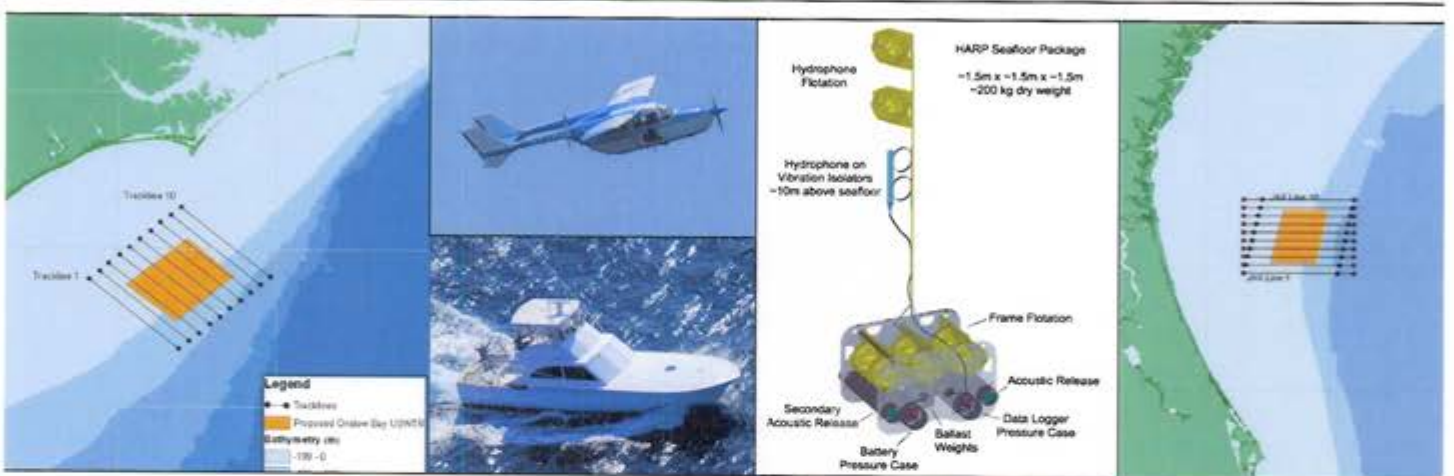


**Protected Species Monitoring in the Proposed Undersea Warfare Training Ranges (USWTR) Onslow Bay, NC Jacksonville, FL Final Report (July 2009 -June 2010)**

**August 27, 2010**



## **Executive Summary**

This is the third annual progress report of a monitoring program for protected marine species at two proposed sites of Undersea Warfare Training Ranges (USWTR) in Onslow Bay, North Carolina and Jacksonville, Florida. The reporting period for this document extends from July 2009 through June 2010. Aerial surveys, vessel-based surveys, and passive acoustics were used to monitor the two USWTR sites. Density estimates for marine mammals and sea turtles were generated from data collected during aerial and vessel-based line transect surveys. In Onslow Bay, three years of monitoring have yielded a comprehensive picture of the density, distribution and abundance of marine mammals and on the distribution and relative abundance of sea turtles and seabirds. The first year of monitoring in Jacksonville has provided new information on the density and distribution of marine mammals and sea turtles in this area.

### Study Areas

The proposed USWTR site in Onslow Bay is 25 nm (46 km) long and 20 nm (37 km) wide (approximately 1700 km<sup>2</sup>). The survey area extends 20 nm in each direction past the proposed boundaries of the USWTR. Ten transect lines 40 nm (74 km) in length and spaced approximately 5 nm (9.3 km) apart cross the survey area, oriented parallel to the short axis of the USWTR boundaries and perpendicular to the primary bathymetric and prevailing oceanographic features influencing the region (Figure i-a). This design yields a total of 400 nm (~740 km) of track line surveyed by both aerial and shipboard platforms.

The proposed Jacksonville (JAX) USWTR site is 25 nm (46 km) long and 20 nm (37 km) wide (approximately 1700 km<sup>2</sup>). Ten 39 nm (72.5 km) long tracklines, spaced 4 nm (7.4 km) apart, transect the USWTR area. The survey area straddles the continental shelf and Blake Plateau and includes neritic, shelf waters and pelagic, offshore waters (Figure i-b). Aerial survey tracklines in JAX are longer (86 km) than those flown in the Onslow Bay study area to minimize the area without survey coverage between the USWTR area and Early Warning System (EWS) aerial surveys for North Atlantic right whales (*Eubalaena glacialis*).



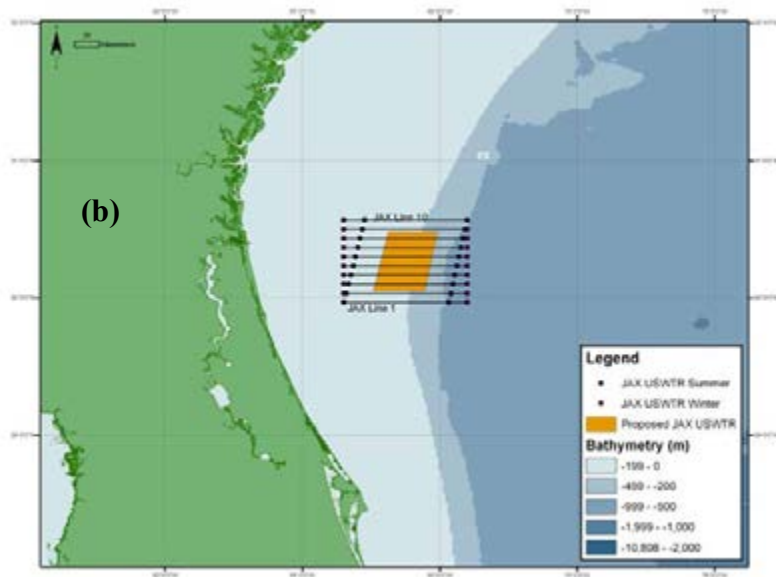
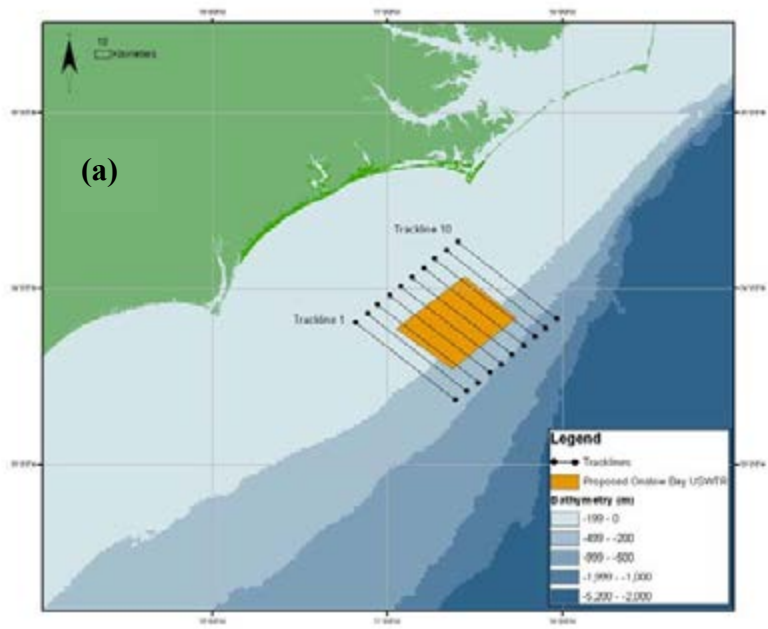


Figure i. Maps depicting the proposed USWTR areas and tracklines used for vessel and aerial surveys: (a) Onslow Bay, NC; and (b) Jacksonville, FL.

### Aerial Surveys for Cetaceans and Sea Turtles – Onslow Bay

Researchers from the University of North Carolina at Wilmington conducted aerial surveys in the proposed USWTR site in Onslow Bay. Aerial surveys were flown monthly between June 2009 and June 2010. The goal was to survey the entire USWTR site (10 track lines) twice per month. This goal was accomplished for seven of the twelve months. For the remaining months a single set of lines were flown except September, in which 16 lines were flown, and May, in which no lines were flown because of adverse weather conditions. A total of 86 cetacean sightings of 1,371 individuals and 374 sea turtle sightings of 646 individuals were recorded while on effort in the study area. Six cetacean species were observed in the survey area while on effort, including: bottlenose dolphins (*Tursiops truncatus*; 53 sightings of 791 individuals); spotted dolphins (*Stenella frontalis*; 24 sightings of 467 individuals); short-finned pilot whales (*Globicephala macrorhynchus*; two sightings of 63 individuals); Risso's dolphins (*Grampus griseus* one sighting of six individuals); common dolphins (*Delphinus delphis*; one sighting of 20 individuals); and a fin whale (*Balaenoptera physalus*; one sighting of a single individual). Four sightings of 23 individual dolphins were recorded in which it was not possible to determine species identity with certainty (termed "unidentified delphinids"). There were also four off effort sightings of bottlenose dolphins, two off-effort sightings of short-finned pilot whales, and single off-effort sightings of Risso's dolphins and a sperm whale (*Physeter macrocephalus*) near or in the USWTR range. No mixed-species groups were observed. Most (501 of 646) sea turtles observed were identified as loggerheads (*Caretta caretta*); 141 were recorded as "unidentified sea turtles" and four were leatherback sea turtles (*Dermochelys coriacea*). Sighting efficiency dropped dramatically as the Beaufort Sea State (BSS) increased. For example, as BSS increased from one to three, cetacean sightings per unit effort (SPUE) decreased from 13.2 to 1.9 per 1000 km surveyed and sea turtle SPUE decreased from 156.9 to 1.9 per 1000 km surveyed respectively. In addition to cetaceans and sea turtles, other pelagic marine vertebrates, including manta rays (*Manta birostris*), ocean sunfish (*Mola mola*) and sharks were observed. Most vessels encountered in the proposed USWTR were recreational fishing vessels, which were observed predominantly shoreward of the 200 m depth contour.

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

Researchers from Duke University conducted vessel-based surveys for marine mammals and sea turtles in the proposed USWTR site in Onslow Bay. Twenty-one track lines were surveyed in approximately 115 hours of survey effort. Most (69%) effort occurred in Beaufort Sea States 2 and 3. A total of 55 groups of cetaceans were sighted during vessel surveys (45 while on effort, ten while off effort) and five species were observed: bottlenose dolphins (29 sightings), Atlantic spotted dolphins (17 sightings), Risso's dolphins (three sightings), pilot whales (2 sightings), and rough-toothed dolphins *Steno bredanensis* (one sighting). One sighting was made of a group of dolphins that were either bottlenose or spotted dolphins and two sightings were made of unidentified delphinids. As in the previous two 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 on the continental shelf. No mixed-species groups were observed. Fifty sea turtle sightings were recorded during vessel surveys (34 while on effort, 16 while off effort) and two species were observed: loggerhead sea turtles (48 sightings) and leatherback sea turtles (2 sightings). One turtle sighting was not identified to species. Over 1,300 digital images were taken for species identification and individual recognition. Analysis of these photographic images resulted in resightings of five bottlenose dolphins and one spotted dolphin during the three years of surveys in Onslow Bay. Several of these resightings span periods of a year or more, suggesting some degree of residency in the study area. In July 2009 additional surveys were conducted off Cape Hatteras with one of our survey vessels to improve the probability detection functions used to calculate marine mammal densities in Onslow Bay. Thirty sightings were recorded in four days of survey effort, far exceeding the sightings per unit effort in Onslow Bay, and providing additional data with which to estimate the probability detection functions. In June 2010 we deployed a Wildlife Computer satellite-linked SPLASH tag on an adult nesting female loggerhead sea turtle. This tag, along with two others deployed after the reporting period, will provide data on diving behavior that will be used to estimate the probability of detecting loggerhead turtles at the surface, where they can be sighted by visual observers.

### Passive Acoustic Monitoring – Onslow Bay

Researchers from Duke University conducted vessel-based and fixed passive acoustic monitoring in the proposed USWTR site in Onslow Bay. During 18 vessel-based surveys, a four-element hydrophone array was towed behind the vessel, resulting in 91.2 hours of passive acoustic monitoring. Forty groups of cetaceans were detected with the hydrophone array and also identified by visual observers (23 groups of bottlenose dolphins, eleven groups of Atlantic spotted dolphins, three groups of Risso's dolphins, two groups of pilot whales, and a single group of rough-toothed dolphins). Recordings from the hydrophone array will be used to help identify species in vocalizations recorded on bottom-mounted acoustic recording devices (High Frequency Acoustic Recording Package; HARP). HARPs have been deployed on three occasions since the start of monitoring in Year One. The instruments were deployed, recovered and redeployed near the center of the USWTR site, close to the 200 m shelf break. In all three deployments, the instruments were programmed to record at a sample rate of 200 kHz for five-minute periods, separated by an inactive interval of ten minutes. Two deployments in the summer months showed a trend towards increased vocal events during the night hours, whereas the single deployment during fall/winter exhibited greater number of vocal events at dawn. Risso's dolphins and sperm whale clicks were extracted from the dataset; both species follow a similar trend in diel variation, with an increase of the number of vocal events at night. Analysis of these recordings is ongoing.

### Vessel-Based Surveys for Seabirds – Onslow Bay

Researchers from Duke University conducted vessel-based surveys for seabirds in the proposed USWTR site in Onslow Bay; these surveys were synoptic with those described above for marine mammals and sea turtles. More than 60 seabirds were observed in approximately 12 hours of survey effort between July 2009 and September 2009, yielding a sighting per unit effort (the number of seabirds recorded per hour of effort) between 1.08 and 6.87 per hour. Three species of seabird were recorded, with Cory's Shearwaters (*Calonectris diomedea*) being sighted most frequently, followed by Greater Shearwaters (*Puffinus gravis*) and Wilson's Storm Petrels (*Oceanites oceanicus*). Analysis of all three years of vessel-based seabird surveys will be completed in the autumn of 2010.



### Aerial Surveys for Cetaceans and Sea Turtles – Jacksonville

Researchers from Duke University and UNCW conducted aerial surveys in the proposed USWTR site in Jacksonville. Preliminary aerial surveys were performed from January through March 2009, resulting in 35 tracklines surveyed. Regularly scheduled aerial surveys commenced in June 2009. Beginning in June, the goal was to survey the entire USWTR site (10 tracklines) twice per calendar month, which was accomplished for eleven of thirteen months. In October 2009 and May 2010 only ten tracklines were covered. Survey coverage was intensified during North Atlantic right whale (*Eubalaena glacialis*) calving season (December 2009 through April 2010) during which time 143 tracklines were flown, for an average of 29 tracklines surveyed per month. In addition, upon request from the US Navy, additional survey coverage was provided during Navy exercises in September 2009 and June 2010. Thus, a total of 534 tracklines (29,839 km) were surveyed during the reporting period. Most (41%) survey effort was flown in BSS 2. A total of 323 sightings of 3,718 cetaceans were observed while on effort in the study area. Nine species of cetaceans were observed while on effort, including: bottlenose dolphins (132 sightings of 1179 individuals); Atlantic spotted dolphins (124 sightings of 2080 individuals); Risso's dolphins (16 sightings of 228 individuals); short-finned pilot whales (two sightings of 19 individuals); sperm whales (one sighting of two individuals); dwarf or pygmy sperm whales (*Kogia* spp.; one sighting of one individual); rough-toothed dolphins (one sighting of 50 individuals); minke whales (*Balaenoptera acutorostrata*; six sightings of eight individuals); and North Atlantic right whales (*Eubalaena glacialis*; two sightings of three individuals). A noteworthy encounter occurred on 20 March 2010 when the aerial survey team observed and documented the birth of a North Atlantic right whale calf in the survey area. The birth occurred outside the designated Right Whale Critical Habitat and represents only the second documentation of the birth of a North Atlantic right whale birth. In addition, there were 37 sightings of 139 individuals where species identity could not be established with certainty (*i.e.* "unidentified delphinids"). An off-effort encounter of a mother/calf right whale pair was recorded approximately 3 km west of the survey area. In addition, there were two off-effort sightings of Atlantic spotted dolphins and two of unidentified

delphinids in or near the survey area. The number of cetacean sightings varied by month, with the highest number of encounters recorded from January through April 2010 and September 2009. A total of 1,543 sea turtles were recorded during the study period. Of these, 1,169 were identified as loggerhead sea turtles, 50 as leatherbacks, one as a Kemp's Ridley sea turtle (*Lepidochelys kempii*), and 323 were "unidentified sea turtles". Sea turtles were observed during every month, with higher numbers during late spring and early summer. Sighting efficiency dropped dramatically as BSS increased. For example, as BSS increased from 1 to 3, cetacean SPUE decreased from 21.4 to 3.3 per 1000 km surveyed and sea turtle SPUE decreased from 91.3 to 23.2 per 1000 km surveyed, respectively. In addition to cetaceans and sea turtles, several species of sharks, manta rays and ocean sunfish were observed. Commercial, Navy and recreational vessels were encountered in the survey area, with most belonging to the latter category.

#### Vessel-Based Surveys for Cetaceans and Sea Turtles – Jacksonville

Researchers from Duke University and UNCW conducted vessel-based surveys in the proposed USWTR site in Jacksonville, Florida. Twenty-two track lines were surveyed in approximately 96 hours of survey effort. Most (78%) survey effort occurred in BSS 2 and 3. A total of 56 groups of cetaceans were sighted during vessel surveys (48 while on effort, eight while off effort) and four species were observed: bottlenose dolphins (15 sightings); Atlantic spotted dolphins (24 sightings); pilot whales (three sightings); and Risso's dolphins (two sightings). Twelve sightings were made of unidentified delphinids. Bottlenose dolphins were observed in deeper and slightly warmer waters than Atlantic spotted dolphins. Fifty-seven sea turtle sightings were recorded during vessel surveys (34 while on effort, 16 while off effort) and three species were observed: loggerhead sea turtles (48 sightings), leatherback sea turtles (five sightings), and Kemp's Ridley sea turtles (one sighting). Three turtle sightings were not identified to species. Approximately 3,300 digital images were taken for the purposes of species identification and individual recognition.

### Passive Acoustic Monitoring – Jacksonville

Researchers from Duke University and UNCW conducted vessel-based and fixed passive acoustic monitoring in the proposed USWTR site in Jacksonville. During 19 surveys, a four-element hydrophone array was towed behind the vessel, resulting in 62.6 hours of passive acoustic monitoring. Nineteen groups of cetaceans were detected with the hydrophone array and identified by visual observers (eight bottlenose, eight Atlantic spotted dolphins, two Risso's dolphins, one pilot whale). Recordings from the hydrophone array will be used to help identify species vocalizations recorded on bottom-mounted acoustic recording devices (High Frequency Acoustic Recording Package; HARP). Between July 1, 2009 and June 30, 2010, four HARP recoveries and re-deployments occurred at two sites in the Jacksonville, FL USWTR range. These deployments yielded 305 recording days, of which 282 days have been analyzed in the high (5 - 100 kHz) and low (10 - 1,000 Hz ) frequency ranges. Delphinid clicks were detected in 1,376 (36%) and 1,097 (51%) one-hour bins at the inshore and offshore sites, respectively. Delphinid whistles were detected in 640 (17%) and 387 (18%) one-hour bins at the inshore and offshore sites, respectively. Whistles and clicks were detected more frequently during the night at the offshore site. At the inshore site, whistles were detected more frequently during the day at the inshore site, while clicks showed no diel trend. No known baleen whale calls were detected at either site, though a complex, stereotyped low-frequency call, likely produced by a fish or cetacean, was frequently detected at the offshore site.

### Density Estimation

Analysis of data from aerial and shipboard surveys of the Onslow Bay USWTR site from June 2007 to June 2010, combined with that of earlier aerial surveys of the UNCW for Onslow Bay 1998 and 1999, allowed maps of animal density to be estimated by scientists from the University of St. Andrews. The species of interest were bottlenose dolphins, spotted dolphins, pilot and beaked whales (combined) and loggerhead turtles. As well as estimating abundance, the statistical models developed also provided insight into some of the environmental correlates of the animals distributions. Detection functions were estimated from the multi-platform, multi-year USWTR survey data with additional data

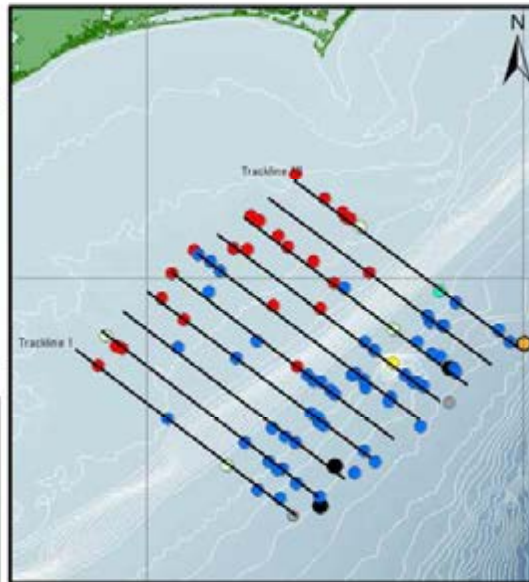
from the UNCW right whale surveys, the 1998/1999 UNCW aerial surveys of Wallop Island and additional sightings data from the shipboard surveys that took place off Cape Hatteras in 2009. Detection functions were not fitted to all of the detected species owing to a paucity of data (namely shipboard whale sightings) but fitted to a species group. Estimates of abundance were obtained for both the core USWTR region and an outer region using the estimated detection probabilities and then separately estimating (a) animal presence/absence using a logistic general additive model and (b) density given presence. Depending on the spatial models chosen, estimates were obtained either as an average for the entire time period, for each year or for each month. At the highest level of resolution, separate estimates were obtained for the USWTR core region and the outer region for the time period September 1998 to July 1999 and June 2007 to June 2010. Estimated bottlenose dolphin numbers varied between 29 (95% CI: 16 - 137, July 2008) and 100 (32 - 202, April 1999) for the core USWTR region and from 77 (43 - 380, July 2008) to 264 (84 - 540, April 1999) for the outer region. Estimated spotted dolphin numbers varied from 0 (0 - 0) in 1998/1999 to 344 (125 - 660, October 2009) in the core region and from 0 (0 - 0) in 1998/1999 to 854 (361 - 1548, in October 2009) in the outer region. Spotted dolphins were not present in the region of interest prior to 2007. Pilot and beaked whale numbers were very low; 5 (1 - 9) in the inner region and 8 (1 - 18) in the outer region throughout the survey period. Estimated loggerhead turtle numbers varied from 2 (1 - 4; July 1999) to 176 (41 - 390; March 2009) in the core USWTR region and from 4 (1 - 8; July 1999) to 350 (82 - 775; March 2009) in the outside region. These abundance estimates are based on the assumption that detection is certain on the trackline. Small sample sizes result in very little power to detect trend in abundance but there was no evidence of a systematic decline in any species in the last ten years and some evidence for an increase in spotted dolphin numbers. The abundance of bottlenose dolphins, spotted dolphins and loggerhead turtles appears to fluctuate throughout the year, perhaps in response to sea surface temperature.

Analysis of data from aerial and shipboard surveys of the Jacksonville USWTR, undertaken by Duke University and the University of North Carolina at Wilmington, for the period June 2009 to June 2010 was also performed. The species for which were



sufficient numbers to generate detection functions were bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella frontalis*), leatherback (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*). Detection functions were not fitted to other species owing to a paucity of data. Estimates of abundance were obtained for both the core USWTR region and the outer region. The results from the aerial and shipboard surveys were generally similar. Estimates of abundance of *Tursiops* in the core USWTR region varied from 20 to 560 (maximum CV 99%) depending on season, *Stenella* varied from 0 to 30 (maximum CV 42%) perhaps again depending on season. For sea turtle abundance, *Dermochelys* were strongly seasonal with a peak in the autumn whereas *Caretta* peaked in summer.

# AERIAL SURVEYS OF THE PROPOSED UNDER SEA WARFARE TRAINING RANGE (USWTR) IN ONSLOW BAY, NORTH CAROLINA, JULY 2009 TO JUNE 2010



Ryan J. McAlarney  
Erin W. Cummings  
D. Ann Pabst  
William A. McLellan

Department of Biology and Marine Biology • University of North Carolina Wilmington  
601 South College Road • Wilmington, NC 28403

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## Summary of Onslow Bay Aerial Surveys

This document is an annual progress report to the U.S. Department of the Navy on aerial surveys conducted at the proposed Under Sea Warfare Training Range (USWTR) in Onslow Bay, North Carolina between July 2009 and June 2010. The aerial surveys were carried out by the University of North Carolina Wilmington. The goal was to survey the entire USWTR site (10 tracklines) twice per month. This goal was accomplished for seven of the twelve months. For the remaining months a single set of lines were flown except September, in which 16 lines were flown, and May, in which no lines were flown because of weather conditions. A total of 86 cetacean sightings, of 1371 individuals, and 374 sea turtle sightings, representing 646 individuals, were observed while on effort in the study area (Table 1, Figure 1). No right whales (*Eubalaena glacialis*) were observed within the site. Six cetacean species were observed in the survey site while on effort including bottlenose dolphins (*Tursiops truncatus*; 53 sightings of 791 individuals), spotted dolphins (*Stenella frontalis*; 24 sightings of 467 individuals), short-finned pilot whales (*Globicephala macrorhynchus*; two sightings of 63 individuals), Risso's dolphin (*Grampus griseus* one sighting of six individuals), common dolphin (*Delphinus delphis*; one sighting of 20 individuals) and a fin whale (*Balaenoptera physalus*; one sighting of a single individual). There were four sightings of 23 individual dolphins where species identity could not be established with 100% certainty (here termed "unidentified delphinids"). There were also eight off effort sightings of bottlenose dolphins (n=4), short-finned pilot whales (n=2), Risso's dolphin (n=1), and a sperm whale (*Physeter macrocephalus*) (n=1) that were recorded near or in the USWTR range. Off effort sightings data are included in tables, maps and descriptions of the corresponding species to demonstrate the seasonal presence and distribution of species. All effort calculations, though, use only on effort sightings data.

A total of 646 sea turtles were observed during the study period. Of these, 501 were identified as loggerhead sea turtles (*Caretta caretta*), 141 were recorded as "unidentified sea turtles", and four were identified as leatherback sea turtles (*Dermochelys coriacea*).

As previously demonstrated in other aerial survey studies, sightings drop off dramatically as the Beaufort Sea State (BSS) increases. In the present study, as the BSS



increased from one to three, cetacean sightings decreased from 13.16 to 1.89 per 1000 km surveyed, whereas sea turtle sightings decreased from 156.87 to 1.89 per 1000 km surveyed respectively.

In addition to cetaceans and sea turtles, other pelagic marine vertebrates, including manta rays, ocean sunfish and sharks, are reported here. The majority of vessels encountered in the proposed USWTR range were recreational fishing vessels, which were predominately observed shoreward of the 100 fathom depth contour.

With the close of this year's surveys there has now been three years of aerial effort conducted in the Onslow Bay USWTR range. An analysis of the combined three years of cetacean and sea turtle sightings has been conducted and is presented in Appendix A.



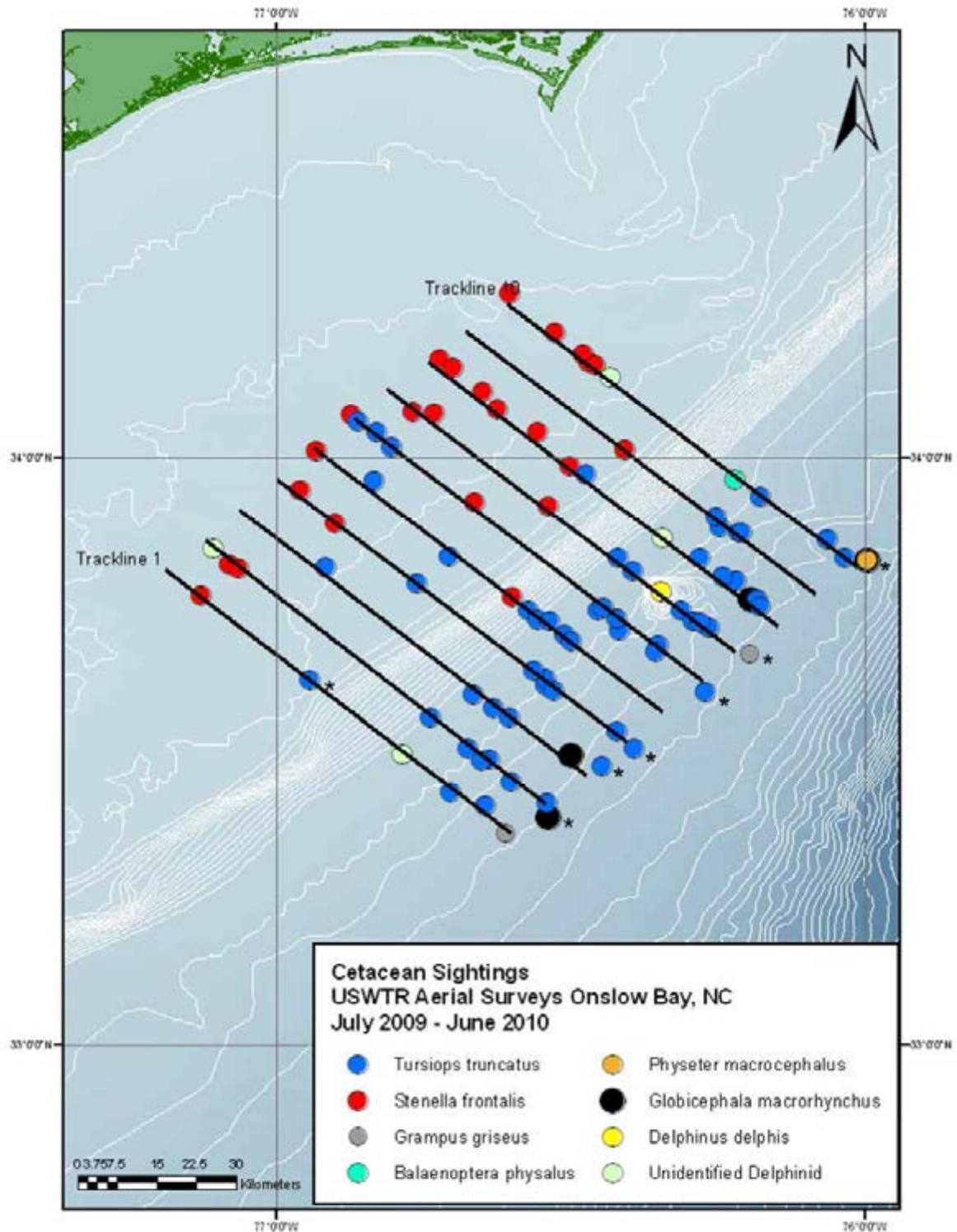


Figure 1. All cetacean sightings during the 2009-2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina. Asterisk denotes off effort sightings.

## **Methodology**

### Survey design and logistics

The University of North Carolina Wilmington (UNCW) provided experienced aerial observers and contracted Orion Aviation, Siler City, NC, to provide planes and certified pilots. Surveys were conducted using NOAA – SER Minimum Aircraft and Crew Provisions Guidelines, which require that aircraft are CFR Part 135 certified and that pilots have demonstrated experience working below 1000 ft in support of biological observational studies. Surveys were flown in a Cessna 337 Skymaster, at 305 m altitude and 185 km/hr speed, with a pilot, co-pilot and two observers. Each observer wore a Nomex ® fire retardant suit, a Switlik ® inflatable life jacket, a personal Emergency Positioning Beacon (EPIRB), as well as additional safety equipment. An inflatable life-raft, plane EPIRB, and satellite phone were also onboard at all times.

The survey consisted of ten 74 km long track-lines spaced 6.5 km apart, which covered the proposed USWTR site and an 18 km boundary around the site in Onslow Bay (Fig. 2 and Table 2). The corners of the core USWTR site are: N34.07°/W-76.56° (NW), N33.83°/W-76.27° (NE), N33.54°/W-76.63° (SW), and N33.77°/W-76.95° (SE). Survey dates were chosen based upon weather and sea conditions, and access to restricted military areas within the site. Because the primary objective of the surveys was to locate and identify to species cetaceans and sea turtles, the sea state and consequent sighting conditions during surveys were key factors that dictated when to initiate and, if necessary, to abort, surveys. Low sea states (*i.e.* winds preferably 5 – 10 knots, but no more than 15 knots and seas maximum 4 feet) were selected to optimize sighting conditions. Sighting rates of small cetaceans drop off to near zero in a Beaufort Sea State (BSS) of four or higher, as demonstrated by several previous aerial survey studies (Gómez de Segura *et al.* 2006, DeMaster *et al.* 2001). Once an appropriate weather window was identified, observers from UNCW and Orion Aviation pilots would coordinate to meet at an FBO at the Wilmington, NC airport, from which all the surveys originated.



Table 2. Coordinates for trackline end points of the Onslow Bay, North Carolina survey site.

Transect Line	Western Way Point		Eastern Way Point	
	Latitude	Longitude	Latitude	Longitude
1	33.8119	-77.1926	33.3596	-76.6017
2	33.8620	-77.1249	33.4074	-76.5370
3	33.9146	-77.0666	33.4575	-76.4724
4	33.9671	-77.0020	33.5149	-76.4047
5	34.0148	-76.9342	33.5626	-76.3399
6	34.0673	-76.8726	33.6152	-76.2783
7	34.1198	-76.8017	33.6653	-76.2104
8	34.1723	-76.7431	33.7154	-76.1456
9	34.2119	-76.6721	33.7679	-76.0870
10	34.2724	-76.6104	33.8157	-76.0252

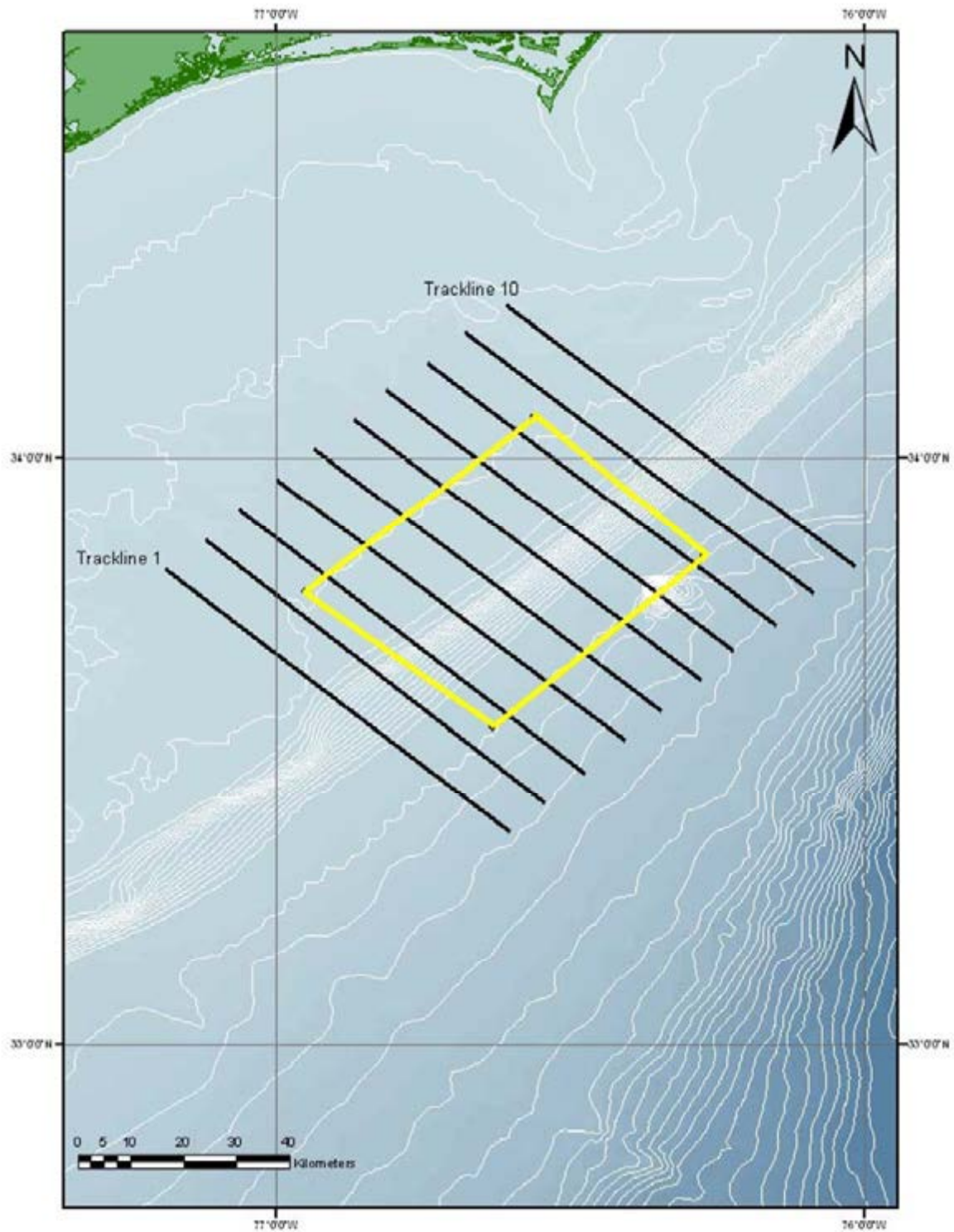


Figure 2. Survey tracklines 1-10 that cover and extend beyond the boundaries of the proposed USWTR site in Onslow Bay, North Carolina.

### Data collection

Each side of the plane was monitored by one observer with his or her own GPS unit, data sheet (see Appendix B), and binoculars, and each side was considered an independent strip transect. The start and end of transect lines, changes in environmental variables (*i.e.* cloud cover, BSS, visibility, and glare), and sightings of marine mammals, sea turtles and vessels in the survey area were recorded by each observer throughout the survey (see Appendix C for sighting codes). When a sighting cue was observed, horizontal and vertical angles between the plane and the sighting cue were recorded. Observers would then record a break track point and go off effort from the survey line to investigate the sighting. The plane would close on the sighting location and circle above the animal(s) to obtain photographic evidence of species. Initial and final locations of the sighting were recorded so that the distance of the initial sighting from the track line, and any general movements of animal(s), could be calculated. During a marine mammal encounter, the observer on the left side of the plane was the designated data recorder and the right observer took digital photographs to confirm species identification. The camera used was a Canon 40D with a 100-400 mm image stabilizer lens. The minimum and maximum numbers of animals in each sighting were estimated by both observers in the field and recorded. After photographic and sighting data were collected, the plane returned to the initial sighting location on the track line taking another waypoint marking the return to on effort surveys. All data collected during a sighting were recorded on the Sighting Data Sheet (Appendix D).

The plane did not break track for sightings of sea turtles, other marine vertebrates (*e.g.* sharks and rays) or vessels, however, these types of sightings were all recorded and logged.

### Data analysis

Upon completion of a daily survey, GPS way points were downloaded to a desktop computer utilizing the GPS Utility software program (GPS Utility Limited, UK) and subsequently transferred into Microsoft ® Excel spread sheets. Observational data (*e.g.* start and stop track line, sightings, and weather conditions) were entered manually

into the spread sheet for each GPS way point. All digital images collected during a survey were also downloaded and separated into individual folders for each sighting that day. The use of digital photography allowed for enlargement of images once in the lab, which enhanced the ability to identify animals to species. For each sighting, a group of best images was selected based on visible diagnostic features. These images were used in conjunction with the preliminary species identification (ID) made in the field, based upon appearance, group size and behavior, to determine species identity. During the first year of surveys observers from Duke and UNCW met on two occasions to review sighting images and establish a clear set of diagnostic features to positively identify each cetacean species. These features were used by both teams during their photo analysis during the subsequent years. Unless the dolphin species identity could be unequivocally established, the designation “unidentified delphinids” was used. Unidentifiable species were often the result of high BSS conditions where a clear set of images could not be obtained. Images obtained during a sighting were similarly employed to calculate group numbers, and a best estimate of group size was established based on field observations and images.

Geographical Information System (GIS) maps of sightings of cetaceans, sea turtles, other marine vertebrates, and vessels within the survey area were created. Positional data were imported from Excel spread sheets into Arc GIS version 9.2 (ESRI<sup>®</sup>, Redlands, CA), and used to plot sightings.

The distances between the break track waypoint (2.0) and the initial position of each sighting (2.4) was calculated using the online software Scripts Movable Type (<http://www.movable-type.co.uk/scripts/latlong.html>), which uses the Haversine formula to calculate distances between two geographical reference points. Since there is a bias in estimating the location of a group of mobile marine mammals from a fast moving airplane, the distances calculated between break track and sighting were recorded to 0.1 km. All data obtained during a marine mammal sighting (*e.g.* observational notes, group size, GPS coordinates and image numbers) were summarized in the Sighting Summary Sheet (See Appendices E and F for example and explanation). When all surveys for a month were completed, tables with sightings and effort (see Tables 3a-b and 4 for

examples) were included in the monthly progress report compiled and sent by DUMML to Parsons (Norfolk, VA).

Off effort sightings (*i.e.* “10.0” and sightings made on effort transits to and from the range) were not included in spread sheets used for data analysis.

Table 3a. Example of a cetacean sighting summary table of USWTR aerial surveys in Onslow Bay, North Carolina for June 2010 that would be included in monthly reports.

Date	Time	On / Off Effort	Latitude	Longitude	Track Number	Species	Common Name	Group Size
16-Jun-10	11:04	On	34.013141	-76.406738	9	<i>S. frontalis</i>	Atlantic Spotted Dolphin	55
17-Jun-10	10:07	On	33.574286	-76.630432	3	<i>T. truncatus</i>	Bottlenose Dolphin	21
17-Jun-10	14:37	On	33.871597	-76.208675	9	<i>T. truncatus</i>	Bottlenose Dolphin	13
18-Jun-10	9:20	On	33.637239	-76.561817	4	<i>T. truncatus</i>	Bottlenose Dolphin	8
18-Jun-10	9:38	On	33.556626	-76.603283	3	<i>T. truncatus</i>	Bottlenose Dolphin	32
18-Jun-10	10:36	On	33.430727	-76.703646	1	<i>T. truncatus</i>	Bottlenose Dolphin	25

Table 3b. Example of a sea turtle sighting summary table of USWTR aerial surveys in Onslow Bay, North Carolina for June 2010 that would be included in monthly reports.

Date	Time	On / Off Effort	Latitude	Longitude	Line	Species	Common Name	Group Size
16-Jun-10	10:45	On Effort	34.061262	-76.601679	8	<i>C. caretta</i>	Loggerhead Sea Turtle	1
16-Jun-10	10:48	On Effort	34.13628	-76.700404	8	Unid. Sea Turtle	Unid. Sea Turtle	1
16-Jun-10	10:57	On Effort	34.161591	-76.591787	9	<i>C. caretta</i>	Loggerhead Sea Turtle	1
16-Jun-10	11:01	On Effort	34.06234	-76.462631	9	<i>C. caretta</i>	Loggerhead Sea Turtle	2
16-Jun-10	11:38	On Effort	34.142977	-76.447917	10	<i>C. caretta</i>	Loggerhead Sea Turtle	1
16-Jun-10	11:39	On Effort	34.158292	-76.467704	10	<i>C. caretta</i>	Loggerhead Sea Turtle	1
17-Jun-10	14:24	On Effort	34.088759	-76.497305	9	<i>C. caretta</i>	Loggerhead Sea Turtle	1
18-Jun-10	9:12	On Effort	33.722898	-76.674437	4	<i>C. caretta</i>	Loggerhead Sea Turtle	1
18-Jun-10	10:15	On Effort	33.699048	-76.909166	2	<i>C. caretta</i>	Loggerhead Sea Turtle	1
18-Jun-10	10:52	On Effort	33.617614	-76.941325	1	<i>C. caretta</i>	Loggerhead Sea Turtle	1
18-Jun-10	10:55	On Effort	33.684558	-77.029150	1	<i>C. caretta</i>	Loggerhead Sea Turtle	1

Table 4. Example of June effort data included in monthly reports.

Date	Line	Sea State	Kilometers Flown	Hobbs Hours
16-Jun-10	5	1 to 2	74.2	3.7
16-Jun-10	6	1 to 2	74.1	
16-Jun-10	7	1 to 2	74.2	
16-Jun-10	8	2 to 3	74.8	
16-Jun-10	9	2 to 3	74.7	
16-Jun-10	10	2 to 3	72.9	
17-Jun-10	1	2 to 3	74.3	6.4
17-Jun-10	2	2 to 3	74.0	
17-Jun-10	3	2 to 3	71.8	
17-Jun-10	4	2	74.4	
17-Jun-10	5	2	74.1	
17-Jun-10	6	2	73.7	
17-Jun-10	7	2	74.3	
17-Jun-10	8	2	75.2	
17-Jun-10	9	2	74.5	
17-Jun-10	10	2	73.7	
18-Jun-10	4	1 to 3	73.5	2.9
18-Jun-10	3	1 to 2	73.5	
18-Jun-10	2	1 to 2	74.6	
18-Jun-10	1	1 to 2	72.9	

#### Data storage

All data obtained during a flight (GPS coordinates and digital pictures) and transcribed notes (*e.g.* observations and sightings) are stored electronically in three separate places: on a networked computer hard drive (which is backed up twice a week), an external hard drive, and on separate CDRs or DVDs. Additionally, the original data sheets used in the plane [*i.e.* daily plane log (Appendix G), observer notes and sightings sheets] are stored in binders, as are electronically entered versions of the same and printed forms of all electronic files. All data are stored at UNCW. In addition, all survey data, once edited, are regularly posted online to OBIS Seamap (<http://seamap.env.duke.edu/>).

#### **Results**

Two full sets of survey tracklines were flown for all months from July 2009 to June 2010 except for the months of November, December and February (10 tracklines or one full set each month), September (16 tracklines), and May (no surveys flown due to

weather) for a total of 13538.1 km (Table 5). Survey conditions ranged from a Beaufort Sea State (BSS) 1 to 4, with the majority of the surveys flown in a BSS 2 or 3 [BSS 1: 1823.1 km (13.5%), BSS 2: 5638.6 km (41.6%), BSS 3: 5017.7 km (37.1 %), BSS 4: 1058.7 km (7.8%)(Fig. 3a and 3b)]. For each survey month an average BSS value was calculated to compare conditions across months. This process was done by taking the distance flown at each sea state multiplied by the BSS number (i.e. BSS 1 distances would be multiplied by 1); these values were then summed and divided by the total distance flown that month (Figure 3c). Survey effort was terminated at BSS greater than 4. Cetacean sighting rates dropped off dramatically as BSS increased beyond a BSS 2, with 24 sightings made in a BSS 1 (13.16 sightings/1000 km flown), 44 in a BSS 2 (7.80 sightings/1000 km flown), 16 in a BSS 3 (3.19 sightings/1000 km flown) and 2 sighting in a BSS 4 (1.89 sightings/ 1000 km flown) (Fig. 4a - c).

Table 5. Tracklines and km flown during aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina between July 2009 and June 2010. Trackline numbers are listed in the order in which they were flown.

Date	Tracklines Flown AM	Tracklines Flown PM	Daily Total km flown
8-Jul-2009		5 to 10	445.4
27-Jul-2009	1 to 4	7 to 10	594.7
28-Jul-2009	6 to 1		446.3
17-Aug-2009	10 to 7		297.6
18-Aug-2009	1 to 4	5 to 10	734.3
19-Aug-2009	6 to 1		445.7
12-Sep-2009	1 to 6	10 to 7	727.8
30-Sep-2009		5 to 10	445.3
1-Oct-2009	5 to 10	1 to 4	736.2
2-Oct-2009	1 to 6		442.6
21-Oct-2009	10 to 7		291.3
8-Nov-2009	1 to 6		446.5
9-Nov-2009	7 to 10		296.2
17-Dec-2009	5 to 10	4 to 1	741.2
14-Jan-2010	5 to 10	1 to 4	737.4
15-Jan-2010	1 to 6	7 to 10	732.4
21-Feb-2010	1 to 6	10 to 7	734.8
8-Mar-2010	10 to 7	6 to 1	627.1
9-Mar-2010	5 to 10		354.8
10-Mar-2010	4 to 1		296.1
11-Apr-2010	5 to 10	4 to 1	743.6
12-Apr-2010	10 to 5	1 to 4	741.5
16-Jun-2010	5 to 10		444.9
17-Jun-2010	1 to 6	7 to 10	739.9
18-Jun-2010	4 to 1		294.6
			13538.1



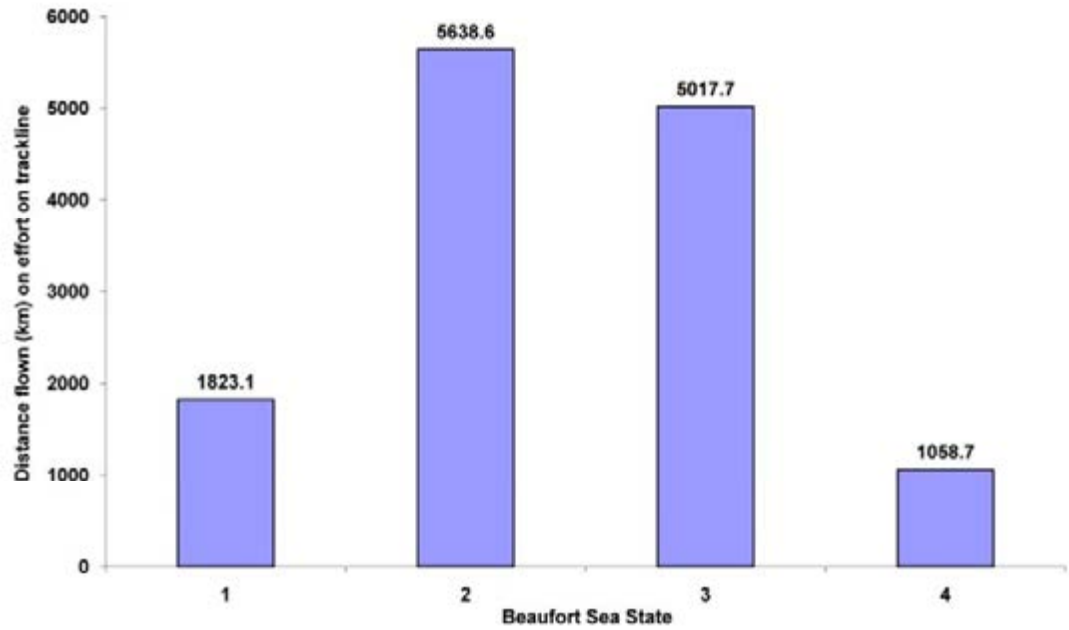


Figure 3a. Total distance surveyed per Beaufort Sea State during the July 2009 – June 2010 USWTR aerial surveys in Onslow Bay, North Carolina.

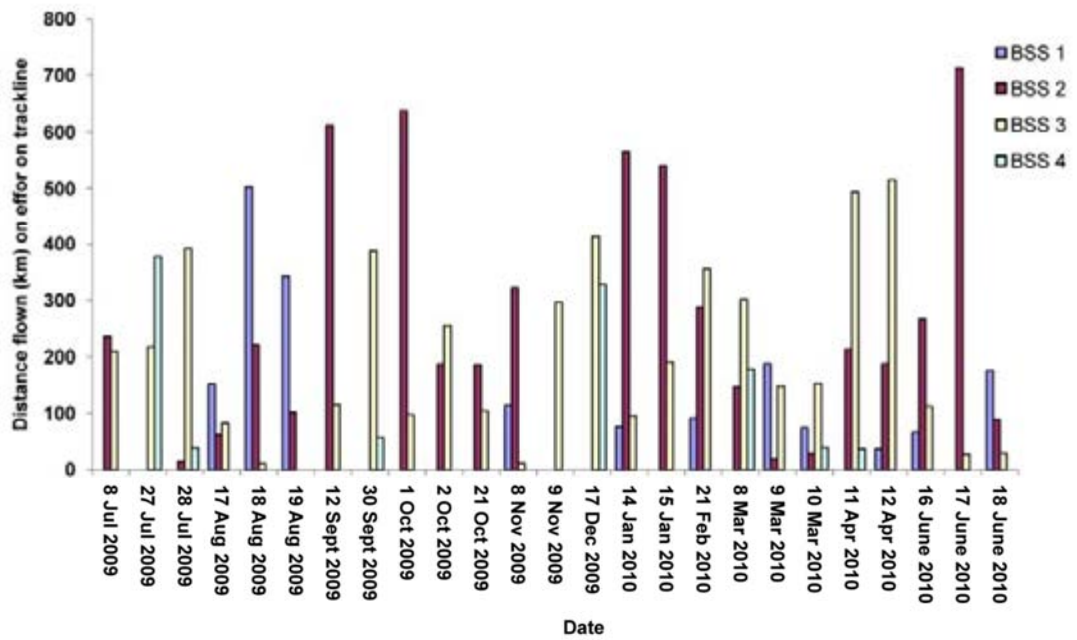


Figure 3b. Effort by Beaufort Sea State for each survey day during the July 2009 – June 2010 USWTR aerial surveys in Onslow Bay, North Carolina.

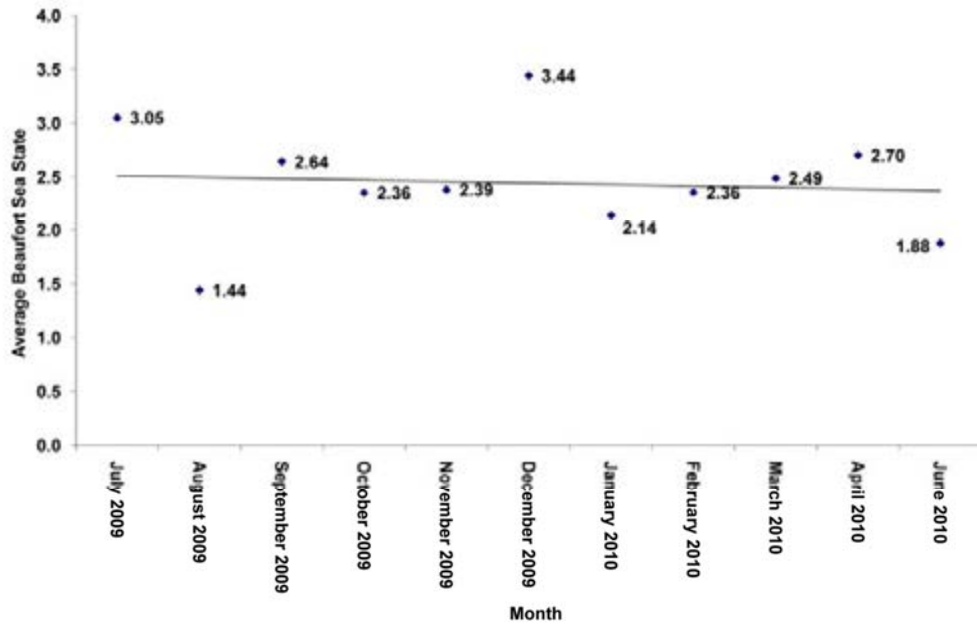


Figure 3c. Average Beaufort Sea State for each month during the July 2009 – June 2010 USWTR aerial surveys in Onslow Bay, North Carolina. Values were calculated using the formula  $AvgBSS = [(Distance @ BSS 1 * 1) + (Distance @ BSS 2 * 2) + \dots] / Total \text{ distance flown that day}$ .

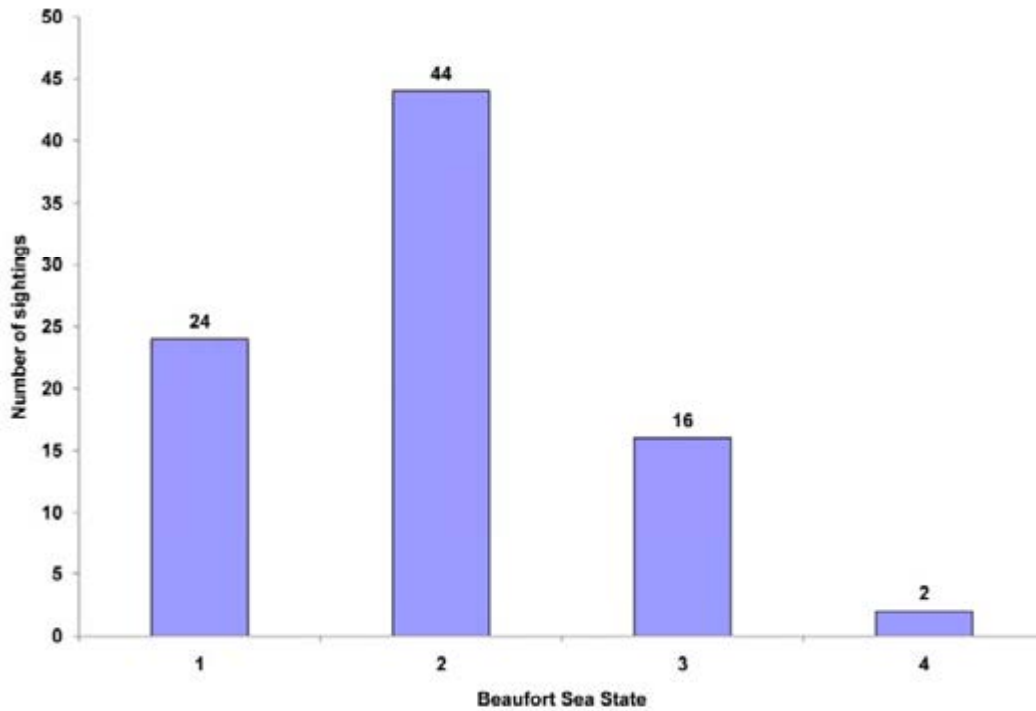


Figure 4a. Total number of cetacean sightings per Beaufort Sea State from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.

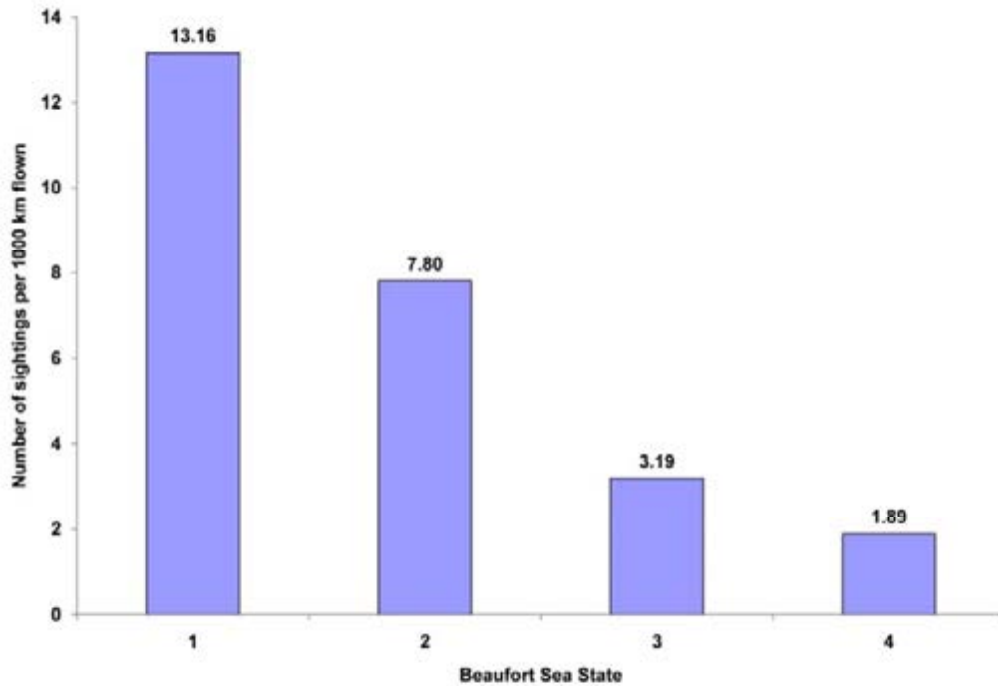


Figure 4b. Cetacean sightings per 1000 km flown by Beaufort Sea State from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.

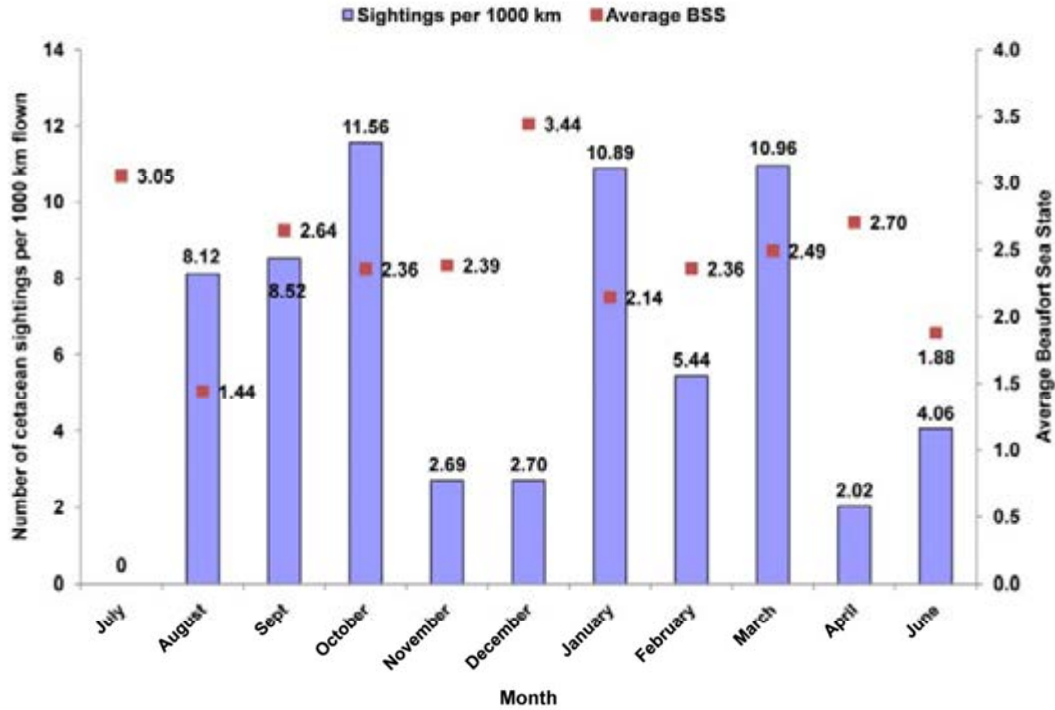


Figure 4c. Cetacean sightings per 1000 km surveyed and the average Beaufort Sea State per month from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.

The mean sighting distance for all cetacean sightings was 0.7 km from the trackline and most sightings were made within 1.2 km of the plane (Fig.5a). The mean sighting distance tended to decrease as BSS increased (Fig. 5b). Average sighting distances were calculated after removing outliers. An outlier was defined as a value in excess of three standard deviations from the mean. This year, a single sighting was removed from these calculations as an outlier (*i.e.* sighting distance calculated as 5.139 km from the trackline). An additional single unidentified delphinid sighting was removed from these calculations as the location of the animal was not taken preventing a sighting distance from being calculated.

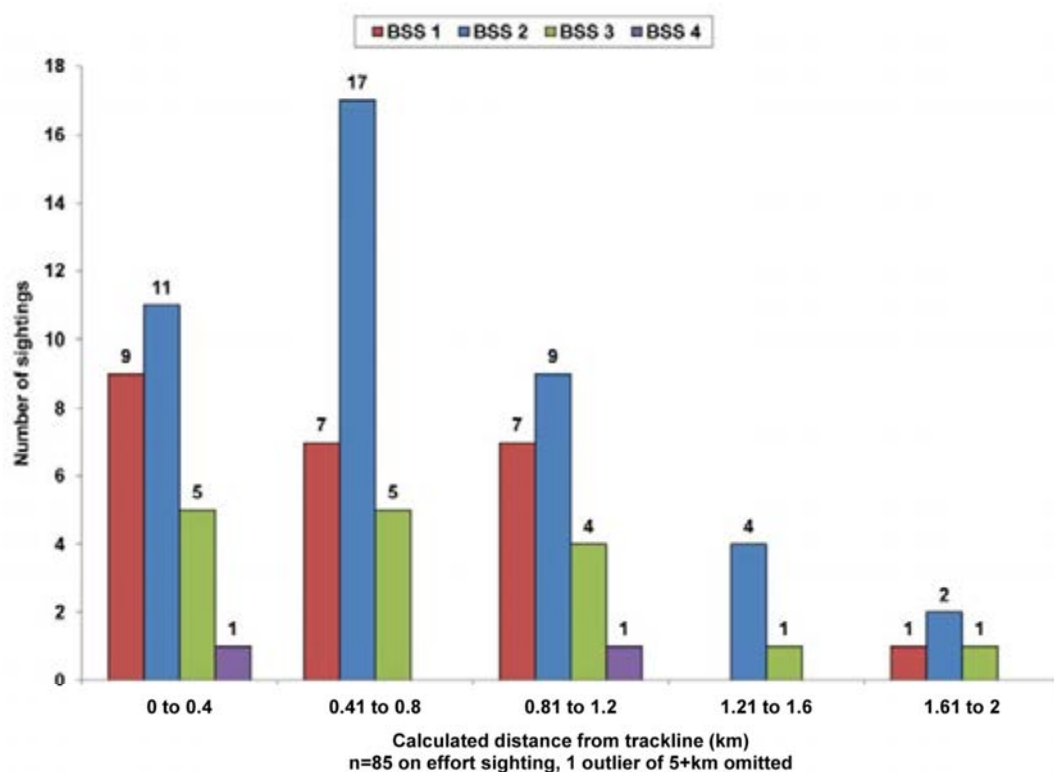


Figure 5a. Sighting distances by Beaufort Sea State for cetacean sightings from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina. A total of 85 sightings are graphed (1 outlier distance of 5+ km was removed).

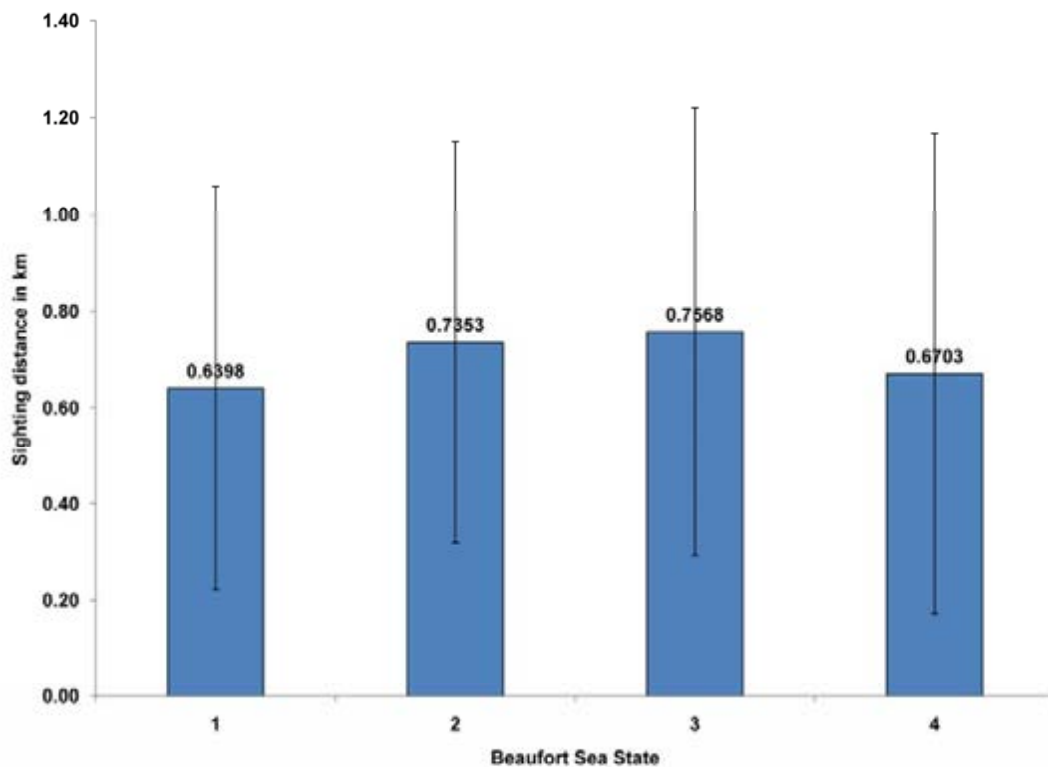


Figure 5b. Mean sighting distance by Beaufort Sea State for all cetacean sightings from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina. Error bars denote standard deviation for each category.

### Marine Mammal Sightings

On March 9, 2010 a single fin whale (*Balaenoptera physalus*) was spotted and documented on the offshore portion of line 10, marking the first baleen whale recorded within the Onslow Bay USWTR survey area. On October 21, 2009 there was also an off effort sighting of a sperm whale (*Physeter macrocephalus*) at the offshore end of line 10, although this individual dove before photographs could be collected. These animals are of special interest as they are listed as endangered under the Endangered Species Act. While sperm whales have been detected acoustically within the USWTR survey area, this sighting provides the first visual confirmation of this species near the site. The survey team also recorded a nearshore sighting of three North Atlantic right whales (*Eubalaena glacialis*) on November 8, 2009 approximately 3.5 miles off of Fort Fisher at Kure Beach, North Carolina. All animals were photo-documented as they moved south and these images were provided to the New England Aquarium for individual identification. The right whales were identified as Eg 3142 (female), 3513 (females) and 3648 (male).

Species are listed below in order of decreasing number of sightings with the most commonly sighted species first. Total number of individuals reported here is the sum of the best estimate of group size for each sighting. Sightings data for the past two years (Pabst *et al.* 2008, McAlarney *et al.* 2009), as well as for the UNCW 1998/1999 aerial survey (McLellan *et al.* 1999), are included for comparison purposes. Summaries for each individual sighting are in Appendix E. All sightings for each month are summarized in Appendix H.

#### Bottlenose dolphins (*Tursiops truncatus*) (Table 6, Fig. 6)

The bottlenose dolphin was the most commonly observed cetacean species during the present study, based upon number of sightings and number of individuals. This species was observed 53 times for a total of 791 individuals. Group size ranged between 1-65 individuals (mean=14). Bottlenose dolphins were observed in August, September, October, November, January, February, March, April, and June. Calves (defined as an individual less than or equal to one-half the total length of the associated adult) were seen in September, October, January, February, March and June. Based on the distance from shore (*i.e.* greater than 69 km), these bottlenose dolphins were most likely the offshore ecotype (Torres *et al.* 2003). Overall, smaller groups were encountered throughout the survey area while larger groups were only seen at and beyond the continental shelf break with one exception. This group size pattern was also observed during last year's surveys. During the 2008/2009 aerial survey period bottlenose dolphins were encountered 36 times for a total of 634 individuals. During the 2007/2008 aerial survey of the same area, bottlenose dolphins were encountered 33 times for a total of 461 individuals. During the 1998/1999 aerial survey of the same area, bottlenose dolphins were encountered 17 times for a total of 151 individuals. The current best estimate of offshore bottlenose dolphins in the Western Atlantic Ocean, between central Florida and Canada, is 81588 (CV = 0.17) (Waring *et al.* 2008).

Table 6. All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
18-Aug-09	9:37	6	33.620708	-76.942240	SE	1	1	90°	2
18-Aug-09	10:15	19	33.504820	-76.674391	NW	2	4	90°	35
18-Aug-09	11:22	39	33.611807	-76.541171	NW	4	1	90°	2
18-Aug-09	11:40	48	33.784330	-76.761268	NW	4	1	90°	3
19-Aug-09	11:04	20	33.811234	-76.916236	NW	3	1	100°	3
19-Aug-09	12:00	32	33.449196	-76.601237	SE	2	3	90°	8
12-Sep-09	11:29	39	33.681102	-76.350511	NW	6	1	90°	1
12-Sep-09	11:36	43	33.705709	-76.415980	NW	6	3	90°	3
12-Sep-09	15:35	80	33.788579	-76.219790	SE	8	3	45°	19
30-Sep-09	14:15	25	33.881552	-76.244972	SE	9	2	90°	43
1-Oct-09	8:42	6	33.739176	-76.572540	SE	5	2	100°	4
1-Oct-09	8:56	10	33.724444	-76.555044	SE	5	3	110°	8
1-Oct-09	10:14	34	33.827829	-76.418514	SE	7	3	90°	15
1-Oct-09	10:24	38	33.740108	-76.312358	SE	7	2	60°	6
1-Oct-09	11:01	50	33.972348	-76.473672	NW	8	3	90°	2
1-Oct-09	15:42	97	33.596687	-76.664434	SE	3	3	90°	19
2-Oct-09	9:50	15	33.475239	-76.447250			2	90°	11
2-Oct-09	10:01	18	33.504595	-76.392273			1	90°	8
2-Oct-09	10:07	21	33.535099	-76.421927	NW	4	3	90°	15
21-Oct-09	11:32	22	33.932099	-76.176954	NW	10	2	90°	6
21-Oct-09	12:37	38	33.756576	-76.181401	NW	8	1	90°	2
21-Oct-09	12:43	41	33.829105	-76.279533	NW	8	4	90°	40
21-Oct-09	13:47	58	33.720393	-76.290826	SE	7	1	90°	12
8-Nov-09	13:51	10	33.407155	76.643227	SE	1	3	90°	38
8-Nov-09	14:55	32	33.623729	76.540808	NW	4	1	90°	4
14-Jan-10	10:34	15	33.668686	-76.355825	NW	6	3	90°	5
14-Jan-10	10:44	20	33.740090	-76.452193	NW	6	3	110°	5
14-Jan-10	11:33	39	33.805552	-76.393617	SE	7	2	90°	3
14-Jan-10	11:51	45	33.746017	-76.176662	NW	8	2	90°	15
14-Jan-10	13:01	66	33.829063	-76.035037	NW	10	1	90°	1
15-Jan-10	9:45	16	33.558281	-76.738722	NW	2	1	90°	8
15-Jan-10	10:39	30	33.602597	-76.529002	NW	4	1	90°	20
15-Jan-10	11:25	44	33.698764	-76.511070	SE	5	3	90°	22
15-Jan-10	11:44	49	33.601521	-76.270769		TE	2	60°	8
15-Jan-10	12:02	54	33.725468	-76.420365	NW	6	2	90°	14
15-Jan-10	12:23	62	34.041882	-76.828397	NW	6	1	90°	3
15-Jan-10	12:35	66	34.061379	-76.860277	NW	6	3	60°	46
15-Jan-10	15:02	87	33.709471	-76.265296	SE	7	2	90°	27
21-Feb-10	14:41	43	33.897988	-76.253719	NW	9	3	90°	11
8-Mar-10	15:30	48	33.487350	-76.636780	SE	2	1	90°	4
8-Mar-10	15:43	52	33.410814	-76.538489	SE	2	3	90°	5
9-Mar-10	9:02	5	33.960739	-76.832647	SE	5	3	90°	15
9-Mar-10	9:17	11	33.830343	-76.706071	SE	5	2	90°	6
9-Mar-10	9:32	17	33.720726	-76.534367	SE	5	3	90°	20
9-Mar-10	9:52	23	33.743504	-76.443130	NW	6	3	60°	65

Table 6 (Continued). All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	10:11	35	34.017554	-76.803091	NW	6	2	90°	5
9-Mar-10	10:57	54	33.719563	-76.280838	SE	7	1	90°	9
9-Mar-10	11:14	60	33.796304	-76.241464	NW	8	1	60°	13
9-Mar-10	12:03	76	33.871443	-76.213856	SE	9	1	90°	30
9-Mar-10	12:19	82	33.858932	-76.064517	NW	10	3	90°	4
11-Apr-10	11:15	37	33.484779	-76.651031	SE	2	1	100°	40
12-Apr-10	11:17	37	33.685951	-76.498036	NW	5	1	90°	8
17-Jun-10	10:07	19	33.574286	-76.498036	SE	3	1	90°	21
17-Jun-10	14:37	47	33.871597	-76.498036	SE	9	2	90°	13
18-Jun-10	9:20	7	33.637239	-76.561817	SE	4	2	100°	8
18-Jun-10	9:38	13	33.556626	-76.603283	NW	3	1	60°	32
18-Jun-10	10:36	24	33.430727	-76.703646	NW	1	1	90°	25



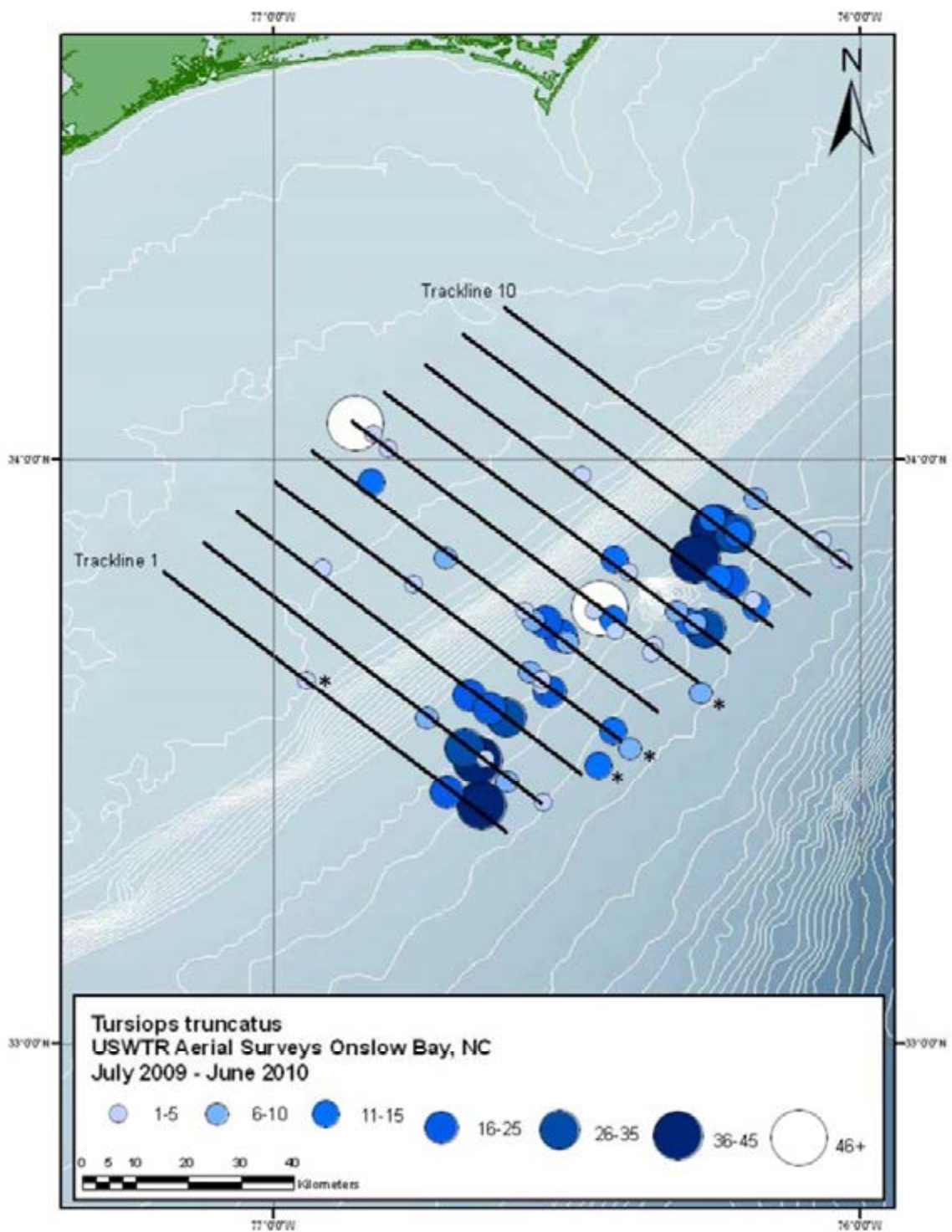


Figure 6. Bottlenose dolphin (*Tursiops truncatus*) sightings indicating group size. Asterisk denotes off effort sightings.

Atlantic spotted dolphins (*Stenella frontalis*) (Table 7, Fig. 7)

The spotted dolphin was the second most commonly encountered species in the survey area, both by number of sightings and number of individuals. Groups of spotted dolphins were sighted 24 times for a total of 467 individuals. This species was encountered in August, September, October, January, February, April, and June. Group size ranged between two and 65 (mean group size = 19). At least one calf was observed within a group during both September and October. Spotted dolphins were almost exclusively encountered on the shallower, inshore side of the continental shelf break except for one sighting that occurred on the shelf break. There are two distinct forms or ecotypes of the Atlantic spotted dolphin in the western north Atlantic: a heavily spotted, larger form that typically occurs on the continental shelf and is most often encountered around the 200 m isobar or in shallower water, and a less spotted and smaller form which occurs further offshore and around islands (Perrin *et al.* 1987, 1994). It is likely, based upon the sighting pattern observed, that the spotted dolphins observed during the present study belong to the continental shelf variety. During the 2008/2009 aerial survey of the same area, spotted dolphins were encountered 22 times for a total of 717 individuals. During the 2007/2008 aerial survey, spotted dolphins were encountered 11 times for a total of 177 individuals. Spotted dolphins were not recorded during the 1998/1999 aerial surveys, although the lines flown in that survey did not extend as far west as in the current surveys (McLellan *et al.* 1999). The abundance estimate for *S. frontalis* (both inshore and offshore ecotypes) in the western north Atlantic is 50978; the status of the stock(s) is/are unknown (Waring *et al.* 2007).

