Environmental Studies Program: Ongoing Study

Title	Discerning behavioral patterns of sea turtles in the Gulf of Mexico to inform management decisions.
Administered by	Marine Minerals Program
BOEM Contact(s)	Jessica Mallindine (Jessica.mallindine@boem.gov)
Procurement Type(s)	Inter-agency Agreement
Conducting Organization(s)	USGS
Total BOEM Cost	$750,000 (USGS collaborative contributions – $500,000)
Performance Period	FY 2016–2021
Final Report Due	June 2021
Date Revised	July 22, 2021
PICOC Summary	
Problem	The study is collecting a robust data set on dive profiles of both immature and mature endangered Kemp's ridleys and threatened loggerheads of both sexes using coarse depth-bin data summaries provided by satellite tags at the sites of dredging operations.
Intervention	Depth-logging satellite tags can provide precise location data on individual movements and information on their use of various portions of the water column.
Comparison	Despite the impressive body of research available on sea turtle movements, there is still little known about their activities and behavior. Assessing turtle behavior allows scientists to determine dive and locational data from attached satellite tags.
Outcome	This project will provide analysis to inform on in-water aggregations of sub-adult, juvenile and adult marine turtles as well as determination of movement and habitat use which will directly inform BOEM on management strategies throughout its programs and support other on-going BOEM studies.
Context	Research would be conducted under existing USGS permit to tag sea turtles in the Northern GOM.

BOEM Information Need(s): Fine-scale information on dive profiles, life history characteristics, and foraging activity is lacking for sea turtles in the Gulf of Mexico. Combining this fine scale movement information with genetic stock analyses, population demographics, health and foraging studies will allow us to address information gaps as identified through the National Environmental Policy Act (NEPA) process and through Endangered Species Act (ESA) Section 7 consultations as required in BOEM's current authorizations. These authorizations require gathering of missing or incomplete data on species to make informed management decisions within BOEM. Results would support data needs related to hazardous spills and decommissioning activities, dredging and trawling associated with coastal restoration programs, and provide knowledge of sea turtle movements and dive behaviors along with their relationships to critical habitats within BOEM Planning Areas.

Background: Turtles that come ashore to nest, the adult (female) life-stage, is most easily studied but significantly less information is available about habitat use and movements of males, sub-adults and juveniles, which do not come ashore to nest. In a single season, hopper dredge relocation trawling, which is expected to continue over the next several years on GOM restoration projects, captured over 150 ridley young juveniles, sub-adults and adults, loggerhead sub-adults and green young juveniles offering an opportunity to gain much needed knowledge on these life stages.

Opportunistically deploying satellite tags capable of logging dive data along with state-of-the-art acceleration data loggers (ADLs) on turtles captured in association with hopper dredge relocation trawling activities, as required through NMFS consultations to reduce the risk of entrainment of sea turtles, will allow for collection of a robust data sets. These data can provide valuable scientific insight on depth use, movement patterns, mortality risk, utilization of post-dredge sites and dive profiles for all life stages of both sexes. Tags with dive-logging capabilities transmit location information which would provide the data on turtle use of preferred thermal zones of the water column and time spent on the bottom within the vicinity of dredging activities which impacts mortality and entrainment risk. Utilization of data collected on dredge trawlers on which turtles are captured (i.e., by-catch species) can be assessed as a proxy for available diet information and benthic composition of bottom habitat in habitat modeling efforts.

Objectives: Utilize hopper dredge relocation trawling operations to opportunistically tag sea turtles and collect biological samples to inform management decisions related to trawling and dredge operations. Tracking their movements post-relocation may provide data needed to validate the distance needed for relocation and can also inform other program areas such as decommissioning of oil rigs (by evaluating dive times) and optimization of current sea turtle visual and aerial survey efforts using data gathered on time spent in upper two meters of water column.

Methods: The following field methods are proposed utilizing turtle capture through relocation trawling, when required, for coastal restoration dredging projects off the Louisiana coast;

- Flipper, PIT, and satellite telemetry tags would be deployed on all life stages of individuals to track turtles at foraging grounds to determine site-fidelity, depth use, drivers of local movements and track movements of turtles away from and within sampling/capture sites in the dredged borrow area;

- Accelerometer data loggers (ADLs) deployed using a VHF transmitter and galvanic timer release;

- Biological sampling using skin and carapace biopsies and bilateral cervical sinus blood sampling;

- Gastric lavage to sample gut content for diet, isotopes, and collection of opportunistic by-catch species for foraging analysis;

- Sample all turtles for genetics to determine stock of origin and population connectivity relevant to section 7 consultation needs.

A report will be generated by USGS scientists outlining the findings as well as BOEM management suggestions following the collection, processing, and assessment of data gathered. This turtle detection data and report will provide small and large geographic scale analysis allowing investigation of in-water aggregations of sub-adult, juvenile and adult marine turtles as well as determination of fine scale movement and habitat use within the Northern Gulf of Mexico which will directly inform BOEM on management strategies throughout its programs.

Specific Research Question(s): The following hypotheses will address the above objectives: 1) Sea turtles will consistently use discrete foraging areas; 2) Sea turtles at foraging areas will originate from multiple nesting groups; 3) Sea turtle distribution will not be uniform; 4) Resource availability will determine presence/absence and distribution of sea turtle species; 5) Sea turtles will display foraging behaviors relative to dredged areas and these foraging behaviors and subsequent entrainment vulnerability will differ between seasons.

Current Status: A draft scientific paper is pending publication from the first batch of 26 satellite tags. The PIs have fully executed the contract and have submitted the Final report outlined in the proposed statement of work. This contract is being closed out as complete.

Publications Completed: None

Affiliated WWW Sites:

http://www.seaturtle.org/tracking/?project_id=1205

https://www.boem.gov/OS-Nov-2017/

https://www.doi.gov/sites/doi.gov/files/uploads/newswave_spring2017_web.pdf

References: None