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AMAPPS Spring 2023 Research Cruise Report

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AMAPPS Spring 2023 Research Cruise

NOAA Ship *Gordon Gunter* (GU2301)

January – April 2023

Cruise report

NMFS MMPA/ESA Permit No. 21938

November 2023

Background

As part of the Atlantic Marine Assessment Program for Protected Species (AMAPPS), the Southeast Fisheries Science Center (SEFSC) conducted shipboard surveys of the U.S. waters of the Western North Atlantic (WNA) from approximately the 200m isobath out to the U.S. Exclusive Economic Zone (EEZ). The survey was conducted between January 23 and April 28, 2023 onboard the NOAA Ship *Gordon Gunter,* for a total of 44 days at sea split into three survey legs. Multiple days were lost due to mechanical problems with the ship and unfavorable weather conditions. A daily log of cruise and survey operations is provided on Table 1.

The survey design was similar to other SEFSC line-transect surveys in the Atlantic Ocean and Gulf of Mexico (Garrison et al., 2016; Rappucci et al., 2019). The ship surveyed along prescribed tracklines in a "double saw-tooth" configuration perpendicularly oriented to bathymetry lines. The main goal of this survey was to collect data on the distribution and abundance of marine mammals in the U.S. waters of the WNA using visual survey teams and passive acoustic detections.

Survey objectives

The specific objectives of this survey were to:

1. Conduct a two-team independent visual line-transect survey to estimate the spatial distribution and abundance of marine mammal species in the U.S. WNA waters;
2. Collect passive acoustic recordings simultaneous with visual surveys to augment information on the spatial distribution and abundance of marine mammal species;
3. Collect data on the distribution and number of seabirds and other marine life;
4. Conduct plankton tows during the nighttime;
5. Collect vertical profiles of hydrographic parameters using conductivity, temperature, and depth sensors;
6. Recover and redeploy autonomous acoustic moorings (NRS07).

Visual Survey Operations

During the survey, the two-team independent approach with Distance sampling was implemented to estimate the detection probabilities for marine mammal sightings (Laake and Borchers, 2004). This method uses two teams of visual marine mammal observers that operate independently of one another. One team of two observers was stationed on the vessel's flying bridge (FB) with a height above the water of 13.9 m. The second team of two observers was stationed on the bridge deck (a.k.a bridge wings-BW) and observed from 11.2 m above the water. Both teams utilized pedestal mounted big eye binoculars located on the port and starboard sides of the ship. A centralized data recorder was located inside the ship and communicated with both teams via discreet VHF channels. Using the big eye binoculars, observers relayed the relative bearing and the distance as reticle readings of sightings to the data recorder. If observing without big eye binoculars (a.k.a. naked eye), the location of sightings was relayed in approximate relative bearings and distance in meters from the ship. Marine mammal sightings were defined as systematic records of cetaceans consisting of one or more individuals observed at the same location and time.

Scientific personnel rotated throughout the entire survey and primarily consisted of experienced marine mammal observers (MMO), acoustic technicians, sea bird observers and plankton tow specialists (Table 2).

Visual survey effort commenced with daylight at approximately 0700 EDT and ended at 1900 EDT, depending on operational requirements and survey conditions. Survey speed was typically 18 km hr^{-1} (10 kt) but varied with ship traffic and sea conditions such as ocean currents.

Before commencing effort and subsequently every 20 minutes, observers on the flying bridge relayed survey conditions, such as Beaufort sea state, cloud cover, glare presence and intensity, visibility through the big eyes, and presence or absence of precipitation to the data recorder. Visual teams were considered "on effort" whenever the ship was steadily cruising on a prescribed or transit trackline and observers were actively searching for marine mammals through the big eye binoculars. Whenever an observer suspected or had in fact seen a marine mammal, data on the relative bearing and distance was relayed to the data recorder as a "cue". A cue is a descriptor of what was seen first that drew the attention of the observer to the location of the potential sighting and could be "marine mammal", "splash", "blow", "birds", "other", etc. Once both observers from that team were focused on the cue, the team was marked as "off effort". Data were recorded for each team by the data recorder using a custom written visual data acquisition program (VisSurvey) installed on a networked laptop that generates a Microsoft Access® Database.

The survey was primarily conducted in "passing mode" whereby the ship maintains a steady course and speed while the observers locate and identify the marine mammal species to the lowest taxonomic level possible and estimate the number of individuals in each sighting. Differently to "closing mode", where the ship approaches groups of mammals, in "passing mode" species identification can be challenging due to distance, hence leading to a high number of unidentified species sightings. FB and BW teams were isolated from one another and could communicate with each other once it was determined by the data recorder (mainly based on location) that both teams had detected the same sighting. Identification of species could be discussed among observers. However, group size counts, as the minimum, maximum, and best numbers of individuals in each sighting were independently estimated by each observer.

Observers were considered to be "off effort" whenever the ship was maneuvering and turning onto a new trackline, if other operations were taking place (e.g., safety drills, etc.), during unfavorable survey conditions (rain, sea state >6, poor visibility due to fog, lightning or a combination of factors), and whenever not actively searching for marine mammals through the big eye binoculars (naked eye observations were recorded as off effort). Sightings observed under such conditions were recorded as off effort and may also have included sightings detected by non-mammal observers, mammal observers off duty, or other crew (including ship's crew). Non-marine mammal sightings, such as sea turtles and fish were opportunistically recorded by observers from the flying bridge team only.

