BUREAU OF OCEAN ENERGY MANAGEMENT | **ENVIRONMENTAL STUDIES PROGRAM**

Quarterly Reports

FY 2022 First Quarter

Latest Reports and Study Profiles Posted to the Environmental Studies Program Information System (ESPIS)

BOEM
Bureau of Ocean Energy Management

ESP
ENVIRONMENTAL STUDIES PROGRAM

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The Environmental Studies Program (ESP) Quarterly Reports include summaries of the Bureau of Ocean Energy Management (BOEM) environmental studies completed each quarter. These studies inform BOEM's policy decisions on the development of energy and mineral resources on the Outer Continental Shelf (OCS).

Visit ESPIS at *https://marinecadastre.gov/espis*

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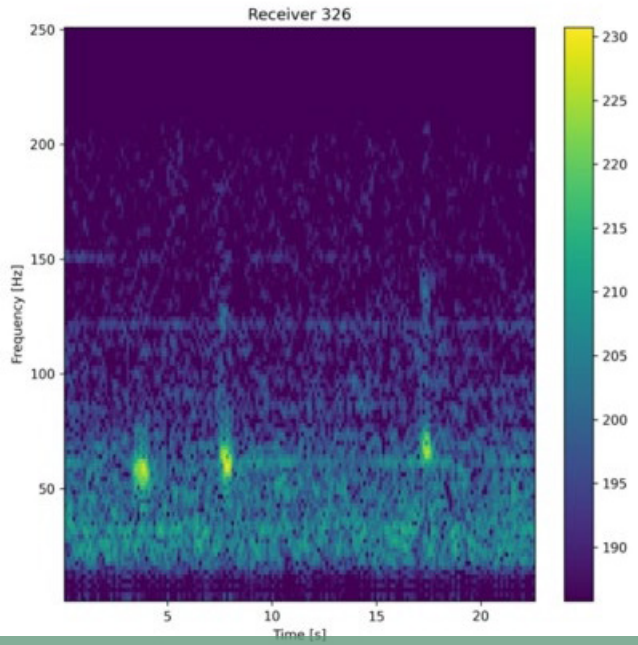
Optimization of Towed Passive Acoustic Monitoring (PAM) Array Design and Performance

ESPIS Link: *https://marinecadastre.gov/espis/#/search/study/100262*

Conducted by: CSA Ocean Sciences Inc.

National Studies List: AT-19-02

Study Products (available in ESPIS): Final report, technical summary



Spectrogram of three baleen whale vocalizations used for testing the algorithm developed for this project

Purpose/Information Use:

Towed hydrophone arrays are used in passive acoustic monitoring (PAM) to detect sound in the ocean. PAM is now widely used in the offshore wind industry to locate whales and ensure they remain outside exclusion zones during development activities. For this approach to be most effective, PAM operators need to determine the location of marine mammals with accuracy. To date, there are limited data to assess the localization accuracy of towed PAM array configurations that are typically used by industry. The goal of the study was to develop an algorithm and user interface that would enable BOEM personnel to input proposed array specifications and determine the theoretical localization capability for low-, mid-, and high-frequency whales within 3 miles of the array. The results of this study will help BOEM determine how effective the localizing abilities of towed PAM arrays are for the various marine mammal species that occur within wind energy areas in the Atlantic Ocean.

Findings/Results:

- Researchers developed and documented a numerical model for simulating the localization performance of a three- or four-hydrophone towed PAM array on multiple species clusters, along with some representative simulations of a 200-meter aperture array for three whale species of high interest (sperm, right, and beaked whales).
- In the model, array position uncertainty had the largest impact on performance. This uncertainty was likely caused by the BOEM-specified noise levels being too low, because they were derived for measurements from a stationary platform well away from vessel noise.
- In consultation with BOEM, researchers will continue exploring example background noise profiles from actual PAM operations to determine when background noise levels become a determining factor for PAM array performance.