Table 7. All spotted dolphin (*Stenella frontalis*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
17-Aug-09	15:27	7	34.160575	-76.468974	SE	10	3	90°	35
18-Aug-09	11:50	53	33.886683	-76.898185	NW	4	2	60°	2
18-Aug-09	14:21	64	33.761505	-76.599899	SE	5	3	60°	65
18-Aug-09	15:02	75	34.070793	-76.872859	NW	6	2	45°	9
19-Aug-09	11:28	27	33.815988	-77.078934	SE	2	3	90°	4
12-Sep-09	9:51	16	33.811053	-77.063150	NW	2	2	90°	7
12-Sep-09	10:50	30	33.943367	-76.958318	NW	4	3	90°	12
12-Sep-09	14:08	57	34.173510	-76.478967	SE	10	1	100°	14
12-Sep-09	15:03	70	34.164627	-76.722763	SE	8	2	110°	4
12-Sep-09	15:14	75	34.110018	-76.648676	SE	8	2	90°	4
1-Oct-09	9:45	23	34.076573	-76.766611	SE	7	3	90°	20
1-Oct-09	11:11	54	34.042681	-76.555923	NW	8	3	90°	6
1-Oct-09	11:29	58	34.150825	-76.699600	NW	8	2	90°	9
1-Oct-09	12:29	73	34.209822	-76.525553	NW	10	2	90°	27
1-Oct-09	14:29	83	33.765256	-77.127123	SE	1	3	100°	4
21-Oct-09	13:02	47	34.079645	-76.624388	NW	8	3	90°	4
14-Jan-10	13:25	72	34.276465	-76.603520	NW	10	3	90°	37
15-Jan-10	14:27	76	34.074558	-76.731663	SE	7	1	90°	30
15-Jan-10	14:43	83	33.917354	-76.538055	SE	7	1	90°	28
15-Jan-10	16:29	107	34.156027	-76.457154	NW	10	2	60°	47
21-Feb-10	11:26	22	33.924674	-76.662710	NW	6	3	90°	18
21-Feb-10	15:17	54	33.984780	-76.500092	SE	8	1	90°	8
16-Jun-10	11:04	26	34.013141	-76.406738	SE	9	3	90°	55
11-Apr-10	9:53	16	34.010019	-76.930714	NW	5	3	90°	18

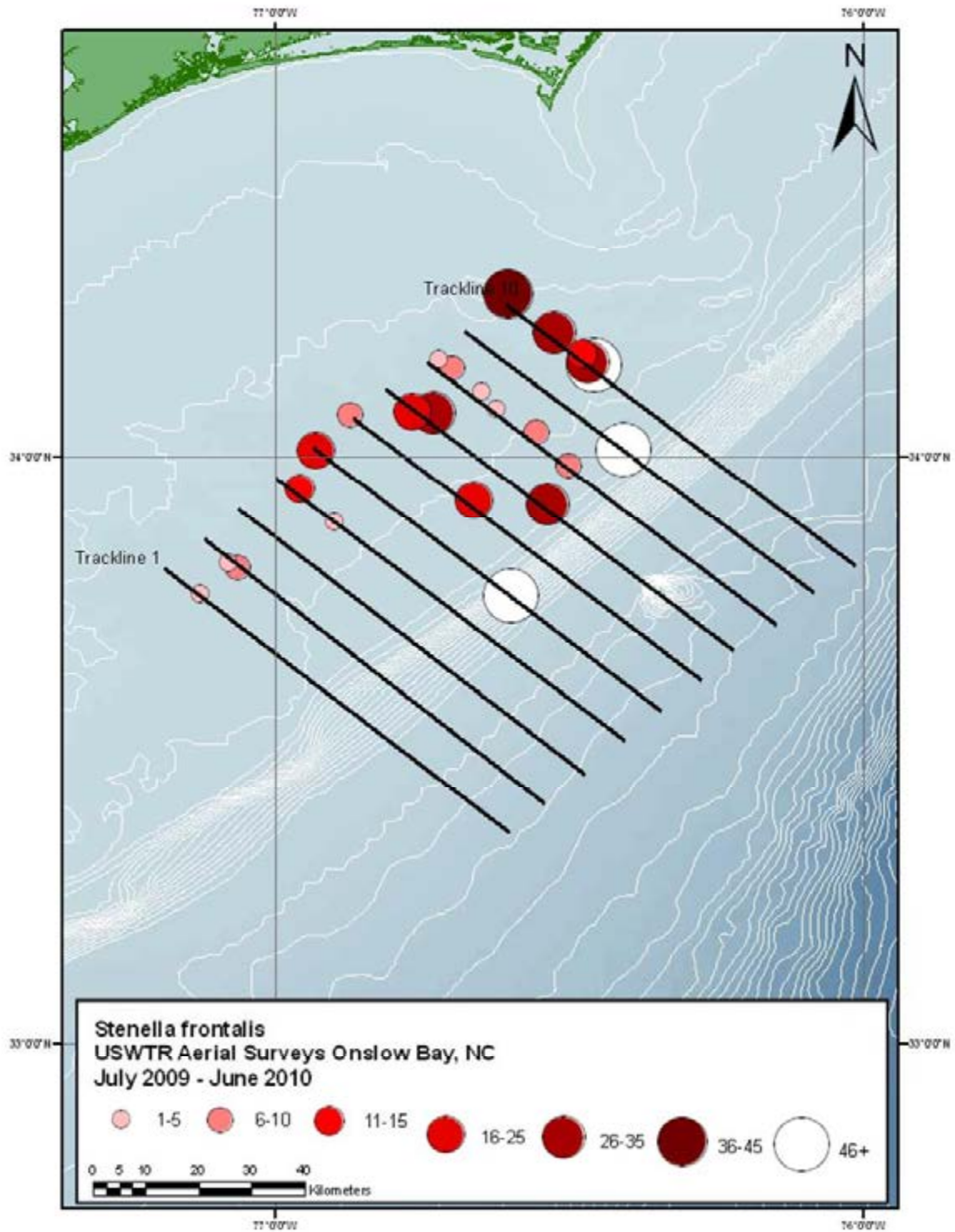


Figure 7. Spotted dolphin (*Stenella frontalis*) sightings indicating group size.

Short-finned pilot whales (*Globicephala macrorhynchus*) (Table 8, Fig. 8)

Short-finned pilot whales were encountered twice, for a total of 63 individuals. Both sightings of this species were offshore of the continental shelf break. As is common for sightings of this species in the survey area, a calf was present in both of these encounters. During the 2008/2009 aerial survey of the same period, short-finned pilot whales were encountered twice for a total of 30 individuals. During the 2007/2008 aerial survey of the same area, short-finned pilot whales were encountered three times for a total of 53 individuals. Pilot whales of unidentified species were encountered once during the 1998/1999 aerial surveys, in May 1999.

Owing to the difficulty of differentiating short-finned and long-finned pilot whales (*Globicephala melas*) at sea, NMFS reports stock numbers and status as *Globicephala* spp. (Waring *et al.* 2007). The abundance estimate of *Globicephala* spp. (31139, CV 0.27) is based upon shipboard surveys along the outer continental shelf of the US Atlantic between Florida and Maryland in 2004 (Waring *et al.* 2009).

Table 8. All short-finned pilot whale (*Globicephala macrorhynchus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
18-Aug-09	10:59	33	33.493955	-76.498147	SE	3	3	90°	40
19-Aug-09	12:20	37	33.386885	-76.537104			2	90°	6
21-Oct-09	11:08	18	33.823938	-75.995138		TE	1	90°	12
21-Feb-10	15:39	59	33.757085	-76.192980	SE	8	2	90°	23



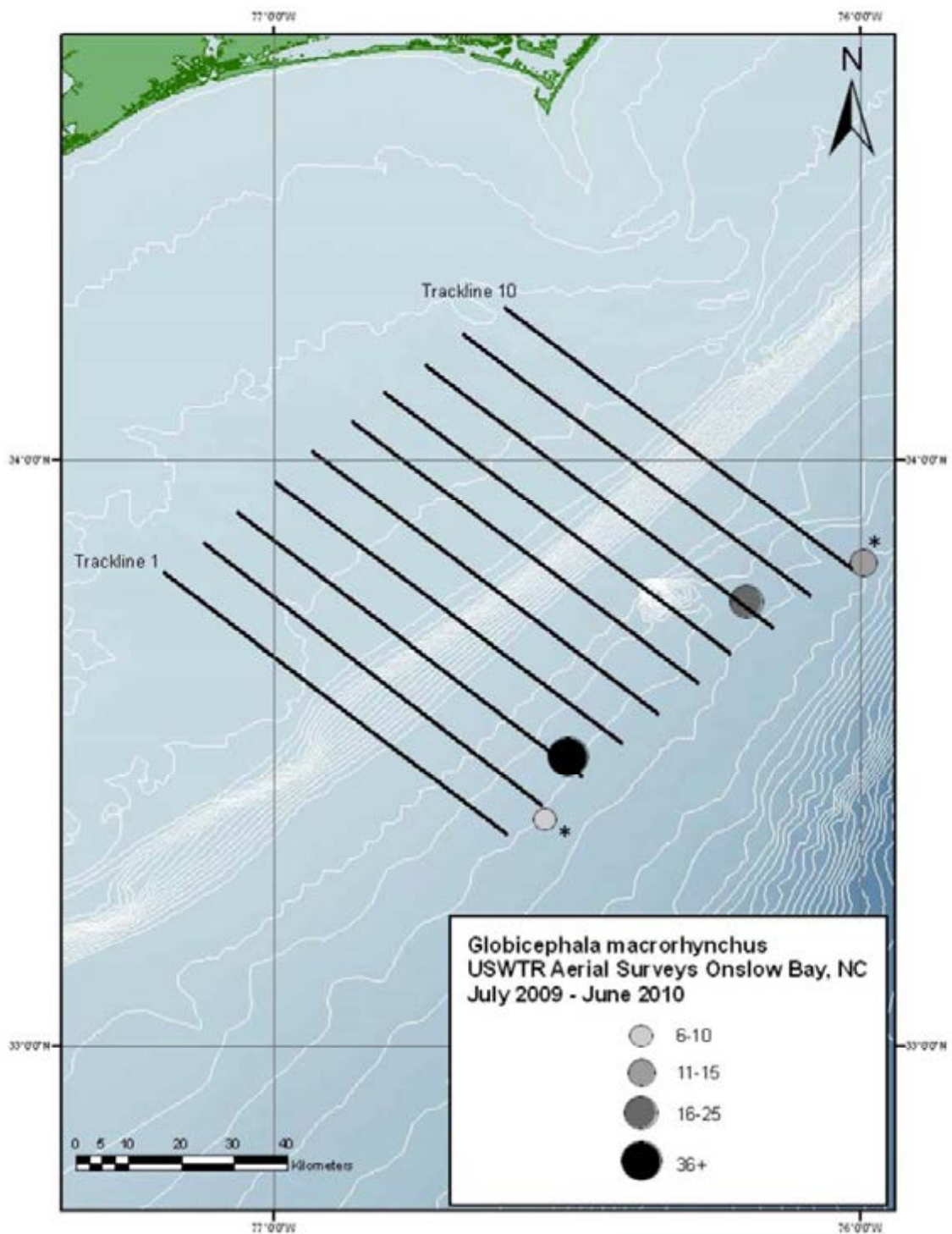


Figure 8. Short-finned pilot whales (*Globicephala macrorhynchus*) sightings indicating group size. Asterisk denotes off effort sightings.

Risso's dolphins (*Grampus griseus*) (Table 9, Fig. 9)

There was a single sighting of a group of 20 Risso's dolphins during the 2009-2010 aerial surveys. There was a single "off effort" sighting of a group of 20 Risso's dolphin during the 2008-2009 survey, which included two adult animals with calves. This species was encountered three times during the 2007-2008 surveys; once in May 2008 and twice in June 2008, for a total of 20 individuals. A single neonate calf (less than half the length of the associated larger animal) was observed during one of the encounters in June 2008. Three groups of Risso's dolphins for 28 individuals were also seen in May and July during the 1998-1999 aerial surveys. All encounters occurred in offshore waters where Risso's dolphins have been found to reside along the mid-Atlantic continental shelf edge year round, with some movement north during spring, summer and fall, and into the mid-Atlantic Bight during winter (Waring *et al.* 2007). The best available estimate for Risso's dolphins based upon results from two US Atlantic surveys conducted in 2004 is 20479 (CV=0.59) (Waring *et al.* 2009).

Table 9. All Risso's dolphin (*Grampus griseus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from June 2009 - July 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
18-Aug-09	9:57	13	33.358769	-76.610723	SE	1	2	90°	6
15-Jan-10	15:16	92	33.664086	-76.195214		TE	1	90°	5

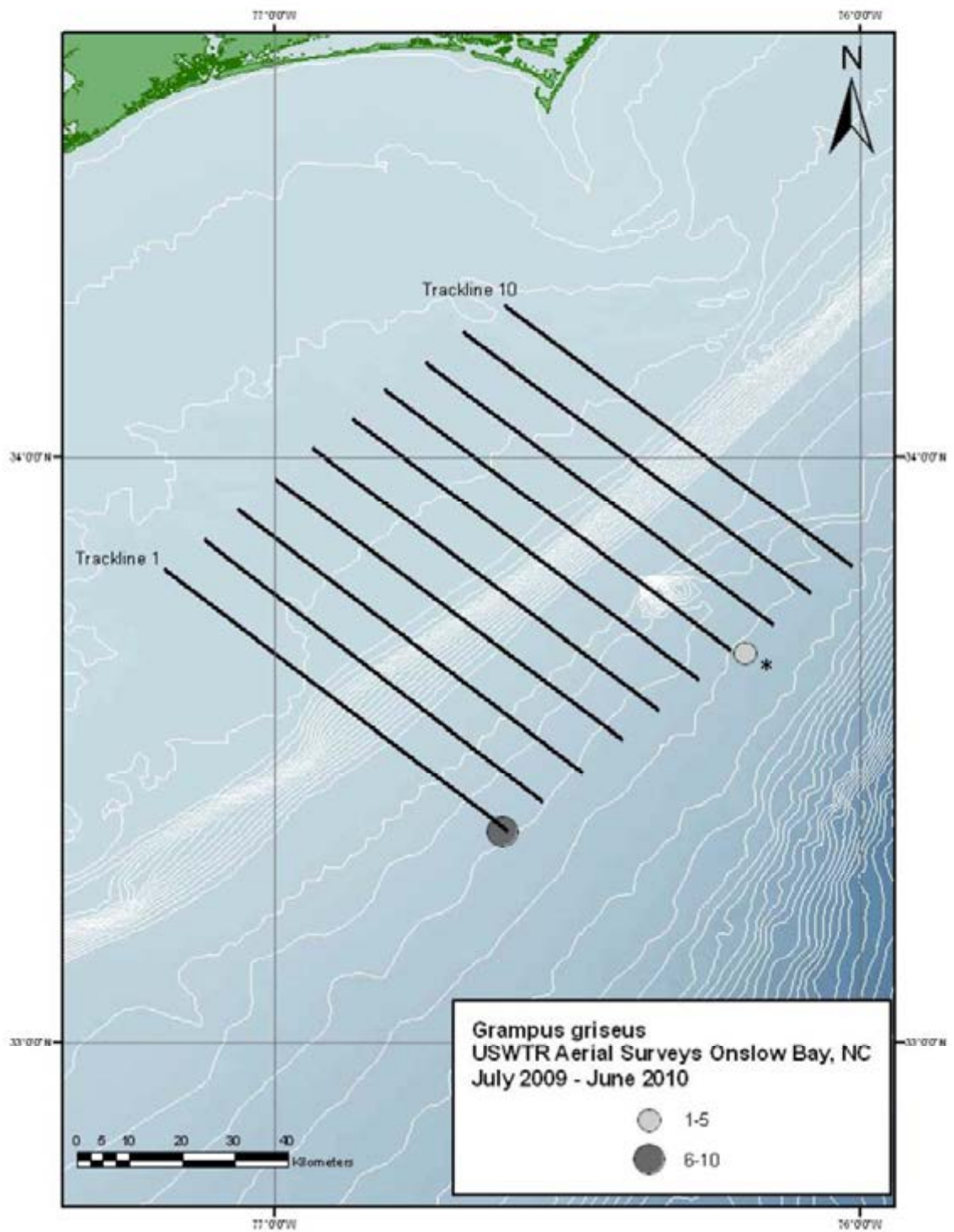


Figure 9. Risso's dolphin (*Grampus griseus*) sightings indicating group size. Asterisk denotes off effort sighting.



Common Dolphins (*Delphinus delphis*) (Table 10, Fig. 10)

A single group of 20 common dolphins with a single calf present was encountered on March 9, 2010 inside the USWTR survey area. These animals had not been observed in the two years prior but were present in the aerial surveys conducted in 1998/99. During the 1998/1999 surveys a total of 14 sightings, representing 194 individuals, were observed in the months of September, October, June and July. The sighting this year occurred in deeper waters offshore of the shelf break on line 7; in 1998/1999 however, sightings occurred throughout the range. The current best estimate of common dolphins in the Western Atlantic Ocean, between central Florida and Canada, is 120743 (CV = 0.23) (Waring *et al.* 2008).

Table 10. All common dolphin (*Delphinus delphis*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from June 2009 - July 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	10:42	49	33.770576	-76.346663	SE	7	1	110°	20

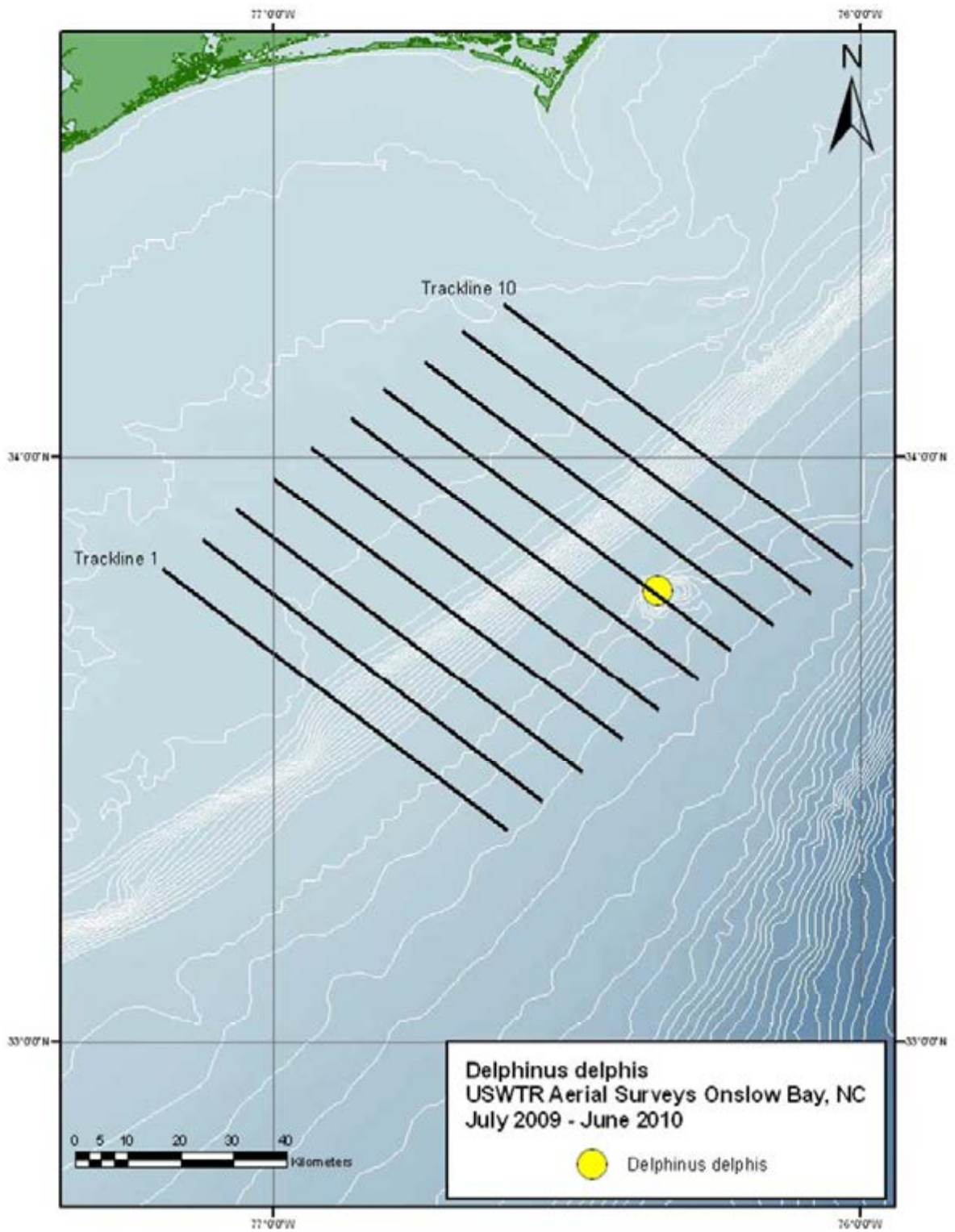


Figure 10. Common dolphin (*Delphinus delphis*) sighting.

Sperm Whale (*Physeter macrocephalus*) (Table. 11, Fig. 11)

On October 21, 2009 while on an “off effort” transit to the offshore end of line 10, a single sperm whale was encountered. Although no photographs of this sighting were possible, there is high confidence in the species ID. Sperm whales are listed as endangered under the Endangered Species Act, and the current best population estimate in the Western North Atlantic is 4804 (CV=0.38) (Waring *et al.* 2007). During the two years prior to this survey period and during the aerial surveys in 1998-99 there were no sightings of sperm whales. Acoustic recordings of sperm whales have been collected from HARPS deployed within the USWTR, although the exact position of the animals could not be specified. This recent sighting confirms the presence of this species near the USWTR range.

Table 11. All sperm whale (*Physeter macrocephalus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from June 2009 - July 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
21-Oct-09	11:08	18	33.823938	-75.995138		TE	1	90°	1	No resight of Sperm whale

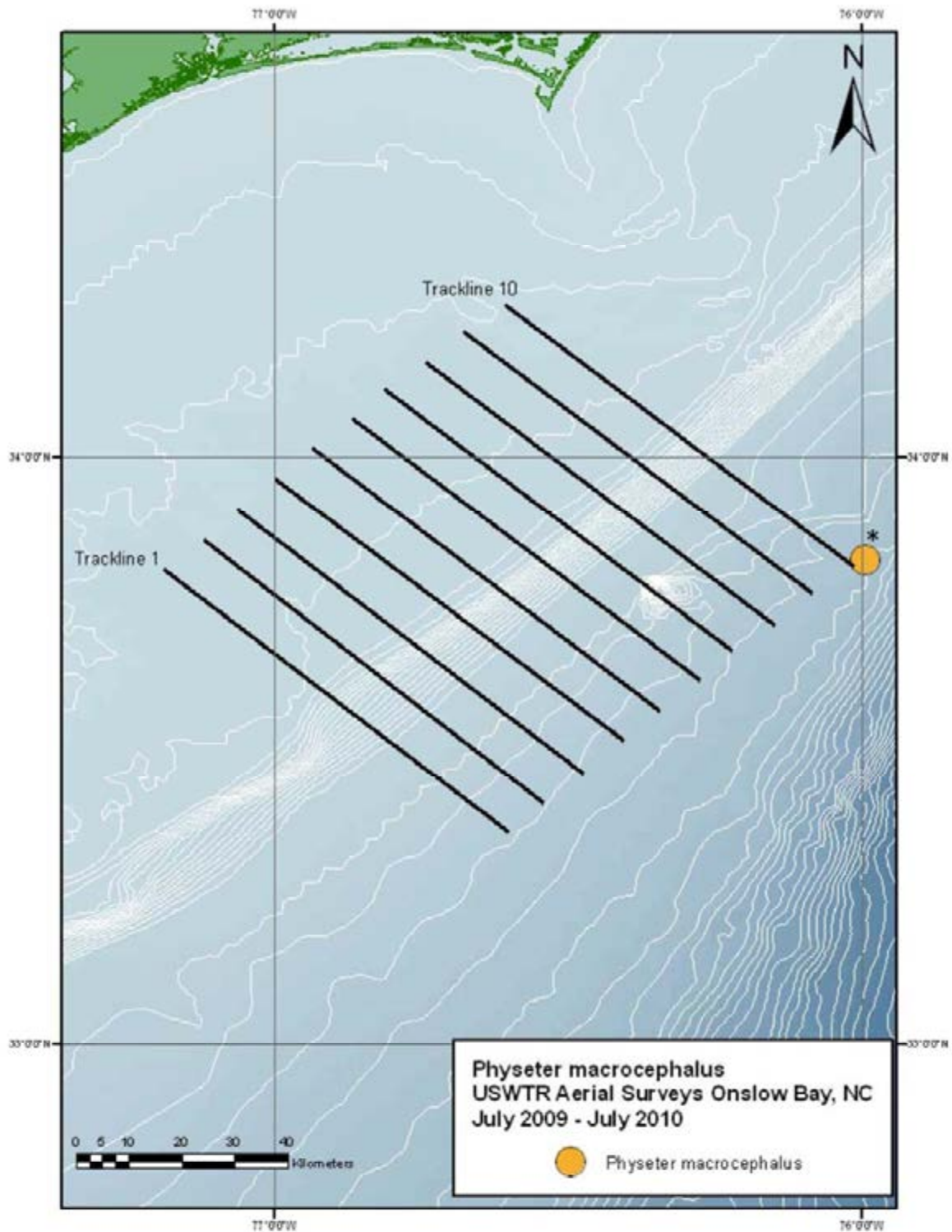


Figure 11. Sperm whale (*Physeter macrocephalus*) sighting. Asterisk denotes off effort sighting.

Fin Whale (*Balaenoptera physalus*) (Table 12, Fig. 12)

A single fin whale sighting was made on March 9, 2010 offshore of the shelf break on line 10. Fin whales are listed as endangered under the Endangered Species Act and the current best population estimate in the Western North Atlantic is 2269 (CV=0.37) (Waring *et al.*, 2009). This species has not been observed in any of the previous surveys in the Onslow Bay USWTR site but was observed further north at the Wallops Island site in 1998/99 (McLellan *et al.*, 1999) and off the mouth of the Chesapeake Bay, VA during right whale aerial surveys in 2001 (McLellan *et al.*, 2001), 2002 (McLellan *et al.*, 2002), 2005-06 (McLellan *et al.*, 2006), and 2006-07 (McLellan *et al.*, 2007).

Table 12. All fin whale (*Balaenoptera physalus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from June 2009 - July 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	12:30	86	33.963446	-76.221540	NW	10	3	90°	1



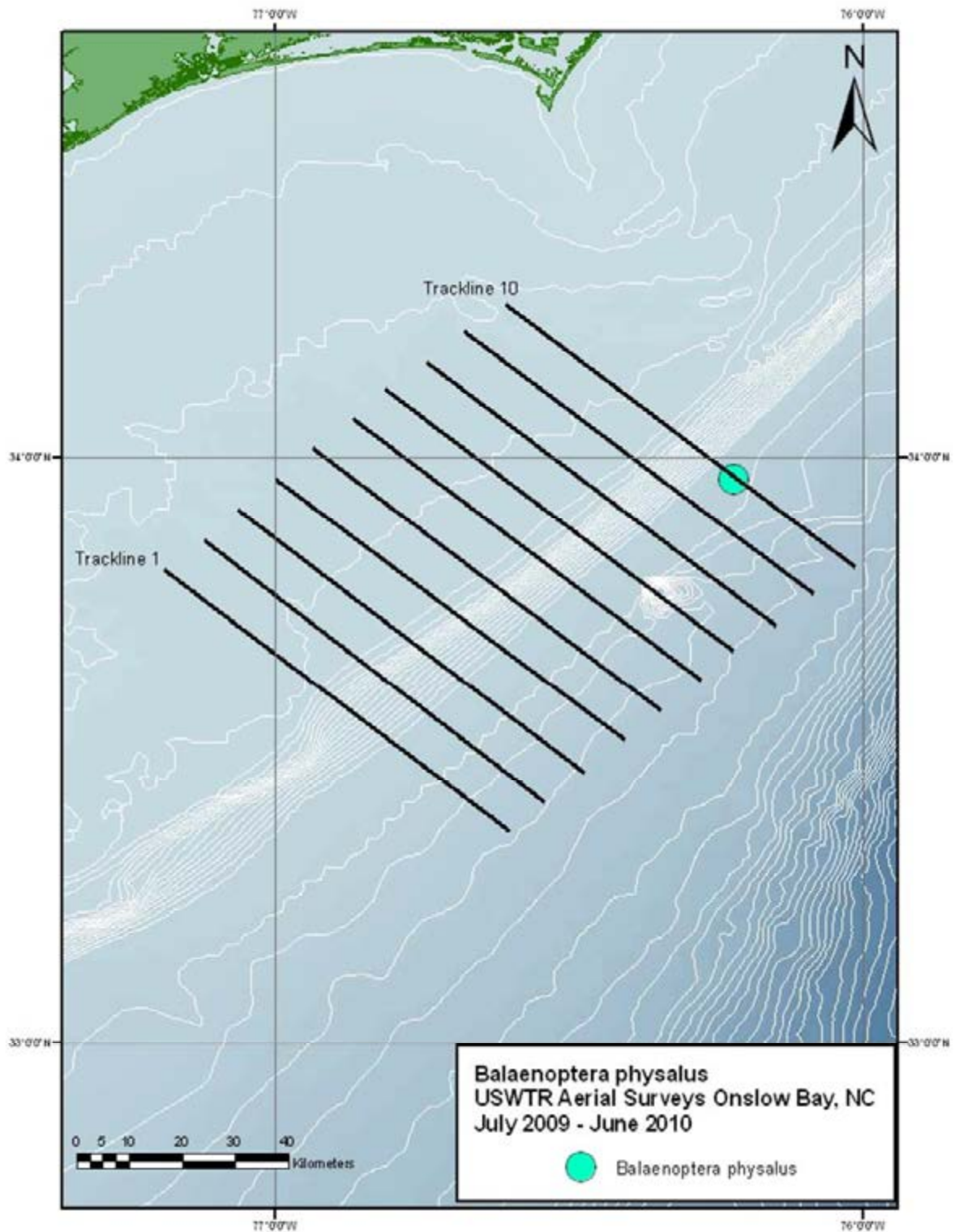


Figure 12. Fin whale (*Balaenoptera physalus*) sighting.

Unidentified delphinids (Table 13, Fig. 13)

When no images were obtained or when images obtained during encounters were not of sufficient quality to make an unequivocal species identification, the designation “unidentified delphinids” was used. A total of 4 sightings of 23 individuals were labeled as unidentified delphinids during the 2009-2010 survey period. In 2008-2009 a total of 41 unidentified delphinids in four sightings were recorded. During the 2007/2008 aerial survey 11 sightings for a total of 97 individuals were labeled as unidentified delphinids.

*Table 13.* All unidentified delphinid sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from June 2009 - July 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
12-Sep-09	9:08	7	33.494854	-76.785000	SE	1	3	100°	3
17-Dec-09	10:56	18	33.862939	-76.343101	NW	8	1	90°	2
17-Dec-09	11:56	28	34.135101	-76.433447	NW	10	3	90°	15
10-Mar-10	9:57	17	33.844501	-77.105389	SE	2	2	90°	3

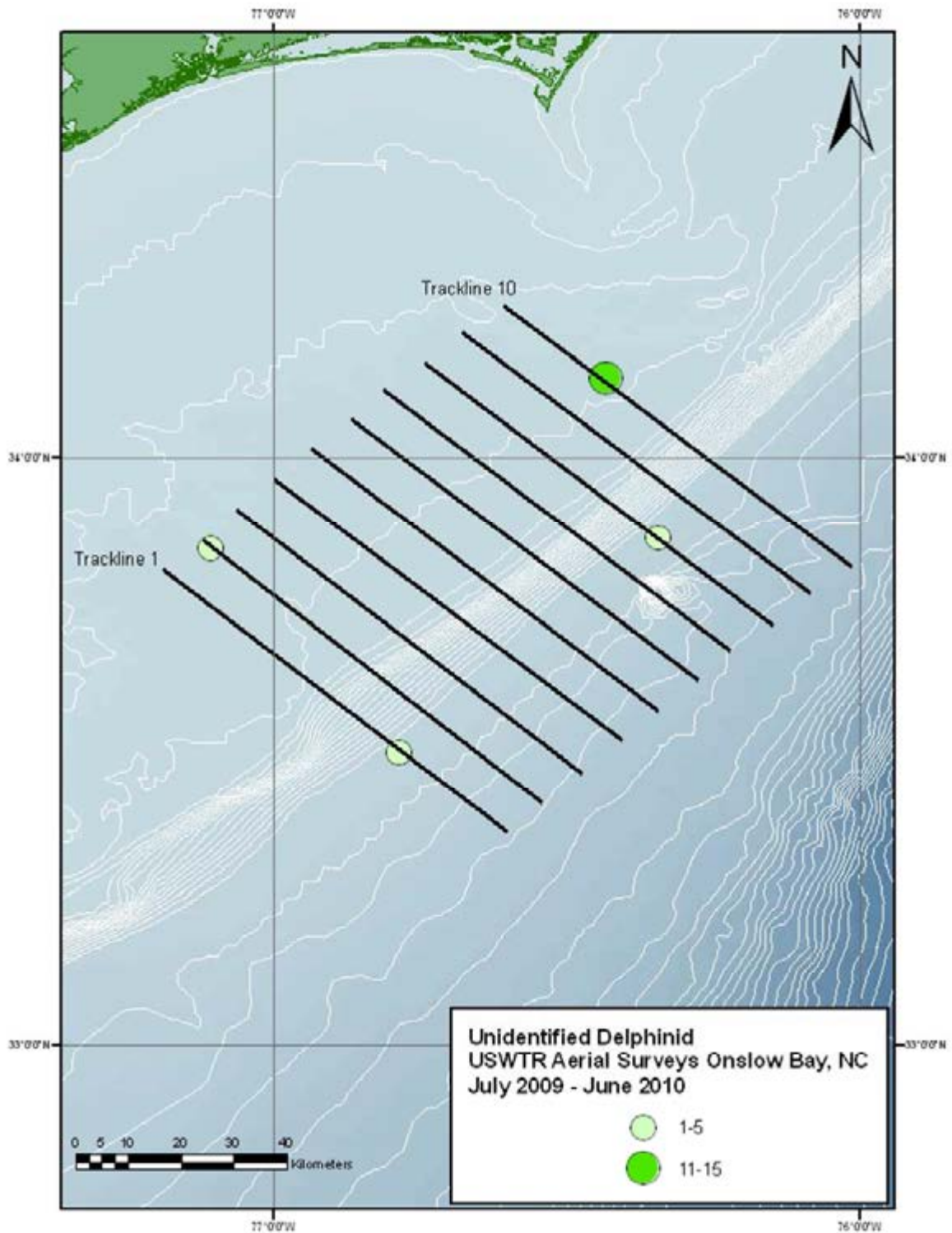


Figure 13. Unidentified delphinid sightings indicating group size.



## Sea Turtles (Tables 14 to 16, Figs. 14 and 15a-c)

The most common sea turtle off the North Carolina coast is the loggerhead sea turtle (*Caretta caretta*), a species that nests along the NC coast and is listed as threatened under the US Endangered Species Act (National Marine Fisheries Service and U.S. Fish and Wildlife Service 2008). Other sea turtle species present in the mid-Atlantic are the green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's Ridley (*Lepidochelys kempii*) (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991, 1992a, 1992b, 1993). A total of 646 sea turtles were seen in the survey area in 2009-2010, which is higher than observed in any previous year. Of these, 501 were identified as loggerhead sea turtles, 141 were recorded as "unidentified sea turtles" and four leatherback sea turtles were observed (three in October and one in March). Leatherback turtles have now been sighted in two consecutive years with a single individual observed in June 2009. They were not seen during the 2007/2008 season but four animals had been seen in the 1998-99 surveys.

In comparison, during the 2007-2008 survey season 208 loggerhead sea turtles and 60 "unidentified sea turtles" were recorded. During the 2008-2009 season 226 loggerhead sea turtles and 36 "unidentified sea turtles" were observed.

Sea turtles were observed in every month of the survey period, although abundance fluctuated throughout the year. The lowest densities were observed in June, July and January (8.11, 5.38 and 6.75 sea turtles /1000 km respectively) and the highest densities occurred in January, February and March (102.74, 70.76, and 176.07 sea turtles /1000 km respectively). The majority of sea turtles were observed shoreward of the continental shelf break. As expected, sea turtle sightings were strongly correlated with Beaufort Sea State.

Table 14 . All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
8-Jul-09	13:53	10	33.878084	-76.623097	NW	6	2	90°	1
8-Jul-09	14:57	24	34.195802	-76.656175	SE	9	2	90°	2
8-Jul-09	15:03	27	34.071089	-76.484849	SE	9	2	110°	1
17-Aug-09	15:46	11	33.991071	-76.245475	SE	10	2	30°	1
17-Aug-09	16:16	18	34.183486	-76.627424	NW	9	1	90°	1
17-Aug-09	16:22	21	34.152674	-76.714152	SE	8	4	90°	1
17-Aug-09	16:26	22	34.065601	-76.599661	SE	8	1	90°	1
17-Aug-09	16:27	23	34.032553	-76.556431	SE	8	3	90°	1
17-Aug-09	16:49	28	33.762449	-76.338879	NW	7	3	60°	1
18-Aug-09	9:27	4	33.743025	-77.099780	SE	1	2	100°	1
18-Aug-09	9:49	11	33.513235	-76.798926	SE	1	4	90°	1
18-Aug-09	10:27	23	33.671233	-76.879581	NW	2	3	90°	1
18-Aug-09	10:42	28	33.833583	-76.957856	SE	3	2	90°	1
18-Aug-09	10:44	29	33.791287	-76.902571	SE	3	3	90°	1
18-Aug-09	11:38	46	33.759375	-76.728531	NW	4	3	90°	1
18-Aug-09	11:46	51	33.840069	-76.835571	NW	4	3	90°	1
18-Aug-09	15:13	80	34.088615	-76.758118	SE	7	2	90°	1
18-Aug-09	15:16	82	34.020482	-76.668820	SE	7	3	90°	1
18-Aug-09	15:18	83	33.974456	-76.608827	SE	7	3	90°	1
19-Aug-09	11:21	23	33.889617	-77.036512	NW	3	3	60°	1
12-Sep-09	8:47	4	33.742486	-77.106245	SE	1	2	90°	1
12-Sep-09	10:02	19	33.859967	-77.118067	NW	2	1	100°	1
12-Sep-09	10:15	23	33.698725	-76.779526	SE	3	3	90°	1
30-Sep-09	12:15	4	33.898165	-76.779545	SE	5	2	90°	1
1-Oct-09	12:25	71	34.158049	-76.456182	NW	10	1	90°	1
1-Oct-09	14:44	86	33.674688	-77.017042	SE	1	1	90°	1
1-Oct-09	15:20	91	33.790268	-77.028675	NW	2	1	90°	1
2-Oct-09	9:19	11	33.852473	-76.983985	SE	3	3	90°	1
21-Oct-09	12:03	32	34.173013	-76.617934	SE	9	2	60°	1
21-Oct-09	13:15	53	34.097636	-76.770540	SE	7	2	60°	1
8-Nov-09	13:28	6	33.647821	-76.972049	SE	1	1	90°	2
8-Nov-09	14:09	16	33.679399	-76.888699	NW	2	2	90°	1
8-Nov-09	14:15	17	33.804874	-77.051340	NW	2	1	60°	1
8-Nov-09	14:21	20	33.894745	-77.041877	SE	3	1	60°	2
8-Nov-09	14:24	21	33.840048	-76.967916	SE	3	2	90°	2
8-Nov-09	14:30	24	33.708602	-76.796400	SE	3	3	100°	3
8-Nov-09	15:26	40	34.007062	-76.924330	SE	5	2	90°	3
8-Nov-09	15:36	42	33.799470	-76.648673	SE	5	2	45°	1
8-Nov-09	16:09	46	34.034573	-76.830253	NW	6	2	90°	3
14-Jan-10	10:09	7	33.923697	-76.811427	SE	5	3	60°	1
14-Jan-10	10:30	12	33.646098	-76.317713	NW	6	1	90°	2
14-Jan-10	10:31	13	33.670578	-76.352304	NW	6	3	90°	1
14-Jan-10	11:04	23	33.874559	-76.619818	NW	6	1	90°	1
14-Jan-10	11:06	24	33.909722	-76.665854	NW	6	1	90°	2
14-Jan-10	11:11	30	34.024434	-76.817598	NW	6	1	90°	4

Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
14-Jan-10	11:21	34	34.012311	-76.659354	SE	7	1	90°	4
14-Jan-10	11:23	35	33.977871	-76.613812	SE	7	2	60°	4
14-Jan-10	12:09	48	33.928146	-76.423492	NW	8	2	90°	2
14-Jan-10	12:17	52	34.100200	-76.649405	NW	8	3	60°	2
14-Jan-10	12:28	56	34.117338	-76.545862	SE	9	3	90°	6
14-Jan-10	12:28	57	34.106038	-76.531052	SE	9	2	60°	3
14-Jan-10	12:30	58	34.071325	-76.485160	SE	9	3	90°	2
14-Jan-10	16:12	90	33.607468	-76.925138	NW	1	1	90°	1
14-Jan-10	16:16	91	33.691822	-77.036045	NW	1	2	110°	1
15-Jan-10	9:15	7	33.604474	-76.919300	SE	1	2	90°	1
15-Jan-10	9:17	8	33.576127	-76.881928	SE	1	2	60°	1
15-Jan-10	9:57	20	33.666273	-76.872060	NW	2	2	90°	1
15-Jan-10	10:18	25	33.711685	-76.801000	SE	3	2	90°	1
15-Jan-10	11:05	35	33.952166	-76.982796	NW	4	2	90°	1
15-Jan-10	11:12	39	33.948889	-76.846308	SE	5	2	90°	1
15-Jan-10	11:20	42	33.761875	-76.599828	SE	5	1	90°	1
15-Jan-10	12:11	57	33.874170	-76.618101	NW	6	2	60°	2
15-Jan-10	12:16	59	33.990441	-76.771721	NW	6	2	45°	2
15-Jan-10	12:17	60	34.012474	-76.800743	NW	6	1	90°	1
15-Jan-10	14:37	79	34.042827	-76.702060	SE	7	1	60°	1
15-Jan-10	14:39	80	33.985401	-76.623156	SE	7	1	45°	2
15-Jan-10	15:31	95	33.943784	-76.445273	NW	8	1	90°	1
15-Jan-10	15:48	98	34.116694	-76.541219	SE	9	2	90°	1
15-Jan-10	15:51	100	34.041217	-76.444075	SE	9	1	90°	1
21-Feb-10	9:33	7	33.667997	-76.872876	NW	2	2	90°	1
21-Feb-10	9:35	8	33.709395	-76.926478	NW	2	2	60°	1
21-Feb-10	12:00	25	34.034801	-76.828779	NW	6	2	60°	1
21-Feb-10	14:01	34	34.253342	-76.586512	SE	10	3	90°	1
21-Feb-10	14:03	35	34.208810	-76.529055	SE	10	2	90°	2
21-Feb-10	14:55	47	34.123505	-76.546724	NW	9	2	90°	2
21-Feb-10	15:04	50	34.157408	-76.722546	SE	8	2	45°	1
21-Feb-10	15:07	51	34.106766	-76.658314	SE	8	2	60°	1
21-Feb-10	16:19	65	34.081816	-76.749535	NW	7	1	90°	2
8-Mar-10	13:21	20	34.034656	-76.829645	SE	6	3	60°	1
8-Mar-10	13:24	21	33.974706	-76.750432	SE	6	2	90°	2
8-Mar-10	13:25	22	33.961879	-76.733515	SE	6	1	90°	1
8-Mar-10	13:28	23	33.891283	-76.640286	SE	6	2	90°	2
8-Mar-10	14:13	34	33.886270	-76.894710	SE	4	2	90°	2
8-Mar-10	14:15	35	33.861046	-76.861237	SE	4	3	60°	3
8-Mar-10	15:08	44	33.683007	-76.892560	SE	2	1	90°	1
9-Mar-10	9:12	8	33.898118	-76.780137	SE	5	2	90°	1
9-Mar-10	9:14	9	33.861196	-76.731401	SE	5	3	60°	1
9-Mar-10	9:25	14	33.804625	-76.656746	SE	5	2	90°	1
9-Mar-10	9:27	15	33.767922	-76.608612	SE	5	1	90°	1
9-Mar-10	10:01	27	33.827833	-76.556565	NW	6	3	60°	2

Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	10:02	28	33.840224	-76.572808	NW	6	3	60°	2
9-Mar-10	10:04	30	33.878250	-76.622588	NW	6	2	45°	3
9-Mar-10	10:06	31	33.925011	-76.684041	NW	6	1	90°	1
9-Mar-10	10:08	32	33.967823	-76.740828	NW	6	2	60°	1
9-Mar-10	10:09	33	33.988278	-76.767975	NW	6	2	60°	3
9-Mar-10	10:28	41	34.022386	-76.674311	SE	7	2	90°	4
9-Mar-10	10:29	42	34.002681	-76.648498	SE	7	2	90°	2
9-Mar-10	10:29	43	33.988287	-76.629720	SE	7	2	60°	3
9-Mar-10	10:31	44	33.960023	-76.592718	SE	7	2	60°	5
9-Mar-10	11:37	65	34.052926	-76.585845	NW	8	2	60°	1
9-Mar-10	11:39	66	34.090787	-76.635594	NW	8	1	90°	1
9-Mar-10	11:40	67	34.111894	-76.663395	NW	8	2	60°	1
9-Mar-10	11:41	68	34.139577	-76.699706	NW	8	3	90°	3
9-Mar-10	11:53	73	34.037500	-76.441284	SE	9	2	90°	3
10-Mar-10	9:06	3	33.948010	-76.977026	SE	4	2	60°	3
10-Mar-10	9:16	5	33.730928	-76.689260	SE	4	3	90°	1
10-Mar-10	10:15	23	33.656404	-76.858287	SE	2	2	60°	1
11-Apr-10	9:48	13	33.960538	-76.863675	NW	5	2	90°	1
11-Apr-10	9:50	14	34.003161	-76.920216	NW	5	3	60°	1
11-Apr-10	10:46	29	33.773411	-76.883261	NW	3	2	90°	1
11-Apr-10	10:52	30	33.900722	-77.049539	NW	3	2	90°	1
11-Apr-10	14:08	54	34.022195	-76.672521	SE	7	3	90°	1
11-Apr-10	14:08	55	34.012545	-76.659842	SE	7	1	90°	1
11-Apr-10	14:56	64	34.114997	-76.542141	SE	9	2	90°	1
11-Apr-10	15:01	66	33.998321	-76.387938	SE	9	1	60°	1
11-Apr-10	15:34	73	34.226395	-76.552354	NW	10	3	100°	1
12-Apr-10	9:08	4	34.215017	-76.535104	SE	10	1	90°	1
12-Apr-10	9:10	5	34.169130	-76.476012	SE	10	2	90°	1
12-Apr-10	9:20	9	34.016787	-76.279442	SE	10	1	90°	1
12-Apr-10	9:48	15	34.105410	-76.532150	NW	9	2	60°	1
12-Apr-10	9:58	18	34.141664	-76.701370	SE	8	2	90°	1
12-Apr-10	10:00	19	34.101123	-76.648155	SE	8	2	90°	1
12-Apr-10	10:01	20	34.059282	-76.593320	SE	8	2	90°	1
12-Apr-10	10:41	26	34.110676	-76.790741	NW	7	2	90°	2
12-Apr-10	10:47	30	34.023453	-76.813501	SE	6	2	60°	1
12-Apr-10	10:48	31	34.003460	-76.787213	SE	6	2	60°	1
16-Jun-10	10:45	21	34.061262	-76.601679	NW	8	3	100°	1
16-Jun-10	11:38	32	34.142977	-76.447917	NW	10	2	90°	1
16-Jun-10	11:39	34	34.158292	-76.467704	NW	10	1	90°	1
17-Jun-10	14:24	45	34.088759	-76.497305	SE	9	2	90°	1
8-Jul-09	15:41	27	34.235277	-76.562036	NW	10	2	90°	1
28-Jul-09	10:51	15	33.660413	-76.864951	SE	2	2	90°	1
17-Aug-09	15:48	13	33.943945	-76.185304	SE	10	2	90°	1
17-Aug-09	16:00	18	33.808016	-76.141633	NW	9	2	100°	1
17-Aug-09	16:08	20	34.006983	-76.398432	NW	9	3	90°	1

Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
17-Aug-09	16:15	23	34.154200	-76.589502	NW	9	3	100°	1
17-Aug-09	16:23	28	34.117362	-76.668036	SE	8	3	90°	1
17-Aug-09	16:27	29	34.043280	-76.570644	SE	8	4	90°	1
17-Aug-09	16:40	31	33.764413	-76.205987	SE	8	3	90°	1
17-Aug-09	16:40	32	33.751701	-76.189365	SE	8	3	90°	1
17-Aug-09	17:03	40	34.055212	-76.719894	NW	7	2	90°	1
18-Aug-09	10:45	18	33.770614	-76.875567	SE	3	4	60°	1
18-Aug-09	11:37	32	33.727864	-76.687137	NW	4	2	90°	1
18-Aug-09	14:56	51	33.991932	-76.775291	NW	6	2	90°	1
18-Aug-09	16:09	64	34.028738	-76.421312	SE	9	2	60°	1
19-Aug-09	9:31	7	33.839874	-76.570116	SE	6	2	90°	1
19-Aug-09	10:03	13	33.960298	-76.864501	NW	5	3	60°	1
19-Aug-09	11:20	23	33.864351	-77.003550	NW	3	3	90°	1
19-Aug-09	11:22	24	33.904012	-77.055396	NW	3	4	90°	1
12-Sep-09	11:01	27	33.994148	-76.908442	SE	5	1	90°	1
12-Sep-09	14:54	56	34.139652	-76.576097	NW	9	2	60°	1
12-Sep-09	15:11	61	34.122552	-76.674267	SE	8	1	90°	1
12-Sep-09	15:32	65	33.811576	-76.267942	SE	8	2	60°	1
30-Sep-09	12:40	8	33.727209	-76.421946	NW	6	1	90°	1
30-Sep-09	13:48	20	34.144996	-76.707060	NW	8	3	90°	1
1-Oct-09	8:33	5	33.884291	-76.761412	SE	5	1	90°	1
1-Oct-09	10:59	34	33.967964	-76.469564	NW	8	1	90°	1
1-Oct-09	12:25	49	34.163205	-76.462239	NW	10	1	45°	1
1-Oct-09	14:47	61	33.610435	-76.929048	SE	1	2	45°	1
2-Oct-09	9:04	9	33.671246	-76.878142	NW	2	2	90°	1
2-Oct-09	10:25	21	33.842027	-76.836401	NW	4	2	90°	1
21-Oct-09	12:02	30	34.187579	-76.638317	SE	9	3	60°	1
21-Oct-09	12:04	32	34.158849	-76.598833	SE	9	2	90°	1
21-Oct-09	12:04	33	34.145489	-76.581990	SE	9	1	90°	1
21-Oct-09	12:58	44	34.032365	-76.560665	NW	8	3	60°	1
21-Oct-09	13:10	48	34.153882	-76.720640	NW	8	1	90°	4
21-Oct-09	13:15	51	34.099198	-76.772674	SE	7	2	60°	1
8-Nov-09	14:08	10	33.665816	-76.871465	NW	2	1	90°	1
8-Nov-09	14:13	11	33.756276	-76.988613	NW	2	2	60°	2
8-Nov-09	14:21	14	33.899431	-77.049546	SE	3	2	90°	1
8-Nov-09	16:00	37	33.846249	-76.582095	NW	6	1	90°	1
9-Nov-09	9:48	7	34.020247	-76.544867	NW	8	1	90°	1
17-Dec-09	12:13	28	34.189596	-76.502615	NW	10	2	90°	1
17-Dec-09	15:37	45	33.780631	-77.151036	NW	1	1	90°	1
14-Jan-10	10:14	5	33.814917	-76.669130	SE	5	2	90°	1
14-Jan-10	10:30	8	33.638825	-76.306292	NW	6	2	90°	1
14-Jan-10	11:04	15	33.872254	-76.616934	NW	6	2	90°	1
14-Jan-10	11:06	17	33.914810	-76.672279	NW	6	1	60°	1
14-Jan-10	11:09	20	33.985336	-76.765886	NW	6	1	60°	1
14-Jan-10	11:18	25	34.092177	-76.764066	SE	7	2	60°	1

Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	9:11	8	33.918617	-76.807588	SE	5	2	90°	1
9-Mar-10	9:25	13	33.815028	-76.670268	SE	5	3	100°	3
9-Mar-10	9:26	14	33.777730	-76.621617	SE	5	1	90°	4
9-Mar-10	10:02	26	33.829569	-76.558756	NW	6	1	60°	2
9-Mar-10	10:03	27	33.853433	-76.589936	NW	6	2	90°	6
9-Mar-10	10:03	28	33.868095	-76.609311	NW	6	3	60°	6
9-Mar-10	10:05	29	33.910465	-76.665191	NW	6	2	90°	7
9-Mar-10	10:06	30	33.932773	-76.694397	NW	6	1	90°	8
9-Mar-10	10:07	31	33.953511	-76.722034	NW	6	2	90°	6
9-Mar-10	10:08	32	33.978584	-76.754946	NW	6	2	90°	9
9-Mar-10	10:09	33	33.995584	-76.777413	NW	6	3	60°	11
9-Mar-10	10:26	38	34.062607	-76.726383	SE	7	2	90°	4
9-Mar-10	10:28	39	34.007107	-76.654329	SE	7	1	90°	3
9-Mar-10	10:31	40	33.946583	-76.575289	SE	7	2	60°	6
9-Mar-10	10:32	41	33.920036	-76.540688	SE	7	3	90°	9
9-Mar-10	11:34	58	33.988721	-76.501293	NW	8	1	60°	1
9-Mar-10	11:37	59	34.053929	-76.587145	NW	8	2	90°	9
9-Mar-10	11:40	61	34.117421	-76.670594	NW	8	2	90°	4
9-Mar-10	11:49	64	34.137698	-76.574108	SE	9	2	90°	7
9-Mar-10	12:50	77	34.095748	-76.382541	NW	10	3	90°	4
9-Mar-10	12:56	79	34.243997	-76.573399	NW	10	2	90°	8
10-Mar-10	9:11	6	33.834044	-76.825617	SE	4	2	60°	1
10-Mar-10	9:13	7	33.792268	-76.770787	SE	4	1	90°	1
10-Mar-10	9:44	16	33.749665	-76.850862	NW	3	2	90°	1
10-Mar-10	9:49	20	33.861604	-76.996910	NW	3	1	90°	1
10-Mar-10	9:51	21	33.903755	-77.052064	NW	3	1	60°	3
10-Mar-10	10:10	27	33.748703	-76.977710	SE	2	1	90°	1
10-Mar-10	10:14	30	33.658099	-76.860420	SE	2	2	90°	1
10-Mar-10	10:41	37	33.606329	-76.921889	NW	1	2	90°	2
10-Mar-10	10:48	41	33.763636	-77.128773	NW	1	2	60°	3
11-Apr-10	9:05	4	34.054570	-76.854696	SE	6	2	90°	2
11-Apr-10	11:01	27	33.739419	-76.964370	SE	2	3	90°	1
11-Apr-10	11:05	28	33.667044	-76.870733	SE	2	3	90°	1
11-Apr-10	11:57	35	33.795604	-77.172689	NW	1	3	90°	1
11-Apr-10	14:40	51	34.009990	-76.530938	NW	8	1	90°	1
11-Apr-10	14:53	56	34.170840	-76.616313	SE	9	2	45°	1
11-Apr-10	15:31	60	34.171487	-76.481811	NW	10	2	60°	1
12-Apr-10	9:06	3	34.260347	-76.593000	SE	10	2	90°	3
12-Apr-10	9:07	4	34.245283	-76.574369	SE	10	1	90°	2
12-Apr-10	9:09	5	34.205325	-76.522603	SE	10	2	100°	4
12-Apr-10	9:58	21	34.131522	-76.688228	SE	8	3	90°	2
12-Apr-10	10:46	34	34.055040	-76.859105	SE	6	3	90°	4
12-Apr-10	14:35	49	33.773823	-77.011464	NW	2	1	90°	1
16-Jun-10	10:57	19	34.161591	-76.591787	SE	9	2	90°	1
16-Jun-10	11:01	20	34.062340	-76.462631	SE	9	2	90°	2



Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
14-Jan-10	11:23	28	33.967905	-76.601169	SE	7	2	60°	1
14-Jan-10	13:18	54	34.144279	-76.446622	NW	10	2	60°	1
14-Jan-10	13:20	56	34.189273	-76.504534	NW	10	1	90°	1
15-Jan-10	9:17	5	33.579637	-76.886918	SE	1	1	60°	1
15-Jan-10	9:55	14	33.630946	-76.825886	NW	2	1	60°	1
15-Jan-10	10:13	19	33.830949	-76.955997	SE	3	3	90°	2
15-Jan-10	10:18	20	33.710213	-76.799080	SE	3	3	90°	5
15-Jan-10	10:55	26	33.741221	-76.702998	NW	4	2	60°	2
15-Jan-10	10:56	27	33.773269	-76.745160	NW	4	3	90°	1
15-Jan-10	11:00	29	33.847695	-76.843923	NW	4	3	90°	3
15-Jan-10	11:05	30	33.948782	-76.978225	NW	4	1	45°	1
15-Jan-10	12:10	42	33.863797	-76.604394	NW	6	1	90°	5
15-Jan-10	12:12	43	33.907346	-76.661745	NW	6	1	90°	2
15-Jan-10	12:15	45	33.959703	-76.731066	NW	6	2	60°	3
15-Jan-10	12:15	46	33.978821	-76.756144	NW	6	1	60°	2
15-Jan-10	14:25	55	34.087031	-76.757116	SE	7	2	90°	2
15-Jan-10	14:40	58	33.973712	-76.608101	SE	7	1	90°	1
15-Jan-10	15:34	68	34.022094	-76.547805	NW	8	1	90°	4
15-Jan-10	15:37	70	34.087611	-76.633540	NW	8	3	90°	3
15-Jan-10	16:18	77	34.040514	-76.314311	NW	10	1	45°	1
21-Feb-10	11:22	20	33.876367	-76.620640	NW	6	2	60°	1
21-Feb-10	11:23	21	33.890604	-76.638503	NW	6	3	90°	1
21-Feb-10	12:00	24	34.037150	-76.831854	NW	6	2	60°	2
21-Feb-10	12:01	25	34.048215	-76.850544	NW	6	2	90°	2
21-Feb-10	14:01	30	34.255498	-76.589260	SE	10	3	90°	1
21-Feb-10	14:03	31	34.221560	-76.545455	SE	10	2	90°	1
21-Feb-10	14:05	32	34.171494	-76.480713	SE	10	2	60°	3
21-Feb-10	14:52	43	34.063529	-76.468725	NW	9	2	90°	3
21-Feb-10	14:55	45	34.117065	-76.537982	NW	9	1	90°	2
21-Feb-10	14:56	46	34.140015	-76.568197	NW	9	2	90°	5
21-Feb-10	14:58	47	34.176295	-76.615111	NW	9	3	90°	4
21-Feb-10	15:04	50	34.160274	-76.726437	SE	8	2	45°	3
21-Feb-10	15:12	51	34.016392	-76.539278	SE	8	2	90°	4
21-Feb-10	16:13	62	33.973686	-76.608215	NW	7	2	90°	1
21-Feb-10	16:18	64	34.058254	-76.720467	NW	7	1	90°	2
21-Feb-10	16:19	65	34.087095	-76.757460	NW	7	3	45°	2
8-Mar-10	9:28	4	34.172064	-76.481553	SE	10	2	60°	1
8-Mar-10	9:28	5	34.159272	-76.465052	SE	10	2	45°	1
8-Mar-10	10:46	20	33.900383	-76.514606	NW	7	2	60°	1
8-Mar-10	13:58	31	33.840730	-76.704016	NW	5	2	60°	1
8-Mar-10	14:47	41	33.709701	-76.798452	NW	3	2	60°	1
8-Mar-10	14:54	44	33.859603	-76.994319	NW	3	1	90°	2
8-Mar-10	16:00	55	33.605138	-76.921055	NW	1	2	90°	1
8-Mar-10	16:06	57	33.738402	-77.095697	NW	1	2	60°	1
9-Mar-10	8:57	4	33.994510	-76.907648	SE	5	2	90°	1

Table 14 (Continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
18-Jun-10	9:12	5	33.722898	-76.674437	SE	4	2	90°	1
18-Jun-10	10:15	16	33.699048	-76.909166	SE	2	2	90°	1
18-Jun-10	10:52	25	33.617614	-76.941325	NW	1	2	90°	1
18-Jun-10	10:55	26	33.684558	-77.029150	NW	1	2	90°	1

Table 15. All leatherback sea turtle (*Dermochelys coriacea*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
1-Oct-09	10:47	46	33.797331	-76.249619	NW	8	3	90°	1
2-Oct-09	9:34	13	33.556246	-76.601330	SE	3	2	90°	1
9-Mar-10	11:47	71	34.176778	-76.625806	SE	9	2	90°	1
1-Oct-09	15:12	64	33.616420	-76.806435	NW	2	2	90°	1



Table 16. All unidentified sea turtle sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
8-Jul-09	14:58	25	34.183342	-76.634894	SE	9	2	110°	2
18-Aug-09	9:44	9	33.600015	-76.919668	SE	1	3	90°	1
18-Aug-09	10:30	24	33.725727	-76.950003	NW	2	2	90°	1
18-Aug-09	11:37	45	33.733042	-76.693974	NW	4	2	100°	1
18-Aug-09	12:02	57	33.966525	-76.999787	NW	4	3	90°	1
18-Aug-09	15:46	88	33.943606	-76.445136	NW	8	4	90°	1
18-Aug-09	16:06	94	34.082670	-76.491323	SE	9	4	90°	1
18-Aug-09	16:36	97	34.089557	-76.377171	NW	10	2	110°	1
19-Aug-09	9:55	9	33.777906	-76.624098	NW	5	3	90°	1
19-Aug-09	9:59	11	33.870794	-76.746317	NW	5	3	90°	1
12-Sep-09	11:48	47	33.877798	-76.623473	NW	6	2	90°	1
12-Sep-09	11:52	48	33.973903	-76.750209	NW	6	3	45°	1
12-Sep-09	14:01	53	34.265715	-76.593059	SE	10	1	90°	1
12-Sep-09	14:50	66	34.061652	-76.474511	NW	9	3	100°	1
1-Oct-09	10:06	30	33.954023	-76.583867	SE	7	3	90°	1
21-Oct-09	11:54	28	34.196512	-76.512789	NW	10	2	90°	1
21-Oct-09	11:56	29	34.229434	-76.555606	NW	10	2	60°	2
21-Oct-09	12:57	45	34.001956	-76.520666	NW	8	2	90°	1
21-Oct-09	13:16	54	34.066873	-76.730287	SE	7	1	90°	1
21-Oct-09	13:23	55	33.936095	-76.558414	SE	7	1	90°	1
8-Nov-09	14:08	15	33.645901	-76.845813	NW	2	1	90°	1
8-Nov-09	14:27	22	33.770925	-76.877474	SE	3	2	45°	1
9-Nov-09	10:01	8	34.135681	-76.570197	SE	9	2	90°	1
17-Dec-09	11:19	23	34.124850	-76.557451	SE	9	2	90°	1
17-Dec-09	14:59	43	33.773244	-77.010398	SE	2	2	90°	1
17-Dec-09	15:06	45	33.606821	-76.793782	SE	2	2	60°	1
14-Jan-10	10:07	5	33.965648	-76.867731	SE	5	1	90°	2
14-Jan-10	10:12	8	33.840001	-76.702502	SE	5	2	60°	1
14-Jan-10	10:17	9	33.746442	-76.579315	SE	5	2	90°	3
14-Jan-10	11:08	27	33.966343	-76.740460	NW	6	2	90°	6
14-Jan-10	11:19	33	34.059438	-76.720813	SE	7	1	90°	3
14-Jan-10	11:24	36	33.946586	-76.573009	SE	7	2	90°	3
14-Jan-10	12:12	49	33.993659	-76.508969	NW	8	3	90°	3
14-Jan-10	12:14	50	34.036416	-76.565283	NW	8	1	60°	2
14-Jan-10	12:15	51	34.051552	-76.585052	NW	8	2	90°	3
14-Jan-10	15:30	82	33.821663	-76.946388	NW	3	2	45°	1
14-Jan-10	15:40	86	33.789380	-77.028498	SE	2	3	90°	1
15-Jan-10	9:14	5	33.641101	-76.967232	SE	1	2	90°	1
15-Jan-10	9:55	19	33.639060	-76.836189	NW	2	2	60°	1
15-Jan-10	9:59	22	33.712078	-76.931008	NW	2	1	90°	1
15-Jan-10	11:10	38	33.990576	-76.898168	SE	5	2	90°	1
15-Jan-10	15:55	103	34.014760	-76.408320	SE	9	1	90°	1
21-Feb-10	15:08	52	34.080735	-76.621368	SE	8	1	90°	2
21-Feb-10	15:34	57	33.793947	-76.244950	SE	8	1	90°	1
9-Mar-10	10:25	40	34.075464	-76.746079	SE	7	2	60°	1

Table 16 (Continued). All unidentified sea turtle sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	11:49	72	34.135153	-76.570658	SE	9	1	60°	2
10-Mar-10	9:49	12	33.853603	-76.986306	NW	3	1	100°	2
10-Mar-10	9:51	13	33.902847	-77.050866	NW	3	2	90°	3
10-Mar-10	10:10	20	33.761414	-76.994305	SE	2	1	90°	2
10-Mar-10	10:50	32	33.791794	-77.165896	NW	1	2	90°	3
12-Apr-10	9:44	14	34.002838	-76.396980	NW	9	2	90°	1
12-Apr-10	10:46	29	34.049133	-76.849504	SE	6	1	90°	1
12-Apr-10	14:52	52	33.721309	-76.812493	SE	3	2	90°	1
17-Aug-09	15:21	4	34.258671	-76.589011	SE	10	3	90°	1
17-Aug-09	15:23	5	34.215023	-76.532874	SE	10	2	110°	1
17-Aug-09	15:43	9	34.057868	-76.330946	SE	10	3	90°	1
17-Aug-09	16:17	24	34.193935	-76.641233	NW	9	3	90°	2
17-Aug-09	16:18	25	34.216918	-76.673388	NW	9	2	90°	2
18-Aug-09	9:33	5	33.632870	-76.955154	SE	1	3	60°	1
19-Aug-09	9:59	12	33.865322	-76.739106	NW	5	1	90°	1
19-Aug-09	10:15	18	33.845945	-76.838537	SE	4	2	90°	1
1-Oct-09	10:20	25	33.791158	-76.371512	SE	7	1	90°	1
1-Oct-09	11:58	45	33.889715	-76.246905	SE	9	1	90°	1
21-Oct-09	11:58	27	34.271778	-76.611080	NW	10	1	60°	1
21-Oct-09	12:05	34	34.121615	-76.550240	SE	9	2	90°	2
21-Oct-09	13:09	47	34.125001	-76.682664	NW	8	1	90°	1
21-Oct-09	13:17	52	34.058683	-76.719290	SE	7	3	90°	1
8-Nov-09	14:22	15	33.887182	-77.030274	SE	3	2	90°	1
14-Jan-10	11:07	18	33.944545	-76.712111	NW	6	2	90°	1
14-Jan-10	11:10	21	33.995354	-76.779329	NW	6	1	60°	1
14-Jan-10	11:20	26	34.045413	-76.702587	SE	7	3	90°	1
14-Jan-10	11:21	27	34.005927	-76.650882	SE	7	3	90°	1
14-Jan-10	12:08	37	33.916353	-76.408430	NW	8	2	60°	1
14-Jan-10	12:12	39	33.993358	-76.508537	NW	8	2	90°	1
14-Jan-10	12:13	40	34.023472	-76.548059	NW	8	2	60°	2
14-Jan-10	12:27	43	34.139535	-76.575368	SE	9	1	90°	1
14-Jan-10	13:15	53	34.082984	-76.367326	NW	10	2	90°	1
14-Jan-10	15:02	67	33.665026	-76.598966	SE	4	1	90°	1
14-Jan-10	15:25	71	33.715429	-76.805102	NW	3	1	90°	1
15-Jan-10	10:02	16	33.771174	-77.007343	NW	2	2	90°	1
15-Jan-10	15:32	67	33.970031	-76.479706	NW	8	2	60°	3
8-Mar-10	14:04	33	33.976917	-76.883754	NW	5	1	90°	1
8-Mar-10	14:48	42	33.729017	-76.823853	NW	3	1	90°	1
9-Mar-10	8:58	5	33.965190	-76.868758	SE	5	1	90°	1
9-Mar-10	9:15	10	33.848781	-76.715022	SE	5	3	90°	4
9-Mar-10	9:28	15	33.747555	-76.582032	SE	5	2	60°	3
10-Mar-10	9:08	4	33.912517	-76.929805	SE	4	2	90°	1
10-Mar-10	9:45	17	33.768800	-76.875785	NW	3	2	60°	1
10-Mar-10	9:48	19	33.837673	-76.965543	NW	3	2	90°	1
11-Apr-10	9:19	6	33.753297	-76.457730	SE	6	1	90°	1

Table 16 (Continued). All unidentified sea turtle sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
12-Apr-10	9:49	17	34.111477	-76.540201	NW	9	2	45°	2
12-Apr-10	9:53	18	34.201625	-76.659705	NW	9	2	90°	2
12-Apr-10	10:00	22	34.088152	-76.631007	SE	8	1	90°	3
12-Apr-10	10:40	31	34.073505	-76.742117	NW	7	2	60°	4
12-Apr-10	11:45	41	34.002549	-76.919181	NW	5	2	90°	1
16-Jun-10	10:48	16	34.136280	-76.700404	NW	8	3	60°	1

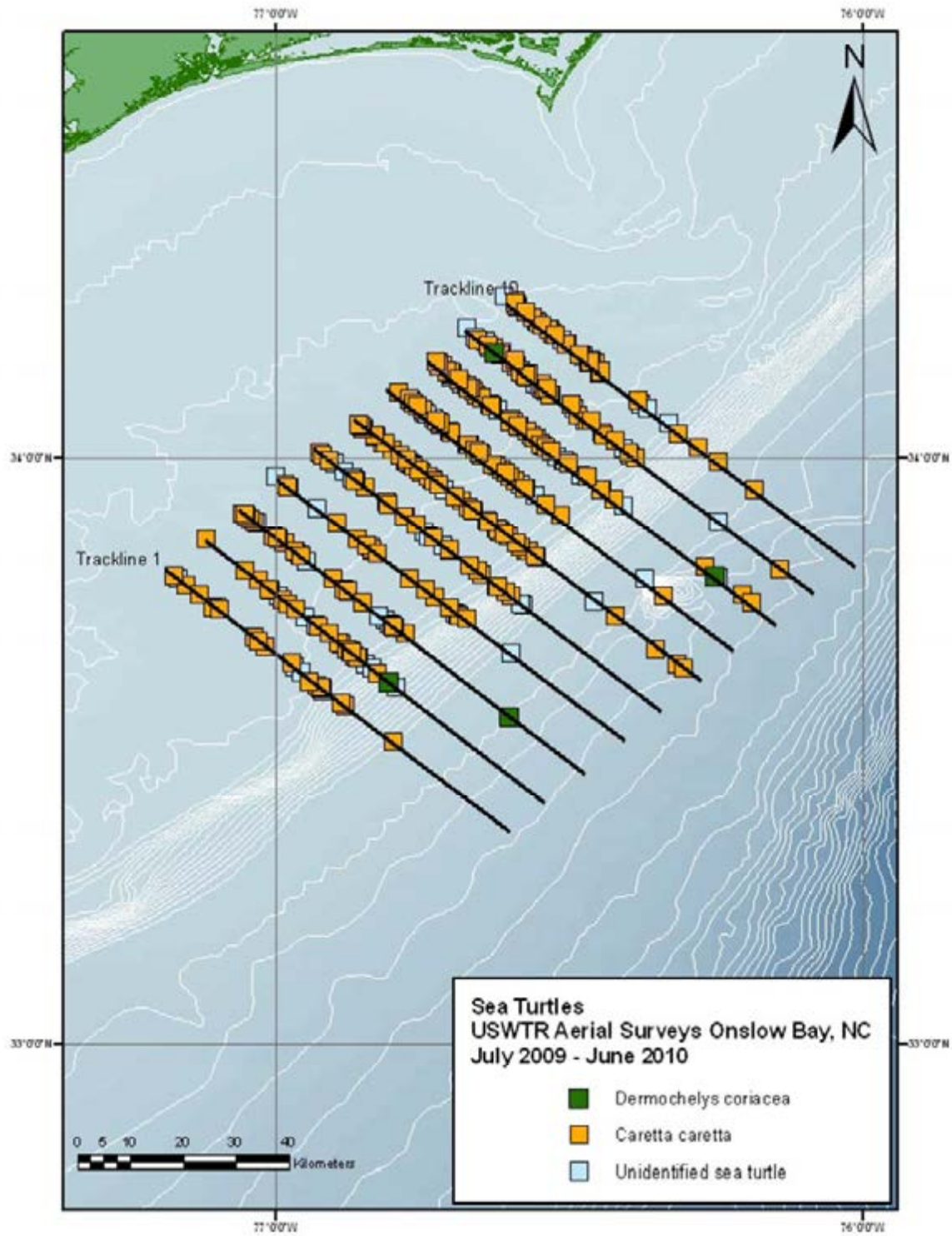


Figure 14. Loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*) and unidentified sea turtle sightings.

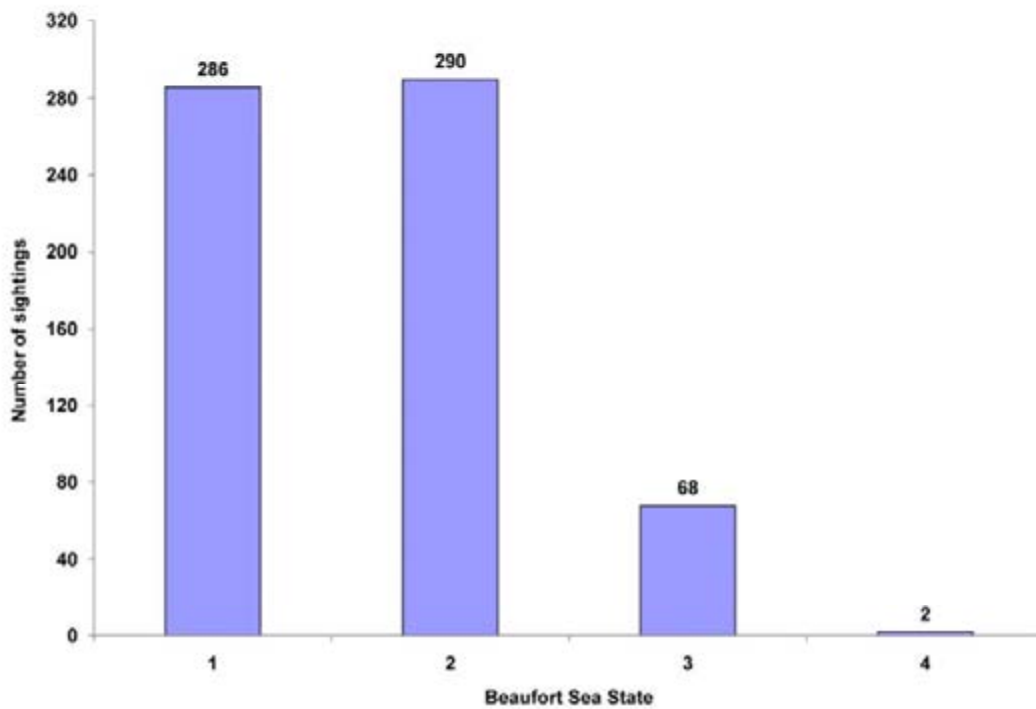


Figure 15a. Total number of sea turtle sightings by Beaufort Sea State in the proposed USWTR site in Onslow Bay, North Carolina during the July 2009 – June 2010 surveys.

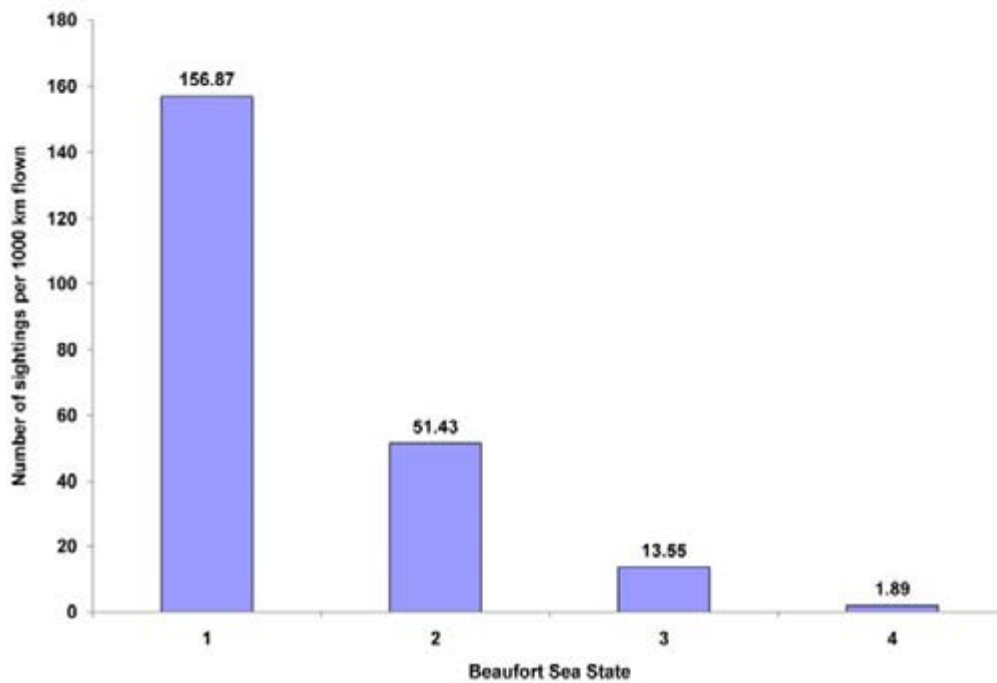


Figure 15b. Sea turtle sightings per 1000 km flow by Beaufort Sea State in the proposed USWTR site in Onslow Bay, North Carolina during the July 2009 – June 2010 surveys.

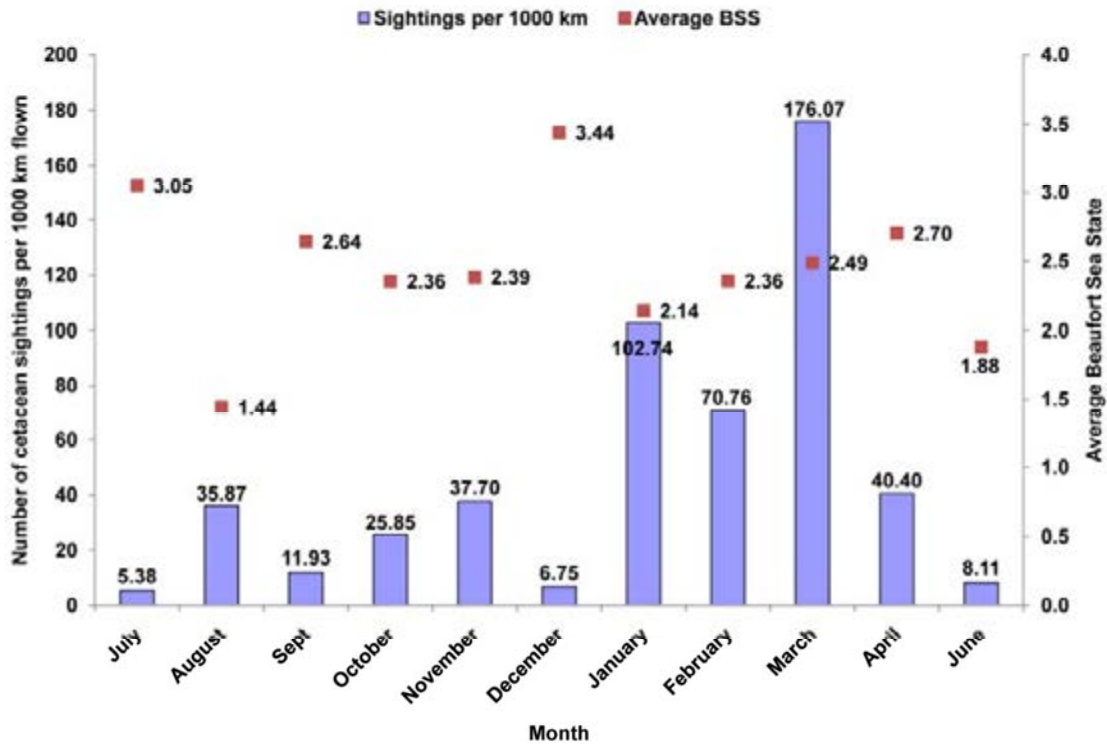


Figure 15c. Sea turtle sightings per 1000 km surveyed and the average Beaufort Sea State per month from July 2009 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.

### Other Marine Vertebrate Sightings (Tables 17-21, Fig. 16)

#### Chondrichthyan fishes

A total of 16 sharks were observed throughout the survey period; hammerhead sharks (*Sphyrna* spp.) accounted for 37.5 percent of these sightings (n=6) (Table 17).

Thirty manta rays (*Manta birostris*) were observed during the survey period (Table 19). There were also three stingray sightings that could not be positively identified to species that were labeled as unidentified rays (Table 20).

#### Other fishes

Ocean sunfish (*Mola mola*) were encountered six times with no discernable spatial or temporal trends (Table 21).