Visual Survey Results

During this survey, 5,260 km of trackline were visually surveyed by a single or dual team (on effort) (Table 1). Due to unfavorable survey conditions, tracklines, or portions of them, may have been surveyed without the use of big eye binoculars (i.e. naked-eye observations) and were recorded as off effort (Table 1). Due to mechanical problems with the ship, leg 1 (Feb 2 - 9) was dedicated to transiting from Pascagoula, MS to a dry dock in Norfolk, VA, therefore only the FB team was active and no proposed tracklines were surveyed (Figure 1). Between 10 Feb and 8 March, the ship was on dry dock under maintenance and science personnel were dismissed. After a 6-day delay, the second leg of the survey was conducted between March 16 - 30 and tracklines north of VA were surveyed (Figure 1). For leg 3, the ship departed Norfolk, VA on April 4, and surveyed tracklines off NC. On April 20, the ship started transiting south and on the 25th entered the Gulf of Mexico, finally arriving in Pascagoula, MS on the 28th. For two days (April 26-27) the ship surveyed the Rice's whale core area (Table 1, Figure 1).

Overall, survey conditions were fair to moderate with an average sea state of 4.1 on the Beaufort scale (Table 1, Figure 1). There were a total of 444 marine mammal sightings from 18

confirmed species (Table 3). Common dolphins (*Delphinus delphis*) were the most frequently recorded species with 61 sightings (14%) followed by common bottlenose dolphins (*Tursiops truncatus*) and sperm whales (*Physeter macrocephalus*) with 38 sightings each (9%) (Table 3, Figures 2 and 3). Of the Stenellid dolphins, Atlantic spotted (*Stenella frontalis*) and Striped dolphins (*S. coeruleoalba*) were the most commonly seen, with 18 and 16 sightings, respectively (Table 3, Figure 2). Identified baleen whale species included one sighting of a Blue whale (*Balaenoptera musculus*) and nine of Humpback whales (*Megaptera novaeangliae*) (Table 3, Figure 3). Large delphinids included 28 sightings of pilot whales (*Globicephala* sp.), 10 of Risso's dolphins (*Grampus griseus*) and two of false killer whales (*Pseudorca crassidens*) (Table 3, Figure 4). Unidentified species totaled 130 sightings (29%) (Table 3, Figure 5). On April 18, a dead sperm whale (*P. macrocephalus*) was located close to the EEZ (Figure 3).

Passive Acoustics Survey

Passive acoustic recordings were collected concurrent with visual surveys during daylight hours using an experimental autonomous towed hydrophone array system (ATHAS; Barlow, 2021). The ATHAS consists of a polycarbonate tube with grooved end caps that allow seawater to flow through it, an autonomous Soundtrap acoustic recorder (Ocean Instruments; Auckland, New Zealand), and a 13 m rope tail. The ATHAS was deployed at distances up to 300 m behind the ship (tow line), and towed at an average of 10 m depth, using a Z-wing150 downrigger (Nekton LLC; Natick, MA). This is the first cruise during which the SEFSC used an ATHAS, and several pilot deployments were completed to assess the tow depth (using a dive watch) as a function of speed and the recording quality. Deployments from April 12 to April 14 set the Z-wing at 30 m ahead of the tow-body, yielding an average deployment depth of 3.5 m at 10 knots. Deployments from April 17 to April 26 set the Z-wing at 50 m ahead of the tow-body, yielding an average deployment depth of 10 m.

Throughout leg 3 of the cruise, one of two ATHAS setups were deployed. The first setup, deployed from April 12 to April 24, used a 2 ft tube with a single-channel ST300HF recorder with the built-in hydrophone facing aft. The hydrophone has a -172.8 dB re V/uPa sensitivity with a flat frequency response (+/- 3 dB) from 20 Hz to 150 kHz. The second ATHAS setup, deployed on April 25 and April 26, used a 4 ft tube with a multi-channel ST4300HF recorder with two HTI-96-min hydrophones, spaced 50 cm apart, held in place with a custom mounting frame. The HTI96min hydrophones have a -165 dB re V/uPa sensitivity with a flat frequency response (+/- 2 dB) from 500 Hz to 160 kHz.

The Soundtrap recorders were configured for recording using SoundTrap Host software on a Dell Latitude 5580 laptop. The recorder was set to continuously record 10 min sud files, sampling 16 bits at 576 kHz over one or 2 channels, yielding a recording bandwidth of 500 Hz - 288 kHz. On April 12, the high-pass filter was off and the preamplifier gain was set to high (+12 dB), yielding noisy recordings with excessive clipping. From April 13 - 26, the 400 Hz high-pass filter was on and preamplifier gain was set to low.

The software Pamguard (v.1.15.15; Gillespie et al. 2008) was used to log survey and deployment metadata. Following each deployment, all acoustic recordings were downloaded from the ST4300 recorder and converted from sud files to wav files using SoundTrap Host software. Files were stored and backed up on 6 TB external SATA hard drives. A total of 104 hours of acoustic recordings were collected over 10 days, yielding 488 GB of data. These recordings will be analyzed in post processing to improve estimates of sperm whale and beaked whale abundance and to develop acoustic species classification algorithms for acoustic species identification.

Passive Acoustic Mooring

As part of NOAA's Ocean Noise Reference Station Network (NRS) project, the NRS07 buoy was refurbished during this cruise. The NRS buoy was deployed to continuously record sounds up to 2.5 kHz for two years with the objective of collecting calibrated long-term recordings of ambient noise to allow comparisons of noise conditions among sites in US waters and over time. The NRS buoy was recovered and redeployed on April 22, 2023, roughly 160 nm from the coast of Daytona Beach FL.

Sea Bird Survey

Sea bird observers conducted counts of all birds detected within a 300m strip from the ship during all legs of the survey. Sea bird observers were generally on effort while marine mammal operations were taking place but also performed observations while marine mammal observers were not on effort. A total of 442 birds were recorded with Herring gulls (*Larus smithsonianus*) being the most abundantly observed (28%) (Table 4).

Scientific Echosounder Data Collection

No echosounder data were collected.

