

Benthic Sampling in Support of Gulf Sturgeon Habitat Characterization in the Vicinity of Ship Island, Mississippi

In 2010 and 2011, Barry A. Vittor & Associates conducted benthic sampling to identify benthic macroinfauna organisms in and around potential borrow and littoral zone areas associated with the U.S. Army Corps of Engineers' Mississippi Coastal Improvements Program (MsCIP) Barrier Island Restoration Project. In addition to this program, it was determined that additional benthic sampling to support the Gulf sturgeon monitoring studies being conducted under MsCIP as relating to barrier island restoration activities was an important component in the completion of the objectives of the overall benthic assessment as it pertains to the barrier island restoration effort. The Gulf sturgeon study is being conducted by Dr. William T. Slack of the U.S. Army Engineer Research and Development Center (ERDC) and Dr. Mark S. Peterson of the University of Southern Mississippi - Gulf Coast Research Laboratory. To the extent practicable, the additional samplings included sites in Mississippi Sound that were surveyed previously under the 2010 and 2011 efforts.

Objectives

The benthic sampling was performed in support of Gulf sturgeon habitat characterization in the vicinity of Ship Island, Mississippi which represents one component of a larger effort examining sturgeon occupation of nearshore waters, including tidal passes and specifically an overwash area of Ship Island, known as Camille Cut. The results of the sampling were coordinated with parallel efforts examining Gulf sturgeon movements within the study area. This effort is being conducted under the technical oversight of the Environmental Laboratory of ERDC.

Benthic Sample Locations

Benthic community sample transects were associated with the passes and shoals in open waters between Cat Island and West Ship Island, Camille Cut, and Dog Keys Pass as indicated as illustrated in Figure 1. Where practical, sample locations included sites in Mississippi Sound that have been surveyed previously in 2010 and 2011 in conjunction with the barrier island restoration benthic community studies (Figure 2). The sample locations included:

- 1) Three transects across the waters between Cat Island and West Ship Island, each with 10 sample points;
- 2) Two sample points in the Gulfport Ship Channel (1 station north of West Ship Island and 1 station south of the Island);
- 3) Three transects across Camille Cut, each with 8 sample points; and
- 4) Three transects across Dog Keys Pass, each with 8 sample points.

This sampling approach produced 80 points at which benthic macroinfauna and sediment texture samples were collected (Figure 3). The samplings were conducted in October, 2011.

Benthic Sample Collection Methods

Benthic macroinfaunal samples were taken at each station with a Shipek grab or a modified Van Veen grab with a sampling area of 0.04 m². Both grabs are spring-loaded and are designed for collecting consistent samples in sand and consolidated sediments. The samples were rinsed in the field through a 0.5-mm mesh screen and preserved with 10% buffered formalin. A subsample (approximately 250 gm) was collected from each grab for sediment texture analysis.

At each station, standard hydrographic measurements were taken at up to three depths depending on ambient water depths, which included near surface, middle, and near-bottom depths prior to benthic sampling. A YSI ® Model 600XL Datasonde or equivalent was used to measure temperature, conductivity, salinity, pH, and dissolved oxygen (DO) concentration.

Laboratory Analyses

Infauna: In the laboratory, benthic samples were inventoried, rinsed through a 0.5-mm mesh sieve to remove preservatives and sediment, stained with Rose Bengal, and stored in 70% isopropanol solution until processing. Sample material was sorted and all macroinvertebrates removed and placed in labeled glass vials containing 70% isopropanol, with each vial representing a major taxonomic group (e.g. Oligochaeta, Mollusca, Arthropoda). Oligochaetes were individually mounted and cleared on microscope slides prior to identification. All sorted macroinvertebrates were identified to the lowest practical identification level (LPIL) which in most cases was to species level unless the specimen was a juvenile, damaged, or otherwise unidentifiable. The number of individuals of each taxon, excluding fragments, was recorded.