Table 17. All shark sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
18-Aug-09	12:00	56	33.931810	-76.957381	NW	4	2	90°	1	Shark
1-Oct-09	11:57	65	33.906816	-76.271371	SE	9	3	90°	1	Hammerhead
1-Oct-09	12:08	69	33.828874	-76.041557	NW	10	2	90°	1	Hammerhead
14-Jan-10	10:43	18	33.738783	-76.441747	NW	6	2	60°	1	Shark
14-Jan-10	11:10	29	34.005303	-76.792311	NW	6	2	60°	1	Hammerhead
14-Jan-10	12:51	62	33.843731	-76.184231	SE	9	3	90°	1	Shark
16-Jun-10	9:20	6	33.897298	-76.774481	SE	5	3	100°	1	
17-Aug-09	16:58	39	33.965171	-76.602357	NW	7	3	90°	1	Shark
12-Sep-09	14:34	49	33.829536	-76.043032	SE	10	2	90°	1	
12-Sep-09	14:39	52	33.805075	-76.134349	NW	9	2	90°	1	
21-Oct-09	11:55	26	34.221290	-76.545231	NW	10	1	90°	1	Hammerhead
8-Nov-09	16:09	39	34.026326	-76.819095	NW	6	1	90°	1	
14-Jan-10	11:06	16	33.910137	-76.666348	NW	6	2	90°	1	
15-Jan-10	15:30	66	33.939211	-76.439378	NW	8	1	90°	1	Hammerhead
21-Feb-10	15:59	59	33.693865	-76.242194	NW	7	2	90°	1	
9-Mar-10	10:33	42	33.909817	-76.527488	SE	7	1	60°	1	Hammerhead

Table 18. All basking shark (*Cetorhinus maximus*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
9-Mar-10	11:23	54	33.818982	-76.278775	NW	8	2	90°	1



Table 19. All manta ray (*Manta birostris*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
19-Aug-09	9:22	4	34.031991	-76.823887	SE	6	2	90°	1	
1-Oct-09	16:21	107	33.912515	-76.928150	NW	4	2	90°	1	
21-Oct-09	11:50	27	34.105472	-76.395207	NW	10	3	90°	1	
14-Jan-10	13:10	69	33.966317	-76.219038	NW	10	3	90°	1	
15-Jan-10	11:19	40	33.781688	-76.625787	SE	5	1	90°	1	
9-Mar-10	10:56	52	33.754886	-76.328231	SE	7	2	45°	1	
10-Mar-10	9:33	8	33.523232	-76.556337	NW	3	1	90°	1	
10-Mar-10	9:34	9	33.540252	-76.579102	NW	3	1	90°	1	
11-Apr-10	14:33	59	33.839643	-76.308652	NW	8	2	90°	1	
11-Apr-10	15:06	68	33.894794	-76.251376	SE	9	2	100°	1	
12-Apr-10	9:38	12	33.887300	-76.244550	NW	9	1	90°	1	Submerged
12-Apr-10	10:12	22	33.824923	-76.286256	SE	8	3	90°	1	Huge
19-Aug-09	10:11	16	33.933344	-76.954704	SE	4	2	100°	1	
21-Oct-09	12:54	43	33.951383	-76.454676	NW	8	2	90°	2	
9-Mar-10	9:49	20	33.708572	-76.399774	NW	6	1	90°	1	
9-Mar-10	9:50	21	33.721972	-76.417632	NW	6	2	90°	1	
9-Mar-10	12:27	73	33.929774	-76.170647	NW	10	3	45°	1	
10-Mar-10	9:26	9	33.534839	-76.431222	SE	4	1	90°	1	
10-Mar-10	9:32	12	33.504492	-76.532448	NW	3	1	90°	1	
10-Mar-10	9:33	13	33.517681	-76.548948	NW	3	2	90°	1	
10-Mar-10	10:25	32	33.432877	-76.570050	SE	2	3	90°	1	
11-Apr-10	10:52	23	33.904697	-77.054657	NW	3	2	90°	1	
11-Apr-10	11:10	29	33.545720	-76.713460	SE	2	2	90°	1	
11-Apr-10	14:32	49	33.832283	-76.299161	NW	8	2	90°	1	
12-Apr-10	9:24	11	33.940655	-76.182569	SE	10	1	90°	3	
12-Apr-10	10:12	24	33.840251	-76.306231	SE	8	2	100°	1	Jumping
12-Apr-10	10:12	25	33.823703	-76.284702	SE	8	1	90°	1	

Table 20. All unidentified ray sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
14-Jan-10	10:06	4	33.969675	-76.873067	SE	5	2	90°	1
14-Jan-10	11:07	25	33.943307	-76.710469	NW	6	2	60°	2



Table 21. All ocean sunfish (*Mola mola*) sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #
30-Sep-09	13:17	15	33.774529	-76.348901	SE	7	3	90°	1
11-Apr-10	14:57	65	34.086161	-76.504031	SE	9	3	90°	1
17-Aug-09	16:12	22	34.085993	-76.500693	NW	9	2	90°	1
15-Jan-10	9:10	4	33.707818	-77.054313	SE	1	1	45°	1
15-Jan-10	15:35	69	34.053398	-76.588992	NW	8	1	90°	1
21-Feb-10	16:14	63	33.984712	-76.620900	NW	7	1	90°	1

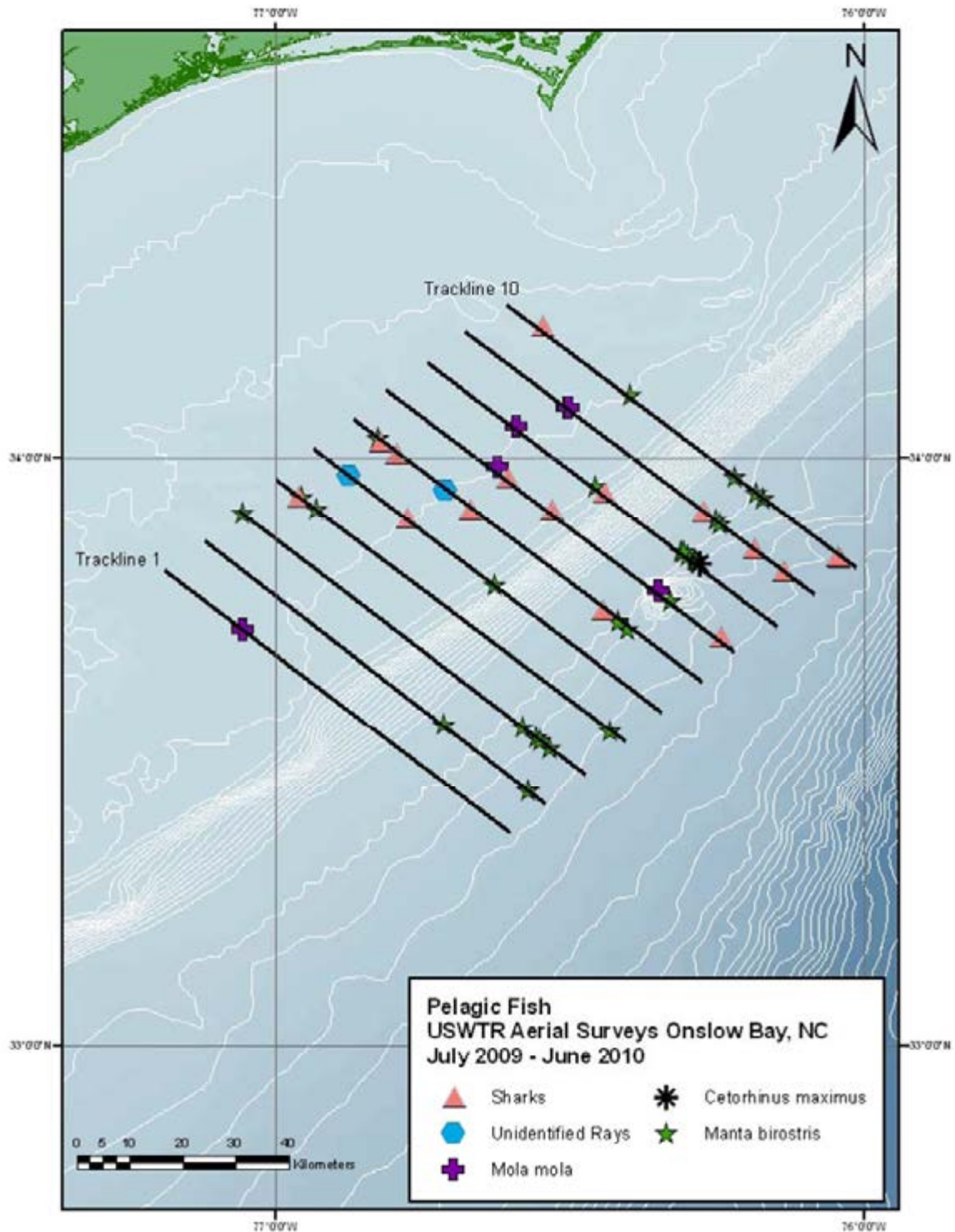


Figure 16. Ocean sunfish (*Mola mola*), manta ray (*Manta birostris*), basking shark (*Cetorhinus maximus*), unidentified sharks, and unidentified ray sightings.

## Vessel Sightings

Commercial (Table 22, Fig. 17)

A total of 62 commercial vessels were seen during the study. This category includes tankers, container/cargo vessels, and car carriers.

Table 22. All commercial vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
8-Jul-09	15:33	32	34.072633	-76.352907	NW	10	3	75°	1	Cargo vessel
28-Jul-09	9:18	5	33.775829	-76.486917	SE	6	4	45°	1	Car carrier
28-Jul-09	9:26	7	33.622975	-76.287048	SE	6	2	30°	1	Car carrier
28-Jul-09	10:13	16	33.538346	-76.435840	SE	4	1	90°	1	Container vessel
17-Aug-09	16:08	17	34.003663	-76.393792	NW	9	3	60°	1	Cargo vessel
18-Aug-09	14:46	70	33.765550	-76.477402	NW	6	5	60°	1	Container vessel
12-Sep-09	14:28	61	33.944271	-76.188512	SE	10	4	90°	1	Car carrier
30-Sep-09	12:31	7	33.577326	-76.355783	SE	5	3	30°	1	Transport vessel
30-Sep-09	13:35	20	33.907432	-76.397717	NW	8	4	30°	1	Cargo vessel
1-Oct-09	10:10	32	33.864559	-76.468963	SE	7	3	60°	1	Cargo vessel
1-Oct-09	16:15	105	33.781328	-76.753291	NW	4	4	45°	2	Cargo vessel
1-Oct-09	16:17	106	33.835421	-76.829296	NW	4	3	30°	1	Large yacht
2-Oct-09	9:07	8	33.732485	-76.956252	NW	2	4	90°	1	Tanker
17-Dec-09	15:30	50	33.612646	-76.930678	NW	1	2	30°	1	Cargo vessel
14-Jan-10	11:08	28	33.972772	-76.749098	NW	6	4	90°	1	Tug and Barge
15-Jan-10	10:52	33	33.668979	-76.608231	NW	4	4	60°	2	Cargo vessel
15-Jan-10	14:40	81	33.963731	-76.595013	SE	7	3	60°	2	Cargo vessel
8-Mar-10	15:09	45	33.664927	-76.869129	SE	2	4	45°	1	
8-Mar-10	15:59	57	33.585261	-76.894799	NW	1	4	45°	1	Tanker
10-Mar-10	10:20	24	33.548455	-76.719120	SE	2	4	90°	1	Car carrier
11-Apr-10	10:17	22	33.750232	-76.712942	SE	4	4	45°	1	Container vessel
11-Apr-10	11:53	46	33.725960	-77.081086	NW	1	4	90°	1	Car carrier
16-Jun-10	9:51	10	33.897973	-76.649266	NW	6	4	60°	1	Container vessel
16-Jun-10	11:11	29	33.988319	-76.365949	SE	9	4	100°	1	
17-Jun-10	9:33	8	33.569180	-76.749182	NW	2	4	60°	1	Cargo vessel
17-Jun-10	10:31	24	33.707056	-76.661150	NW	4	3	45°	1	Cargo vessel
17-Jun-10	15:18	52	34.145320	-76.451196	NW	10	1	90°	1	Cargo vessel
8-Jul-09	14:24	14	33.732044	-76.296077	SE	7	3	30°	1	Cargo vessel
27-Jul-09	9:09	4	33.610407	-76.927314	SE	1	4	30°	1	Container vessel
17-Aug-09	15:45	11	34.006533	-76.265088	SE	10	4	45°	1	Container vessel
17-Aug-09	15:52	14	33.856398	-76.073834	SE	10	3	90°	1	Tanker
18-Aug-09	9:32	4	33.651833	-76.980065	SE	1	4	45°	1	Cargo vessel
18-Aug-09	16:32	67	33.988681	-76.247849	NW	10	4	60°	1	Cargo vessel
19-Aug-09	9:23	4	34.014270	-76.800128	SE	6	5	90°	1	Tug boat
19-Aug-09	9:28	6	33.903985	-76.654495	SE	6	5	90°	1	Tanker
19-Aug-09	12:36	35	33.518931	-76.810789	NW	1	5	60°	1	Container vessel
12-Sep-09	8:50	5	33.687047	-77.034606	SE	1	4	30°	1	Cargo vessel
12-Sep-09	9:36	11	33.564086	-76.729819	NW	2	4	45°	1	Cargo vessel
12-Sep-09	10:14	17	33.705580	-76.791420	SE	3	3	45°	3	Cargo vessel
12-Sep-09	14:24	48	34.040499	-76.312226	SE	10	3	45°	1	Cargo vessel
30-Sep-09	12:15	4	33.892835	-76.771446	SE	5	1	45°	1	Car carrier
30-Sep-09	14:49	29	34.075758	-76.358203	NW	10	4	90°	1	Car carrier
1-Oct-09	15:53	72	33.550020	-76.594788	SE	3	3	45°	1	Container vessel
2-Oct-09	10:14	18	33.599099	-76.507958	NW	4	3	30°	1	Container vessel
21-Oct-09	11:48	25	34.073803	-76.354470	NW	10	3	45°	1	Tanker
8-Nov-09	14:29	16	33.734845	-76.830604	SE	3	4	60°	1	Cargo vessel
9-Nov-09	10:11	11	33.939980	-76.311930	SE	9	1	45°	1	Cargo
17-Dec-09	9:32	4	33.898428	-76.780213	SE	5	3	45°	1	Container vessel

Table 22 (Continued). All commercial vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
14-Jan-10	11:03	14	33.849828	-76.587737	NW	6	3	90°	1	Cargo vessel
15-Jan-10	9:23	8	33.540931	-76.836067	SE	1	4	45°	1	Tanker
15-Jan-10	15:57	74	33.972366	-76.352700	SE	9	4	45°	1	Container vessel
21-Feb-10	16:06	60	33.830730	-76.421029	NW	7	4	90°	1	Cruise ship
10-Mar-10	10:11	28	33.728673	-76.951883	SE	2	3	30°	1	Cargo vessel
11-Apr-10	9:39	11	33.779334	-76.624761	NW	5	4	30°	1	Cargo vessel
11-Apr-10	10:43	21	33.716392	-76.808834	NW	3	4	60°	1	Cargo vessel
16-Jun-10	9:24	3	33.814428	-76.665425	SE	5	3	45°	1	Container vessel
18-Jun-10	10:33	20	33.384871	-76.637854	NW	1	3	45°	1	Container vessel

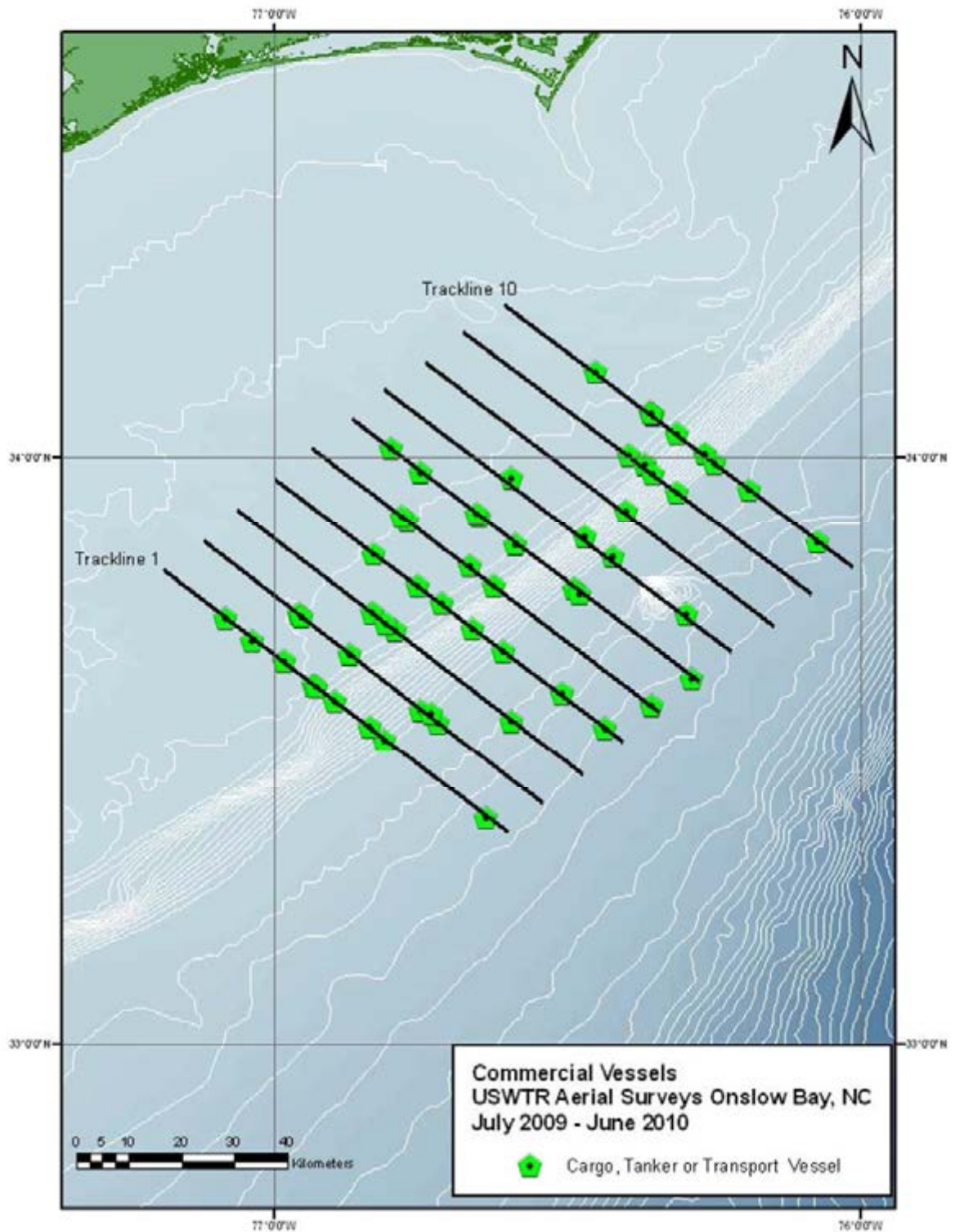


Figure 17. Large commercial shipping vessel sightings.

Military (Table 23, Fig. 18)

A total of two U.S. Military vessels were observed in the study site.

Table 23. All military vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
12-Apr-10	9:19	8	34.051475	-76.322325	SE	10	4	90°	1	Navy warship
1-Oct-09	9:17	12	33.645814	-76.316561	NW	6	3	90°	1	Military vessel



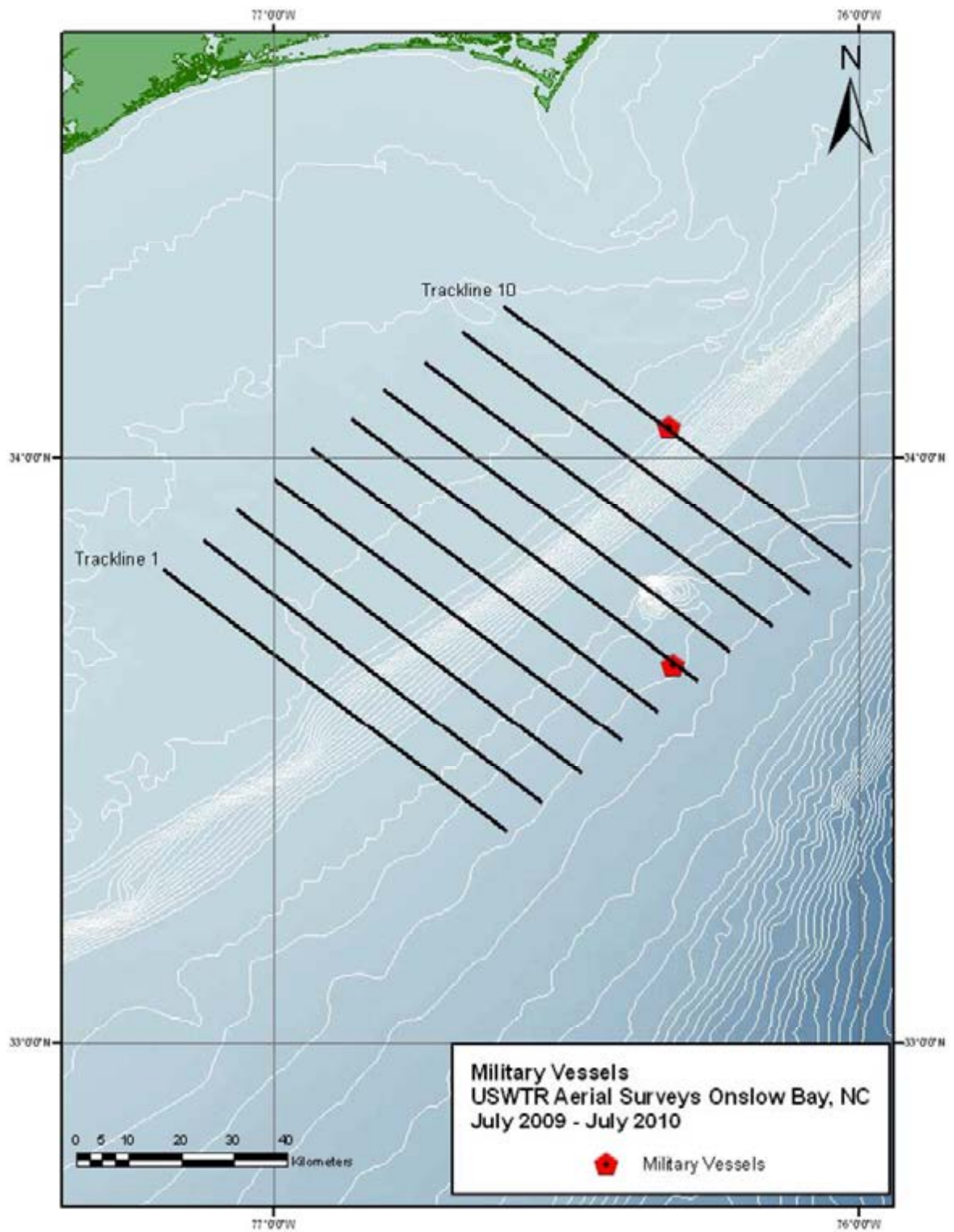


Figure 18. Military vessel sightings.

Recreational (Table 24, Fig. 19)

The most commonly sighted types of vessel in the survey area were recreational fishing vessels (n=308), with the majority of sightings occurring at or shoreward of the continental shelf break.

Table 24. All other vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 to June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
8-Jul-09	13:21	4	33.903031	-76.784230	SE	5	3	90°	1	Recreational fishing vessel
8-Jul-09	13:45	8	33.712955	-76.403130	NW	6	4	45°	1	Recreational fishing vessel
8-Jul-09	13:59	11	33.984725	-76.763776	NW	6	3	45°	1	Recreational fishing vessel
8-Jul-09	14:18	15	33.868063	-76.474205	SE	7	4	90°	1	Recreational fishing vessel
8-Jul-09	14:41	19	33.921571	-76.412839	NW	8	4	75°	1	Recreational fishing vessel
8-Jul-09	15:00	26	34.145006	-76.582109	SE	9	4	45°	1	Recreational fishing vessel
8-Jul-09	15:07	28	33.999245	-76.390907	SE	9	4	90°	1	Recreational fishing vessel
8-Jul-09	15:41	33	34.234025	-76.560308	NW	10	3	45°	1	Recreational fishing vessel
28-Jul-09	10:48	22	33.738554	-76.965035	SE	2	3	45°	1	Recreational fishing vessel
28-Jul-09	11:27	25	33.794171	-77.171117	NW	1	2	30°	1	Recreational fishing vessel
17-Aug-09	15:22	4	34.221355	-76.540983	SE	10	4	45°	1	Recreational fishing vessel
17-Aug-09	15:24	5	34.180638	-76.488416	SE	10	4	60°	1	Recreational fishing vessel
17-Aug-09	16:30	24	33.985369	-76.494534	SE	8	4	45°	1	Recreational fishing vessel
18-Aug-09	10:41	27	33.853226	-76.983572	SE	3	3	90°	1	Recreational fishing vessel
18-Aug-09	10:46	30	33.741818	-76.838174	SE	3	4	90°	1	Recreational fishing vessel
18-Aug-09	14:53	72	33.931610	-76.695561	NW	6	5	90°	1	Recreational fishing vessel
18-Aug-09	14:58	73	34.030196	-76.825629	NW	6	5	90°	1	Recreational fishing vessel
18-Aug-09	15:15	81	34.033156	-76.685535	SE	7	4	90°	1	Recreational fishing vessel
18-Aug-09	15:47	89	33.965977	-76.474503	NW	8	4	90°	1	Recreational fishing vessel
18-Aug-09	15:56	90	34.157910	-76.726133	NW	8	5	90°	1	Recreational fishing vessel
18-Aug-09	16:03	93	34.138721	-76.563979	SE	9	3	90°	1	Recreational fishing vessel
19-Aug-09	9:23	5	33.993859	-76.773218	SE	6	4	60°	1	Recreational fishing vessel
19-Aug-09	10:03	12	33.946407	-76.846248	NW	5	2	45°	1	Recreational fishing vessel
19-Aug-09	10:15	15	33.853115	-76.848154	SE	4	1	90°	1	Recreational fishing vessel
12-Sep-09	9:39	14	33.624181	-76.815500	NW	2	3	45°	1	Recreational fishing vessel
12-Sep-09	10:07	22	33.858532	-76.994410	SE	3	3	45°	3	Recreational fishing vessel
12-Sep-09	10:40	28	33.741381	-76.696402	NW	4	2	90°	1	Recreational fishing vessel
12-Sep-09	11:12	35	33.773610	-76.614443	SE	5	4	90°	1	Recreational fishing vessel
12-Sep-09	11:45	46	33.823078	-76.544594	NW	6	1	90°	1	Recreational fishing vessel
12-Sep-09	14:02	54	34.252442	-76.578587	SE	10	3	90°	3	Recreational fishing vessel
12-Sep-09	14:05	55	34.179842	-76.489362	SE	10	4	90°	2	Recreational fishing vessel
12-Sep-09	14:20	60	34.122264	-76.416959	SE	10	4	45°	1	Recreational fishing vessel
12-Sep-09	14:47	64	33.985111	-76.370760	NW	9	1	90°	1	Recreational fishing vessel
12-Sep-09	14:49	65	34.034121	-76.438878	NW	9	3	90°	2	Recreational fishing vessel
12-Sep-09	14:57	67	34.195669	-76.650002	NW	8	2	90°	1	Recreational fishing vessel
12-Sep-09	15:11	73	34.111594	-76.657957	SE	8	3	45°	1	Recreational fishing vessel
12-Sep-09	15:27	78	33.917983	-76.409206	SE	8	2	90°	2	Recreational fishing vessel
30-Sep-09	12:17	5	33.868752	-76.740742	SE	5	3	45°	1	Recreational fishing vessel
30-Sep-09	12:57	11	34.048547	-76.854716	NW	6	3	45°	1	Recreational fishing vessel
30-Sep-09	13:05	14	34.021984	-76.668950	SE	7	4	60°	1	Recreational fishing vessel
30-Sep-09	14:56	30	34.215755	-76.536258	NW	10	3	30°	1	Recreational fishing vessel
1-Oct-09	9:26	17	33.815811	-76.535134	NW	6	4	90°	1	Recreational fishing vessel
1-Oct-09	9:27	18	33.831359	-76.556799	NW	6	3	45°	2	Recreational fishing vessel
1-Oct-09	10:02	27	33.968296	-76.618305	SE	7	4	90°	1	Recreational fishing vessel
1-Oct-09	10:08	31	33.912704	-76.531404	SE	7	3	60°	1	Recreational fishing vessel
1-Oct-09	10:57	48	33.921838	-76.412976	NW	8	4	60°	1	Recreational fishing vessel
1-Oct-09	11:51	63	34.015358	-76.412727	SE	9	1	60°	1	Recreational fishing vessel
1-Oct-09	11:53	64	33.990264	-76.379563	SE	9	2	45°	5	Recreational fishing vessel



Table 24 (Continued). All other vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
1-Oct-09	15:27	94	33.905149	-77.057523	SE	3	2	45°	1	Recreational fishing vessel
1-Oct-09	15:31	95	33.819169	-76.938700	SE	3	3	60°	1	Recreational fishing vessel
1-Oct-09	16:12	104	33.721730	-76.676554	NW	4	3	60°	1	Recreational fishing vessel
2-Oct-09	10:47	28	33.793941	-76.639202	SE	5	4	90°	2	Recreational fishing vessel
2-Oct-09	10:48	29	33.765307	-76.602686	SE	5	4	90°	1	Recreational fishing vessel
2-Oct-09	11:14	32	33.862128	-76.602003	NW	6	3	45°	1	Recreational fishing vessel
2-Oct-09	11:22	33	34.034930	-76.820432	NW	6	2	45°	1	Recreational fishing vessel
21-Oct-09	11:44	25	33.990904	-76.248549	NW	10	4	60°	2	Recreational fishing vessel
21-Oct-09	12:11	33	34.000393	-76.390572	SE	9	2	45°	2	Recreational fishing vessel
21-Oct-09	13:10	50	34.148064	-76.713061	NW	8	3	60°	1	Recreational fishing vessel
8-Nov-09	14:29	23	33.720940	-76.812234	SE	3	4	90°	1	Recreational fishing vessel
8-Nov-09	14:31	25	33.681905	-76.761587	SE	3	2	90°	2	Recreational fishing vessel
8-Nov-09	15:32	41	33.884612	-76.760520	SE	5	3	60°	1	Recreational fishing vessel
9-Nov-09	10:32	11	34.029348	-76.300830	NW	10	2	45°	1	Recreational fishing vessel
17-Dec-09	12:16	31	34.264324	-76.598056	NW	10	3	45°	1	Recreational fishing vessel
17-Dec-09	15:00	44	33.752071	-76.982417	SE	2	2	60°	1	Recreational fishing vessel
14-Jan-10	10:08	6	33.937554	-76.829710	SE	5	1	45°	1	Recreational fishing vessel
14-Jan-10	11:08	26	33.952933	-76.723269	NW	6	1	45°	1	Recreational fishing vessel
14-Jan-10	11:25	37	33.919871	-76.537203	SE	7	3	90°	1	Recreational fishing vessel
14-Jan-10	12:27	55	34.130329	-76.582921	SE	9	4	90°	3	Recreational fishing vessel
14-Jan-10	13:23	70	34.254288	-76.587917	NW	10	4	90°	2	Recreational fishing vessel
14-Jan-10	15:44	87	33.684421	-76.892168	SE	2	3	45°	1	Recreational fishing vessel
15-Jan-10	9:15	6	33.608461	-76.924504	SE	1	2	90°	1	Recreational fishing vessel
15-Jan-10	15:51	99	34.057010	-76.464885	SE	9	3	30°	1	Recreational fishing vessel
15-Jan-10	16:35	110	34.204371	-76.525126	NW	10	4	60°	1	Recreational fishing vessel
21-Feb-10	9:59	11	33.682249	-76.763384	SE	3	3	60°	1	Recreational fishing vessel
21-Feb-10	10:53	16	33.775289	-76.617123	SE	5	3	60°	1	Recreational fishing vessel
21-Feb-10	11:18	19	33.798440	-76.518820	NW	6	2	30°	4	Recreational fishing vessel
21-Feb-10	11:22	20	33.883488	-76.630159	NW	6	1	45°	1	Recreational fishing vessel
21-Feb-10	14:05	36	34.173588	-76.483401	SE	10	3	45°	1	Recreational fishing vessel
21-Feb-10	14:11	38	34.045154	-76.317222	SE	10	3	45°	2	Recreational fishing vessel
21-Feb-10	14:48	46	33.994168	-76.377537	NW	9	2	45°	1	Recreational fishing vessel
21-Feb-10	16:08	64	33.862979	-76.467564	NW	7	2	60°	2	Recreational fishing vessel
8-Mar-10	9:57	6	33.994247	-76.383612	NW	9	4	90°	1	Recreational fishing vessel
8-Mar-10	13:30	25	33.847824	-76.583313	SE	6	3	60°	2	Recreational fishing vessel
8-Mar-10	13:32	26	33.808812	-76.532083	SE	6	1	90°	1	Recreational fishing vessel
9-Mar-10	10:01	26	33.810028	-76.532960	NW	6	4	60°	1	Recreational fishing vessel
9-Mar-10	10:03	29	33.865038	-76.605269	NW	6	2	45°	1	Recreational fishing vessel
9-Mar-10	10:33	45	33.908722	-76.526039	SE	7	4	60°	2	Recreational fishing vessel
9-Mar-10	11:55	74	33.988573	-76.389829	SE	9	2	90°	2	Recreational fishing vessel
9-Mar-10	12:56	90	34.245547	-76.575446	NW	10	2	60°	1	Recreational fishing vessel
10-Mar-10	10:46	29	33.705424	-77.052438	NW	1	1	60°	1	Recreational fishing vessel
11-Apr-10	8:20	7	33.731019	-76.428427	SE	6	3	90°	7	Recreational fishing vessel
11-Apr-10	11:07	35	33.626623	-76.818046	SE	2	2	90°	1	Recreational fishing vessel
11-Apr-10	11:48	44	33.602722	-76.919639	NW	1	3	90°	1	Recreational fishing vessel
11-Apr-10	14:52	63	34.192540	-76.646320	SE	9	3	90°	3	Recreational fishing vessel
12-Apr-10	10:54	33	33.878453	-76.621898	SE	6	1	60°	1	Recreational fishing vessel
16-Jun-10	9:18	4	33.934333	-76.823601	SE	5	2	45°	1	Recreational fishing vessel

Table 24 (Continued). All other vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
16-Jun-10	10:09	14	34.005391	-76.648062	SE	7	3	60°	1	Dive boat
16-Jun-10	10:26	17	33.673193	-76.214907	SE	7	1	60°	1	Recreational fishing vessel
16-Jun-10	10:56	24	34.176118	-76.610691	SE	9	3	90°	1	Recreational fishing vessel
16-Jun-10	11:42	35	34.228530	-76.558291	NW	10	1	60°	1	Recreational fishing vessel
17-Jun-10	9:53	13	33.853895	-76.977093	SE	3	3	30°	1	Recreational fishing vessel
17-Jun-10	9:56	14	33.790584	-76.892240	SE	3	4	90°	1	Recreational fishing vessel
17-Jun-10	10:00	15	33.703183	-76.786499	SE	3	3	45°	1	Recreational fishing vessel
17-Jun-10	10:36	25	33.823654	-76.815536	NW	4	3	30°	1	Recreational fishing vessel
17-Jun-10	11:21	30	33.844292	-76.581913	NW	6	4	60°	1	Recreational fishing vessel
17-Jun-10	11:28	31	33.983168	-76.764873	NW	6	2	90°	1	Recreational fishing vessel
17-Jun-10	13:30	38	34.114997	-76.789677	SE	7	1	90°	1	Recreational fishing vessel
17-Jun-10	13:33	39	34.035918	-76.687206	SE	7	3	45°	2	Recreational fishing vessel
17-Jun-10	13:35	40	33.998595	-76.638220	SE	7	3	45°	1	Recreational fishing vessel
17-Jun-10	15:22	53	34.247101	-76.582498	NW	10	1	90°	1	Recreational fishing vessel
18-Jun-10	9:54	16	33.696111	-76.785494	NW	3	2	60°	1	Recreational fishing vessel
18-Jun-10	10:52	27	33.608492	-76.929417	NW	1	3	60°	1	Recreational fishing vessel
8-Jul-09	13:31	6	33.697743	-76.516939	SE	5	3	30°	1	Recreational fishing vessel
8-Jul-09	14:02	10	34.045587	-76.844841	NW	6	4	30°	1	Recreational fishing vessel
8-Jul-09	15:33	25	34.073507	-76.354025	NW	10	2	45°	1	Recreational fishing vessel
17-Aug-09	15:23	6	34.204683	-76.519487	SE	10	3	45°	1	Recreational fishing vessel
17-Aug-09	16:56	36	33.906227	-76.525599	NW	7	4	90°	1	Recreational fishing vessel
17-Aug-09	16:57	37	33.934422	-76.562311	NW	7	3	90°	1	Recreational fishing vessel
18-Aug-09	10:46	19	33.741966	-76.838342	SE	3	4	90°	1	Recreational fishing vessel
18-Aug-09	10:55	21	33.554713	-76.595494	SE	3	1	90°	1	Recreational fishing vessel
18-Aug-09	14:13	44	33.880420	-76.753043	SE	5	4	90°	1	Recreational fishing vessel
18-Aug-09	14:14	45	33.857293	-76.722232	SE	5	3	60°	1	Recreational fishing vessel
18-Aug-09	14:51	50	33.868701	-76.612788	NW	6	3	45°	1	Headboat
18-Aug-09	16:04	61	34.124360	-76.545349	SE	9	4	45°	1	Recreational fishing vessel
19-Aug-09	9:23	5	33.996967	-76.777274	SE	6	4	90°	2	Recreational fishing vessel
19-Aug-09	11:45	29	33.746240	-76.971745	SE	2	5	60°	1	Recreational fishing vessel
12-Sep-09	8:47	4	33.746663	-77.111690	SE	1	3	45°	1	Recreational fishing vessel
12-Sep-09	10:38	21	33.709828	-76.656529	NW	4	4	60°	1	Recreational fishing vessel
12-Sep-09	11:05	28	33.921268	-76.810193	SE	5	3	30°	1	Recreational fishing vessel
12-Sep-09	11:11	29	33.791638	-76.637534	SE	5	3	60°	1	Head boat
12-Sep-09	11:44	38	33.808071	-76.525626	NW	6	3	60°	1	Recreational fishing vessel
12-Sep-09	14:01	45	34.257606	-76.583891	SE	10	4	60°	1	Recreational fishing vessel
12-Sep-09	14:47	53	33.990891	-76.377408	NW	9	3	60°	2	Recreational fishing vessel
12-Sep-09	14:49	54	34.020138	-76.421058	NW	9	3	90°	1	Recreational fishing vessel
12-Sep-09	14:53	55	34.124289	-76.555522	NW	9	4	45°	1	Recreational fishing vessel
12-Sep-09	15:24	64	33.983141	-76.491445	SE	8	2	60°	1	Recreational fishing vessel
12-Sep-09	15:53	70	33.886949	-76.497028	NW	7	4	90°	1	Recreational fishing vessel
30-Sep-09	13:10	12	33.921312	-76.540440	SE	7	2	90°	1	Recreational fishing vessel
30-Sep-09	13:12	14	33.877942	-76.482863	SE	7	3	90°	2	Recreational fishing vessel
30-Sep-09	13:39	19	33.982608	-76.497750	NW	8	3	90°	1	Recreational fishing vessel
1-Oct-09	9:26	13	33.828207	-76.552091	NW	6	3	90°	1	Recreational fishing vessel
1-Oct-09	9:27	14	33.844353	-76.576949	NW	6	1	90°	1	Recreational fishing vessel
1-Oct-09	9:28	15	33.850013	-76.585007	NW	6	3	90°	1	Recreational fishing vessel
1-Oct-09	10:08	22	33.904555	-76.521217	SE	7	3	90°	4	Recreational fishing vessel

Table 24 (Continued). All other vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
1-Oct-09	10:44	30	33.739562	-76.175267	NW	8	2	45°	1	Recreational fishing vessel
1-Oct-09	10:57	33	33.916884	-76.407001	NW	8	4	90°	8	Recreational fishing vessel
1-Oct-09	11:52	43	33.999507	-76.392102	SE	9	2	45°	1	Recreational fishing vessel
1-Oct-09	11:53	44	33.975170	-76.360279	SE	9	1	90°	1	Recreational fishing vessel
1-Oct-09	14:42	60	33.713220	-77.066925	SE	1	4	90°	1	Recreational fishing vessel
1-Oct-09	15:13	65	33.627730	-76.821817	NW	2	4	90°	2	Recreational fishing vessel
1-Oct-09	15:19	66	33.766049	-76.994095	NW	2	4	90°	1	Recreational fishing vessel
1-Oct-09	15:37	69	33.684201	-76.765863	SE	3	4	90°	3	Recreational fishing vessel
1-Oct-09	16:12	78	33.717922	-76.670882	NW	4	4	90°	1	Recreational fishing vessel
1-Oct-09	16:21	79	33.919853	-76.939322	NW	4	4	90°	1	Recreational fishing vessel
1-Oct-09	16:23	80	33.958903	-76.986534	NW	4	3	45°	1	Recreational fishing vessel
2-Oct-09	8:33	4	33.670772	-77.004747	SE	1	2	45°	1	Recreational fishing vessel
2-Oct-09	9:27	12	33.690074	-76.771788	SE	3	4	60°	1	Recreational fishing vessel
2-Oct-09	10:20	19	33.724266	-76.676321	NW	4	2	45°	2	Recreational fishing vessel
2-Oct-09	10:47	25	33.783024	-76.626640	SE	5	4	90°	1	Recreational fishing vessel
21-Oct-09	11:46	24	34.025282	-76.292314	NW	10	1	90°	1	Recreational fishing vessel
21-Oct-09	12:03	31	34.176557	-76.622927	SE	9	2	45°	1	Yacht
21-Oct-09	13:25	53	33.879964	-76.486627	SE	7	1	90°	2	Recreational fishing vessel
8-Nov-09	13:26	3	33.692388	-77.033340	SE	1	3	90°	1	Recreational fishing vessel
8-Nov-09	14:31	17	33.692433	-76.775095	SE	3	3	60°	1	Recreational fishing vessel
8-Nov-09	15:28	29	34.000250	-76.916724	SE	5	2	90°	1	Recreational fishing vessel
8-Nov-09	15:27	30	33.980258	-76.884810	SE	5	1	90°	1	Sail boat
8-Nov-09	15:58	36	33.796669	-76.517070	NW	6	3	60°	1	Recreational fishing vessel
9-Nov-09	9:45	6	33.953035	-76.457110	NW	8	3	90°	1	Recreational fishing vessel
9-Nov-09	9:53	8	34.136193	-76.696950	NW	8	4	45°	1	Sailboat
17-Dec-09	12:15	29	34.225041	-76.548652	NW	10	3	90°	6	Recreational fishing vessel
17-Dec-09	12:16	30	34.257115	-76.590128	NW	10	3	90°	12	Recreational fishing vessel
17-Dec-09	15:35	44	33.729167	-77.084195	NW	1	3	45°	1	Recreational fishing vessel
14-Jan-10	11:00	13	33.793136	-76.513263	NW	6	3	60°	1	Recreational fishing vessel
14-Jan-10	11:11	22	34.020293	-76.812074	NW	6	3	45°	1	Recreational fishing vessel
14-Jan-10	11:27	30	33.877630	-76.482980	SE	7	2	45°	1	Recreational fishing vessel
14-Jan-10	13:14	52	34.068863	-76.350030	NW	10	4	60°	1	Recreational fishing vessel
14-Jan-10	13:23	57	34.256637	-76.590800	NW	10	2	60°	2	Recreational fishing vessel
14-Jan-10	14:57	65	33.789860	-76.763797	SE	4	3	45°	1	Recreational fishing vessel
15-Jan-10	12:09	41	33.850681	-76.586784	NW	6	4	90°	4	Recreational fishing vessel
21-Feb-10	9:04	4	33.591617	-76.903562	SE	1	4	90°	1	Recreational fishing vessel
21-Feb-10	10:25	11	33.720496	-76.675172	NW	4	4	45°	1	Recreational fishing vessel
21-Feb-10	11:17	19	33.786677	-76.503911	NW	6	3	60°	2	Recreational fishing vessel
21-Feb-10	14:10	34	34.050293	-76.323937	SE	10	2	45°	1	Recreational fishing vessel
21-Feb-10	14:13	35	34.004435	-76.269693	SE	10	4	90°	3	Recreational fishing vessel
21-Feb-10	14:47	41	33.958151	-76.330426	NW	9	4	90°	3	Recreational fishing vessel
21-Feb-10	14:50	42	34.028089	-76.423896	NW	9	3	45°	1	Recreational fishing vessel
8-Mar-10	9:33	7	34.049602	-76.324132	SE	10	3	90°	1	Recreational fishing vessel
8-Mar-10	9:55	10	33.958248	-76.336687	NW	9	3	30°	2	Recreational fishing vessel
8-Mar-10	10:22	15	33.909044	-76.397937	SE	8	3	45°	1	Recreational fishing vessel
8-Mar-10	10:43	19	33.851018	-76.450446	NW	7	4	60°	2	Recreational fishing vessel
8-Mar-10	15:58	54	33.571668	-76.876831	NW	1	4	45°	1	Recreational fishing vessel
9-Mar-10	9:59	24	33.775694	-76.487117	NW	6	4	45°	1	Recreational fishing vessel

Table 24 (Continued). All other vessel sightings in the proposed USWTR site in Onslow Bay, North Carolina for surveys conducted from July 2009 - June 2010.

Date	Time	Way Point	Latitude	Longitude-1	Heading	Track Number	Angle out	Degree Forward	Best #	Comments
9-Mar-10	10:00	25	33.802821	-76.523493	NW	6	4	45°	4	Recreational fishing vessel
9-Mar-10	11:32	57	33.934825	-76.431140	NW	8	3	90°	1	Recreational fishing vessel
9-Mar-10	11:56	66	33.975849	-76.360158	SE	9	2	45°	1	Recreational fishing vessel
10-Mar-10	10:43	38	33.646969	-76.975641	NW	1	4	60°	1	Recreational fishing vessel
11-Apr-10	10:24	18	33.597109	-76.510653	SE	4	3	60°	1	Recreational fishing vessel
11-Apr-10	14:06	41	34.055799	-76.716481	SE	7	2	45°	1	Recreational fishing vessel
11-Apr-10	14:15	42	33.866275	-76.469405	SE	7	2	60°	3	Recreational fishing vessel
11-Apr-10	14:15	43	33.855560	-76.455167	SE	7	3	90°	1	Recreational fishing vessel
11-Apr-10	14:38	50	33.966840	-76.474430	NW	8	4	60°	1	Recreational fishing vessel
11-Apr-10	14:48	52	34.160082	-76.728372	NW	8	3	90°	1	Headboat
11-Apr-10	14:52	55	34.192641	-76.646459	SE	9	3	60°	2	Recreational fishing vessel
12-Apr-10	9:24	12	33.925988	-76.163465	SE	10	3	90°	1	Recreational fishing vessel
12-Apr-10	9:43	15	33.988814	-76.378403	NW	9	3	45°	2	Recreational fishing vessel
12-Apr-10	10:23	28	33.726411	-76.289885	NW	7	3	60°	1	Recreational fishing vessel
12-Apr-10	10:25	29	33.766740	-76.343326	NW	7	1	90°	1	Sailboat
16-Jun-10	9:26	4	33.774162	-76.612306	SE	5	3	45°	1	Recreational fishing vessel
16-Jun-10	10:12	10	33.945298	-76.569674	SE	7	3	45°	1	Recreational fishing vessel
16-Jun-10	10:39	15	33.941544	-76.444650	NW	8	3	60°	1	Recreational fishing vessel
17-Jun-10	9:07	4	33.700532	-77.041653	SE	1	4	90°	1	Recreational fishing vessel
17-Jun-10	9:51	9	33.888348	-77.028500	SE	3	3	45°	1	Recreational fishing vessel
17-Jun-10	9:55	10	33.811107	-76.913090	SE	3	2	60°	1	Recreational fishing vessel
17-Jun-10	11:18	19	33.785920	-76.505167	NW	6	3	45°	2	Recreational fishing vessel
17-Jun-10	14:08	27	34.036374	-76.568951	NW	8	3	45°	1	Recreational fishing vessel
17-Jun-10	14:18	30	34.210095	-76.656316	SE	9	2	60°	1	Recreational fishing vessel
17-Jun-10	14:22	31	34.130482	-76.550830	SE	9	2	60°	1	Dive boat
18-Jun-10	10:13	15	33.734326	-76.955065	SE	2	3	45°	1	Recreational fishing vessel
10-Mar-10	10:36	35	33.502317	-76.788673	NW	1	4	30°	1	Recreational fishing vessel



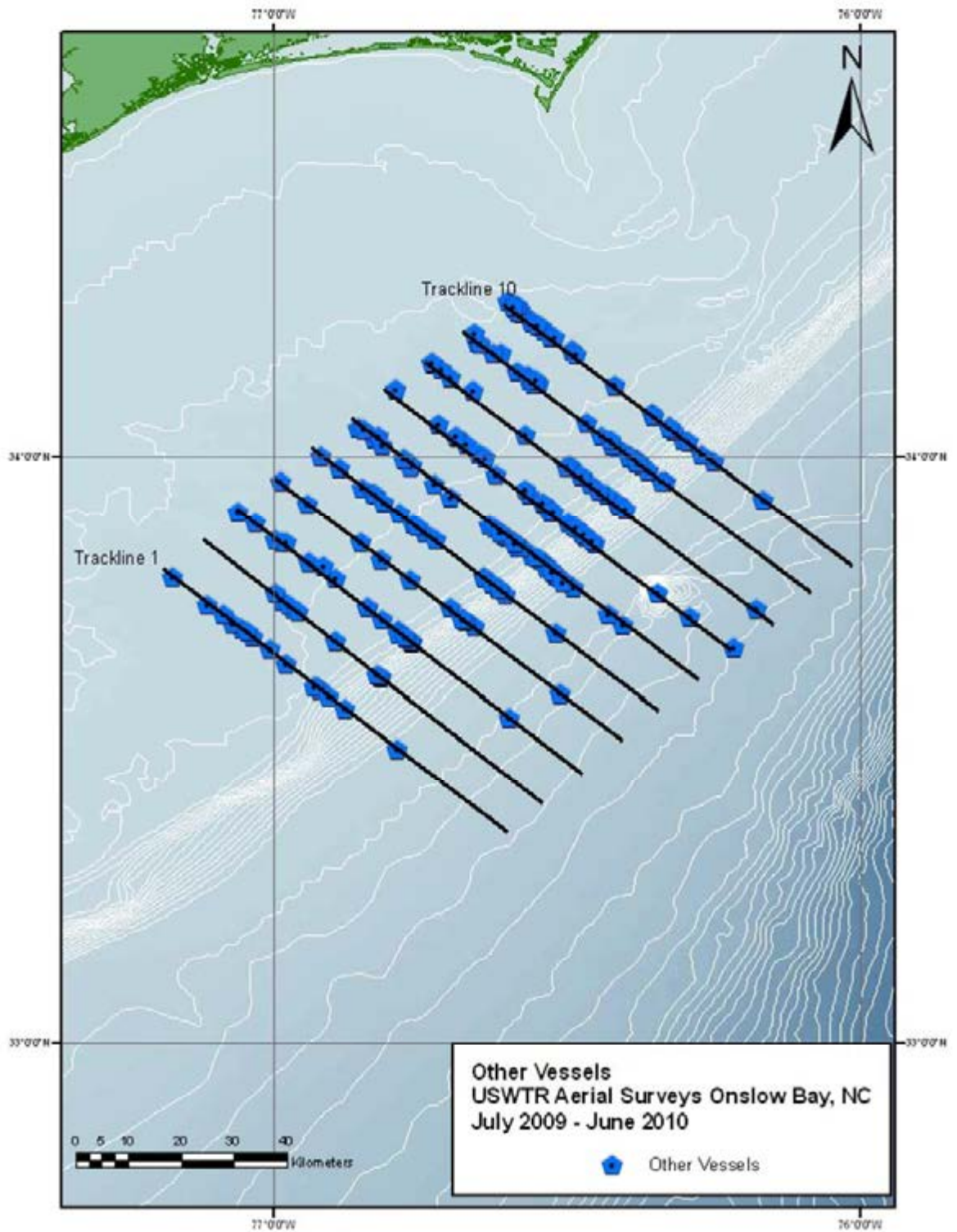


Figure 19. Other vessel sightings.

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### **Three Year Summary of Onslow Bay Aerial Survey Effort**

This report summarizes the combined results of three years of aerial surveys in the proposed Onslow Bay USWTR site (Figure Appendix 1). Effort extended from July 2007 to July 2010 and included 81 flight days, covering 577 track lines, for a total survey effort of 41629 km flown. A total of 214 cetacean sightings, representing eight species, were recorded (Table Appendix 1 and Figure Appendix 2). The maximum species diversity observed during any single day survived occurred on August 18, 2009 when four species (*Tursiops truncatus*, *Stenella frontalis*, *Grampus griseus* and *Globicephala macrorhynchus*) were recorded over 10 tracklines. The contractual goal of flying a complete set of tracklines twice each month was accomplished in 22 of the 36 months (Table Appendix 2). There was only a single month (May 2010) in which no surveys could be flown due to continuously poor weather conditions. With the exception of May 2009, a maximum of 20 tracklines were flown during any given month. For the combined three year survey period a total of at least 30 tracklines were flown every calendar month with seven of the 12 months having 50 or more tracklines of coverage. While survey effort across all three years was concentrated (78%) in a Beaufort Sea State (BSS) 2 and 3 (Figure Appendix 3) cetacean sightings were predominantly (81%) recorded in BSS 1 or 2 (Figure Appendix 4a). Previous line transect survey work has shown that the detection function for marine mammals is inversely proportional to the sea state. When we correct for effort sighting rates are highest in BSS 1 (Figure Appendix 4b).



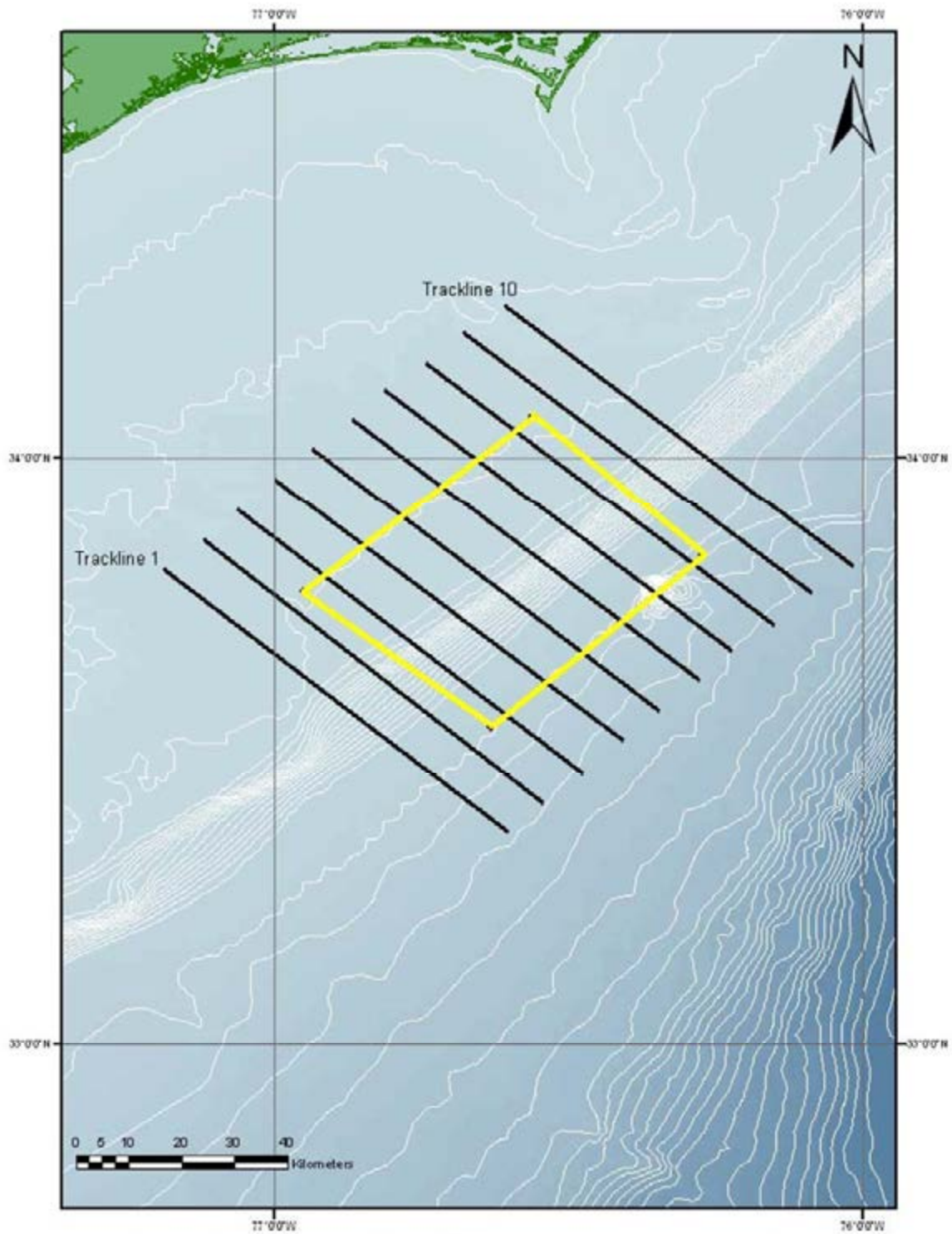


Figure Appendix 1. Survey tracklines 1-10 that cover and extend beyond the boundaries of the proposed USWTR site in Onslow Bay, North Carolina.

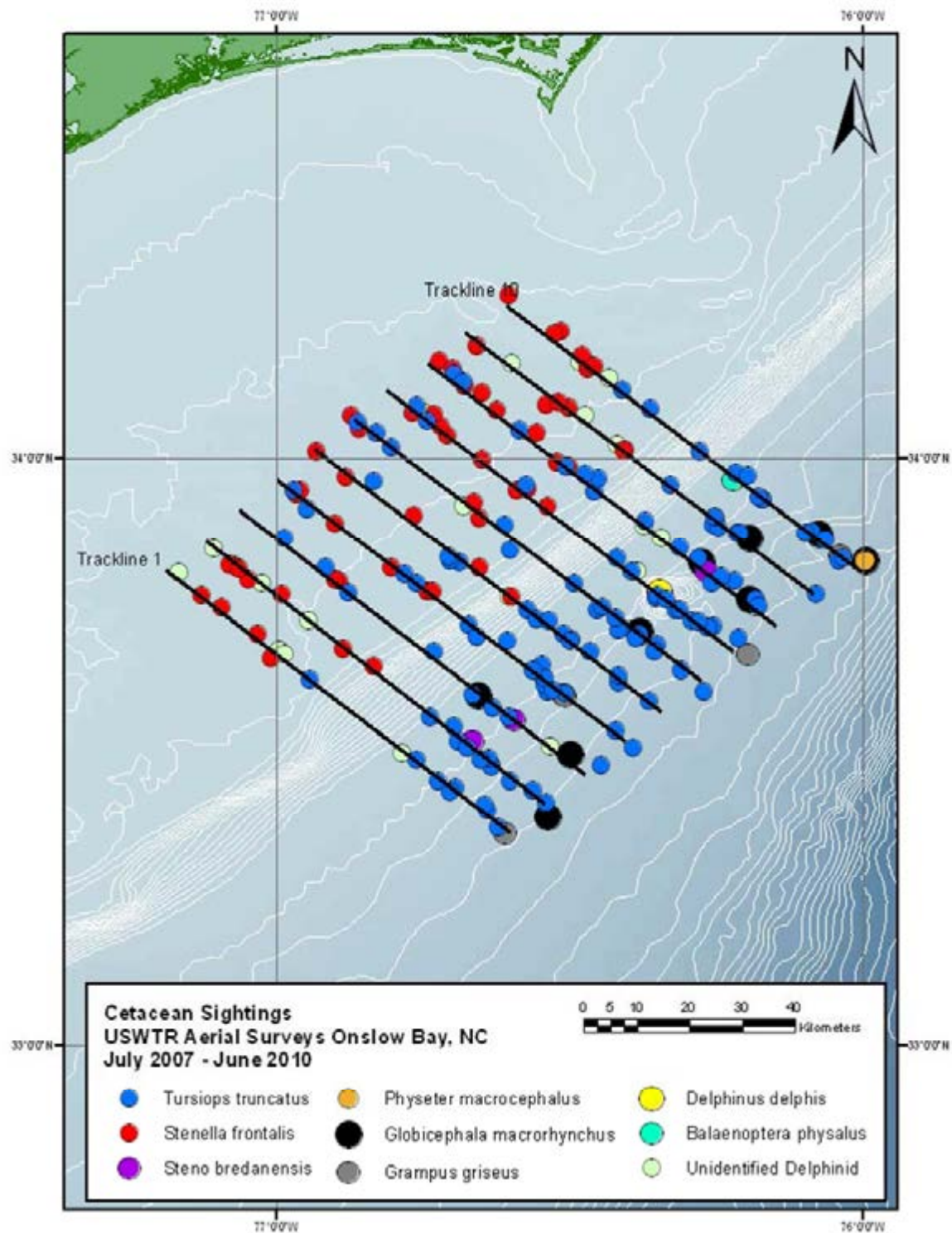


Figure Appendix 2. All cetacean sightings during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina. Off-effort sightings for year 3 are included as reported above.

Table Appendix 1. Total number of sightings and individuals for each species by month and year from July 2007 – June 2010 for the Onslow Bay, North Carolina USWTR survey site. Shaded areas indicate months that were not flown due to circumstances other than inclement weather. During the 2007 – 2008 reporting period there were thirteen survey months with June 2007 being a precursory survey month.

	2007												2008						Total						
	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November		December	January	February	March	April	May
<i>Tursiops truncatus</i>	1				1	9	1														3	5	5	8	33
Sightings # of individuals	80				40	113	1														33	43	43	67	461
<i>Stenella frontalis</i>				1																	4	1	1	4	11
Sightings # of individuals				4																	68	36	36	11	177
<i>Globicephala macrorhynchus</i>	1																							2	3
Sightings # of individuals	32																							21	53
<i>Steno bredanensis</i>																						1	26	2	3
Sightings # of individuals																						1	14	14	40
<i>Grampus griseus</i>																							1	2	3
Sightings # of individuals																							5	15	20
<i>Tursiops/ Stenella frontalis</i>																					1	3	3	2	5
Sightings # of individuals																								2	5
<i>Unidentified delphinid</i>	1	1	1	1	1	4															2	1	1	1	11
Sightings # of individuals	6	3	6	6	6	56															20	5	1	1	97
Total sightings	2	1	1	2	1	13	1	0	0	6	6	6	9	18	66										
Total individuals	112	6	3	10	40	169	1	0	0	88	77	69	104	174	853										

	2008												2009						Total						
	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December		January	February	March	April	May	June
<i>Tursiops truncatus</i>	2	1		4	3																2	3	6	9	36
Sightings # of individuals	42	9		48	79																80	11	78	186	634
<i>Stenella frontalis</i>	1				1																3	8	5	1	3
Sightings # of individuals	22				30																160	257	198	25	717
<i>Globicephala macrorhynchus</i>	2																								2
Sightings # of individuals	30																								30
<i>Unidentified delphinid</i>																							1	2	4
Sightings # of individuals																						3	3	27	11
Total sightings	4	2	0	4	4	4	0	0	0	5	12	11	12	10	64										
Total individuals	72	31	0	48	109	0	0	0	0	240	271	276	238	137	1422										

	2009												2010						Total						
	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December		January	February	March	April	May	June
<i>Tursiops truncatus</i>	5	4	11	2	2																				63
Sightings # of individuals	51	66	129	42	42																109	11	176	48	791
<i>Stenella frontalis</i>	5	5	6																		4	2	1	1	24
Sightings # of individuals	115	41	70																		142	26	18	55	467
<i>Globicephala macrorhynchus</i>	1																				1				2
Sightings # of individuals	40																				23				63
<i>Steno bredanensis</i>																									0
Sightings # of individuals																									0
<i>Crampus griseus</i>	1																								1
Sightings # of individuals	6																								6
<i>Delphinus delphis</i>																					1	20			1
Sightings # of individuals																									20
<i>Physeter macrocephalus</i>																									0
Sightings # of individuals																									0
<i>Balaenoptera physalus</i>																									1
Sightings # of individuals																									1
<i>Unidentified delphinid</i>																					2	4			4
Sightings # of individuals																									4
Total sightings	0	12	10	17	2	2	16	4	14	3	0	6	86												
Total individuals	0	212	110	199	42	42	311	60	200	66	0	154	1371												

Table Appendix 2. Survey effort given as tracklines flown in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys. Shaded areas indicate months that were not flown due to circumstances other than inclement weather.

	July	August	September	October	November	December	January	February	March	April	May	June
07-08	20	20	20	20	20	10		10	15	20	20	20
08-09	20	20		20	16	10	10	20	20	10	30	20
09-10	20	20	16	20	10	10	20	10	20	20	0	20
Total	60	60	36	60	46	30	30	40	55	50	50	60

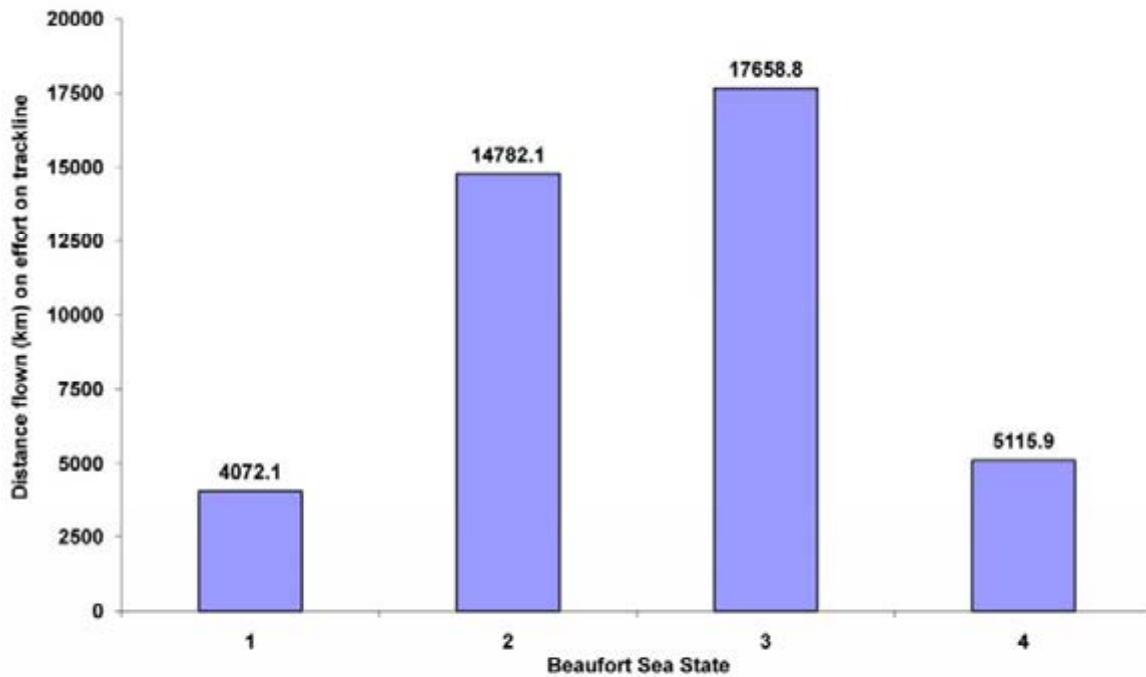


Figure Appendix 3. Total distance surveyed per Beaufort Sea State during the July 2007 – June 2010 USWTR aerial surveys in Onslow Bay, North Carolina.

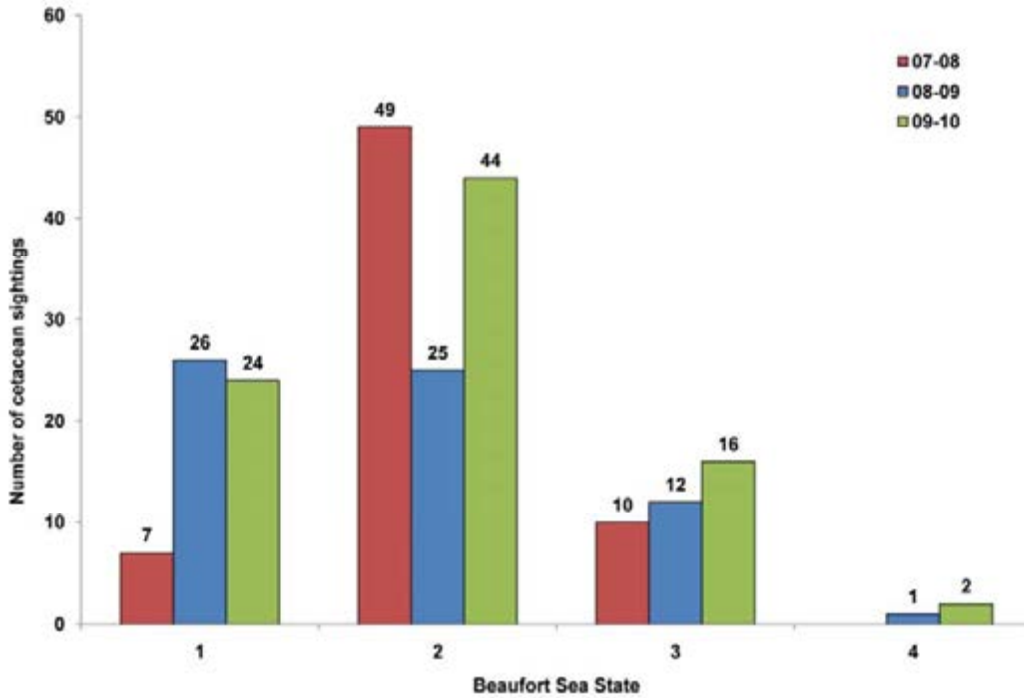


Figure Appendix 4a. Total number of cetacean sightings per Beaufort Sea State from July 2007 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.

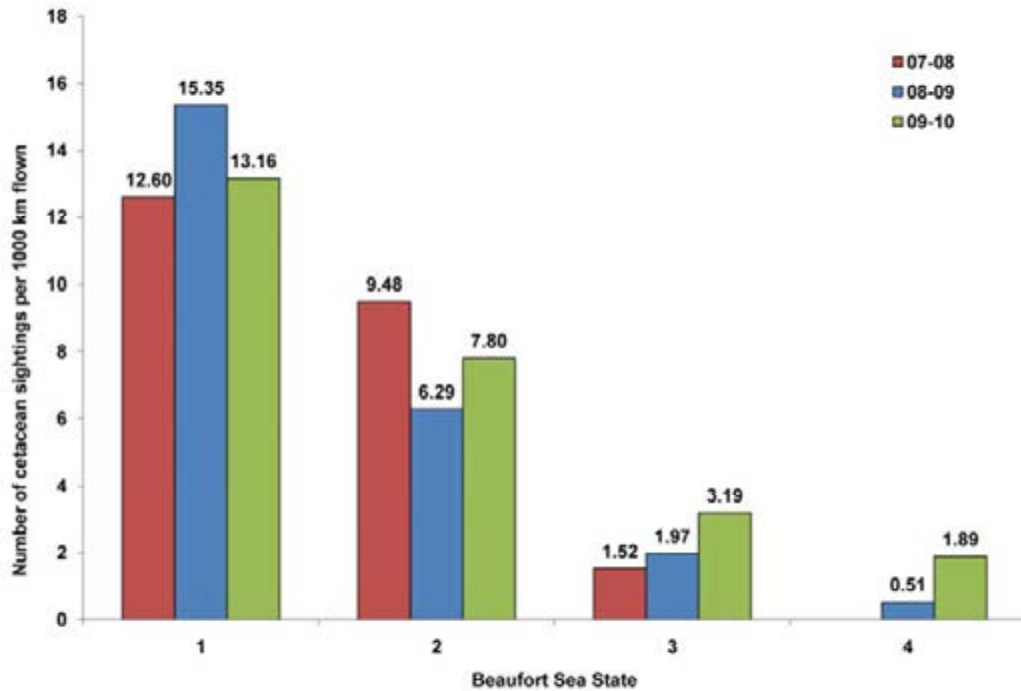


Figure Appendix 4b. Cetacean sightings per 1000 km flown by Beaufort Sea State from July 2007 – June 2010 in the proposed USWTR site in Onslow Bay, North Carolina.



## Marine Mammal Sightings

### Bottlenose dolphin (*Tursiops truncatus*) (Figure Appendix 5)

The bottlenose dolphin was the most commonly sighted and most abundant cetacean encountered during our surveys with 126 sightings (59% of all cetacean sightings) representing a total of 1806 individuals. Sightings of bottlenose dolphins during any single survey day ranged from no sightings made to a maximum of nine sightings of 167 individuals seen in 6 tracklines on March 9, 2010. While this species was found throughout the survey area, differences in the abundance and group size were observed between the inshore and offshore regions of the range. Sightings inside of the continental shelf break were more sparse and consisted of predominantly small groups containing less than 20 individuals. In contrast, offshore of the shelf break bottlenose dolphins occurred more frequently and group sizes ranged from single animals to groups containing 65 individuals. Seasonal patterns of sightings varied across years; some of this variation can be attributed to uncharacteristically low sea states during a particular month's survey as is the case in November 2007, October 2009, and January and March 2010 (Figure Appendix 6a-c). Over the three year combined survey period, though, there was at least one bottlenose dolphin sighting recorded in every calendar month (Figure Appendix 7).

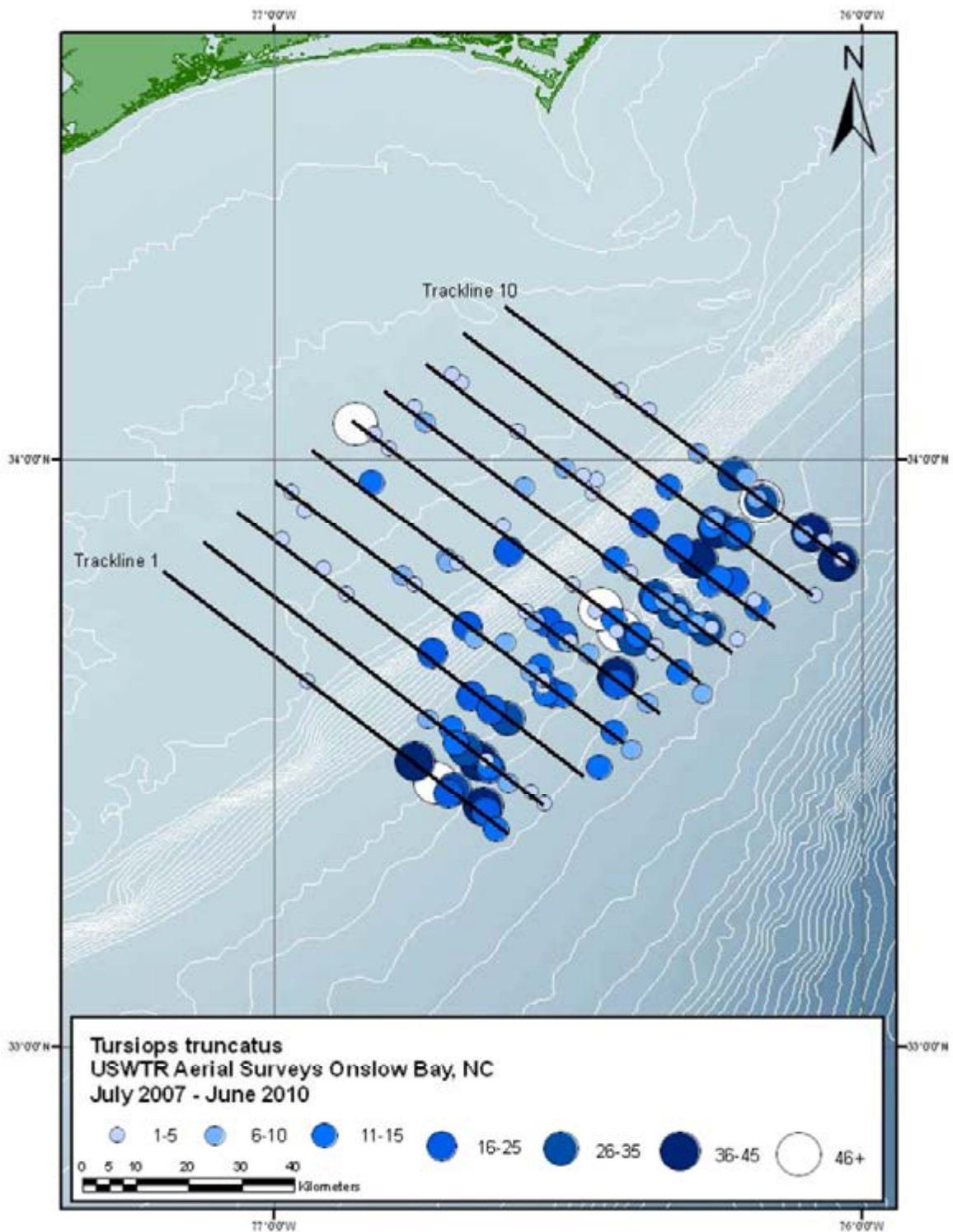


Figure Appendix 5. Bottlenose dolphin (*Tursiops truncatus*) sightings indicating group size during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.



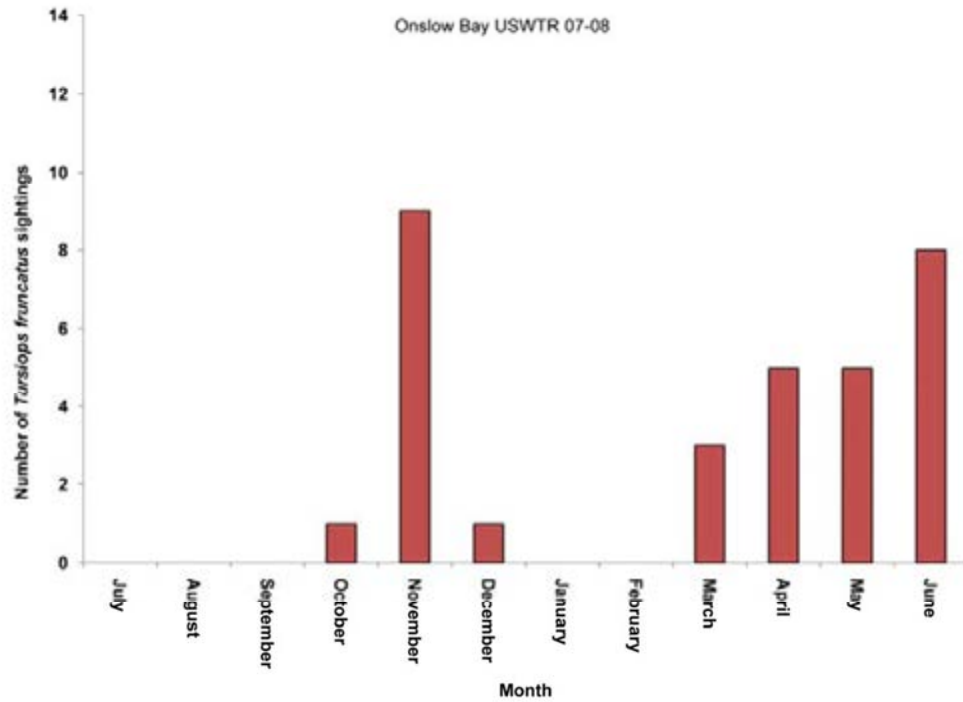


Figure Appendix 6a. Bottlenose dolphin (*Tursiops truncatus*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2008 surveys.

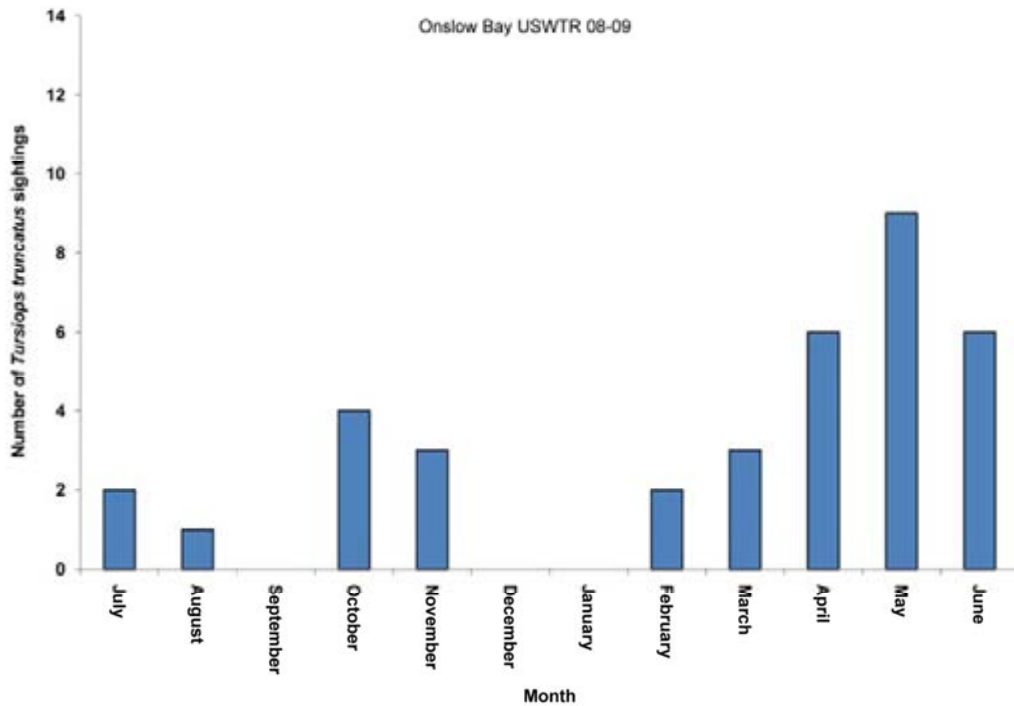


Figure Appendix 6b. Bottlenose dolphin (*Tursiops truncatus*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2008 – June 2009 surveys.

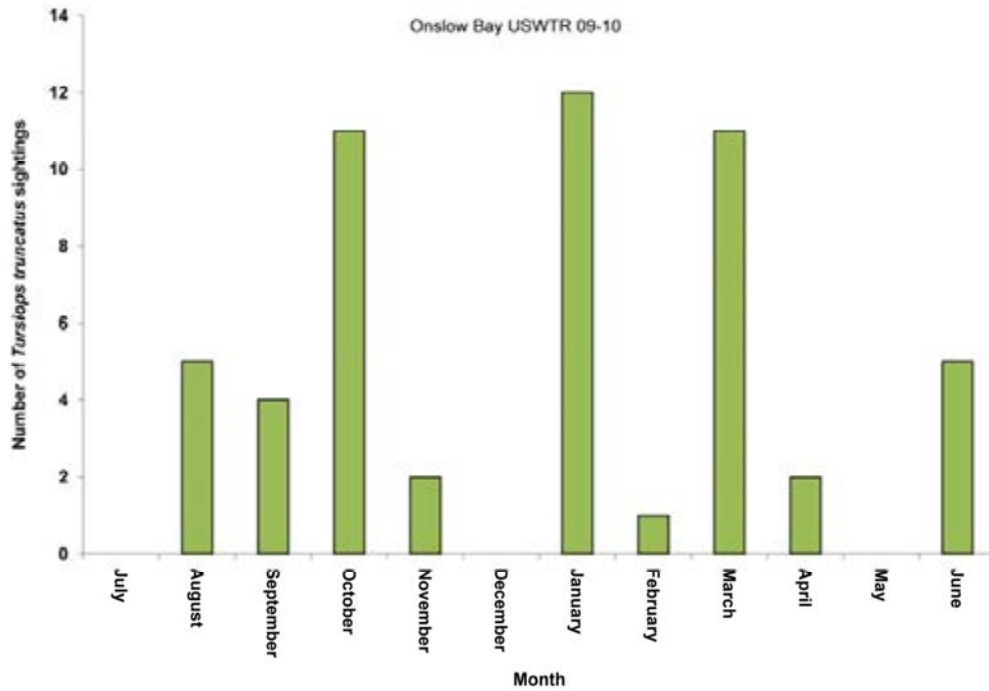


Figure Appendix 6c. Bottlenose dolphin (*Tursiops truncatus*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2009 – June 2010 surveys.