Final Report:

Thode A, Abadie S, Barkaszi MJ. 2021. Optimization of towed passive acoustic monitoring (PAM) array design and performance study (passive acoustic monitoring study). Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 32 p. Report No.: OCS Study BOEM 2021-086.

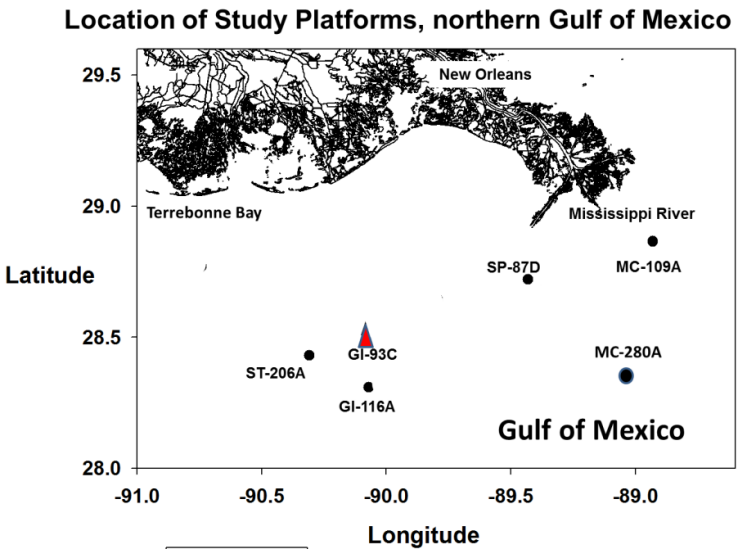
Genetic Affinities in Populations of the Invasive Indo-Pacific Coral *Tubastraea micranthus* on Northern Gulf of Mexico Platforms: Multiple Invasions?

ESPIS Link: *https://marinecadastre.gov/espis/#/search/study/100026*

Conducted by: Louisiana Universities Marine Consortium

National Studies List: GM-09-01-13

Study Products (available in ESPIS): Final report, technical summary



Map of the north-central Gulf of Mexico showing locations of the six offshore oil and gas platforms studied here

Purpose/Information Use:

Oil and gas platforms are potential incubators of invasive species (species that have become established outside of their native range). The successful establishment of an invasive species can lead to a reduction in native plants and animals because the non-indigenous species compete for the same limited resources. Previous surveys have confirmed that the Indo-Pacific coral *Tubastraea micranthus* has colonized platforms south of the Mississippi River mouth. However, scientists are unsure whether the multiple sightings of *T. micranthus* are from one colony spreading through the region or from the species invading the area multiple times. If *T. micranthus* is subject to multiple or repeated invasions, this would make control or eradication difficult. By analyzing the genetics of the colonies, this study sought to determine whether a single or multiple introductions of *T. micranthus* have occurred in the region south of the Mississippi River mouth. This study will provide BOEM with more information on how to best manage *T. micranthus*.

