Environmental Studies Program: Ongoing Study

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<tr>
<th>Title</th>
<th>Atlantic Marine Assessment Program for Protected Species II (AT-14-03)</th>
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<td>National Oceanic and Atmospheric Administration, Northeast and Southeast Fisheries Science Centers</td>
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<td>Total BOEM Cost</td>
<td>$9,096,000</td>
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<td>Performance Period</td>
<td>FY 2014–2020</td>
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<td>Final Report Due</td>
<td>June 20, 2020</td>
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**PICOC Summary**

**Problem**
Broad scale and long-term ecological 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.

**Intervention**
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.

**Comparison**
This study will build upon the 5 years of baseline data collected previously and provide a comparative data set with which to identify changing environmental conditions and assess the potential impact of BOEM-related activities on offshore species of interest in the Atlantic.

**Outcome**
Accurate abundance estimates, distribution, ecology, and behavior of marine mammals, sea turtles, and seabirds throughout the US Atlantic.

**Context**
Maine to the southern tip of Florida, from the coastline to the US EEZ.

**BOEM Information Need(s):** BOEM requires abundance and distribution information about protected marine mammal and sea turtle species for consultations under the Endangered Species Act and Marine Mammal Protection Act. Stock assessments are used to calculate take requirements for industry permits. In addition, offshore observations of bird distributions are limited but growing. These surveys allow for concurrent collection of avian information and expansion of baseline knowledge about birds offshore.

**Background:** The first 5 years of the Atlantic Marine Assessment Program for Protected Species (AMAPPS) was a collaborative program involving BOEM, U.S. Navy, NOAA Fisheries, and U.S. Fish and Wildlife Service. The program focuses on collecting seasonal data on the abundance, distribution, and behavior of marine mammals, sea turtles, and seabirds throughout the U.S. Atlantic EEZ and providing spatially explicit information in a format that can be used by Federal decision makers with living marine
resource responsibilities. The primary tools for the assessment of population abundance and spatial distribution are aerial and shipboard line-transect surveys. These surveys typically employ visual detection of animals at the surface, though more recently passive acoustic monitoring has been incorporated into these surveys to improve detection of marine mammals. AMAPPS II will continue the work of the original program in conducting surveys of the entire Atlantic EEZ in each season in replicate surveys. AMAPPS has, and will continue to support tagging of sea turtles. AMAPPS is also actively coordinating with other BOEM, NOAA, U.S. Fish and Wildlife Service, U.S. Navy, and Department of Energy funded efforts that are surveying and modeling the density, abundance, and distribution of marine mammals, sea turtles, and seabirds.

AMAPPS was initially conceived as a long-term research and monitoring program, and the first 5-year phase ended in FY2015. Although great strides have been made in improving the base knowledge regarding the abundance and distribution of marine mammals, sea turtles, and seabirds, important information gaps remain. For the next 5-year phase (FY2014-FY2019), core survey work will need to continue, particularly given the dramatic inter-annual differences in oceanographic conditions within just the first three years (2010-2012) of AMAPPS. Fine or finer scale surveys will also likely be required, along with continued efforts to integrate and cross-validate fine-scale and broad-scale survey results. Additional emphasis could be placed on tagging seabirds, cetaceans, and seals both to inform survey corrections and to gather information on behavior, seasonal movements, and habitat use. Current AMAPPS efforts are incorporating more passive acoustic survey and monitoring efforts to learn more about large whale behavior, movements and habitat use. Analytical and modeling results from the first phase of AMAPPS is helping to inform which of these various topics will be most fruitful to focus on during the next 5-year phase.

Objectives: The objective of this study is to improve the knowledge base of Federal agencies with living marine resource responsibilities through improved surveys of marine mammals, sea turtles, and avian species. This will be accomplished by the following tasks:

- Collect broad-scale data over multiple years on the seasonal distribution and abundance of marine mammals (cetaceans and pinnipeds), sea turtles, and sea birds using fixed passive acoustic monitoring direct aerial and shipboard surveys of U.S. Atlantic Ocean waters;
- Collect distribution and abundance data at finer scales at several sites of particular interest to BOEM, NOAA, and their partners using visual and acoustic survey techniques;
- Conduct tagging studies of protected species to develop corrections for availability bias in the abundance survey data and to investigate behavior and ecology of species in areas of interest;
- Collect additional data on life-history and ecology, including habitat use, residence time, frequency of use, and behavior;
- Identify currently used, viable technologies and explore alternative platforms and technologies to improve population assessment studies, if necessary; and
• Assess the population size of surveyed species at regional scales; and develop models and associated tools to translate these survey data into seasonal, spatially explicit density estimates incorporating habitat characteristics.

• Collect long-term ambient noise data in U.S. Atlantic Ocean waters.

**Methods:** Visual sightings of cetaceans, seabirds, sea turtles, and seals from shipboard and aerial surveys; acoustic detections of vocalizing cetaceans and fish from ship-towed and bottom-mounted passive acoustic recorders; and location/depth information telemetered to satellites from radio tags affixed to turtles, seals, and cetaceans. Physical water characteristics and distribution and densities of various fish and planktonic trophic levels are documented using the following: Conductivity-temperature-depth (CTD); Video Plankton Recorder (VPR); Bongo nets; Multiple Opening/Closing Net Environmental Sensing System (MOCNESS); Issac Kidd Midwater Trawls (IKMT); a modified 1x2m neuston net, midwater trawls; paired go-pro video cameras; Didson high definition imaging sonar; an Imaging Flow Cytobot, and multifrequency Simrad EK60 echosounders.

**Specific Research Question(s):**

1. What is the abundance, distribution, ecology, and behavior of marine mammals, sea turtles, and seabirds throughout the US Atlantic?