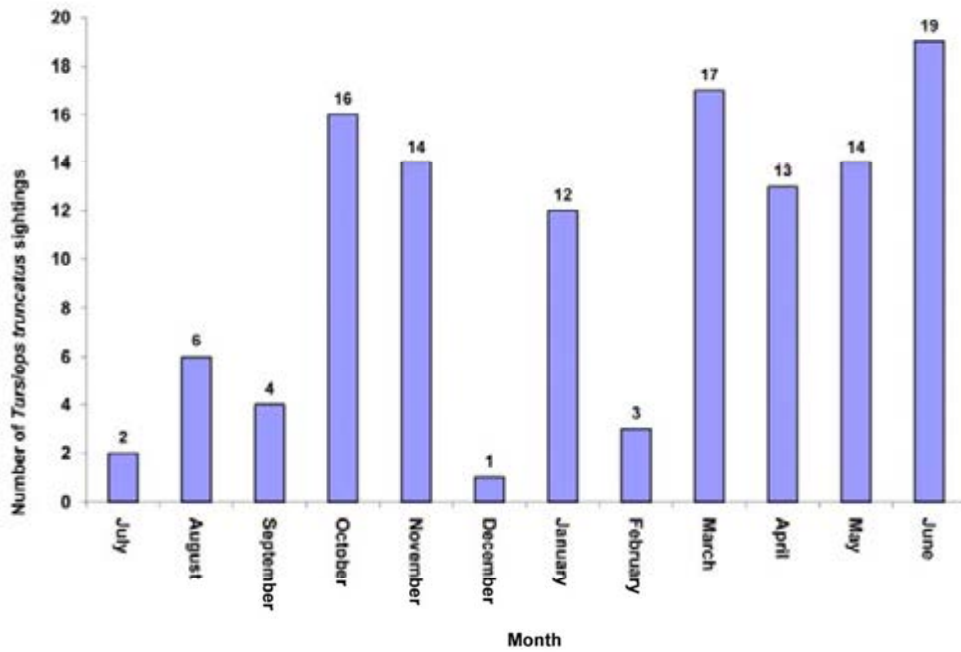


Figure Appendix 7. All bottlenose dolphin (*Tursiops truncatus*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys.

A review of all images of bottlenose dolphins sighted over the combined survey period resulted in the identification of two distinct pigmentation patterns. On the dorsal surface of the peduncle of some dolphins, there was an obvious white pigmentation pattern extending from just caudal of the dorsal fin to near the flukes. Other bottlenose dolphins sighted in the survey area lacked this pigmentation pattern and possessed a solid gray peduncle. We analyzed the distribution of dolphins that displayed the white peduncle markings, by both group size and distance from shore (Figure Appendix 8). Only sightings where conditions permitted clear observations of the peduncle were used in this analysis. Except for one sighting, only dolphins that were sighted on, or east, of the continental shelf break exhibited the white peduncle pigmentation pattern. These dolphins tend to reside in larger groups, while animals on the shelf were more uniform in color and reside in smaller groups. This analysis suggest there is separation of bottlenose dolphins by coloration pattern from the nearshore shelf and offshore of the shelf break.

In addition, on 17 June 2010, the team documented one animal within a group of 13 individuals on trackline 9 that had a bright white coloration extending from behind the dorsal fin down the peduncle and laterally forward of the dorsal fin on both sides (Figure Appendix 8). This coloration was more pronounced both among animal within the group (all had white peduncles) and as compared to all previous observations made inside the range. Examination of the photos collected, as well as comparison with images published in Rotstein *et al.* (2009) in the journal *Emerging Infectious Diseases*, suggests this animal had the fungus *Lacazia loboi* in the dorsal skin. Symptoms of this fungal infection appear as raised gray to white nodules on the epidermis. This disease is commonly called “lobo” in coastal bottlenose dolphin populations in the east and west coast of Florida. Rotstein *et al.* (2009) found the disease in offshore bottlenose dolphins north of Cape Hatteras. As the paper states, there have been recorded cases of this disease occurring in offshore bottlenose dolphins off North Carolina and this observation extends the presence of the disease south of Cape Hatteras. The sighting in the USWTR range was circulated to the colleagues who published this finding in stranded specimens in North Carolina.

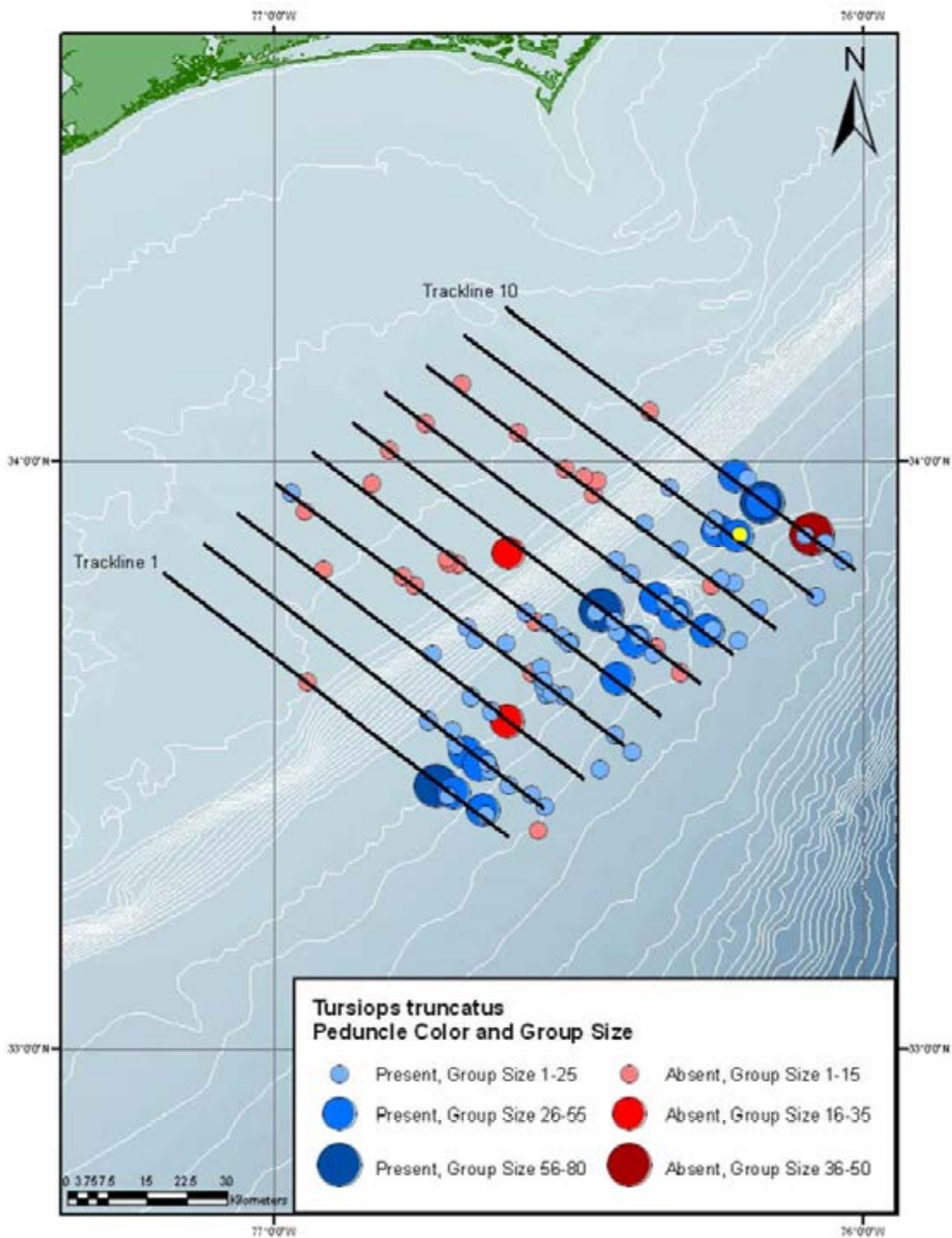


Figure Appendix 8. Bottlenose dolphin (*Tursiops truncatus*) sightings from July 2007 – June 2010. Sightings indicating group size and the presence or absence of a white pigmentation pattern on the peduncle. Photos where pigmentation was unclear or could not be determined were omitted. Yellow circle denotes a possible *Lacazia loboi* infected dolphin.

Spotted dolphin (*Stenella frontalis*) (Figure Appendix 9)

Spotted dolphins were the second most commonly sighted and abundant cetacean species with 57 sightings (26.5% of all sightings) representing 1361 individuals. During any one survey day spotted dolphins ranged from being absent in the USWTR site to a maximum of 6 sightings for 142 individuals across 10 tracklines that was recorded on March 5, 2008. Spotted dolphins were found only within the inshore portion of the USWTR site on the shelf, except for one group of 65 that was observed 7.7 km east past the continental shelf break. Their temporal distribution was highly variable across months and between years (Figure Appendix 10a-c). Spotted dolphins have been observed, though, in ten months of the year except December and July (Figure Appendix 11).

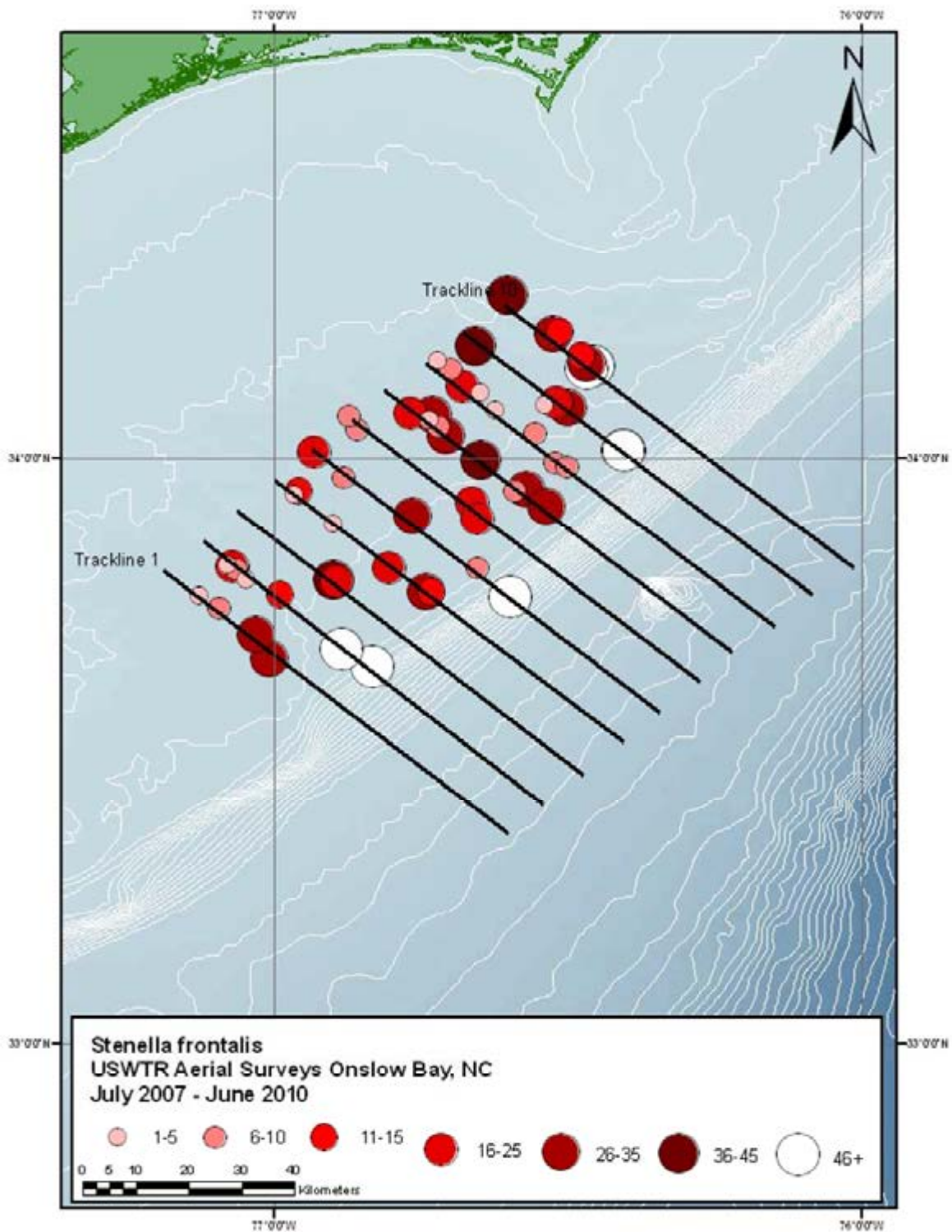


Figure Appendix 9. Spotted dolphin (*Stenella frontalis*) sightings indicating group size during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.

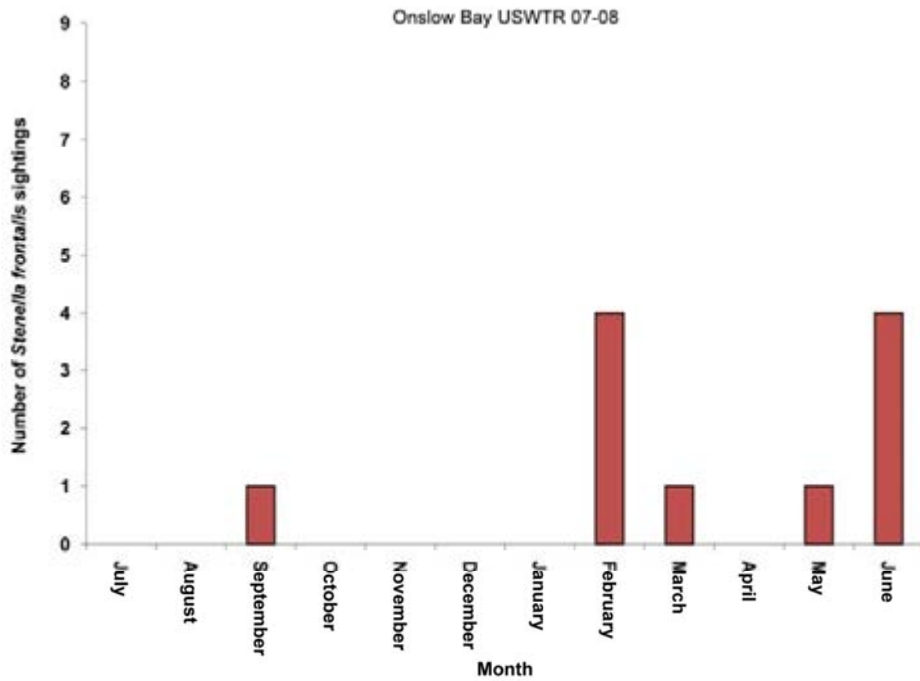


Figure Appendix 10a. Spotted dolphin (*Stenella frontalis*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2008 surveys.

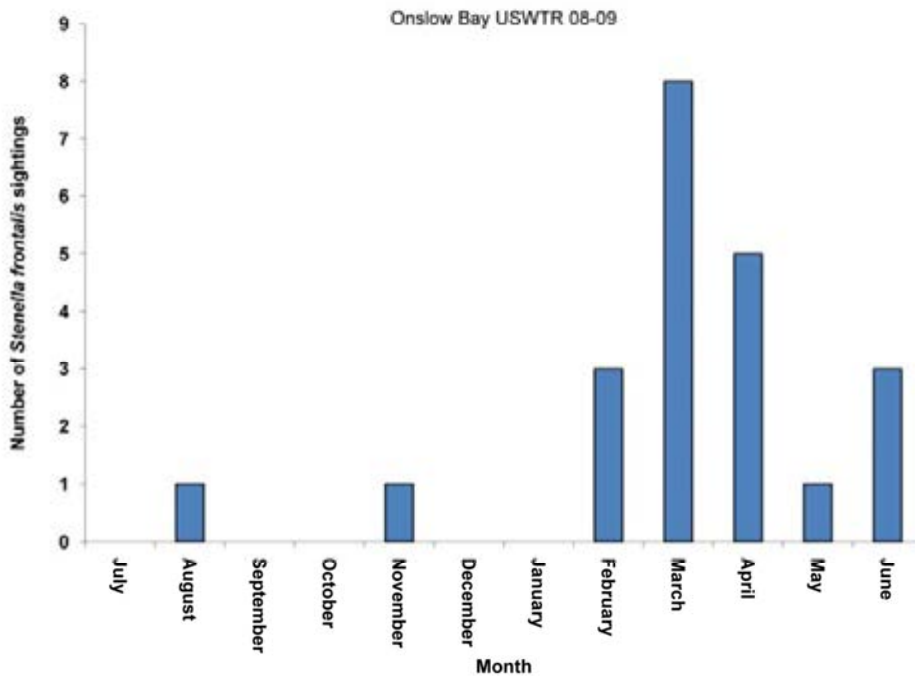


Figure Appendix 10b. Spotted dolphin (*Stenella frontalis*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2008 – June 2009 surveys.



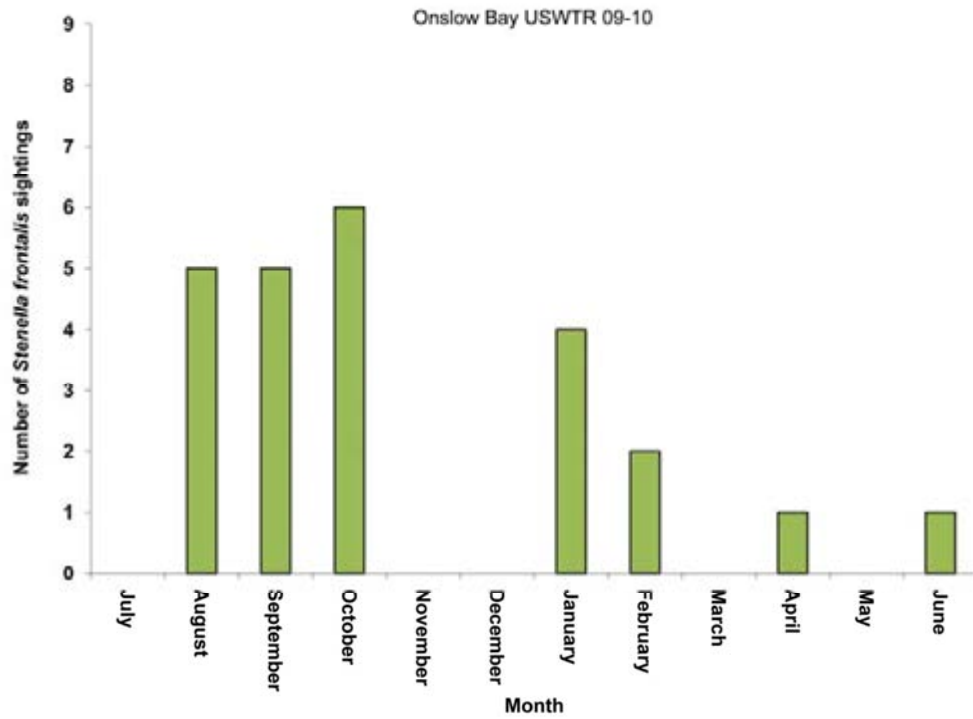


Figure Appendix 10c. Spotted dolphin (*Stenella frontalis*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2009 – June 2010 surveys.

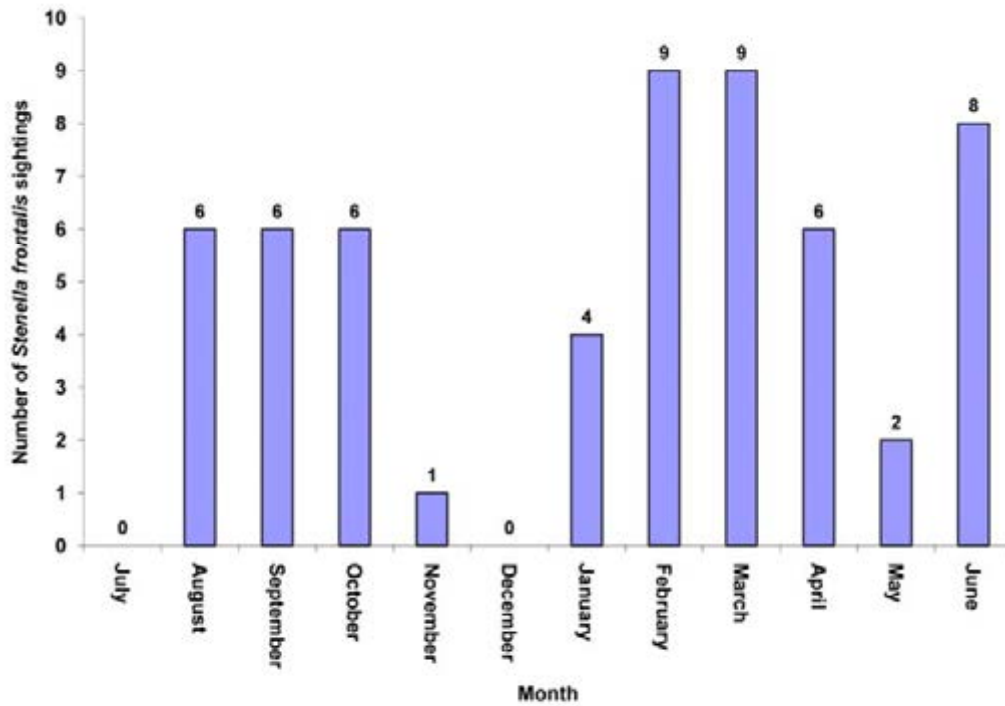


Figure Appendix 11. All spotted dolphin (*Stenella frontalis*) sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys.

Short-finned pilot whales (*Globicephala macrorhynchus*) (Figure Appendix 12)

Short-finned pilot whales were sighted nine times during the combined survey period; six sightings were on effort, two were off effort during offshore transit between tracklines, and a single sighting during a preliminary survey during June 2007. A single sighting was also made during the aerial surveys conducted in 1998-99. All sightings occurred offshore of the shelf break with most occurring in the eastern-most last quarter of a trackline in water depths of ~400m. A single sighting was made in both October and February with all other sightings occurring during the summer months from May to August. The sightings made inside the USWTR range along with those made during coastal right whale aerial surveys and directed pilot whale vessel surveys make up the entirety of short-finned pilot whale sightings made off North Carolina posted to OBIS Seemap.

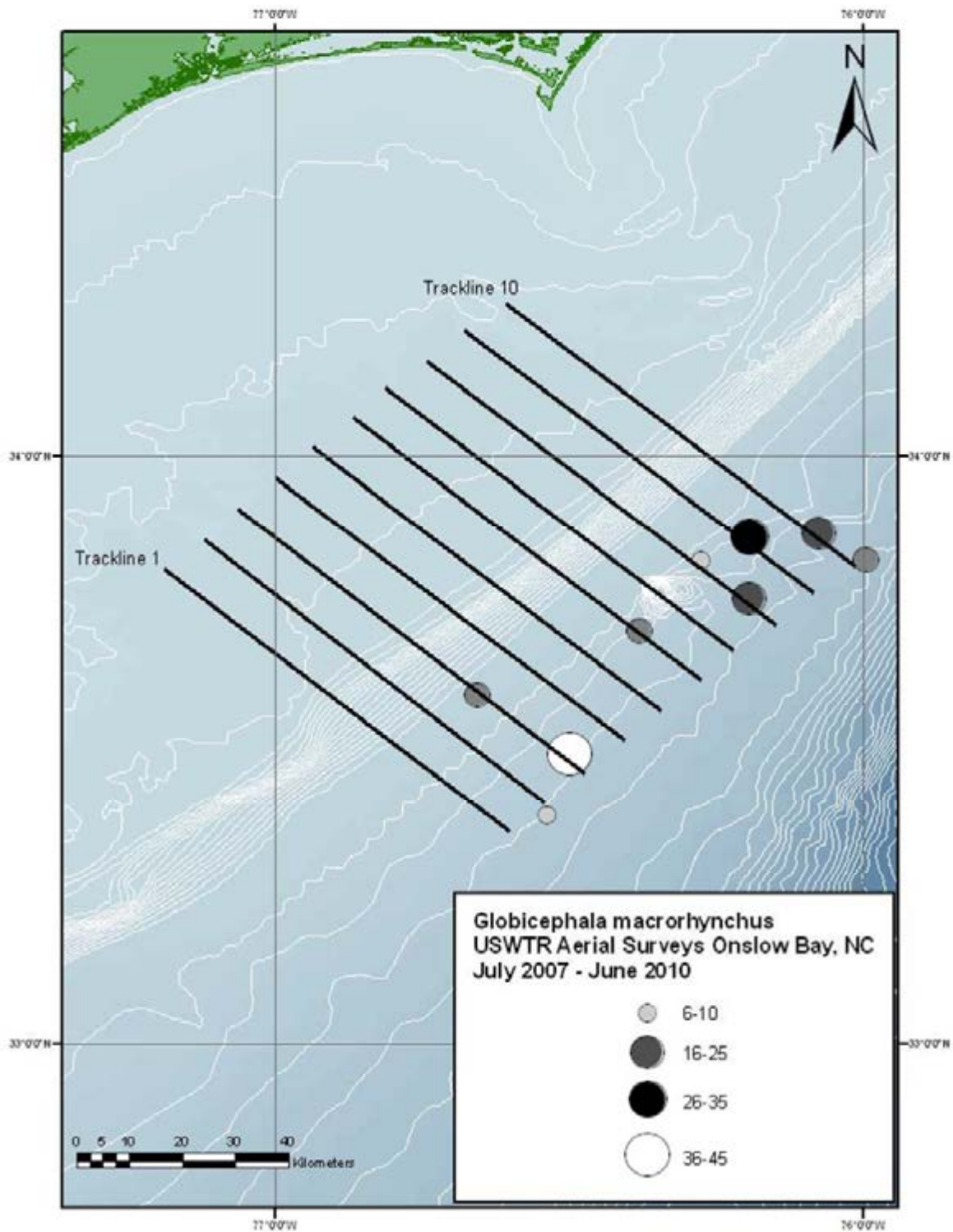


Figure Appendix 12. Short-finned pilot whales (*Globicephala macrorhynchus*) sightings indicating group size during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.

Risso's dolphins (*Grampus griseus*) (Figure Appendix 13)

Risso's dolphins were seen three times during the first year of surveys and only once more in 2009-10. All sightings came in the summer months and were limited to the deep offshore waters of the range. Our sightings fit well with past surveys posted to OBIS Seemap in which all animals seen south of Cape Hatteras occurred west of the continental shelf break.

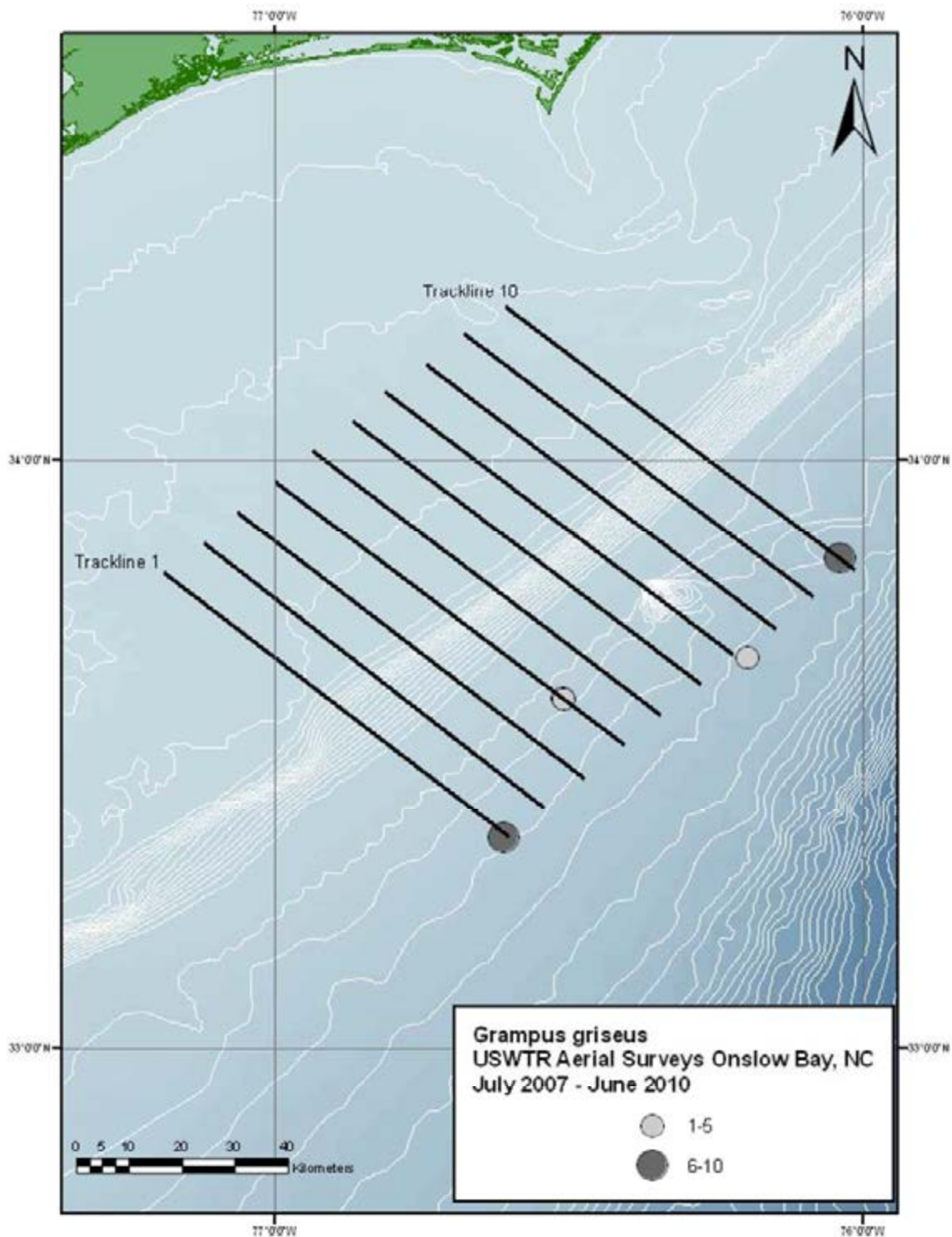


Figure Appendix 13. Risso's dolphin (*Grampus griseus*) sightings indicating group size during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.

Rough-toothed dolphins (*Steno bredanensis*) (Figure Appendix 14)

Rough-toothed dolphins accounted for three sightings in our first year of surveys, but were not detected from the aerial platform during subsequent years. This species was also limited to the deep offshore waters of the range and occurred during April and June. These sightings make the Onslow Bay USWTR data set the second largest contributor of rough-toothed dolphin sightings posted to OBIS Seamap along the eastern United States, with NOAA's Southeast Fisheries Science Center leading with four.



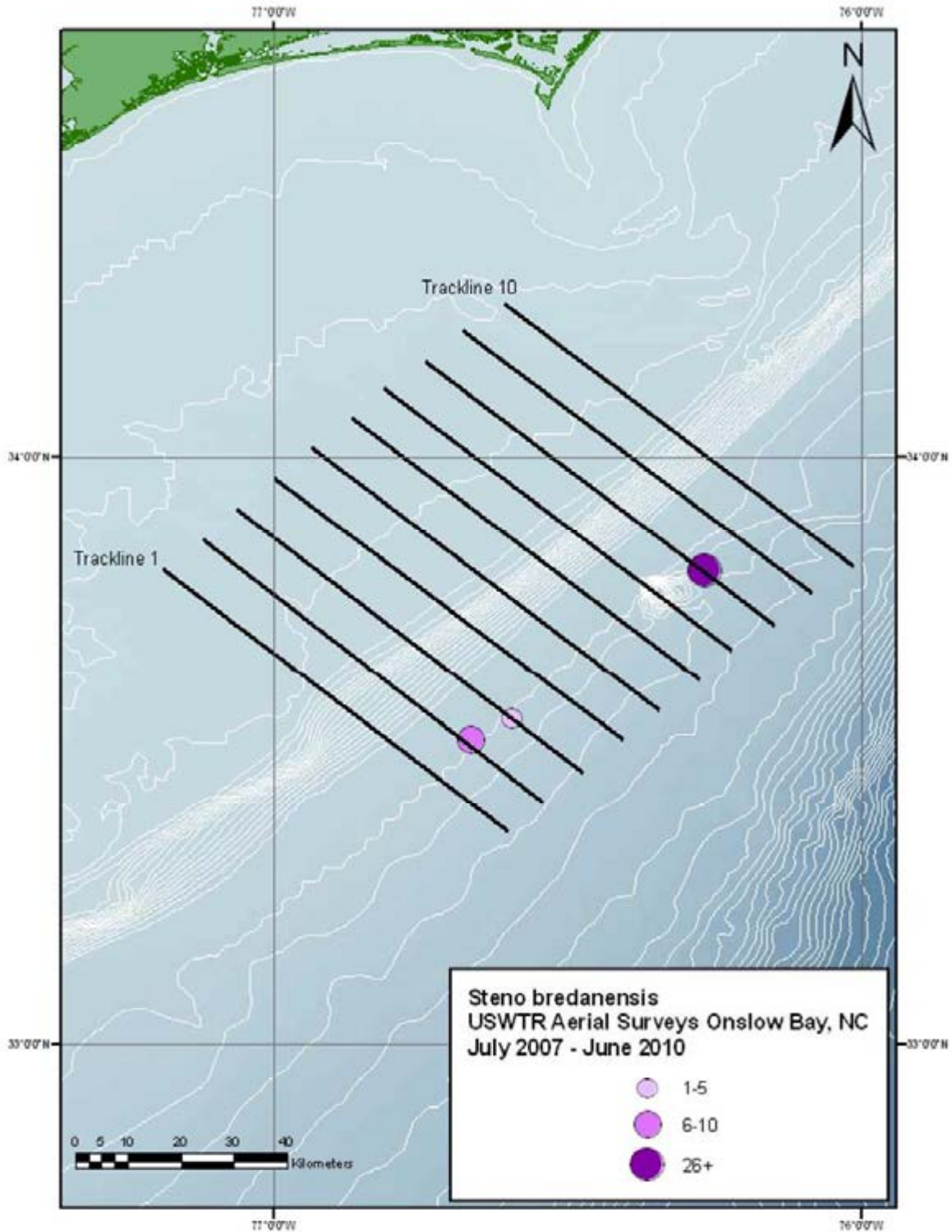


Figure Appendix 14. Rough-toothed dolphin (*Steno bredanensis*) sightings indicating group size during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.



Common dolphin (*Delphinus delphis*) (Figure Appendix 15)

A herd of 20 common dolphins were observed once in March 2010 representing the only sighting of this species during the combined three years survey period. This species had been recorded a total of 13 times during the 1998-99 surveys in Onslow Bay. Although its range extends further south than North Carolina, sightings of this species posted to OBIS Seemap are more prevalent in cooler, northern waters. Our most recent sighting may have been a result of a mass of colder water moving south bringing with it more favorable conditions for this species.

Fin Whale (*Balaenoptera physalus*) (Figure Appendix 15)

A single fin whale was recorded in March 2010, the same day as the common dolphin sighting, and represents the first baleen whale seen in this range both in the current three year project and in the initial 1998-99 surveys. Along the eastern coast of the United States our recent sighting represents the farthest south this species has been recorded of those surveys posted to OBIS Seemap.

Sperm Whale (*Physeter macrocephalus*) (Figure Appendix 15)

On October 21, 2009 while transiting to the offshore end of trackline 10 a single sperm whale was observed just outside the USWTR survey area. The animal was observed as it began a dive which prevented collection of any photographs. Sperm whale vocalizations have been recovered from the HARPs deployed in Onslow Bay but this is the first visual confirmation of this species near the range. Sightings posted to OBIS Seemap have Sperm whales occurring predominantly north of Cape Lookout and in deeper waters past the 1000 fathom mark. This is a species of special concern as it is listed as endangered under the Endangered Species Act (MMPA Annual Report 1997).

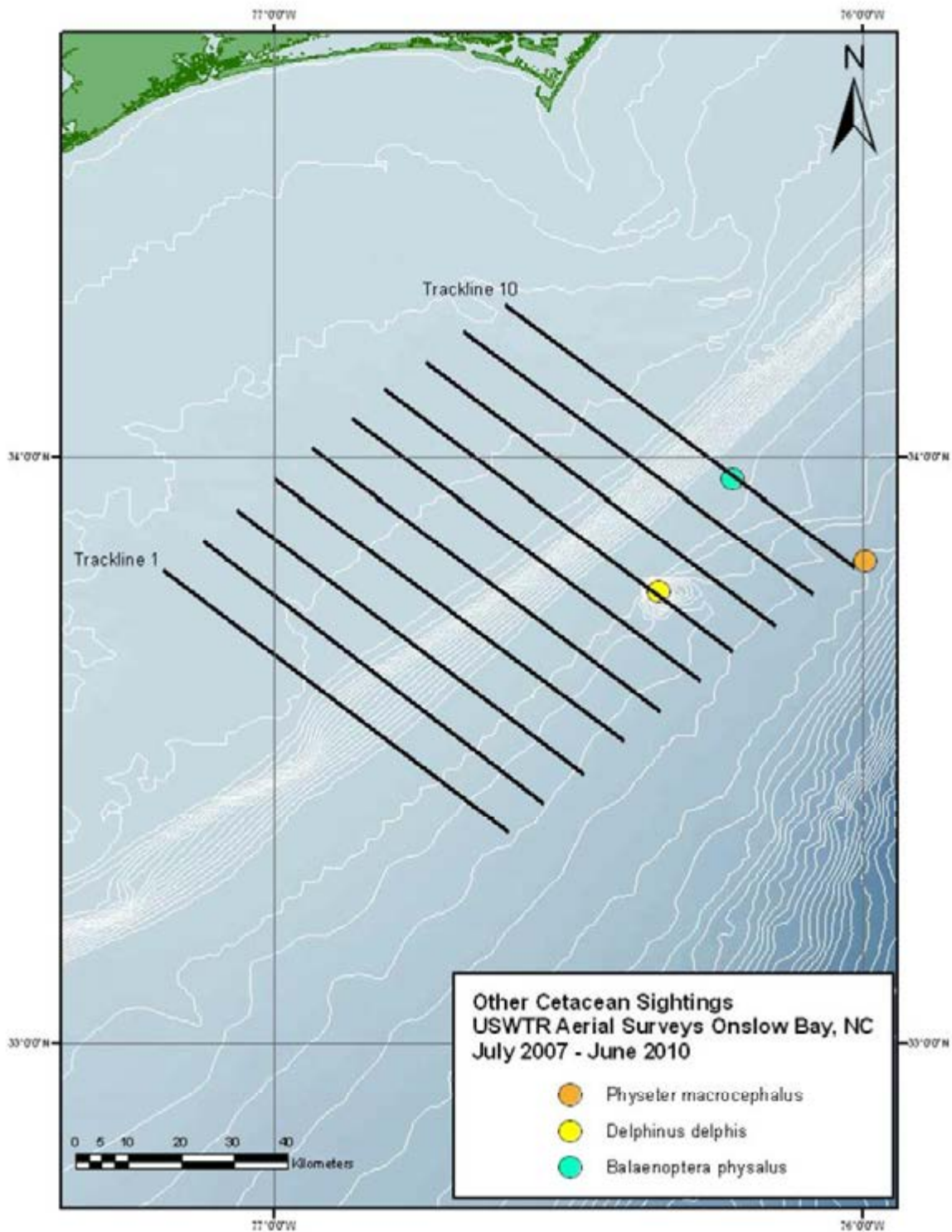


Figure Appendix 15. Sperm whale (*Physeter macrocephalus*), common dolphin (*Delphinus delphis*) and fin whale (*Balaenoptera physalus*) sightings during the 2007 – 2010 aerial surveys of the proposed USWTR site in Onslow Bay, North Carolina.

### Sea Turtle Sightings (Figure Appendix 16)

Sea turtles were the most common sighting recorded in the USWTR range with a total of 1181 individuals seen during our three years of effort. Two species of turtles were observed, the loggerhead sea turtle (*Caretta caretta*) which made up the majority of the sightings with 936 individuals (79% of the sightings) and the leatherback sea turtle (*Dermochelys coriacea*) with 5 individuals. The remaining 240 sightings were of animals that could not be identified to species, typically because they were submerged too far below the surface obscuring any species specific diagnostic features, and are labeled as unidentified sea turtles. Like cetaceans, sightings of sea turtles were linked strongly to BSS with more animals recorded in a low sea state (BSS 1 or 2) as compared to higher sea states (BSS 3 or higher)(Figure Appendix 17a-b). Sea turtle sightings were highly variable between months and across years but over the three year survey period sightings were posted during every calendar month (Figure Appendix 18a-c and 19). The majority of sightings were made over the shelf in shallow water.



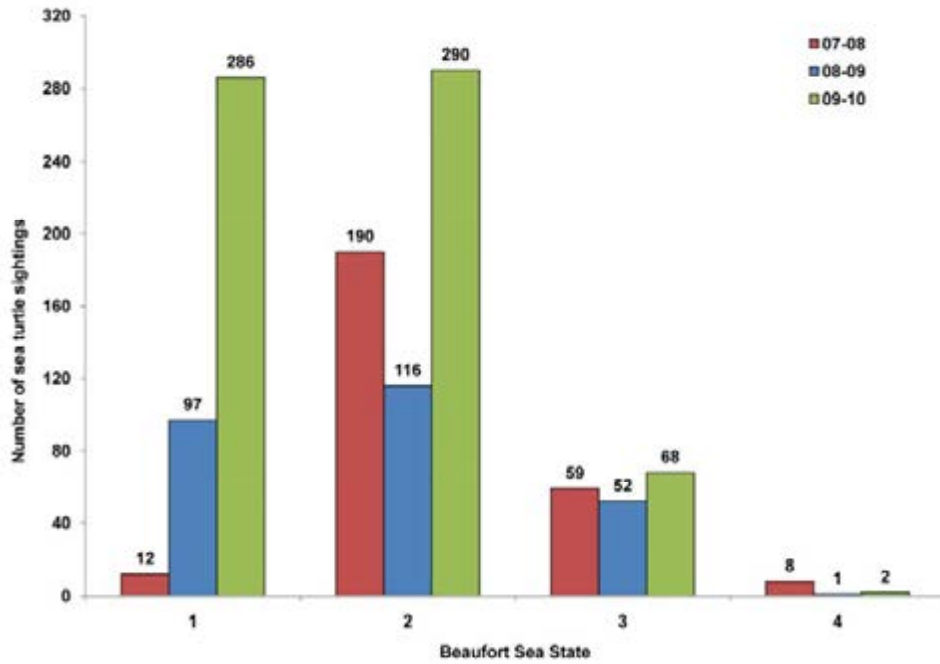


Figure Appendix 17a. Total number of sea turtle sightings by Beaufort Sea State in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys.

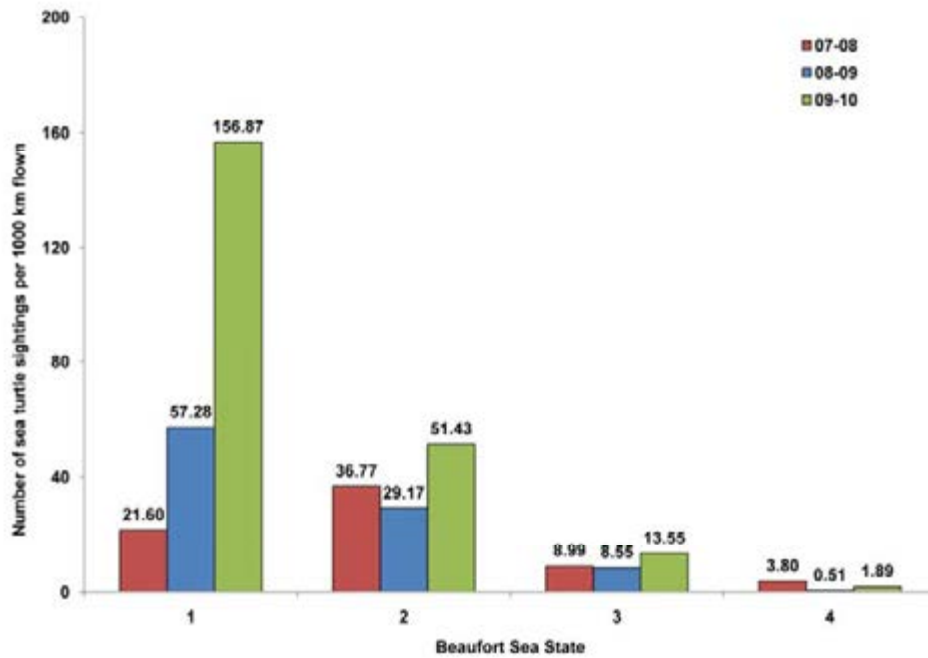


Figure Appendix 17b. Sea turtle sightings per 1000 km flown by Beaufort Sea State in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys.

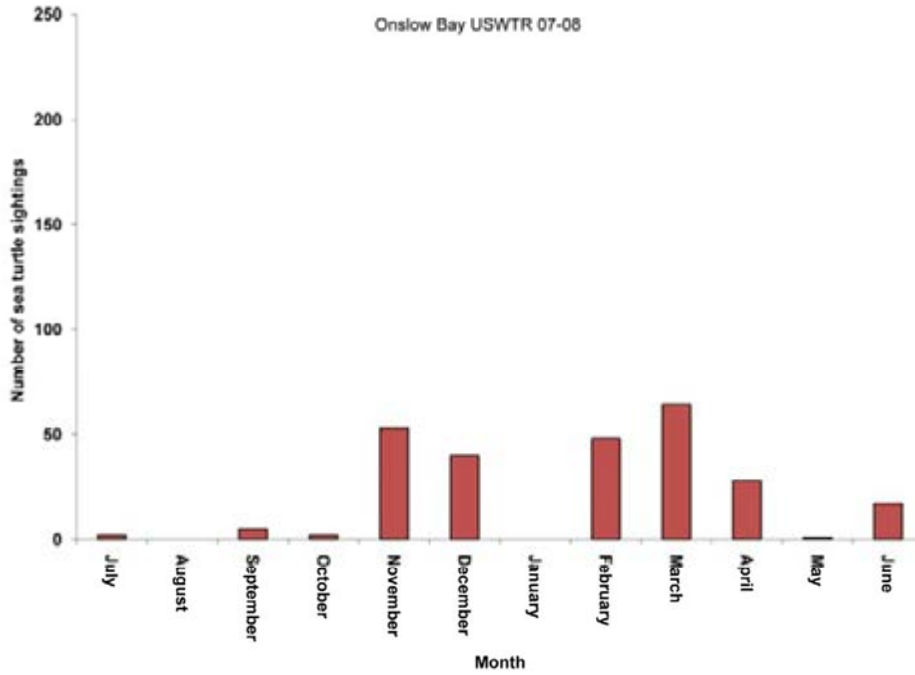


Figure Appendix 18a. Sea turtle sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2008 surveys.

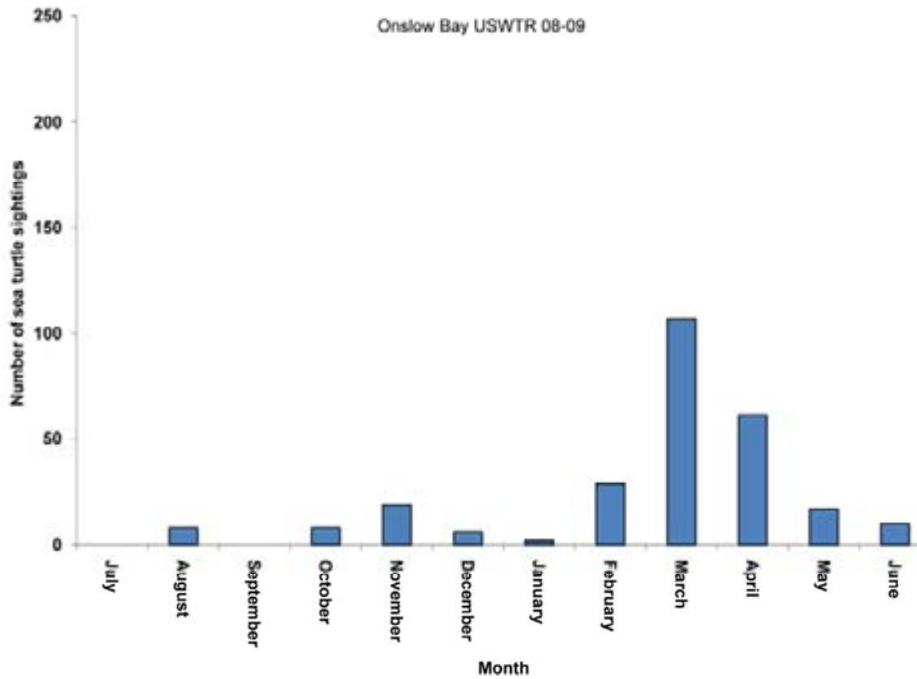


Figure Appendix 18b. Sea turtle sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2008 – June 2009 surveys.

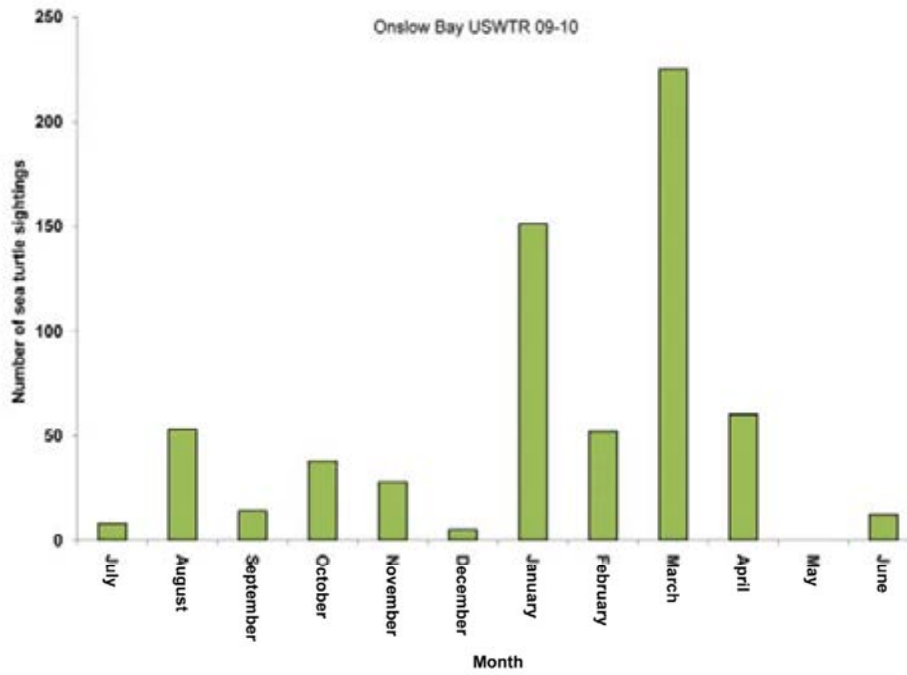


Figure Appendix 18c. Sea turtle sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2009 – June 2010 surveys.

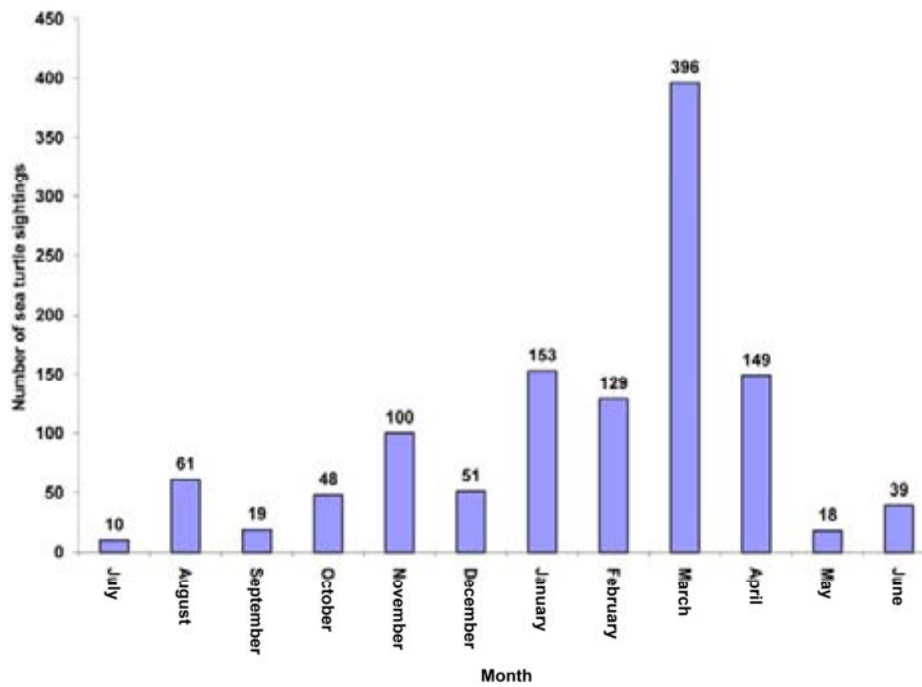


Figure Appendix 19. All sea turtle sightings by month in the proposed USWTR site in Onslow Bay, North Carolina during the July 2007 – June 2010 surveys.





**Codes for Variables on USWTR Aerial Survey Data Sheet****Date:** YYYYMMDD**Track#:** opportunistic track line=99**Event:**

1.1 = On effort/on track

1.2 = Off effort

3.1 = Change in environmental conditions

10.0 = Opportunistic sighting(s)

PF = Preflight

XB = Cross Beach

WU = Wheels Up

WD = Wheels Down

TE = Transit Leg on Effort

2.0 = Sighting-breaking track/off effort (real time)

2.2 = Sighting of commercial fishing vessel

2.3 = Vessel sighting

2.4 = Sighting of marine mammal (real location)

2.41 = Location of Sighting Cue, No Animals sighted

2.42 = Break from sighting

2.7 = Sighting of sea turtle (real location)

2.8 = Sighting of large vessel (Military, commercial, etc.)

2.9 = Unidentified sighting, requires comments

**Sighted by:** 1= pilot      2= co-pilot      3= observer left side      4= observer right side**Confidence of cue**

1 = definite

2 = probable

3 = possible/unsure

**Visibility:**

1 = clear to horizon

2 = half the distance to the horizon

3 = less than half the distance to the horizon

**Sea State:**

0 = slick, calm, mirror-like

1 = small waves

2 = whitecaps 0-33%, waves 1-2 feet

3 = whitecaps 33-50%, waves 2-3 feet

4 = whitecaps 50-65%, waves 3-5 feet

5 = whitecaps &gt;65%, waves &gt;5 feet

6 = too rough too survey

**Sighting Cues:**

1 = Blow

2 = Splash

3 = Body Part

4 = Breach

5 = Other (needs comments)

**Cloud Cover:**

01 = clear

02 = partly cloudy

03 = continuous layer of clouds

04 = rain

05 = haze

99 = other, requires comments

**Vertical Angle** is given in rough increments of 20 degrees with 1 being directly on the trackline and 4 being anything outside of survey wide to horizon**Horizontal Angle** is given assuming the nose of the plane is 0 degrees and directly off the wing is 90 degrees – measurements are taken from 1-180 on each side of the plane.**Glare**

0 = No glare

1 = 0-25 %

2 = 25 -50 %

3 = &gt;50%

## Appendix C

Species List for Aerial Surveys		
Common Name	Scientific Name	Species Code
<b>Cetaceans</b>		
North Atlantic right whale	<i>Eubalaena glacialis</i>	Egl
Minke whale	<i>Balaenoptera acutorostrata</i>	Bac
sei whale	<i>Balaenoptera borealis</i>	Bbo
fin whale	<i>Balaenoptera physalus</i>	Bph
Brydes whale	<i>Balaenoptera edeni</i>	Bed
humpback whale	<i>Megaptera novaeangliae</i>	Mno
unidentified balaenopterid	Family <i>Balaenopteridae</i>	BALA
sperm whale	<i>Physeter macrocephalus</i>	Pma
pygmy sperm whale	<i>Kogia breviceps</i>	Kbr
dwarf sperm whale	<i>Kogia sima</i>	Ksi
unidentified Kogia	<i>Kogia</i> spp.	KOGI
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	Ham
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Zca
Mesoplodon beaked whale	Genus <i>Mesoplodon</i>	MESO
unidentified beaked whale	Family <i>Ziphiidae</i>	ZIPH
harbor porpoise	<i>Phocoena phocoena</i>	Pph
killer whale	<i>Orcinus orca</i>	Oor
melon-headed whale	<i>Peponocephala electra</i>	Pel
pygmy killer whale	<i>Feresa attenuata</i>	Fat
false killer whale	<i>Pseudorca crassidens</i>	Pcr
Risso's dolphin	<i>Grampus griseus</i>	Ggr
long-finned pilot whale	<i>Globicephala melas</i>	Gme
short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Gma
unidentified pilot whale	Genus <i>Globicephala</i>	GLOB
rough-toothed dolphin	<i>Steno bredanensis</i>	Sbr
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Lac
Fraser's dolphin	<i>Lagenodelphis hosei</i>	Lho
common dolphin	<i>Delphinus delphis</i>	Dde
bottlenose dolphin	<i>Tursiops truncatus</i>	Ttr
spotted dolphin	<i>Stenella frontalis</i>	Sfr
striped dolphin	<i>Stenella coeruleoalba</i>	Sco
spinner dolphin	<i>Stenella longirostris</i>	Scl
unidentified <i>Stenella</i>	Genus <i>Stenella</i>	STEN
unidentified delphinid	Family <i>Delphinidae</i>	DELP
unidentified cetacean		CETA
<b>Pinnipeds</b>		
gray seal	<i>Halichoerus grypus</i>	Hgr
harbor seal	<i>Phoca vitulina</i>	Pvi
harp seal	<i>Phoca groenlandica</i>	Pgr
hooded seal	<i>Cystophora cristata</i>	Ccr
unidentified phocid	Family <i>Phocidae</i>	PHOC
<b>Sea Turtles</b>		
loggerhead	<i>Caretta caretta</i>	Cca
leatherback	<i>Dermochelys coriacea</i>	Dco
green	<i>Chelonia mydas</i>	Cmy
Kemp's ridley	<i>Lepidochelys kempii</i>	Lke
hawksbill	<i>Eretmochelys imbricata</i>	Eim
unidentified sea turtle		TURT
<b>Other interesting sightings</b>		
basking shark	<i>Cetorhinus maximus</i>	Cma
manta ray	<i>Manta birostris</i>	Mbi
ocean sunfish	<i>Mola mola</i>	Mmo
spotted eagle-ray	<i>Aetobatus narinari</i>	Ana
Unidentified elasmobranch		CHON
Unidentified marine vertebrate		VERT

Date: \_\_\_\_\_

- UNCW USWTR Aerial Survey -

Sighting # \_\_\_\_\_

### Sighting Data Sheet

#### Initial Sighting on Track

Time: \_\_\_\_\_ WP: \_\_\_\_\_ Sighting Cue: \_\_\_\_\_

Confidence: 1 2 3 4 Vertical Angle: 1 2 3 4 Horizontal Bearing in Degrees: \_\_\_\_\_

Observer: \_\_\_\_\_ Observer Side: L R

Beaufort Sea State: \_\_\_\_\_ Track Line: \_\_\_\_\_

#### Actual Time and Position of Sighting

Time: \_\_\_\_\_ WP #: \_\_\_\_\_

Species: \_\_\_\_\_ Numbers: (Low/ High/ Best): \_\_\_\_/\_\_\_\_/\_\_\_\_

Photographer: \_\_\_\_\_ Frame Numbers: \_\_\_\_\_ to \_\_\_\_\_ Spacer: \_\_\_\_\_

#### Final Time and Position of Sighting

Time: \_\_\_\_\_ WP#: \_\_\_\_\_

Behavior and Additional Comments:

### Complete Cetacean Sighting Summaries.

Compiled here are all sighting summaries for cetaceans seen during the July 2009 - June 2010 USWTR Onslow Bay aerial surveys. Each of the 86 on effort sightings is represented along with nine additional off effort sightings. Seven of the off effort sightings occurred on the off shore end of the range while transiting between tracklines. One sighting, which was on trackline 1, was deemed off effort because it was reported by the pilot. Finally, a summary was included for the right whale sighting made on November 8, 2009. This sighting was made 3.4 miles off the coast of Fort Fisher (*i.e.* far from the USWTR site) and is included here because of its importance to the conservation of the species.

Monday, August 17, 2009 Sighting # 1

**Initial sighting on Track**

Time: 15:27 WP#: 6 Lat: 34.164764 Long: 76.467999  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 15:27 WP#: 7 Lat: 34.160575 Long: 76.468974  
Species: *Stenella frontalis* Numbers (Low/High/Best): 30 / 40 / 35  
Features used in Species ID: Alternating light and dark patterning along body, multiple animals with spots present on sides. Prominent shoulder blaze terminating near dorsal fin.  
Representative images used for Species ID: 9692, 9699, 9702, 9711  
Photographer: Erin Frame numbers: 9683 to 9727 Spacer: 9728  
Calculated distance from Trackline: 0.4744 km

**Final Time and Position of Sighting**

Time: 15:37 WP#: 8 Lat: 34.159285 Long: 76.469067  
Calculated Distance Traveled: 0.1437 km

**Behavior and Additional Comments**

Multiple sub-groups from single animals to groups of 5-6. Lots of distance between all the groups.  
Animals stayed just below the surface for much of the sighting with multiple pairs swimming belly to belly and tactile interactions. Alternating light and dark pattern along the animals body.

Tuesday, August 18, 2009 Sighting # 1

**Initial sighting on Track**

Time: 09:33 WP#: 5 Lat: 33.620025 Long: -76.938710  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: 1 Beaufort Sea State: 1  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 09:37 WP#: 6 Lat: 33.620708 Long: -76.942240  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Robust body appearance, uniform grey coloration along animals sides. Overall robust body appearance and a broad dorsal fin.  
Representative images used for Species ID: 9, 17, 18, 19, and 26  
Photographer: Ryan Frame numbers: 1 to 29 Spacer: 30  
Calculated distance from Trackline: 0.3 km

**Final Time and Position of Sighting**

Time: 09:42 WP#: 7 Lat: 33.624153 Long: -76.944483  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Two individuals traveling at the surface. The animals had regular surfacing. Animals had uniform gray coloration.

Tuesday, August 18, 2009 Sighting # 2

**Initial sighting on Track**

Time: 09:56 WP#: 12 Lat: 33.362290 Long: -76.604256  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 1 Beaufort Sea State: 2  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 09:57 WP#: 13 Lat: 33.358769 Long: -76.610723  
Species: *Grampus griseus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Varied color pattern along lateral surface of animals consistent with scarring. Tall dorsal fin and long pectoral fins. Melon with clear central crease.  
Representative images used for Species ID: 38, 73, 74, 76, and 83  
Photographer: Ryan Frame numbers: 31 to 115 Spacer: 116  
Calculated distance from Trackline: 0.7 km

**Final Time and Position of Sighting**

Time: 10:04 WP#: 14 Lat: 33.360732 Long: -76.614702  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals were traveling slowly just below the surface. Animals were traveling Southwest. They were lighter in color. Showed no avoidance behavior.



Tuesday, August 18, 2009 Sighting # 3

### Initial sighting on Track

Time: 10:14 WP#: 18 Lat: 33.510644 Long: -76.683584  
Vertical Angle: 4 Horizontal Bearing in Degrees: 90 Sighting Cue: splash  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 10:15 WP#: 19 Lat: 33.504820 Long: -76.674391  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 25/40/35  
Features used in Species ID: Robust body with a uniform grey coloration to animals body.  
Shoulder blaze trailing to behind the dorsal fin.  
Representative images used for Species ID: 118, 133, 143, and 144  
Photographer: Ryan Frame numbers: 117 to 154 Spacer: 155  
Calculated distance from Trackline: 1.1 km

### Final Time and Position of Sighting

Time: 10:19 WP#: 20 Lat: 33.503596 Long: -76.681915  
Calculated Distance Traveled: 0.7 km

### Behavior and Additional Comments

Groups ranging from 1 to 9 individuals. Animals were spread out and traveling southwest. Most of the time animals were traveling just below the surface with some doing deeper dives.

Tuesday, August 18, 2009 Sighting # 4

### Initial sighting on Track

Time: 10:58 WP#: 32 Lat: 33.482176 Long: -76.495909  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 3 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 10:59 WP#: 33 Lat: 33.493955 Long: -76.498147  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 30/50/40  
Features used in Species ID: Dark bodied, large dorsal fin a third of the way down the body.  
Blunt head.  
Representative images used for Species ID: 204, 219, 220, 247, 251, and 258  
Photographer: Ryan Frame numbers: 156 to 258 Spacer: 259  
Calculated distance from Trackline: 1.3 km

### Final Time and Position of Sighting

Time: 11:09 WP#: 34 Lat: 33.490847 Long: -76.505077  
Calculated Distance Traveled: 0.7 km

### Behavior and Additional Comments

Three large groups, scattered and logging at the surface. Were not moving in any direction. No avoidance behavior. Calves present.

Tuesday, August 18, 2009 Sighting # 5

**Initial sighting on Track**

Time: 11:19 WP#: 38 Lat: 33.616677 Long: -76.542725  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:22 WP#: 39 Lat: 33.611807 Long: -76.541171  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Uniform grey coloration and shoulder blaze to behind dorsal fin.

Representative images used for Species ID: 260 and 269  
Photographer: Ryan Frame numbers: 260 to 283 Spacer: 284  
Calculated distance from Trackline: 0.6 km

**Final Time and Position of Sighting**

Time: 11:26 WP#: 40 Lat: 33.620225 Long: -76.548453  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Animals traveling slowly to the west, just below the surface. Animals had a light peduncle region.

Tuesday, August 18, 2009 Sighting # 6

**Initial sighting on Track**

Time: 11:39 WP#: 47 Lat: 33.786418 Long: -76.764197  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 1  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:40 WP#: 48 Lat: 33.784330 Long: -76.761268  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Uniform grey coloration, broad pectoral fins. There is a clear crease between the melon and rostrum.

Representative images used for Species ID: 300, 301, and 318  
Photographer: Ryan Frame numbers: 285 to 322 Spacer: 323  
Calculated distance from Trackline: 0.4 km

**Final Time and Position of Sighting**

Time: 11:43 WP#: 49 Lat: 33.777362 Long: -76.759709  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Animals had stocky bodies and large pectorals. Animals were traveling slowly just under the surface.

Tuesday, August 18, 2009 Sighting # 7

**Initial sighting on Track**

Time: 11:48 WP#: 52 Lat: 33.884851 Long: -76.894934  
Vertical Angle: 1 Horizontal Bearing in Degrees: 2 Sighting Cue: Splash  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 1  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:50 WP#: 53 Lat: 33.886683 Long: -76.898185  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Alternating light and dark pattern along the side of animals body.  
Clear white tip to rostrum. Clear light and dark line between dorsal and ventral surface.  
Representative images used for Species ID: 326, 328, 334, and 338  
Photographer: Ryan Frame numbers: 324 to 358 Spacer: 359  
Calculated distance from Trackline: 0.4 km

**Final Time and Position of Sighting**

Time: 11:58 WP#: 54 Lat: 33.891388 Long: -76.891678  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

A first the animals were diving deep then started surface swimming. Animals were traveling north and swimming belly up at times.

Tuesday, August 18, 2009 Sighting # 8

**Initial sighting on Track**

Time: 14:18 WP#: 63 Lat: 33.764864 Long: -76.601318  
Vertical Angle: 3 Horizontal Bearing in Degrees: 60 Sighting Cue: Splash  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 14:21 WP#: 64 Lat: 33.761505 Long: -76.599899  
Species: *Stenella frontalis* Numbers (Low/High/Best): 50/70/65  
Features used in Species ID: clear alternating light and dark coloration along animals body with clear spotting patterns present. White tip to the rostrum.  
Representative images used for Species ID: 363, 373, 380, and 395  
Photographer: Ryan Frame numbers: 360 to 412 Spacer: 413  
Calculated distance from Trackline: 0.4 km

**Final Time and Position of Sighting**

Time: 14:27 WP#: 65 Lat: 33.764612 Long: -76.587170  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Large group of animals, space out. Animals were logging at the surface or just below. They had a leisurely travel moving west. Animals seemed to be playing and showing bellies.

Tuesday, August 18, 2009 Sighting # 9

**Initial sighting on Track**

Time: 15:00 WP#: 74 Lat: 34.066408 Long: -76.874048  
Vertical Angle: 2 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 1  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 15:02 WP#: 45 Lat: 34.070793 Long: -76.872859  
Species: *Stenella frontalis* Numbers (Low/High/Best): 7/15/9  
Features used in Species ID: Alternating light and dark body coloration with clear spotting pattern present. White tip to rostrum.  
Representative images used for Species ID: 455 and 457  
Photographer: Ryan Frame numbers: 414 to 458 Spacer: 459  
Calculated distance from Trackline: 0.5 km

**Final Time and Position of Sighting**

Time: 15:02 WP#: 76 Lat: 34.068945 Long: -76.869925  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Animals were slowly traveling west. Most individuals were logging at the surface while some were deeper diving.

Wednesday, August 19, 2009 Sighting # 1

**Initial sighting on Track**

Time: 10:51 WP#: 19 Lat: 33.802839 Long: -76.92295  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Trackline: 3 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:04 WP#: 20 Lat: 33.811234 Long: -76.916236  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Uniform grey coloration along animals body, robust body.

Representative images used for Species ID: 194, 203, 210, and 211  
Photographer: Erin Frame numbers: 189 to 211 Spacer: 212  
Calculated distance from Trackline: 1.1 km

**Final Time and Position of Sighting**

Time: 11:15 WP#: 21 Lat: 33.810471 Long: -76.902408  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

Initial observation of a single animal traveling across the trackline. Animal was hanging at the surface and surfacing frequently. Another 2 animals traveling slowly, close to one another were seen after circling. Animals showed possible avoidance by spending an increased amount of time below the surface traveling at an increased rate of speed.

Wednesday, August 19, 2009 Sighting # 2

**Initial sighting on Track**

Time: 11:27 WP#: 27 Lat: 33.821176 Long: -77.069429  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:28 WP#: 27 Lat: 33.815988 Long: -77.078934  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/4/4  
Features used in Species ID: Alternating light and dark patterning along animals body with spots present. White tip to the rostrum.

Representative images used for Species ID: 214, 226, 227, and 237  
Photographer: Erin Frame numbers: 213 to 247 Spacer: 248  
Calculated distance from Trackline: 1.1 km

**Final Time and Position of Sighting**

Time: 11:41 WP#: 28 Lat: 33.824734 Long: -77.070231  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

Animals in a disperse group hanging at the surface.

Wednesday, August 19, 2009 Sighting # 3

**Initial sighting on Track**

Time: 11:59 WP#: 30 Lat: 33.447656 Long: -76.593333  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:00 WP#: 32 Lat: 33.449196 Long: -76.601237  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: Uniform grey body coloration with a shoulder blaze ending behind dorsal fin. White caudal peduncle patch.  
Representative images used for Species ID: 255, 257, 265, and 294  
Photographer: Erin Frame numbers: 249 to 301 Spacer: 302  
Calculated distance from Trackline: 0.8 km

**Final Time and Position of Sighting**

Time: 12:11 WP#: 33 Lat: 33.445177 Long: -76.604646  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Initially six animals seen traveling in a horizontal line. All animals stayed densely packed throughout the sighting. Additional animals joined group during our observations. All animals with robust body and uniform grey coloration except for lighter grey peduncle region.

Wednesday, August 19, 2009 Sighting # 4

**Initial sighting on Track**

Time: 12:15 WP#: 33 Lat: 33.385048 Long: -76.542506  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: between 1 & 2 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:20 WP#: 37 Lat: 33.385048 Long: -76.537104  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Black body coloration, large blunt head, dorsal fin placed ~1/3 of way down animals body.  
Representative images used for Species ID: 304, 309, 312, 314, and 326  
Photographer: Erin Frame numbers: 303 to 328 Spacer: 329  
Calculated distance from Trackline: 0.5 km

**Final Time and Position of Sighting**

Time: 12:26 WP#: 38 Lat: 33.389091 Long: -76.518081  
Calculated Distance Traveled: 1.8 km

**Behavior and Additional Comments**

Slow travel to the entire group with animals surfacing frequently. Both adults and calves were observed

Saturday, September 12, 2009 Sighting # 1

### Initial sighting on Track

Time: 8:59 WP#: 6 Lat: 33.484843 Long: -76.769353  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Trackline: 1 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 9:08 WP#: 7 Lat: 33.494854 Long: -76.785000  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Animals coloration had traits of Tursiops or young *Stenella frontalis* because of limited photos due to animals evasive behavior sighting is listed as Unidentified  
Representative images used for Species ID: 331, 333  
Photographer: Ryan Frame numbers: 330 to 336 Spacer: 337  
Calculated distance from Trackline: 1.829 km

### Final Time and Position of Sighting

Time: 9:19 WP#: 8 Lat: 33.493120 Long: -76.792201  
Calculated Distance Traveled: 0.695 km

### Behavior and Additional Comments

Swimming close together, traveling at a fast pace just below the surface, heading NW. Difficult to photograph. May be showing signs of avoidance.

Saturday, September 12, 2009 Sighting # 2

### Initial sighting on Track

Time: 9:49 WP#: 15 Lat: 33.817175 Long: -77.065780  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 9:51 WP#: 16 Lat: 33.811053 Long: -77.063150  
Species: *Stenella frontalis* Numbers (Low/High/Best): 7/7/7  
Features used in Species ID: Alternating light and dark pattern down the body.  
Representative images used for Species ID: 338, 370 - 372  
Photographer: Ryan Frame numbers: 338 to 409 Spacer: 410  
Calculated distance from Trackline: 0.7228 km

### Final Time and Position of Sighting

Time: 9:59 WP#: 17 Lat: 33.815577 Long: -77.065084  
Calculated Distance Traveled: 0.5338

### Behavior and Additional Comments

Moving slowly on the surface or just below. Animals were traveling in a NE direction. Three animals were swimming close together and one calf was present in the group.



Saturday, September 12, 2009 Sighting # 3

### Initial sighting on Track

Time: 10:49 WP#: 29 Lat: 33.936691 Long: -76.961680  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 2  
Observer: Ryan Observer side: Right

### Actual Time and Position of Sighting

Time: 10:50 WP#: 30 Lat: 33.943367 Long: -76.958318  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/14/12  
Features used in Species ID: Alternating light and dark pattern down the body. Rostrum has white tip.

Representative images used for Species ID: 430, 442  
Photographer: Ryan Frame numbers: 411 to 473 Spacer: 474  
Calculated distance from Trackline: 0.8045 km

### Final Time and Position of Sighting

Time: 10:55 WP#: 31 Lat: 33.941145 Long: -76.956955  
Calculated Distance Traveled: 0.2772 km

### Behavior and Additional Comments

Animals displayed avoidance behavior. As soon as we got over them, they all scattered and dove deep. They surface in a tight group not heading any particular direction.

Saturday, September 12, 2009 Sighting # 4

### Initial sighting on Track

Time: 11:28 WP#: 38 Lat: 33.684126 Long: -76.359407  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 11:29 WP#: 39 Lat: 33.681102 Long: -76.350511  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Robust animal, grey color throughout, with a light colored peduncle

Representative images used for Species ID: 476, 487, 497, 501  
Photographer: Ryan Frame numbers: 475 to 506 Spacer: 507  
Calculated distance from Trackline: 0.8892 km

### Final Time and Position of Sighting

Time: 11:31 WP#: 40 Lat: 33.678555 Long: -76.355844  
Calculated Distance Traveled: 0.569 km

### Behavior and Additional Comments

Traveling at the surface or just below. Jumping out of the water occasionally. No avoidance behavior was noticed.

Saturday, September 12, 2009 Sighting # 5

**Initial sighting on Track**

Time: 11:34 WP#: 42 Lat: 33.716202 Long: -76.411922  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:36 WP#: 43 Lat: 33.705709 Long: -76.415980  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Robust animals, grey color throughout with a light colored peduncle

Representative images used for Species ID: 521, 531  
Photographer: Ryan Frame numbers: 508 to 543 Spacer: 544  
Calculated distance from Trackline: 1.226 km

**Final Time and Position of Sighting**

Time: 11:40 WP#: 44 Lat: 33.700694 Long: -76.417541  
Calculated Distance Traveled: 0.576 km

**Behavior and Additional Comments**

Logging at the surface and splashing. Spread out and moving SW at a medium pace.

Saturday, September 12, 2009 Sighting # 6

**Initial sighting on Track**

Time: 14:05 WP#: 56 Lat: 34.166207 Long: -76.471789  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 14:08 WP#: 57 Lat: 34.173510 Long: -76.478967  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/14/14  
Features used in Species ID: Alternating light and dark pattern down the body. White tip on rostrum.

Representative images used for Species ID: 587, 593, 597, 605, 617, 629  
Photographer: Ryan Frame numbers: 545 - 583 and 585 - 634 Spacer: 584 to 635  
Calculated distance from Trackline: 1.047 km

**Final Time and Position of Sighting**

Time: 14:14 WP#: 58 Lat: 34.172885 Long: -76.472194  
Calculated Distance Traveled: 0.627 km

**Behavior and Additional Comments**

Logging at the surface not moving any given direction, mostly spread out. There were two groups one with 6 animals and one with 8 animals.

Saturday, September 12, 2009 Sighting # 7

**Initial sighting on Track**

Time: 15:01 WP#: 59 Lat: 34.154594 Long: -76.720716  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:03 WP#: 70 Lat: 34.164627 Long: -76.722763  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Alternating light and dark pattern down the body. White tip to the rostrum  
Representative images used for Species ID: 636, 637, 641, 644, 645  
Photographer: Ryan Frame numbers: 636 to 660 Spacer: 661  
Calculated distance from Trackline: 1.131 km

**Final Time and Position of Sighting**

Time: 15:09 WP#: 71 Lat: 34.155826 Long: -76.723110  
Calculated Distance Traveled: 0.9791 km

**Behavior and Additional Comments**

All animals were swimming close together, traveling slowly to the West. Some animals were doing some deeper dives. One calf was present.

Saturday, September 12, 2009 Sighting # 8

**Initial sighting on Track**

Time: 15:12 WP#: 74 Lat: 34.105455 Long: -76.649559  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:14 WP#: 75 Lat: 34.110018 Long: -76.648676  
Species: *Stenella frontalis* Numbers (Low/High/Best): 1/4/4  
Features used in Species ID: Alternating light and dark pattern down the body. White tip on the rostrum  
Representative images used for Species ID: 669, 685, 686  
Photographer: Ryan Frame numbers: 662 to 690 Spacer: 691  
Calculated distance from Trackline: 5.139 km

**Final Time and Position of Sighting**

Time: 15:19 WP#: 76 Lat: 34.107573 Long: -76.649798  
Calculated Distance Traveled: 0.2908 km

**Behavior and Additional Comments**

Some were logging at the surface with some doing deeper dives. Animals were spaced out and slowly moving in a NE direction.

Saturday, September 12, 2009 Sighting # 9

**Initial sighting on Track**

Time: 15:34 WP#: 79 Lat: 33.783156 Long: -76.227563  
Vertical Angle: 3 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:35 WP#: 80 Lat: 33.788579 Long: -76.219790  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15/19/19  
Features used in Species ID: Robust animal with uniform grey color throughout. Light color on peduncle  
Representative images used for Species ID: 716, 717, 722, 730, 733, 736, 741, 754  
Photographer: Ryan Frame numbers: 692 to 765 Spacer: 766  
Calculated distance from Trackline: 0.9379 km

**Final Time and Position of Sighting**

Time: 15:38 WP#: 81 Lat: 33.788291 Long: -76.223547  
Calculated Distance Traveled: 0.3487 km

**Behavior and Additional Comments**

Animals were surface swimming and traveling slowly towards the SW. They were grouped pretty close together with 5 calves present.

Wednesday, September 30, 2009 Sighting # 1

**Initial sighting on Track**

Time: 14:07 WP#: 23 Lat: 33.880462 Long: -76.231674  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 9 Beaufort Sea State: 3  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 14:11 WP#: 24 Lat: 33.880390 Long: -76.242362  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 40/45/43  
Features used in Species ID: Large robust animals, uniform grey color throughout.

Representative images used for Species ID: 1466, 1472, 1475, 1495, 1506  
Photographer: Erin Frame numbers: 1455-1509 Spacer: 1510  
Calculated distance from Trackline: 0.9867 km

**Final Time and Position of Sighting**

Time: 14:26 WP#: 25 Lat: 33.875912 Long: -76.250629  
Calculated Distance Traveled: 0.9113 km

**Behavior and Additional Comments**

Initial sighting of 5 animals, upon resight large group of 30+ animals with slow travel near the surface.  
A few tight bunches of animals but most with a fair amount of space between them. Some calves present. Some doing tail slaps. Some spending time on deeper dives out of sight.

Thursday, October 1, 2009 Sighting # 1

**Initial sighting on Track**

Time: 8:41 WP#: 5 Lat: 33.736759 Long: -76.566984  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 8:42 WP#: 6 Lat: 33.739176 Long: -76.572540  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/4/4  
Features used in Species ID: Robust animal with uniform grey color throughout. Light color on peduncles  
Representative images used for Species ID: 1512, 1523, 1535, 1536, 1540  
Photographer: Erin Frame numbers: 1511 to 1543 Spacer: 1544  
Calculated distance from Trackline: 0.5798 km

**Final Time and Position of Sighting**

Time: 8:53 WP#: 7 Lat: 33.741642 Long: -76.598047  
Calculated Distance Traveled: 2.374 km

**Behavior and Additional Comments**

Two animals traveling close together at a good rate of speed, just below the surface and creating large splashes when they surface. Frequent surfacing. After circling two other animal appeared far from pair. Other pair began to spread out. One calf present.

Thursday, October 1, 2009 Sighting # 2

**Initial sighting on Track**

Time: 8:54 WP#: 9 Lat: 33.724178 Long: -76.553179  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Splash  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 8:56 WP#: 10 Lat: 33.724444 Long: -76.555044  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/9/8  
Features used in Species ID: Robust animals with uniform grey color throughout, light color peduncle  
Representative images used for Species ID: 1545, 1562, 1572, 1580  
Photographer: Erin Frame numbers: 1545 to 1586 Spacer: 1587  
Calculated distance from Trackline: 0.175 km

**Final Time and Position of Sighting**

Time: 9:03 WP#: 11 Lat: 33.725550 Long: -76.556218  
Calculated Distance Traveled: 0.1641 km

**Behavior and Additional Comments**

Group of 8 animals milling at surface causing some disturbance. Some diving and showing bellies and then surfacing again. Horizontal line of slow moving animals then bunching.