Environmental Data

Environmental data were collected at predetermined stations using a conductivity, temperature, and depth sensor (CTD) unit. CTD casts recorded vertical profiles of depth, conductivity, salinity, temperature, and oxygen content to a maximum depth of approximately 500m. CTD casts were performed daily, before commencing visual survey effort in the morning. Between March 20 and April 20, a total of 97 CTD casts were performed in the study area (Figure 6).

Marine Mammal Biopsy Sampling

No marine mammal biopsy sampling was conducted.

Plankton Sampling

Plankton was sampled using a standard MARMAP double oblique tow with a 61-cm Bongo net equipped with 2 - 333 micron mesh nets. Towing speeds of 1.5-2.0 knots (2.8-3.7 km/h) were used during all casts and vessel speed was adjusted during the bongo tow to maintain a 45º wire angle to uniformly sample throughout the water column. Maximum depth (m) of the bongo was monitored in real-time using a CTD. Sample depth was 5 m above the bottom depth or to a maximum depth of 200 m. One net was preserved in 5 % formalin and one in 95 % ethanol from each bongo tow. A total of 97 plankton stations were sampled on the cruise (Figure 6).

Data Disposition

All data collected during this survey are stored at the Southeast Fisheries Science Center (SEFSC) Miami network server. This server is backed up off site. The data presented here are preliminary and subject to change as further auditing and analyses are performed.

The 97 formalin preserved samples were sent to the Morski Instytut Rybacki in Szczecin, Poland for zooplankton and ichthyoplankton processing. The remaining 97 ethanol preserved samples are being stored at a Southeast Fisheries Science Center facility.

Research Permit

The Southeast Fisheries Science Center was authorized to conduct marine mammal research activities during this survey under the National Marine Fisheries Service (NMFS), Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) Permit No. 21938.

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Tables

The data presented here are preliminary and subject to change as further auditing and analyses are performed.

Table 1: Daily cruise and survey operations during GU2301. *includes naked-eye sightings (off effort); **on effort.

Leg	Date	Activity	Visual effort (km)			Ave. sea state**	Num. mammal sights.*	Acoustic effort (hr)	Num. plankton stations
			on	off*	total				
NA	1/23	Travel / load / setup ship	0.0	0.0	0.0	-	0	0	0
NA	1/24	Travel / load / setup ship	0.0	0.0	0.0	-	0	0	0
NA	1/25	Original departing day / delay	0.0	0.0	0.0	-	0	0	0
NA	1/26	Delay	0.0	0.0	0.0	-	0	0	0
NA	1/27	Delay	0.0	0.0	0.0	-	0	0	0
NA	1/28	Delay	0.0	0.0	0.0	-	0	0	0
NA	1/29	Delay	0.0	0.0	0.0	-	0	0	0
NA	1/30	Delay	0.0	0.0	0.0	-	0	0	0
NA	1/31	Delay	0.0	0.0	0.0	-	0	0	0
NA	2/1	Delay	0.0	0.0	0.0	-	0	0	0
NA	2/2	Depart / abort / delay	0.0	0.0	0.0	-	0	0	0
1	2/3	Depart Pascagoula, MS	0.0	0.0	0.0	-	0	0	0
1	2/4	Survey ops (mammals, seabirds) during transit	6.6	167.6	174.2	5.2	1	0	0
1	2/5	Survey ops (mammals, seabirds) during transit	167.3	26.8	194.1	3.7	13	0	0
1	2/6	Survey ops (mammals, seabirds) during transit	82.0	129.7	211.7	4.3	2	0	0
1	2/7	Survey ops (mammals, seabirds) during transit	158.4	54.4	212.7	3.7	9	0	0
1	2/8	Survey ops (mammals, seabirds) during transit	172.1	18.9	191.0	4.7	3	0	0
1	2/9	Arrive in Norfolk, VA	0.0	0.0	0.0	-	0	0	0

Leg	Date	Activity	Visual effort (km)			Ave. sea state**	Num. mammal sights.*	Acoustic effort (hr)	Num. plankton stations
NA	2/10 to 3/08	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/9	Travel	0.0	0.0	0.0	-	0	0	0
NA	3/10	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/11	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/12	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/13	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/14	Delay	0.0	0.0	0.0	-	0	0	0
NA	3/15	Delay	0.0	0.0	0.0	-	0	0	0
2	3/16	Depart Norfolk, VA	0.0	0.0	0.0	-	0	0	0
2	3/17	Survey ops	72.7	37.6	110.4	5.7	0	0	0
2	3/18	Shelter for unfavorable weather	0.0	0.0	0.0	-	0	0	0
2	3/19	Shelter for unfavorable weather	0.0	0.0	0.0	-	0	0	0
2	3/20	Survey ops (mammals, seabirds, plankton)	191.6	11.3	202.9	4.1	19	0	2
2	3/21	Survey ops (mammals, seabirds, plankton)	173.8	37.4	211.2	3.6	34	0	5
2	3/22	Survey ops (mammals, seabirds, plankton)	164.7	54.4	219.1	2.9	54	0	4
2	3/23	Survey ops (mammals, seabirds, plankton)	170.3	38.0	208.3	5.3	18	0	5
2	3/24	Survey ops (mammals, seabirds, plankton)	156.9	34.8	191.7	4.0	21	0	6
2	3/25	Survey ops (mammals, seabirds, plankton)	186.7	10.7	197.4	4.6	11	0	5
2	3/26	Survey ops (mammals, seabirds, plankton)	43.6	13.7	57.4	3.2	3	0	1

