

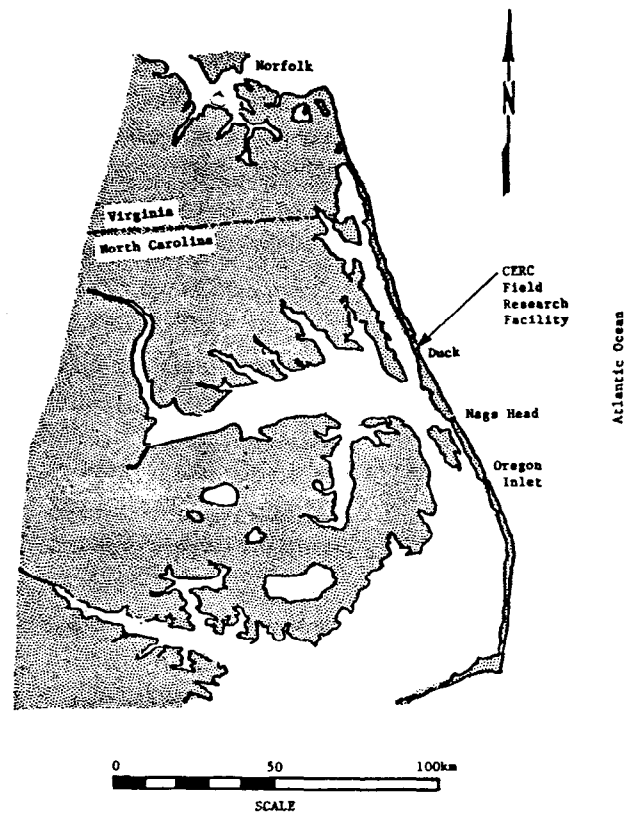
Coastal Engineering Technical Note

COASTAL PIER CONSTRUCTION IMPACTS ON A MID-ATLANTIC BARRIER ISLAND

PROBLEM: The Corps of Engineers constructs and issues permits for the construction of coastal structures such as groins, jetties, and piers in the coastal zone. Potential impacts on local beach fauna by the construction and presence of these structures need to be determined to aid coastal planners in designing and evaluating such structures. This note provides information on pier construction impacts on local beach fauna communities on a mid-Atlantic barrier island.

BACKGROUND: The Coastal Engineering Research Center (CERC) constructed an 1,800-foot pier at its Field Research Facility at Duck, North Carolina in 1975 (Figure 1). This pier is a reinforced concrete structure with 3-foot diameter steel piles spaced at 40-foot intervals.

Prior to construction of the pier, CERC inventoried the macro-benthic animals (those larger than 0.5 millimeters) and measured physical parameters within and outside the areas influenced by pier construction (Matta, 1977). The physical and biological environment of the study area was found to be typical of a high-energy sand beach along an exposed ocean coast.



Location of the CERC
Field Research Facility

Report Documentation Page

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To assess the impacts of the pier on the macrobenthic population, CERC did a followup study five years after pier construction using the same transects, stations, and other methodology used by Matta (Diaz and DeAlteris, 1982).

This latter study showed that the physical sedimentary environment at the sites surveyed had not changed. Changes, however, occurred in the nearshore bathymetry near the pier. While temperature and salinity were different for pre- and post-construction years, they were within the range of natural variation for this coastal region.

Macrobenthic populations between pre- and post-construction periods were similar (Table 1). In 1976, 20 benthic species were identified; whereas, in 1981, 19 were identified.

Table 1. Taxonomic Comparison between 1976 and 1981
Macrobenthic Species Collected from the Ocean Beach

Taxon	1976	1981
Polychaeta		
<i>Scoelepis squamata</i>	+	+
<i>Spilophanes bombyx</i>	+	
<i>Nephtys buccera</i>	+	+
<i>Magelona rosea</i>	+	+
<i>Sigambra</i> sp.		+
<i>Microphthalmus sczelkowi</i>	+	
<i>Traviesa carnea</i>	+	
<i>Glycera dibranchiata</i>	+	+
<i>Eteone heteropoda</i>	+	
Hesionid		+
Phylodocid		+
Mollusca		
<i>Donax</i> spp.	+	+
<i>Ensis</i> sp.	+	
<i>Anadara ovalis</i>	+	
<i>Acteon</i> sp.		+
<i>Epitonium</i> sp.		+
Amphipoda		
Haustoriids	+	+
<i>Amphiporeia virginiana</i>	+	+
<i>Bathyporeia quoddyensis</i>	+	+
Corophiid		+
<i>Jassa falcata</i>	+	
Decapoda		
<i>Enerita talpoida</i>	+	+
<i>Ovalipes ocellatus</i>	+	+
<i>Pagurus longicarpus</i>	+	
Isopoda		
<i>Edotea</i> sp.		+
Cumacea	+	+
Mysidacea	+	+

CONCLUSIONS: The major physical change resulting from pier construction was scour beneath the seaward end of the pier. This was believed to be caused by the erosive effects of turbulent eddies around the pier legs. Sediment grain sizes between pre- and post-construction periods were similar at the sites sampled.

Macrobenthic communities were statistically similar between study periods with the exception of some uncommon species which were not found in both periods. Macrobenthic animals formed a single community throughout the study area and showed signs of seasonal migration offshore.

Abundance of species between years was also within natural populations variations and were considered to be similar. In 1981, there was no relationship observed between the proximity of sample sites to the pier and the abundance and diversity of species found. Any affects the pier may have had on the macrobenthic animals and their environment were not detectable in this high energy environment. It is unlikely that even more extensive sampling would identify changes associated with pier construction in this dynamic environment.

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REFERENCES:

- DIAZ, R.J. and DeALTERIS, J.T., "Long-Term Changes in Beach Fauna at Duck, North Carolina," CERC Contract Report DACW72-81-C-0002, Aug 1982.
- MATTA, J.F., "Beach Fauna Study of the CERC Field Research Facility, North Carolina," MR 77-6, U.S. Army Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA, Apr 1977.