Thursday, October 1, 2009 Sighting # 3

**Initial sighting on Track**

Time: 9:44 WP#: 22 Lat: 34.081511 Long: -76.760356  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 3  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 9:45 WP#: 23 Lat: 34.076573 Long: -76.766611  
Species: *Stenella frontalis* Numbers (Low/High/Best): 16/22/20  
Features used in Species ID: Animals alternating color patter light and dark down body. White tip on rostrum  
Representative images used for Species ID: 1626, 1628, 1634, 1637  
Photographer: Erin Frame numbers: 1588 to 1665 Spacer: 1666  
Calculated distance from Trackline: 0.7958 km

**Final Time and Position of Sighting**

Time: 9:45 WP#: 24 Lat: 34.076655 Long: -76.763090  
Calculated Distance Traveled: 0.3244 km

**Behavior and Additional Comments**

Group swimming in pairs at a moderate pace just below the surface. "Easy" regular surfacing. Calfs present.

Thursday, October 1, 2009 Sighting # 4

**Initial sighting on Track**

Time: 10:12 WP#: 33 Lat: 33.824397 Long: -76.415549  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State:  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 10:14 WP#: 34 Lat: 33.827829 Long: -76.418514  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15/15/15  
Features used in Species ID: Robust animals with uniform grey color throughout. Light color on peduncle.  
Representative images used for Species ID: 1670, 1674, 1687, 1694, 1695, 1697, 1708  
Photographer: Erin Frame numbers: 1667 to 1728 Spacer: 1729  
Calculated distance from Trackline: 0.4697 km

**Final Time and Position of Sighting**

Time: 10:18 WP#: 35 Lat: 33.822314 Long: -76.423457  
Calculated Distance Traveled: 0.7646 km

**Behavior and Additional Comments**

Well spaced group some in bunches and others as singles. Slow travel close to surface, surfacing regularly. Calves present. Did deeper dive as a group while circling.



Thursday, October 1, 2009 Sighting # 5

**Initial sighting on Track**

Time: 10:23 WP#: 37 Lat: 33.745514 Long: -76.311765  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 10:24 WP#: 38 Lat: 33.740108 Long: -76.312358  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Robust animals with uniform grey color throughout. Light color on peduncle.  
Representative images used for Species ID: 1738, 1746  
Photographer: Erin Frame numbers: 1730 to 1759 Spacer: 1760  
Calculated distance from Trackline: 0.6036 km

**Final Time and Position of Sighting**

Time: 10:32 WP#: 39 Lat: 33.747684 Long: -76.310261  
Calculated Distance Traveled: 0.8644 km

**Behavior and Additional Comments**

Well spaced groups with a calf present.

Thursday, October 1, 2009 Sighting # 6

**Initial sighting on Track**

Time: 11:00 WP#: 49 Lat: 33.974367 Long: -76.476265  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 50 Lat: 33.972348 Long: -76.473672  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Large robust animals with uniform grey color throughout, light color on peduncle.  
Representative images used for Species ID: 1777, 1783, 1792, 1796  
Photographer: Erin Frame numbers: 1775 to 1806 Spacer: 1807  
Calculated distance from Trackline: 0.328 km

**Final Time and Position of Sighting**

Time: 11:05 WP#: 51 Lat: 33.968423 Long: -76.476450  
Calculated Distance Traveled: 0.5061 km

**Behavior and Additional Comments**

Single pair with slow travel. Regular surfacing.

Thursday, October 1, 2009 Sighting # 7

**Initial sighting on Track**

Time: 11:09 WP#: 53 Lat: 34.040443 Long: -76.566163  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:11 WP#: 54 Lat: 34.042681 Long: -76.555923  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Animals with alternating light and dark patterns down body. White tip on rostrum.  
Representative images used for Species ID: 1813, 1827, 1833, 1835  
Photographer: Erin Frame numbers: 1808 to 1843 Spacer: 1844  
Calculated distance from Trackline: 0.9758 km

**Final Time and Position of Sighting**

Time: 11:22 WP#: 55 Lat: 34.043148 Long: -76.569154  
Calculated Distance Traveled: 1.22 km

**Behavior and Additional Comments**

Animals swimming in close pairs or as a group, splashes at the surface with moderate rate of travel.  
Not a cooperative group. A couple of animals joined while on sighting.

Thursday, October 1, 2009 Sighting # 8

**Initial sighting on Track**

Time: 11:28 WP#: 57 Lat: 34.145184 Long: -76.700832  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:29 WP#: 58 Lat: 34.150825 Long: -76.699600  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/10/9  
Features used in Species ID: Alternating light and dark pattern down body. White tip on rostrum  
Representative images used for Species ID: 1845, 1866, 1868, 1871, 1890, 1892  
Photographer: Erin Frame numbers: 1845 to 1922 Spacer: 1923  
Calculated distance from Trackline: 0.6374 km

**Final Time and Position of Sighting**

Time: 11:37 WP#: 59 Lat: 34.149839 Long: -76.697322  
Calculated Distance Traveled: 0.2366 km

**Behavior and Additional Comments**

Animals traveling at moderate pace. Two groups, lots of activity below the surface, bellies and bodies in a bunch. Milling behavior, tightly packed. Spending periods of time at surface followed by subsurface group.

Thursday, October 1, 2009 Sighting # 9

**Initial sighting on Track**

Time: 12:27 WP#: 72 Lat: 34.212643 Long: -76.533652  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:29 WP#: 73 Lat: 34.209822 Long: -76.525553  
Species: *Stenella frontalis* Numbers (Low/High/Best): 25/30/27  
Features used in Species ID: Alternating light and dark pattern down the body with white tip on rostrum  
Representative images used for Species ID: 1944, 1994, 1997, 2001, 2005, 2006, 2001  
Photographer: Frame numbers: 1924 to 2053 Spacer: 2054  
Calculated distance from Trackline: 0.8081 km

**Final Time and Position of Sighting**

Time: 12:38 WP#: 74 Lat: 34.213151 Long: -76.526828  
Calculated Distance Traveled: 0.3883 km

**Behavior and Additional Comments**

Slow travel and milling at the surface. Lots of underwater belly showing and animals piling up on one another. Central group with some outliers. Lots of splashing at the surface as animals rush one another. Three groups with at least 4 in each, heading towards main group after circling for a bit. Lots of big fish in group.

Thursday, October 1, 2009 Sighting # 10

**Initial sighting on Track**

Time: 14:23 WP#: 82 Lat: 33.765509 Long: -77.131241  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Trackline: 1 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 14:29 WP#: 83 Lat: 33.765256 Long: -77.127123  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/4/4  
Features used in Species ID: Alternating light and dark pattern down the body with a white tip on rostrum  
Representative images used for Species ID: 2080, 2091, 2098, 2102  
Photographer: Erin Frame numbers: 2055 to 2108 Spacer: 2109  
Calculated distance from Trackline: 0.3817 km

**Final Time and Position of Sighting**

Time: 14:39 WP#: 84 Lat: 33.775061 Long: -77.135756  
Calculated Distance Traveled: 1.351 km

**Behavior and Additional Comments**

Animals moving at a moderate pace, surfacing and diving frequently. Dense group, one swimming belly up, lots of circling. Bunch of fish behind dolphins.

Thursday, October 1, 2009 Sighting # 11

**Initial sighting on Track**

Time: 15:41 WP#: 96 Lat: 33.605614 Long: -76.660022  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 3 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 15:42 WP#: 97 Lat: 33.596687 Long: -76.664434  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 19/19/19  
Features used in Species ID: Large robust animals, uniform grey color throughout, with light color on peduncle  
Representative images used for Species ID: 2116, 2120, 2136  
Photographer: Erin Frame numbers: 2110 to 2136 Spacer: 2137  
Calculated distance from Trackline: 1.073 km

**Final Time and Position of Sighting**

Time: 15:50 WP#: 98 Lat: 33.601462 Long: -76.650871  
Calculated Distance Traveled: 1.364 km

**Behavior and Additional Comments**

Wide spread group, slow travel with lots of splashing at the surface. Calves present. Deep dives sometime.

Friday, October 2, 2009 Sighting # 1

### Initial sighting on Track

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: 3-4 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 9:50 WP#: 16 Lat: 33.475239 Long: -76.447250  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/15/11  
Features used in Species ID: Large robust animals with uniform grey color throughout. Light color on peduncle.

Representative images used for Species ID: 2143, 2145, 2159, 2186, 2189, 2198, 2201, 2206-07  
Photographer: Ryan Frame numbers: 2123 to 2223 Spacer: N/A  
Calculated distance from Trackline: N/A

### Final Time and Position of Sighting

Time: 9:57 WP#: 16 Lat: 33.477259 Long: -76.438536  
Calculated Distance Traveled: 0.8388 km

### Behavior and Additional Comments

Traveling just below the surface, staying in a fairly tight group. Calves present. Group traveling SE, moving at a fast pace. Some swimming belly up just below surface. No avoidance behavior shown.

Friday, October 2, 2009 Sighting # 2

### Initial sighting on Track

Time: 9:58 WP#: 17 Lat: 33.503239 Long: -76.393519  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: 3-4 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 10:01 WP#: 18 Lat: 33.504595 Long: -76.392273  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/9/8  
Features used in Species ID: Large robust animals with uniform grey color throughout, with light color on peduncle.

Representative images used for Species ID: 2231  
Photographer: Ryan Frame numbers: 2224 to 2238 Spacer: N/A  
Calculated distance from Trackline: 0.19 km

### Final Time and Position of Sighting

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

### Behavior and Additional Comments

Animal traveling spread out, could have been a subgroup seen in the distance after circling. Animals not seen again for a final sighting and waypoint.

Friday, October 2, 2009 Sighting # 3

**Initial sighting on Track**

Time: 10:06 WP#: 20 Lat: 33.532137 Long: -76.424493  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 3  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 10:07 WP#: 21 Lat: 33.535099 Long: -76.421927  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/20/15  
Features used in Species ID: Large robust animals, uniform grey color throughout with light color on peduncle.  
Representative images used for Species ID: 2244, 2261, 2262, 2267, 2273, 2291  
Photographer: Ryan Frame numbers: 2239 to 2295 Spacer: 2296  
Calculated distance from Trackline: 0.4063 km

**Final Time and Position of Sighting**

Time: 10:11 WP#: 22 Lat: 33.537519 Long: -76.426343  
Calculated Distance Traveled: 0.4898 km

**Behavior and Additional Comments**

Some deeper diving animals while others are on the surface. Swimming spaced out and traveling west, some pairing, calves present.

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Wednesday, October 21, 2009 Sighting # 1

### Initial sighting on Track

Time: 11:05 WP#: 17 Lat: 33.82021 Long: -75.991577  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: Transit effort Beaufort Sea State: 3  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 11:08 WP#: 18 Lat: 33.823938 Long: -75.995138  
Species: *Physeter macrocephalus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Large animal with a grey color. Blunt head with a large forward blow

Representative images used for Species ID: NA  
Photographer: Erin Frame numbers: NA Spacer: NA  
Calculated distance from Trackline: 0.5292 km

### Final Time and Position of Sighting

Time: NA WP#: NA Lat: NA Long: NA  
Calculated Distance Traveled: NA

### Behavior and Additional Comments

Large light grey animal was seen logging at the surface, animal had large blunt head. As we were turning to circle, the animal gave a very large blow in the forward direction just before it started to head down. Animal was seen starting its dive. By the time the plane got over the initial sighting area the animal was no longer there. Animal was seen facing the NW.

Wednesday, October 21, 2009 Sighting # 2

### Initial sighting on Track

Time: 11:05 WP#: 17 Lat: 33.82021 Long: -75.991577  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: Transit effort Beaufort Sea State: 3  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 11:08 WP#: 18 Lat: 33.823938 Long: -75.995138  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 10\12\12  
Features used in Species ID: Large dark bodied animals with light suspenders and post dorsal fin region. Large blunt head and wide based dorsal fin. Pronounced curve to pectoral fins.

Representative images used for Species ID: 2304, 2316, 2334, 2354, 2362, 2365, and 2378  
Photographer: Erin Frame numbers: 2297 to 2387 Spacer: 2388  
Calculated distance from Trackline: 0.5 km

### Final Time and Position of Sighting

Time: 11:23 WP#: 19 Lat: 33.822067 Long: -75.993267  
Calculated Distance Traveled: 0.3 km

### Behavior and Additional Comments

Animals were widely dispersed traveling singularly or in pairs with ~40m distance between each other. All animals moving at a slow rate of speed and hanging near the surface. Between 2 and 3 calves present swimming with larger animal.



Wednesday, October 21, 2009 Sighting # 3

**Initial sighting on Track**

Time: 11:31 WP#: 21 Lat: 33.936485 Long: -76.178056  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 3  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:32 WP#: 22 Lat: 33.932099 Long: -76.176954  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/7/6  
Features used in Species ID: Robust body appearance, uniform grey in coloration with white patch on peduncle.  
Representative images used for Species ID: 2401 and 2406  
Photographer: Erin Frame numbers: 2389 to 2413 Spacer: 2414  
Calculated distance from Trackline: 0.5 km

**Final Time and Position of Sighting**

Time: 11:41 WP#: 23 Lat: 33.930748 Long: -76.170652  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Animals appear large with a uniform grey coloration except for white peduncle patch. Group was well dispersed and left abruptly during sighting.

Wednesday, October 21, 2009 Sighting # 4

**Initial sighting on Track**

Time: 12:27 WP#: 37 Lat: 33.747052 Long: -76.190284  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 3  
Observer: On Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:37 WP#: 38 Lat: 33.756576 Long: -76.181401  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Uniform grey coloration with shoulder blaze to behind dorsal fin. Blunt rostrum with clear crease at insertion to melon.  
Representative images used for Species ID: 2423, 2424, 2439, and 2459  
Photographer: Erin Frame numbers: 2415 to 2469 Spacer: 2470  
Calculated distance from Trackline: 1.3 km

**Final Time and Position of Sighting**

Time: NA WP#: NA Lat: NA Long: NA  
Calculated Distance Traveled: NA

**Behavior and Additional Comments**

Two animals initially encountered chasing each other close to the surface. Lots of crossing over one another, swimming on their sides or belly up. Some slow travel as a pair between periods of "play".

Wednesday, October 21, 2009 Sighting # 5

**Initial sighting on Track**

Time: 12:41 WP#: 40 Lat: 33.822768 Long: -76.286738  
Vertical Angle: 4 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 12:43 WP#: 41 Lat: 33.829105 Long: -76.279533  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 35/40/40  
Features used in Species ID: Uniform grey coloration with shoulder blaze trailing to behind dorsal fin. Robust body appearance and flukes.  
Representative images used for Species ID: 2475, 2478, 2484, and 2515  
Photographer: Erin Frame numbers: 2471 to 2515 Spacer: 2516  
Calculated distance from Trackline: 1.0 km

**Final Time and Position of Sighting**

Time: 12:48 WP#: 42 Lat: 33.828935 Long: -76.276133  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Multiple sub groups of 5-6 animals surrounding main group of 30+ animals. Main group traveling slowly while subgroups moving at higher speed, moving away from and rejoining main group. Entire group would dive below the surface where flashes of bellies or sides could still be seen as the animals interacted.

Wednesday, October 21, 2009 Sighting # 6

**Initial sighting on Track**

Time: 13:00 WP#: 46 Lat: 34.080022 Long: -76.624487  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 13:02 WP#: 47 Lat: 34.079645 Long: -76.624388  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Alternating light and dark coloration on dorsal surface. Shoulder blaze to level of dorsal fin with dark lateral blaze behind dorsal fin.  
Representative images used for Species ID: 2546, 2554, and 2521  
Photographer: Erin Frame numbers: 2517 to 2560 Spacer: 2561  
Calculated distance from Trackline: 0.1 km

**Final Time and Position of Sighting**

Time: 13:06 WP#: 48 Lat: 34.083673 Long: -76.626463  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Animals traveling in a fairly close group at a slow rate of speed just below the surface.

Wednesday, October 21, 2009 Sighting # 7

### Initial sighting on Track

Time: 13:33 WP#: 57 Lat: 33.726041 Long: -76.287453  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 3  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 13:47 WP#: 58 Lat: 33.720393 Long: -76.290826  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/15/12  
Features used in Species ID: Uniform grey coloration with lighter grey peduncle patch.  
Robust body of uniform grey coloration.  
Representative images used for Species ID: 2576, 2577, 2583, and 2591  
Photographer: Erin Frame numbers: 2562 to 2618 Spacer: 2619  
Calculated distance from Trackline: 0.7 km

### Final Time and Position of Sighting

Time: NA WP#: NA Lat: NA Long: NA  
Calculated Distance Traveled: NA

### Behavior and Additional Comments

Initial sighting of 10 to 15 animals traveling slowly at the surface in pairs or as single animals. After circling only a smaller group of 4 animals was seen. All animals with uniform grey coloration to their bodies.

Sunday, November 8, 2009 Sighting # 1

### Initial sighting on Track

Time: 3:40 WP#: 9 Lat: 33.394250 Long: -76.652008  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 1 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 13:51 WP#: 10 Lat: 33.407155 Long: -76.643227  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 30/45/38  
Features used in Species ID: Robust animals, uniform grey except white peduncle

Representative images used for Species ID: 2955, 2959, 2972, 2981, 2982, 2985, 2986, 3006  
Photographer: Ryan Frame numbers: 2941-3030 Spacer: 3031  
Calculated distance from Trackline: 1.65 km

### Final Time and Position of Sighting

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

### Behavior and Additional Comments

Animals had a noticeably white peduncle. Animals were spread out, jumping, zig zagging and showing bellies. Animals had regular surfacing and lots of splashing, traveling SE, several sub-groups. Animals were not seen to get a final time and position. No calves present.

Sunday, November 8, 2009 Sighting # 2

### Initial sighting on Track

Time: 14:52 WP#: 31 Lat: 33.626162 Long: -76.551936  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 14:55 WP#: 32 Lat: 33.623729 Long: -76.540808  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Robust animals with uniform grey color except for white peduncle

Representative images used for Species ID: 3045, 3051, 3058, 3059, 3061, 3062, 3070, 3076  
Photographer: Ryan Frame numbers: 3032-3080 Spacer: 3081  
Calculated distance from Trackline: 1.056 km

### Final Time and Position of Sighting

Time: 15:06 WP#: 33 Lat: 33.626228 Long: -76.531504  
Calculated Distance Traveled: 0.9052 km

### Behavior and Additional Comments

Animals were seen jumping, darting and circling each other. They were not moving in any given direction. May have shown avoidance behavior. Swimming in pairs. No calves present.

Sunday, November 8, 2009 Sighting # 3

**Initial sighting on Track**

Time:  WP#:  Lat:  Long:   
Vertical Angle:  Horizontal Bearing in Degrees:  Sighting Cue:   
On/Off Effort:  Trackline:  Beaufort Sea State:   
Observer:  Observer side:

**Actual Time and Position of Sighting**

Time:  WP#:  Lat:  Long:   
Species: *Eubalaena glacialis* Numbers (Low/High/Best):   
Features used in Species ID:

Representative images used for Species ID:   
Photographer:  Frame numbers:  Spacer:   
Calculated distance from Trackline:

**Final Time and Position of Sighting**

Time:  WP#:  Lat:  Long:   
Calculated Distance Traveled:

**Behavior and Additional Comments**

Thursday, December 17, 2009 Sighting # 1

### Initial sighting on Track

Time: 10:49 WP#: 17 Lat: 33.868083 Long: -76.343578  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 4  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 10:56 WP#: 18 Lat: 33.862939 Long: -76.343101  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 2 / 2 / 2  
Features used in Species ID: Animals ~7-8 ft long grey coloration, pronounced rostrum and dorsal fin. Surfacing regularly to breath.  
Representative images used for Species ID: N/A  
Photographer: Erin Frame numbers: N/A Spacer: N/A  
Calculated distance from Trackline: 0.5737 km

### Final Time and Position of Sighting

Time: 10:57 WP#: 19 Lat: 33.865992 Long: -76.346368  
Calculated Distance Traveled: 0.4541 km

### Behavior and Additional Comments

A pair of animals were sighted directly under the plane. Attempts to relocate the animals were impeded by a high sea state and after ~10min with no sign of the animals.

Thursday, December 17, 2009 Sighting # 2

### Initial sighting on Track

Time: 11:54 WP#: 27 Lat: 34.137144 Long: -76.435874  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 4  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 11:56 WP#: 28 Lat: 34.135101 Long: -76.433447  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 10 / 15 / 15  
Features used in Species ID: Animals traveling close together with lots of tactile interactions and showing of bellies and sides. No dedicated direction of travel.  
Representative images used for Species ID: N/A  
Photographer: Erin Frame numbers: N/A Spacer: N/A  
Calculated distance from Trackline: 0.3186 km

### Final Time and Position of Sighting

Time: 12:10 WP#: 29 Lat: 34.140698 Long: -76.435275  
Calculated Distance Traveled: 0.6447 km

### Behavior and Additional Comments

Animals very active at the surface interacting with one another. Due to the high sea states the animals were relocated once but we were unable to collect photographs of them.

Thursday, January 14, 2010 Sighting # 1

### Initial sighting on Track

Time: 10:32 WP#: 14 Lat: 33.678573 Long: -76.362084  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 10:34 WP#: 15 Lat: 33.668686 Long: -76.355825  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Robust animals, uniform grey color throughout except for a white peduncle  
Representative images used for Species ID: 3094, 3095, 3097  
Photographer: Ryan Frame numbers: 3082 to 3132 Spacer: 3133  
Calculated distance from Trackline: 1.243 km

### Final Time and Position of Sighting

Time: 10:39 WP#: 16 Lat: 33.669678 Long: -76.357610  
Calculated Distance Traveled: 0.1986 km

### Behavior and Additional Comments

White peduncles, animals hanging just below surface. Regular surfacing, not traveling fast, just hanging out. Animals staying close together.

Thursday, January 14, 2010 Sighting # 2

### Initial sighting on Track

Time: 10:43 WP#: 19 Lat: 33.748319 Long: -76.455140  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Splash  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 10:44 WP#: 20 Lat: 33.740090 Long: -76.452193  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: Large, robust animals with uniform grey color, throughout except for white peduncles  
Representative images used for Species ID: 3142, 3143, 3144, 3170  
Photographer: Ryan Frame numbers: 3133 to 3196 Spacer: 3197  
Calculated distance from Trackline: 0.9547 km

### Final Time and Position of Sighting

Time: 10:57 WP#: 21 Lat: 33.750234 Long: -76.464898  
Calculated Distance Traveled: 1.629 km

### Behavior and Additional Comments

White peduncles, animals darting in different directions. First sighted spaced out and then they came together and then they spaced out again. Regular surfacing, doing deeper dives. Showing some avoidance behavior. Animals were doing some jumping and moving very fast.



Thursday, January 14, 2010 Sighting # 3

### Initial sighting on Track

Time: 11:31 WP#: 38 Lat: 33.806697 Long: -76.392061  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 11:33 WP#: 39 Lat: 33.805552 Long: -76.393617  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Large robust animals with uniform grey color throughout except for white peduncles  
Representative images used for Species ID: 3237, 3238, 3239, 3275, 3277  
Photographer: Ryan Frame numbers: 3198 to 3280 Spacer: 3281  
Calculated distance from Trackline: 0.1920 km

### Final Time and Position of Sighting

Time: 11:39 WP#: 40 Lat: 33.812085 Long: -76.388968  
Calculated Distance Traveled: 0.8439 km

### Behavior and Additional Comments

Animals were spread out with regular surfacing. Some animals were jumping and they were traveling in different directions, moving just below the surface then doing some deeper dives. Animals had white peduncles

Thursday, January 14, 2010 Sighting # 4

### Initial sighting on Track

Time: 11:50 WP#: 44 Lat: 33.744101 Long: -76.184952  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Ryan Observer side: Right

### Actual Time and Position of Sighting

Time: 11:51 WP#: 45 Lat: 33.746017 Long: -76.176662  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 9/18/15  
Features used in Species ID: Large robust animals with uniform grey color throughout except for white peduncles  
Representative images used for Species ID: 3305, 3328, 3329, 3330, 3376, 3378, 3379  
Photographer: Ryan Frame numbers: 3282 to 3381 Spacer: 3382  
Calculated distance from Trackline: 0.7956 km

### Final Time and Position of Sighting

Time: 12:00 WP#: 46 Lat: 33.743483 Long: -76.188124  
Calculated Distance Traveled: 1.097 km

### Behavior and Additional Comments

Some animals swimming in pairs, swimming just below the surface, regular surfacing and not traveling very fast. Some animals jumping, traveling in two groups. Animals had white peduncles.

Thursday, January 14, 2010 Sighting # 5

**Initial sighting on Track**

Time: 12:28 WP#: 65 Lat: 33.831365 Long: -76.040427  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 13:01 WP#: 66 Lat: 33.829063 Long: -76.035037  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Large robust animal with uniform grey color throughout except for white peduncle  
Representative images used for Species ID: 3477, 3478, 3481  
Photographer: Ryan Frame numbers: 3451 to Spacer: 3483  
Calculated distance from Trackline: 0.5598 km

**Final Time and Position of Sighting**

Time: 13:03 WP#: 67 Lat: 33.822784 Long: -76.033389  
Calculated Distance Traveled: 0.7146 km

**Behavior and Additional Comments**

Animal doing some deeper dives, regular surfacing, not traveling very fast

Thursday, January 14, 2010 Sighting # 6

**Initial sighting on Track**

Time: 13:24 WP#: 71 Lat: 34.270316 Long: -76.608068  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 13:25 WP#: 72 Lat: 34.276465 Long: -76.603520  
Species: *Stenella frontalis* Numbers (Low/High/Best): 25/40/37  
Features used in Species ID: Alternating light and dark pattern down the body, white tips on rostrum, well defined blaze on sides tapering off just before dorsal fin to the middle of the dorsal fin  
Representative images used for Species ID: 3500, 3517, 3525, 3538, 3549, 3552, 3557, 3565  
Photographer: Ryan Frame numbers: 3481 to 3612 Spacer: 3613  
Calculated distance from Trackline: 0.8013 km

**Final Time and Position of Sighting**

Time: 13:30 WP#: 73 Lat: 34.279187 Long: -76.604144  
Calculated Distance Traveled: 0.3081 km

**Behavior and Additional Comments**

Large group of animals all bunched up, lots of splashing, regular surfacing. Animals traveling just below the surface and darting back and fourth.

Friday, January 15, 2010 Sighting # 1

### Initial sighting on Track

Time: 9:43 WP#: 15 Lat: 33.561615 Long: -76.736314  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 3  
Observer: Ryan Observer side: Left

### Actual Time and Position of Sighting

Time: 9:45 WP#: 16 Lat: 33.558281 Long: -76.738722  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7 / 9 / 8  
Features used in Species ID: Robust body appearance, uniform grey coloration with slightly darker grey dorsal cape. Uniform rostrum color, broad flukes and white peduncle patch.  
Representative images used for Species ID: 3630, 3646, 3649 and 3652  
Photographer: Erin Frame numbers: 3617 to 3655 Spacer: 3655  
Calculated distance from Trackline: 0.4 km

### Final Time and Position of Sighting

Time: 9:52 WP#: 17 Lat: 33.556537 Long: -76.739997  
Calculated Distance Traveled: 0.2 km

### Behavior and Additional Comments

Group was traveling slowly just below the surface very close to one another. Animals appear to have a white peduncle patch.

Friday, January 15, 2010 Sighting # 2

### Initial sighting on Track

Time: 10:38 WP#: 29 Lat: 33.608496 Long: -76.529525  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 3  
Observer: Ryan Observer side: Left

### Actual Time and Position of Sighting

Time: 10:39 WP#: 30 Lat: 33.602597 Long: -76.529002  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15 / 21 / 20  
Features used in Species ID: Uniform grey body coloration, lighter grey blaze to region of dorsal fin. No spotting pattern on large adult animals.  
Representative images used for Species ID: 3663, 3671, 3674, and 3678  
Photographer: Erin Frame numbers: 3656 to 3695 Spacer: 3696  
Calculated distance from Trackline: 0.65 km

### Final Time and Position of Sighting

Time: 10:49 WP#: 31 Lat: 33.606813 Long: -76.535992  
Calculated Distance Traveled: 0.8 km

### Behavior and Additional Comments

Tightly grouped animals traveling slowly just below the surface moving in a definite direction. Animals moved into a wide string once plane began to circle them. Some animals rolling on their sides or showing belly, also appeared to be two calves in the group roughly 3/4 adult length. Some animals with appearance of white peduncle.

Friday, January 15, 2010 Sighting # 3

### Initial sighting on Track

Time: 11:23 WP#: 43 Lat: 33.694585 Long: -76.511749  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 3  
Observer: Ryan Observer side: Left

### Actual Time and Position of Sighting

Time: 11:25 WP#: 44 Lat: 33.698764 Long: -76.51107  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12 / 24 / 22  
Features used in Species ID: Uniform grey coloration of body, large robust dorsal fin and rostrum.

Representative images used for Species ID: 3704, 3709, 3714, 3722, 3724 and 3727  
Photographer: Erin Frame numbers: 3697 to 3730 Spacer: 3731  
Calculated distance from Trackline: 0.4 km

### Final Time and Position of Sighting

Time: 11:33 WP#: 45 Lat: 33.70114 Long: -76.507911  
Calculated Distance Traveled: 0.4 km

### Behavior and Additional Comments

Another bunched group of animals traveling slowly just below the surface. Animals were split into two groups, the smaller of which was barely moving. Possible white peduncle patch.

Friday, January 15, 2010 Sighting # 4

### Initial sighting on Track

Time: 11:42 WP#: 48 Lat: 33.605988 Long: -76.264493  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: Off Trackline: Between 5 & 6 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

### Actual Time and Position of Sighting

Time: 11:44 WP#: 49 Lat: 33.601521 Long: -76.270769  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8 / 8 / 8  
Features used in Species ID: Robust animals with uniform grey coloration except for slightly darker cape on dorsal surface to area before dorsal fin. Large dorsal fin.

Representative images used for Species ID: 3765, 3775 and 3777  
Photographer: Erin Frame numbers: 3732 to 3754 Spacer: 3755  
Calculated distance from Trackline: 0.7 km

### Final Time and Position of Sighting

Time: 11:50 WP#: 50 Lat: 33.607359 Long: -76.269571  
Calculated Distance Traveled: 0.6 km

### Behavior and Additional Comments

All animals traveling parallel to one another in a single line. Slow directional travel.  
Animals appear to have white peduncle patch.

Friday, January 15, 2010 Sighting # 5

**Initial sighting on Track**

Time: 11:55 WP#: 53 Lat: 33.725211 Long: -76.421522  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 3  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:02 WP#: 54 Lat: 33.725468 Long: -76.420365  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 13 / 15 / 14  
Features used in Species ID: Robust rostrum and large dorsal fin. Robust body with uniform grey coloration, lighter blaze to region of dorsal fin.  
Representative images used for Species ID: 3765, 3775 and 3777  
Photographer: Erin Frame numbers: 3756 to 3803 Spacer: 3804  
Calculated distance from Trackline: 0.1 km

**Final Time and Position of Sighting**

Time: 12:03 WP#: 55 Lat: 33.730208 Long: -76.425060  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Two groups of densely packed animals - groups spread out a little as sighting continued, formed more of a nose to tail line. Groups would spend lots of time below the surface.

Friday, January 15, 2010 Sighting # 6

**Initial sighting on Track**

Time: 12:18 WP#: 61 Lat: 34.037598 Long: -76.833729  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:23 WP#: 62 Lat: 34.041882 Long: -76.828397  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3 / 3 / 3  
Features used in Species ID: Uniform grey coloration of body with no spotting on lateral surfaces  
Robust body, large dorsal fin  
Representative images used for Species ID: 3828, 3834 and 3836  
Photographer: Erin Frame numbers: 3805 to 3836 Spacer: 3837  
Calculated distance from Trackline: 0.7 km

**Final Time and Position of Sighting**

Time: 12:29 WP#: 63 Lat: 34.035980 Long: -76.824297  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Single animal followed primarily with two additional animals joining and then leaving original animal. Documented feeding of one animal catching fish.

Friday, January 15, 2010 Sighting # 7

**Initial sighting on Track**

Time: 12:30 WP#: 65 Lat: 34.063128 Long: -76.863297  
Vertical Angle: 3 Horizontal Bearing in Degrees: 60 Sighting Cue: Splash  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 12:35 WP#: 66 Lat: 34.061379 Long: -76.860277  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 45 / 50 / 46  
Features used in Species ID: Large robust body, uniform grey body coloration.

Representative images used for Species ID: 3844, 3848, 3857, 3885, 3887 and 3890  
Photographer: Erin Frame numbers: 3838 to 3891 Spacer: 3892  
Calculated distance from Trackline: 0.3 km

**Final Time and Position of Sighting**

Time: 12:37 WP#: 67 Lat: 34.063698 Long: -76.865346  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Two large groups swimming fast and splashing at the surface.

Friday, January 15, 2010 Sighting # 8

**Initial sighting on Track**

Time: 14:26 WP#: 75 Lat: 34.070326 Long: -76.734718  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Bofy  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 14:27 WP#: 76 Lat: 34.074558 Long: -76.731663  
Species: *Stenella frontalis* Numbers (Low/High/Best): 28 / 35 / 30  
Features used in Species ID: Alternating light and dark coloration along length of animal.  
White tip to rostrum.

Representative images used for Species ID: 3895, 3905, 3907, 3920, 3932, 3937 and 3952  
Photographer: Erin Frame numbers: 3893 to 3965 Spacer: 3966  
Calculated distance from Trackline: 0.5 km

**Final Time and Position of Sighting**

Time: 14:35 WP#: 77 Lat: 34.071690 Long: -76.725560  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Slow moving group with some swimming at surface and some deep so only shadows are seen.

Friday, January 15, 2010 Sighting # 9

**Initial sighting on Track**

Time: 14:42 WP#: 82 Lat: 33.917797 Long: -76.535541  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 14:43 WP#: 83 Lat: 33.917354 Long: -76.538055  
Species: *Stenella frontalis* Numbers (Low/High/Best): 23 / 30 / 28  
Features used in Species ID: White tip to rostrum. Alternating light and dark coloration along the length of the animal. Light and dark blaze meeting at dorsal fin region.  
Representative images used for Species ID: 3980, 3995 and 3999  
Photographer: Erin Frame numbers: 3967 to 4017 Spacer: 4018  
Calculated distance from Trackline: 0.2 km

**Final Time and Position of Sighting**

Time: 14:50 WP#: 84 Lat: 33.912765 Long: -76.530079  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Mixture of two groups of dolphins one with ~25 the other with ~3. Schools of good sized fish nearby both groups of dolphins.

Friday, January 15, 2010 Sighting # 10

**Initial sighting on Track**

Time: 14:59 WP#: 86 Lat: 33.711036 Long: -76.266830  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Blow  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 15:02 WP#: 87 Lat: 33.709471 Long: -76.265296  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 25 / 27 / 27  
Features used in Species ID: Uniform grey coloration with slightly darker grey cape on dorsal area before dorsal fin. Large dorsal fin and robust rostrum.  
Representative images used for Species ID: 4024, 4036 and 4044  
Photographer: Erin Frame numbers: 4019 to 4047 Spacer: 4048  
Calculated distance from Trackline: 0.2 km

**Final Time and Position of Sighting**

Time: 15:07 WP#: 88 Lat: 33.706547 Long: -76.259007  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Large group with other animals trailing, lots of non-directional underwater (just shadows of animals) Later one central group with fewer smaller groups nearby.



Friday, January 15, 2010 Sighting # 11

**Initial sighting on Track**

Time: 15:15 WP#: 91 Lat: 33.659242 Long: -76.198512  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Trackline: Between 7 & 8 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:16 WP#: 92 Lat: 33.664086 Long: -76.195214  
Species: *Grampus griseus* Numbers (Low/High/Best): 5 / 5 / 5  
Features used in Species ID: Light grey scarring patterns on animals sides, pointed melon with central crease. Large tall dorsal fin and pectoral fins.  
Representative images used for Species ID: 4057, 4059, 4064, 4067, 4679 and 4089  
Photographer: Erin Frame numbers: 4049 to 4092 Spacer: 4093  
Calculated distance from Trackline: 0.6 km

**Final Time and Position of Sighting**

Time: 15:18 WP#: 93 Lat: 33.664600 Long: -76.196155  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Animals with blunt head. Only a single animal seen at first and photographed. After breaking from animal encountered a group of 3 and another single animal over a distance of ~2 miles.

Friday, January 15, 2010 Sighting # 12

**Initial sighting on Track**

Time: 16:23 WP#: 106 Lat: 34.152472 Long: -76.457880  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 16:29 WP#: 107 Lat: 34.156027 Long: -76.457154  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40 / 48 / 47  
Features used in Species ID: Alternating light and dark body coloration. White tip to rostrum and appearance os spotting on sides.  
Representative images used for Species ID: 4147, 4151, 4156 and 4157  
Photographer: Erin Frame numbers: 4094 to 4167 Spacer: 4168  
Calculated distance from Trackline: 0.4 km

**Final Time and Position of Sighting**

Time: 16:32 WP#: 108 Lat: 34.162620 Long: -76.453377  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

One large group made up of smaller groups of 8-15, totalling ~50 animals. Lots of belly showing and rolling on their sides. Lots of activity at the surface.

Sunday, February 21, 2010 Sighting # 1

**Initial sighting on Track**

Time: 11:24 WP#: 21 Lat: 33.917971 Long: -76.675536  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:26 WP#: 22 Lat: 33.924674 Long: -76.66271  
Species: *Stenella frontalis* Numbers (Low/High/Best): 18 / 21 / 18  
Features used in Species ID: White tip to rostrum, spotting pattern along sides, light shoulder blaze to dorsal fin with darker blaze from peduncle to below dorsal fin.  
Representative images used for Species ID: 0032, 0034, 0050, 0056, and 0067  
Photographer: Erin Frame numbers: 0030 - 0068 Spacer: 0069  
Calculated distance from Trackline: 1.4 km

**Final Time and Position of Sighting**

Time: 11:53 WP#: 23 Lat: 33.930494 Long: -76.64368  
Calculated Distance Traveled: 1.8 km

**Behavior and Additional Comments**

Two groups of animals, one with 12 individuals in it and the second with ~6 individuals tightly bunched together. Groups moving slowly at the surface but after a few circle groups picked up speed and fanned out. Third group of 5-6 seen after circling on initial group, all animals diving and interacting with one another below the surface.

Sunday, February 21, 2010 Sighting # 2

**Initial sighting on Track**

Time: 14:32 WP#: 42 Lat: 33.904141 Long: -76.263097  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 9 Beaufort Sea State: 3  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 14:41 WP#: 43 Lat: 33.897988 Long: -76.253719  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10 / 12 / 11  
Features used in Species ID: Uniform grey coloration, robust dorsal fin and body appearance.  
Representative images used for Species ID: 0072 - 0074  
Photographer: Erin Frame numbers: 0070 - 0077 Spacer: 0078  
Calculated distance from Trackline: 1.1 km

**Final Time and Position of Sighting**

Time: 14:44 WP#: 44 Lat: 33.8972 Long: -76.266149  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Lots of animals scattered over a wide area, mainly singles, one or two doubles. All animals have robust and were surfacing briefly before diving again. After circling group many of the animals separated from the rest so by the end of the sighting there were only 3-4 animals in the area.

Sunday, February 21, 2010 Sighting # 3

**Initial sighting on Track**

Time: 15:13 WP#: 53 Lat: 33.982184 Long: -76.501112  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:17 WP#: 54 Lat: 33.98478 Long: -76.500092  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8 / 9 / 8  
Features used in Species ID: Clear spot pattern along sides of body, white tip to rostrum and light shoulder blaze to dorsal fin with dark coloration from peduncle to below white blaze.  
Representative images used for Species ID: 0079, 0082 and 0113  
Photographer: Erin Frame numbers: 0079 - 0115 Spacer: 0116  
Calculated distance from Trackline: 0.3 km

**Final Time and Position of Sighting**

Time: 15:24 WP#: 55 Lat: 33.984625 Long: -76.507871  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Lots of activity at the surface. Animals showing slow milling behavior with no obvious direction of travel. Individuals widely spaced with no more than 3 in a group.

Sunday, February 21, 2010 Sighting # 4

**Initial sighting on Track**

Time: 15:36 WP#: 58 Lat: 33.757085 Long: -76.19298  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:39 WP#: 59 Lat: 33.757085 Long: -76.19298  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 20/25/23  
Features used in Species ID: Large square heads, dark body coloration, large body size of ~20ft long, large dorsal fin roughly 1/3 of the way back on the animal.  
Representative images used for Species ID: 0133 - 0135, 0137, 0141, 0162, 0167 and 0183  
Photographer: Erin Frame numbers: 0117 to 0193 Spacer: 0194  
Calculated distance from Trackline: 0 km

**Final Time and Position of Sighting**

Time: 15:54 WP#: 60 Lat: 33.750509 Long: -76.187337  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Animals hanging just below the surface traveling slowly side by side. Uniform dark body coloration with large dorsal fins. Calves present. Central group of ~18 animals and two smaller groups each containing 3-4 animals

Monday, March 8, 2010 Sighting # 1

**Initial sighting on Track**

Time: 15:17 WP#: 47 Lat: 33.497966 Long: -76.654189  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:30 WP#: 48 Lat: 33.487350 Long: -76.636780  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/4/4  
Features used in Species ID: Dark grey colored, robust animals, light colored capes extending from rostrum to dorsal fin, white color on peduncle  
Representative images used for Species ID: 4438, 4439  
Photographer: Ryan Frame numbers: 4370 to 4440 Spacer: 4441  
Calculated distance from Trackline: 2.0 km

**Final Time and Position of Sighting**

Time: 15:37 WP#: 49 Lat: 33.479525 Long: -76.629389  
Calculated Distance Traveled: 1.108 km

**Behavior and Additional Comments**

Animals were traveling fast just below the surface and darting different directions. Animals had white peduncles. Animals were also doing deeper dives.

Monday, March 8, 2010 Sighting # 2

**Initial sighting on Track**

Time: 15:41 WP#: 51 Lat: 33.403629 Long: -76.534098  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 15:43 WP#: 52 Lat: 33.410814 Long: -76.538489  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: Dark grey colored, robust animals, light colored cape extending from rostrum to dorsal fin, white peduncle  
Representative images used for Species ID: 4452-4456  
Photographer: Ryan Frame numbers: 4442 to 4457 Spacer: 4458  
Calculated distance from Trackline: 0.897 km

**Final Time and Position of Sighting**

Time: 15:44 WP#: 53 Lat: 33.407768 Long: -76.533567  
Calculated Distance Traveled: 0.569 km

**Behavior and Additional Comments**

Some animals were logging at the surface or just below. Animals had white peduncles.

Tuesday, March 9, 2010 Sighting # 1

**Initial sighting on Track**

Time: 9:01 WP#: 4 Lat: 33.946805 Long: -76.844542  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 1  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:02 WP#: 5 Lat: 33.960739 Long: -76.832647  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15 / 15 / 15  
Features used in Species ID: Uniform light grey coloration across the animals body.  
Robust animal with a wide base to the dorsal fin and broad fluke blades.  
Representative images used for Species ID: 4465, 4469 & 4489  
Photographer: Erin Frame numbers: 4459 to 4508 Spacer: 4508  
Calculated distance from Trackline: 1.9 km

**Final Time and Position of Sighting**

Time: 9:10 WP#: 6 Lat: 33.94881 Long: -76.848433  
Calculated Distance Traveled: 2 km

**Behavior and Additional Comments**

Dolphins moving slowly at the surface in a horizontal line. Upon circling animals they began diving and staying submerged for longer periods of time either just below the surface or out of sight.

Tuesday, February 9, 2010 Sighting # 2

**Initial sighting on Track**

Time: 9:15 WP#: 10 Lat: 33.833809 Long: -76.695374  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 9:17 WP#: 11 Lat: 33.830343 Long: -76.706061  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6 / 6 / 6  
Features used in Species ID: Uniform body coloration to animals body, robust body, flukes and pectoral fins.  
Representative images used for Species ID: 4509 to 4542  
Photographer: Erin Frame numbers: 4509 to 4542 Spacer: 4543  
Calculated distance from Trackline: 1 km

**Final Time and Position of Sighting**

Time: 9:23 WP#: 12 Lat: 33.826938 Long: -76.705278  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Initially 2 animals seen moving slowly at the surface with non-directional travel at surface. They would surface briefly then dive, swimming just below the surface. As sighting continued more animals appeared bring the total to 6 animals that were widely separated from one another. All animals had a robust body appearance. Calves were observed.

Tuesday, March 9, 2010 Sighting # 3

**Initial sighting on Track**

Time: 9:29 WP#: 16 Lat: 33.718742 Long: -76.544124  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 1  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:32 WP#: 17 Lat: 33.720726 Long: -76.534367  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 20 / 20 / 20  
Features used in Species ID: Robust bodied animals, broad fluke blades and pectoral fins.  
Presence of white peduncle patch.  
Representative images used for Species ID: 4544, 4557 & 4574  
Photographer: Erin Frame numbers: 4544 to 4584 Spacer: 4585  
Calculated distance from Trackline: 0.9 km

**Final Time and Position of Sighting**

Time: 9:34 WP#: 18 Lat: 33.721457 Long: -76.535991  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

A slow group of animals hanging out just below the surface within one body length of one another.  
White peduncles observed in the group.

Tuesday, March 9, 2010 Sighting # 4

**Initial sighting on Track**

Time: 9:51 WP#: 22 Lat: 33.742673 Long: -76.444336  
Vertical Angle: 3 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 1  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:52 WP#: 23 Lat: 33.743504 Long: -76.443130  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 60 / 70 / 65  
Features used in Species ID: Dark dorsal body coloration with a lighter shoulder stripe to the area of the dorsal fin. White coloration behind dorsal fin to region of peduncle.  
Representative images used for Species ID: 4598, 4602 & 4606  
Photographer: Erin Frame numbers: 4586 to 4638 Spacer: 4639  
Calculated distance from Trackline: 0.1 km

**Final Time and Position of Sighting**

Time: 9:57 WP#: 24 Lat: 33.745405 Long: -76.439837  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

A large diffuse group of dolphins splashing a lot at the surface while surfacing at regular intervals.

Tuesday, March 9, 2010 Sighting # 5

**Initial sighting on Track**

Time: 10:10 WP#: 34 Lat: 34.014712 Long: -76.803052  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 6 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 10:11 WP#: 35 Lat: 34.017554 Long: -76.803091  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Uniform light grey coloration to the body, broad based dorsal fin.

Representative images used for Species ID: 4643, 4645 & 4656  
Photographer: Erin Frame numbers: 4640 to 4674 Spacer: 4675  
Calculated distance from Trackline: 0.3 km

**Final Time and Position of Sighting**

Time: 10:18 WP#: 36 Lat: 34.023353 Long: -76.805641  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Animals traveling slowly right at the surface - they appear a more uniform grey coloration.  
Two calves approximately 75% of adult size were observed in the group.

Tuesday, March 9, 2010 Sighting # 6

**Initial sighting on Track**

Time: 10:42 WP#: 45 Lat: 33.768898 Long: -76.344696  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 10:42 WP#: 49 Lat: 33.770576 Long: -76.346663  
Species: *Delphinus delphis* Numbers (Low/High/Best): 20 / 20 / 20  
Features used in Species ID: Dark grey/black dorsal coloration with clear division from ventral cream color. Light peduncle coloration forms V behind dorsal fin. Dark tip & central crease to rostrum.

Representative images used for Species ID: 4679, 4686-87, 4690, 4695-96, 4702, 4732, 4755  
Photographer: Erin Frame numbers: 4676 to 4766 Spacer: 4767  
Calculated distance from Trackline: 0.2 km

**Final Time and Position of Sighting**

Time: 10:43 WP#: 50 Lat: 33.771246 Long: -76.353443  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Dense group traveling right at the surface, some showing bellies. Odd lateral coloration to body.  
At least 3 calves present.



Tuesday, March 9, 2010 Sighting # 7

**Initial sighting on Track**

Time: 10:57 WP#: 48 Lat: 33.719389 Long: -76.280639  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 7 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 10:57 WP#: 54 Lat: 33.719563 Long: -76.280838  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 9 / 9 / 9  
Features used in Species ID: Robust animal, broad flukes, uniform grey coloration.

Representative images used for Species ID: 4770, 4780, 4787 & 4792  
Photographer: Erin Frame numbers: 4768 to 4793 Spacer: 4793  
Calculated distance from Trackline: 0.02670 km

**Final Time and Position of Sighting**

Time: 11:04 WP#: 55 Lat: 33.716324 Long: -76.273950  
Calculated Distance Traveled: 0.07318 km

**Behavior and Additional Comments**

Groups of 2-3 animals widely spaced from one another. Surfacing regularly then spending much of the time traveling subsurface. White peduncles present. A few calves were observed.

Tuesday, March 9, 2010 Sighting # 8

**Initial sighting on Track**

Time: 11:12 WP#: 59 Lat: 33.795542 Long: -76.24935  
Vertical Angle: 1 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Trackline: 8 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:14 WP#: 60 Lat: 33.796304 Long: -76.241464  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 13 / 13 / 13  
Features used in Species ID: Dark grey dorsal coloration with a lighter shoulder stripe to area of dorsal fin. Broad based dorsal fin and light peduncle region.

Representative images used for Species ID: 4794, 4800, 4804 & 4809  
Photographer: Erin Frame numbers: 4794 to 4820 Spacer: 4821  
Calculated distance from Trackline: 0.7336 km

**Final Time and Position of Sighting**

Time: 11:22 WP#: 61 Lat: 33.797223 Long: -76.240884  
Calculated Distance Traveled: 0.1154 km

**Behavior and Additional Comments**

Initial sighting of a pair of animals traveling at a good rate of speed side by side. More animals arrived during sighting for a total of about 13 animals in groups of 2-4 spaced well apart from each other. White peduncle regions were observed.

Tuesday, March 9, 2010 Sighting # 9

**Initial sighting on Track**

Time: 12:01 WP#: 75 Lat: 33.864916 Long: -76.214671  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 9 Beaufort Sea State: 1  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 12:03 WP#: 76 Lat: 33.871443 Long: -76.213856  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 30/30/30  
Features used in Species ID: Dark grey dorsal region with shoulder stripe to trailing edge of dorsal fin. Dark region just behind dorsal fin angling forward to pectoral fin.  
Representative images used for Species ID: 4854, 4861 & 4869  
Photographer: Erin Frame numbers: 4822 to 4874 Spacer: 4875  
Calculated distance from Trackline: 0.7297 km

**Final Time and Position of Sighting**

Time: 12:08 WP#: 77 Lat: 33.881694 Long: -76.215087  
Calculated Distance Traveled: 1.146 km

**Behavior and Additional Comments**

A diffuse group of dolphins that were hanging out at the surface interacting with one another. Lots of splashing. No direction to travel during our observation.

Tuesday, March 9, 2010 Sighting # 10

**Initial sighting on Track**

Time: 12:18 WP#: 81 Lat: 33.850651 Long: -76.070237  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 1  
Observer: Erin Observer side: Right

**Actual Time and Position of Sighting**

Time: 12:19 WP#: 82 Lat: 33.858932 Long: -76.064517  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2 / 4 / 4  
Features used in Species ID: Darker grey dorsal region with lighter shoulder blaze. White peduncle patch.  
Representative images used for Species ID: 4881 & 4892  
Photographer: Erin Frame numbers: 4876 to 4899 Spacer: 4900  
Calculated distance from Trackline: 1.062 km

**Final Time and Position of Sighting**

Time: 12:24 WP#: 83 Lat: 33.860598 Long: -76.064861  
Calculated Distance Traveled: 0.1880 km

**Behavior and Additional Comments**

Animals logging close to the surface with little directional movement. Very diffuse group with some white peduncle patches present.

Tuesday, March 9, 2010 Sighting # 11

**Initial sighting on Track**

Time: 12:29 WP#: 85 Lat: 33.966355 Long: -76.21616  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 10 Beaufort Sea State: 1  
Observer: Ryan Observer side: Left

**Actual Time and Position of Sighting**

Time: 12:30 WP#: 86 Lat: 33.963446 Long: -76.22154  
Species: *Balaenoptera physalis* Numbers (Low/High/Best): 1 / 1 / 1  
Features used in Species ID: Large fusiform body shape, wide flukes, light coloration around head relatively small pectoral fins. Total body length ~60ft.  
Representative images used for Species ID: 4940, 4942-44  
Photographer: Erin Frame numbers: 4901 to 4945 Spacer: 4946  
Calculated distance from Trackline: 0.6 km

**Final Time and Position of Sighting**

Time: 12:43 WP#: 87 Lat: 33.964796 Long: -76.221166  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Large animal logging just below the surface, could see a dark dorsal coloration with light coloration on head and pectoral flippers. Animals dove out of sight after initial sighting. It was relocated once where it surfaced for a breath before diving out of sight again.

Wednesday, March 10, 2010 Sighting # 1

**Initial sighting on Track**

Time: 9:56 WP#: 16 Lat: 33.845063 Long: -77.103378  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: 2  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:57 WP#: 17 Lat: 33.844501 Long: -77.105389  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: N/A

Representative images used for Species ID: N/A  
Photographer: Ryan Frame numbers: 4946 to 4956 Spacer: 4957  
Calculated distance from Trackline: 0.1960 km

**Final Time and Position of Sighting**

Time: 10:05 WP#: 18 Lat: 33.855759 Long: -77.096990  
Calculated Distance Traveled: 1.473 km

**Behavior and Additional Comments**

One mom/calf pair traveling spaced out from another adult. Animals were traveling fast to the SW.  
They were swimming just below the surface and doing deeper dives but spending most of the time  
below the surface. Showing extreme avoidance behavior. Calf was relatively new, measuring less than  
50% of the moms body size.

Sunday, April 11, 2010 Sighting # 1

**Initial sighting on Track**

Time: 9:50 WP#: 15 Lat: 34.012236 Long: -76.933173  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 2  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:53 WP#: 16 Lat: 34.010019 Long: -76.930714  
Species: *Stenella frontalis* Numbers (Low/High/Best): 12/18/18  
Features used in Species ID: Alternating light and dark pattern down the body. White tip on rostrum and spots present.  
Representative images used for Species ID: 5244, 5231, 5226, 5218, 5216, 5212  
Photographer: Ryan Frame numbers: 5179 to 5247 Spacer: 5248  
Calculated distance from Trackline: 0.3349 km

**Final Time and Position of Sighting**

Time: 10:02 WP#: 17 Lat: 34.012325 Long: -76.931942  
Calculated Distance Traveled: 0.2803 km

**Behavior and Additional Comments**

Animals were traveling in a tight group with a few stragglers. Most were staying just below the surface with some doing deeper dives and some jumping. Once we started circling they dispersed.

Sunday, April 11, 2010 Sighting # 2

**Initial sighting on Track**

Time: 11:13 WP#: 36 Lat: 33.489563 Long: -76.641621  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: body  
On/Off Effort: On Trackline: 2 Beaufort Sea State: 4  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:15 WP#: 37 Lat: 33.484779 Long: -76.651031  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 37/41/40  
Features used in Species ID: Robust animals with a uniform grey color throughout except for a white pattern on the peduncle.  
Representative images used for Species ID: 5291, 5281, 5256, 5255  
Photographer: Ryan Frame numbers: 5249 to 5310 Spacer: 5311  
Calculated distance from Trackline: 1.022 km

**Final Time and Position of Sighting**

Time: 11:29 WP#: 38 Lat: 33.483916 Long: -76.645300  
Calculated Distance Traveled: 0.5401 km

**Behavior and Additional Comments**

Animals had white peduncles, some were seen swimming on their sides. There were three groups of 4, 8, 25+ traveling and darting in different directions. There was some jumping and splashing. Possible avoidance behavior. Some were doing deeper dives.

Monday, April 12, 2010 Sighting # 1

**Initial sighting on Track**

Time: 11:15 WP#: 36 Lat: 33.685605 Long: -76.501951  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 5 Beaufort Sea State: 3  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 11:17 WP#: 37 Lat: 33.685951 Long: -76.498036  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7 / 9 / 8  
Features used in Species ID: Robust body shape and white peduncle patch.

Representative images used for Species ID: 5321 & 5327  
Photographer: Erin Frame numbers: 5312 - 5331 Spacer: 5332  
Calculated distance from Trackline: 0.3 km

**Final Time and Position of Sighting**

Time: 11:30 WP#: 38 Lat: 33.677447 Long: -76.50565  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

White peduncle patch observed. Initial sighting was of 2 animals, one on each side of the plane. Once we began circling more animals were seen. Disperse group traveling at moderate speed with no consistent direction. Difficult to photograph animals unless we were right on top of them because of the high Beaufort Sea State.

Wednesday, June 16, 2010 Sighting # 1

**Initial sighting on Track**

Time: 11:03 WP#: 25 Lat: 34.017047 Long: -76.403834  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: body  
On/Off Effort: On Trackline: 9 Beaufort Sea State: 2  
Observer: Ryan Observer side: Right

**Actual Time and Position of Sighting**

Time: 11:04 WP#: 26 Lat: 34.013141 Long: -76.406738  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40/65/55  
Features used in Species ID: Alternating light and dark pattern down the body, white tip on rostrum  
Representative images used for Species ID: 5455, 5462-5464, 5488, 5490, 5491  
Photographer: Ryan Frame numbers: 5428 to 5495 Spacer: 5495  
Calculated distance from Trackline: 0.5102 km

**Final Time and Position of Sighting**

Time: 11:09 WP#: 27 Lat: 34.020554 Long: -76.414159  
Calculated Distance Traveled: 1.071 km

**Behavior and Additional Comments**

Large group of animals traveling fairly close together, all milling around on the surface, flashing bellies, some belly to belly contact.

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Thursday, June 17, 2010 Sighting # 1

### Initial sighting on Track

Time: 10:05 WP#: 18 Lat: 33.578886 Long: -76.62527  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 3 Beaufort Sea State: 2  
Observer: Erin Observer side: Right

### Actual Time and Position of Sighting

Time: 10:07 WP#: 19 Lat: 33.574286 Long: -76.630432  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 20 / 23 / 21  
Features used in Species ID: Robust animals, uniform grey color through out, except for a white color pattern on the peduncle  
Representative images used for Species ID: 5498, 5505, 5508, 5511, 5519  
Photographer: Erin Frame numbers: 5496 to 5530 Spacer: 5531  
Calculated distance from Trackline: 0.7 km

### Final Time and Position of Sighting

Time: 10:13 WP#: 20 Lat: 33.579754 Long: -76.625076  
Calculated Distance Traveled: 0.8 km

### Behavior and Additional Comments

Disperse group covering a wide area of approximately a half a mile. Group traveling at a moderate speed just below the surface in pair or singles. Some animals causing large splashes while surfacing. White peduncle patch present on animals. Possibly one calf in group.

Thursday, June 17, 2010 Sighting # 2

### Initial sighting on Track

Time: 14:34 WP#: 46 Lat: 33.865240 Long: -76.20837  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Trackline: 9 Beaufort Sea State: 2  
Observer: Ryan Observer side: Left

### Actual Time and Position of Sighting

Time: 14:37 WP#: 47 Lat: 33.871597 Long: -76.208675  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 9 / 13 / 13  
Features used in Species ID: Robust animals, uniform grey color throughout, except for a white color pattern on the peduncle  
Representative images used for Species ID: 5536, 5537, 5547, 5576, 5583, 5585  
Photographer: Erin Frame numbers: 5532 to 5596 Spacer: 5597  
Calculated distance from Trackline: 0.7 km

### Final Time and Position of Sighting

Time: 14:55 WP#: 48 Lat: 33.875885 Long: -76.208729  
Calculated Distance Traveled: 0.5 km

### Behavior and Additional Comments

Animals traveling side by side just below the surface in groups of 4-5 with ~20 feet between groups. White peduncle present on most to all individuals with one animal with extremely white area behind dorsal fin. Animals formed into a tighter group while we were circling them.

Friday, June 18, 2010 Sighting # 1

**Initial sighting on Track**

Time: 9:16 WP#: 6 Lat: 33.631227 Long: -76.556895  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Trackline: 4 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:20 WP#: 7 Lat: 33.637239 Long: -76.561817  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/8/8  
Features used in Species ID: Robust animals, uniform grey color throughout except for a white color pattern on the peduncle  
Representative images used for Species ID: 5642, 5670-5672  
Photographer: Ryan Frame numbers: 5617 to 5676 Spacer: 5677  
Calculated distance from Trackline: 0.8090 km

**Final Time and Position of Sighting**

Time: 9:23 WP#: 8 Lat: 33.639783 Long: -76.563793  
Calculated Distance Traveled: 0.3369 km

**Behavior and Additional Comments**

Slow travel and staying on the surface or just below. Some doing deeper dives. There was one group of 5 animals and one group of 3. Animals have a white pattern on the peduncle, and regular surfacing. Some belly to belly swimming.

Friday, June 18, 2010 Sighting # 2

**Initial sighting on Track**

Time: 9:38 WP#: 12 Lat: 33.559194 Long: -76.607674  
Vertical Angle: 1 Horizontal Bearing in Degrees: 60 Sighting Cue: Splash  
On/Off Effort: On Trackline: 3 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 9:38 WP#: 13 Lat: 33.556626 Long: -76.603283  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 20/32/32  
Features used in Species ID: Robust animals with uniform grey color throughout except for a white color pattern on the peduncle  
Representative images used for Species ID: 5678, 5704, 5707, 5715  
Photographer: Ryan Frame numbers: 5678 to 5731 Spacer: 5732  
Calculated distance from Trackline: 0.4971 km

**Final Time and Position of Sighting**

Time: 9:47 WP#: 14 Lat: 33.552743 Long: -76.619753  
Calculated Distance Traveled: 1.586 km

**Behavior and Additional Comments**

Animals traveling spaced out. At least one calf observed. Animals traveling just under the surface with regular surfacing. Some belly to belly swimming. Animals have white peduncles

Friday, June 18, 2010 Sighting # 3

**Initial sighting on Track**

Time: 10:36 WP#: 23 Lat: 33.437707 Long: -76.706675  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Trackline: 1 Beaufort Sea State: 1  
Observer: Erin Observer side: Left

**Actual Time and Position of Sighting**

Time: 10:36 WP#: 24 Lat: 33.430727 Long: -76.703646  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 25/25/25  
Features used in Species ID: Robust animals with uniform grey color throughout except for a white color pattern on the peduncle  
Representative images used for Species ID: 5741, 5749, 5758, 5776, 5778, 5779, 5800, 5803  
Photographer: Ryan Frame numbers: 5733 to 5818 Spacer: 5819  
Calculated distance from Trackline: 0.8255 km

**Final Time and Position of Sighting**

Time: 10:43 WP#: 25 Lat: 33.431798 Long: -76.717267  
Calculated Distance Traveled: 1.270 km

**Behavior and Additional Comments**

Animals traveling very spaced out, not traveling in any particular direction. Most doing deeper dives and staying under for a while. Some belly to belly swimming. Possible calves, white peduncles present.

## Notes on the Sighting Summary Sheet

The Sighting Summary, adapted from the Sighting Data Sheet used in the field (Fig. 3), integrates data gathered in the field with results from lab analyses to provide a full summary of each marine mammal sighting. A Sighting Summary was completed for all sightings, including sightings made while off-effort during transits between survey legs, as well as sighting cues which were never relocated.

The Sighting Summary sheet is broken into four sections; “Initial Sighting on Track”, “Time and Position of Sighting”, “Final Time and Position of Sighting”, and “Behavior and Additional Comments”. Each section and sub headings will be detailed below.

### **Initial Sighting on Track**

**Time:** The time the break track GPS way-point was taken

**WP#:** GPS way-point number of the break track

**Lat/Long:** The latitude and longitude associated with the break track way-point

**Track Line:** The track line surveyed when the sighting was made

**On/Off Effort:** Whether the sighting was made during an active survey track line (i.e. On effort) or during transit BETWEEN track lines (i.e. off effort). Sightings made during off effort transit to and from the range are NOT included in the sighting summaries.

**Sighting Cue:** Whether the initial sighting was a splash, a breach or body part.

**Vertical Angle:** Vertical “angle” between 1 and 4, the lower edge of view (“1”) to the horizon (“4”). A subjective and relative measure of how far away from the track line the initial sighting occurred.

**Horizontal Bearing in Degrees:** The horizontal degrees from front to back (0 to 180) at which the sighting occurred.

**Observer:** Three lettered initial of the observer who made the sighting

**Observer Side:** On which side of the plane in the direction of travel the sighting occurred.

### **Time and Position of Sighting**

**Time:** The time the GPS way-point was taken while relocating animals and circling above

**WP#:** GPS way-point number of the sighting

**Lat/Long:** The latitude and longitude associated with the way point obtained while circling over animals

**Beaufort Sea State:** The sea state observed during the sighting

**Species:** Scientific binomial name of the marine mammal species involved in the sighting. When species identity could not be established unequivocally, the next higher taxonomic level to which identity could be established was used. If a cetacean was identified as a dolphin but images obtained during the encounter were not sufficient to establish species ID, the designation “unidentified delphinid” or “*T. truncatus*/*S. frontalis*” was used. The next higher level used was unidentified cetacean. If a large body was observed but it could not be established whether a cetacean, fish/shark or turtle was involved in the sighting, the designation “unidentified marine vertebrate” was used.

**Criteria used to identify species:** Which species specific diagnostic features were used in classifying a sighting to species.

**Best images used for species ID:** The images obtained during the sighting that best displayed the features used to establish species.

**Numbers (Low/ High/ Best):** Low, high, and best estimate of number of animals involved in the sighting.

**Calves observed?** Whether any calves were observed during the encounter. A conservative measure was used, in that only animals roughly half the size of the associated larger animal (the presumed mother) were designated as calves.

**Calculated Distance from Track Line:** The distance between the break track way-point and the initial sighting way-point. For more information on how distance was calculated and errors inherent in this method, refer to the “Methods” section.

**Photographer:** Three lettered initials of observer seated in the right camera seat.

**Card #:** Memory card on which the photos from the particular sighting was made.

**Frame Numbers:** Starting and ending frame number

**Spacer:** Image used to separate sighting to clarify when one sighting ends and the next begins. Image typically of interior of plane or a 45 degree angle shot of the horizon.

### **Final Time and Position of Sighting**

Time: WP#: Lat: Long: Calculated Distance traveled: ➡see section above

### **Behavior and Additional Comments**

Any behavioral notes obtained during the sighting (*e.g.* group formation, relative travel speed, feeding events or presumed copulation attempts, presence of other cetaceans or sharks in or around the animal(s) in the sighting, interaction with inanimate objects such marine debris). This section also includes notes on altitude of the survey plane during the encounter as well as any indications (or lack thereof) of the animal(s) reacting evasively to the presence of the plane.

Date: \_\_\_\_\_

**USWTR Daily Plane Log Sheet**

Pilot in Command: \_\_\_\_\_ Second in Command: \_\_\_\_\_ Plane: \_\_\_\_\_

Observers: \_\_\_\_\_

Time take off: \_\_\_\_\_

HOBBS Start: \_\_\_\_\_

Land for lunch: \_\_\_\_\_

Track Lines and Direction (e.g. N to S) Flown: \_\_\_\_\_

Take off after lunch: \_\_\_\_\_

HOBBS Stop: \_\_\_\_\_

Land: \_\_\_\_\_

HOBBS Total: \_\_\_\_\_

Track Lines and Direction (e.g. N to S) Flown: \_\_\_\_\_

Overall weather: \_\_\_\_\_

**General Observations**

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Transit effort leg: \_\_\_\_\_

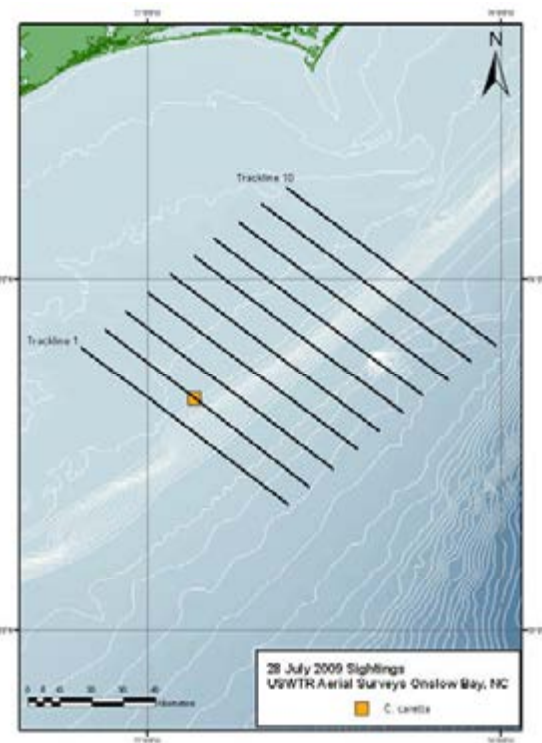
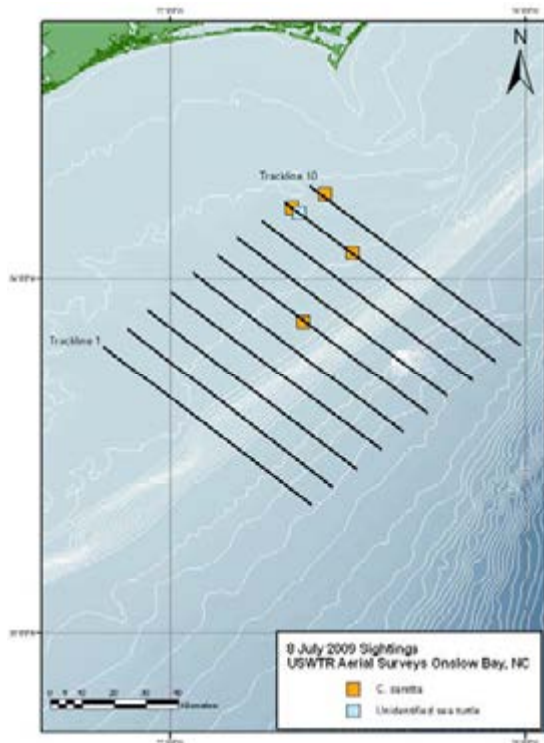
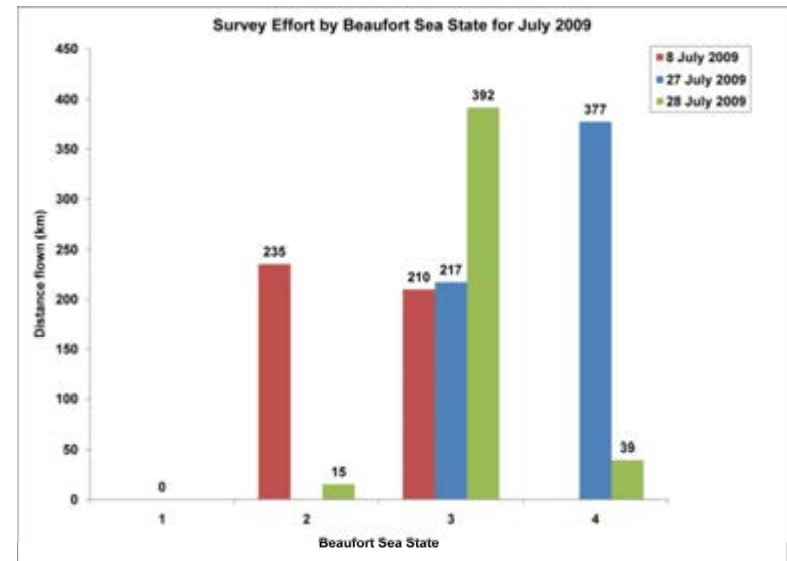
Appendix H

July 8, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Caretta caretta</i>	4	5	3	-
Unidentified sea turtle	1	2	3	9

July 28, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Caretta caretta</i>	1	1	3	2



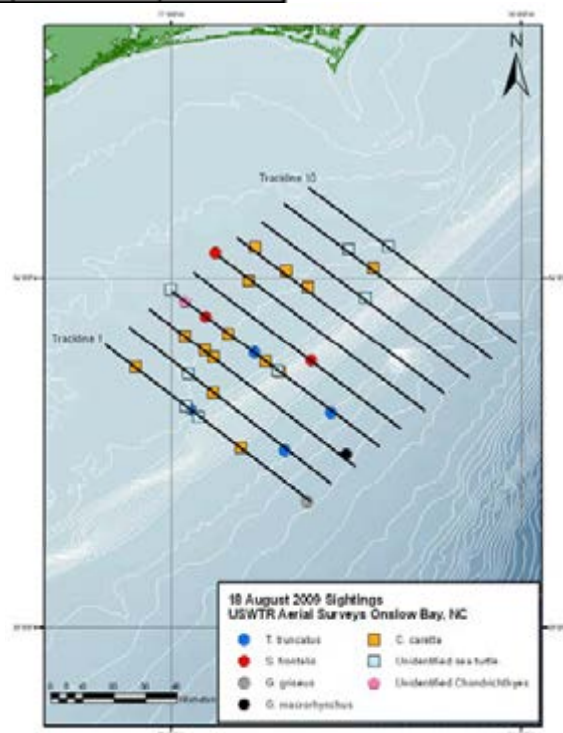
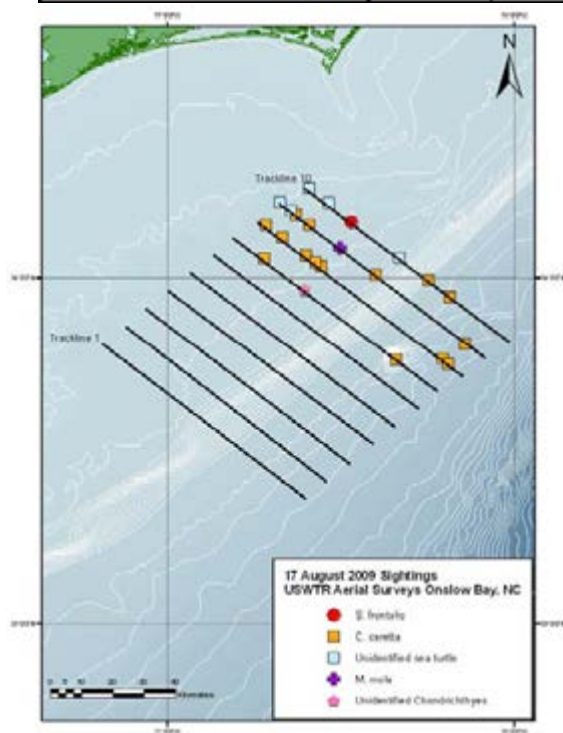
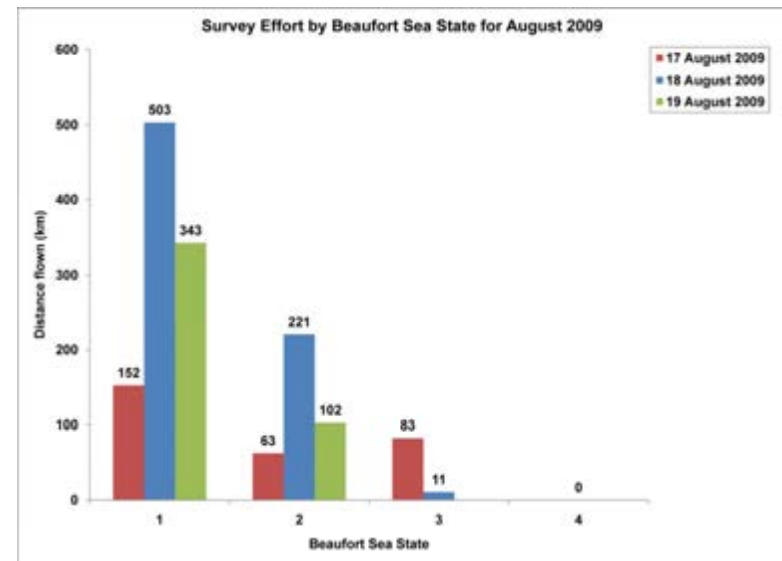


August 17, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Stenella frontalis</i>	1	35	1	10
<i>Caretta caretta</i>	15	15	1 to 3	-
Unidentified sea turtle	5	7	1	-
<i>Mola mola</i>	1	1	1	9
Unidentified Chondrichthyes	1	1	1	7

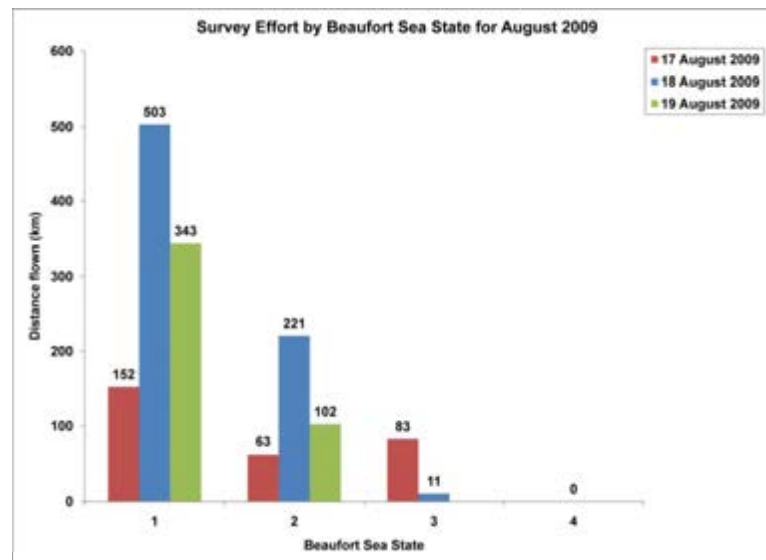
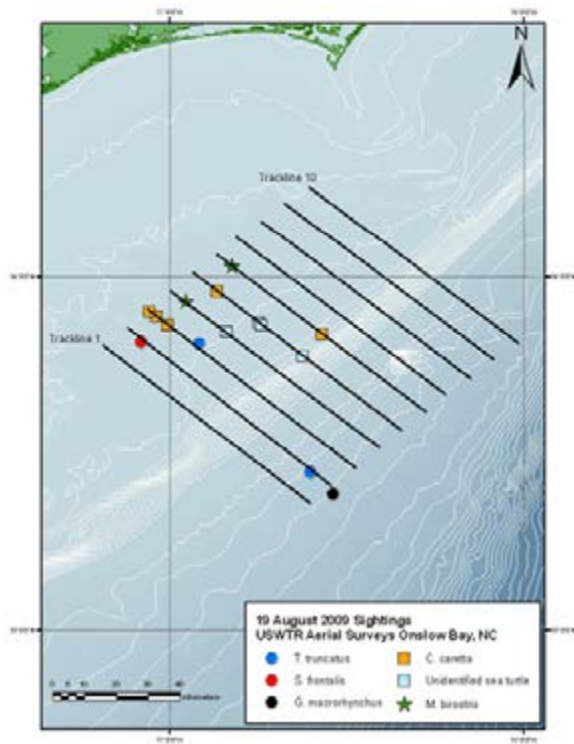
August 18, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Grampus griseus</i>	1	6	2	1
<i>Globicephala macrorhynchus</i>	1	40	2	3
<i>Stenella frontalis</i>	1	2	1	4
<i>Stenella frontalis</i>	1	65	1	5
<i>Stenella frontalis</i>	1	9	1	6
<i>Tursiops truncatus</i>	1	35	2	2
<i>Tursiops truncatus</i>	1	2	2	4
<i>Tursiops truncatus</i>	1	3	1	4
<i>Tursiops truncatus</i>	1	2	1	Off effort
<i>Caretta caretta</i>	14	14	1 to 2	-
Unidentified sea turtle	8	8	1 to 2	-
Unidentified Chondrichthyes	1	1	1	4



August 19, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	3	1	3
<i>Tursiops truncatus</i>	1	8	1	2
<i>Stenella frontalis</i>	1	4	1	2
<i>Globicephala macrorhynchus</i>	1	6	-	Off effort
<i>Caretta caretta</i>	5	5	1 to 2	-
Unidentified sea turtle	4	4	1 to 2	-
<i>Manta birostris</i>	2	2	2	-

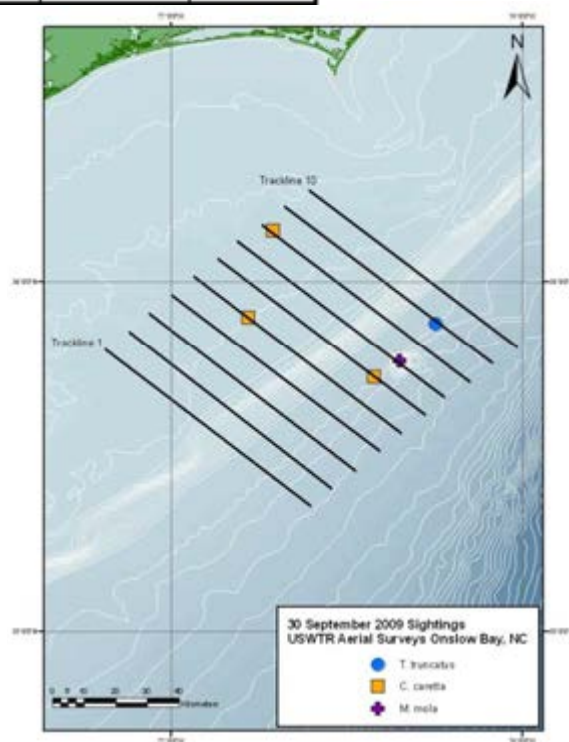
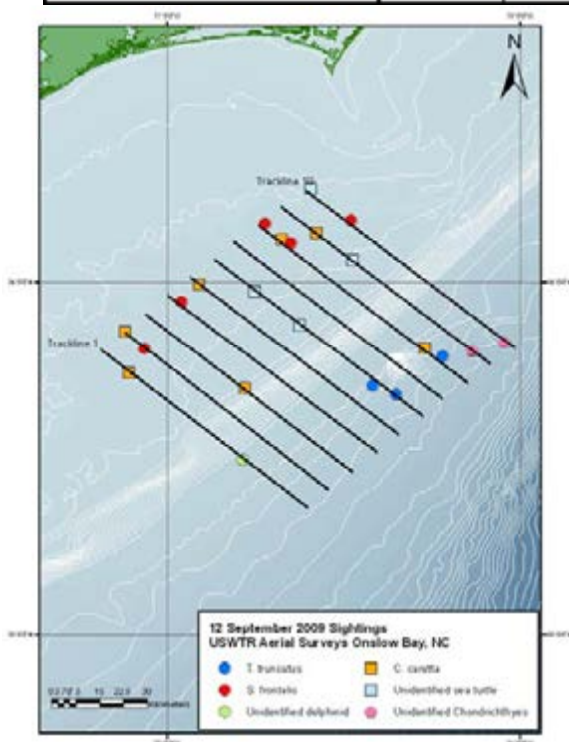
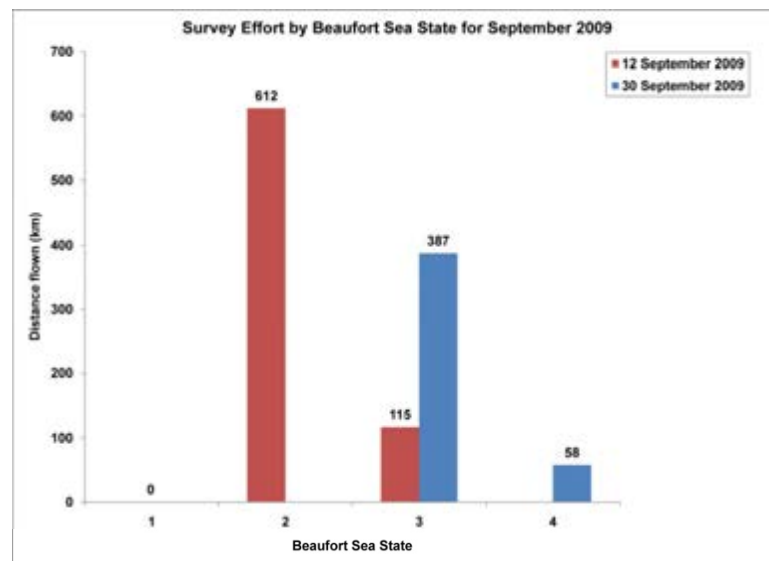


