Protected Species Monitoring in the Cape Hatteras, Onslow Bay and Jacksonville OPAREAs

Cape Hatteras, NC

Onslow Bay, NC

Jacksonville, FL

Final Report (January 2012 – December 2012)

April 22, 2013

Executive Summary

This is the fifth progress report of a monitoring program for protected marine species in waters offshore Cape Hatteras and Onslow Bay, North Carolina and Jacksonville, Florida. The results of aerial line transect surveys and vessel-based photo-ID surveys and passive acoustic monitoring are reported for the period from January 2012 through December 2012. Density estimates for marine mammals and sea turtles were generated from data collected during aerial and vessel-based surveys. In Onslow Bay, five years of monitoring has yielded a comprehensive picture of the density, distribution and abundance of marine mammals and sea turtles and has provided insights to residency patterns among delphinids in this region. Over three years of monitoring in Jacksonville has similarly provided information on the density and distribution of marine mammals and sea turtles in this area. In Cape Hatteras, two years of monitoring surveys have provided preliminary information on the distribution and diversity of the marine mammals and sea turtles in this highly productive area.

Study Areas

The site off Cape Hatteras, North Carolina is subsumed within the Navy's Atlantic Fleet Active Sonar Training (AFAST) Monitoring Program. The survey area encompasses approximately 16,000 km² and includes continental shelf waters and deeper waters beyond the shelf break (Figure 1-a). Twenty six tracklines ranging from 73.5 to 81.5 km long, and orientated perpendicular to the coastline, transect the survey area. The survey area includes a large portion of the Cape Hatteras Special Research Area (CHSRA), designated by NOAA Fisheries to address interactions between short-finned pilot whales (*Globicephala macrorhynchus*) and the pelagic longline fisheries. The survey area excludes coastal waters to minimize survey effort in areas where the spatial distribution and relative abundance of coastal bottlenose dolphins is reasonably well understood (Torres *et al.* 2003; Torres *et al.* 2005).

The study area in Onslow Bay encompasses the region previously proposed by the Navy as an Undersea Warfare Training Range (USWTR). The survey area is 25 nm (46 km) long and 20 nm (37 km) wide (approximately 1700 km^2) and extends 20 nm in each direction past the proposed boundaries of the original USWTR. Aerial survey effort in Onslow Bay was reallocated to the

Cape Hatteras survey area in May 2011; therefore, vessel survey effort was the only monitoring method in Onslow Bay in 2012.

Like the other two study sites, the survey area off Jacksonville, Florida encompasses the proposed Jacksonville (JAX) USWTR site and, like that in Onslow Bay, is 25 nm (46 km) long and 20 nm (37 km) wide (approximately 1700 km^2). The survey area straddles the continental shelf and Blake Plateau and includes neritic, shelf waters and pelagic, offshore waters (Figure 1-c). The ten survey tracklines in JAX are longer (86 km) than those in the Cape Hatteras area to allow complementary survey coverage in the USWTR area with that of the Early Warning (EWS) aerial surveys for North Atlantic right whales (*Eubalaena glacialis*).

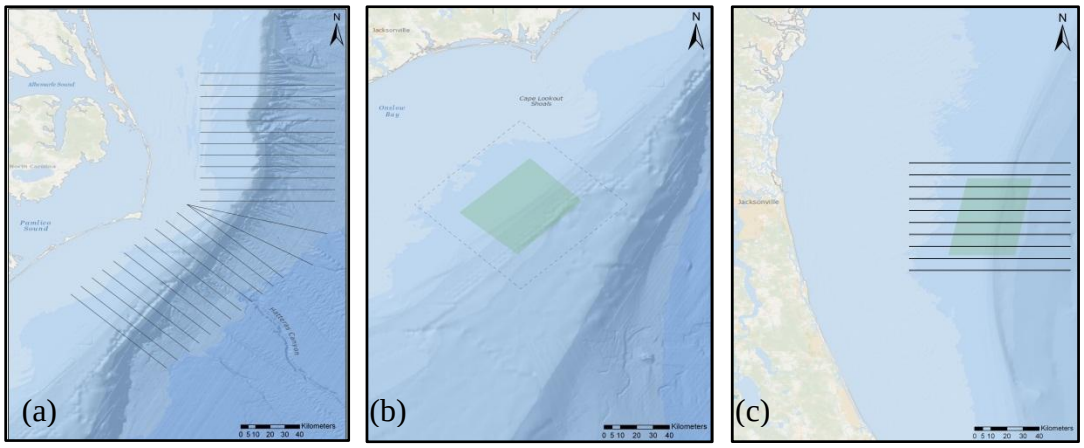

Figure 1. Maps depicting the survey areas and tracklines used for vessel and aerial surveys: (a) Cape Hatteras, NC; (b) Onslow Bay, NC; and (c) Jacksonville, FL.

