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STUDY TITLE: Southwest Florida Nearshore Benthic Habitat Study

REPORT TITLE: Southwest Florida Nearshore Benthic Habitat Study, Narrative Report

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PROJECT MANAGER: M. J. Thompson

AFFILIATION: Continental Shelf Associates, Inc.

ADDRESS: 759 Parkway Street, Jupiter, FL 33477

PRINCIPAL INVESTIGATOR*: M. J. Thompson, T. Kunneke

KEY WORDS: Eastern Gulf of Mexico; biology; mapping; seagrasses; algae; hard-bottom; shelf; coral reef; Florida Bay; Florida Keys; aerial photography; survey; shipboard observations; biomass; seasonality; habitat; distribution; Gulf of Mexico Region

BACKGROUND: The Outer Continental Shelf (OCS) Environmental Studies Program is designed to provide critical environmental data for leasing and lease-management decision making regarding offshore petroleum exploration and development. Within the eastern Gulf of Mexico, the Minerals Management Service (MMS) has sponsored a wide variety of information-gathering and synthesis studies, including regional reconnaissance, area-specific, and environmental-process-specific studies. The Southwest Florida Nearshore Benthic Habitat Study was designed to provide information on habitats and sessile biota (seagrasses and hard and soft corals) in shallow water along the southwest Florida coast.

OBJECTIVES: (1) To map and inventory seagrass beds and habitats formed by sessile invertebrates along Florida's southwest coast, within Florida Bay, and along the north side of the Florida Keys to Dry Tortugas, using a combination of aerial photography and shipboard ground truthing; and (2) to determine the seasonal growth period and

seaward extent of deep seagrass beds formed by Halophila spp. throughout the study area.

DESCRIPTION: Originally, the Southwest Florida Nearshore Benthic Habitat Study was planned as a two-part effort: (1) remote mapping with aerial imagery; and (2) ground truthing to quantify mapped habitats and to survey deep seagrass beds beyond the detection capabilities of remote imagery. However, one of the major objectives of this study was to determine the extent and maximum depth of growth of the deep seagrass beds known to occur along the southwest Florida continental shelf. Deep-growing seagrass (Halophila spp.) and macroalgal stands have been reported to a depth of 80 ft (24 m) in the Florida Big Bend area, and similar communities were known to exist on the southwest coast of Florida. Due to poor weather conditions, ground truthing field work on the South Florida Nearshore Benthic Habitat Study did not begin until 11 November 1987. Once in the field, the survey team immediately noted the absence of deep seagrass and algal stands which were to be mapped. Ground truthing was discontinued at that point until 1988, and the study was expanded to include a set of short surveys to determine appearance dates and growth rates of seagrass species comprising these deep, offshore beds.

SIGNIFICANT CONCLUSIONS: Habitat distributions within 9,627,000 ac (3,896,047 ha or 15,042 mi2) of the southwest Florida nearshore continental shelf were mapped. Within 5,006,000 ac (2,025,928 ha), habitat distributions were mapped from aerial imagery. In an additional 4,622,000 ac (1,870,523 ha), habitat distribution patterns were extrapolated from ground survey data. In terms of area, the deep-growing seagrass stands of *H. decipiens* were the most widely distributed habitat surveyed. These seagrass communities covered 3,004,000 ac (1,215,719 ha) of the inner southwest Florida continental shelf, or 31% of the entire mapped area. *H. decipiens* appeared seasonally on the west Florida shelf, beginning in late May and early June. These deep seagrass beds grow rapidly and reached a peak standing crop in late September. Mean biomass of *H. decipiens* across the inner southwest Florida continental shelf was 194.0 mg/m2 in September 1988. Extrapolation from this figure yielded a standing crop estimate of 2,600 tons (2,359 metric tons). The fate of this organic material within the continental shelf ecosystem is not well understood.

STUDY RESULTS: Four, geomorphically distinct sub-areas exist within this study area: (1) the inner southwest Florida continental shelf, dominated by low-relief hard and soft coral communities and Halophila decipiens stands; (2) Florida Bay, dominated by communities of Thalassia testudinum, Syrinqodium filiforme, and Halodule wriqhtii; (3) the Lower Florida Keys, dominated by Thalassia, Syringodium, and Halodule stands and patch reefs; and (4) the Tortugas/Marquesas Reef Banks, dominated by sand banks and coral reefs.