Leg	Date	Activity	Visual effort (km)			Ave. sea state**	Num. mammal sights.*	Acoustic effort (hr)	Num. plankton stations
2	3/27	Survey ops (mammals, seabirds, plankton)	113.9	15.6	129.5	4.6	10	0	4
2	3/28	Survey ops (mammals, seabirds, plankton)	164.1	33.4	197.5	3.9	20	0	7
2	3/29	Survey ops (mammals, seabirds, plankton)	127.0	83.0	210.0	5.3	25	0	4
2	3/30	Arrive in Norfolk, VA	0.0	0.0	0.0	-	0	0	0
NA	4/1	In port	0.0	0.0	0.0	-	0	0	0
NA	4/2	In port	0.0	0.0	0.0	-	0	0	0
NA	4/3	In port	0.0	0.0	0.0	-	0	0	0
3	4/4	Depart Norfolk, VA	0.0	0.0	0.0	-	0	0	0
3	4/5	Survey ops (mammals, seabirds, plankton)	196.4	17.3	213.7	5.1	1	0	1
3	4/6	Survey ops (mammals, seabirds, plankton)	187.0	5.6	192.6	4.7	5	0	6
3	4/7	Survey ops (mammals, seabirds, plankton)	146.6	30.3	176.9	4.8	30	0	5
3	4/8	Unfavorable weather	0.0	0.0	0.0	-	0	0	0
3	4/9	Unfavorable weather	0.0	0.0	0.0	-	0	0	0
3	4/10	Unfavorable weather	0.0	0.0	0.0	-	0	0	0
3	4/11	Survey ops (mammals, seabirds, plankton)	175.0	43.2	218.2	3.3	8	0	5
3	4/12	Survey ops (mammals, seabirds, plankton)	135.8	58.3	194.1	5.9	2	12.9	5
3	4/13	Survey ops (mammals, seabirds, plankton)	169.2	5.7	174.9	4.9	9	11.9	1

Leg	Date	Activity	Visual effort (km)			Ave. sea state**	Num. mammal sights.*	Acoustic effort (hr)	Num. plankton stations
3	4/14	Survey ops (mammals, seabirds, plankton)	109.0	66.9	175.9	3.6	46	0	6
3	4/15	Survey ops (mammals, seabirds, plankton)	137.4	44.2	181.5	3.7	18	0	2
3	4/16	Survey ops (mammals, seabirds, plankton)	222.1	2.5	224.6	4.3	5	0	6
3	4/17	Survey ops (mammals, seabirds, plankton)	115.7	30.9	146.6	5.2	6	11.3	5
3	4/18	Survey ops (mammals, seabirds, plankton)	169.7	26.6	196.3	4.7	4	2.6	1
3	4/19	Survey ops (mammals, seabirds, plankton)	147.3	42.5	189.8	3.5	13	13.4	6
3	4/20	Survey ops (mammals, seabirds, plankton)	226.2	17.7	243.9	2.9	31	13.4	5
3	4/21	Survey ops (mammals, seabirds)	230.6	7.1	237.7	3.8	7	11.2	0
3	4/22	Survey ops (mammals, seabirds), Recover 2021 NRS07, deploy 2023 NRS07	88.8	5.4	94.2	4.6	4	0	0
3	4/23	Personnel transfer	0.0	0.0	0.0	-	0	0	0
3	4/24	Survey ops (mammals, seabirds)	166.6	30.0	196.6	3.5	2	13.7	0
3	4/25	Survey ops (mammals, seabirds) during transit	197.7	36.8	234.6	2.2	6	13.4	0
3	4/26	Survey ops (mammals,	178.7	13.0	191.7	3.5	3	0.2	0

Leg	Date	Activity	Visual effort (km)			Ave. sea state**	Num. mammal sights.*	Acoustic effort (hr)	Num. plankton stations
		seabirds) during transit							
3	4/27	Survey ops (mammals, seabirds) during transit	108.5	15.3	123.8	5.0	1	0	0
3	4/28	Arrive in Pascagoula, MS	0.0	0.0	0.0	-	0	0	0
Total			**5260.0**	**1266.6**	**6526.8**	**4.1**	**444**	**104**	**97**

Table 2: Scientific personnel during GU2301.

Name	Affiliation	Role	Legs
Allison Black	CIMAS	Sea bird observer	2 and 3
Amanda Jacobsen	NEFSC	Plankton ops	3
Anthony Martinez	SEFSC Miami	Field Party Chief	1, 2 and 3
Audy Peoples	NEFSC	Plankton ops	1
Chris Haney	CIMAS	Sea bird observer	1
Chris Hoefer	CIMAS	Marine Mammal Observer	2 and 3
Felipe Triana	CIMAS	Marine Mammal Observer	1, 2 and 3
Heidi Malizia	CIMAS	Marine Mammal Observer	1, 2 and 3
Jon Andrew	CIMAS	Sea bird observer	2 and 3
Jonathan Reid	CIMAS	Acoustician	3
Juan Carlos Salinas	CIMAS	Marine Mammal Observer	1, 2 and 3
Laura Dias	SEFSC Miami, CIMAS	MMO, Data manager	1
Ludovic Tenorio	CIMAS	Acoustician	1
Mary Applegate	CIMAS	MMO, Data manager	1, 2 and 3
Nick Metheny	CIMAS	Sea bird observer	1
Paula Olson	CIMAS	Marine Mammal Observer	1, 2 and 3
Samuel Chavez	NEFSC	Marine Mammal Observer	2 and 3
Tom Ninke	CIMAS	Marine Mammal Observer	1, 2 and 3

Affiliations: SEFSC = NOAA Southeast Fisheries Science Center; NEFSC = NOAA Northeast Fisheries Science Center; CIMAS = Cooperative Institute for Marine and Atmospheric Studies at the University of Miami.

Table 3: Number of marine mammal sightings for each leg during GU2301.

