Geology of Shelf-edge Habitats of the Eastern Gulf of Mexico

The West Florida Shelf supports a highly productive commercial and sport fishery, which accounts for over 90% of the landings in the Gulf of Mexico of several economically important species, such as red grouper, gag grouper, and yellowtail snapper. In recent years, over-fishing, particularly in spawning grounds, has led to declining catches. Some species, such as speckled hind, are now classified as threatened. Fisheries scientists from the National Marine Fisheries Service and Florida State University are evaluating the critical fish habitats along the West Florida Shelf-edge where several species aggregate to spawn, feed or reside for part of their life cycle. Because seafloor morphology and composition of the substrate are critical factors in spawning success, ***geologists from the U.S. Geological Survey (USGS) are working with the biologists to map the seafloor and analyze the geologic history of these shelf-edge areas (figure 1).***

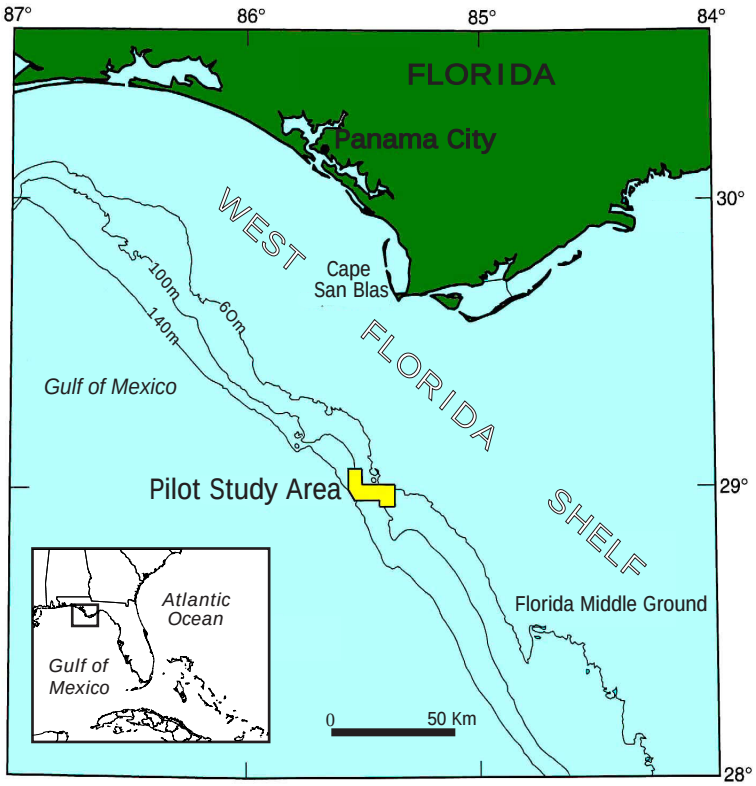

Figure 1. A pilot study in this area is allowing geologists and biologists from the U.S. Geological Survey, the National Marine Fisheries Service, and Florida State University to compare observations of fish spawning and feeding behavior with the geology of the seafloor.

The sediments on the outer shelf in the eastern Gulf of Mexico are part of a band of mixed relict (early Holocene or Pleistocene) and modern sands (figure 2). The band of sediment encompasses and partially covers rocky mounds and ridges, some of which are drowned pinnacle reefs. Although some preliminary studies of the general sedimentological characteristics of the relict shelf-edge deposits on the West Florida Shelf were published in the 1950s and 1960s, there has been no comprehensive analysis of the age, morphology, and origin of the elevated landforms, or of the age, thickness, distribution, and paleoecological evolution of the relict deposits.

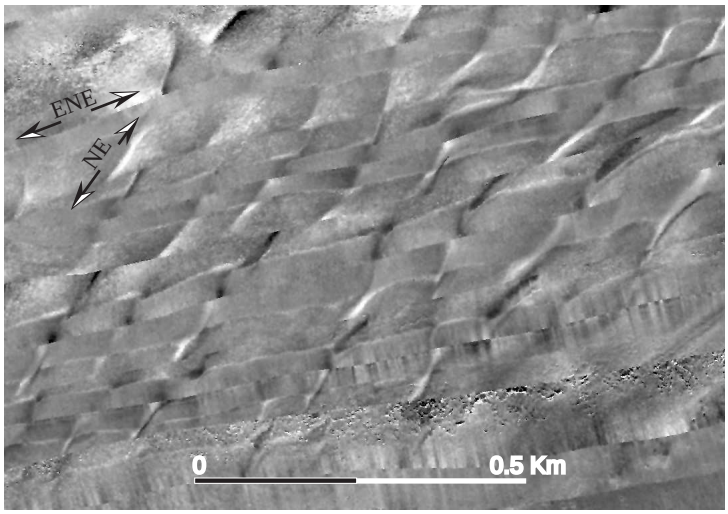

Figure 2. Coarse relict sand from Pleistocene or early Holocene time migrate slowly across the outer edge of the West Florida Shelf, forming these NE-trending sediment waves. The waves are 1 to 4 meters high and about 100 m from crest to crest. Seams between adjacent data strips create an ENE-trending artifact.

Preliminary analysis of sidescan sonar mosaics and underwater video from pilot studies south of Panama City, FL (figure 1) reveals spectacular benthic habitats (rocky ridges, hardgrounds, pinnacles, even natural rock arches) likely to support spawning aggregations. ***USGS geologists discovered a series of rocky ridges (figure 5), surrounded and partially buried by an undetermined thickness of mobile sand (figure 2) in 60 to 80 m of water.*** A subsequent fisheries acoustic survey, supplemented by camera drops, confirmed that the waters around these ridges are populated by numerous species of fish. In deeper parts of the survey area (80 to 120 meters) the presence of numerous pits, presumed to be excavated by