Sediment Grain Size Analysis: One sample was collected at each station for sediment grain size analysis. Each sample was washed with deionized water, dried, and weighed. The coarse and fine fractions (sand/silt) were separated by sieving through a U.S. Standard Sieve Mesh #230 (62.5 µm). Median grain size and percentages of gravel, sand, silt, and clay were calculated for each sample.

Data Analyses

The following numerical indices were calculated for each sample:

- 1) Infaunal abundance (total number of individuals per station);
- 2) Infaunal density (total number of individuals per square meter);

- 3) Species richness (total number of taxa represented in a given station and by Margalef's D);
- 4) Taxa diversity (Pielou's Index H'); and
- 5) Evenness (Pielou's Index J').

Data Utilization

A field survey report was prepared which detailed sample/data collection efforts, problems encountered, and observations of sea state/weather.

Data for macroinfauna sample analysis was prepared and provided in an EXCEL spreadsheet electronic format to the Environmental Laboratory of ERDC. Standard community statistics were presented in tabular form and included taxa abundance, individual abundance and density, various diversity and evenness indices, and species richness. A phylogenetic listing of all taxa censused was also provided. In addition, sediment texture data was provided in hard copy.

All data reports were provided to ERDC upon completion of field sampling efforts. Environmental Laboratory of ERDC utilization of this data will characterize Gulf sturgeon use of habitat in those previously identified sampled areas. In addition, this data will provide a baseline for future Gulf sturgeon habitat utilization comparison.