Species or taxa	Num. - Leg 1	Num. - Leg 2	Num. - Leg 3	Num. - Total
Atlantic spotted dolphin	3	2	13	18
Blue whale		1		1
Bottlenose dolphin	3	7	28	38
Bottlenose or Atlantic spotted dolphin		1		1
Clymene dolphin		1	1	2
Common dolphin		43	18	61
Cuvier's beaked whale			2	2
Dwarf sperm whale			2	2
False killer whale	1		1	2
Fraser's dolphin		1		1
Gervais' beaked whale			1	1
Humpback whale		3	6	9
Melon-headed or Pygmy killer or False killer whale			1	1
Pantropical spotted dolphin	1			1
Pilot whales	3	10	15	28
Pygmy or Dwarf sperm whale		1	10	11
Pygmy sperm whale			2	2
Risso's dolphin	4	6		10
Rough-toothed dolphin	1			1
Sei or Fin or Bryde's-like whale		1		1
Sperm whale	3	19	15	37
Stenellid dolphin	1	11	4	16
Striped dolphin		14	2	16
Unidentified baleen whale		12	8	20
Unidentified dolphin	4	66	47	117
Unidentified large whale	1	2	3	6
Unidentified mesoplodont	1	3	10	14
Unidentified odontocete	1	1	2	4
Unidentified rorqual		4		4
Unidentified small whale		1	2	3
Unidentified ziphiid	1	5	8	14
Total	**28**	**215**	**201**	**444**

Table 4. Number of sea birds observed during GU2301. Species observed during transit not included.

Seabird species	Num. - Leg 1	Num. - Leg 2	Num. - Leg 3	Num. - Total
American Robin		1		1
Atlantic Puffin		18	8	26
Audubon's Shearwater			30	30
Band-rumped Storm-Petrel		3	1	4
Barn Swallow			1	1
Black Scoter			2	2
Black-capped Petrel	11	6	22	39
Black-legged Kittiwake		8	1	9
Bonaparte's Gull	11	10	3	24
Brown Booby			7	7
Brown Pelican			1	1
Brown Thrasher			1	1
Common Tern			1	1
Cory's Shearwater			2	2
Dark-eyed Junco		1		1
Dovekie		2	2	4
Golden-crowned Kinglet		1		1
Great Black-backed Gull		3	1	4
Great Blue Heron			1	1
Greater Shearwater		3	10	13
Herring Gull	6	95	17	118
Leach's Storm-Petrel			5	5
Lesser Black-backed Gull			2	2
Manx Shearwater		10	4	14
Northern Flicker		1		1
Northern Fulmar		12		12
Northern Gannet		2	2	4
Osprey			1	1
Pomarine Jaeger	1	1	4	6
Red Phalarope			1	1
Red-throated Loon		2		2
Red-winged Blackbird			1	1
Song Sparrow		1		1
Sooty Shearwater			1	1
Unidentified alcid		9	2	11
Unidentified blackbird		1		1
Unidentified jaeger		2	2	4

Seabird species	Num. - Leg 1	Num. - Leg 2	Num. - Leg 3	Num. - Total
Unidentified Laridae		13	2	15
Unidentified passerine		4	1	5
Unidentified phalarope	1	12	2	15
Unidentified Pterodroma	1			1
unidentified shearwater		2	4	6
Unidentified shorebird (European “wader”)		2	2	4
Unidentified Sterna tern		1		1
unidentified storm-petrel		1	2	3
Unidentified tern		3	6	9
Unidentified warbler			1	1
Wilson's Storm-Petrel			5	5
Total	**31**	**230**	**161**	**422**

Figures

The data presented here are preliminary and subject to change as further auditing and analyses are performed.

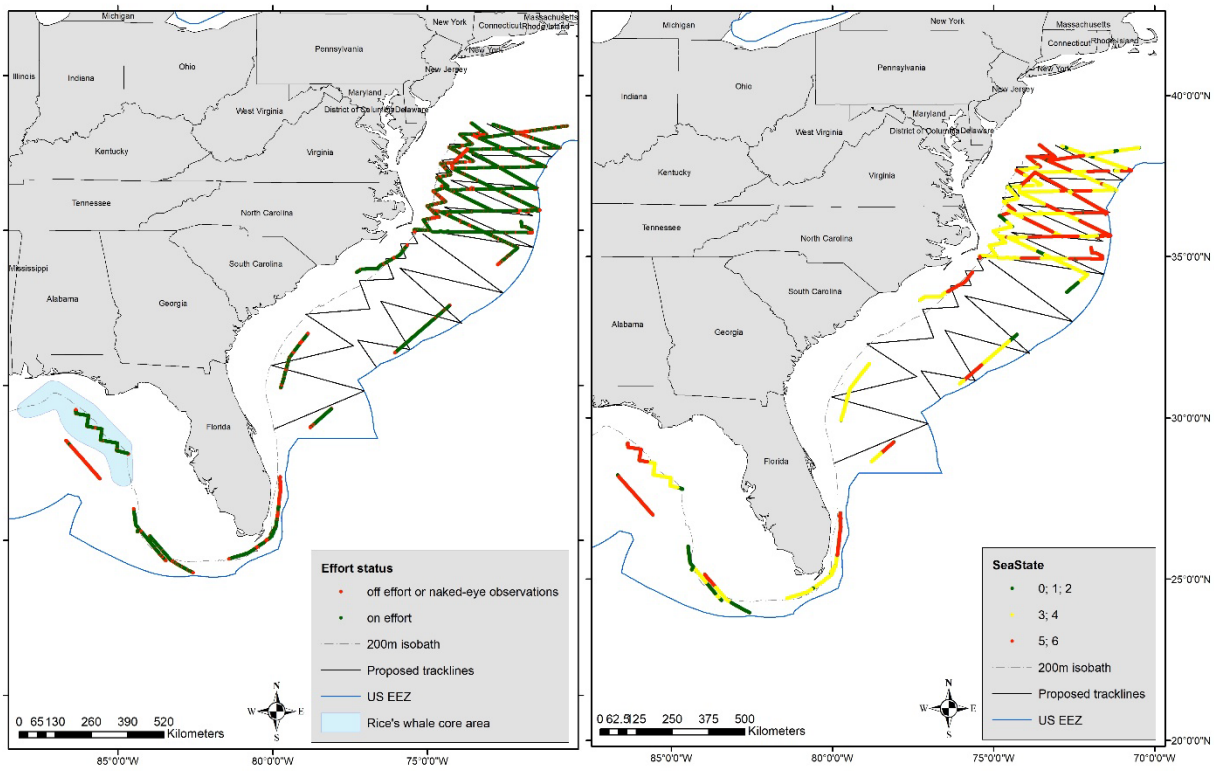

Figure 1. Proposed survey tracklines, accomplished effort and sea state conditions during GU2301.