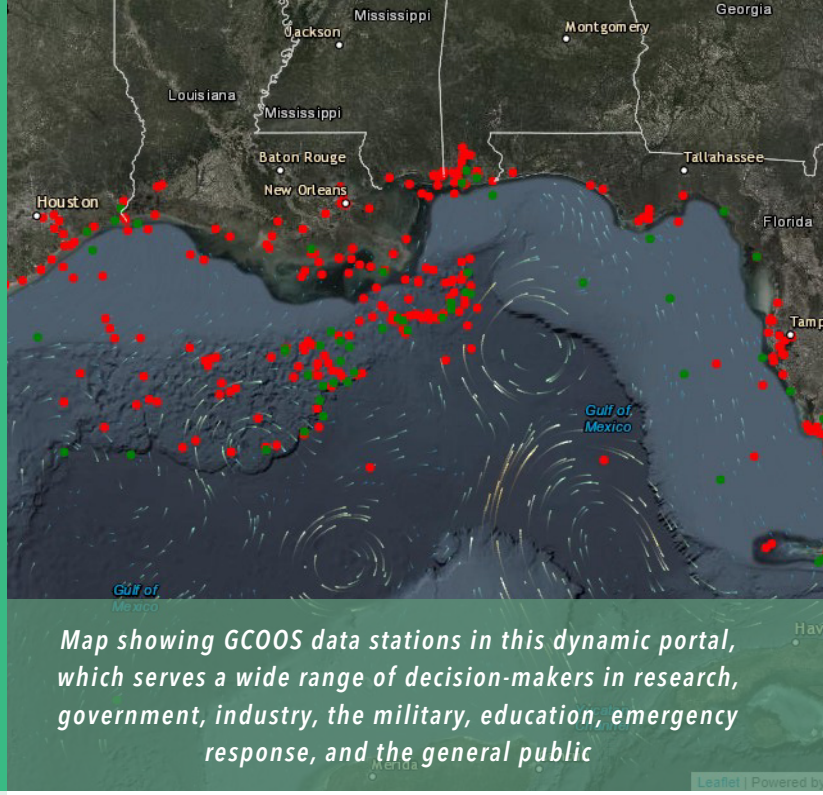
Findings/Results:

- Researchers compared the genetics of *T. micranthus* colonies on two platforms (GI-93C and MC-280A). Samples from the two platforms clearly were genetically distinct from one another, suggesting that the founding individuals were likely genetically distinct.
- There were strong differences in genetic heterogeneity between the two platforms; GI-93C was highly heterogeneous (composed of individuals with different genetic constitutions), and MC-280A was highly homogeneous (composed of individuals with the same genetic constitution). This implies that the two platforms were derived from different sets of recruitment and larval sources.
- The possibility that the low genetic variability found on MC-280A resulted from a second invasion of *T. micranthus* cannot be ruled out; multiple ongoing invasions would thwart attempts to control or eradicate this invasive species.

Final Report:

Sammarco PW. 2017. Genetic affinities in populations of the invasive Indo-Pacific coral Tubastraea micranthus on northern Gulf of Mexico platforms: multiple invasions? New Orleans (LA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 32 p. Report No.: OCS Study BOEM 2017-083.

The Economic Benefits of the Gulf of Mexico Coastal Ocean Observing System (GCOOS)



Map showing GCOOS data stations in this dynamic portal, which serves a wide range of decision-makers in research, government, industry, the military, education, emergency response, and the general public

ESPIS Link: *https://marinecadastre.gov/espis/#/search/study/100027*

Conducted by: Louisiana State University

National Studies List: GM-09-01-15

Study Products (available in ESPIS): Related publications

Purpose/Information Use:

GCOOS is the Gulf of Mexico (GOM) regional component of the U.S. Integrated Ocean Observing System. The program's mission is to deliver reliable and timely GOM data and information to aid forecasting efforts, improve understanding of GOM environmental conditions, and inform decision-making. The long-term data produced by GCOOS has inherent value to BOEM's Environmental Studies Program. This particular study was designed to provide BOEM with a better understanding of the economic value of GCOOS. The study contributed to two contingent valuation surveys—one aimed at vessel users and one targeted at beachgoers—that sought to place a value on expanding GCOOS. By asking about respondents' willingness to pay (WTP), contingent valuation can be used to determine the value of a nonmarket resource.

Findings/Results:

- The WTP of vessel users is estimated to be $25.29 per year. Applying this WTP to all vessel owners in the GOM yields an aggregate WTP of $59.9 million.
- The WTP of beachgoers is estimated to be $11.61 per household per year. Extrapolating this WTP by the number of beachgoing households results in an aggregate WTP of $112.5 million per year.
- While both these aggregate WTP values should be viewed as upper-bound measures, they greatly exceed the projected costs of GCOOS expansion (estimated to be $21 million in capital costs and $20 million in annual costs).

