

Environmental Studies Program: Studies Development Plan | FY 2020–2022

Title	Behavioral and Spatial Ecology of the Endangered Giant Manta Ray (<i>Manta birostris</i>)
Administered by	Marine Minerals Program
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Procurement Type(s)	T.B.D.
Performance Period	FY 2020–2023
Date Revised	December 25, 2018
PICOC Summary	Write one or two sentences for each of the following elements, as appropriate.
<i>Problem</i>	Bureau of Ocean Energy Management (BOEM) authorized projects may impact Endangered Species Act (ESA)-listed manta (<i>Manta birostris</i>). Information regarding the population on the Atlantic and Gulf Outer Continental Shelf (OCS) and the site fidelity within specific BOEM lease areas and will aid in consultations under the ESA.
<i>Intervention</i>	Gathering behavioral information on habitat use as well as synthesizing existing telemetry and genomic data (information on distinct population segments) inform assessment of risk associated with BOEM actions.
<i>Comparison</i>	The outcome of this study would <ol style="list-style-type: none"> a) provide for a better understanding of population demographics between ESA-listed and non-listed population mixing; and b) Describe behavioral ecology documented of select large pelagic species such as <i>M. birostris</i>.
<i>Outcome</i>	The outcome will be a reduction in data gaps related to manta sand shoal habitat areas, specifically improving our understanding of fine-scale movement, distinct population segments, and behavior that may be impacted by BOEM activities such as preventative relocation trawling.
<i>Context</i>	Atlantic and Gulf of Mexico (e.g., Canaveral Shoals, Ship Shoals Borrow area)

BOEM Information Need(s): There is considerable risk to not knowing the answers to how the Giant Manta ray (*M. birostris*) use sand shoal ecosystems in the vicinity of borrow areas. Listing of this species on the ESA, as well as declining population, make for a pressing need in understanding risk of impact associated with BOEM managed activities. Direct observations of Manta species interaction with preventative trawling operations in 2017 and 2018 causes an additional level of risk which could potentially be mitigated through additional information. This study could better inform areas to be avoided or seasonal mitigation. Should this study not be funded, it is likely that adverse impacts to this endangered species will continue.

Background: The recent ESA listing of *M. birostris* overlaps spatially and temporally with activities associated with Marine Minerals Program (MMP) borrow areas. Giant manta have been observed during preventative trawling operations within offshore sand resource areas. However, their fine-scale behavior and implication to risk associated in the vicinity of sand shoals is largely unknown.

This study targets understanding of that overlap and risk of interaction with these activities, particularly the Canaveral Shoals borrow area. Although some information on the presence of manta off the southeast U.S. exists, it is not of sufficient detail to understand population demographics, nor the fine-scale behavioral ecology information required to understand interaction with marine mineral operations. This effort leverages the extensive investment in monitoring occurring at Canaveral Shoals borrow area. Results of this study would be applicable to the Marine Minerals, Renewable Energy, and Oil & Gas Programs across the Gulf and Atlantic OCS Regions.

K-selected species like manta exhibit life history characteristics such as matrotrophic reproduction, extremely low fecundity, and a high degree of site fidelity, making manta extremely susceptible to anthropogenic impacts (Dulvy 2008; Dulvy 2014). Additionally, manta are known to move between coastal and offshore waters of the U.S. Gulf of Mexico and Atlantic Coasts and have been shown to exhibit a high degree of site residency, increasing their susceptibility to highly localized anthropogenic impacts (Adams 1993; Dewar 2008; Marshall 2011).

Objectives: The purpose of this study is to understand site fidelity and behavioral ecology of *M. birostris*, and the relationship between their fine-scale behavior and risk from BOEM-permitted activities.

Methods: The study will collect new, and synthesize existing, data in the vicinity of MMP borrow areas to determine risk in relation to habitat use. It will leverage existing data sets collected by government, academia, and non-governmental organization studies. Additional telemetry data will improve fine-scale and site-specific information. Fine-scale habitat use has been described using inertial measurement sensor tags successfully deployed on manta outside the United States (Stewart *et al.*, 2018). Animal-borne sensors which sample at fine-scale intervals, typically sub-second, collect information on pitch, roll, heading, and depth, as well as other oceanographic variables, can be utilized to visualize an animal's behavior. Tag data can be further analyzed with simulated dredge operations. This is similar to methods currently employed in several BOEM studies investigating fine-scale habitat use (Please see [Fine-scale Dive Profiles and Activity Patterns of Sea Turtles in the Gulf of Mexico](#), p. 160).

Specific Research Question(s): How does site fidelity and behavior of *M. birostris* impact risk of interaction with relocation trawling operations on the OCS?

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