<u>Aerial Surveys for Cetaceans and Sea Turtles – Cape Hatteras</u>

Researchers from the University of North Carolina Wilmington (UNCW) and Duke University conducted aerial surveys off Cape Hatteras between January 2012 and December 2012. The goal was to conduct two days of effort each month, covering a subset of the 26 tracklines that cover the area. This goal was achieved in January, March, May, June and December. During the months of February, August, September and November, a single survey day was achieved; during the remaining three months surveys were not conducted due to unfavorable weather conditions. Thus, a total of 134 tracklines (9186 km) were covered during the reporting period. Survey conditions were dominated by Beaufort Sea State (BSS) 3, although effort was conducted from a BSS 1-5. A total of 148 sightings of 3699 cetaceans were encountered while on effort.

Thirteen species of cetaceans were documented, including bottlenose dolphins (*Tursiops truncatus*; 48 sightings of 943 individuals), short-finned pilot whales; (*Globicephala macrorhynchus*; 30 sightings of 372 individuals), Cuvier's beaked whales (*Ziphius cavirostris*; 14 sightings of 40 individuals), mesoplodont beaked whales (*Mesoplodon* spp; 10 sightings of 25 individuals), common dolphins (*Delphinus delphis*; 7 sighting of 565 individuals), Atlantic spotted dolphins (*Stenella frontalis*; 7 sightings of 348 individuals), humpback whales (*Megaptera novaeangliae*; four sightings of 4 individuals), Risso's dolphins (*Grampus griseus*; four sightings of 31 individuals), sperm whales (*Physeter macrocephalus*; four sightings of 10 individuals), fin whales (*Balaenoptera physalus*; four sighting of 7 individuals), striped dolphins (*Stenella coeruleoalba*; four sightings of 775 individuals), melon-headed whales (*Peponocephala electra*; two sightings of 395 individuals), Clymene dolphins (*Stenella clymene*; two sightings of 165 individuals), and minke whales (*B. acutorostrata*; two sightings of four individuals). A total of 80 sea turtle sightings were recorded during this survey period, including 71 loggerhead (*Caretta caretta*) turtles and one leatherback (*Dermochelys coriacea*) turtle. In addition to cetaceans and sea turtles, other pelagic marine vertebrates (e.g. a small number of shark species, manta rays and ocean sunfish) and two whale sharks were observed. Commercial, Coast Guard, Navy and recreational vessels were also encountered in the survey area.

Vessel-Based Surveys for Cetaceans and Sea Turtles – Cape Hatteras

In 2012, researchers at Duke University conducted dedicated vessel-based surveys (423.9 km) in conjunction with a pilot whale behavioral response study (625.5 km) in the Cape Hatteras survey site. Approximately 1050 km were surveyed, totaling 155.6 hours of survey effort. During 16 field days, 130 sightings of eight species were recorded, including: fin whales (n = 1), common dolphins (n = 11), short-finned pilot whales (n = 52), Risso's dolphins (n = 2), sperm whales (n = 4), Atlantic spotted dolphins (n = 2), bottlenose dolphins (n = 54), Cuvier's beaked whales (n = 1) and three unidentified delphinids. Two sightings of loggerhead sea turtles and one unidentified sea turtle were also recorded during vessel surveys. Forty eight biopsy samples were collected from common dolphins (n = 5), pilot whales (n = 33), and bottlenose dolphins (n = 10). Approximately 4111 digital images were taken during the reporting period for species confirmation and 2635 were analyzed for individual recognition. Twenty seven bottlenose

dolphins were added to the catalog although there were no matches made in 2012. One hundred seventeen short-finned pilot whales, photographed during behavioral follows conducted as part of the controlled sound exposure research, were also added to the existing catalog. A number of these pilot whales were matched to photo-identification catalogs from previous tagging and biopsy work in the Cape Hatteras survey area.