September 12, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
Unidentified Delphinid	1	3	2	1
<i>Tursiops truncatus</i>	1	1	2	6
<i>Tursiops truncatus</i>	1	3	2	6
<i>Tursiops truncatus</i>	1	19	2	8
<i>Stenella frontalis</i>	1	7	2	2
<i>Stenella frontalis</i>	1	12	2	4
<i>Stenella frontalis</i>	1	14	2	10
<i>Stenella frontalis</i>	1	4	2	8
<i>Stenella frontalis</i>	1	4	2	8
<i>Caretta caretta</i>	7	7	2	-
Unidentified sea turtle	4	4	2	-
Unidentified Chondrichthyes	2	2	2	-

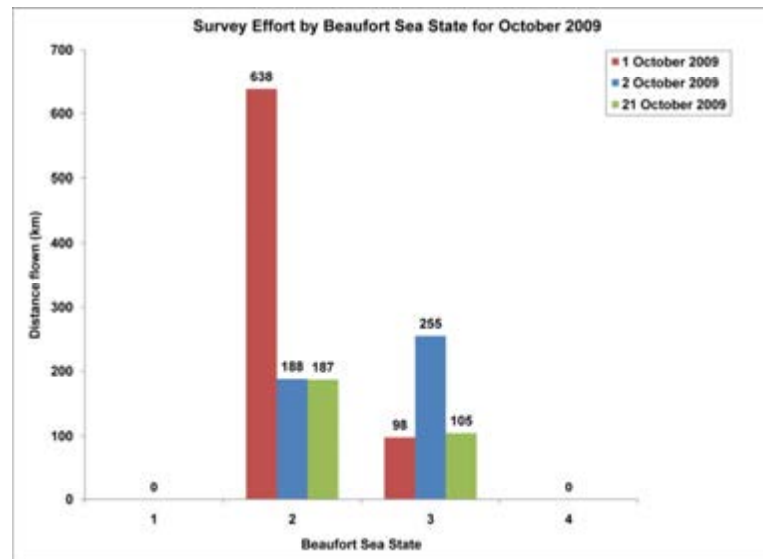
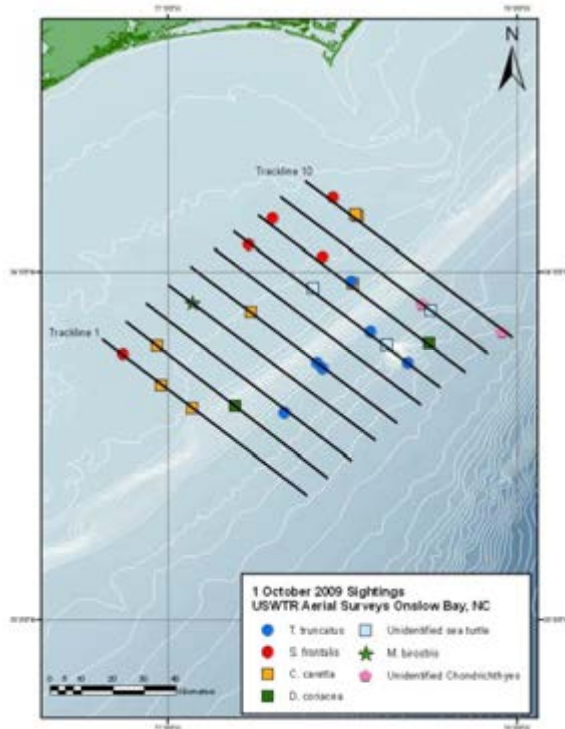
September 30, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	43	3	9
<i>Caretta caretta</i>	3	3	3	-
<i>Mola mola</i>	1	1	3	7



October 1, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	4	2	5
<i>Tursiops truncatus</i>	1	6	2	7
<i>Tursiops truncatus</i>	1	19	2	3
<i>Tursiops truncatus</i>	1	8	2	5
<i>Tursiops truncatus</i>	1	15	2	7
<i>Tursiops truncatus</i>	1	2	2	8
<i>Stenella frontalis</i>	1	20	3	7
<i>Stenella frontalis</i>	1	6	2	8
<i>Stenella frontalis</i>	1	9	2	8
<i>Stenella frontalis</i>	1	27	2	10
<i>Stenella frontalis</i>	1	4	2	1
<i>Caretta caretta</i>	7	7	2	-
<i>Dermochelys coriacea</i>	2	2	2	-
Unidentified sea turtle	3	3	2	-
<i>Manta birostris</i>	1	1	2	4
Unidentified Chondrichthyes	2	2	2 to 3	-



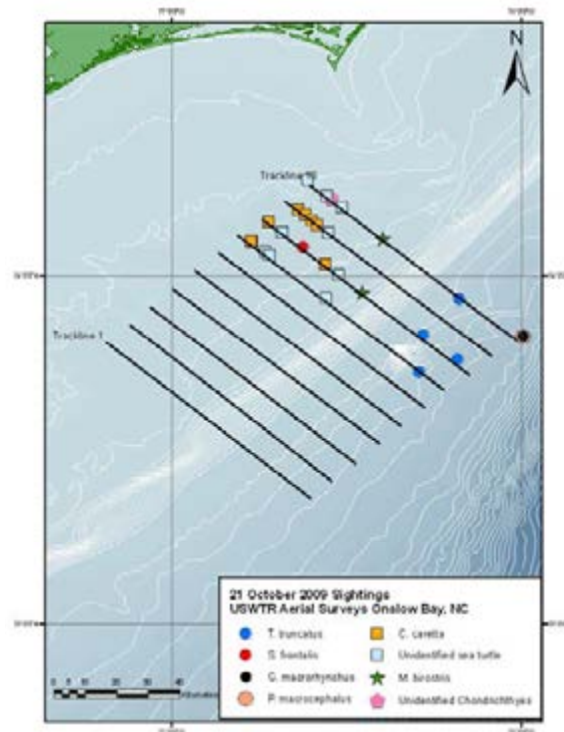
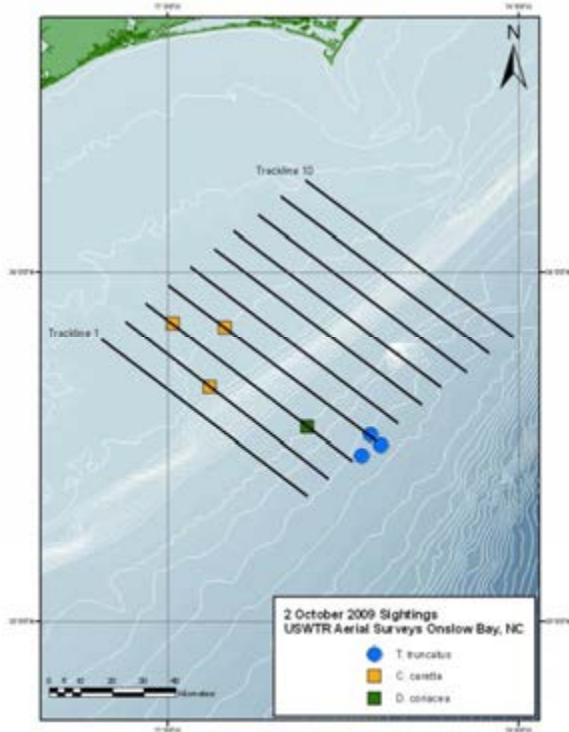
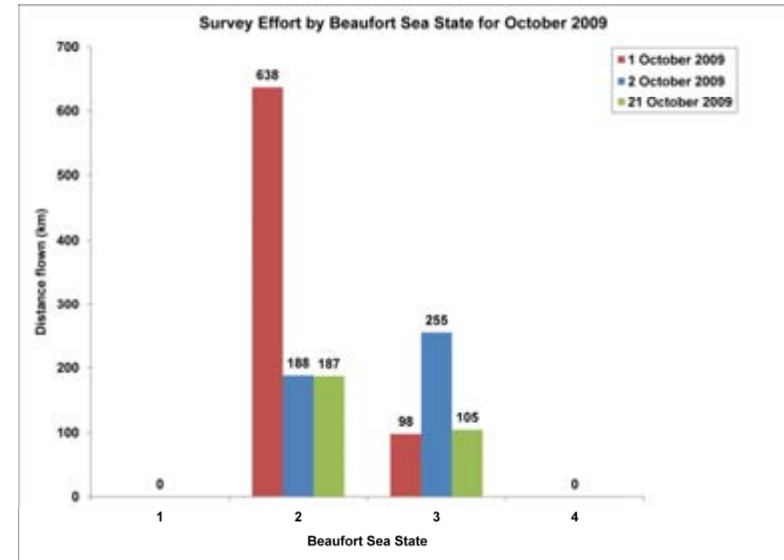


October 2, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	15	3	4
<i>Tursiops truncatus</i>	1	11	2	Off effort
<i>Tursiops truncatus</i>	1	8	2	Off effort
<i>Caretta caretta</i>	3	3	2	-
<i>Dermochelys coriacea</i>	1	1	3	3

October 21, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	6	3	10
<i>Tursiops truncatus</i>	1	2	3	8
<i>Tursiops truncatus</i>	1	40	3	8
<i>Tursiops truncatus</i>	1	12	3	7
<i>Stenella frontalis</i>	1	4	2	8
<i>Globicephala macrorhynchus</i>	1	12	3	Off effort
<i>Physeter macrocephalus</i>	1	1	3	Off effort
<i>Caretta caretta</i>	8	11	2	-
Unidentified sea turtle	9	11	2	-
<i>Manta birostris</i>	2	3	2	-
Unidentified Chondrichthyes	1	1	2	10

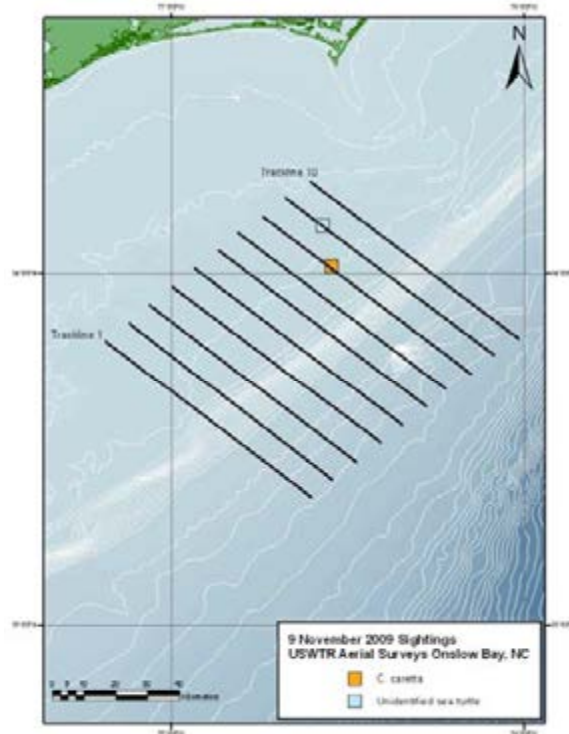
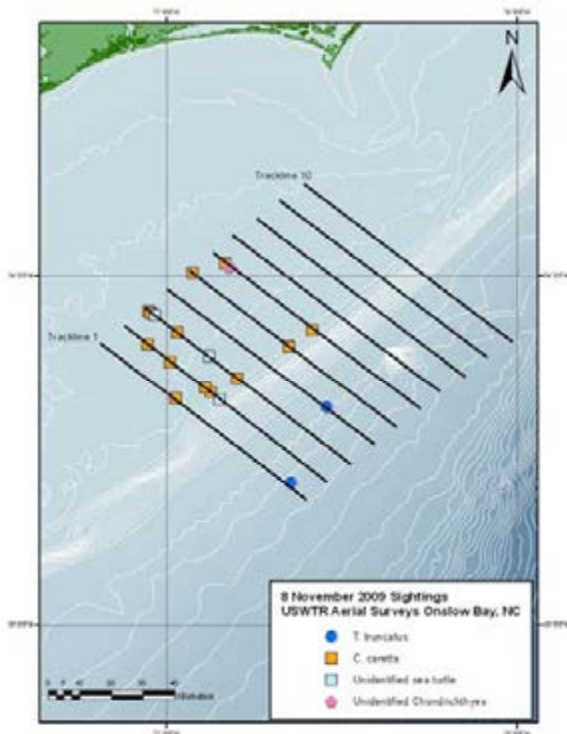
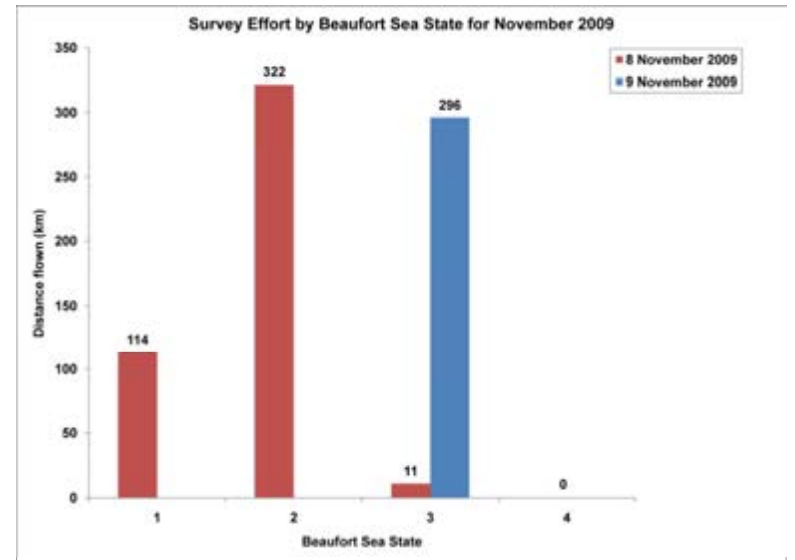


November 8, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	38	2	1
<i>Tursiops truncatus</i>	1	4	2	4
<i>Caretta caretta</i>	13	23	1 to 2	-
Unidentified sea turtle	3	3	1 to 2	-
Unidentified Chondrichthyes	1	1	1	6

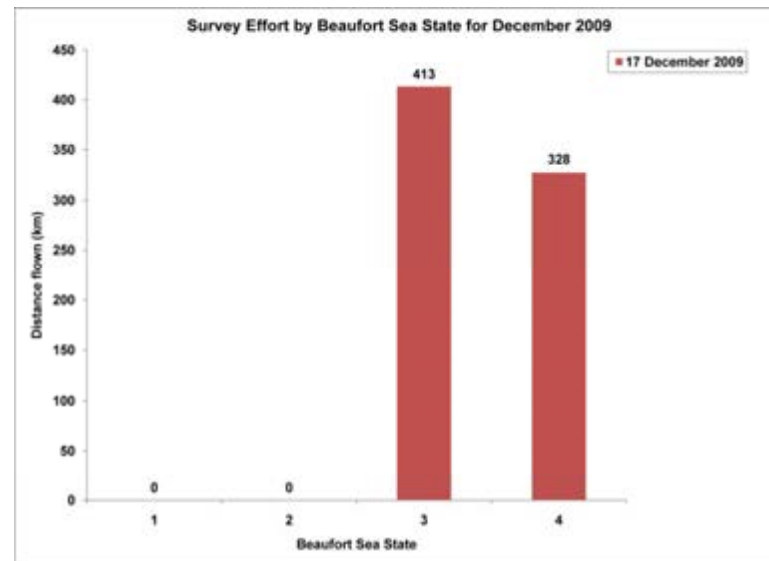
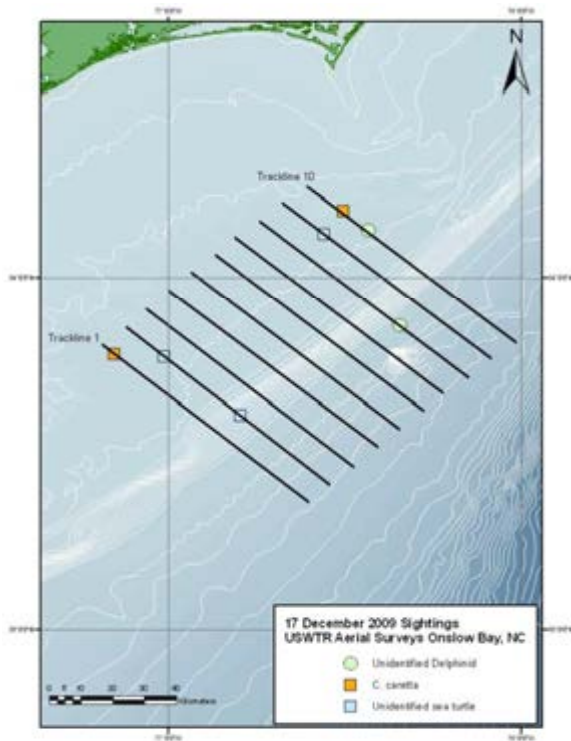
November 9, 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Caretta caretta</i>	1	1	3	-
Unidentified sea turtle	1	1	3	-



December 17, 2009

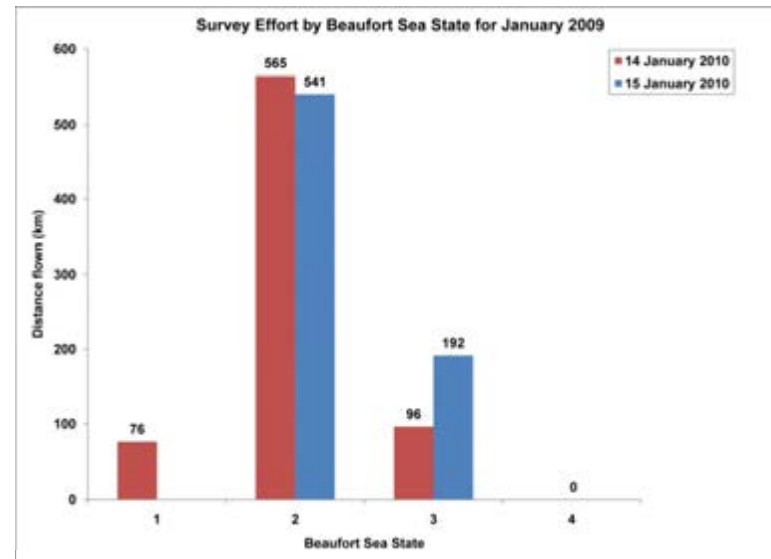
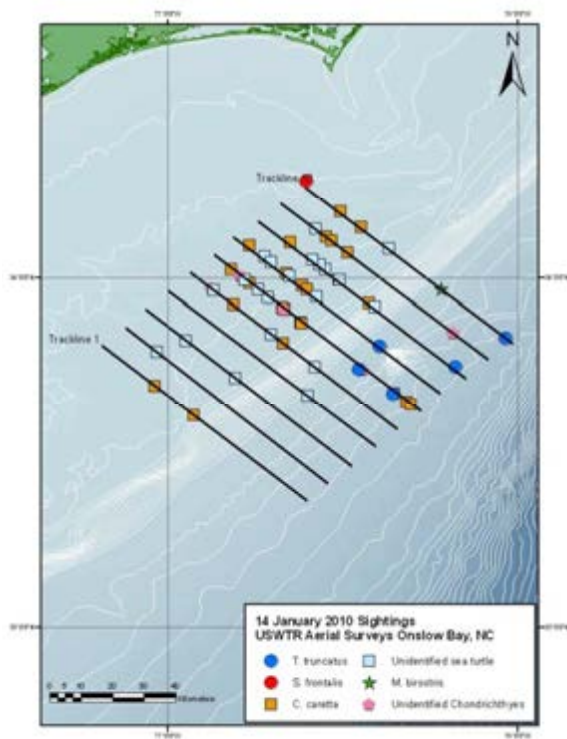
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
Unidentified delphinid	1	2	3	8
Unidentified delphinid	1	15	4	10
<i>Caretta caretta</i>	2	2	3 to 4	-
Unidentified sea turtle	3	3	3 to 4	-





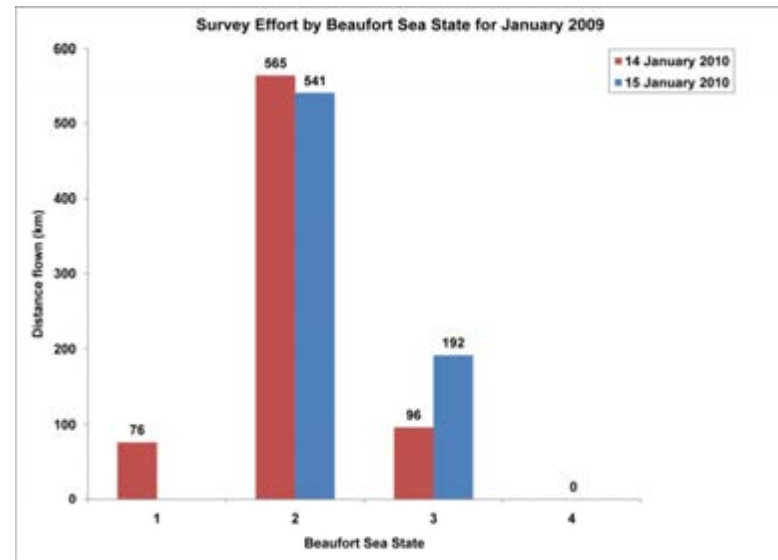
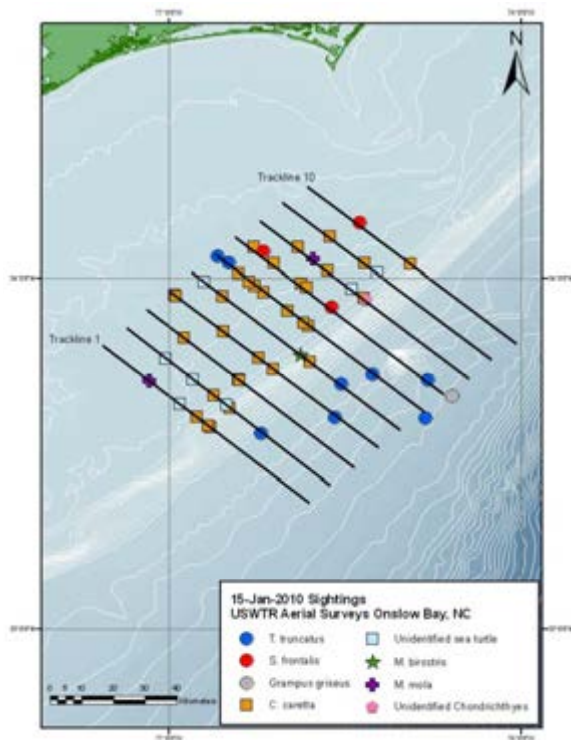
January 14, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	5	2	6
<i>Tursiops truncatus</i>	1	5	2	6
<i>Tursiops truncatus</i>	1	3	2	7
<i>Tursiops truncatus</i>	1	15	2	8
<i>Tursiops truncatus</i>	1	1	2	10
<i>Stenella frontalis</i>	1	37	2	10
<i>Caretta caretta</i>	24	45	1 to 2	-
Unidentified sea turtle	22	40	1 to 3	-
<i>Manta birostris</i>	1	1	2	10
Unidentified Chondrichthyes	6	7	2	-



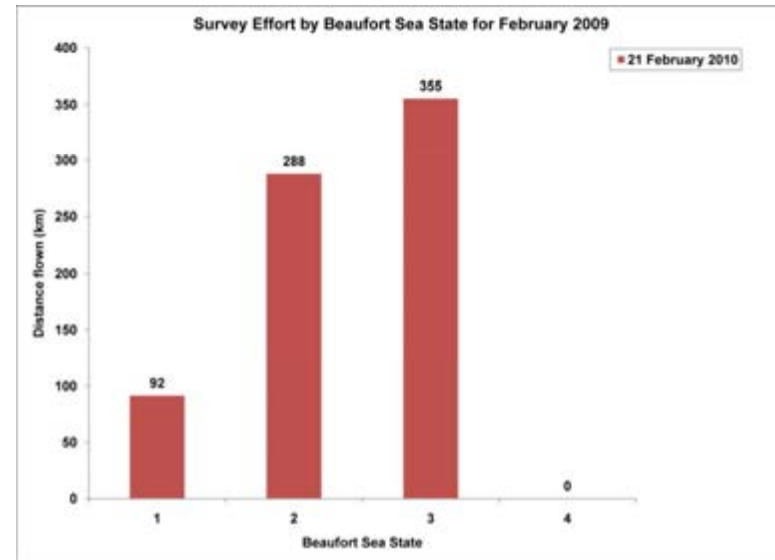
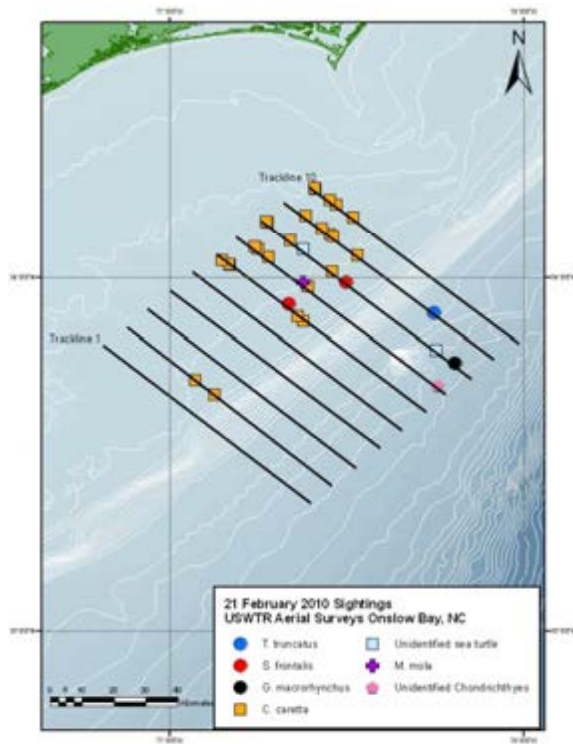
January 15, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	20	3	4
<i>Tursiops truncatus</i>	1	22	3	5
<i>Tursiops truncatus</i>	1	8	3	-
<i>Tursiops truncatus</i>	1	14	3	8
<i>Tursiops truncatus</i>	1	3	2	6
<i>Tursiops truncatus</i>	1	27	2	7
<i>Tursiops truncatus</i>	1	8	3	2
<i>Tursiops truncatus</i>	1	46	3	6
<i>Stenella frontalis</i>	1	30	2	7
<i>Stenella frontalis</i>	1	28	2	7
<i>Stenella frontalis</i>	1	47	2	10
<i>Grampus griseus</i>	1	5	-	Off effort
<i>Caretta caretta</i>	32	57	2 to 3	-
Unidentified sea turtle	7	9	2 to 3	-
<i>Manta birostris</i>	1	1	2	5
<i>Mola mola</i>	2	2	2	-
Unidentified Chondrichthyes	1	1	2	8



February 21, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	11	3	9
<i>Stenella frontalis</i>	1	18	2	6
<i>Stenella frontalis</i>	1	8	1	8
<i>Globicephala macrorhynchus</i>	1	23	2	8
<i>Caretta caretta</i>	25	49	1 to 3	-
Unidentified sea turtle	2	3	1 to 2	-
<i>Mola mola</i>	1	1	1	7
Unidentified Chondrichthyes	1	1	2	7



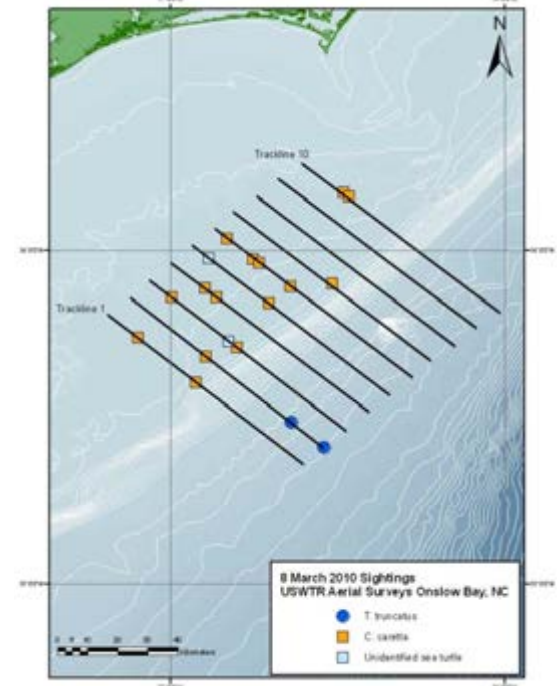
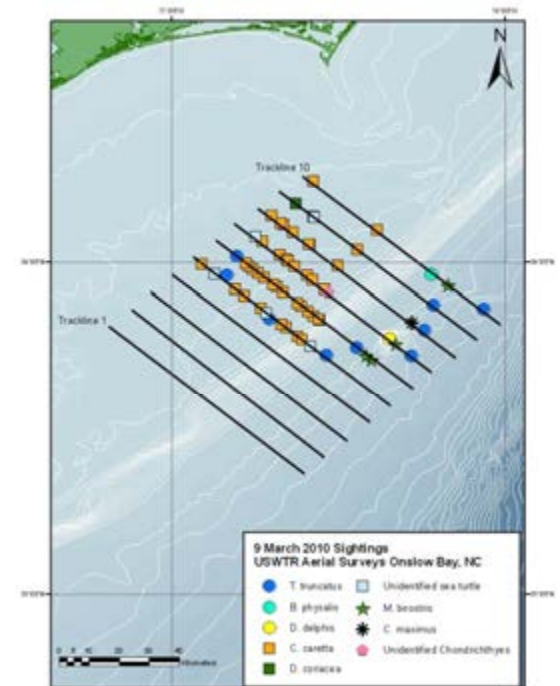
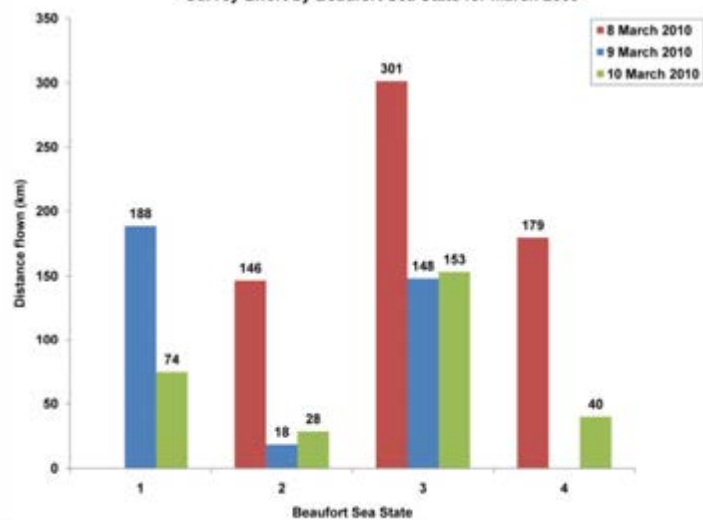
March 8, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	4	3	2
<i>Tursiops truncatus</i>	1	5	3	2
<i>Caretta caretta</i>	15	21	2 to 3	-
Unidentified sea turtle	2	2	2 to 3	-

March 9, 2010

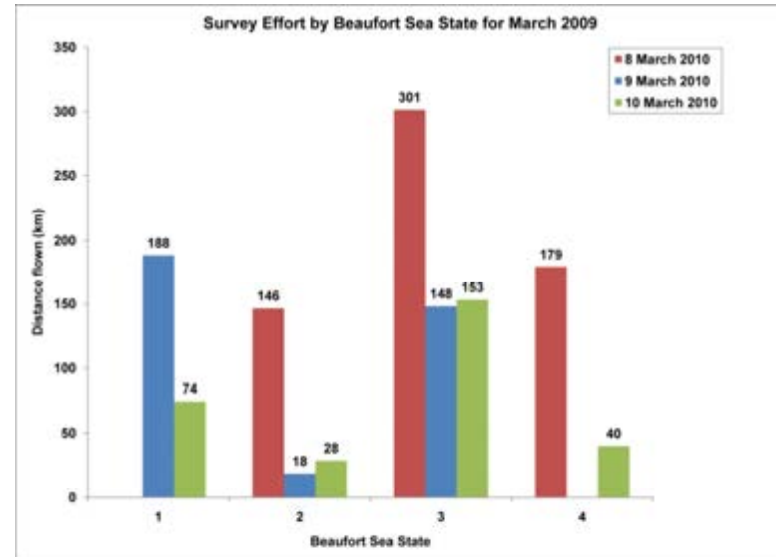
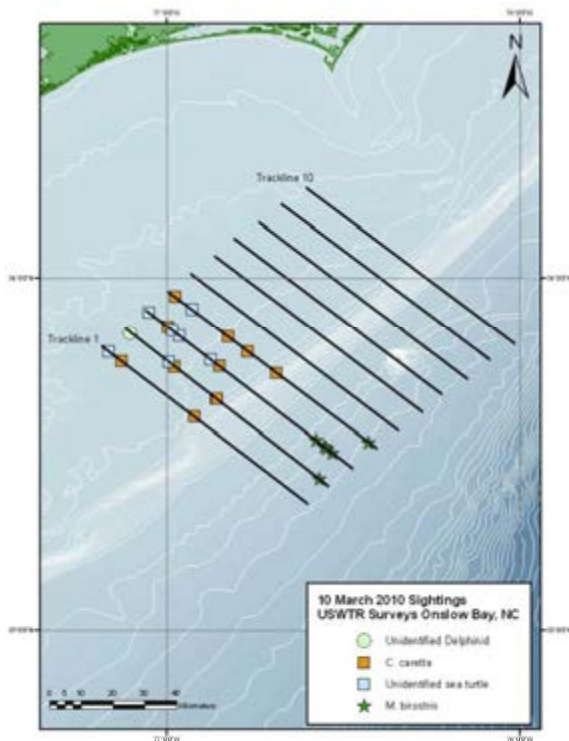
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	15	1	5
<i>Tursiops truncatus</i>	1	20	1	5
<i>Tursiops truncatus</i>	1	65	1	6
<i>Tursiops truncatus</i>	1	30	1	9
<i>Tursiops truncatus</i>	1	6	1	5
<i>Tursiops truncatus</i>	1	5	1	9
<i>Tursiops truncatus</i>	1	9	1	7
<i>Tursiops truncatus</i>	1	13	1	8
<i>Tursiops truncatus</i>	1	4	1	10
<i>Delphinus delphis</i>	1	20	1	7
<i>Balaenoptera physalis</i>	1	1	1	10
<i>Caretta caretta</i>	41	158	1 to 2	-
<i>Dermochelys coriacea</i>	1	1	1	9
Unidentified sea turtle	5	11	1 to 2	-
<i>Cetorhinus maximus</i>	1	1	1	8
<i>Manta birostris</i>	4	4	1	-
Unidentified Chondrichthyes	1	1	1	7

Survey Effort by Beaufort Sea State for March 2009



March 10, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
Unidentified delphinid	1	3	1	2
<i>Caretta caretta</i>	12	19	1 to 3	-
Unidentified sea turtle	7	13	1 to 3	-
<i>Manta birostris</i>	6	6	3 to 4	-



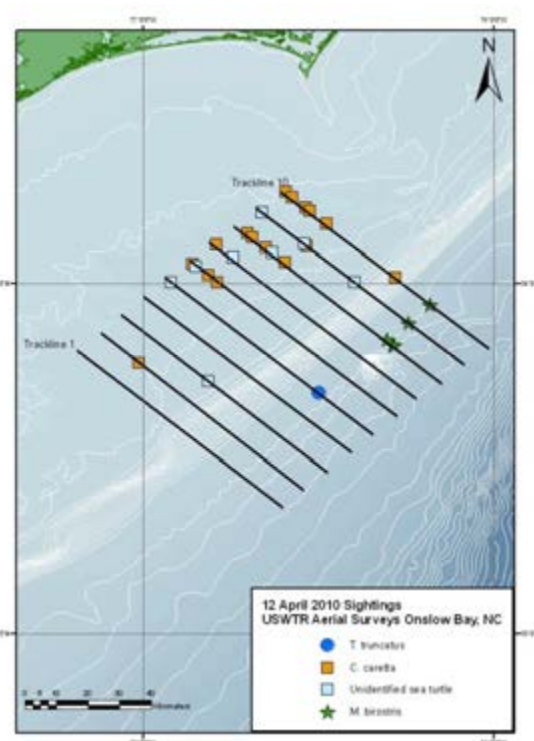
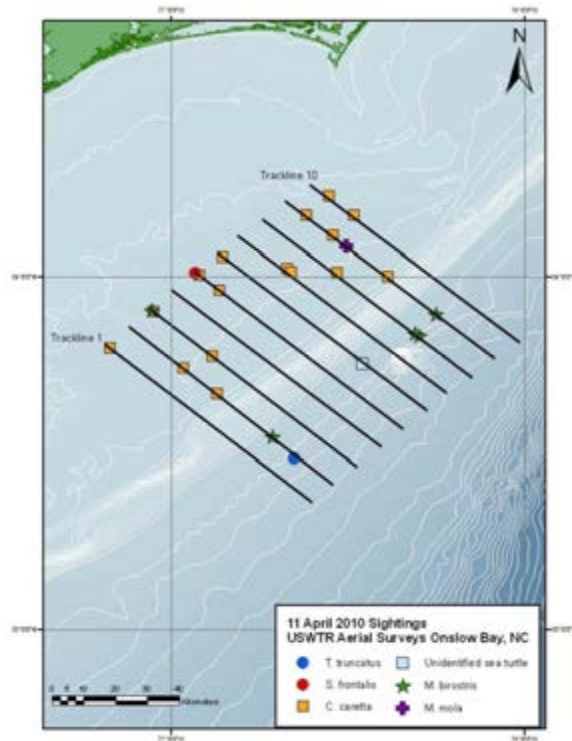
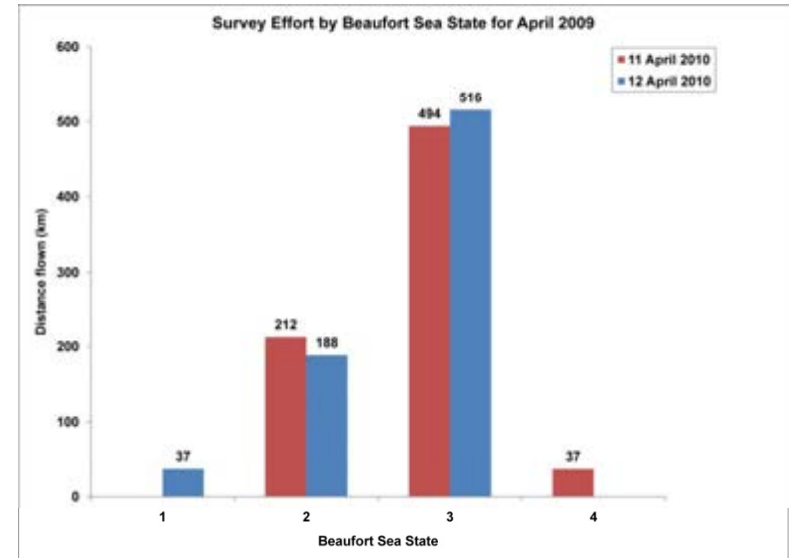


April 11, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	40	4	2
<i>Stenella frontalis</i>	1	18	2	5
<i>Caretta caretta</i>	16	17	2 to 3	-
Unidentified sea turtle	1	1	3	6
<i>Manta birostris</i>	5	5	2 to 3	-
<i>Mola mola</i>	1	1	2	9

April 12, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	9	3	5
<i>Caretta caretta</i>	16	27	1 to 3	-
Unidentified sea turtle	8	15	2 to 3	-
<i>Manta birostris</i>	5	7	3	-

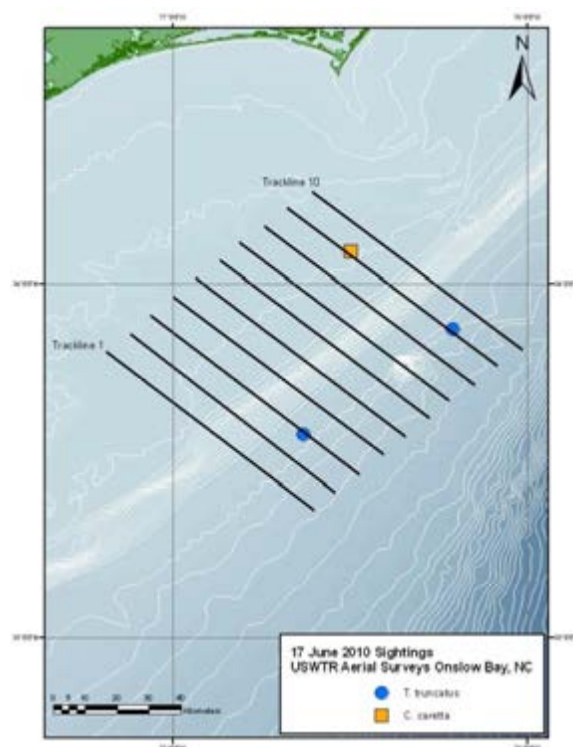
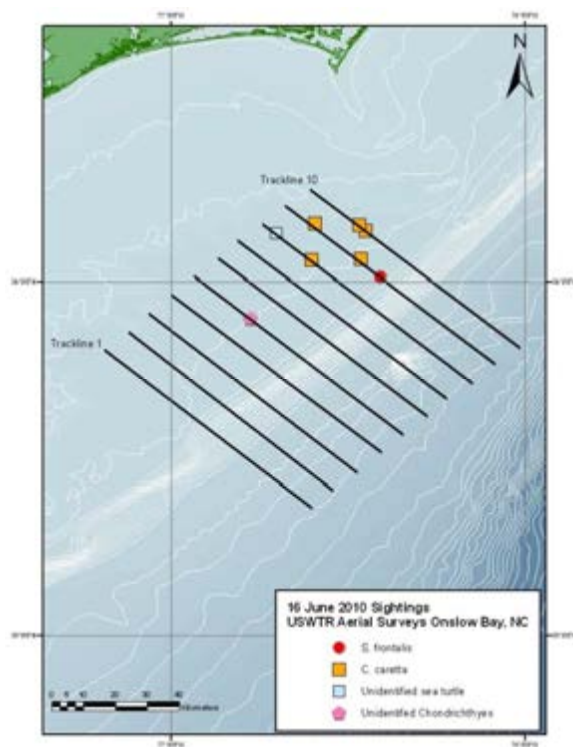
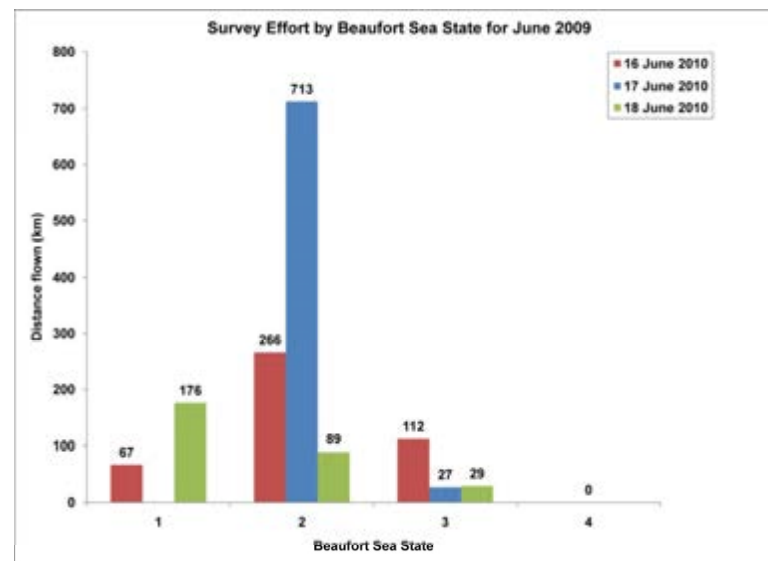


June 16, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Stenella frontalis</i>	1	55	2	9
<i>Caretta caretta</i>	5	6	2 to 3	-
Unidentified sea turtle	1	1	2	8
Unidentified Chondrichthyes	1	1	1	5

June 17, 2010

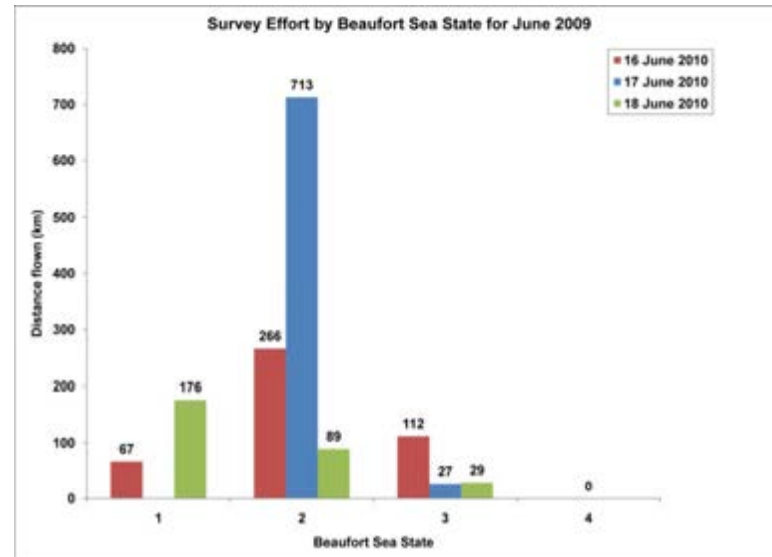
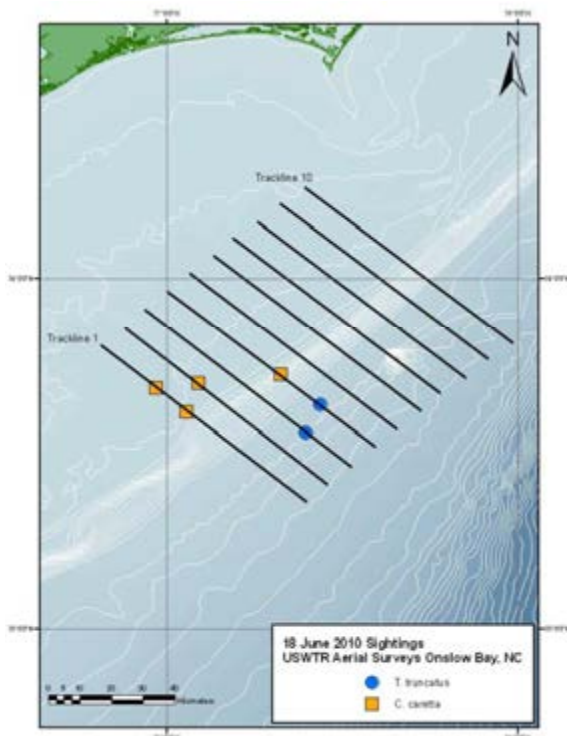
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	21	2	3
<i>Tursiops truncatus</i>	1	13	2	9
<i>Caretta caretta</i>	1	1	2	9





June 18, 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line number
<i>Tursiops truncatus</i>	1	8	1	4
<i>Tursiops truncatus</i>	1	32	1	3
<i>Tursiops truncatus</i>	1	25	1	1
<i>Caretta caretta</i>	4	4	1 to 2	-



**VESSEL-BASED SURVEYS AND PASSIVE ACOUSTIC MONITORING OF THE  
PROPOSED UNDERSEA WARFARE TRAINING RANGE (USWTR)  
IN ONSLOW BAY, NORTH CAROLINA  
JULY 2009 THROUGH JUNE 2010**



Andrew Read  
Dave Johnston  
Kim Urian  
Danielle Waples  
Lynne Williams  
Lesley Thorne  
Anna-Marie Laura  
Jennifer Dunn  
Julia Burrows  
Wendy Dow

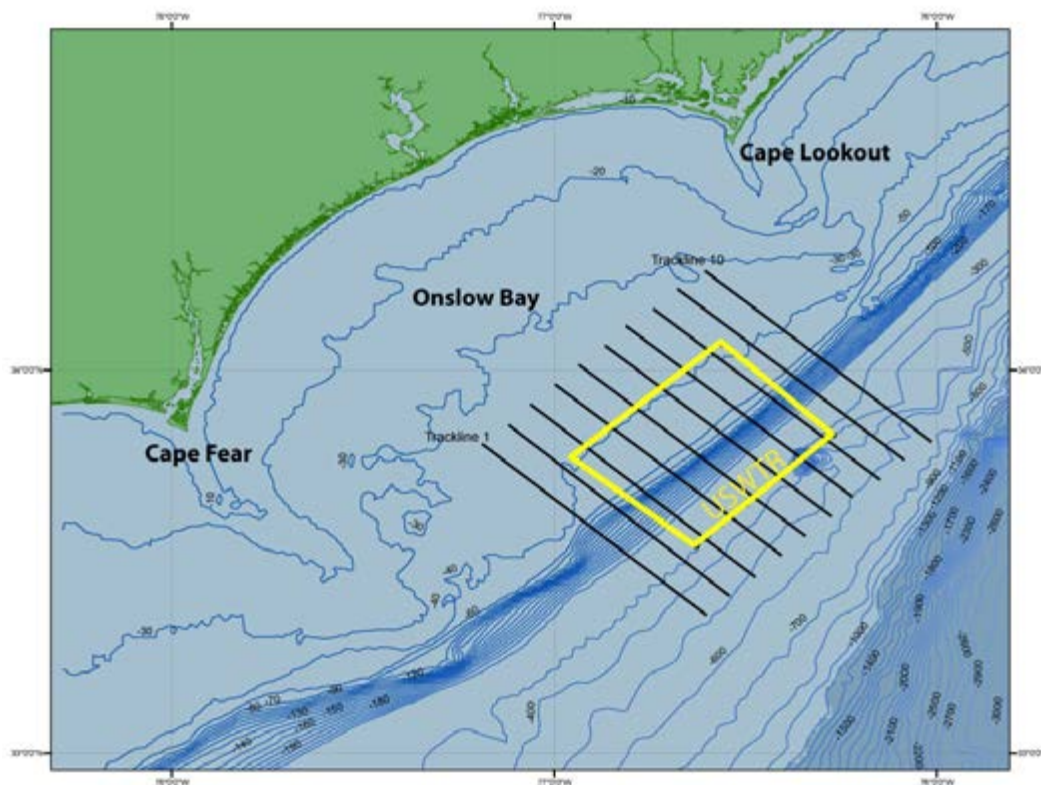
Duke University Marine Laboratory  
135 Duke Marine Lab Road  
Beaufort, NC 28516

Submitted to:  
**The Department of the Navy**  
**Norfolk, VA**

## Methodology

### Study Area

The study area consists of a box approximately 37% larger than the proposed USWTR; the USWTR area itself is 25 nm (46 km) long and 20 nm (37 km) wide (approximately from NW to SE; Figure 1). We survey ten 40-nm (74-km) long transect lines oriented parallel to the short axis of the USWTR boundaries and perpendicular to the prevailing bathymetric and oceanographic features influencing the study area. The transect lines are spaced approximately 5 nm (9.3 km) apart. This design yields a total of 400 nm (741 km) of track line available for surveys; all ten transect lines were surveyed by both aerial and shipboard platforms.



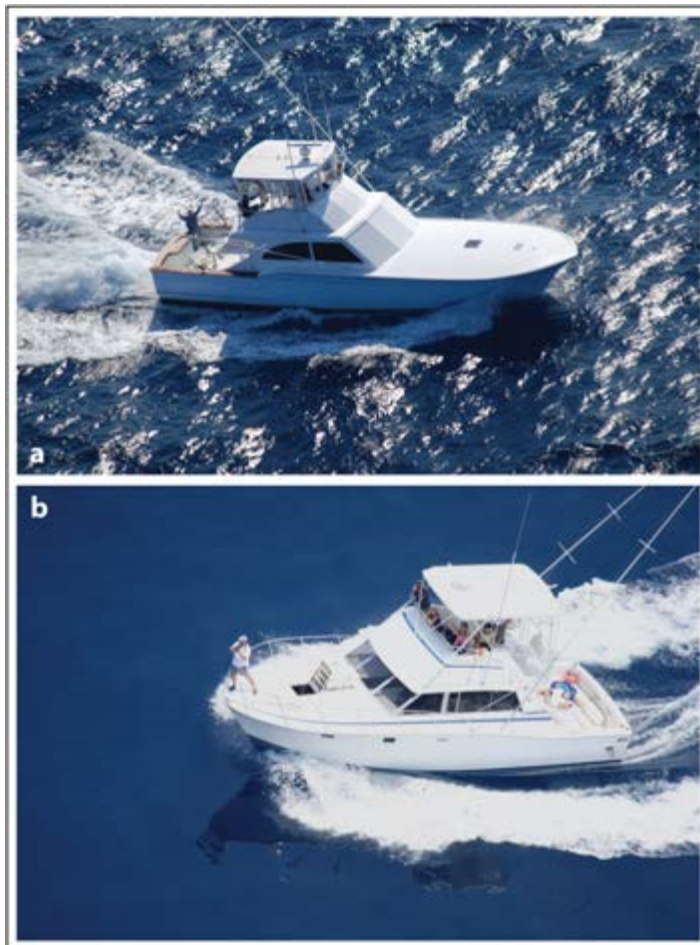
**Figure 1.** Map of the study area, the proposed Undersea Warfare Training Range (USWTR; yellow box) and bathymetry of Onslow Bay.

## Vessel Survey Data Collection

### Visual Surveys

Vessel-based survey platforms provide a greater probability of sighting deep-diving species than aerial surveys (Barlow and Gisiner 2006). Shipboard observers are also more likely to be able to confirm species identity, particularly for animals that are difficult to distinguish from the air. Additionally, vessel-based platforms allow for biopsy sampling and photographic identification.

To ensure maximum detection rates, we employed a traditional visual survey approach, supplemented by passive acoustic monitoring using a towed hydrophone array. We conducted these surveys at a speed of approximately 10 knots.



**Figure 2. Aerial photographs of the F/V *Sensation* (a) and the R/V *Cetus* (b).**

Visual surveys for cetaceans and other marine megafauna were conducted from two survey platforms: the F/V *Sensation* (Fig. 2a), a 16-m offshore fishing vessel and the R/V *Cetus* (Fig. 2b), a modified 12-m offshore fishing vessel.

Observations were made from the flying bridge (5.0m and 4.2m above waterline for the *Sensation* and *Cetus*, respectively) by naked eye and 7x50 binoculars. At the start of our project we held a classroom training exercise for all marine mammal observers at the Duke University Marine Laboratory on

April 24<sup>th</sup>, 2007. Training of new observers in Year Three continued on an as-needed basis.

Two observers (one port and one starboard) scanned constantly from straight ahead to 90° abeam either side of the trackline. A center observer monitored the trackline, coordinated with the vessel skipper and acted as data recorder. Observations were conducted following standard distance sampling/line transect methods for cetaceans, similar to those employed in Barlow (2006). The location, species and behavior of each cetacean group were recorded. If turtles were encountered, the location and species were recorded. Each observer estimated group size independently and individual estimates were averaged at the end of the survey to generate an overall estimate of group size. Environmental conditions (weather, sea state, depth and sea surface temperature) were recorded every 30 minutes or whenever sighting conditions changed. Sighting and environmental data were entered into an at-sea data collection system (Vis-Survey, developed by Dr. Lance Garrison, NOAA/SEFSC) linked with the onboard GPS.

In addition, we monitored cetacean use of the USWTR and adjacent areas by individual animals using photo-identification techniques. This approach is feasible for sperm whales, beaked whales, humpback whales, bottlenose dolphins, spotted dolphins, pilot whales and Risso's dolphins. Thus, whenever possible, we obtained photographs of cetaceans for individual photo-identification (we also use these photographs to confirm species identification at each sighting and to compare identification features with those used by the aerial survey team). Photographs were taken with Canon or Nikon digital SLRs (equipped with 100-300 mm zoom lenses) in 24-bit color at a resolution of 3072 X 2048 pixels and saved in jpg format.

Finally, seabird counts were conducted by a single experienced observer who recorded seabirds in a 90-degree bow-beam arc in a 300-meter strip on the starboard side of the ship (Tasker *et al.* 1984). The observer recorded the time and location of each bird sighting. At each sighting the observer recorded species identification, abundance, general behavior (sitting, flying, or foraging), and associations with other marine species. The presence of ship-following birds was noted separately to avoid biases in quantitative analyses.

### Passive Acoustic Monitoring

Passive acoustic data were collected in the proposed range using two methods: a towed hydrophone array and bottom-mounted recorders.

#### *Towed Array*

A four-element array was towed behind the survey vessel to allow acoustic detection of vocalizing cetaceans. The towed array (manufactured by Seiche Instruments, UK) consisted of four hydrophone elements with approximate linear sensitivity to frequencies between 1kHz and 100 kHz. The array was towed 150m behind the vessel and acoustic signals were routed to an analog-to-digital converter/mixer (MOTU Traveler, MOTU, Cambridge, MA) sampling at 192 kHz. These signals were then passed to two personal laptop computers equipped with software for real-time visualization/recording (*Ishmael* 1.0) and spatial localization (*WhalTrak* 2.0) of cetacean sounds. An acoustician (Lynne Williams) monitored the array and made recordings of all potential cetacean sounds detected and any other novel sounds. When possible, the acoustician attempted to localize cetacean vocalizations with time difference of arrival (TDOA) techniques involving two or more hydrophone elements and using *Ishmael* and *Whaltrak* software.

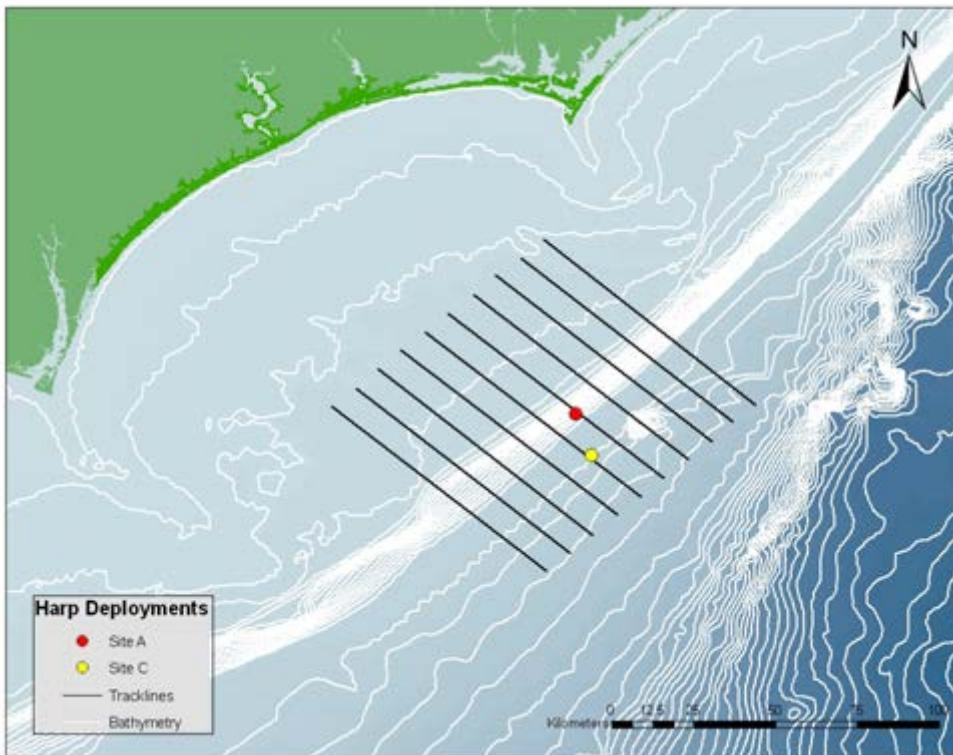
#### *Bottom-mounted Recorders*

To collect time-series of acoustic data in the Onslow Bay USWTR study area, autonomous High Frequency Acoustic Recording Packages (HARPs; Wiggins and Hildebrand 2007) were utilized. The HARP data-logging system includes a 16-bit A/D converter, up to 1.9 TB of storage capacity, a hydrophone suspended 10 m above the seafloor, an acoustic release system, ballast weights and flotation. The data-loggers are capable of sampling up to 200 kHz and can be set to record continuously or on a duty cycle to accommodate variable deployment durations. These instruments combine high and low frequency hydrophone elements to detect the vocalizations of both odontocete and mysticete whales. The units sample at rates high enough to capture the echolocation clicks of many odontocetes. We deployed the HARPs in the central region of the Onslow Bay USWTR survey area.

In Year Three, we retrieved the HARP from the third deployment (site A: 33.790°N and -76.519°W, in a depth of 174 m) on September 16, 2009. Also during Year Three, we



acquired an additional HARP was acquired, so we deployed both HARPs on November 8, 2009 (fourth deployment). One instrument was returned to site A (33.787°N and -76.524°W, 171 m depth) and one was deployed at a new, deeper site (site C 33.678°N and -76.477°W, 335 m depth; see Fig.3). We recovered both instruments on June 19, 2010. In the third deployment, the instrument was programmed to record at a sampling rate of 200 kHz for five-minute periods separated by an inactive interval of five minutes. For the fourth deployment, the instruments were programmed to record at a sampling rate of 200 kHz for five-minute periods separated by an inactive interval of 10 minutes (to further prolong the recording life of the unit).



**Figure 3.** Location of HARP deployments in Onslow Bay, NC, for Year 3.



### Data Analysis

Vessel survey effort and sighting data were compiled and mapped using ArcGIS 9.2 to illustrate the location of effort and sightings within the study area. All sighting data (including radial distance and bearing estimates for each cue) were forwarded to our colleagues at CREEM at the University of St. Andrews, UK for density estimation. Vessel based survey tracks and sighting locations from June 2007 through June 2010 have been posted on OBIS-SEAMAP (<http://seamap.env.duke.edu/>).

### Acoustic Analysis

Towed hydrophone array recordings were analyzed with the software program *Raven Pro 1.3*. Selections of whistles and clicks from sightings with positive species identifications were saved for future analysis of species-specific patterns. Discriminant function analyses (DFAs) will be performed to look for species-specificity in the whistles after measuring several parameters including: start, end, minimum and maximum frequency; duration; number of inflection points; and number of steps. This approach is similar to that used by Oswald *et al.* (2003). We also plan to look for species-specific patterns, such as consistent peaks and notches, in the recorded clicks using techniques, similar to those employed by Soldevilla *et al.* (2008). Analyses of variance (ANOVAs) will be used to examine species-specific frequency differences in peaks and notches of echolocation clicks. In addition, techniques that combine both whistles and clicks into a single classifying analysis will be explored, such as combining certain parameters of each call type in a single DFA. Inclusion of both call types (whistles and clicks) may help us to increase correct classification rates.

HARP data requires processing prior to analysis, including backing up data in original format, converting data to wav format, decimating wav data by factors of 10 and 100 to aid in baleen whale detection, and creating long-term spectral averages (LTSAs). LTSAs provide a way to examine hours to weeks of data on the same spectrogram, allowing for rapid review of large data sets. Each HARP deployment results approximately 2 TB of data, which is impractical to analyze manually in original form. Therefore, these data were compressed for visual overview by creating LTSAs from the wav files. LTSAs are effectively compressed spectrograms created using the Welch algorithm (Welch, 1967) by

coherently averaging 500 spectra created from 2000-point, 0%-overlapped, Hann-windowed data and displaying these averaged spectra sequentially over time. The resulting LTSAs had resolutions of 5 s in time and 100 Hz, 10 Hz and 1 Hz in frequency, for the original, decimation factor 10 and df 100 data, respectively. Using LTSAs, high energy acoustic events can easily be distinguished from background noise (*e.g.* Wiggins and Hildebrand, 2007), allowing an efficient review of these large data sets.

LTSAs made using a MATLAB-based acoustic program called *Triton* (Hildebrand Lab at Scripps Institution of Oceanography) were used to look for odontocete whistle and click events in the HARP data from the third deployment (24 April 2009 – 9 August 2009) and the fourth deployment at site C (8 November 2009 – 20 April 2010). (The HARP located at site A during the fourth deployment stopped recording early (24 February 2010) and had some timing errors which are currently being examined at Scripps. For these reasons, these data have not yet been processed.) We inspected these LTSAs in *Triton* for high-energy events representing whistles and clicks. Our analysis of diel patterns employed definitions of photoperiods obtained from the U.S. Naval Observatory website (<http://aa.usno.navy.mil>). A day or night-time designation was assigned to each one-hour bin that contained vocal events. Diel variation in the occurrence of vocal events was statistically tested using a Kruskal-Wallis.

In the upcoming months, we will choose loud and clear whistles with acceptable signal-to-noise ratios for further analysis. The same parameters used in determining species-specific differences will be measured in these newly selected whistles. These values will then be processed using a combination of DFAs and Classification and Regression Trees (CART) to determine to which species was responsible for the vocalization.

We also will select one click from each click train for further analysis. The selected clicks will be examined for peaks and notches that occur within frequency ranges determined by towed array data for different species. This examination will help to determine which species produced the echolocation clicks.

In addition, for those instances when both whistles and clicks are detected in a single vocal event, the predicted species identification for both the whistles and clicks from that same event will be compared to determine if the same species was selected. In addition to determining the likely vocalizing species in this way, we will explore techniques that combine both whistles and clicks into a single classifying analysis.

HARP data from all deployments has been decimated to look for baleen whale calls. Once we have determined which species is responsible for these calls, we will sort the vocal events by species and look for temporal patterns in their vocalizations.

### Data Storage

All acoustic, visual survey and photographic data are archived on digital media and backed up on a Duke University network server.

## **Results**

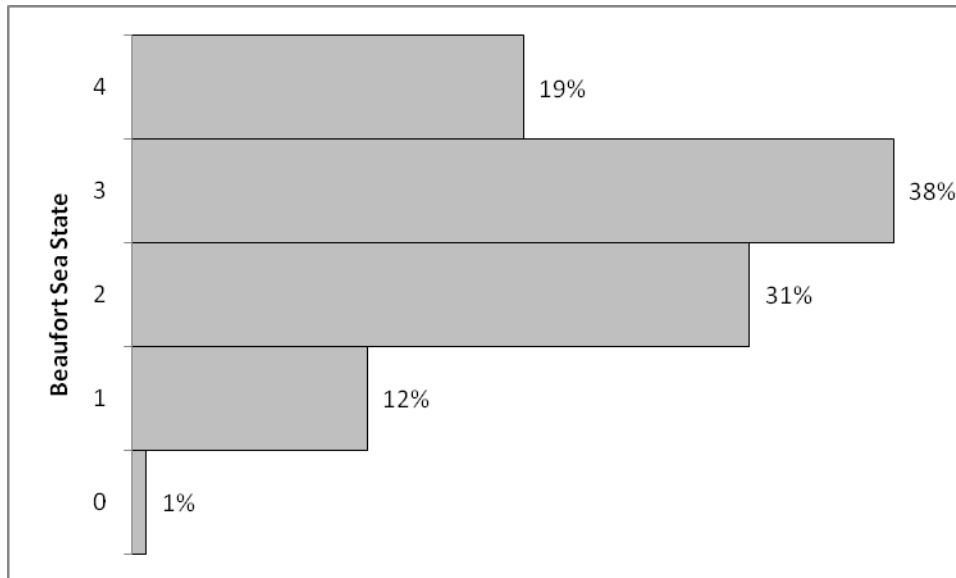
### Vessel Survey Effort

Between 1 July 2009 and 30 June 2010, we surveyed 21 tracklines (Table 1) during approximately 115 hours of marine mammal surveys (109 hours on effort, 6 hours off effort). During this period we also completed 12 hours of on effort seabird surveys.

Surveys were conducted in Beaufort Sea States 0 to 4. Most survey effort was conducted in Beaufort 2 and 3 (69%); only 13% of effort was conducted in optimal (Beaufort 0 and 1) sighting conditions (Fig. 4).

**Table 1. Vessel survey effort in Onslow Bay. Number of tracklines completed per year. Year 1 includes June 2007 through June 2008. Year 2 includes July 2008 through June 2009. Year 3 includes July 2009 through June 2010. Survey effort is rounded to the nearest integer.**

Trackline	Year 1	Year 2	Year 3
1	1	1	2
2	2	2	1
3	3	3	2
4	4	2	2
5	4	4	1
6	3	2	1
7	4	1	4
8	2	2	3
9	3	4	2
10	4	2	3
<b>Total</b>	<b>29</b>	<b>22</b>	<b>21</b>



**Figure 4. Distribution of sea state conditions (% of total effort) for vessel surveys during Year Three in Onslow Bay.**

### Marine Mammal and Sea Turtle Line Transect Sightings

We recorded 55 marine mammal sightings during vessel surveys (45 while on effort, 10 while off effort) in Year Three (Table 2). Five species of cetaceans were detected visually in the study area: bottlenose dolphins (*Tursiops truncatus*, n=29; 22 on effort), Atlantic spotted dolphins (*Stenella frontalis*, n=17; 16 on effort), Risso's dolphins (*Grampus griseus*, n=3; 2 on effort), pilot whales (*Globicephala macrorhynchus*, n=2; 1 on effort), and rough-toothed dolphins (*Steno bredanensis*, n=1; on effort). This was the first sighting of rough-toothed dolphins during vessel surveys in the Onslow Bay USWTR. In addition, the vessel survey team made one on effort sighting of a group of dolphins that were either bottlenose or spotted dolphins and two sightings of unidentified delphinids (one on effort). No mixed-species groups were observed (Table 3). Overall sightings per unit effort was, not surprisingly, highest in Beaufort Sea State 0, but sightings were made in all conditions (Figure 5).

We also recorded 50 sea turtle sightings during vessel surveys (34 while on effort, 16 while off effort) in Year Three (Tables 2 and 4). Two species of sea turtles were recorded in the study area: loggerheads (*Caretta caretta*, n=47 of 48 individuals; 33 on effort) and leatherbacks (*Dermochelys coriacea*, n=2; one on effort).

**Table 2. Vessel-based cetacean and sea turtle sightings made in the Onslow Bay USWTR study area during Year Three, July 2009 through June 2010.**

Date	Vessel	Trackline	Depth (m)	Temp (°C)	Species	Group Size	Effort
07/11/09	Cetus	8	36	29.7	<i>Tursiops truncatus</i>	6	On
07/11/09	Cetus	8	153	29.2	<i>Unidentified delphinid</i>	n/a	On
08/08/09	Sensation	1	38	27.1	<i>Stenella frontalis</i>	5	On
08/09/09	Sensation	4	41.1	28.8	<i>Stenella frontalis</i>	5	On
08/09/09	Sensation	4	36.6	27.9	<i>Caretta caretta</i>	1	On
08/09/09	Sensation	4	427.9	27.9	<i>Grampus griseus</i>	24	On
08/09/09	Sensation	4	39.5	28	<i>Tursiops truncatus</i>	3	On
08/16/09	Sensation	2	42.6	29.2	<i>Caretta caretta</i>	1	On
08/16/09	Sensation	2	504.7	30.2	<i>Grampus griseus</i>	36	Off
08/16/09	Sensation	2	457.2	30	<i>Grampus griseus</i>	16	On
08/16/09	Sensation	2	290.8	30.1	<i>Tursiops truncatus</i>	6	On
08/16/09	Sensation	2	267	30.1	<i>Tursiops truncatus</i>	16	On
08/16/09	Sensation	2	215.8	28.7	<i>Tursiops truncatus</i>	14	On
08/16/09	Sensation	2	42.1	28.8	<i>Tursiops truncatus</i>	4	On
08/17/09	Sensation	5	35.5	29.1	<i>Stenella frontalis</i>	10	On
08/17/09	Sensation	5	34.7	28.9	<i>Stenella frontalis</i>	5	On
08/17/09	Sensation	5	34.9	28.8	<i>Stenella frontalis</i>	5	On
08/17/09	Sensation	5	446.2	30	<i>Caretta caretta</i>	1	On
08/17/09	Sensation	5	305.4	29.9	<i>Tursiops truncatus</i>	41	On
08/18/09	Sensation	3	42.1	30.2	<i>Caretta caretta</i>	1	On
08/18/09	Sensation	3	40.4	30.8	<i>Caretta caretta</i>	1	On
08/18/09	Sensation	3	37.1	30.6	<i>Caretta caretta</i>	1	On
08/18/09	Sensation	3	42.6	29.4	<i>Dermochelys coriacea</i>	1	Off
08/18/09	Sensation	3	37.3	30.7	<i>Dermochelys coriacea</i>	1	On
08/18/09	Sensation	3	475.5	30	<i>Globicephala macrorhynchus</i>	8	Off
08/18/09	Sensation	3	464.5	29.9	<i>Globicephala macrorhynchus</i>	45	On
08/18/09	Sensation	3	168.2	30.3	<i>Steno bredanensis</i>	27	On
08/18/09	Sensation	3	48.6	29.4	<i>Tursiops truncatus</i>	10	Off
08/18/09	Sensation	3	41	31	<i>Tursiops truncatus</i>	2	On
08/18/09	Sensation	3	40.2	30.9	<i>Tursiops truncatus</i>	4	On
08/18/09	Sensation	3	38	30.6	<i>Tursiops truncatus</i>	12	On
08/18/09	Sensation	3	20.4	30.7	<i>Unidentified turtle</i>	1	Off
09/15/09	Sensation	8	39.9	28.8	<i>Caretta caretta</i>	1	Off
09/15/09	Sensation	8	36.9	28.8	<i>Caretta caretta</i>	1	Off
09/15/09	Sensation	8	406	27.1	<i>Tursiops truncatus</i>	9	Off
09/15/09	Sensation	8	442.6	27.6	<i>Tursiops truncatus</i>	5	On
09/16/09	Sensation	6	303.6	27.3	<i>Tursiops truncatus</i>	9	Off

09/16/09	Sensation	6	387.7	28.7	<i>Tursiops truncatus</i>	15	On
09/24/09	Sensation	10	40.4	29	<i>Caretta caretta</i>	1	On
09/24/09	Sensation	10	239.5	29.8	<i>Tursiops truncatus</i>	10	On
10/01/09	Sensation	7	41.7	27.6	<i>Stenella frontalis</i>	103	On
10/01/09	Sensation	7	41	27.9	<i>Stenella frontalis</i>	6	On
10/01/09	Sensation	7	37.3	27.4	<i>Stenella frontalis</i>	15	On
10/01/09	Sensation	7	592.5	27.5	<i>Tursiops truncatus</i>	5	On
10/01/09	Sensation	7	167.3	27.2	<i>Tursiops truncatus</i>	42	On
10/22/09	Sensation	9	38.8	27.3	<i>Caretta caretta</i>	1	On
10/22/09	Sensation	9	39	27.6	<i>Caretta caretta</i>	1	On
10/22/09	Sensation	9	20.8	27.8	<i>Caretta caretta</i>	1	On
10/22/09	Sensation	9	38.4	27.8	<i>Caretta caretta</i>	1	On
10/22/09	Sensation	9	550.5	28.2	<i>Tursiops truncatus</i>	2	Off
10/22/09	Sensation	9	33.8	25.7	<i>Tursiops truncatus</i>	1	On
10/22/09	Sensation	9	34.7	25.3	<i>Tursiops truncatus/Stenella frontalis</i>	1	On
01/15/10	Sensation	8	37.3	13.9	<i>Stenella frontalis</i>	143	On
01/15/10	Sensation	8	33.5	14	<i>Stenella frontalis</i>	24	On
01/15/10	Sensation	8	40.8	16.1	<i>Caretta caretta</i>	1	Off
01/15/10	Sensation	8	33.5	14	<i>Caretta caretta</i>	1	Off
01/15/10	Sensation	8	42.2	19.7	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	42.6	17.6	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	41	17.2	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	41	16.6	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	41	17.2	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	38	14.1	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	38	14.1	<i>Caretta caretta</i>	1	On
01/15/10	Sensation	8	248.7	22.2	<i>Tursiops truncatus</i>	3	On
01/16/10	Sensation	10	47.7	19.4	<i>Stenella frontalis</i>	8	On
01/16/10	Sensation	10	40.2	16.1	<i>Stenella frontalis</i>	127	On
01/16/10	Sensation	10	32.4	14.7	<i>Stenella frontalis</i>	10	On
01/16/10	Sensation	10	47.7	19.4	<i>Caretta caretta</i>	1	Off
03/09/10	Cetus	9	35.4	20.8	<i>Caretta caretta</i>	1	Off
03/09/10	Cetus	9	35.4	20.8	<i>Caretta caretta</i>	1	Off
03/09/10	Cetus	9	450	21.5	<i>Tursiops truncatus</i>	10	Off
03/09/10	Cetus	9	425	21.8	<i>Tursiops truncatus</i>	23	Off
04/02/10	Cetus	10	n/a	n/a	<i>Caretta caretta</i>	1	Off
04/02/10	Cetus	10	n/a	n/a	<i>Caretta caretta</i>	1	Off
04/02/10	Cetus	10	n/a	n/a	<i>Caretta caretta</i>	1	Off
04/02/10	Cetus	10	n/a	n/a	<i>Caretta caretta</i>	1	Off
04/02/10	Cetus	10	32.7	20.8	<i>Caretta caretta</i>	1	On



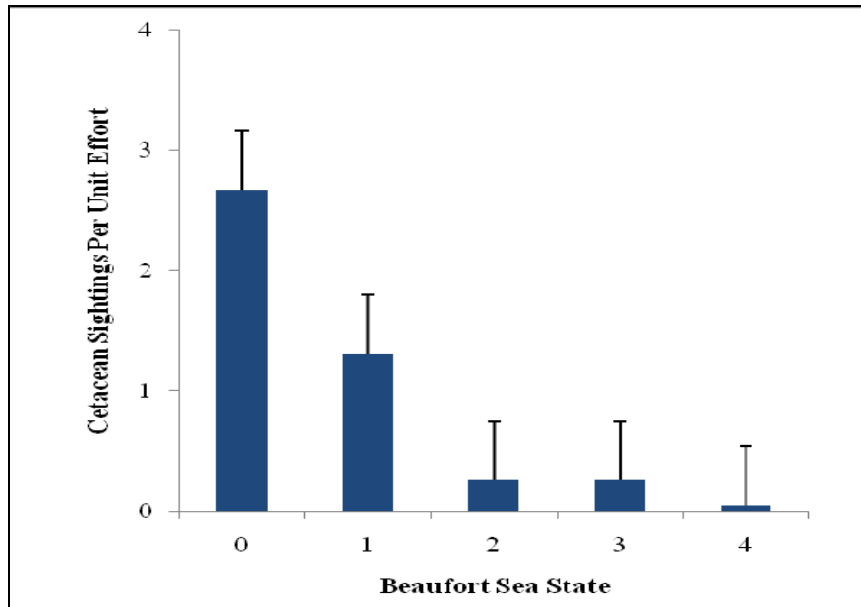
04/02/10	Cetus	10	n/a	n/a	<i>Caretta caretta</i>	1	On
04/02/10	Cetus	10	46	20.9	<i>Tursiops truncatus</i>	9	On
04/02/10	Cetus	10	n/a	n/a	<i>Tursiops truncatus</i>	36	On
04/11/10	Sensation	1	501.1	22.1	<i>Tursiops truncatus</i>	12	Off
04/12/10	Sensation	7	36.6	17.6	<i>Caretta caretta</i>	1	Off
04/12/10	Sensation	7	36.6	17.6	<i>Caretta caretta</i>	1	Off
04/12/10	Sensation	7	36.8	17.6	<i>Caretta caretta</i>	1	On
04/12/10	Sensation	7	35.8	17.6	<i>Caretta caretta</i>	1	On
04/12/10	Sensation	7	37.3	17.6	<i>Caretta caretta</i>	1	On
04/12/10	Sensation	7	35.1	17.6	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	49.4	19.3	<i>Stenella frontalis</i>	6	On
04/20/10	Sensation	4	36.4	20.1	<i>Stenella frontalis</i>	12	On
04/20/10	Sensation	4	39.1	20.3	<i>Caretta caretta</i>	1	Off
04/20/10	Sensation	4	63.6	19.9	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	35.8	19.8	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	34.7	19.3	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	35.8	19.7	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	34.7	18.8	<i>Caretta caretta</i>	2	On
04/20/10	Sensation	4	36.4	18.8	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	36.4	18.8	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	3	36.4	18.8	<i>Caretta caretta</i>	1	On
04/20/10	Sensation	4	36.6	20.1	<i>Tursiops truncatus</i>	3	On
04/20/10	Sensation	4	39.1	20.3	<i>Tursiops truncatus</i>	6	On
05/07/10	Sensation	3	38.2	21.8	<i>Caretta caretta</i>	1	On
05/07/10	Sensation	3	38	22.5	<i>Unidentified delphinid</i>	2	Off
06/16/10	Cetus	7	34.38	28.7	<i>Stenella frontalis</i>	14	Off
06/16/10	Cetus	7	34.83	29.5	<i>Stenella frontalis</i>	8	On
06/16/10	Cetus	7	37.7	29.7	<i>Tursiops truncatus</i>	2	On

**Table 3.** Number of sightings and mean group size for each species observed during Year 1, Year 2, and Year 3 of vessel surveys in the Onslow Bay USWTR area.