Related Publications:

Petrolia DR, Penn J, Quainoo R, Caffey RH, Fannin JM. 2019. Know thy beach: values of beach condition information. Marine Resource Economics. 34(4):331–359. doi: 10.1086/706248

Plummer CL. 2017. Preferences and values for the Gulf Coast Ocean Observing System [thesis]. Baton Rouge (LA): Louisiana State University. 111 p. https://digitalcommons.lsu.edu/gradschool_theses/4515/

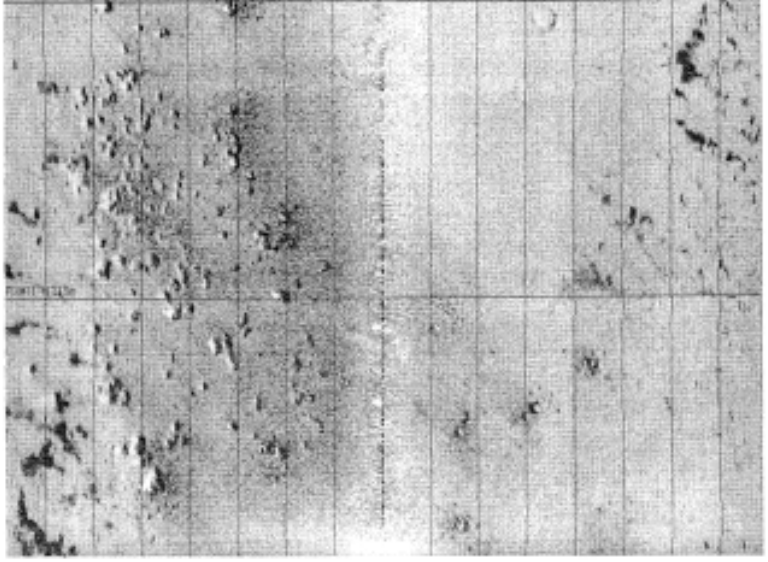
Identifying Sensitive, Hard-bottom Habitat in Shallow, Federal Waters of the Gulf of Mexico

ESPIS Link: *https://marinecadastre.gov/espis/#/search/study/100335*

Conducted by: CSA Ocean Sciences Inc.

National Studies List: GM-21-x05

Study Products (available in ESPIS): Final report, technical summary, data



SIDE SCAN SONAR RECORD OF SURVEY LINE NO. 12 (UNANNOTATED)

The cover image is an evidence of potential hardbottom visible in the side-scan sonar product of a survey

Purpose/Information Use:

Bottom-disturbing activities related to energy exploration and development may impact benthic resources (animals and plants that live on or in the seabed). Though the majority of the Gulf of Mexico (GOM) seafloor is made up of soft sediments (e.g., sand, silt, and clay), hardbottom communities are scattered across the region. Hardbottom habitats are often high in biodiversity and biomass and are sensitive to disturbance. They attract corals and other encrusting organisms, which in turn provide shelter and food to other invertebrates and fish species. BOEM maintains a database of shallow water, hardbottom locations for avoidance and protection, but the information is outdated. The goal of this study was to identify and document the location of sensitive, hardbottom habitat in the shallow, Federal waters of the GOM Outer Continental Shelf (OCS). CSA reviewed existing seafloor surveys of the Central and Western GOM for evidence of hardbottom habitat. BOEM will use the results of this study to update its internal GIS mapping products and other materials for internal and external uses.

Findings/Results:

- Researchers reviewed 237 individual surveys and examined a total of 846 OCS lease blocks (either partially or in their entirety).
- Overall, hardbottom was present or potentially present in 50 percent of the lease blocks reviewed in this study.
- The data from this study will direct future investigations for shallow water, hardbottom features and/or habitat.

Final Report:

CSA Ocean Sciences Inc. 2021. Identifying sensitive, hardbottom habitat in shallow, Federal waters of the Gulf of Mexico: final report. New Orleans (LA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 132 p. Report No.: OCS Study BOEM 2021-069.

Department of the Interior Mission

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

Bureau of Ocean Energy Management

The mission of the Bureau of Ocean Energy Management is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program

The mission of the Environmental Studies Program (ESP) is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).

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