Passive Acoustic Monitoring – Cape Hatteras

Researchers from Duke University conducted vessel-based and fixed passive acoustic monitoring in the Cape Hatteras survey site. During three days of vessel surveys, a four-element hydrophone array was towed behind the vessel, resulting in 33.8 hours of passive acoustic recordings. Whistles were detected during 23.2 hours of the recording time and clicks were detected during 19.0 hours of the recording time. Species identification for acoustic detections was not possible due to high sea states that prevented positive visual confirmation of all animals in the area, but species included: pilot whales (*Globicephala* spp.) and bottlenose dolphins. Additionally, there was a single acoustic detection of sperm whale clicks.

During a two day deployment, approximately 18 hours of passive acoustic recordings were collected by an autonomous glider. Whistles were detected during 12.9 hours and clicks were detected during 8.0 hours of the total recording time.

In 2012, two HARP deployments and one HARP recovery occurred at Cape Hatteras at one site (Site A) located along the shelf break at 950-970 m depth. Both HARPs were programmed to sample continuously at 200 kHz. The data from the first HARP deployment have been analyzed. Detections of marine mammals included: fin whale 20-Hz pulses (7.1% of recording effort), minke whale pulse trains (8.1%), *Kogia* spp. clicks (0.02%), Risso's dolphin clicks (0.4%), sperm whale clicks (10.3%), beaked whale spp. clicks (0.3%), and unidentified odontocete whistles, clicks, and burst-pulses (77.2%). Eleven beaked whale click events were recorded, and spectral characteristics of the detected clicks are similar to clicks of *Mesoplodon europaeus* (8 events) and *Ziphius cavirostris* (3 events).

Vessel-Based Surveys for Cetaceans and Sea Turtles – Onslow Bay

Researchers from Duke University conducted shipboard surveys for marine mammals and sea turtles in the Onslow Bay survey site. Over 420 km were surveyed, totaling 31.5 hours of survey effort. Most survey effort was conducted in BSS 2 to 3 (70.8%) and 26.6% of effort was conducted in less than ideal sighting conditions (BSS 4). Twelve cetacean sightings were recorded during vessel surveys consisting of Risso's dolphins (n = 1), *Mesoplodon* spp. (n = 2), Atlantic spotted dolphins (n = 1), bottlenose dolphins (n = 7) and one unidentified small whale. As in previous years, bottlenose dolphins were observed in both shallow and deep waters across the continental shelf break, whereas spotted dolphins were observed only in shallow waters over the continental shelf. Survey effort that extended beyond the propose USWTR and in deeper water resulted in two observations of *Mesoplodon* spp. Two sightings of loggerhead sea turtles were recorded during vessel surveys in Year Five. Fifteen biopsy samples were collected from Risso's dolphins (n = 5), spotted dolphins (n = 2) and bottlenose dolphins (n = 8). Over 1440 digital images were taken during the reporting period for species confirmation and individual identification. Photo-identification analysis is now complete for all images taken through December 2012. Since the beginning of the monitoring program in 2007, seven bottlenose dolphins and three Atlantic spotted dolphins have been re-sighted (Figure 12). In total, approximately 5% of bottlenose dolphins (7 of 139) and 4% (3 of 78) of Atlantic spotted dolphins identified in Onslow Bay have been re-sighted, despite limited sampling effort. These re-sightings suggest some degree of residency for both bottlenose dolphins and Atlantic spotted dolphins within the study area.

Passive Acoustic Monitoring – Onslow Bay

In 2012, two HARP recoveries and two HARP deployments occurred in Onslow Bay at one site (Site E) located just east of the vessel survey area at 850-950 m depth. In all deployments, the instruments were programmed to record at a sample rate of 200 kHz for five-minute periods, separated by an inactive interval of five minutes. Analysis of the two HARPs recovered during 2012 has not yet occurred; however, analysis of the HARP data from the 2010-2011 Site A deployment was completed. Detections of marine mammals included: blue whale Type A and B

calls (2.0% of recording effort); fin whale 20-Hz pulses (3.3%); minke whale pulse trains (1.7%); North Atlantic right whale up-calls, moans, and variable calls (0.02%); possible sei whales (0.4%); *Kogia* spp. clicks (0.01%); Risso's dolphin clicks (0.5%); sperm whale clicks (0.2%); and unidentified odontocete whistles, clicks, and burst-pulses (15.6%). As found in previous winter deployments at Site A, a strong pulse of longer-duration and clustered unidentified odontocete vocal events was found during the 2010-2011 deployment, starting in November and ending in January.