Species	Sightings			Mean Group Size
	Year 1	Year 2	Year 3	
<i>Globicephala sp.</i>	1	0	2	<b>31.0</b>
<i>Grampus griseus</i>	3	0	3	<b>30.5</b>
<i>Stenella frontalis</i>	6	17	17	<b>17.7</b>
<i>Tursiops truncatus</i>	23	14	29	<b>10.9</b>
<i>Steno bredanensis</i>	0	0	1	<b>27.0</b>
Unid. Delphinid	3	2	3	<b>1.6</b>
<b>Total:</b>	<b>36</b>	<b>33</b>	<b>55</b>	

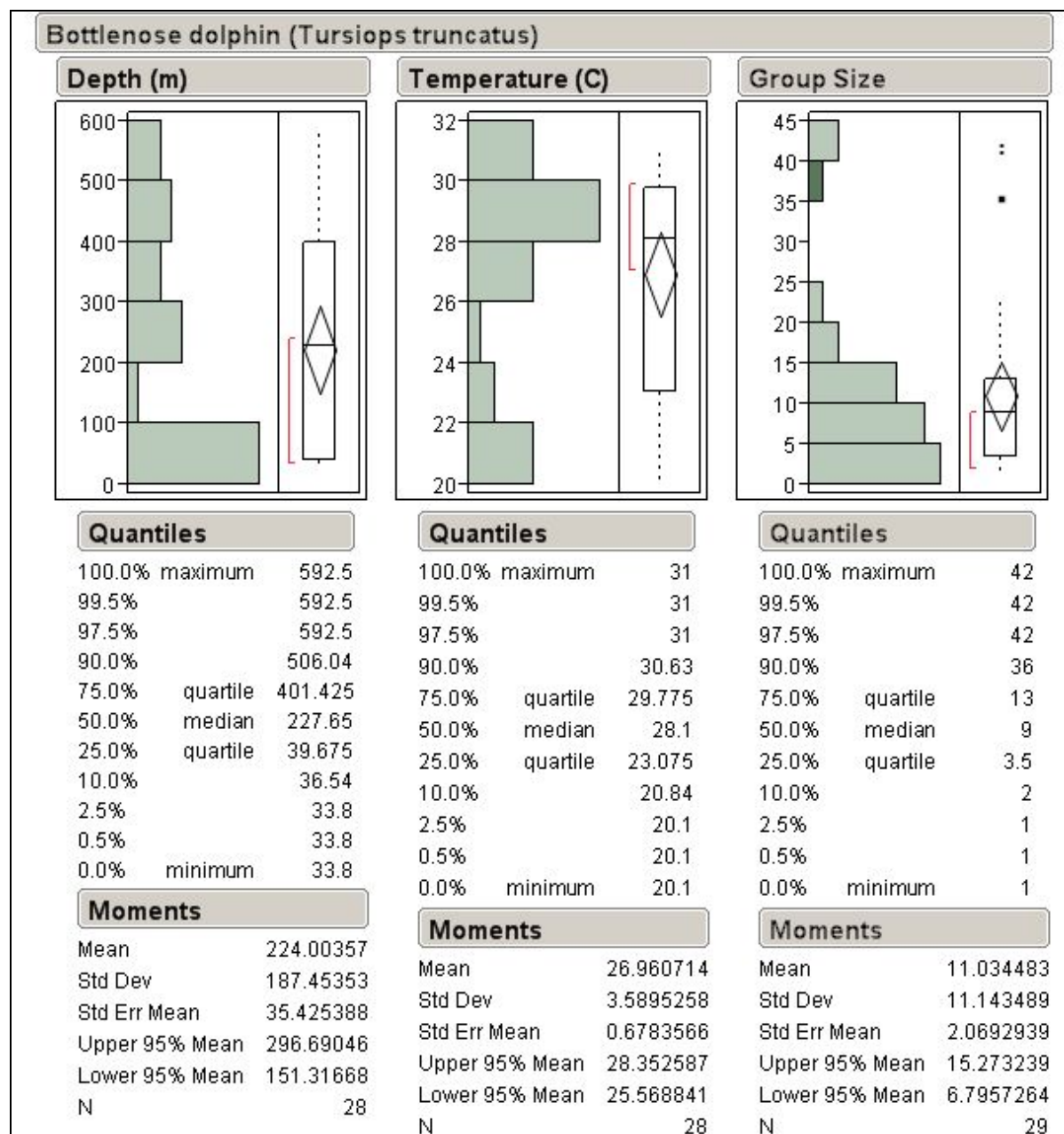
**Table 4.** Number of sea turtle sightings for each species observed during Year 1, Year 2, and Year 3 of vessel surveys in the Onslow Bay USWTR area.

Species	Sightings		
	Year 1	Year 2	Year 3
<i>Caretta caretta</i>	19	49	47
<i>Dermochelys coriacea</i>	0	0	2
Unid. Turtle	1	0	1
<b>Total:</b>	<b>20</b>	<b>49</b>	<b>50</b>

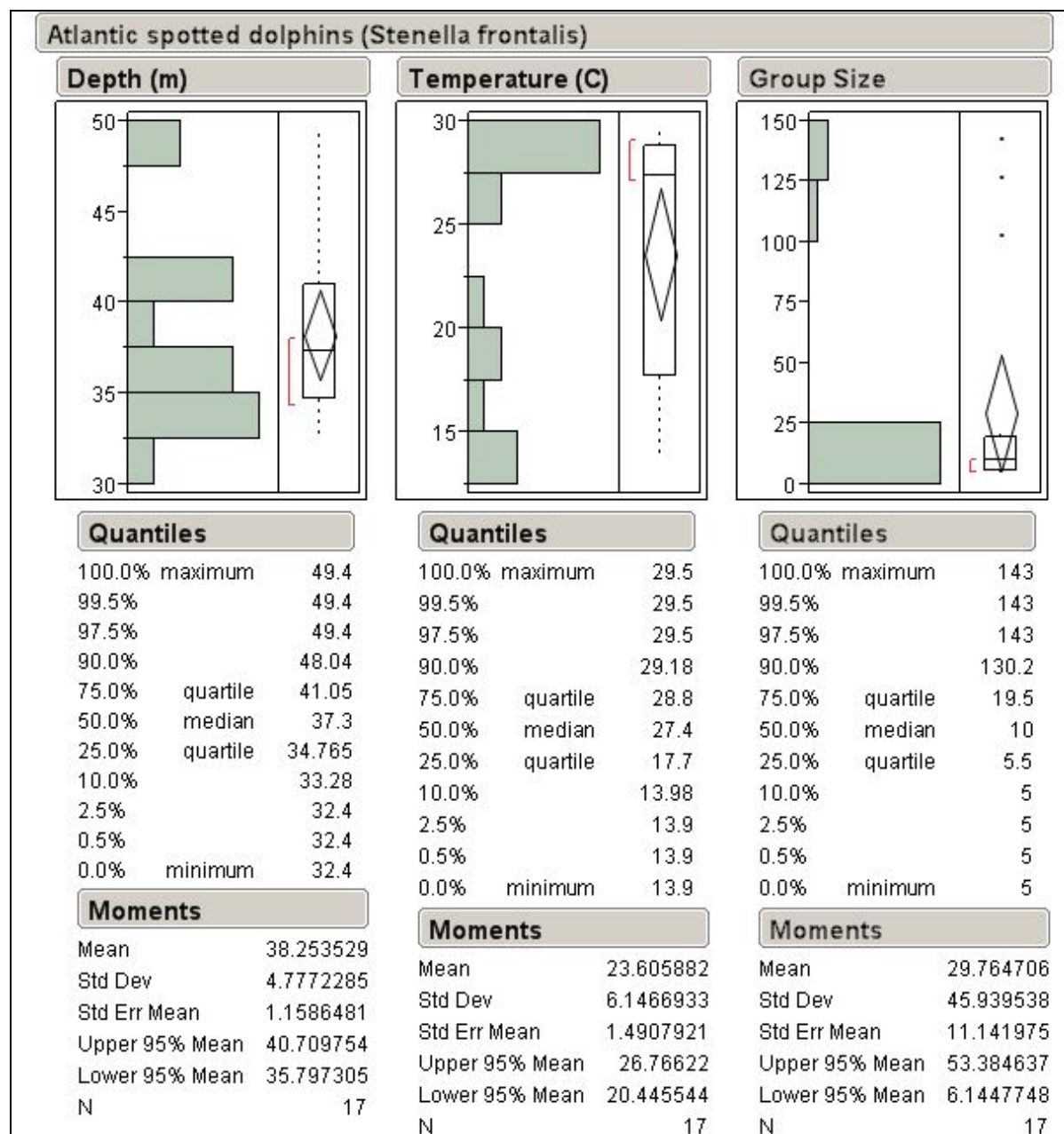


**Figure 5.** Number of cetacean sightings in the Onslow Bay USWTR area in Year Three corrected for hours on effort in each Beaufort sea state.

Descriptive statistics for bottlenose dolphins and spotted dolphin sightings are presented in Figures 6 and 7 respectively. In general, bottlenose dolphins were detected in waters deeper than spotted dolphins (mean water depth of 224m *versus* 38m respectively) and in slightly warmer water (mean values of 26.9°C and 23.6°C, respectively). Mean group size for spotted dolphins was greater than for bottlenose dolphins (30 *versus* 11 individuals per group), but this difference was driven largely by a small number of very large (>100 individuals) groups of spotted dolphins. Both species exhibited a bi-modal distribution of group size, with similar median values (bottlenose dolphins 9 individuals; spotted dolphins 10 individuals).



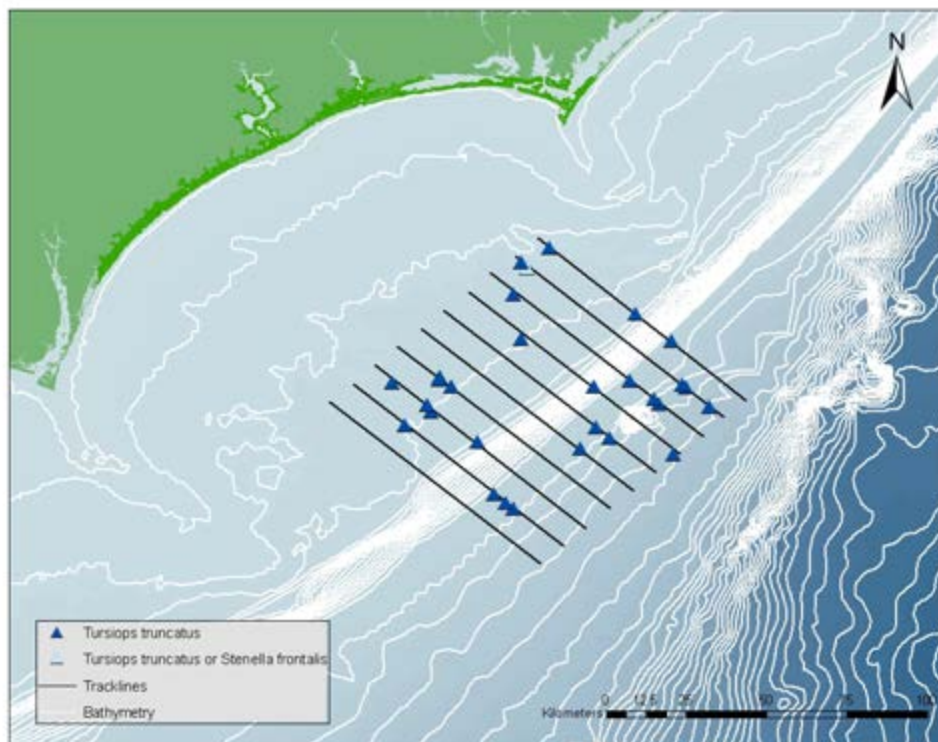
**Figure 6. Descriptive statistics for depth, sea surface temperature, and group size estimates for bottlenose dolphin (*Tursiops truncatus*) sightings during vessel line transects surveys in the USWTR study area (July 2009 through June 2010).**



**Figure 7. Descriptive statistics for depth, sea surface temperature, and group size estimates for Atlantic spotted dolphins (*Stenella frontalis*) sightings during vessel line transects surveys in the USWTR study area (July 2009 through June 2010).**

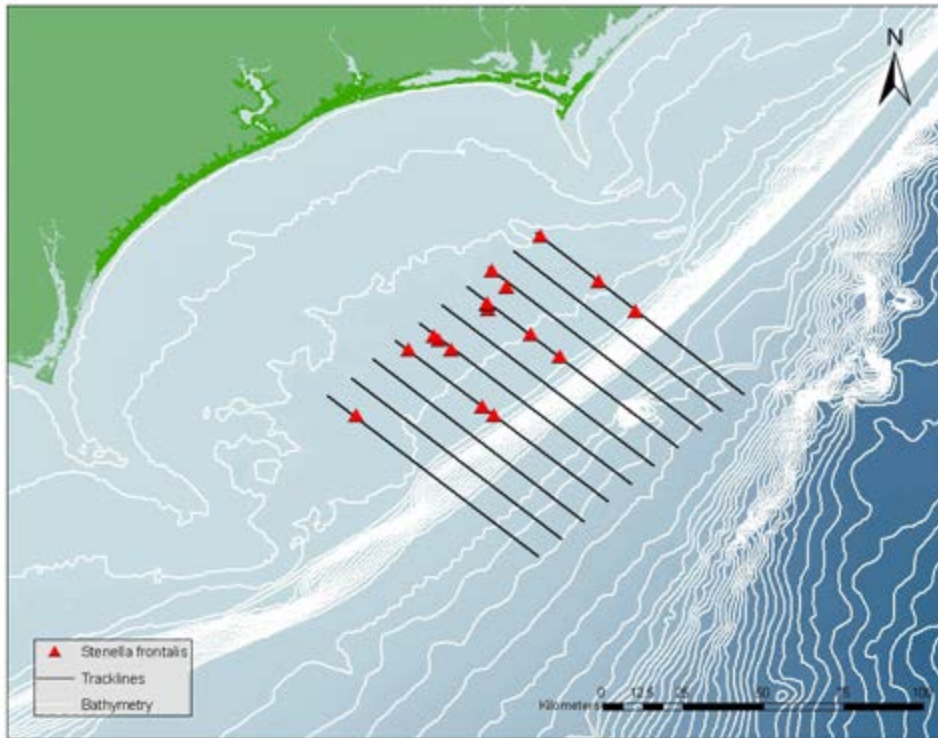
### Distributions and Habitat Associations of Cetaceans

The distribution of marine mammal sightings, by species, are presented in Figures 8 through 10. As was the case in previous years, spotted dolphins were largely restricted to the relatively shallow shelf waters, whereas bottlenose dolphins ranged over a large area with many groups detected in deeper waters (this likely reflects the presence of both the coastal and offshore ecotypes of this species in the study area). The other species (pilot whales, Risso's dolphins and rough-toothed dolphins) are known to be relatively deep-water species and were all observed offshore of the 200-m isobath. This general inter-specific pattern of distribution has been consistent in all years of the monitoring program. The distribution of sea turtle sightings is depicted in Figure 11.

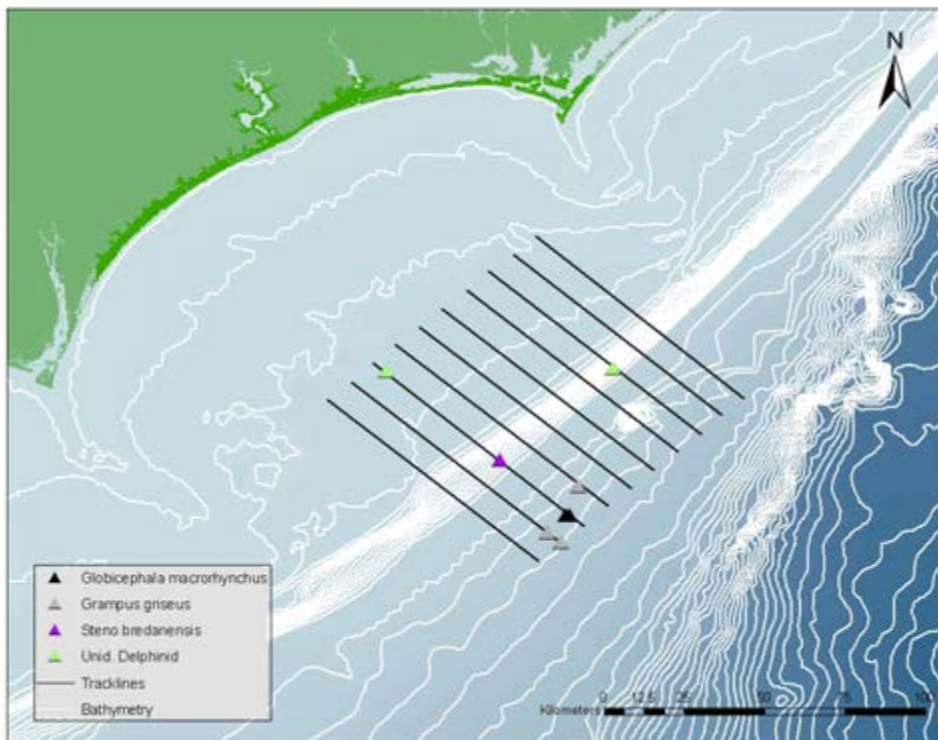


**Figure 8.** Distribution of bottlenose dolphin (*Tursiops truncatus*) sightings made during vessel-based surveys in Onslow Bay, NC, July 2009 through June 2010.



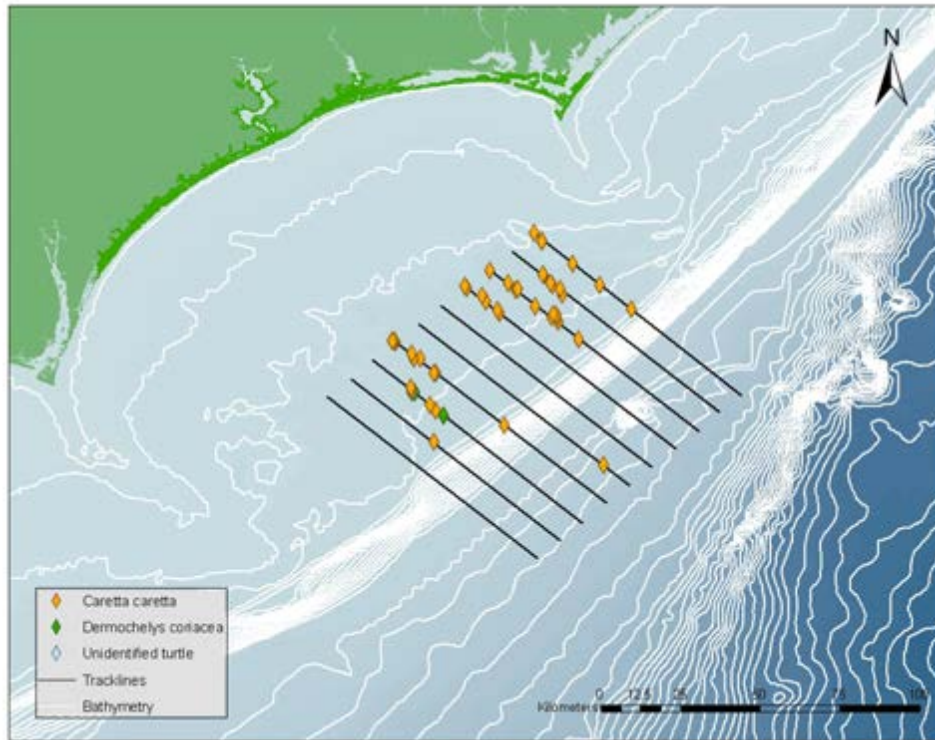


**Figure 9.** Distribution of Atlantic spotted dolphin (*Stenella frontalis*) sightings made during vessel-based surveys in Onslow Bay, NC, July 2009 through June 2010.



**Figure 10.** Distribution of other cetacean sightings made during vessel-based surveys in Onslow Bay, NC, July 2009 through June 2010.





**Figure 11.** Distribution of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) sea turtle sightings made during vessel-based surveys in Onslow Bay, NC, July 2009 through June 2010.

### Seasonality of Effort and Sightings

Due to unfavorable survey conditions, there was no effort in three months and limited effort in several other months during Year Three. Trends in seasonality of cetacean sightings are, therefore, difficult to interpret (Figs. 12 and 13). Nevertheless, it is clear that both spotted and bottlenose dolphins are found year-round in the study area. The presence of other cetacean species appears to be more sporadic. Sea turtle presence appears to peak in April, however with no survey effort in February and little effort in March and May, this apparent peak may be exaggerated.

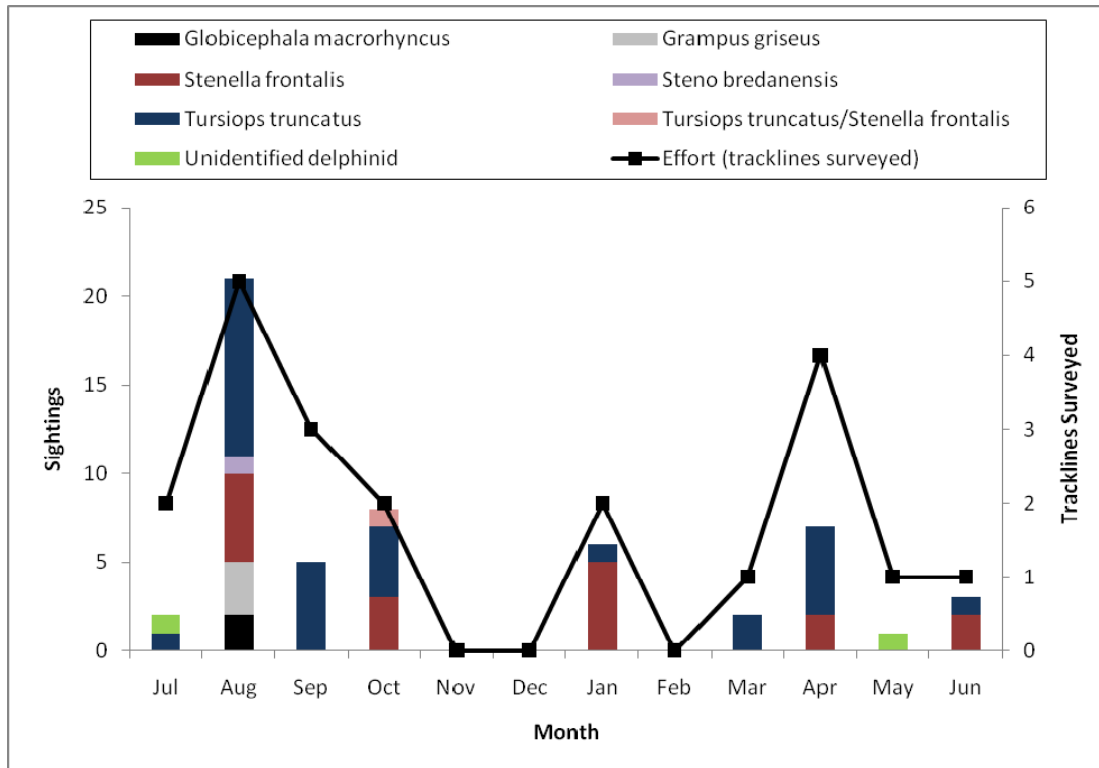


Figure 12. Number of cetacean sightings by month and effort (number of tracklines surveyed) in Year Three.

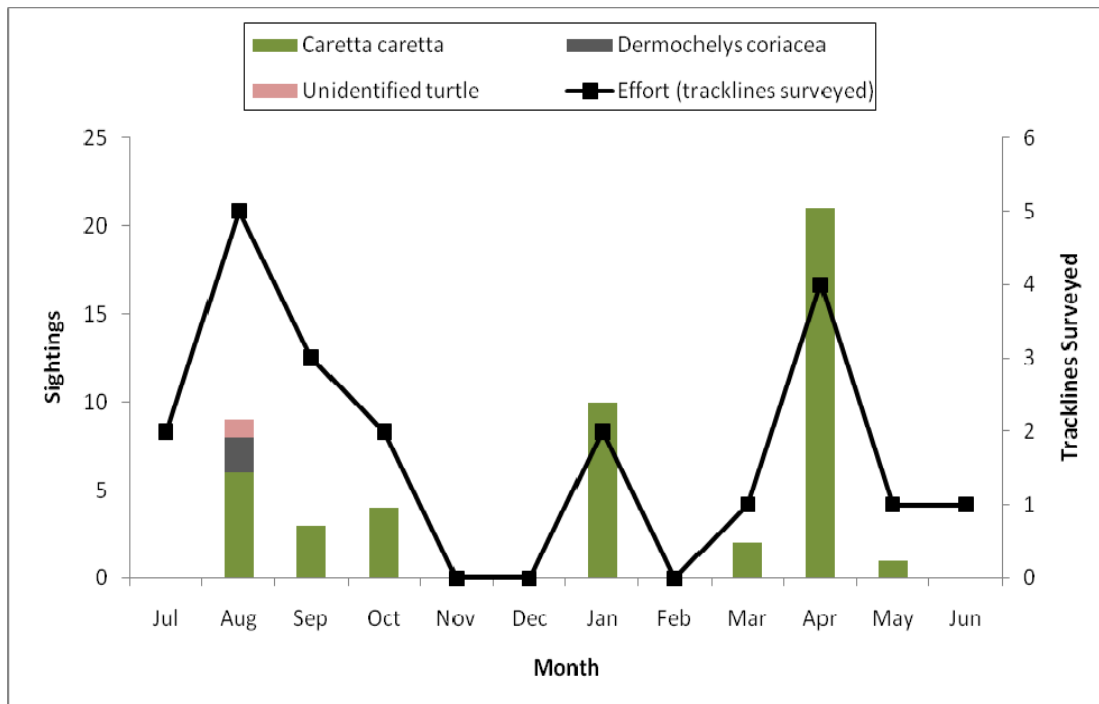


Figure 13. Number of turtle sightings by month displayed with effort (number of tracklines surveyed) in Year Three.

## Cape Hatteras Surveys

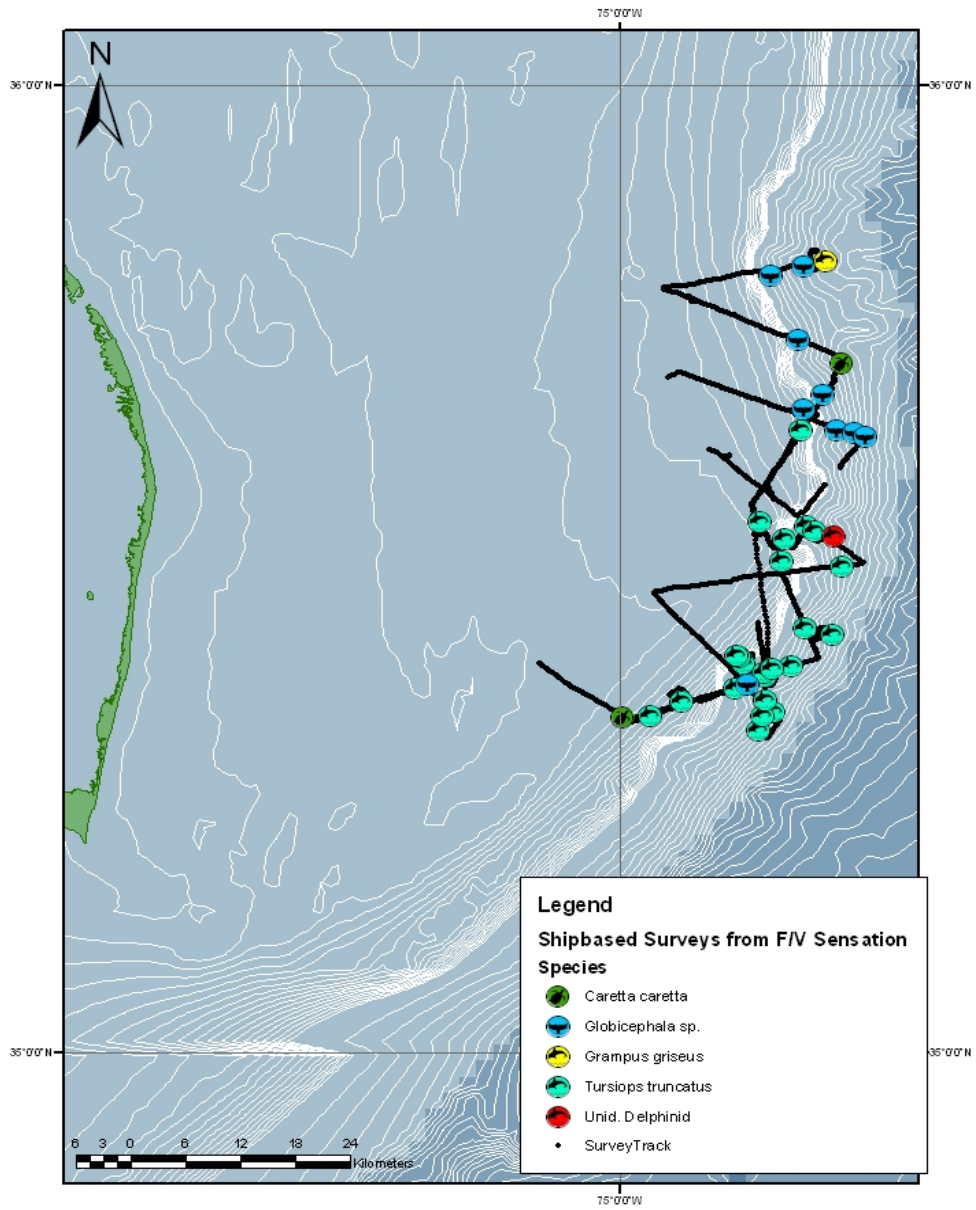
In July 2009 we conducted a small number of surveys off Cape Hatteras, to the north of the Onslow Bay study area. The objective of these surveys was to generate a large number of sightings from one of our survey platforms (F/V *Sensation*). These additional sightings will allow us to improve the probability detection functions used to calculate marine mammal densities in Onslow Bay by. We recorded more than 30 sightings in four days of survey effort off Cape Hatteras, compared with 55 sightings in approximately 21 survey days in Onslow Bay. The results of the surveys off Cape Hatteras are presented in Tables 5 and 6 and Figure 14.

**Table 5. Sightings from vessel surveys conducted off Cape Hatteras, July 2009**

<b>Common Name</b>	<b>Scientific Name</b>	<b># of Sightings</b>	<b># of individuals</b>
Bottlenose Dolphin	<i>Tursiops truncatus</i>	23	497
Risso's Dolphin	<i>Grampus griseus</i>	1	34
Unidentified Delphinid		1	2
Pilot Whale	<i>Globicephala sp.</i>	9	213
Loggerhead Sea Turtle	<i>Caretta caretta</i>	2	2

**Table 6. Effort details for vessel surveys conducted off Cape Hatteras, July 2009.**

Number of Survey Days	4
Total Survey Hours	26.5
Hours On Effort	15.5
Total Tracklines Covered	N/A



**Figure 14.** Locations of cetacean sightings from vessel surveys conducted off Cape Hatteras, July 2009.

## Sea Turtle Satellite Tag Deployment

To refine our estimates of sea turtle abundance in the survey area we deployed a Wildlife Computer satellite-linked SPLASH tag on an adult nesting female loggerhead sea turtle in June 2010. In addition to providing location, SPLASH tags provide information on the time the animal spends at predefined depth and temperature bins, as well as the



amount of time the tag is wet and dry. Data from these tags will allow us to refine our probability detection function for loggerhead sea turtles by determining the proportion of time they spend at, or very close to the surface where they can be sighted by visual observers. Wendy Dow, a Ph.D. student at the Duke Marine Laboratory, deployed tag 096290 (nicknamed *Pointe*) on 26 June 2010 on Emerald Isle, NC (Fig. 15). We have two more SPLASH tags to be deployed on loggerhead sea turtles in July 2010.

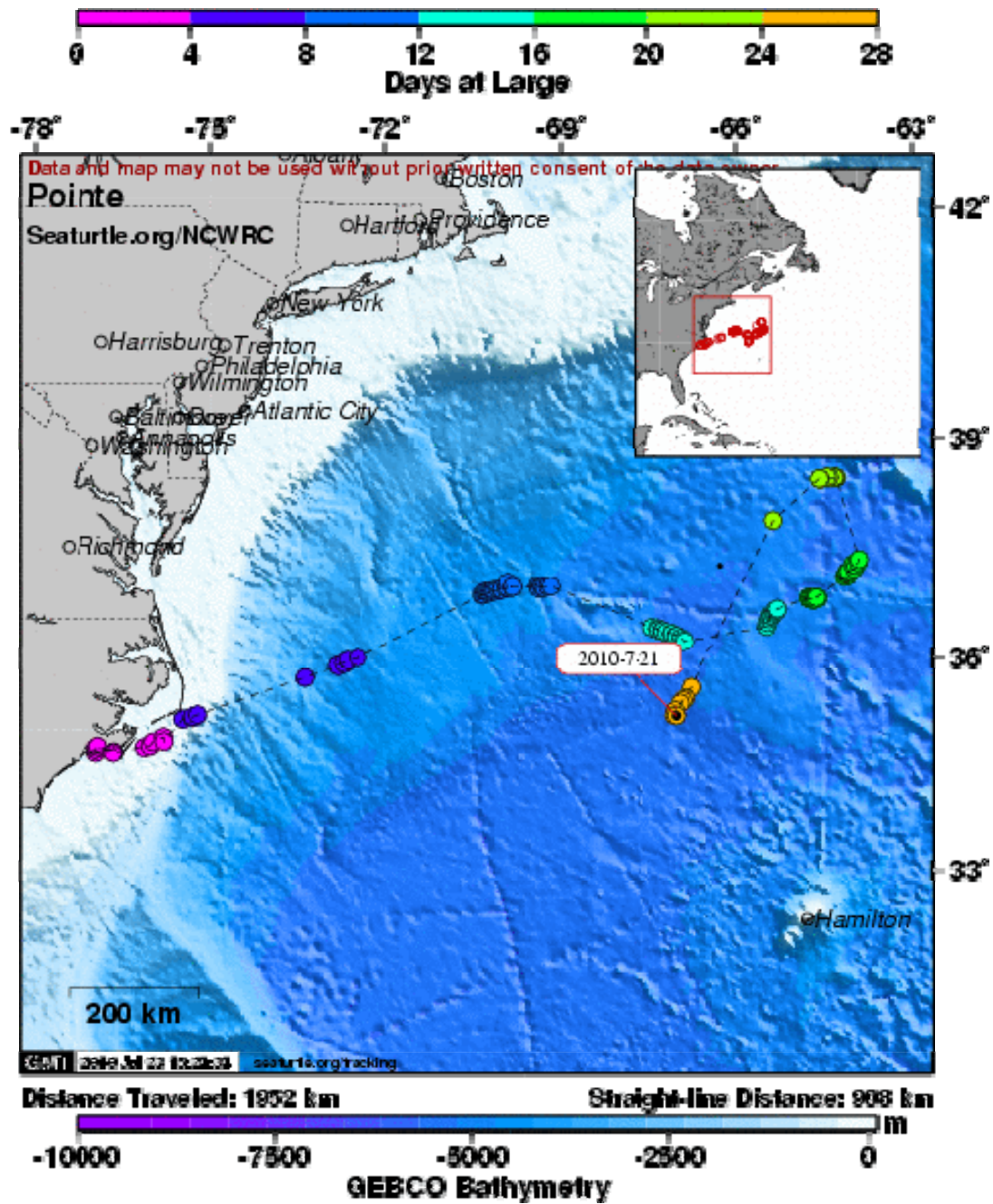


Figure 15. A map of "Pointe", a loggerhead sea turtle equipped with a SPLASH tag on 26 June 2010

([http://www.seaturtle.org/tracking/index.shtml?tag\\_id=96290&full=1&lang=](http://www.seaturtle.org/tracking/index.shtml?tag_id=96290&full=1&lang=)).



### Photographic Effort

In total, 1369 digital images were taken during Year Three for species identification and individual recognition purposes. Of the 55 cetacean sightings in Year 3, we obtained images from all but three encounters. Every attempt was made to photograph all animals encountered but our ability to sample each group completely was often hampered because it is difficult to maneuver the vessel to take good quality photo-identification images, especially while towing the passive acoustic array. Images taken during the vessel-based surveys have also been used to identify diagnostic species-specific features and for comparison with images taken during aerial surveys to improve our ability to discriminate among species (particularly spotted and bottlenose dolphins).

We continued to add to our photo-identification catalogs in Onslow Bay in Year Three (Table 7). Photo-identification analysis is now complete for all images taken through June 2010. Since the beginning of our monitoring program in 2007 we have re-sighted five bottlenose dolphins: (1) ID 9-016 on 25 July 2008 and 17 August 2009; (2) ID 4-002 on 15 September 2009 and 1 October 2009; (3) 1-004 on 1 October 2009 and 11 April 2010; (4) and (5) IDs 7-015 and 8-009, seen together on 28 April 2009, and both seen together again, nearly one year later, on 20 April 2010. We also matched one spotted dolphin, ID 9-013, seen on 9 August 2009 and then again on 1 October 2009 (Figure 16). We have now resighted approximately 5% of bottlenose dolphins (5 of 106) and 2% (1 of 49) of spotted dolphins identified in Onslow Bay, despite limited sampling effort. Several of these resightings span periods of a year or more, suggesting at least some residency in the study area. To date, we have not re-sighted any other species photographed, although the number of sightings and catalog sizes for these species are very small.

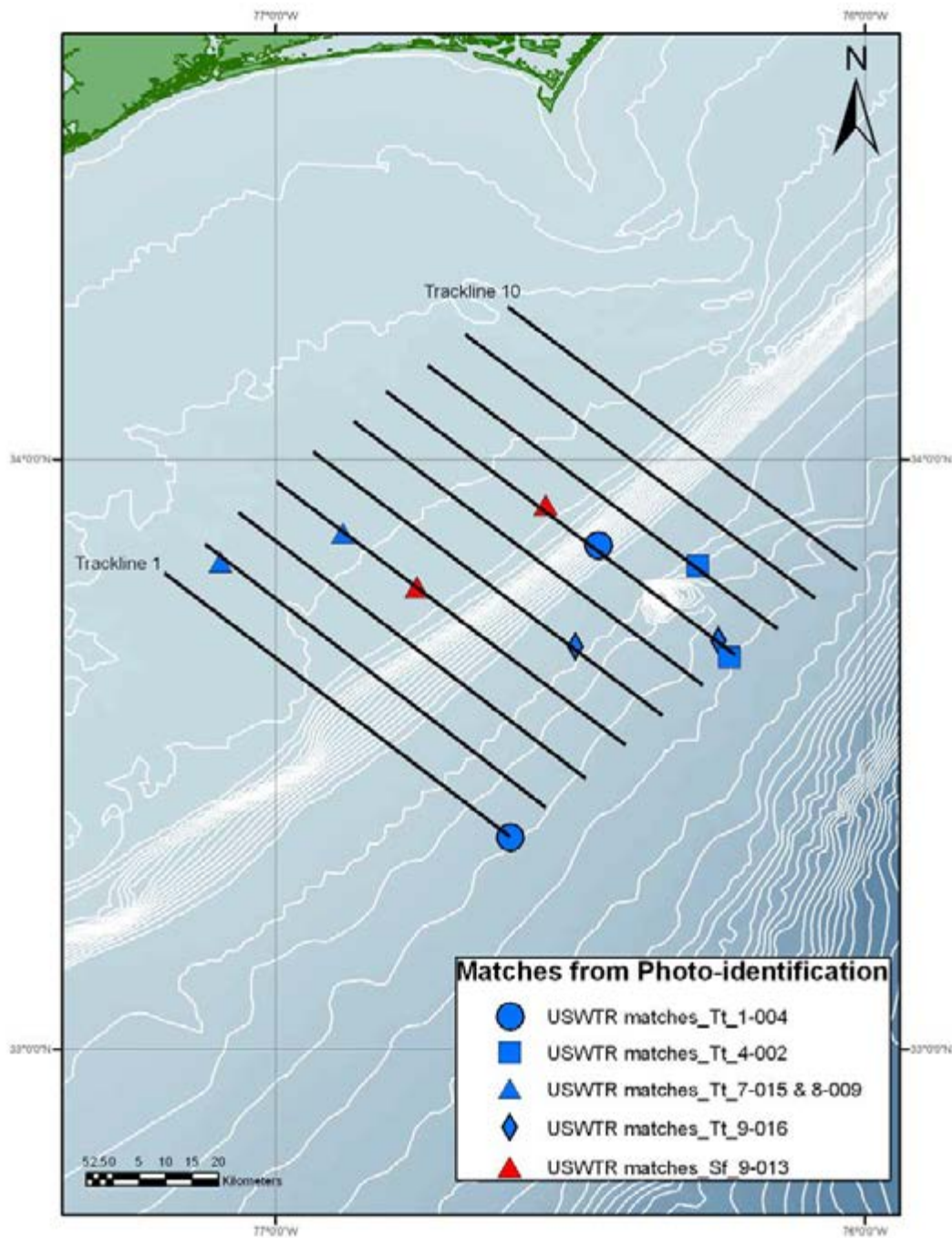
We will continue to take images to augment our existing catalogs (Table 7). We also compare images of the dorsal fins of stranded cetaceans in North Carolina to our photo-identification catalogs for Onslow Bay, but we have not found any matches to date.

We are planning to conduct dedicated photo-identification surveys and biopsy sampling in Year 4 to further examine the population structure of cetaceans in this area.



**Table 7. Comparison of photo-identification effort between Year 1 (2007-2008), Year 2 (2008-2009), and Year 3 (2009-2010), showing cumulative catalog sizes and the number of matches made over the three-year period.**

Species	Year 1			Year 2			Year 3		
	Images	Catalog Size	Matches	Images	Catalog Size	Matches	Images	Catalog Size	Matches
<i>Tursiops truncatus</i>	472	52	0	271	78	0	536	106	5
<i>Stenella frontalis</i>	76	3	0	698	29	0	542	49	1
<i>Globicephala sp.</i>	105	8	0	0	8	0	64	16	0
<i>Grampus griseus</i>	182	5	0	0	5	0	75	7	0
<i>Steno bredanensis</i>	0	0	0	0	0	0	148	12	0



**Figure 16a.** Plot of sighting locations of bottlenose and spotted dolphins. Each symbol represents the sighting location of matched dolphins.



**Figure 16b.** Dorsal fin images of matched dolphins.

## Passive Acoustic Monitoring

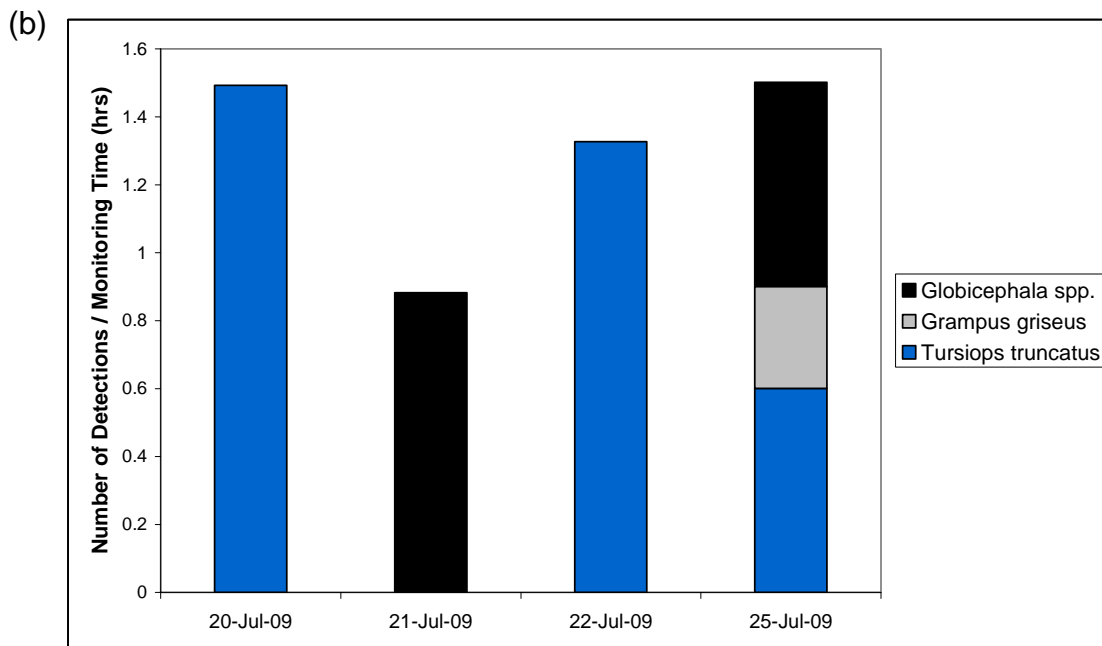
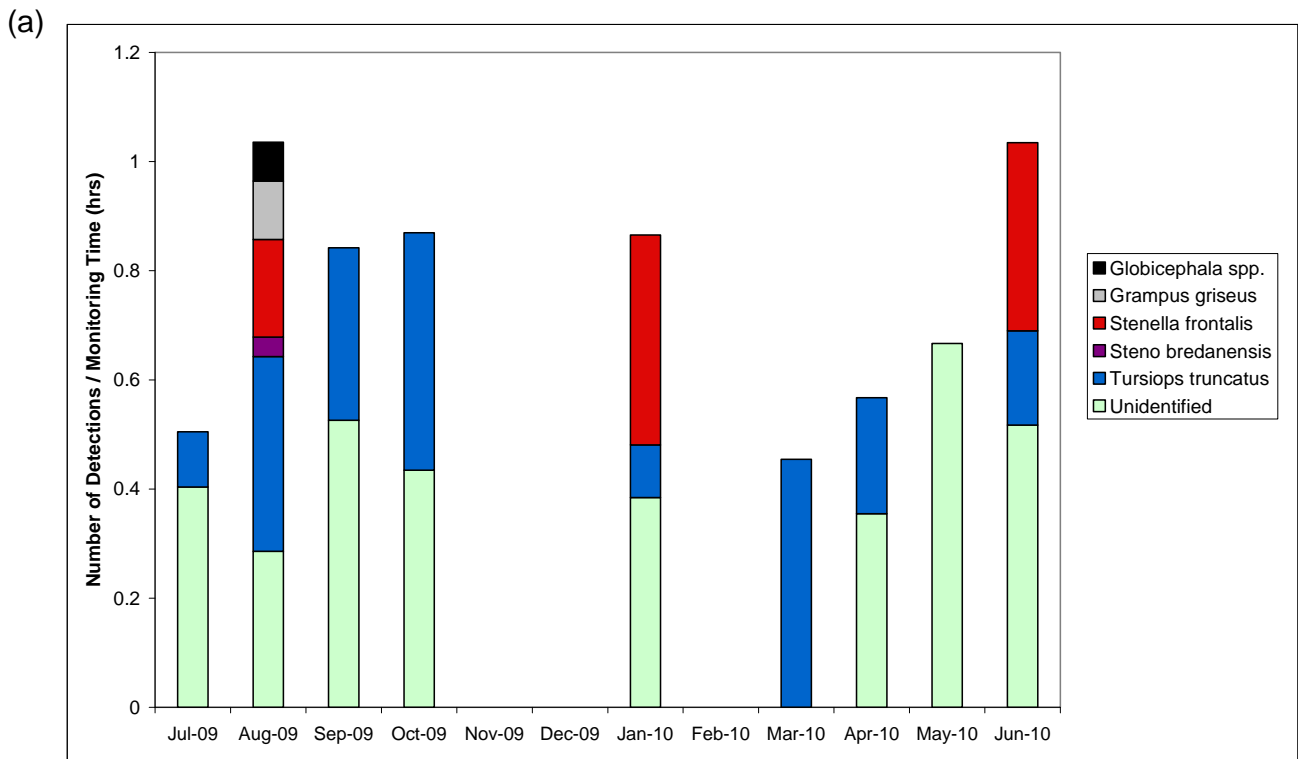
During Year Three we conducted 18 line transect surveys with the towed hydrophone array in Onslow Bay, resulting in 91.2 hours of passive acoustic monitoring. During these surveys, we obtained recordings from 40 groups of animals that were positively identified to species by the visual observers. Twenty-three of these 40 groups were identified as bottlenose dolphins, eleven were Atlantic spotted dolphins, three were identified as Risso's dolphins, two groups were pilot whales and there was a single group of rough-toothed dolphins (Table 8). As noted above, in July 2009 we also conducted four days of line transect surveys with the towed hydrophone array off Cape Hatteras; this resulted in additional 15.3 hours of passive acoustic monitoring. During the surveys off Cape Hatteras, we recorded 18 groups of animals that were positively identified by the visual observers. Twelve of these were bottlenose dolphins, four were pilot whales, one was as a mixed group of bottlenose dolphins and pilot whales, and one was a mixed group of Risso's dolphins and bottlenose dolphins (Table 9). Figure 17 shows the number of towed array detections per hour for each species by month in Onslow Bay and by survey day off Cape Hatteras. Further spectral analysis (measuring the parameters described above) of these data will be conducted in the upcoming months.

**Table 8. Number of recordings made using the towed hydrophone array in Onslow Bay between July 2009 and June 2010.**

<b>Species</b>	<b>Total # of Days Detected</b>	<b>Total # of Detections</b>	<b>Total Duration of Recordings (h:mm)</b>
<i>Globicephala spp.</i>	1	2	1:06
<i>Grampus griseus</i>	2	3	2:08
<i>Stenella frontalis</i>	6	11	4:53
<i>Steno bredanensis</i>	1	1	0:40
<i>Tursiops truncatus</i>	13	23	9:30
Unidentified	17	34	13:27

**Table 9. Number of recordings made using towed array off Cape Hatteras in July 2009.**

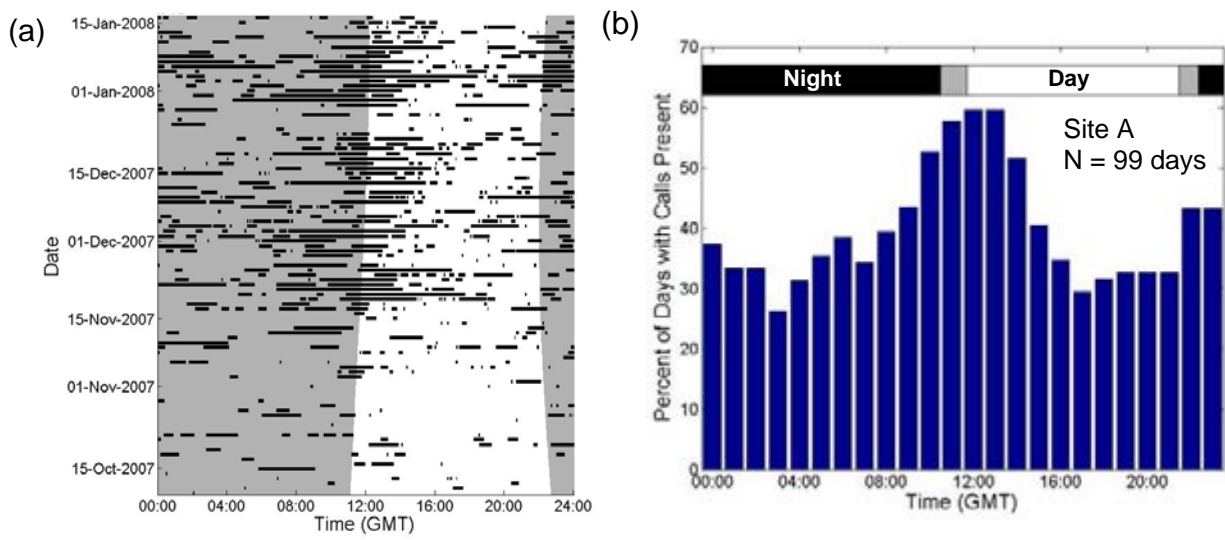
<b>Species</b>	<b>Total # of Days Detected</b>	<b>Total # of Detections</b>	<b>Total Duration of Recordings (h:mm)</b>
<i>Globicephala spp.</i>	2	5	2:19
<i>Grampus griseus</i>	1	1	0:25
<i>Tursiops truncatus</i>	3	13	5:41



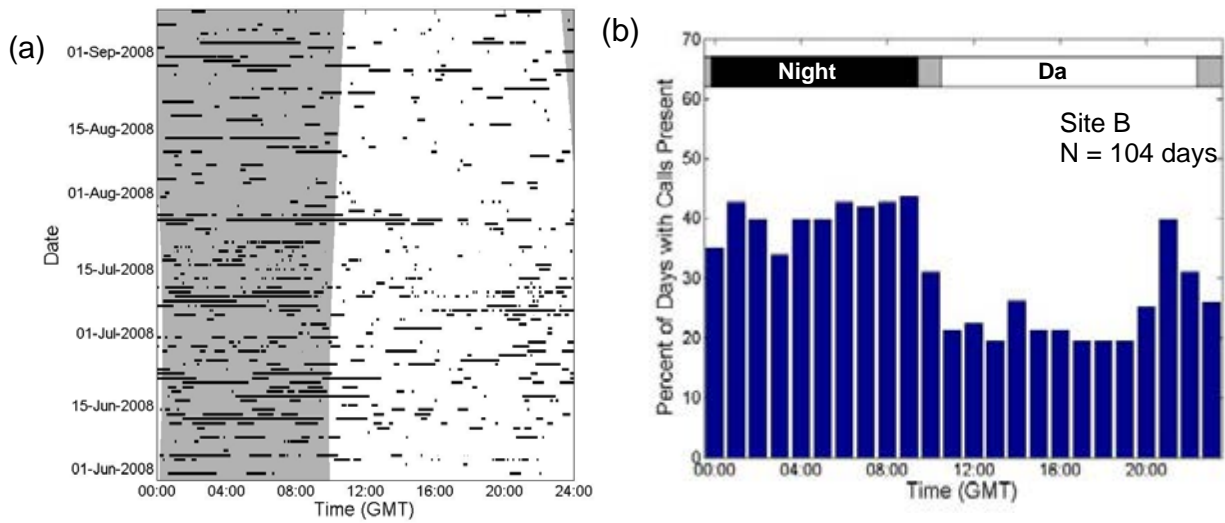
**Figure 17. (a) Number of detections in Onslow Bay from the towed array per hour by month and (b) number of detections off Cape Hatteras from the towed array per hour by day.**

We performed Kruskal-Wallis tests on HARP data from the first three deployments to determine whether the number of vocal events differed during the day and night. For the 1<sup>st</sup> HARP deployment, no significant difference was found between these two photoperiods; however, when the data were divided into four photoperiods (dawn, day, dusk, and night), a Kruskal-Wallis showed a significant increase in the number of vocal events at dawn ( $p < 0.001$ , Figure 18). A significant increase in the number of vocal events was found during night for both the second (Kruskal-Wallis,  $p < 0.001$ , Figure 19) and third HARP deployments (Kruskal-Wallis,  $p < 0.001$ , Figure 20). We cannot quantify seasonal or inter-annual differences in these data due to the presence of large gaps in the data and the use of multiple recording sites, but it is interesting to note that both summer data sets (the second and third deployments) showed a trend towards a greater number of vocal events at night whereas the fall/winter data (first deployment) exhibited a different trend.

We also conducted Kruskal-Wallis tests on the occurrence of Risso's dolphin and sperm whale clicks to test for diel variation in vocal activity. We concentrated on these two species, because their clicks are relatively easy to discern in the HARP acoustic records. With data from the first three deployments were combined, we observed a significant increase in the occurrence of Risso's dolphin click bouts at night (Kruskal-Wallis,  $p < 0.001$ , Figure 21). Similarly, when the sperm whale click data from the first three deployments were combined, we found a significant increase in the occurrence of sperm whale click bouts at night (Kruskal-Wallis,  $p = 0.001$ , Figure 22).

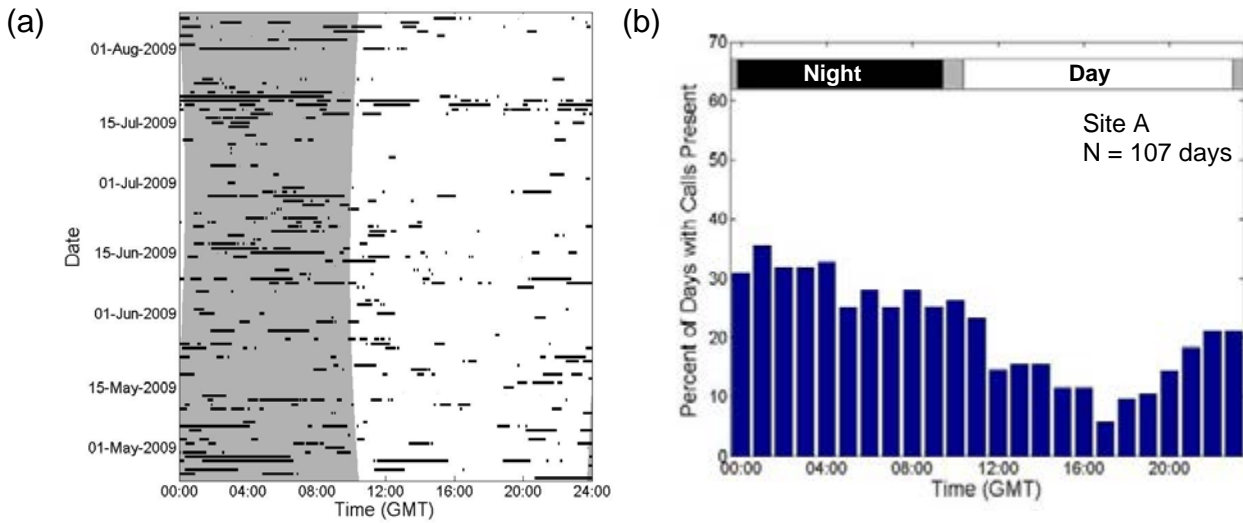


**Figure 18.** Data from the first HARP deployment showing (a) time of vocal events, with shading indicating periods of darkness and (b) number of days with calls (normalized by total number of hours recorded) by time of day (GMT). The gray bars represent periods that could be either day or night depending on the time of year.

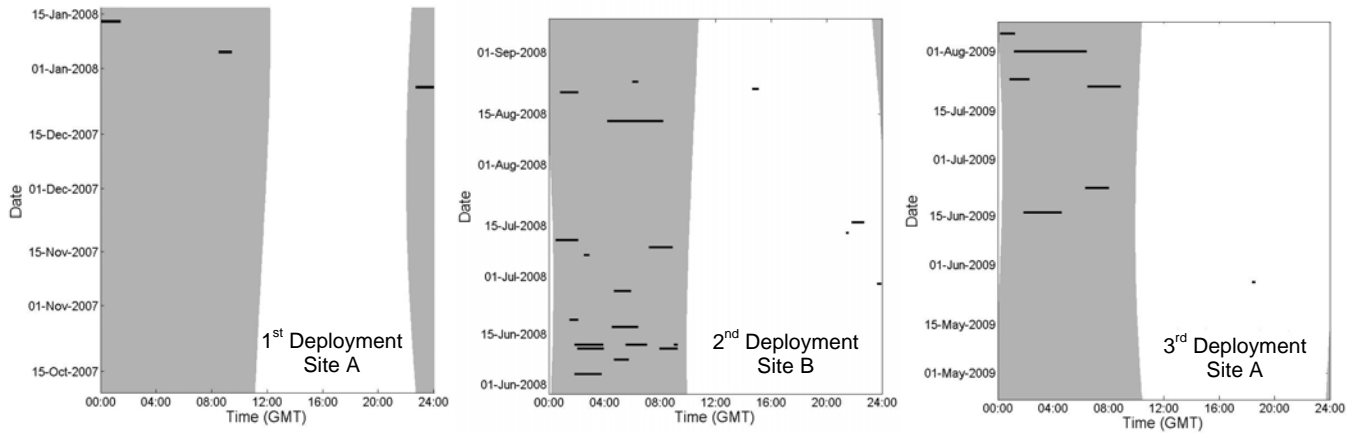


**Figure 19.** Data from the second HARP deployment showing (a) time of vocal events, with shading indicating periods of darkness and (b) number of days with calls (normalized by total number of hours recorded) by time of day (GMT). The gray bars represent periods that could be either day or night depending on the time of year.

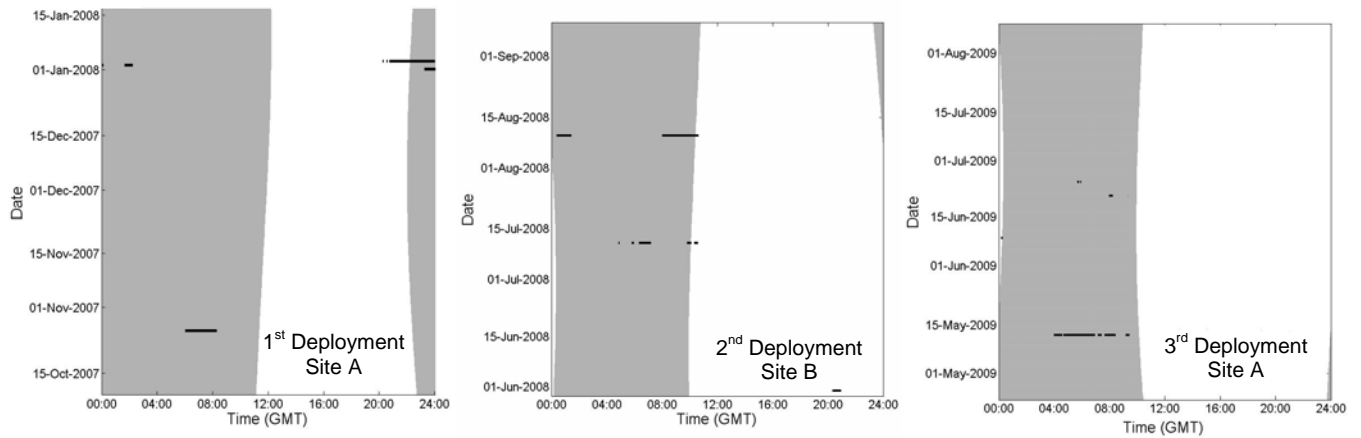




**Figure 20.** Data from the third HARP deployment showing (a) time of vocal events, with shading indicating periods of darkness and (b) number of days with calls (normalized by total number of hours recorded) by time of day (GMT). The gray bars represent periods that could be either day or night, depending on the time of year.

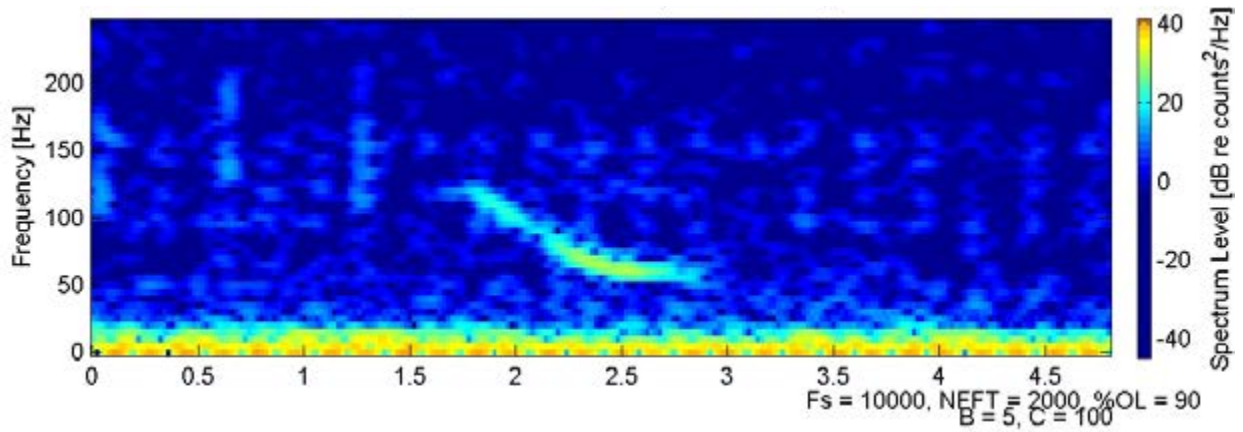


**Figure 21.** Data from the first three HARP deployments showing the time of Risso's dolphin click events. Shading indicates periods of darkness, determined from the U.S. Naval Observatory.

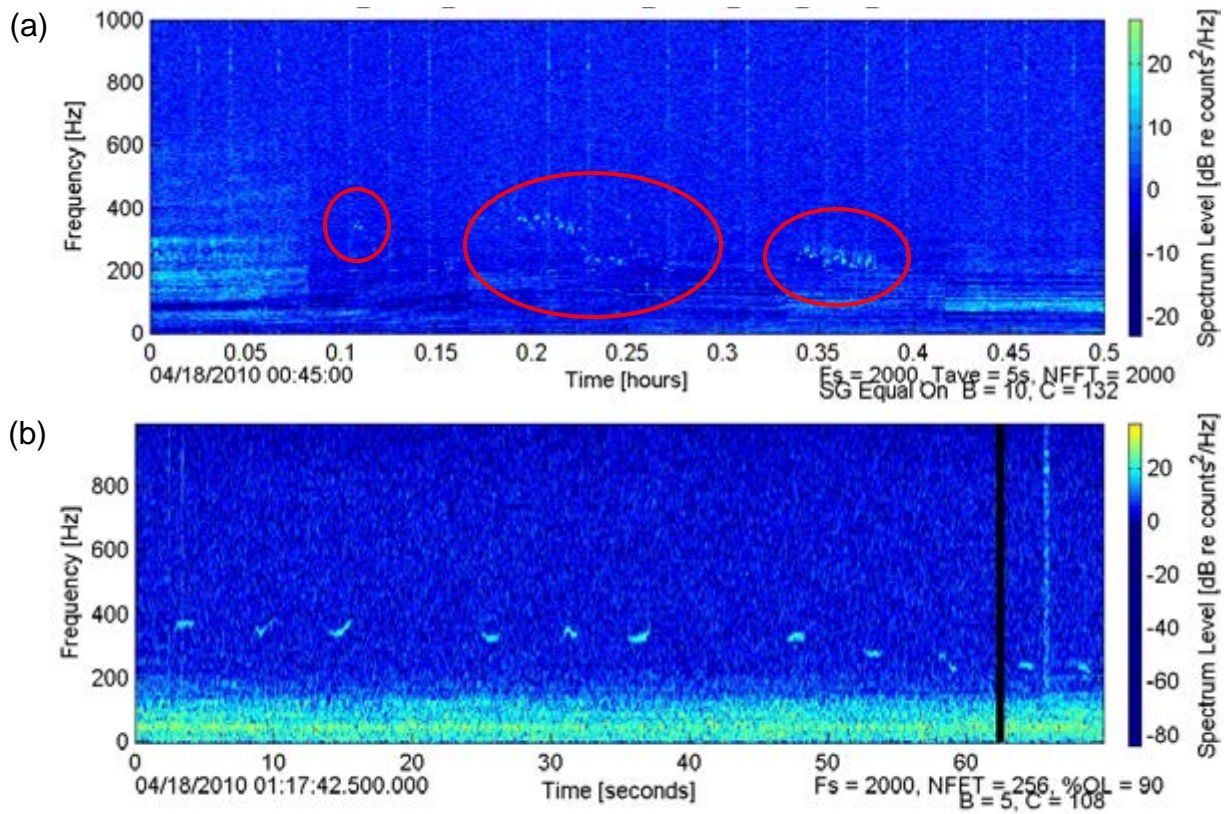


**Figure 22.** Data from the first three HARP deployments showing the time of sperm whale click events. Shading indicates periods of darkness, determined from the U.S. Naval Observatory.

The analysis of the data from the fourth HARP deployment at site C is currently underway, as is the analysis of the decimated data for all HARP deployments. A brief look through the decimated data of the HARP at site C during the fourth deployment revealed probable calls from sei whales (Figure 23) and calls from humpback whales (Figure 24).



**Figure 23.** Spectrogram showing a probable sei whale call on February 8, 2010, in the HARP data from the fourth deployment at Site C.



**Figure 24.** (a) LTSA and (b) spectrogram showing humpback whale calls on April 18, 2010, in the HARP data from the fourth deployment at Site C.

### Seabird Observations

During Year Three of our surveys in Onslow Bay, we recorded a total of 61 birds over approximately 12 hours of seabird observations (Table 10). The sightings per unit effort (SPUE), or the number of seabirds recorded per hour of effort, ranged between 1.08 and 6.87, and was highest in September, although no seabird surveys were conducted during winter or spring months. The relatively low number of surveys in Year Three reflects the end of the data collection phase for Lesley Thorne's dissertation research. She is currently working up these data as part of her Ph.D. dissertation on the influence of oceanographic features on the distribution of seabirds.

Table 11 shows the species of seabird observed in each survey month. Cory's Shearwaters (*Calonectris diomedea*) were by far the most commonly sighted birds, while Greater Shearwaters (*Puffinus gravis*) and Wilson's Storm Petrels (*Oceanites oceanicus*) were also observed frequently.

Mean SPUE, depth, sea surface temperature (SST) and distance to continental shelf for each observed seabird species is shown in Table 12. The distributions of shearwater and storm petrel species during surveys in Onslow Bay are shown in Figures 23 and 24, respectively.

**Table 10. Seabird sighting statistics by month during surveys in Onslow Bay, NC from July 2009 through June 2010. The sighting per unit effort (SPUE) was calculated by dividing the number of birds observed by the number of hours surveyed.**

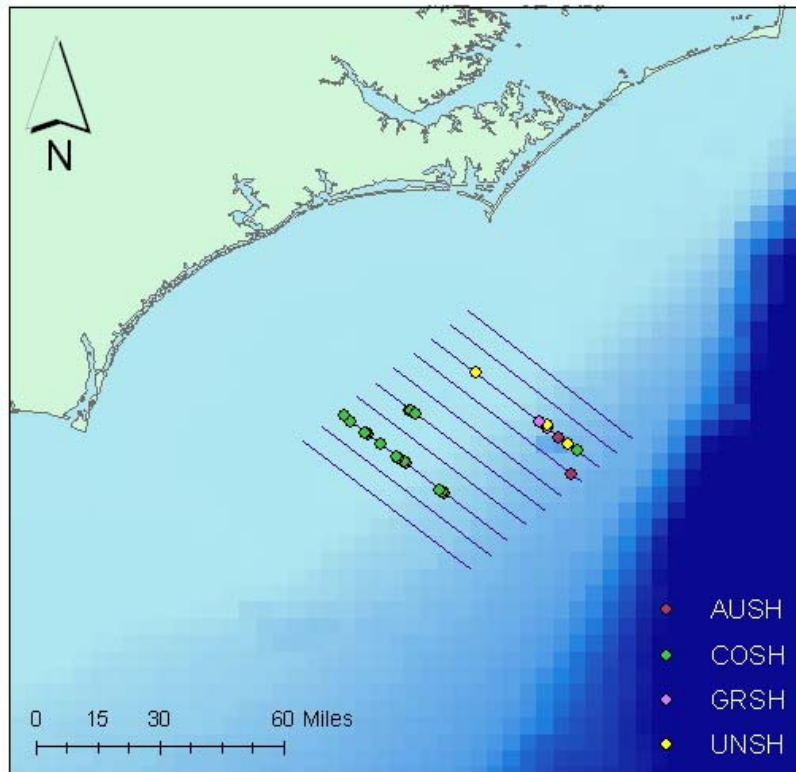
<b>Month</b>	<b>Number of Species Observed</b>	<b>Total Number of Birds Observed</b>	<b>Total Hours Surveyed</b>	<b>SPUE</b>
<b>July 09</b>	3	4	3.72	1.08
<b>Aug 09</b>	3	31	4.68	6.62
<b>Sept 09</b>	3	26	3.78	6.98
<b>OVERALL</b>	<b>4</b>	<b>61</b>	<b>12.18</b>	<b>5.01</b>

**Table 11. Seabird sightings by month from July 2009 through June 2010 during surveys in Onslow Bay, NC.**

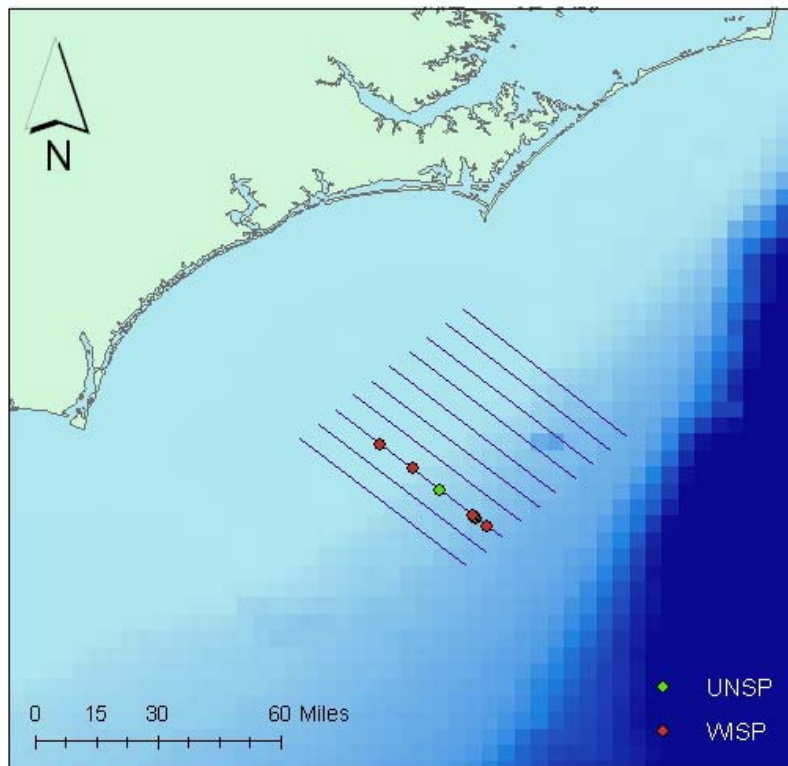
Month	Jul-09	Aug-09	Sept-09	TOTAL
Audubon's Shearwaters	1	0	2	3
Cory's Shearwaters	2	21	8	31
Greater Shearwaters	1	2	5	8
Unidentified Shearwaters	0	0	8	8
Wilson's Storm Petrels	0	5	0	5
Unidentified Storm Petrels	0	2	0	2
Unidentified seabird	0	0	1	1
Unidentified swallow	0	1	2	3
<b>TOTAL</b>	<b>4</b>	<b>31</b>	<b>26</b>	<b>61</b>

**Table 12. Mean depth, sea surface temperature (SST) and distance to continental shelf for commonly sighted seabird species from surveys in Onslow Bay, NC**

Species	Mean SPUE	Mean SST	Mean depth (m)	Mean distance to shelf (km)
Audubon's Shearwaters ( <i>Puffinus lherminieri</i> )	0.25	82.15	-194.00	35781.91
Cory's Shearwaters ( <i>Calonectris diomedea</i> )	2.55	85.28	-126.58	80989.71
Greater Shearwaters ( <i>Puffinus gravis</i> )	0.66	82.87	-143.25	66475.05
Unidentified Shearwaters ( <i>Puffinus</i> sp.)	0.66	81.96	-218.50	49203.78
Wilson's Storm Petrels ( <i>Oceanites oceanicus</i> )	0.41	86.14	-202.60	62883.09
Unidentified Storm Petrels	0.16	86.35	-239.50	56942.94



**Figure 23.** Distribution of shearwater species observed during surveys in Onslow Bay, NC. Species codes are listed in Table 13.



**Figure 24.** Distribution of storm petrel species observed during surveys in Onslow Bay, NC. Species codes are listed in Table 13.

**Table 13. Species codes for seabirds observed on Onslow Bay surveys**

<b>Seabird Species</b>	<b>Species Code</b>
Audubon's Shearwaters ( <i>Puffinus lherminieri</i> )	AUSH
Cory's Shearwaters ( <i>Calonectris diomedea</i> )	COSH
Greater Shearwaters ( <i>Puffinus gravis</i> )	GRSH
Leach's Petrel ( <i>Oceanodroma leucorhoa</i> )	LESP
Unidentified Shearwaters ( <i>Puffinus</i> sp.)	UNSH
Unidentified Storm Petrels	UNSP
Wilson's Storm Petrels ( <i>Oceanites oceanicus</i> )	WISP

### Oceanographic surveys of Gulf Stream frontal eddies

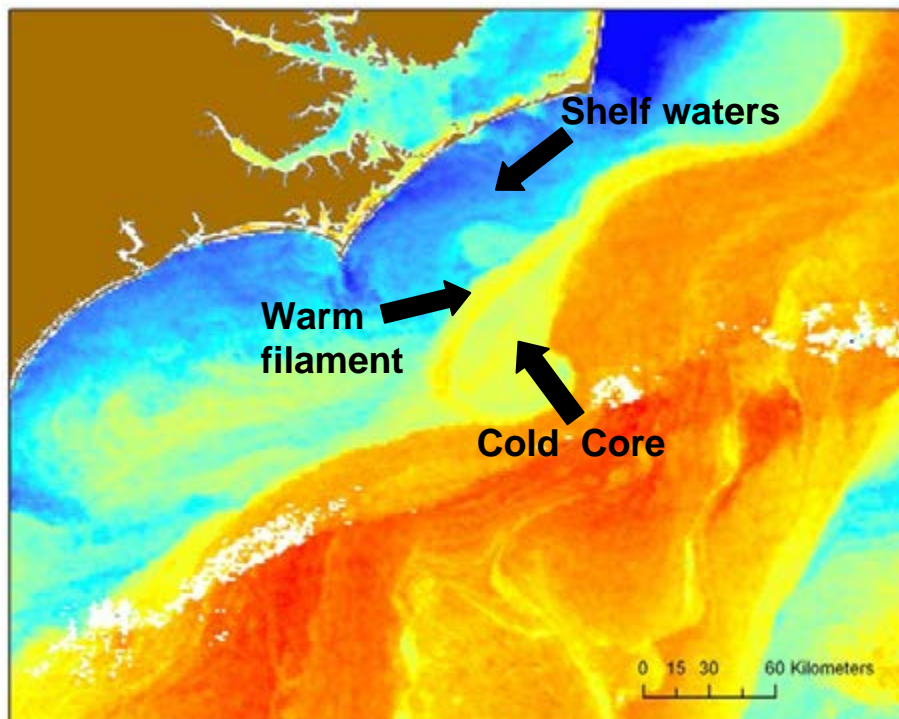
We conducted oceanographic and fisheries acoustics surveys in Onslow Bay to better understand the influence of oceanographic features on the distribution of cetaceans, sea turtles and seabirds. In Year Three we focused our oceanographic sampling on Gulf Stream Frontal Eddies (GSFE) to examine the distribution of forage (prey) fish relative to oceanographic parameters and eddy water masses and the distribution of foraging seabirds. In particular, we were interested in comparing distributions of forage fish in the eddy cold core and warm filament relative to Gulf Stream waters (see Figure 25).

We sampled GSFEs on six days during the summer and fall of 2009 and also conducted surveys across Gulf Stream and shelf waters on three other days for comparative purposes. We located GSFEs using *in situ* sea surface temperature measurements and satellite images of sea surface temperature, along with depth profiles from expendable bathythermographs (XBTs). We measured ocean currents using an Acoustic Doppler Current Profiler (ADCP) and used a 38 kHz split-beam Simrad transducer to examine the synoptic distribution of forage fish. To date we have analyzed the upper 40 m of the eddies to describe the distribution of forage fish accessible to foraging seabirds; 40 m is the maximum recorded diving depth of Audubon's shearwaters, the deepest diving seabird observed in the study area when these surveys were conducted.

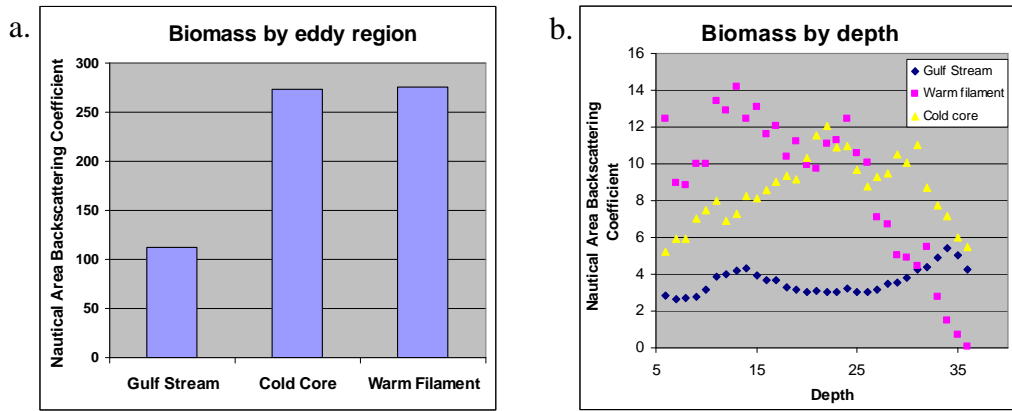
The cold core and warm filament of the GSFEs had a higher biomass of fish than Gulf Stream (Figure 26a). In addition, biomass within the eddy cold core and the warm filament



was closer to the surface in the warm filament and cold core than in the Gulf Stream (Figure 26b). The high biomass observed within the warm filament of the GSFEds was surprising as other studies have shown that seabirds are more abundant in the cold core of the eddies. Fronts within GSFEds likely play an important role in aggregating prey for foraging seabirds. An ongoing analysis examining distributions in fish biomass relative to eddy fronts (*e.g.* the front between the warm filament and the cold core) may provide further insight into seabird habitat use relative to prey biomass and GSFEds.



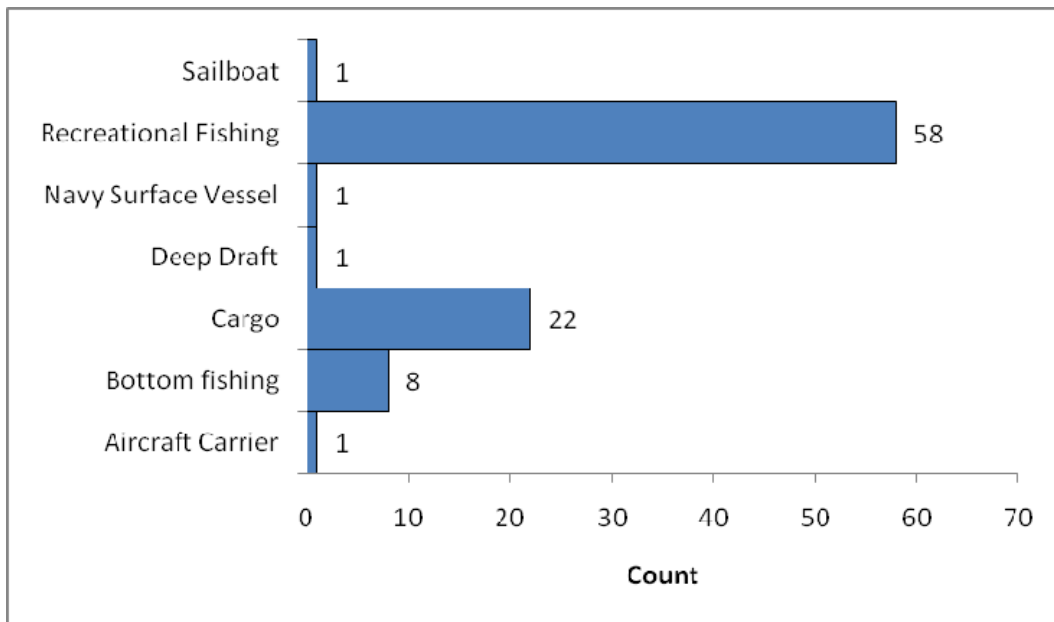
**Figure 25.** Example of water masses associated with a Gulf Stream frontal eddy in the Onslow Bay USWTR study area.



