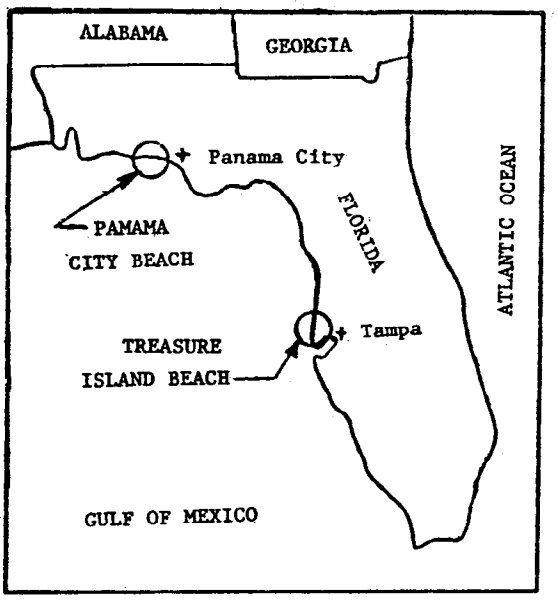
Coastal Engineering Technical Note

BIOLOGICAL EFFECTS OF BEACH RESTORATION ON THE FLORIDA GULF COAST

PROBLEM: Beach restoration with dredged material can provide a means of counteracting beach erosion in some coastal areas. Therefore, the Corps is presently using this method to solve coastal erosion problems. As an Environmental Impact Statement is required for these projects, the Corps is having to answer many environmental questions about the effects of beach restoration. At present, available information is needed to substantiate the required evaluations. Studies at Panama City Beach, Florida (Culter and Mahadevan, 1981 and Saloman, Naughton and Taylor, 1981) and Treasure Island, Florida (Saloman, 1974 and Taylor Biological Company, 1978) provide guidance for the planning of beach restoration projects along the Florida gulf coast and evaluating its potential biological impact (see Location Map).

EFFECTS OF BEACH RESTORATION: As in other coastal regions, there are varying wave energy conditions along the gulf coast. Panama City Beach is in a moderately high wave energy area, whereas Treasure Island is in a moderately low wave energy area. The macrobenthic communities in the nearshore area at the two projects were rich and diverse, except in the swash zone. As a result of wave energy, the nearshore sediments experienced an almost constant agitation. This agitation dictated the type of macrobenthic animals inhabiting the nearshore area. Most macrobenthic animals were active burrowers or crawlers capable of quickly digging into the sediments if threatened with displacement. It was found that the beach restoration projects in both coastal environments did not result in any discernable, long-term effects on the nearshore macrobenthic animals. In these and other coastal areas, studies have shown that the nearshore communities are resilient and show no lasting effects resulting from beach restoration projects. See CETN-V-5 and CETN-V-7 for results of studies on the Atlantic and Pacific Coasts, respectively.



Site Location Map

However, major differences were found in the recovery rate of the offshore borrow pits in the two geographic areas. At Treasure Island, it was found that the offshore borrow pit sediments contained a high percentage of organic matter and hydrogen sulfide and the water was occasionally low in dissolved oxygen. This resulted in a generally poor quality of habitat; thus, the abundance and diversity of macrobenthic fauna in the pits were lower than the undisturbed substra-

tum in adjacent areas. It was found that the pits are in a slow state of recovery and it may take 10 years or more for them to completely recover.

In contrast, the offshore borrow pits dredged in 1976 at Panama City Beach rapidly filled with sediment from adjacent areas and did not act as a trap for fine particles and organic matter as observed at Treasure Island. Dredging did cause an immediate decline in the bottom communities, but it was followed by a rapid recovery that was virtually complete in about one year. The borrow pits had no discernable long-term effects on the macrobenthic animals. The recovery rates of the two borrow areas were thought to be related to the differing physical environments in the two geographical regions and the resiliency of the macrobenthic animals.

CONCLUSIONS: Macrobenthic animal recovery apparently is rapid following beach restoration, but it may take 10 years or more for some borrow areas to recover, depending on the physical and chemical conditions, i.e., currents, sediment movements, and water quality. To improve macrobenthic animal recovery rates, consideration should be given to shallow dredging over large low wave energy areas rather than deep dredging. Although biological damage would be initially greater, recovery would be expected to be much quicker in the shallow dredged area.

ADDITIONAL INFORMATION: Contact the CERC Coastal Ecology Branch at (202) 325-7393.

REFERENCES:

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