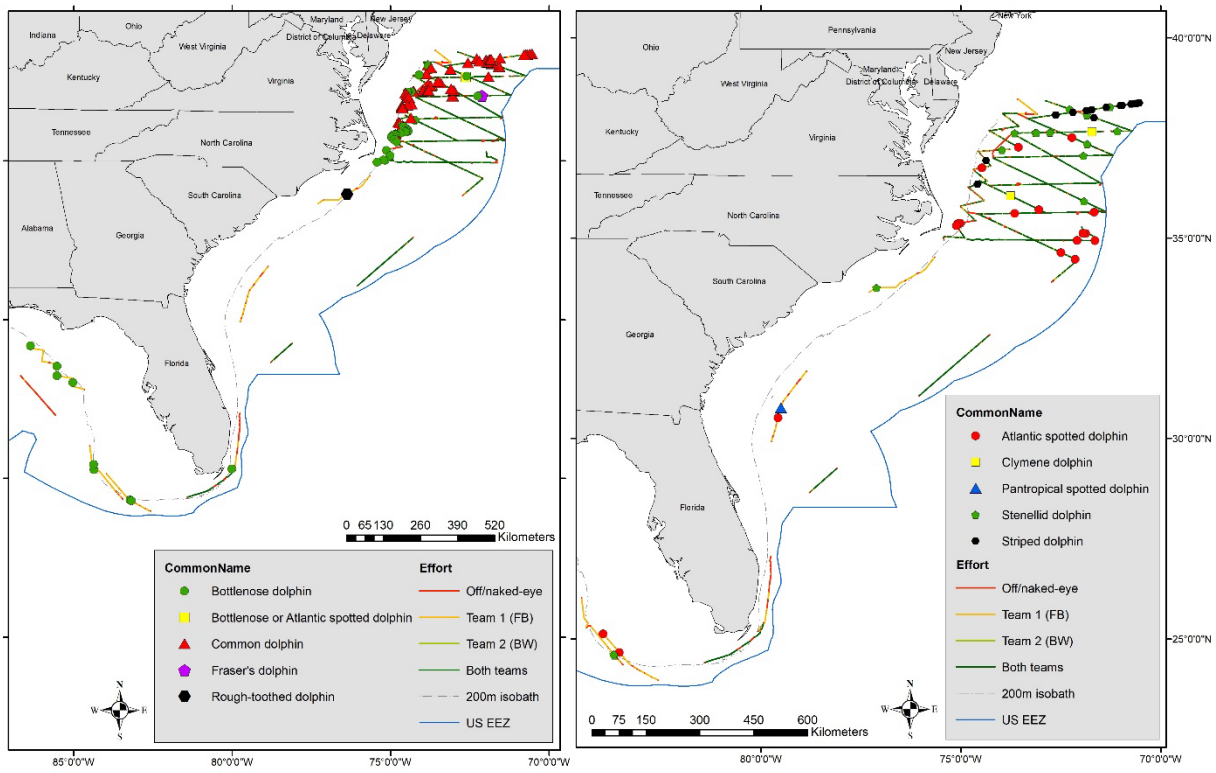

Figure2. Delphinids observed and survey effort during GU2301 .

