

Environmental Studies Program: Ongoing Study

Title	Atlantic Marine Assessment Program for Protected Species III (AT-19-07)
Administered by	Office of Renewable Energy Programs
BOEM Contact(s)	Timothy White (timothy.white@boem.gov)
Procurement Types(s)	Inter-agency agreement
Conducting Organization(s)	NOAA, NMFS
Total BOEM Cost	\$1,510,000
Performance Period	FY 2019–2024
Final Report Due	August 30, 2024
Date Revised	December 13, 2022
PICOC Summary	
<i><u>Problem</u></i>	Broad scale and long-term data on protected species in the Atlantic are limited. Collection of these data are essential in order to understand the potential effects of BOEM-related activities on these species relative to long-term climatological changes in the environment.
<i><u>Intervention</u></i>	Aerial observations, shipboard observations and oceanographic sampling, telemetry and passive acoustic monitoring can be used to collect ecological data, covering all major species of interest.
<i><u>Comparison</u></i>	This study will build upon the 10 years of baseline data collected previously and provide a comparative data set with which to assess the potential effects of changing environmental conditions and BOEM-related activities on offshore species of interest in the Atlantic.
<i><u>Outcome</u></i>	To understand and differentiate between the potential effects of changing environmental conditions and BOEM-related activities on offshore species of interest in the Atlantic.
<i><u>Context</u></i>	Halifax, Nova Scotia to the southern tip of Florida, from the coastline to the US EEZ.

BOEM Information Need(s): Long-term, broad scale ecosystem-based studies are needed in order to provide updated scientific information on the status of the Atlantic ecosystem for NEPA and ESA consultations, especially when considering potential impacts from BOEM-related activities.

Background: Atlantic Marine Assessment Program for Protected Species (AMAPPS) was initially conceived as a long-term research and monitoring program, partnering with the US Fish and Wildlife Services, National Marine Fisheries Service and the US Navy. A new potential partner could be Fisheries and Ocean Canada. The first 5-year phase ended in FY2015 and the second phase ends in FY2019. Data collected in association with AMAPPS I developed a better understanding of the distribution and characteristics of the species of interest in the Atlantic, as well as the Atlantic oceanic environment itself. Strong annual variability was detected in the NE Atlantic (Palka et al., 2017). Moving forward it is imperative to continue this broad scale ecological data collection, as well as some fine scale focus on areas and species of interest. These data are needed in order to detect any climatological or other

effects on this ecosystem that may be happening with or without the influence of BOEM-related activities on the outer continental shelf.

Objectives: To collect broad scale and site-specific ecological data to enable the identification of possible climatological trends and/or potential effects to marine protected species in the US Atlantic, as well as the potential stressors, including the highly endangered North Atlantic right whale.

Methods: Standard line transect surveys from aerial and vessel-based platforms, potentially using drone technology; oceanographic sampling of the water column using standardized techniques; passive acoustic monitoring using appropriate hydrophone recorders, arrays and analytical software. Telemetry tagging and/or suction cup tagging for species of interest.

Specific Research Question(s):

1. What is the trend in environmental variability along the Atlantic?
2. Can changes in species distribution or behavior be attributed to any BOEM-related activities or other factors?
3. A) Where and when are protected species, for example, North Atlantic right whales and sea turtles, detected? B) Why are they located in these areas?

AMAPPS III activities by category:

- **SPATIAL-TEMPORAL DISTRIBUTION PATTERNS AND ABUNDANCE ESTIMATES OF PROTECTED SPECIES:** Document the spatial-temporal distribution patterns and abundance estimates of protected species, which can then be used to assess current population sizes in addition to investigate trends, variability and their relationships to longer-term climatological changes in their physical and biological environment
- **PASSIVE ACOUSTIC ANALYSIS SUPPORT:** Maintain support to conduct ongoing analyses of passive acoustic data collected through AMAPPS surveys. This includes continuing to analyze the voluminous existing datasets (towed hydrophone array, HARP and MARU), as well as analyzing new data collected throughout AMAPPS III. Request funds to cover a portion of contract analyses that will be required to meet our objectives.
- **AT-SEA MONITORING OF THE DISTRIBUTIONS OF PELAGIC SEABIRDS IN THE NORTHEAST U.S. SHELF ECOSYSTEM:** This project will add visual survey teams to future Oceans and Climate Branch Ecosystem Monitoring (EcoMon) cruises to collect broad-scale observer data over multiple years on the seasonal distribution and abundance of seabirds, marine mammals (cetaceans and pinnipeds), and turtles using direct shipboard observations (AMAPPSIII 1.c). The visual survey team will use similar methods used during Atlantic Marine Assessment Program for Protected Species (AMAPPS) surveys; standard strip transect methods supplemented with distance data. Data management procedures will follow AMAPPS protocols, and be entered into the AMAPPS Oracle database. EcoMon surveys collect concurrent hydrographic and plankton samples from four regions of the Northeast Continental Shelf Ecosystem (Mid-Atlantic Bight, Southern New England, Georges Bank, and Gulf of Maine) 3-4 times per year.
- **OPPORTUNISTIC PLANKTON SAMPLING OFF THE NORTHEAST U.S. SHELF AND SLOPE SEA:** Opportunistic plankton sampling (AMAPPSIII 1.a) has been occurring as a part of AMAPPS and the Oceans and Climate Branch plans to continue to collect plankton samples for zooplankton and ichthyoplankton analysis.

