Environmental Studies Program: Studies Development Plan | FY 2022–2023

Title	Efficacy of Thermal Detection Technology for Nighttime Protected Species Observer Surveys (MM-22-01)
Administered by	Marine Minerals Program
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Procurement Type(s)	Contract
Conducting Organization(s)	TBD
Total BOEM Cost	TBD
Performance Period	FY 2022–2024
Final Report Due	TBD
Date Revised	February 12, 2021
PICOC Summary	
Problem	BOEM needs to evaluate emerging thermal detection technology alternatives for Protected Species Observers (PSOs) to provide more effective and efficient nighttime surveillance of mammals and sea turtles during BOEM authorized activities (e.g., geophysical and geotechnical (G&G) surveys, dredging, and relocation trawling operations). In conjunction or in lieu of other mitigative monitoring measures, this method has the potential to further reduce risk to species of concern that could be impacted by activities authorized and/or associated with leased areas. It also may reduce costs of mitigative practices put in place to safeguard protected species.
Intervention	Determine the efficacy of use and cost of new thermal detection technologies for nighttime PSO monitoring procedures as compared to traditional visual monitoring during daylight hours and nighttime Passive Acoustic Monitoring (PAM) technologies used within all BOEM program areas.
Comparison	There has been no formal integration and assessment of new thermal detection technology into current mitigative practices. Determination of the efficacy of thermal tools for PSO protocols could modify existing PSO parameters and influence NMFS Biological Opinions and Incidental Take Regulations in the future, while reducing survey and mitigation costs across all BOEM program areas.
Outcome	A quantitative evaluation of the efficacy of thermal detection technology for PSO monitoring procedures. This evaluation of alternative nighttime mitigations as compared to other common mitigation measures will provide a baseline recommendation on future use of this technology, which will directly inform BOEM on mitigation strategies.
Context	Gulf of Mexico and Atlantic OCS

BOEM Information Need(s): Enhanced and continuous cetacean and sea turtle monitoring using new thermal detection technologies during nighttime surveys has been proposed and requested (e.g. by the Texas General Land Office (GLO)) as an alternative or improved method to be used by protected species observers (PSO) during geological and geophysical (G&G) surveys. This method, in conjunction or in lieu

of other nighttime mitigative monitoring measures, has the potential to further reduce risk to species of concern that could be impacted by not just G&G surveys but any activities authorized and/or associated with leased areas, and likely reduce costs of mitigative practices put in place to safeguard protected species. To date, there has been no formal assessment and integration of thermal detection technologies into current mitigative practices. This study aims to establish a quantitative evaluation of the efficacy of thermal detection technology for incorporation into future project management practices. The adoption of this technology could improve PSO standards and influence future NMFS Biological Opinions and Incidental Take Regulations.

Background: In April of 2019 BOEM published The Final Environmental Assessment, Sand Survey Activities for BOEM's Marine Minerals Program, Atlantic and Gulf of Mexico (hereby referred to as the EA). This EA was prepared to evaluate the potential environmental impacts of G&G survey activities that support identification, delineation, monitoring, and scientific investigation of sand resources on the Atlantic and Gulf of Mexico Outer Continental Shelf (OCS). The EA also sets forth the proper environmental mitigation measures required to perform high-resolution G&G sediment search surveys. Since its publication, requests have been submitted to BOEM to replace current nighttime mitigations, which are both limiting and expensive, by adding thermal detection measures to the nighttime protocol requirements outlined in the EA.

Thermal imaging technology, for example, allows up to 24-hour marine mammal and sea turtle surveillance by utilizing thermal imaging, real-time automated distance estimation at sea, and automated recognition of cetaceans as far as 2.5 km away. The technology would allow survey scientists to continually monitor a thermal imaging camera mounted on the vessel which would allow for additional visual observations near the survey equipment source. Although the thermal imaging cameras are designed for cetaceans, sea turtles maintain a higher temperature than seawater allowing the thermal imagining software to detect the small reptiles (Mrosovsky, 1980). The software's ability to detect both cetaceans and sea turtles combined with the relatively small Acoustic Exclusion Zone (AEZ) of 100 m potentially allows for enhanced monitoring at nighttime.

In addition to G&G surveys there are other activities authorized and/or associated with BOEM leased areas that maintain types of mitigative suites to reduce impacts to protected species. Such activities include dredging and relocation trawling operations. Thermal imaging technology was specifically recommended to be incorporated into the suite of available tools to use during nighttime monitoring as a means of enhanced PSO monitoring.

Objectives: Evaluate the efficacy of the use and cost of thermal detection technologies as a means of robust nighttime PSO monitoring procedures as compared to other common mitigation measures, including visual monitoring standards, used during daylight hours and Passive Acoustic Monitoring (PAM) techniques.

The following hypotheses will address the above objective. The use of thermal detection technology at night is 1) comparable to daylight visual standards; 2) increases likelihood of detection of marine mammals and sea turtles by PSOs at night; and 3) a viable alternative to PAM.

Methods: The following methods are proposed to evaluate the efficacy and feasibility of thermal detection technology:

- Conduct research on current available thermal technology to provide metrics, costs, benefits, and tool limitations to ascertain feasibility of implementation relative to current PSO practices

- Conduct field tests of thermal technology to determine range and functionality in various environmental conditions (e.g., fog, sea state, temperature, etc.). Information on sea turtle distribution and behavior from ongoing BOEM studies in the Gulf (i.e., NT-16-07 and MM-19-03) could be used to guide and influence thermal technology field test locations
- Develop and conduct testing to evaluate operations using trained PSOs utilizing thermal detection tools compared to nighttime PAM for marine mammal and sea turtle observations
- Provide a cost-analysis of use of alternative nighttime mitigation practices as compared to traditional mitigations currently being used for activities authorized and/or associated with leased areas within all BOEM program areas

A report will be generated outlining the findings as well as suggestions to BOEM management regarding existing and potential mitigation efficacy following equipment synthesis, testing and analysis of observation data gathered. This evaluation of alternative nighttime mitigations will provide a baseline recommendation on future testing and use of this technology which will directly inform BOEM on mitigation strategies.

Specific Research Question(s):

1. What is the efficacy of thermal detection technologies for PSO monitoring compared to common mitigation measures, such as visual monitoring standards and PAM techniques?
2. Would adoption of thermal imaging technology reduce risk to species of concern impacted by activities authorized and/or associated with leased areas?
3. Would thermal detection technology, in lieu of other mitigations, reduce total costs of mitigative practices put in place to safeguard protected species?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Mrosovsky N. 1980. Thermal Biology of Sea Turtles. Amer. Zool. 20:531-547.