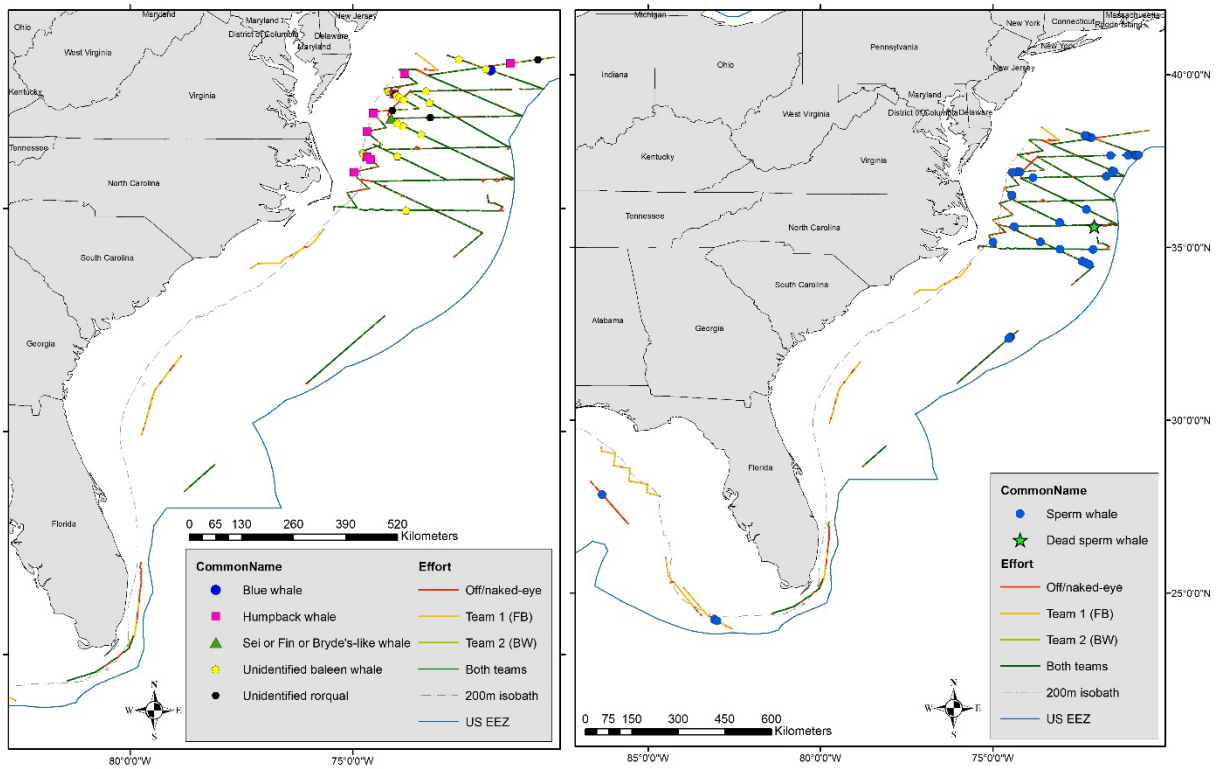

Figure 3. Baleen and sperm whales observed and survey effort during GU2301, note the dead sperm whale off NC near the EEZ.

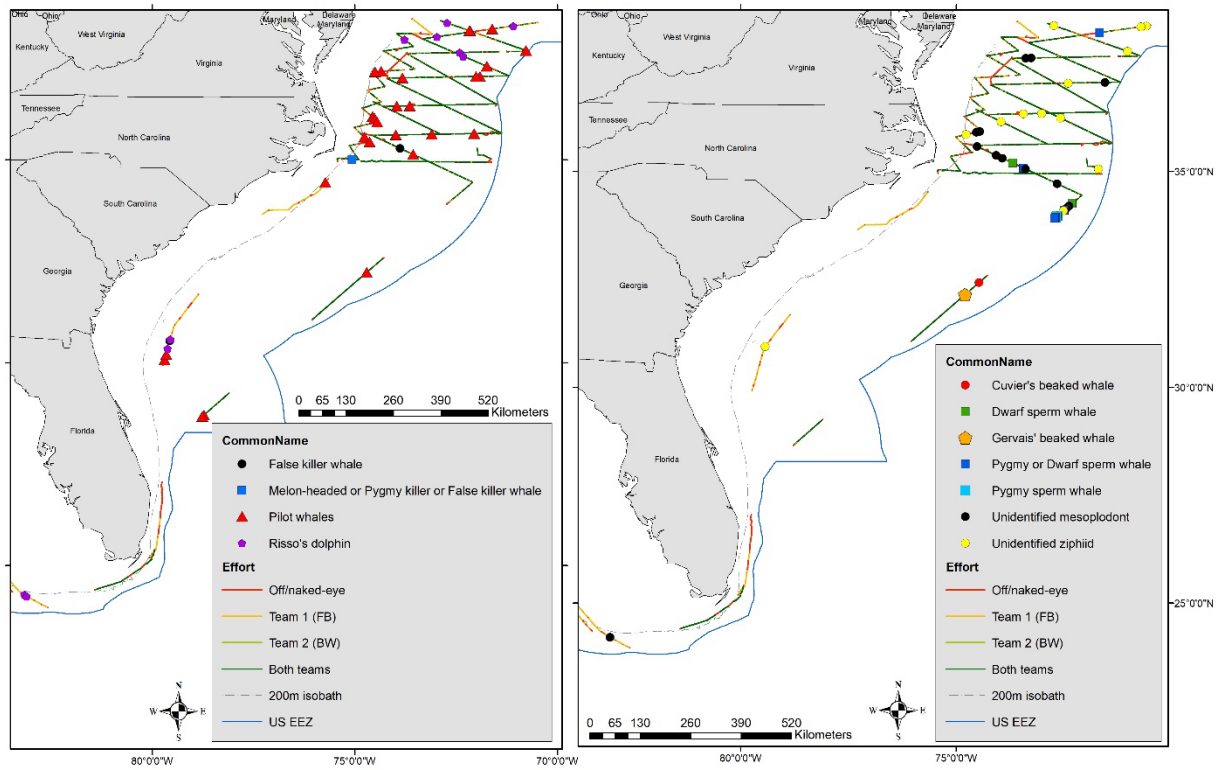

Figure 4. Large delphinids and cryptic species (beaked and pygmy and/or dwarf sperm whales) observed and survey effort during GU2301.