Aerial Surveys for Cetaceans and Sea Turtles – Jacksonville

Researchers from UNCW and Duke University conducted aerial surveys off Jacksonville, Florida between January 2012 and December 2012. The goal was to survey the entire site (10 tracklines) twice per calendar month, and during the months of January, April, May, and July we achieved those goals. No surveys were conducted in February, June, August, October and December due to unfavorable weather conditions. Thus, a total of 120 tracklines (9853 km) were surveyed during the reporting period. A total of 75 sightings of 1153 cetaceans were recorded while on effort in the study area. Six species of cetaceans were observed including bottlenose dolphins (*Tursiops truncactus*; 35 sightings of 351 individuals), Atlantic spotted dolphins (*Stenella frontalis*; 28 sightings of 657 individuals), Risso's dolphins (*Grampus griseus*; 6 sightings of 75 individuals), rough-toothed dolphins (*Steno bredanensis*; two sightings of 63 individuals), short-finned pilot whales (*Globicephala macrorhynchus*; one sightings of two individuals), and a humpback whale (*Megaptera novaeangliae*; one sighting of a single individual). There were no sightings North Atlantic right whales (*Eubalaena glacialis*) during the reporting period. The number of cetacean sightings varied by month, with the highest number of encounters in January, March, July and September. A total of 319 sea turtles were recorded during the study period, including 274 loggerhead (*Caretta caretta*), and 17 leatherback (*Dermochelys coriacea*) turtles. Sea turtles were observed during each month surveyed, with highest numbers recorded in March 2012. In addition to cetaceans and sea turtles, other pelagic marine vertebrates (e.g. multiple species of sharks, manta rays, and ocean sunfish) and a single whale shark were observed. Commercial, Navy and recreational vessels were also encountered in the survey area.

Vessel-Based Surveys for Cetaceans and Sea Turtles – Jacksonville

Researchers from Duke University and UNCW conducted vessel-based surveys in the Jacksonville, Florida survey area. Ten vessel surveys were conducted in 2012, totaling 937.4 km, or 58.6 hours, of marine mammal and sea turtle surveys. Most survey effort was conducted in BSS 2 to 3 (82.2 %) and 14.9 % in optimal (BSS 1) sighting conditions. Forty one cetacean sightings were recorded during vessel surveys consisting of spotted dolphins (n = 14), bottlenose dolphins (n = 23), and unidentified delphinids (n = 4). Similar to previous years, Atlantic spotted dolphins were largely restricted to the relatively shallow shelf waters, whereas bottlenose dolphins were encountered throughout the survey area with one group detected in deeper offshore waters (Figure 8). Forty nine sea turtles were observed and included loggerhead sea turtles (n = 41), leatherback sea turtles (n = 4) and Kemp's ridley sea turtles (n = 1). Thirty one biopsy samples were collected from Atlantic spotted dolphins (n = 19) and bottlenose dolphins (n = 12). Approximately 949 digital images were taken for species confirmation and individual identification during vessel surveys. Images of newly identified dolphins were added to existing catalogs (Table 8) and photo-identification analysis is now complete for all images taken through December 2012. Photo-identification catalogues for *Tursiops truncatus* and *Stenella frontalis* currently consist of 41 and 60 individuals, respectively. Two individual spotted dolphins have been re-sighted within the Jacksonville survey area, however, there were no matches made in 2012.

Passive Acoustic Monitoring – Jacksonville

In 2012, one HARP was deployed in Jacksonville at one site (Site A; 91 m) but was never recovered. Retrieval and search trips were made but yielded no results toward recovery. All recovery attempts have now been halted for this HARP. Analysis of data from four HARP deployments (05A, 05B, 06A, and 06B) was completed by members of the Scripps Whale Acoustics Lab. Detections of marine mammals during this time period (August 2010 – July 2011) at Site A included: fin whale 20-Hz pulses (0.3% of recording effort), minke whale pulse trains (0.7%), possible sei whales (0.04%), a 5-pulse sound likely produced by a mysticete (0.8%), Risso's dolphin clicks (0.6%), and unidentified odontocete whistles and clicks (58.7%).

Detections of marine mammals during this time period (August 2010 – July 2011) at Site B included: humpback whale calls (0.01% of recording effort); minke whale pulse trains (0.01%), and unidentified odontocete whistles and clicks (24.1%). Overall rates of unidentified odontocete detections were higher at Site A than B. A greater number of Risso's click detections were observed in the August 2010 – July 2011 data sets than in previous data sets.