2. What environmental factors affect the distribution of surveyed species?

**Current Status:** The 2018 Annual Report is available at [http://www.nefsc.noaa.gov/psb/AMAPPS/](http://www.nefsc.noaa.gov/psb/AMAPPS/). From April to June 2019, the NE and SE aerial abundance surveys were conducted, covering 20,200 km from Nova Scotia to Florida. Some of the interesting sightings included white-beaked dolphins, Cuvier’s beaked whales, killer whales, and entangled right whales. In addition, gray and harbor seal haul-out sites in Maine and Massachusetts were photographed. In the SE interesting sightings included bubble feeding humpback whales, Kogia and Cuvier’s beaked whales, along with lots of turtles off of Florida. A cooperative survey was undertaken in late April with the University of Rhode Island that took place south of Cape Cod to shelf break. The physical and biological characteristics of the water were sampled using bongo nets, passive acoustics and visual observers. Seabird observers collected data on May and July WHOI cruises and on the Spring and Summer EcoMon cruises. 19 MARUs from the broad-scale passive acoustic monitoring of the US eastern seaboard continental shelf were recovered in May – July. The 8 HARPs from the shelf break acoustic monitoring of the US eastern seaboard were recovered in July-Sept and the data are currently being extracted by Scripps Institution of Oceanography. Analysis of towed hydrophone array data from SEFSC 2016 shipboard cetacean abundance survey (GU1605) to assess Kogia distribution was completed. There were 24 Kogia detections across 46 days analyzed. While Kogia species cannot yet be reliably distinguished acoustically, based on the available information, we expect that most detections are likely *Kogia sima*. The maximum detection range based on several localizable individuals was 500m. Analysis of towed hydrophone array data from SEFSC 2016 shipboard cetacean abundance survey (GU1605) to assess beaked whale distribution was completed. There were 263 detections of beaked whales found across
43 days analyzed. Five species were detected (Cuvier’s, Gervais’, True’s, Sowerby’s, and Blainville’s beaked whales). Distinguishing between True’s and Gervais’ beaked whales remains difficult. Additional visually-verified recordings of Gervais’ beaked whales are required to develop methodologies to reliably discriminate the two species.

Joint SE-NE Leatherback Tagging in MA - mid to late August 2019. Deployed 9 satellite tags in Cape Cod Bay; all moved out of the Bay and into southern New England waters within a week of being tagged. Collaborative leatherback suction cup tagging in MA - September. Simultaneously collecting data on animal behavior (including surface duration) and improving capability of tags. Two new collaborative tags incorporating acoustic components (as well as a new hybrid suction cup-satellite tag) were successfully deployed multiple times. Also working collaboratively with DFO on a multi-day tag.

Conducted Offshore Cetacean Ecology survey from Aug 17-29, 2019. Visual team highlights were ~73 groups of beaked whales and 4 Kogia mother-calf pairs. Focal follow data were collected on several beaked whale groups to quantify surface availability and dive times. The seabird team documented several unusual species (highlighted by NPR). eDNA samples, tag and focal follow data collected during the NEFSC 2018 Offshore Cetacean Ecology survey are being processed. All of the line transect survey data from 2010 to 2018 have been audited and initial distance sampling analyzes have been conducted for shipboard and aerial surveys. Once the fronts’ data becomes available, updated density-habitat models will be developed and included in the AMAPPS II final report.

The data collected during AMAPPS is contributing to multiple ongoing efforts including:

- Visual-passive acoustic join analysis to estimate abundance of sperm whales that also includes availability bias correction;
- exploring ways to propagate uncertainty using two-step method to estimate a habitat-density model;
- With help from staff from the Ecosystems Dynamics and Assessment Branch at the Narragansett NEFSC lab, new and improved satellite derived data (SST, chlorophyll a, primary productivity, particulate inorganic and organic carbon) have been developed from 2010 to 2018;
- collaboration with Scott Baker and Debbie Steel at Oregon State University to assess the efficacy of eDNA sampling for identifying cryptic, deep-diving cetacean species;
- High-quality identification photographs of beaked whales taken during the NEFSC offshore cetacean ecology survey in July/August 2018 were requested by collaborators at the SWFSC for the purposes of compiling a manuscript on the field identification of Mesoplodon beaked whales; manuscript preparation is in process.

AMAPPS also continues to provide extremely important data regarding the highly endangered North Atlantic right whale. Results from bottom-mounted recorder data, including MARU and HARP data collected during AMAPPS II, were used in conjunction
with visual models to assess right whale seasonal occurrence in lobster management areas. Dr. Jason Roberts from Duke University is using right whale daily presence information derived from passive acoustic data to compare to monthly predictions of right whale occurrence from habitat-based density models, which are based on visual sightings. This work is ongoing.

AMAPPS II will be completed in June 2020.

**Publications Completed:**


Garrison, L.P., and Rosel, P.E. 2017. Partitioning short-finned and long-finned pilot whale bycatch estimates using habitat and genetic information. Southeast Fisheries Science Center, Protected Resources and Biodiversity Division, 75 Virginia Beach Dr., Miami, FL 33140. PRBD Contribution # PRBD-2016-17, 24 pp.


**Affiliated WWW Sites:**

- https://marinecadastre.gov/espis/#/search/study/100066
- http://www.nefsc.noaa.gov/psb/AMAPPS/
- https://www.nefsc.noaa.gov/AMAPPSviewer/
- http://www.nefsc.noaa.gov/psb/acoustics/
- http://www.nefsc.noaa.gov/psb/turtles/turtleTracks.html
- http://www.seaturtle.org/tracking/?project_id=510