nekton) and drifting or weakly swimming (plankton) species entering and leaving an inlet than a typical non-weir jetty.

Murrells Inlet is a biologically productive, marshy lagoon on the northern third of the South Carolina coastline. It is a comparatively small system (3,379 acres, 1,348 hectares), characterized by ocean beaches, sand and mud flats, intertidal shellfish beds, and expanses of saltmarsh intersected by tidal creeks. It is one of the most intensively utilized coastal areas in South Carolina for sport fishing. Sport fishermen frequently catch such species as spot, Atlantic croaker, sea trout, sheepshead, red drum, black drum, and flounder.

In addition, the area is known to be an important nursery ground for such commercial species as shrimp, blue crabs, black sea bass, bluefish, sea trout, spot and black and red drum.

APPROACH: During July 1979, a study was made on the movement of fish and plankton across the weir jetty at Murrells Inlet. This study evaluated several different sampling techniques to determine the best for the shallow, rocky areas to be sampled. Observations on the direction and velocity of water currents were made at eight stations around the jetty prior to sampling.

A floating gill net was set directly on the weir from a shallow boat. The gill nets were fished for approximately one hour. Six one-hour sets were made on the weir using variable mesh gill nets. In addition, both floating and sinking gill nets were set conventionally in areas adjacent to the jetty for documentation of the local fish species and for comparison with gill net sets on the weir.

Eight plankton samples at each tide also were collected. The samples were preserved in five percent seawater formalin; and, in the laboratory, selected species of animals were picked from the samples and counted.

RESULTS: Only one fish, a sheepshead, was captured in the gill nets on the weir. The sheepshead may have been feeding around the weir when it was caught in the net. No blue crabs were caught in the nets on the weir. By comparison with the paucity of swimming animals taken in the gill net set at the weir, 44 finfish and several blue crabs were taken in gill net sets made in areas adjacent to the weir. These catches indicate that the nets were fishing properly, and that the scarcity of fish in the weir sets was not due to gear malfunction.

These data suggest that few swimming organisms were moving across the weir during the study. Further evidence supporting the hypothesis that the weir is a barrier to free swimming species came from visual observations. Visible schools of fishes, including menhaden and mullet, were never observed passing directly over the weir. The crest of the weir remained visible at the surface of the water even at high tide, and its location was marked by the turbulence from passing waves.

The plankton samples collected on the weir contained large numbers of small organisms; but only the finfish, shrimp, and crab were sorted and counted. Of 1,238 fish collected, over half (692) were anchovies. Other fish found in the samples included important commercial and sport species. Planktonic forms of commercial shrimp and blue crabs also were present in the samples. As adults, these shellfish constitute the principal fishery resources of the southeastern United States.

CONCLUSIONS: This study evaluated the migration of fish and invertebrates across a weir of a weir jetty. It did not evaluate the movement of marine animals through the inlet. During this study planktonic organisms were transported over the weir section of the jetty with the water; whereas, the lack of fishes and crabs in gill net sets on the weir suggests that the weir acts as a barrier to swimming organisms even when it is covered with water. This study included only one month during the summer; and seasonal migrations of many species (e.g., spot, croaker, sea trout, red drum, black drum, flounder, shrimp, and blue crab) occur along the coast in spring and autumn. A different pattern of movement around the jetty might be observed at other times of year. This information may be used in consideration of environmental impact.

ADDITIONAL INFORMATION: For further information contact E. J. Pullen
(WESER-C) (601) 634-3650

REFERENCE:

HALES, L.S., and CALDER, D.R., "A Study of Fish and Shellfish Migration
Across the Weir of a Weir Jetty, Murrells Inlet, South Carolina,"
Agreement No. W74-RDV CERC 79-38, Summary Report, Marine Resources
Institute, South Carolina Wildlife and Marine Resources Department,
Sept. 1979, 2 pp.