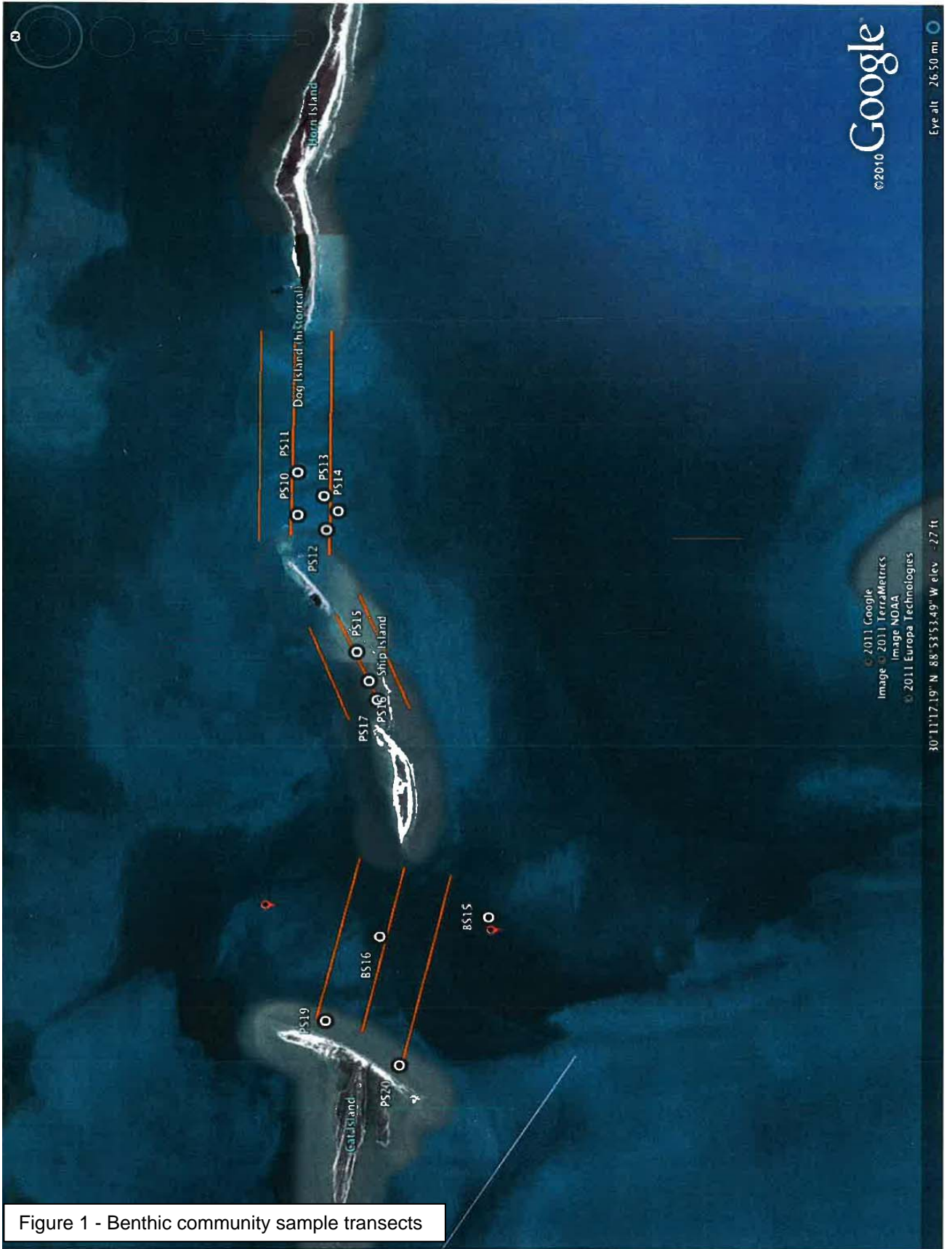


Figure 1 - Benthic community sample transects



Figure 2 – Previous 2010 and 2011 sampling locations

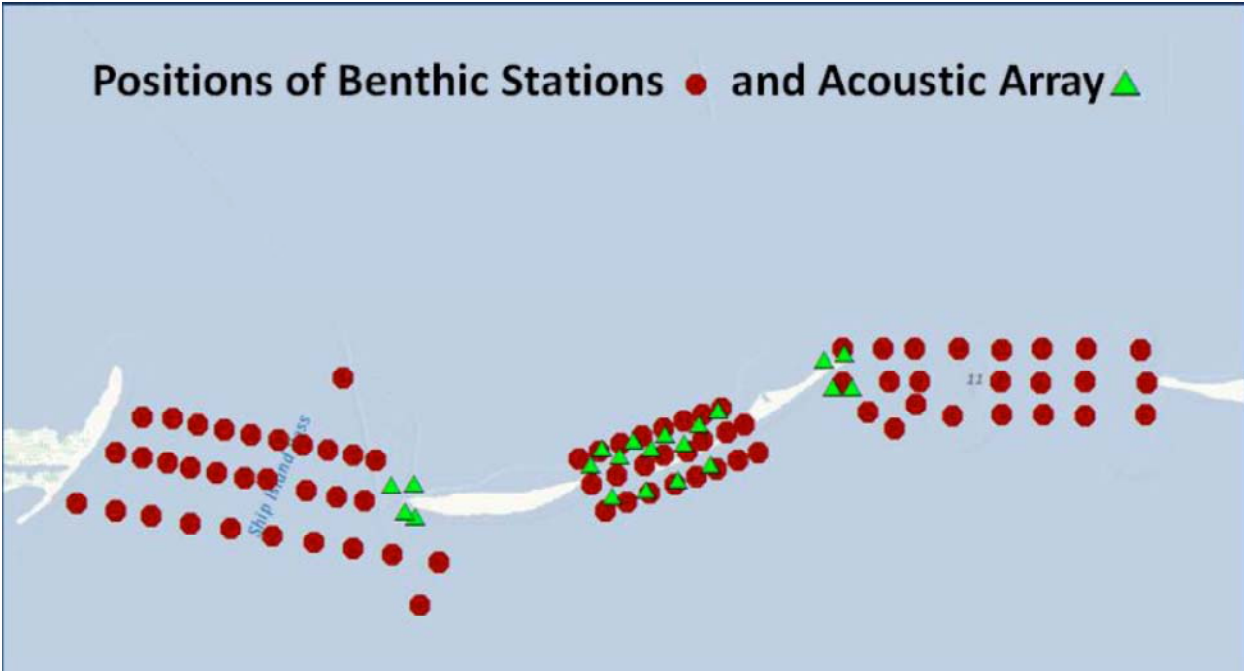


Figure 3 – Individual sampling locations in support of the Gulf sturgeon habitat characterization