- **SEA TURTLE ECOLOGY:** The general objective of this program is to continue (at a lower level) the ongoing AMAPPS loggerhead ecology program and to grow the AMAPPS leatherback ecology program --The loggerhead program is focused in the Greater Atlantic Area, from North Carolina northwards, and represents a 10-year time series of water column temperature patterns and loggerhead distribution and behavior. These data, (along with the many biological samples that have been collected) can be used to evaluate the trend in environmental variability along the Atlantic, to detect changes in distribution and/or behavior, and to investigate causes for patterns in turtle distribution and habitat utilization. Continuing this time series will enable us to investigate distribution and behavior changes, which may be occurring due to environmental changes. The leatherback program covers the Western Atlantic from Florida northward. It began as a pilot project in AMAPPS II, and we is growing it into a full program to address the same types of ecological issues as the loggerhead program.
- **USING VERY HIGH-RESOLUTION SATELLITE IMAGERY TO DETECT CETACEANS:** Several recent technological advances make this technology on the cusp of operational feasibility: 1) the launch of the Maxar WorldView-3 satellite with 30cm resolution, 2) the planned launch of the Maxar Legion program with dramatically improved revisit rates, 3) proof of concept academic studies, and 4) advances in deep learning tools which enable semi-automated identification and classification of objects. The operational detection of cetacean species from very high-resolution satellite imagery is of joint interest and application to both BOEM and NOAA.

Current Status:

Field work continues into 2023.

Publications Completed:

- Chavez-Rosales S, Palka DL, Garrison L, Josephson E. 2019. Environmental predictors of habitat suitability and occurrence of cetaceans in the western North Atlantic Ocean. *Scientific Reports*. 9(5833):1-11. doi: 10.1038/s41598-019-42288-6.
- Cholewiak D, DeAngelis AI, Palka D, Corkeron P, Van Parijs SM. 2017. Beaked whales demonstrate a marked acoustic response to the use of shipboard echosounders. *Royal Society Open Science*. 4(170940):1-15. doi: 10.1098/rsos.170940.
- DeAngelis A, Stanistreet J, Baumann-Pickering S, Cholewiak D. 2018. A description of echolocation clicks recorded in the presence of True's beaked whale (*Mesoplodon mirus*). *Journal of the Acoustical Society of America*. 144(5):2691-2700. doi: 10.1121/1.5067379.
- DeAngelis A, Valtierra R, Van Parijs S, Cholewiak D. 2017. Using multipath reflections to obtain dive depths of beaked whales from a towed hydrophone array. *Journal of the Acoustical Society of America*. 142(2):1078-1087. doi: 10.1121/1.4998709.
- Patel SH, Barco SG, Crowe LM, Manning JP, Matzen E, Smolowitz RJ, Haas HL. 2018. Loggerhead turtles are good ocean-observers in stratified mid-latitude regions. *Estuarine, Coastal and Shelf Science*. 213:128-136. doi: 10.1016/j.ecss.2018.08.019.
- Patel SH, Dodge KL, Haas HL, Smolowitz RJ. 2016. Videography reveals in-water behavior of loggerhead turtles (*Caretta caretta*) at a foraging ground. *Frontiers in Marine Science*. 3(254):1-11. doi: 10.3389/fmars.2016.00254.

Sigourney DB, Chavez-Rosales S, Conn PB, Garrison L, Josephson E, Palka D. 2020. Developing and assessing a density surface model in a Bayesian hierarchical framework with a focus on uncertainty: Insights from simulations and an application to fin whales (*Balaenoptera physalus*). PeerJ. 8(e8226):1-22. doi: 10.7717/peerj.8226.

White, T. P., and R. R. Veit. 2020. Spatial ecology of long-tailed ducks and white-winged scoters wintering on Nantucket Shoals. *Ecosphere* 11(1):e03002. 10.1002/ecs2.3002

Affiliated WWW Sites:

<https://www.nefsc.noaa.gov/psb/AMAPPS/>

<https://www.fisheries.noaa.gov/feature-story/surveys-collect-data-year-round-marine-life-along-us-east-coast>

<https://www.fisheries.noaa.gov/feature-story/2019-northeast-fall-ecosystem-monitoring-cruise-concludes>

<https://www.fisheries.noaa.gov/feature-story/monitoring-northeast-shelf-ecosystem>

References:

Davis GE, Baumgartner MF, Bonnell JM, Bell J, Berchok C, Bort Thornton J, Brault S, et al. 2017. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (*Eubalaena glacialis*) from 2004 to 2014. *Scientific reports* 7, no. 1: 1-12.

Pace RM, Corkeron PJ, Kraus SD. 2017. State–space mark–recapture estimates reveal a recent decline in abundance of North Atlantic right whales. *Ecology and Evolution*. DOI: 10.1002/ece3.3406.

Palka DL, Chavez-Rosales S, Josephson E, Cholewiak D, Haas HL, Garrison L, Jones M, Sigourney D, Waring G, Jech M, Broughton E, Soldevilla M, Davis G, DeAngelis A, Sasso CR, Winton MV, Smolowitz RJ, Fay G, LaBrecque E, Leiness JB, Warden DM, Murray K, Orphanides C. 2017. Atlantic Marine Assessment Program for Protected Species: 2010-2014. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Atlantic OCS Region, Washington, DC. OCS Study BOEM 2017-071. 211 p.