RECENT SEDIMENTARY ENVIRONMENT OF PENSACOLA BAY, FLORIDA

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ABSTRACT

The Pensacola Bay system represents the largest coastal estuary in the northwest Florida panhandle and covers an area of nearly 150 square miles. The system includes four interconnected water bodies (Pensacola, Escambia, East, and Blackwater Bays) and serves as the terminus for rivers draining a watershed of some 6,776 square miles. The Blackwater, Yellow, and Escambia Rivers each empty into the bay with the latter originating over 150 miles from the head of the bay, in eastern Alabama. Because each of the streams passes largely through Neogene-age Coastal Plain formations, the bay's sediments consist almost entirely of sand, silt, and clay eroded from these older units. Near the mouth of the bay, however, longshore currents and tidal currents have acted to transport Pleistocene-age sands into the bay that have been reworked from either the immediate offshore area or from exposed beach units farther to the east.

Because of the restricted water circulation patterns and the relatively narrow opening afforded to the Gulf of Mexico, most of the sediment that is carried into the bay by the three rivers remains in the bay and becomes incorporated in the bottom sediments. As a result, not only is the bay undergoing a gradual infilling but deltas are now noticeably prograding into the bay at the mouths of the three rivers. Prior studies of the bay's sediments carried out 20 years ago, however, bear a striking similarity to the results of the present investigation in terms of the areal distribution of sediment types. While a distinct coarsening of the sediments over time was observed at the head of Escambia Bay, the overall distribution of sediment textures throughout the remainder of the bay has remained essentially unchanged. Quarrying operating that have now ceased at a site upstream on the Escambia River are suspected as a cause of the coarsening of the sediments observed in the bay near the river's mouth.

Mineralogical analyses carried out on the bay's bottom sediments, similarly, indicated that no significant changes have taken place with respect to clay mineral abundance in the past 20 years. The bay continues to be characterized by a clay minteral suite intermediate between the montmorillonite-rich sediments of Mississippi Sound and Mobile Bay, to the west, and to the kaolinite-rich suites found in Choctwhatchee, St. Andrews, and Apalachicola Bays, to the east.

Of particular importance, however, was information acqired in this study relating to the bottom sediment chemistry of the bay system. During the interval from 1955 to 1964, massive quantities of industrial wastes were discharged into the Escambia River and were responsible for a number of major fish kills and an alarming decline in spot fishing that prompted Federal and State action to protect the bay. Major restrictions were placed upon allowable municipal and industrial effluent that could be discharged into either the bay or rivers entering the bay in order to ameliorate the problem. Chemical analyses summarized in Table 1 (below) show that the bay now has largely returned to its "pre-impact" condition and is characterized by heavy metal levels generally below those found in other estuaries in the northern Gulf of Mexico.

Table 1 — Average heavy metal concentrations (in ppm) for bays and estuaries in the northern Gulf of Mexico.

Location	Cu	Zn	V	Cr	Cd	Co	Pb	Ni	Mn	Fe (%)
Pensacola Bay	12	68	13	44	1.0	10	25	11	234	2.41
Mobile Bay	22	225	163	63	1.2	29	40	57	786	3.56
Mississippi Sound	20	74	80	57	1.0	13	15	24	nr	2.31
Apalachicola Bay	37	57	79	34	1.2	18	61	28	nr	2.68
Choctwhatchee Bay	11	46	100	71	1.0	12	26	16	654	4.79
Avg. Crustal Abundance	55	70	110	100	0.2	25	13	75	1000	5.63

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