The habitat mosaic of hard bottom, and seagrass-algal communities upon the southwest Florida inner continental shelf from Sanibel Island southward to 250 N was extremely complex. Deep-growing seagrass and soft and hard coral communities could be present at any given location within this area. The low-relief, soft and hard coral flats

here are separated by ribbons of wave-sorted, fine and coarse sediments where seagrasses grew. During the growth season, *H. decipiens* appeared almost ubiquitously across this shelf.

South of 250 N, the portion of the study area directly off the mouth of Florida Bay consisted of a sandy silt, lime carbonate mud substrate, and no hard-bottom communities were seen until the Florida Keys. Halophila decipiens grew into the northern and southern edges of this silty mud area, but its presence there was limited.

Florida Bay showed a diverse pattern of benthic communities dominated by the three, perennial seagrass species. Listed in order of abundance, these species were: (1) Thalassia testudinum; (2) Syrinqodium filiforme; and (3) Halodule wriqhtii.

The northern side of the Lower Florida Keys showed considerable patch-reef development, along with extensive seagrass habitats dominated by Thalassia, Syrinaodium, and Halodule. Habitat distribution patterns in this area depended upon topographic features, substrate types, and the presence or absence of tidal channels linking the Gulf of Mexico and the Straits of Florida. Extensive and welllveloped coral reefs surrounded the Dry
Tortugas Bank at the Fort Jefferson National Monument.

Halophila decipiens appeared in significant amounts across this continental shelf from the early part of June through late October or early November, depending upon weather conditions. From its first appearance in early June, the biomass of these deep seagrass stands increased rapidly throughout June, July and August. Biomass and relative proportions of larger to smaller blades within samples indicated a peak in the growing season in September. Decline set in shortly after the growth season peak, and these deep seagrass beds became progressively more sceptible to destruction by winter rough weather.

In September 1988, the mean biomass of *H. decipiens* from the southwest Florida inner shelf was 194.0 mg/m2. Within the 70- to 90-ft (21.3- to 27.4-m) depth range, *H. decipiens* biomass was 287.0 mg/m2. At all other depth ranges combined, mean *H. decipiens* biomass was 145.3 mg/m2. The apparent biomass peak in the 70- to 90-ft (21.3- to 27.4-m) depth range was probably related to both the abundance of suitable substrate within those bathymetric contours and the improved photosynthetic response shown by *H. decipiens* at lower irradiance levels.

Below 100 ft (30.4 m), *H. decipiens* was replaced with a long, narrow-bladed growth form of C. prolifera. No *H. decipiens* was seen growing at depths >122 ft (37.2 m).

No Halophilia engelmannii was seen anywhere on the southwest Florida continental shelf during this study. The absence of this species is conspicuous since it has previously been reported from the southwest Florida shelf, and was abundant on the northwest Florida continental shelf (Big Bend area) during studies conducted in 1984

and 1985. No explanation for its absence off southwest Florida during the 1988 sampling period has been advanced.

Two composite 1:250,000 scale maps showing marine habitat distribution throughout the study area were produced. In addition, a two-volume atlas set composed of 57 1:40,000 scale habitat maps was produced based on direct interpretation of the aerial imagery.

STUDY PRODUCTS: Continental Shelf Associates, Inc. 1991. Southwest Florida Nearshore Benthic Habitat Study. Narrative Report. A final report for the U.S. Department of the Interior, Minerals Management Service, New Orleans, LA. MMS Report 89-0080. Contract No. 14-12-0001-30383. 55 pp. + app. and maps.

Continental Shelf Associates, Inc. and Geonex Martel, Inc. 1991. Southwest Florida Benthic Habitat Study Atlas (2 volumes). A final mapping product for the U.S. Department of the Interior, Minerals Management Service, New Orleans, LA. Contract No. 14-12-0001-30383. 61 pp.

*P.I.'s affiliation may be different than that listed for Project Manager.