CESAM-PD-FP (1105-2-10b) 29 March 1993

MEMORANDUM FOR Executive Office

SUBJECT: Fact Sheet on Erosion Problems, Dauphin Island, Alabama

1. PURPOSE. Provide information on current erosion problems on Dauphin Island, Alabama, and the recently completed Section 14 (Emergency Shoreline Protection for Public Structures) studies.

2. RECOMMENDED USE. Briefing for Congressman Bevill.

3. INFORMATION.

a. The problem. Two separate reaches of Gulf of Mexico shoreline on Dauphin Island, Alabama, are experiencing severe erosion. So far as we can determine, the erosion at these sites is not related. One reach is at the east end of the island at Fort Gaines, a famous historic structure. The erosion there extends well past the fort to include the beach front property of the Marine Environmental Sciences Consortium, the U.S. Coast Guard recreation area, and the Dauphin Island Park and Beach Board (DIPBB) public campground. The other reach is about 3 miles west of the fort and roughly centered on the DIPBB Main Beach Park. A major feature of that park is a public fishing pier. The fort, the campground and the park are all public property administered by the DIPBB. These sites provide the only public access on the island to the Gulf of Mexico beach.

At both Fort Gaines and the Main Beach Park the loss of sand combined with strong currents has made the beaches unsafe and they have been closed. Additionally, at the Main Beach Park numerous sharp tree trunks have been uncovered by the erosion and protrude through the beach, increasing the hazard. If the erosion at Fort Gaines continues unchecked we estimate that damage to the fort can begin to occur in about 5 years. At the park, erosion from Hurricane Andrew left two pavilions that had been built on top of the dune hanging over the beach beyond the edge of the erosion scarp. Andrew's passage also left the gulf edge of the bath house with the public restrooms out over the erosion scarp. Erosion over the winter has further eroded the dune and the gulf edge of the bath house is now well out over the beach. The fishing pier is being undermined by the shoreward movement of the beach profile as it recedes. The landward 150 feet of the pier was originally constructed over dry beach, but now the water is at its rear edge. If the present rate of erosion continues, we estimate that the shallow pilings in that section will no longer have adequate botton penetration by the end of 1993 and that at the pilings on the gulf end the bottom will pass safe penetration depth by the end of 1994. We cannot

say definitely that the pier will be destroyed in that time frame, but the safety factors on the piling penetration will certainly be exceeded, rendering the pier unsafe.

b. Historical Background. Dauphin Island is a barrier island with a long history of shoreline erosion and accretion and hurricane damage. The erosion/accretion processes occur and reoccur on some sort of semicyclical basis, but the cause(s) have never actually been determined. There is a massive ebb tidal delta at the mouth of Mobile Bay south of the east end of the island. It has been hypothesized that storm induced changes in that delta produce changes in the wave refraction patterns that, in turn, produce changes in the wave energy received at the shoreline resulting in erosion or accretion. Dauphin Island was completely breached by a hurricane in the general area of the Main Beach Park between 1909 and 1917. Maps did not show that breach as filled until 1942. The island was again breached by a hurricane in September 1948 and March 1950 aerial photographs showed it was rejoined. Hurricane Frederic in 1979 caused massive washover on the west end but a complete breach did not occur. Shoreline change maps for the period 1942 to 1974 show gulf shoreline erosion rates of about 6 feet per year. Accretion at the west end between 1917 and 1974 added about 2 miles to the island.

Late in the 1800's the Corps of Engineers began installing a revetment seawall and short groins around the east end of the island to protect Fort Gaines from ongoing erosion. There is a series of plans showing various installations of revetment plus stub groins from 1894 onward and all works were completed about 1909. These structures have survived with little to no maintenance and successfully protected the fort. There is evidence, however, that the revetment seawall is beginning to fail as the soil behind it is eroded by wave action.

A recent study by Dr. Scott Douglass, a professor at the University of South Alabama, suggests that Sand and/or Pelican Island(s), a highly mobile island(s) just south of Dauphin Island, is actually just a visible portion(s) of that massive ebb tidal delta. As such, the island(s) is part of the total sand transfer process. His work indicates that Pelican Island has migrated northward in the past, as it is now doing. This migration pushes Pelican Pass northward and erodes the shoreline on Dauphin Island until some natural force breaches Pelican Island, diverting Pelican Passage, and restarting the migration process. The current erosion process is rapid and continuous and

storms temporarily accelerate it to dramatic proportions. Unfortunately, this is also the site of the present public park and fishing pier.

The 5-mile long entrance to the Mobile Harbor ship channel runs from deep water in the Gulf of Mexico, through Mobile Pass, and into Mobile Bay. Work on the existing project commenced in 1931 and was completed in 1981. Phase I of the channel improvement authorized by the 1986 WRDA was completed in 1990 and the entrance channel is presently maintained at 47 feet deep by 600 feet wide. Corps' records show that since 1974 about 15 million cubic yards of material have been removed from the entrance channel. Almost 7 million cubic yards of that amount were removed in 1990 for the channel improvement. The total amount removed by Corps activities is 1¼ percent of the total estimated volume of the ebb tidal delta. Dr. Douglass has pointed out the annualized amount removed exceeds the estimated annual littoral transport volume for this area. While this may be correct, the littoral transport path estimated by Dr. Douglass indicates that any effects from this practice would be felt mostly on the west end of the island and not at either of the present problem areas.

In FY 1991 the Corps deepened the Fort Gaines Channel (Government Cut), between the turning basin and Dauphin Island Bay, from 4 feet to 6 feet by dredging about 17,000 cubic yards of sand. We offered to place this sand in the eroding area south of Fort Gaines provided some responsible agency would pay the excess pumping cost of about $25,000. No financial support could be found and the dredged material was placed in the approved area on Little Dauphin Island.

c. Present Action. The Mobile District has recently completed two Emergency Shoreline Erosion Protection studies under the authority of Section 14 of the Flood Control Act of 1946. The study for the Fort Gaines vicinity was named East End Dauphin Island, Alabama, and the one for the Main Beach Park was called Dauphin Island Shoreline, Alabama. Both reports are presently undergoing inhouse review.

d. Study Results. The study of the Fort Gaines area, East End Dauphin Island, indicates that restoring the protection at the fort to the original 1909 configuration is practical and feasible. The estimated cost is $253,000, of which $63,200 must be contributed in cash by a non-Federal sponsor. That sponsor can be the DIPBB or some other local non-Federal entity with

sufficient fiscal authority to insure funding support. Environmental coordination is essentially complete and there appear to be no problems there.

As the of result of considerable study at the Main Beach Park, Dauphin Island Shoreline, we are recommending a fairly short and massive section of stone protection along the shoreline and a stone blanket beneath the fishing pier. The shoreline protection would begin about 150 feet east of the pier centerline and extend 150 to 300 feet west of the centerline, depending on the condition of the bath house when construction can be initiated. The blanket under the pier would be 3 feet deep and 30 feet wide, 10 feet beyond the bent piling on either side, and extend from the shoreline section for the full length of the pier, about 665 feet. All stone would be placed on geotech filter fabric. That work is estimated to cost $461,100, of which $115,275 must be contributed in cash by a non-Federal sponsor.

4. COORDINATION:

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CESAM-PD	Concur/~~Nonconcur~~		(205) 690-2777
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5. APPROVAL. The Chief, Planning and Environmental Branch, approved this information paper.

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Study Manager