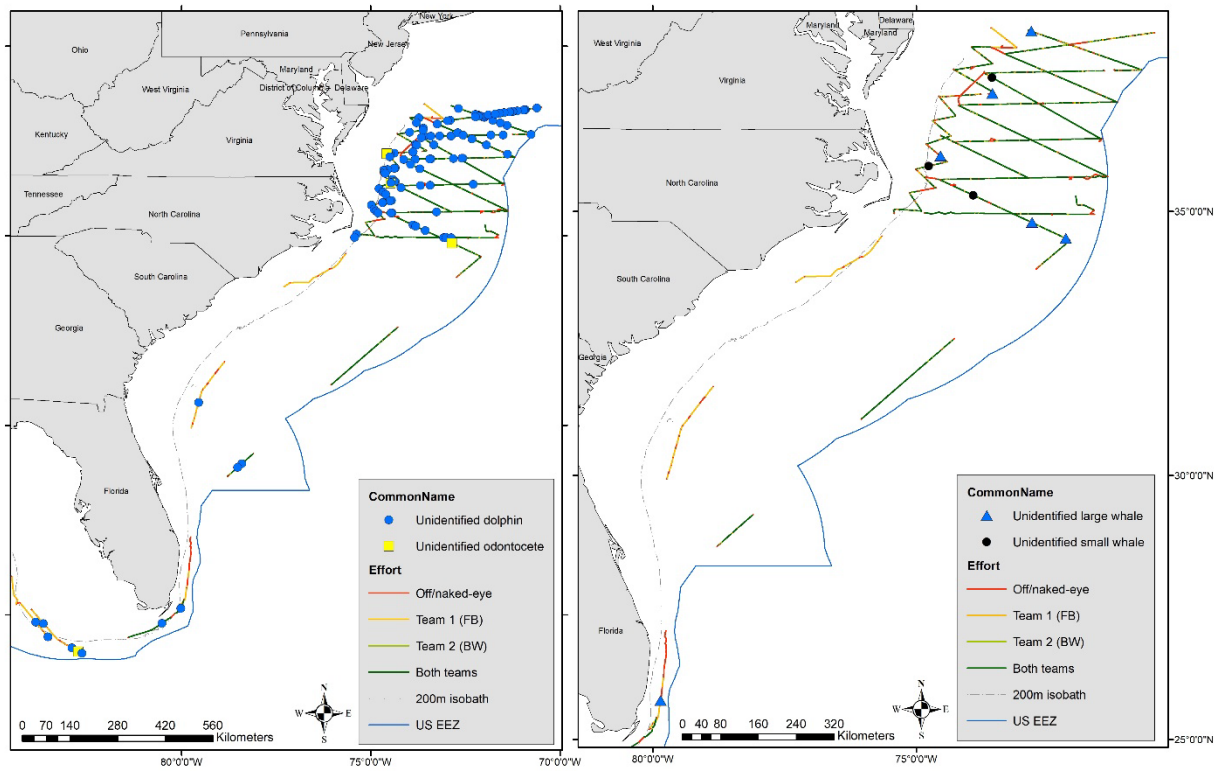

Figure 5: Unidentified cetacean species observed and survey effort during GU2301.

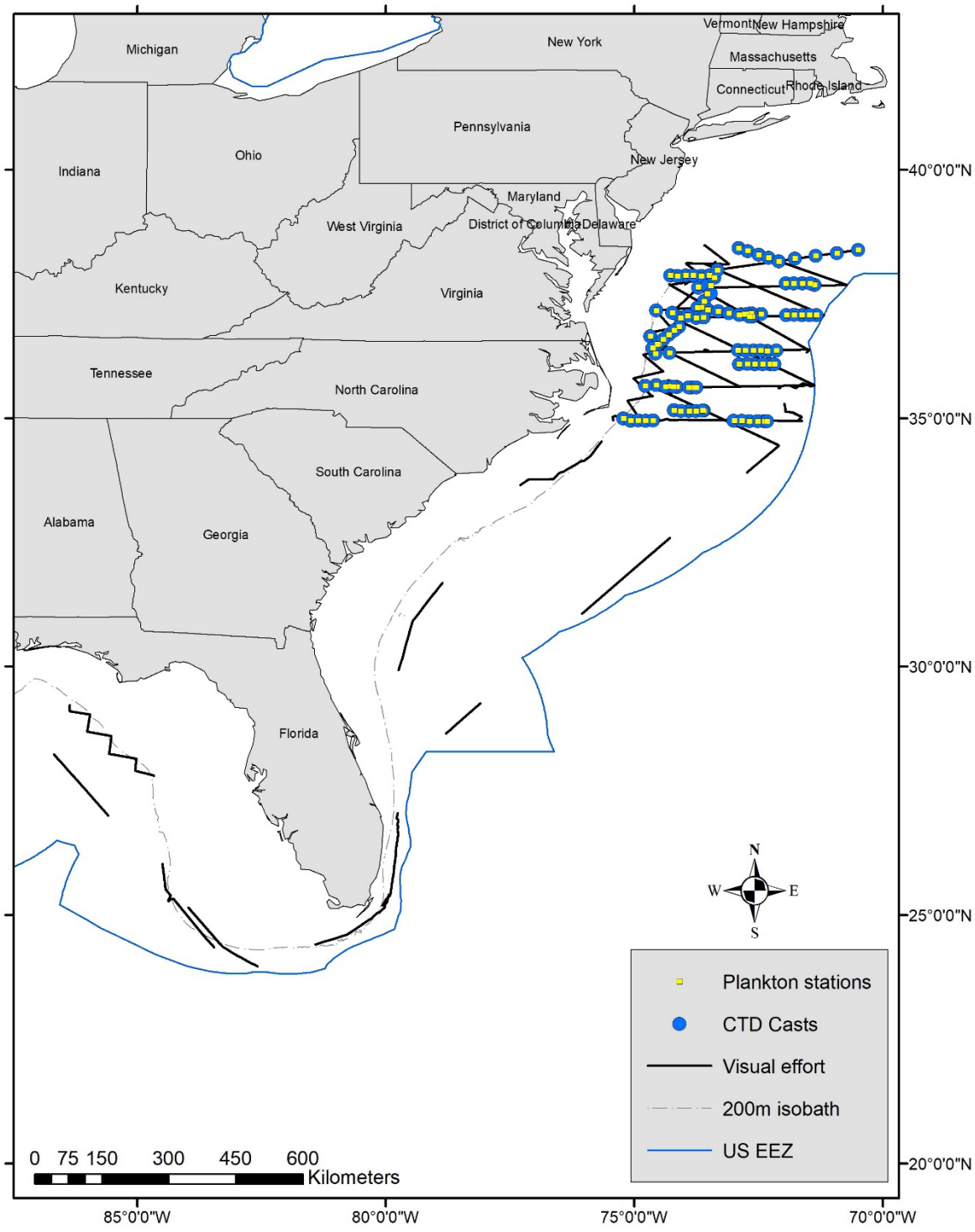

Figure 6. CTD casts and associated plankton stations sampled during GU2301.