**Figure 26. Biomass by region (a) and depth (b) measured with a 38 kHz Simrad transducer within different water masses of Gulf Stream frontal eddies in Onslow Bay, NC.**

Vessel Sightings

A total of 92 vessels were encountered in the study area during vessel surveys, ranging from small recreational boats to large cargo vessels. The number of each category of vessels observed is presented in Figure 27.



**Figure 27. Vessels observed during surveys in Onslow Bay, NC, July 2009 through June 2010.**

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We thank Joel Bell (Naval Facilities Engineering Command Atlantic) for support and guidance and Joe Campo (Parsons, Inc.) for contract administration. Keith Mullin and Kathy Foley allowed us to work under their biopsy permit (779-1633). Dr. Lance Garrison modified VisSurvey for our use. For assistance with HARPs we thank Dr. John Hildebrand, Chris Garsha and Tim Boynton and the Captain and crew of the R/V *Cape Fear*. For the shipboard surveys, we thank Ryan McAlarney, Erin Cummings, Meagan Dunphy-Daly, Steve Thornton, Kristina Cammen, Anna McGregor, Ross McGregor, Jennifer Tennesen, Sara McDonald, Reny Tyson, Trey McDonald, Barbie Byrd, Caroline Good, Tom Ninke, Matt Bowers, Lucie Hazen and Melissa Soldevilla. A special thanks goes to Captain Dale Britt for his expertise and good nature on the F/V *Sensation* and Captains Matt Besch and Faith Purcell on the R/V *Cetus*. Surveys were conducted under NOAA Scientific Permit 948-1692-00 held by UNCW and NOAA General Authorization 808-1798-01 held by Duke University.

AERIAL SURVEYS OF THE PROPOSED UNDER  
SEA WARFARE TRAINING RANGE (USWTR)  
OFF JACKSONVILLE, FLORIDA  
JANUARY 2009 TO JUNE 2010



Peter B. Nilsson Heather J. Foley  
Rachel E. Hardee Richard C. Holt  
Erin W. Cummings Ryan J. McAlarney  
D. Ann Pabst William A. McLellan

Department of Biology and Marine Biology  
University of North Carolina at Wilmington  
601 South College Road, Wilmington, NC 28403

Duke University Marine Lab  
135 Duke Marine Lab Road  
Beaufort, NC 28516

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## Summary of JAX Aerial Surveys

This document is an annual progress report to the U.S. Department of the Navy on aerial surveys at the proposed Under Sea Warfare Training Range (USWTR) off of Jacksonville, Florida between January 2009 and June 2010. Preliminary aerial surveys were performed from January through March 2009 for a total of 35 tracklines surveyed, and regularly scheduled aerial surveys commenced in June 2009. Beginning in June, the goal was to survey the entire USWTR site (10 tracklines) twice per calendar month, which was accomplished for eleven of thirteen months. In October 2009 and May 2010, only ten tracklines were covered. Survey coverage was intensified during North Atlantic right whale (*Eubalaena glacialis*) calving season (December 2009 through April 2010) during which time 143 tracklines were flown, for an average of 29 tracklines surveyed per month. In addition, upon request from the US Navy, extra survey coverage was provided during Navy exercises in September 2009 and June 2010. Thus, a total of 354 tracklines (29839.4 km) were surveyed during the reporting period. The majority of surveys were flown in Beaufort Sea State (BSS) 2 (41.3%).

A total of 323 sightings of 3718 cetaceans were observed while on effort in the study area (Table 1, Figure 1). Nine species of cetaceans were observed in the survey area while on effort including bottlenose dolphins (*Tursiops truncatus*; 132 sightings of 1179 individuals), Atlantic spotted dolphins (*Stenella frontalis*; 124 sightings of 2080 individuals), Risso's dolphins (*Grampus griseus*; 16 sightings of 228 individuals), short-finned pilot whales (*Globicephala macrorhynchus*; two sightings of 19 individuals), sperm whales (*Physeter macrocephalus*; one sighting of two individuals), dwarf or pygmy sperm whales (*Kogia* spp.; one sighting of one individual), rough-toothed dolphins (*Steno bredanensis*; one sighting of 50 individuals), minke whales (*Balaenoptera acutorostrata*; six sightings of eight individuals), and North Atlantic right whales (*Eubalaena glacialis*; two sightings of three individuals). A noteworthy encounter occurred on 20 March 2010 when the aerial survey team observed and documented the birth of a North Atlantic right whale calf in the survey area. It occurred outside of the designated Right Whale Critical Habitat and represents only the second time a right whale birth has been witnessed (see Zani *et al.* 2008). In addition, there were 38 sightings (148 individual dolphins) where species identity could not be established with 100 percent certainty (*i.e.* "unidentified delphinids"). There was also an off effort encounter of a mother/calf right whale pair approximately 3 km west of the survey area. In addition, there were four off effort sightings of

Atlantic spotted dolphins (n=2) and unidentified delphinids (n=2) that were observed in or near the survey area. Off effort sightings data are not included in maps, tables or density calculations. The number of cetacean sightings varied by month, with the highest number of encounters recorded from January through April 2010 and September 2009.

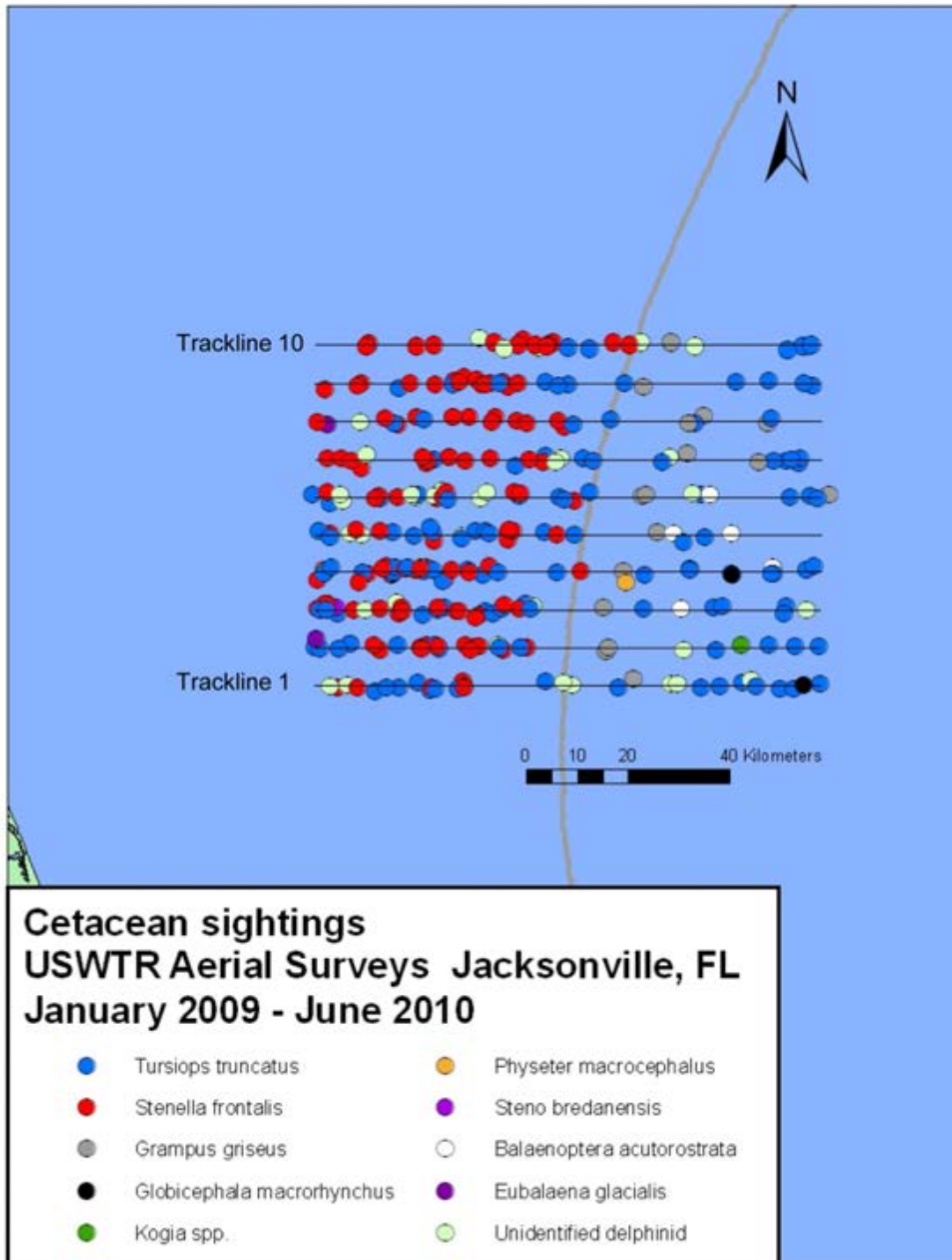
A total of 1543 sea turtles were recorded during the study period. Of these, 1169 were identified as loggerhead sea turtles (*Caretta caretta*), 50 as leatherback sea turtles (*Dermochelys coriacea*), one as a Kemp's Ridley sea turtle (*Lepidochelys kempii*), and 323 were labeled "unidentified sea turtles". Sea turtles were observed during each month surveyed, with an apparent general trend of higher densities during late spring and early summer.

As previously demonstrated in other aerial survey studies, sightings drop off dramatically as the Beaufort Sea State increases. In the present study, as BSS increased from 1 to 3, cetacean sighting rates decreased from 21.35 to 3.33 per 1000 km surveyed, and sea turtle sightings decreased from 91.31 to 23.23 per 1000 km surveyed respectively.

In addition to cetaceans and sea turtles, other pelagic marine vertebrates (*e.g.* multiple species of sharks, manta rays [*Manta birostris*], and ocean sunfish) were observed. Commercial, Navy and recreational vessels were encountered in the survey area, with the majority belonging to the latter category.







*Figure 1.* All cetacean sightings during aerial surveys of the proposed USWTR survey site off of Jacksonville, Florida during January 2009 – June 2010.

## **Methodology**

### Survey design and logistics

The JAX USWTR survey area consists of ten 86 km long tracklines spaced 7.4 km apart, which cover the proposed USWTR site and a 10 to 30 km boundary around the site offshore of Jacksonville (Table 2, Fig. 2). The corners of the core USWTR site are: N30.47°/W-80.37° (NW), N30.47°/W-80.00° (NE), N30.05°/W-80.47° (SW), N30.05°/W-80.10° (SE). The site sits offshore of the primary calving grounds for the highly endangered North Atlantic right whale (*Eubalaena glacialis*) which is located off the coast of the southeastern US (reviewed in Waring *et al.* 2009). The JAX USWTR tracklines begin 9.3 km east of the Early Warning Systems (EWS) eastern margin. Aerial EWS surveys have been conducted in northern Florida and southern Georgia for the past 15 years to warn mariners in real time about the presence of right whales in the region. These surveys are performed on a daily basis, weather permitting, from December through March. Another objective for the JAX USWTR surveys was to collect shoulder season data outside of the EWS survey period. Additional survey efforts, including on effort transits, were performed during November 2009 and April 2010.

In order to establish safety and communication protocols for transits through EWS areas, the USWTR team met with researchers from the New England Aquarium and Florida Wildlife Service prior to the start of EWS surveys. The protocols outlined coordination between survey team leaders on the morning of a survey, plane to plane communication at the start of an aerial survey and the maintenance of a 1000 m altitude for the USWTR survey plane transiting through the EWS area between December and March. The protocols also established the 9.3 km “buffer zone” between the western margin of the USWTR surveys and the eastern margin of the EWS surveys. This was done to safely maximize aerial coverage during right whale calving season.

All aerial surveys were based out of the local FBO in Fernandina Beach, FL, except for preliminary aerial surveys conducted during February and March 2009, which originated in St Augustine, Florida. Prior to an aerial survey, pilots with Orion aviation would contact SeaLord at FACFASJAX in Jacksonville, Florida, to get event codes for passage out of and into U.S. territorial waters.

Except for the geographic and logistical details described above, the JAX USWTR aerial surveys mirror those carried out at the Onslow Bay site. Please see the Survey design and

logistics section for Onslow Bay North Carolina USWTR site for complete description of survey methods.

Table 2. Coordinates for trackline endpoints of the Jacksonville, Florida survey site.

Transect Line	Western Way Point		Eastern Way Point	
	Latitude	Longitude	Latitude	Longitude
1	29.9650110	-80.7000000	29.9650110	-79.8014160
2	30.0312638	-80.7000000	30.0312638	-79.8014160
3	30.0996944	-80.7000000	30.0996944	-79.8014160
4	30.1657638	-80.7000000	30.1657638	-79.8014160
5	30.2322277	-80.7000000	30.2322277	-79.8014160
6	30.2994770	-80.7000000	30.2994770	-79.8014160
7	30.3651528	-80.7000000	30.3651528	-79.8014160
8	30.4327972	-80.7000000	30.4327972	-79.8014160
9	30.4988666	-80.7000000	30.4988666	-79.8014160
10	30.5662330	-80.7000000	30.5662330	-79.8014160

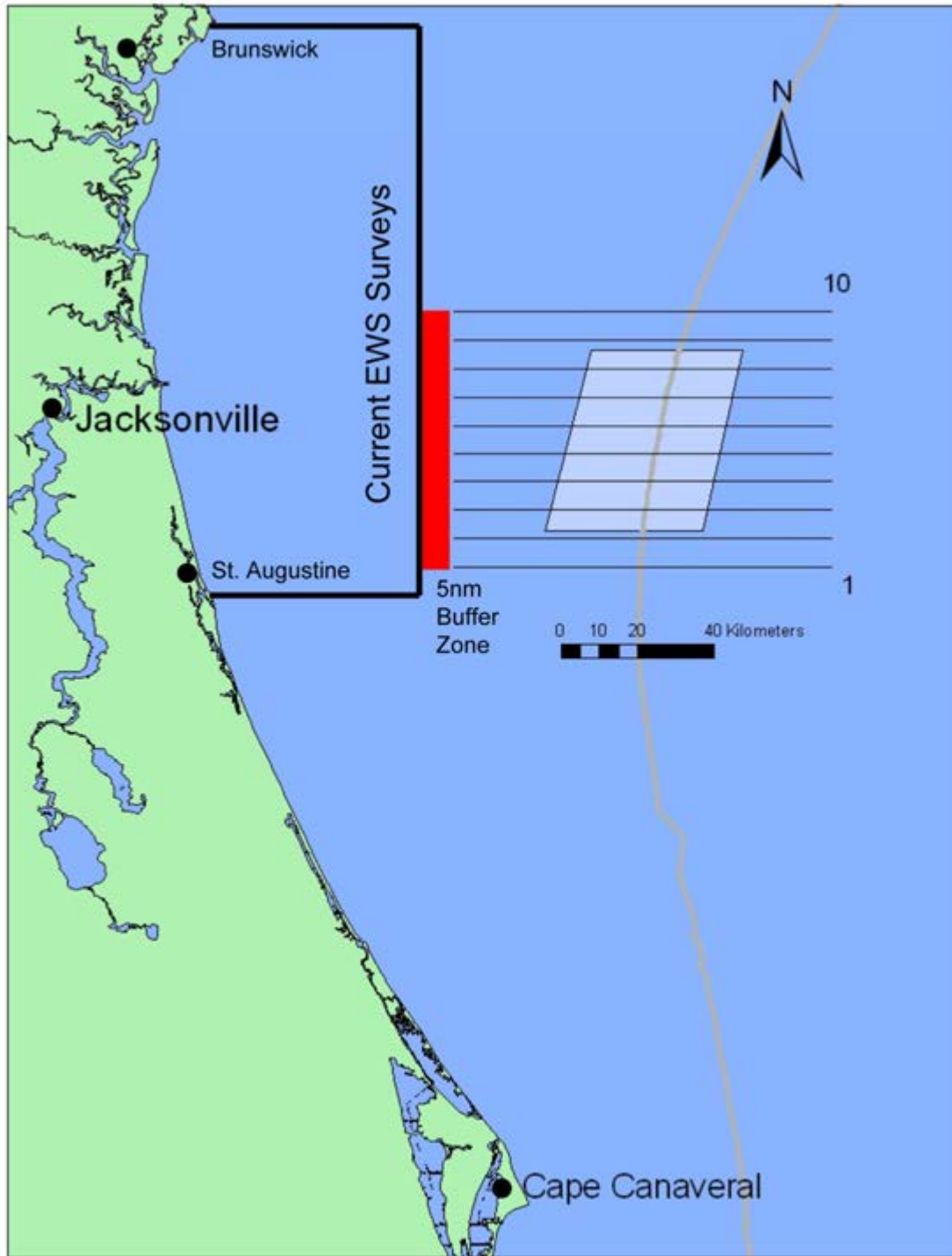


Figure 2. Survey tracklines 1 – 10 that cover and extend beyond the boundaries of the proposed USWTR site off of Jacksonville, Florida.

## Results

Preliminary aerial surveys of the proposed USWTR site off of Jacksonville, Florida were performed in January, February and March 2009. During these initial surveys a total of 35 tracklines were flown (Table 3). Regularly scheduled aerial surveys commenced in June 2009. The aim of the aerial surveys was to cover the entire survey area twice (20 tracklines) during each calendar month. A minimum of two full sets of survey tracklines were flown each month between June 2009 and June 2010, except October 2009 and May 2010 (10 tracklines each). During the North Atlantic right whale (*Eubalaena glacialis*) calving season survey effort was increased for a total of 143 tracklines surveyed from December 2009 through April 2010, an average of 29 tracklines per calendar month. Upon request by the US Navy, aerial surveys were conducted to cover naval exercises in the USWTR area during September 2009 and June 2010 for a total of 76 tracklines surveyed during these two months. A total of 354 tracklines and 29839.4 km were surveyed from January 2009 through June 2010.

Table 3. Tracklines and km flown during aerial surveys of the proposed USWTR site off of Jacksonville, Florida between January 2009 – June 2010. Trackline numbers are listed in the order in which they were flown.

Date	Tracklines Flown AM	Tracklines Flown PM	Daily Total km Flown
27-Jan-2009	1 to 6		505.9
28-Jan-2009	7 to 10		345.5
26-Feb-2009	10 to 7	6 to 1	861.8
27-Feb-2009	1 to 6	7 to 10	842.8
31-Mar-2009	5 to 9		431.7
9-Jun-2009		10 to 5	514.3
10-Jun-2009	1 to 6	7 to 10	857.7
11-Jun-2009	4 to 1		318.7
15-Jul-2009		1 to 6	507.7
16-Jul-2009	10 to 5	4 to 1	857.1
17-Jul-2009	7 to 10		344.3
4-Aug-2009	10 to 5		507.2
5-Aug-2009	1 to 6	7 to 8	689.7
6-Aug-2009	1 to 4, 9, 10		513.2
14-Sep-2009	10 to 7		343.4
15-Sep-2009	1 to 6	7 to 10	854.0
16-Sep-2009	1 to 4	5 to 6	512.2
18-Sep-2009	10 to 5	4 to 1	856.9
30-Sep-2009	1 to 6	7, 8, 10, 9	763.5
1-Oct-2009	10 to 5	4 to 1	821.5
17-Nov-2009		10-5	517.5
18-Nov-2009	1 to 6	10 to 7	856.9
20-Nov-2009	1 to 4		345.1
8-Dec-2009	10 to 1		865.8
10-Dec-2009	1 to 2		86.1
22-Dec-2009	1 to 6	7 to 10	860.0
7-Jan-2010	1 to 6	7 to 10	862.4
19-Jan-2010	10 to 5	4 to 1	856.0
20-Jan-2010	1 to 6	7 to 10	832.9
27-Jan-2010	10 to 5	4 to 1	862.2
28-Jan-2010	1 to 4	5 to 6	507.5
19-Feb-2010	1 to 6	7 to 10	863.8
20-Feb-2010	10 to 5	4 to 1	846.6
21-Feb-2010	1 to 6	7 to 10	835.5
20-Mar-2010	1 to 2	3 to 8	681.7
24-Mar-2010	10 to 6		506.0
31-Mar-2010		1 to 4, 9, 10	497.6
1-Apr-2010	10 to 5	4 to 1	834.0
2-Apr-2010	1 to 6	7 to 10	822.0
3-Apr-2010	10 to 5		411.0
6-May-2010	1 to 2	3	184.3
7-May-2010	3 to 10		636.0
4-Jun-2010	1 to 6	7 to 10	858.8
5-Jun-2010	10 to 1		816.5
6-Jun-2010	1 to 6	7 to 10	832.3
7-Jun-2010	10 to 5		511.5
		Total	29839.4



Each survey month an average Beaufort Sea State (BSS) value was calculated as a way to compare conditions across time. This average was calculated by taking the distance flown at each sea state multiplied by the BSS number (*i.e.* BSS 1 distances would be multiplied by 1). These values were then summed and divided by the total distance flown that month. Survey effort was terminated at BSS greater than 4. Survey conditions ranged from a BSS 0 to 5, with the majority of the surveys flown in a BSS 2 [BSS 0: 80.5 km (0.3%), BSS 1: 6275.4 km (21.0%), BSS 2: 12315.6 km (41.3%), BSS 3: 9299.1 km (31.2%), BSS 4: 1782.6 km (6.0%), BSS 5: 86.1 km (0.3%)(Fig. 3a-c)]. Cetacean sighting rates dropped off dramatically as BSS increased, with 12.42 sightings/1000km surveyed in BSS 0, 21.35 sightings/1000km surveyed in BB1, 12.67 sightings/1000km surveyed in BSS 2, 3.33 sightings/1000 km surveyed in BSS 3, and 0.56 sightings/1000km surveyed in BSS 4 (Fig. 4a-c).

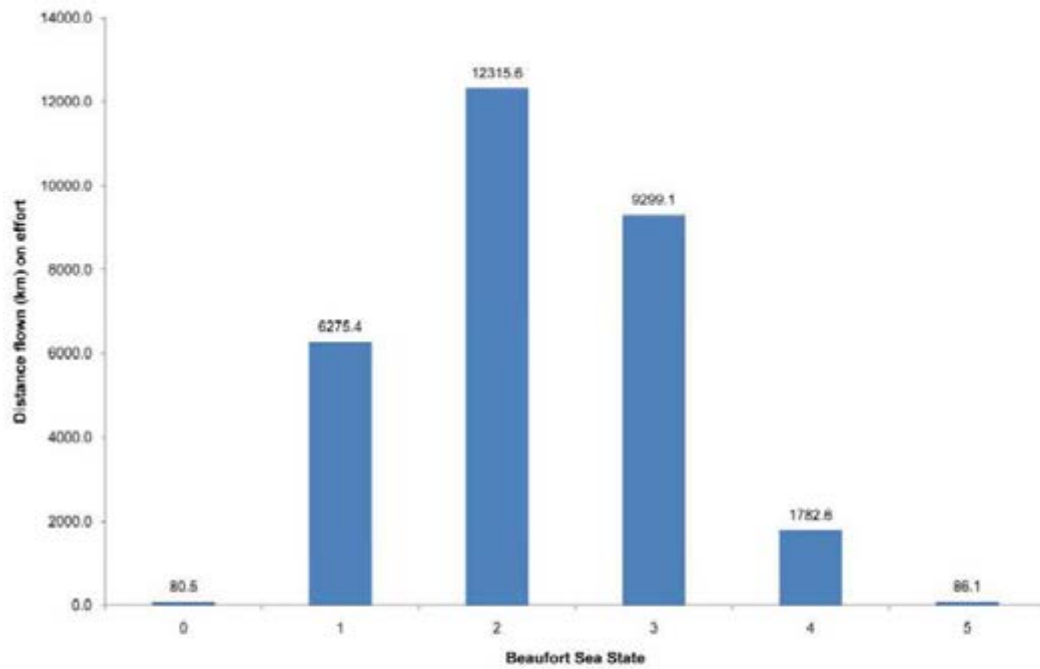


Figure 3a. Total distance surveyed per Beaufort Sea State during the January 2009 – June 2010 aerial surveys of the proposed USWTR survey site off Jacksonville, Florida.

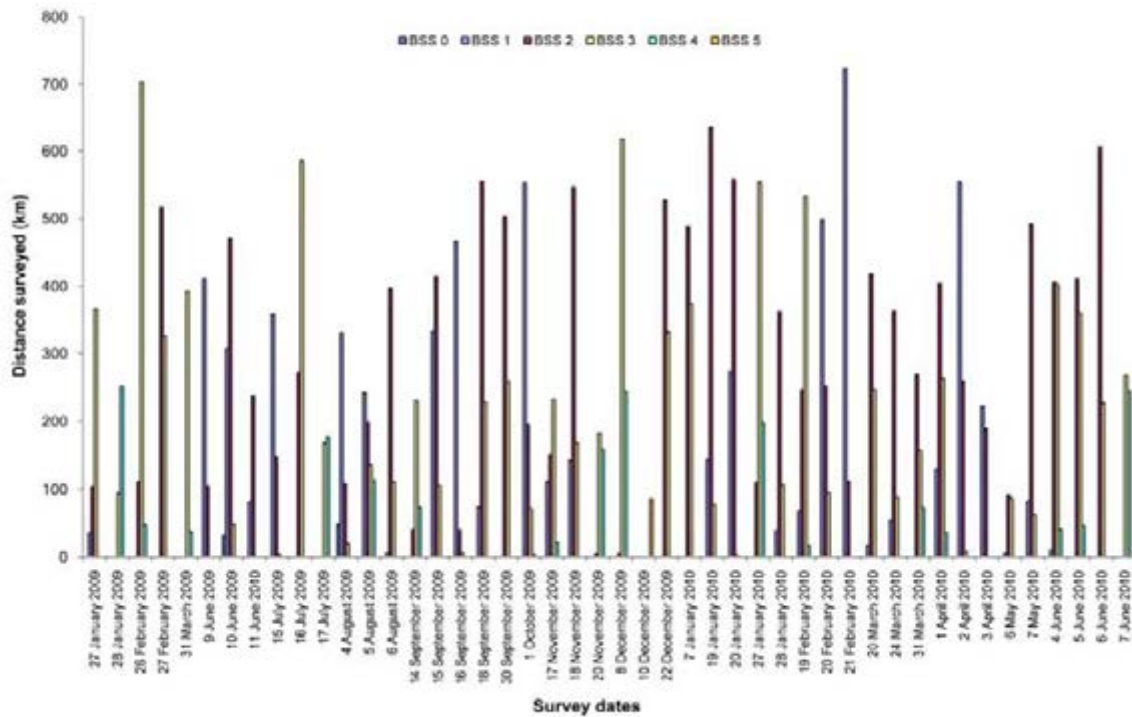


Figure 3b. Effort by Beaufort Sea State for each survey day during the January 2009 – June 2010 aerial surveys of the proposed USWTR site off of Jacksonville, Florida.

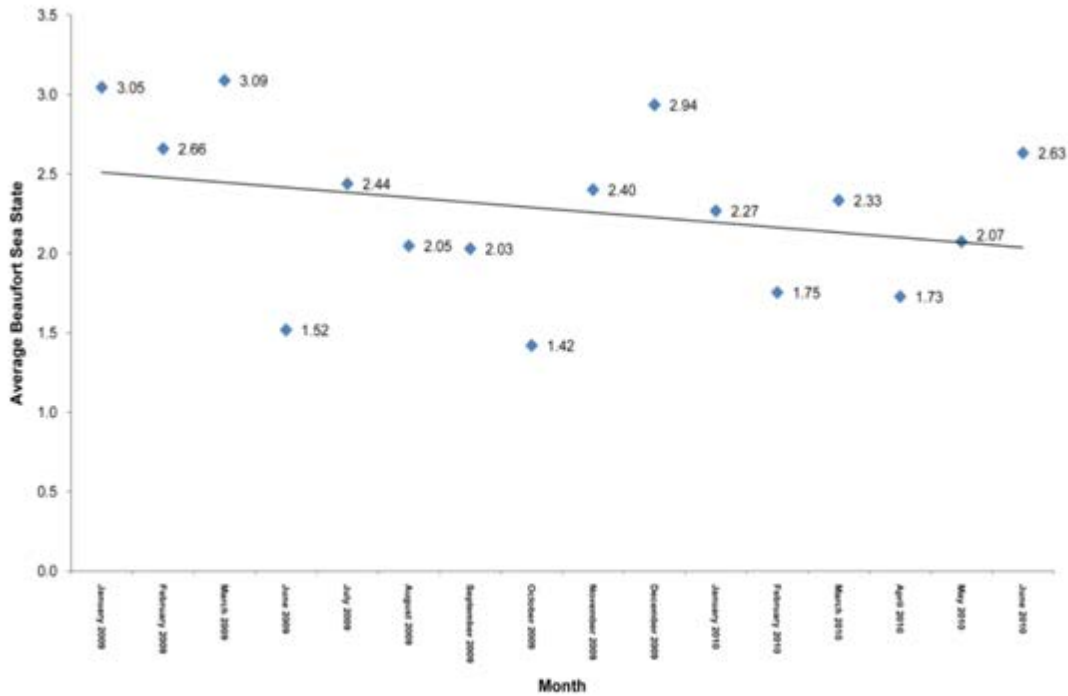


Figure 3c. Average Beaufort Sea State for each month during the January 2009 – June 2010 aerial surveys of the proposed USWTR site off of Jacksonville, Florida. Values were calculated using the formula  $AvgBSS = \frac{(Distance @ BSS1 * 1) + (Distance @ BSS2 * 2) + \dots}{Total \ distance \ flown \ that \ day}$ .

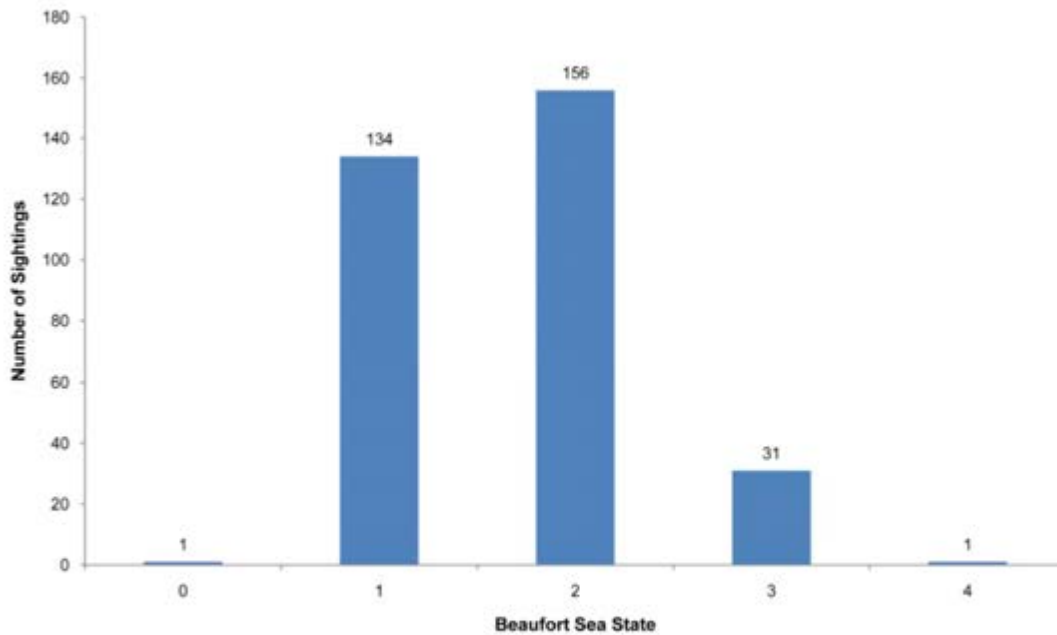


Figure 4a. Total number of cetacean sightings per Beaufort Sea State January 2009 – June 2010 for aerial surveys flown in the proposed USWTR site off of Jacksonville, Florida.

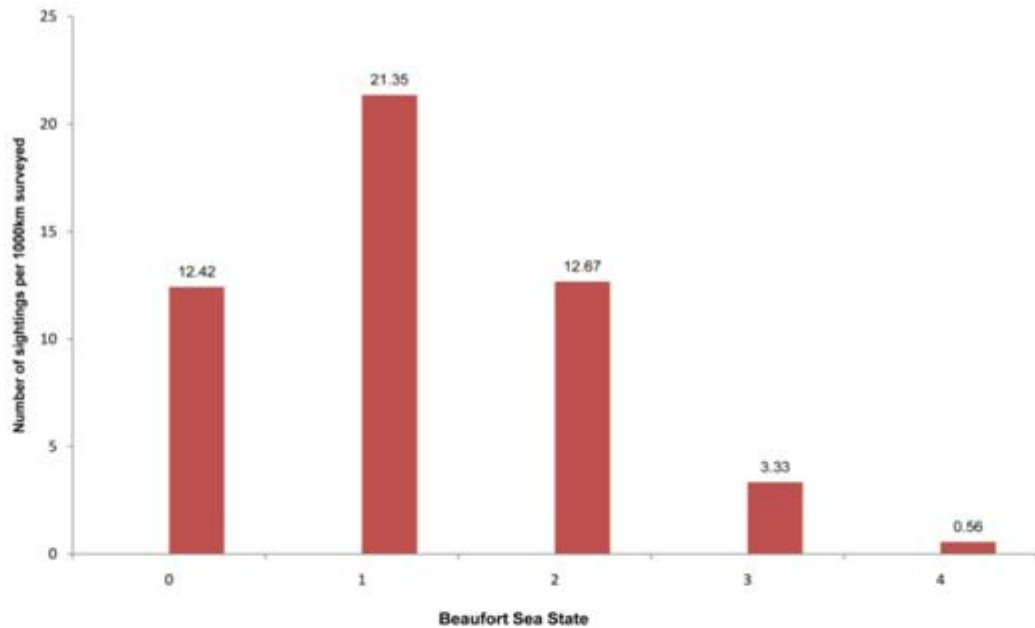


Figure 4b. Cetacean sightings per 1000 km flown by Beaufort Sea State from January 2009 – June 2010 during aerial surveys of the proposed USWTR site off of Jacksonville, Florida.

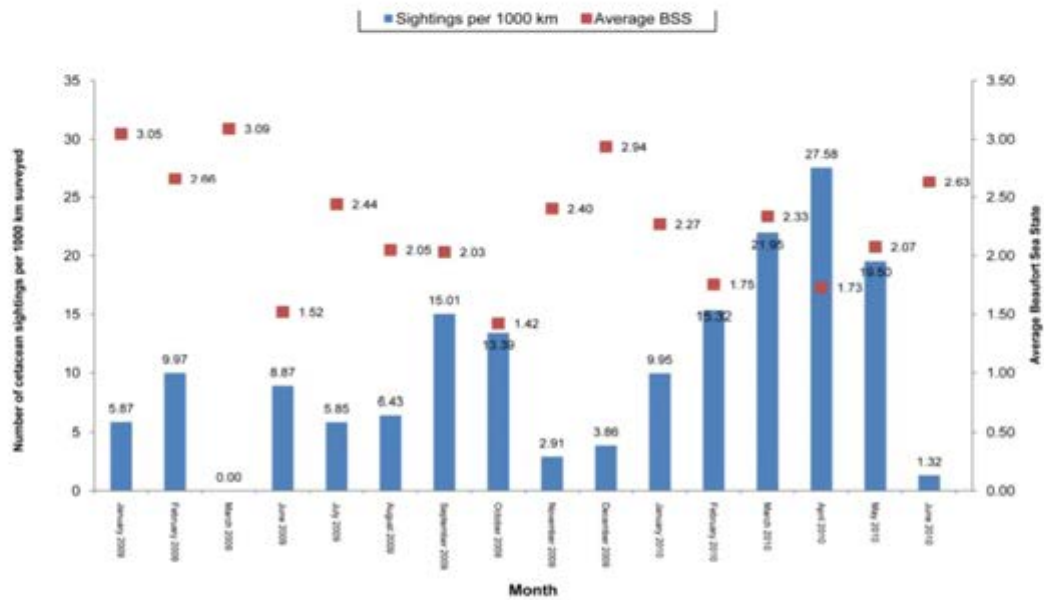


Figure 4c. Cetacean sightings per 1000 km surveyed and the average Beaufort Sea State per month from January 2009 – June 2010 during aerial surveys of the proposed USWTR site off of Jacksonville, Florida.

The mean sighting distance for all cetacean sightings was 0.72 km (SD=0.46) and most sightings were made within 1.2 km of the plane (Fig.5a). The mean sighting distance tended to decrease as BSS increased (Fig. 5b). Average sighting distances were calculated after removing outliers. An outlier was defined as a value in excess of three standard deviations from the mean. Six sighting distances were removed from these calculations as outliers (*i.e.* sighting distances calculated at 2.1, 2.1, 2.2, 2.5, 2.5 and 3.2 km from the trackline).

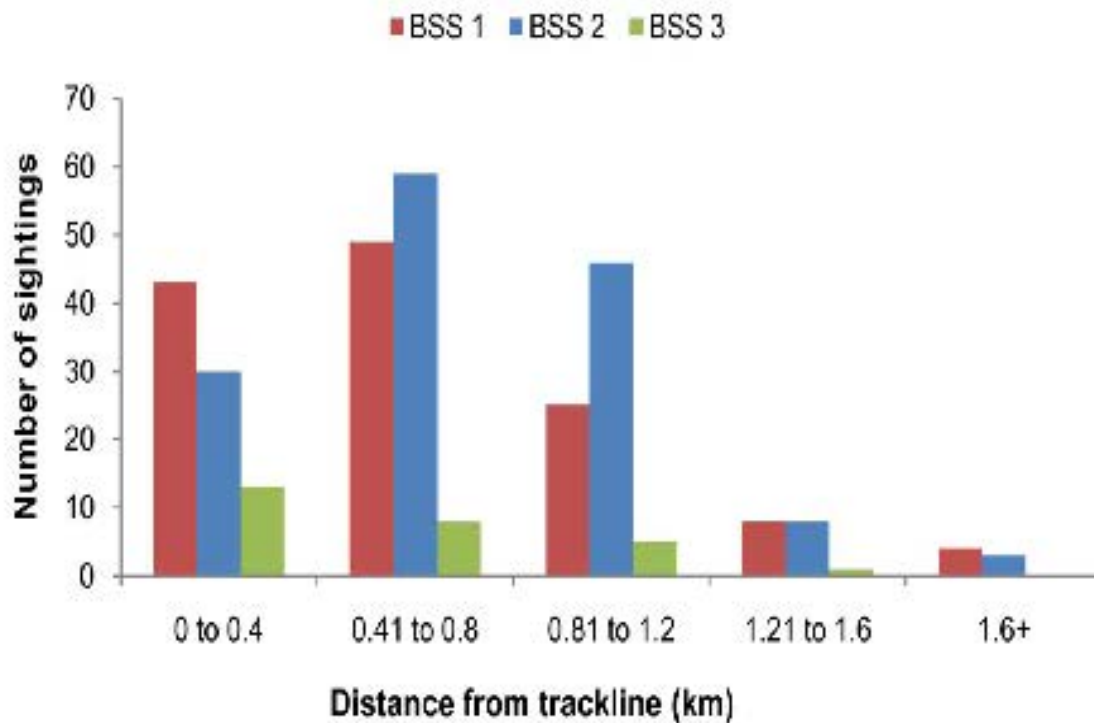


Figure 5a. Sighting distances by Beaufort Sea State for cetacean sightings from January 2009 – June 2010 in the proposed USWTR off of Jacksonville, Florida. A total of 323 sightings are plotted. Six outliers (distance > 3 standard deviations) were omitted from the calculations.

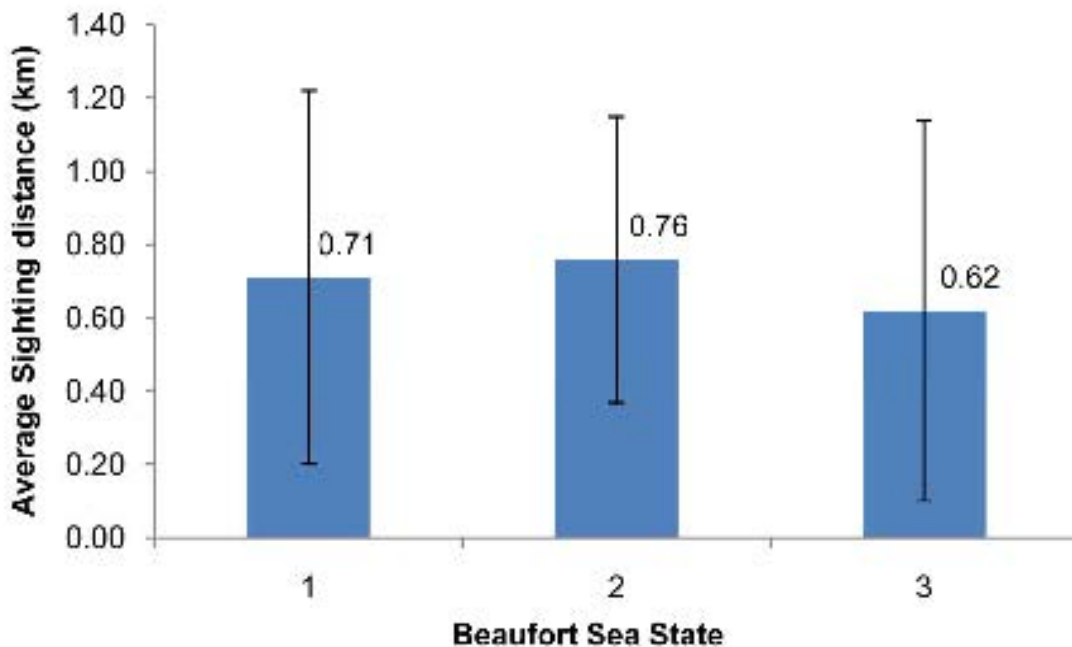


Figure 5b. Mean sighting distance by Beaufort Sea State for all cetacean sightings from January 2009 – June 2010 in the proposed USWTR site off of Jacksonville, Florida. Error bars denote standard deviation for each category.

## Marine Mammal Sightings

A total of 323 sightings of 3718 individual cetaceans were observed while on effort during the reporting period. Nine species of cetaceans were observed in the study area while on effort. A rare event was witnessed by the aerial survey team on 20 March 2010 when a North Atlantic right whale (*Eubalaena glacialis*) was observed giving birth, 11 km west of the proposed USWTR site. This was only the second time such an event had been documented (see Zani *et al.* 2008). Species encountered on effort are listed below in decreasing number of sightings (*i.e.* most commonly sighted species first). Summaries for individual sightings are in Appendix I. Daily sightings are summarized in Appendix J.

### Bottlenose dolphin (*Tursiops truncatus*) (Table 4, Fig. 6)

Bottlenose dolphins were the most frequently encountered cetaceans (132 sightings for a total of 1179 individuals). Group size ranged from 1 to 50 (mean = 8.92). The most common group size encountered was three (n=20), followed by sightings of a single animal (n=15). Based on the distance from shore (*e.g.* greater than 69 km), the bottlenose dolphins observed in this study most likely belonged to the offshore ecotype (Torres *et al.* 2003). Bottlenose dolphins were encountered throughout the study area, with an apparent zone of low density just offshore of the continental shelf (Fig. 6). In general, group size tended to be smaller inshore of the shelf break compared to groups encountered offshore, and almost all sightings of single bottlenose dolphins occurred inshore of the shelf-break (Fig. 6). This species was encountered during each month surveyed except November 2009 and June 2010. The current best estimate of offshore bottlenose dolphins in the Western Atlantic Ocean, between central Florida and Canada, is 81588 (CV = 0.17) (NOAA Stock Assessment Report; Waring *et al.* 2008).



Table 4. All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Jan-09	12:47	9	29.956440	-80.496258	E	1	2	90°	15
27-Jan-09	15:20	59	30.228130	-80.008412	E	5	1	90°	25
26-Feb-09	9:59	14	30.565175	-79.827772	E	10	1	90°	12
27-Feb-09	8:56	5	29.960482	-80.551935	E	1	3	90°	1
27-Feb-09	9:58	24	30.035786	-80.553049	W	2	2	90°	3
27-Feb-09	10:16	35	30.102491	-80.471207	E	3	1	90°	19
27-Feb-09	11:01	48	30.169046	-80.429190	W	4	3	90°	3
27-Feb-09	12:37	74	30.295815	-80.583819	W	6	1	120°	5
27-Feb-09	14:40	83	30.366118	-80.489115	E	7	2	90°	1
27-Feb-09	14:48	89	30.367579	-80.223930	E	7	3	90°	8
9-Jun-09	13:42	13	30.502732	-79.953532	W	9	2	90°	8
10-Jun-09	10:55	25	30.161913	-80.401118	W	4	1	90°	8
10-Jun-09	12:18	52	30.288698	-80.673378	W	6	2	100°	18
10-Jun-09	12:25	56	30.302670	-80.704548	W	6	2	60°	16
11-Jun-09	9:44	14	30.091657	-80.659760	W	3	2	75°	4
11-Jun-09	10:53	27	29.967194	-79.804484	W	1	1	90°	14
11-Jun-09	11:08	31	29.969022	-79.941584	W	1	2	90°	16
15-Jul-09	15:10	76	30.162002	-80.116169	W	4	2	90°	4
15-Jul-09	15:35	91	30.233127	-80.675794	E	5	1	90°	4
16-Jul-09	9:29	8	30.566033	-79.834290	E	10	2	120°	12
16-Jul-09	14:35	38	30.039753	-80.637413	E	2	2	110°	6
16-Jul-09	15:29	61	29.958990	-79.874340	W	1	1	110°	10
16-Jul-09	15:58	67	29.969852	-80.518172	W	1	1	100°	13
4-Aug-09	13:58	31	30.359854	-79.840649	W	7	2	110°	24
4-Aug-09	14:56	51	30.303775	-80.014142	E	6	2	75°	35
6-Aug-09	9:10	10	29.961709	-80.161598	E	1	1	90°	20
6-Aug-09	10:37	27	30.172326	-80.033970	W	4	1	90°	17
15-Sep-09	9:57	9	29.962785	-79.982730	E	1	1	90°	3
15-Sep-09	16:17	88	30.429269	-80.558831	W	8	1	100°	2
15-Sep-09	16:32	95	30.492564	-80.550183	E	9	1	90°	8
16-Sep-09	10:22	4	29.954849	-80.593794	E	1	2	120°	9
16-Sep-09	11:51	43	30.097543	-80.397718	E	3	2	110°	10
16-Sep-09	12:05	49	30.109295	-80.326179	E	3	3	110°	4
16-Sep-09	12:56	61	30.149300	-80.473643	W	4	3	90°	6
18-Sep-09	12:19	63	30.238101	-80.415326	W	5	3	90°	16
18-Sep-09	14:38	13	30.168336	-80.505832	E	4	1	90°	5
18-Sep-09	15:41	33	30.032023	-80.699443	E	2	1	90°	15
18-Sep-09	15:52	37	30.039557	-80.636833	E	2	2	100°	4
30-Sep-09	11:06	48	30.169024	-80.034752	W	4	2	45°	5

Table 4 (continued). All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
1-Oct-09	14:04	83	30.163510	-80.562485	E	4	2	90°	10
1-Oct-09	14:34	95	30.169987	-79.828164	E	4	2	90°	40
22-Dec-09	14:16	54	30.363803	-80.206578	E	7	1	90°	50
22-Dec-09	15:23	70	30.499372	-80.249891	E	9	2	120°	4
22-Dec-09	15:45	74	30.497783	-79.816314	E	9	2	80°	3
7-Jan-10	10:50	10	30.028720	-80.690989	W	2	2	100°	1
7-Jan-10	12:02	22	30.164537	-80.559666	W	4	2	75°	2
7-Jan-10	15:54	48	30.439802	-79.890082	W	8	3	110°	45
19-Jan-10	10:18	16	30.368094	-79.839572	W	7	1	90°	10
19-Jan-10	10:23	20	30.362928	-79.864591	W	7	2	110°	5
19-Jan-10	11:20	27	30.300247	-79.821877	E	6	1	90°	11
19-Jan-10	14:26	46	30.091970	-80.385131	W	3	3	110°	4
19-Jan-10	14:54	53	30.035396	-80.486387	E	2	1	90°	24
19-Jan-10	15:02	57	30.034382	-80.374406	E	2	1	95°	2
19-Jan-10	15:23	62	30.026904	-79.988553	E	2	2	90°	5
20-Jan-10	10:03	27	30.030747	-80.479153	W	2	1	90°	3
20-Jan-10	10:26	34	30.098657	-80.691225	E	3	2	110°	3
20-Jan-10	10:48	42	30.101009	-80.116509	E	3	1	60°	40
20-Jan-10	10:57	45	30.104286	-79.992491	E	3	3	120°	5
20-Jan-10	12:07	66	30.298620	-79.858260	W	6	1	75°	29
20-Jan-10	14:23	96	30.372688	-80.289967	E	7	3	100°	3
20-Jan-10	14:34	102	30.361459	-80.084967	E	7	2	90°	14
20-Jan-10	15:06	114	30.436033	-80.506570	W	8	2	90°	7
20-Jan-10	15:48	133	30.567242	-79.818377	W	10	2	90°	16
28-Jan-10	9:32	6	29.959962	-80.573048	E	1	1	110°	5
28-Jan-10	11:18	38	30.030443	-80.658599	W	2	2	110°	2
28-Jan-10	12:59	70	30.163580	-80.684992	W	4	1	80°	2
28-Jan-10	15:08	81	30.230264	-80.524258	E	5	2	90°	3
28-Jan-10	15:23	86	30.238250	-80.398262	E	5	1	100°	3
28-Jan-10	16:14	103	30.300036	-80.337468	W	6	2	150°	3
20-Feb-10	12:27	52	30.303476	-80.516636	E	6	2	110°	12
20-Feb-10	13:45	85	30.238398	-80.693274	W	5	1	90°	1
20-Feb-10	15:46	106	30.163147	-79.885885	E	4	2	90°	3
21-Feb-10	9:00	13	30.034156	-79.805427	W	2	1	150°	4
21-Feb-10	9:10	17	30.033649	-79.848469	W	2	1	90°	20
21-Feb-10	9:55	28	30.090595	-80.509092	E	3	2	130°	8
21-Feb-10	10:23	37	30.104639	-79.864820	E	3	1	110°	26
21-Feb-10	11:01	51	30.175268	-80.557259	W	4	2	95°	6
21-Feb-10	11:18	60	30.228045	-80.672911	E	5	1	150°	1

Table 4 (continued). All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
21-Feb-10	11:27	65	30.237415	-80.561136	E	5	1	90°	3
21-Feb-10	11:35	70	30.236873	-80.491644	E	5	3	90°	3
21-Feb-10	11:52	80	30.236288	-80.292178	E	5	2	90°	8
21-Feb-10	14:50	118	30.354268	-80.344896	E	7	2	120°	6
21-Feb-10	15:10	124	30.364399	-79.885563	E	7	2	110°	3
21-Feb-10	15:23	130	30.430170	-80.025826	W	8	1	120°	13
20-Mar-10	13:01	39	30.099889	-80.367558	W	3	2	90°	2
31-Mar-10	14:30	19	30.099076	-80.680099	E	3	2	110°	5
31-Mar-10	16:02	49	30.502046	-80.372564	E	9	2	110°	1
31-Mar-10	16:09	57	30.503607	-80.291330	E	9	1	90°	1
31-Mar-10	16:21	62	30.500793	-80.151141	E	9	2	100°	2
31-Mar-10	16:35	70	30.501375	-79.831675	E	9	1	90°	18
31-Mar-10	17:01	86	30.562104	-80.212544	W	10	1	90°	3
1-Apr-10	11:32	25	30.306852	-80.213772	E	6	2	140°	3
1-Apr-10	14:25	53	30.173926	-80.535763	E	4	2	130°	2
1-Apr-10	14:30	57	30.170693	-80.491403	E	4	3	70°	1
1-Apr-10	14:44	67	30.165493	-80.270584	E	4	3	90°	7
1-Apr-10	15:00	73	30.163185	-79.962582	E	4	1	80°	11
1-Apr-10	15:31	83	30.099932	-80.317157	W	3	2	110°	1
1-Apr-10	16:03	104	30.035986	-80.485707	E	2	1	90°	3
2-Apr-10	9:15	9	29.959600	-80.446274	E	1	3	100°	3
2-Apr-10	9:40	21	29.961503	-80.013987	E	1	2	120°	2
2-Apr-10	9:48	26	29.963709	-79.918157	E	1	2	130°	8
2-Apr-10	9:53	30	29.958657	-79.850725	E	1	2	90°	5
2-Apr-10	10:09	40	30.037085	-79.894317	W	2	2	90°	4
2-Apr-10	10:26	48	30.032868	-80.373894	W	2	1	110°	15
2-Apr-10	11:03	69	30.099114	-80.481895	E	3	1	100°	10
2-Apr-10	11:21	77	30.104917	-79.977374	E	3	1	90°	6
2-Apr-10	11:26	81	30.092008	-79.867933	E	3	2	100°	1
2-Apr-10	11:35	87	30.176137	-79.815244	W	4	2	100°	39
2-Apr-10	11:39	91	30.163063	-79.889926	W	4	1	90°	4
2-Apr-10	12:08	106	30.166215	-80.616192	W	4	2	90°	2
2-Apr-10	12:15	110	30.175159	-80.671960	W	4	2	100°	2
2-Apr-10	12:30	118	30.244618	-80.494633	E	5	3	110°	1
2-Apr-10	12:39	122	30.225323	-80.439020	E	5	2	100°	1
2-Apr-10	12:53	132	30.218106	-80.045485	E	5	3	92°	5
2-Apr-10	13:20	141	30.299055	-80.265751	W	6	1	90°	6
2-Apr-10	15:54	176	30.365067	-79.855610	E	7	1	90°	10
2-Apr-10	16:11	183	30.435725	-80.175345	W	8	3	80°	12

Table 4 (continued). All bottlenose dolphin (*Tursiops truncatus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
2-Apr-10	16:44	199	30.498584	-80.456330	E	9	2	90°	4
3-Apr-10	8:37	8	30.563400	-80.250618	E	10	2	100°	1
3-Apr-10	8:55	13	30.558371	-79.861974	E	10	3	120°	1
3-Apr-10	9:57	47	30.428283	-80.241561	E	8	1	75°	10
3-Apr-10	11:01	68	30.293566	-80.463537	E	6	2	100°	1
3-Apr-10	11:10	72	30.294518	-80.257094	E	6	2	100°	3
3-Apr-10	11:30	76	30.296693	-79.808363	E	6	1	90°	12
6-May-10	9:53	7	29.958342	-80.487387	E	1	2	100°	10
6-May-10	10:05	12	29.972346	-80.290129	E	1	2	135°	24
6-May-10	10:41	23	30.031996	-80.336320	W	2	2	90°	6
7-May-10	10:19	21	30.164865	-80.375852	W	4	1	100°	4
7-May-10	10:51	35	30.234612	-80.389831	E	5	2	90°	5
7-May-10	11:01	41	30.231191	-80.239313	E	5	3	130°	8
7-May-10	14:39	85	30.496633	-80.267536	E	9	2	145°	5

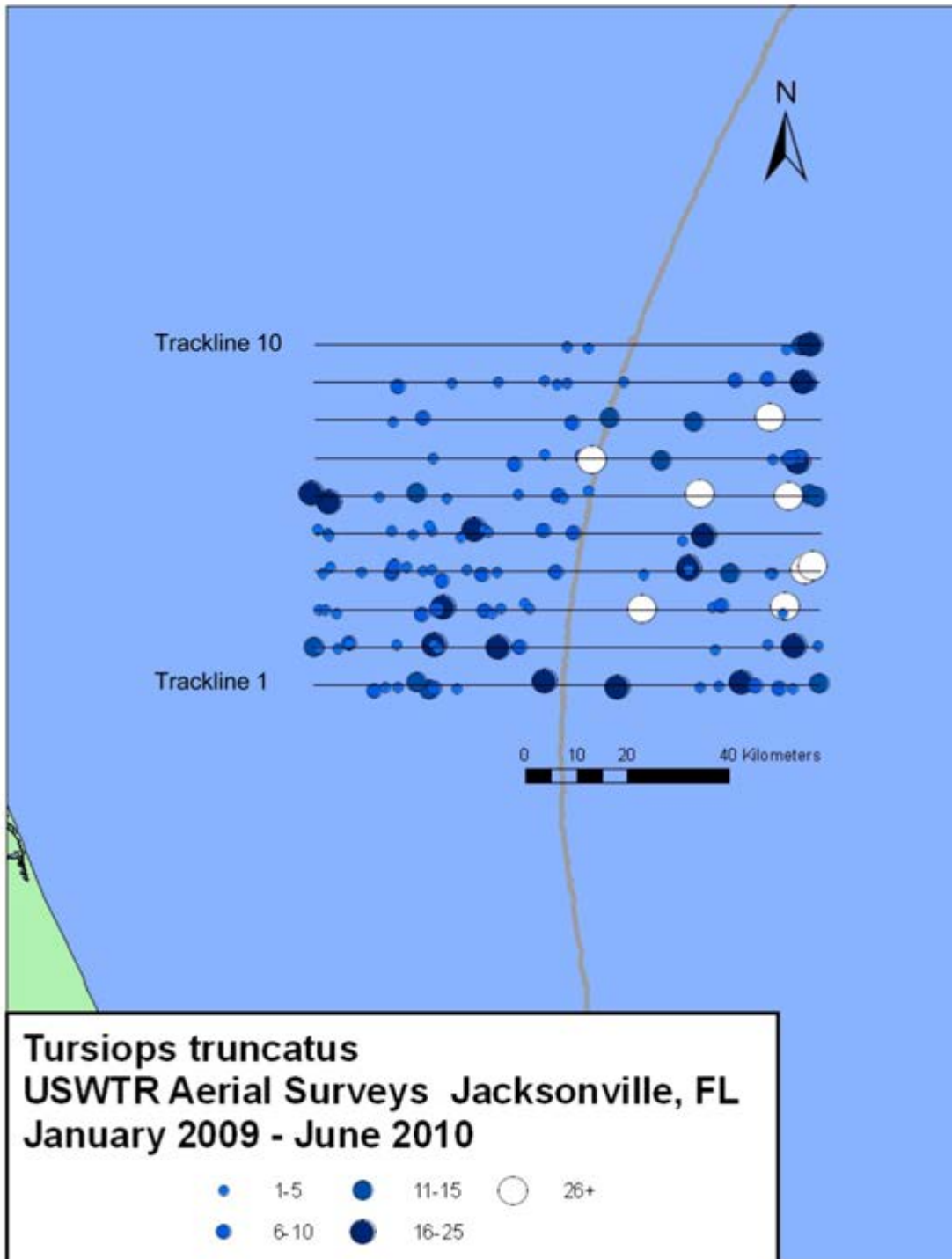


Figure 6. Bottlenose dolphin (*Tursiops truncatus*) sightings indicating group size.

Atlantic Spotted Dolphin (*Stenella frontalis*) (Table 5, Fig. 7)

While not the most commonly encountered, Atlantic spotted dolphins were the most numerous cetaceans (2080 individuals in 124 sightings) observed in the survey area. Group size ranged from 2 to 100 (mean = 16.77). Spotted dolphins were seen every month except November and December 2010. This species was encountered exclusively in shallow water over the continental shelf (Fig. 7). There are two distinct forms, or ecotypes, of the Atlantic spotted dolphin in the western North Atlantic: a heavily spotted form that typically occurs on the continental shelf and is most often encountered around the 200 m isobar or in shallower water, and a less spotted and smaller form which occurs farther offshore and around islands (Perrin *et al.* 1987, 1994). It is likely, based upon the features observed, that the spotted dolphins seen during the present study belong to the continental shelf variety. The abundance estimate for *S. frontalis* (both the inshore and the offshore forms) in the western north Atlantic is 50978 (CV = 0.42); the status of the stock(s) is/are unknown (Waring *et al.* 2007).

Table 5. All Atlantic spotted dolphin (*Stenella frontalis*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Jan-09	14:40	44	30.176813	-80.572702	W	4	3	90°	100
26-Feb-09	10:53	26	30.489811	-80.682168	W	9	1	90°	2
27-Feb-09	11:13	52	30.167427	-80.509722	W	4	3	90°	7
9-Jun-09	14:02	20	30.505660	-80.452111	W	9	2	90°	14
9-Jun-09	14:27	32	30.434622	-80.341820	E	8	2	110°	6
10-Jun-09	15:32	87	30.428722	-80.554191	W	8	2	80°	10
10-Jun-09	15:51	99	30.511654	-80.435801	E	9	2	75°	7
15-Jul-09	16:54	115	30.307943	-80.677572	W	6	2	45°	16
16-Jul-09	14:54	47	30.037417	-80.432347	E	2	1	100°	12
4-Aug-09	12:05	5	30.570403	-80.603836	E	10	3	110°	4
4-Aug-09	13:03	17	30.507257	-80.413696	W	9	2	90°	25
4-Aug-09	13:23	24	30.440882	-80.520348	E	8	3	120°	6
4-Aug-09	14:38	44	30.297389	-80.483850	E	6	3	90°	7
6-Aug-09	8:37	5	29.960847	-80.659663	E	1	1	120°	20
6-Aug-09	12:08	40	30.577324	-80.330336	W	10	3	90°	6
14-Sep-09	12:51	10	30.502628	-80.365528	W	9	2	110°	8
15-Sep-09	10:40	18	30.028446	-80.584039	W	2	1	120°	7
15-Sep-09	11:56	37	30.155112	-80.468606	W	4	2	100°	40
15-Sep-09	12:27	49	30.235518	-80.357595	E	5	2	135°	36
15-Sep-09	13:13	57	30.302087	-80.586596	W	6	2	110°	10
15-Sep-09	15:21	70	30.358729	-80.501714	E	7	3	90°	6
16-Sep-09	10:37	9	29.972613	-80.436649	E	1	2	110°	25
16-Sep-09	11:26	26	30.036121	-80.595111	W	2	1	90°	12
16-Sep-09	11:40	37	30.098577	-80.630170	E	3	2	90°	48
16-Sep-09	12:52	57	30.164620	-80.426851	E	4	1	90°	12
16-Sep-09	13:12	65	30.174440	-80.501961	W	4	2	100°	7
16-Sep-09	13:26	69	30.170953	-80.685147	W	4	1	90°	16
16-Sep-09	15:18	85	30.223357	-80.357840	E	5	2	85°	23
16-Sep-09	16:07	101	30.298897	-80.554275	W	6	2	45°	36
18-Sep-09	8:56	6	30.564918	-80.519281	E	10	3	90°	17
18-Sep-09	9:10	11	30.571772	-80.382930	E	10	3	100°	24
18-Sep-09	9:51	22	30.500495	-80.387744	W	9	1	90°	12
18-Sep-09	10:22	35	30.441061	-80.427384	E	8	2	90°	50
18-Sep-09	14:33	8	30.160878	-80.563221	E	4	1	90°	5
18-Sep-09	15:29	27	30.100683	-80.694371	W	3	2	100°	7
30-Sep-09	9:12	6	29.960539	-80.492943	E	1	1	100°	5
30-Sep-09	10:00	19	30.034495	-80.412547	W	2	1	120°	10
30-Sep-09	10:19	25	30.109130	-80.676868	E	3	3	90°	12
30-Sep-09	10:33	34	30.095493	-80.448507	E	3	2	125°	5



Table 5 (continued). All Atlantic spotted dolphin (*Stenella frontalis*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
30-Sep-09	10:40	38	30.089326	-80.407715	E	3	2	100°	23
30-Sep-09	11:27	56	30.163869	-80.607505	W	4	1	80°	4
30-Sep-09	11:36	60	30.162798	-80.684799	W	4	1	90°	5
30-Sep-09	11:48	67	30.240264	-80.626807	E	5	3	100°	9
30-Sep-09	15:36	104	30.568879	-80.340131	E	10	2	75°	9
1-Oct-09	9:35	16	30.499122	-80.404954	W	9	2	90°	4
1-Oct-09	9:58	24	30.441838	-80.454912	E	8	3	90°	25
1-Oct-09	10:08	30	30.429398	-80.324880	E	8	1	80°	6
1-Oct-09	10:18	35	30.424412	-80.257176	E	8	3	110°	12
1-Oct-09	11:09	52	30.295678	-80.592304	E	6	2	120°	6
1-Oct-09	12:08	68	30.234899	-80.674308	W	5	3	100°	9
1-Oct-09	13:56	78	30.152214	-80.695794	E	4	3	90°	6
1-Oct-09	15:13	109	30.110079	-80.682445	W	3	2	90°	4
20-Jan-10	9:55	22	30.035027	-80.409063	W	2	2	120°	3
20-Jan-10	14:07	81	30.368279	-80.678521	E	7	1	90°	30
20-Jan-10	14:15	90	30.363624	-80.499746	E	7	2	90°	15
20-Jan-10	15:22	124	30.501224	-80.530414	E	9	3	135°	7
28-Jan-10	11:04	30	30.028005	-80.366154	W	2	1	150°	11
28-Jan-10	11:41	45	30.101081	-80.585021	E	3	2	100°	10
28-Jan-10	12:02	53	30.096646	-80.444014	E	3	1	80°	8
20-Feb-10	10:33	17	30.499955	-80.396613	W	9	1	90°	17
20-Feb-10	10:48	22	30.500891	-80.618709	W	9	2	120°	2
20-Feb-10	12:05	41	30.368241	-80.652563	W	7	3	90°	10
20-Feb-10	12:36	56	30.298273	-80.473435	E	6	1	165°	3
20-Feb-10	12:42	60	30.307844	-80.346851	E	6	3	100°	45
20-Feb-10	13:35	80	30.220544	-80.489406	W	5	2	140°	60
20-Feb-10	15:26	96	30.169151	-80.521569	E	4	2	150°	2
20-Feb-10	16:17	115	30.103998	-80.545810	W	3	1	90°	4
21-Feb-10	10:02	32	30.085494	-80.414333	E	3	3	110°	50
21-Feb-10	11:47	76	30.238243	-80.348145	E	5	3	110°	7
21-Feb-10	12:37	93	30.307680	-80.465500	W	6	3	120°	40
21-Feb-10	14:26	105	30.350682	-80.618624	E	7	3	120°	70
21-Feb-10	14:36	110	30.370790	-80.462578	E	7	3	90°	18
21-Feb-10	14:42	114	30.368036	-80.389323	E	7	1	75°	40
21-Feb-10	15:43	138	30.440175	-80.456014	W	8	2	75°	12
21-Feb-10	16:04	150	30.493992	-80.358464	E	9	1	80°	30
21-Feb-10	16:36	161	30.572472	-80.277572	W	10	2	90°	18
21-Feb-10	16:48	165	30.566559	-80.608603	W	10	1	80°	18
20-Mar-10	10:02	17	30.028323	-80.425266	E	2	1	90°	7

Table 5 (continued). All Atlantic spotted dolphin (*Stenella frontalis*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Mar-10	10:08	22	30.036836	-80.502131	E	2	2	110°	4
20-Mar-10	13:12	44	30.100872	-80.336616	W	3	1	110°	29
20-Mar-10	14:14	67	30.232452	-80.270676	W	5	3	90°	34
20-Mar-10	14:41	78	30.292360	-80.240354	E	6	2	145°	19
20-Mar-10	15:10	95	30.362502	-80.432803	W	7	3	90°	20
20-Mar-10	15:55	116	30.434805	-80.269575	E	8	2	120°	21
20-Mar-10	15:58	120	30.442233	-80.378832	E	8	1	110°	2
24-Mar-10	10:16	23	30.431388	-80.386431	E	8	2	120°	10
24-Mar-10	11:14	40	30.362014	-80.294141	W	7	1	90°	12
24-Mar-10	11:25	44	30.370039	-80.461945	W	7	3	90°	6
31-Mar-10	14:08	11	30.032377	-80.325045	W	2	2	90°	18
31-Mar-10	15:26	33	30.169487	-80.458317	W	4	2	120°	2
31-Mar-10	15:36	39	30.171467	-80.540148	W	4	3	90°	2
31-Mar-10	16:06	53	30.502116	-80.340091	E	9	3	140°	80
31-Mar-10	16:54	82	30.572921	-80.169614	W	10	2	60°	25
31-Mar-10	17:05	90	30.568151	-80.309380	W	10	1	90°	2
1-Apr-10	12:21	35	30.240809	-80.355085	W	5	3	90°	11
1-Apr-10	12:36	40	30.239016	-80.583593	W	5	2	100°	3
1-Apr-10	14:36	63	30.175791	-80.389746	E	4	3	90°	6
1-Apr-10	15:37	87	30.107272	-80.363344	W	3	2	90°	6
1-Apr-10	16:47	117	29.962665	-80.435568	W	1	2	120°	4
2-Apr-10	9:09	5	29.961342	-80.623578	E	1	2	90°	8
2-Apr-10	10:36	54	30.033836	-80.482236	W	2	2	110°	3
2-Apr-10	10:42	58	30.032604	-80.513773	W	2	3	90°	12
2-Apr-10	10:58	65	30.092114	-80.551591	E	3	3	90°	11
2-Apr-10	12:03	102	30.172578	-80.512579	W	4	2	90°	25
2-Apr-10	13:26	145	30.306456	-80.335262	W	6	2	90°	18
2-Apr-10	15:30	162	30.365679	-80.319100	E	7	1	90°	28
2-Apr-10	17:21	212	30.567434	-80.140728	W	10	1	100°	18
2-Apr-10	17:26	218	30.567027	-80.285993	W	10	1	100°	22
2-Apr-10	17:36	222	30.567220	-80.489157	W	10	1	120°	4
3-Apr-10	9:27	26	30.502812	-80.443168	W	9	1	90°	12
3-Apr-10	9:32	30	30.498981	-80.486959	W	9	1	110°	9
3-Apr-10	9:38	35	30.496229	-80.624682	W	9	1	90°	10
3-Apr-10	10:37	54	30.370552	-80.507992	W	7	1	90°	3
3-Apr-10	10:47	59	30.364375	-80.636263	W	7	1	100°	24
6-May-10	10:49	27	30.030748	-80.510834	W	2	2	60°	40
6-May-10	13:42	39	30.096822	-80.544239	E	3	2	60°	4
6-May-10	13:52	42	30.102411	-80.481820	E	3	2	80°	4

Table 5 (continued). All Atlantic spotted dolphin (*Stenella frontalis*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
7-May-10	10:10	17	30.167974	-80.229344	W	4	2	45°	75
7-May-10	12:48	68	30.439407	-80.575846	W	8	3	75°	18
7-May-10	12:55	72	30.432984	-80.695540	W	8	1	90°	17
7-May-10	15:23	96	30.566378	-80.289206	W	10	2	75°	3
5-Jun-10	11:30	32	30.172613	-80.579141	W	4	3	110°	40
6-Jun-10	8:59	6	29.961922	-80.435265	E	1	2	110°	10
6-Jun-10	10:40	31	30.147797	-80.621601	W	4	3	100°	12

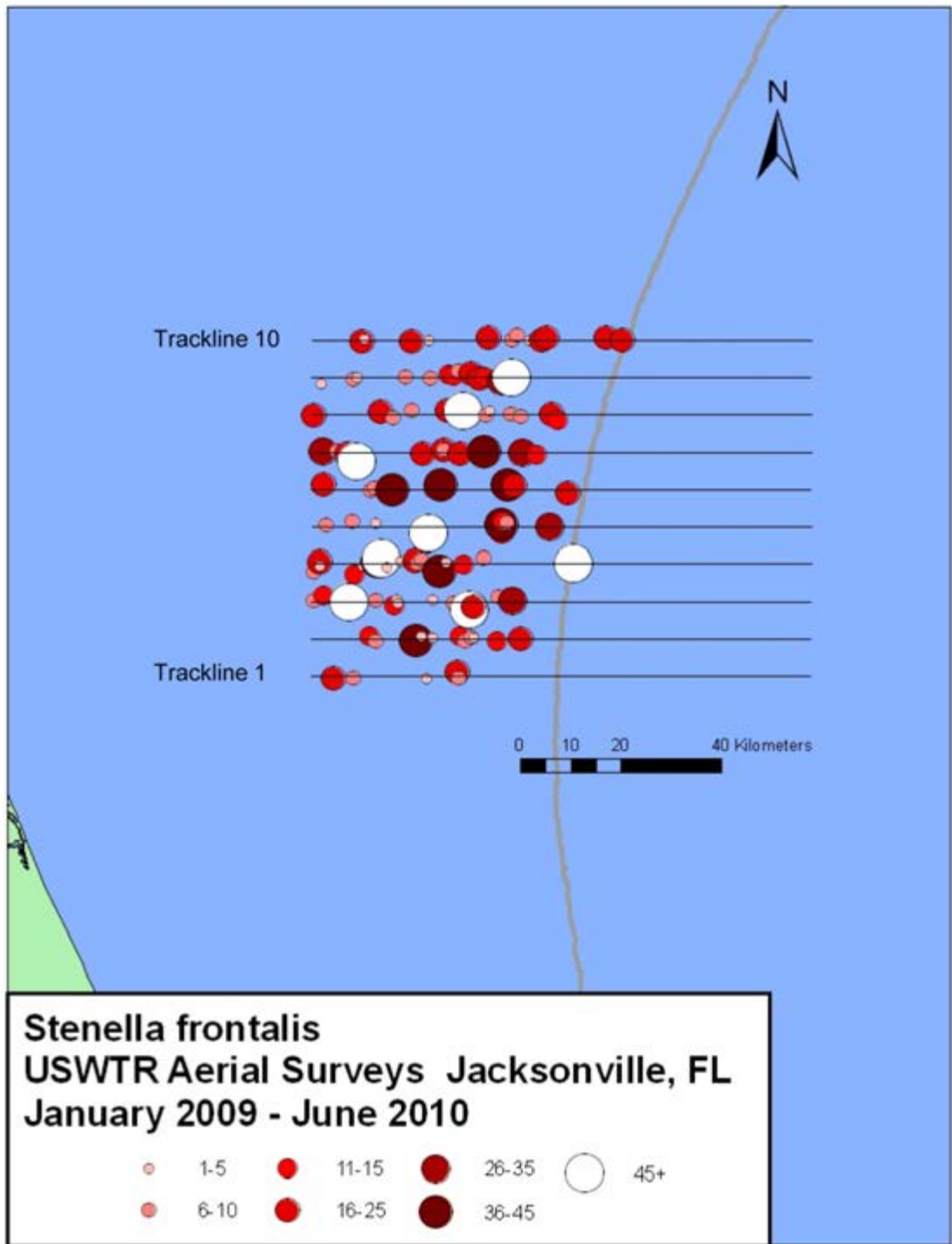


Figure 7. Atlantic spotted dolphin (*Stenella frontalis*) sightings indicating group size.

Risso's Dolphin (*Grampus griseus*) (Table 6, Fig. 8)

This species was encountered 16 times for a total of 228 individuals. Group size in this species ranged from 2 to 40 individuals (mean = 14.25). During surveys in 2009, this species was encountered in February, June, September, October, and November, and in 2010 it was observed in January, February, March, and April. Risso's dolphins were only recorded in deeper, offshore waters. *G. griseus* have been found to reside along the mid-Atlantic continental shelf edge year round, with some movement north during spring, summer and fall, and into the mid-Atlantic bight during winter (Waring *et al.* 2007). The best available estimate for Risso's dolphins, based on results from two US Atlantic surveys conducted in 2004, is 20479 (CV=0.59) (Waring *et al.* 2009). The status of this species in the western Atlantic is unknown (Waring *et al.* 2009).

Table 6. All Risso's dolphin (*Grampus griseus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Feb-09	9:18	12	29.975986	-80.134317	E	1	4	90°	5
10-Jun-09	14:50	72	30.376196	-80.040349	E	7	3	75°	14
10-Jun-09	16:07	104	30.493967	-80.117448	E	9	1	60°	32
15-Sep-09	17:12	109	30.571831	-80.067951	W	10	2	145°	36
16-Sep-09	15:42	94	30.303848	-79.787409	W	6	3	170°	4
18-Sep-09	16:10	43	30.026112	-80.183865	E	2	1	110°	5
30-Sep-09	14:55	92	30.443106	-80.010302	W	8	3	90°	26
1-Oct-09	11:48	61	30.237722	-80.092674	W	5	3	110°	4
18-Nov-09	15:02	82	30.429478	-79.897009	E	8	1	110°	40
20-Nov-09	9:48	13	30.031926	-80.179763	W	2	2	95°	20
28-Jan-10	16:02	97	30.302032	-80.120480	W	6	1	120°	7
21-Feb-10	10:43	45	30.168803	-80.153954	W	4	1	90°	7
20-Mar-10	15:33	108	30.361425	-79.911819	W	7	2	110°	6
24-Mar-10	10:36	32	30.429088	-80.037463	E	8	2	140°	2
24-Mar-10	12:11	57	30.302457	-80.113317	E	6	2	80°	9
1-Apr-10	15:24	79	30.102853	-80.187906	W	3	1	90°	11

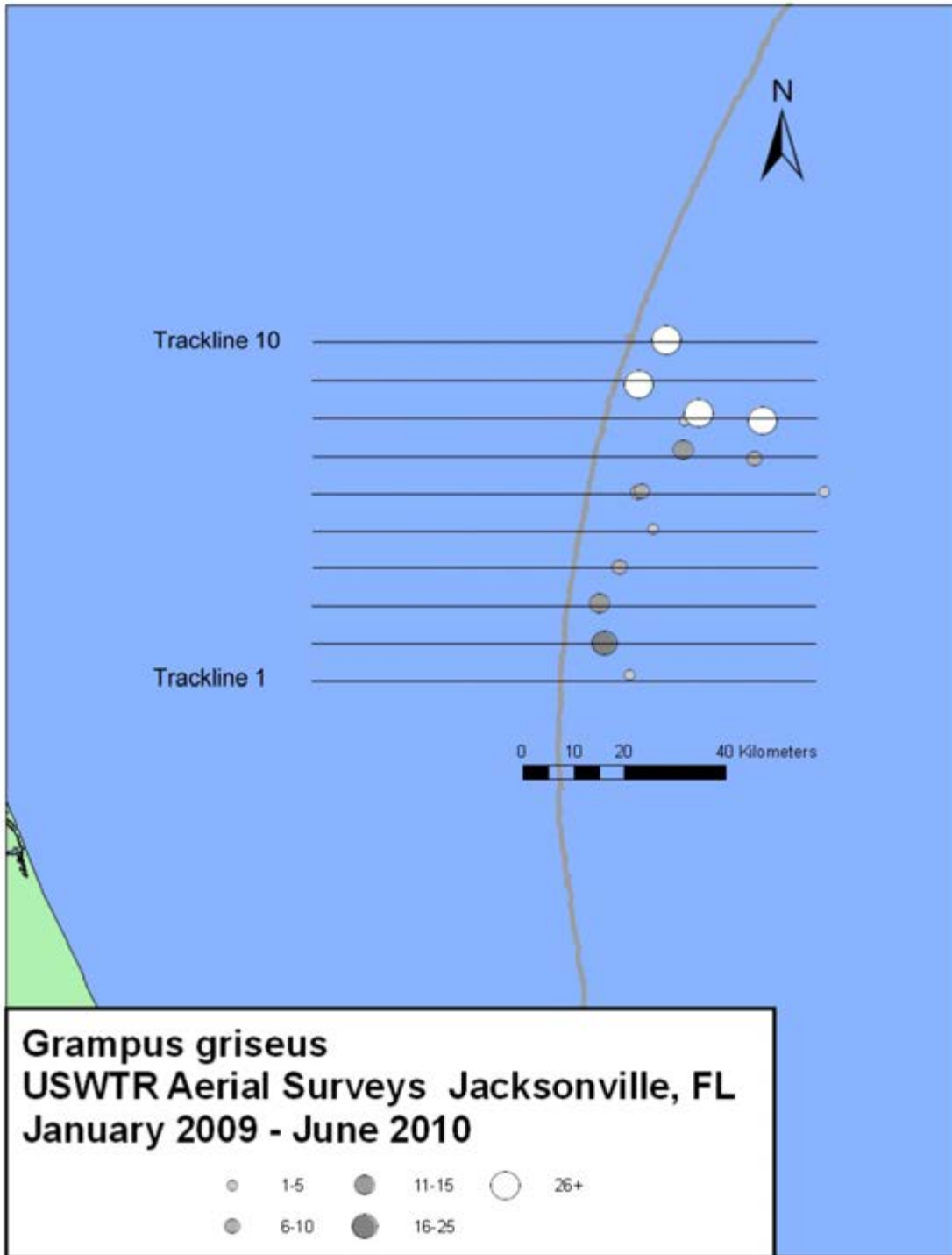


Figure 8. Risso's dolphin (*Grampus griseus*) sightings indicating group size.

Minke Whale (*Balaenoptera acutorostrata*) (Table 7, Fig. 9)

Minke whales were observed six times (eight individuals). All but one sighting was of an individual whale. A cow/calf pair and a second adult whale were encountered traveling together on 26 February 2009. This species was exclusively observed during the months of January and February. Minke whales inhabiting waters off the U.S. east coast are considered part of the Canadian East Coast stock, which occurs from the western portion of the Davis Strait (45°W) south to the Gulf of Mexico. The best available abundance estimate for this stock is 3312 (CV=0.74)(Waring *et al.* 2009).

*Table 7. All minke whale (*Balaenoptera acutorostrata*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.*

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Jan-09	14:22	37	30.173667	-79.887883	W	4	1	90°	1
26-Feb-09	10:06	15	30.565997	-79.830736	E	10	3	90°	1
26-Feb-09	14:13	54	30.235458	-79.960768	W	5	2	90°	3
26-Feb-09	15:26	67	30.101772	-80.051190	W	3	3	90°	1
20-Feb-10	13:15	73	30.234682	-80.064016	W	5	1	120°	1
21-Feb-10	12:16	86	30.303635	-79.999596	W	6	3	120°	1



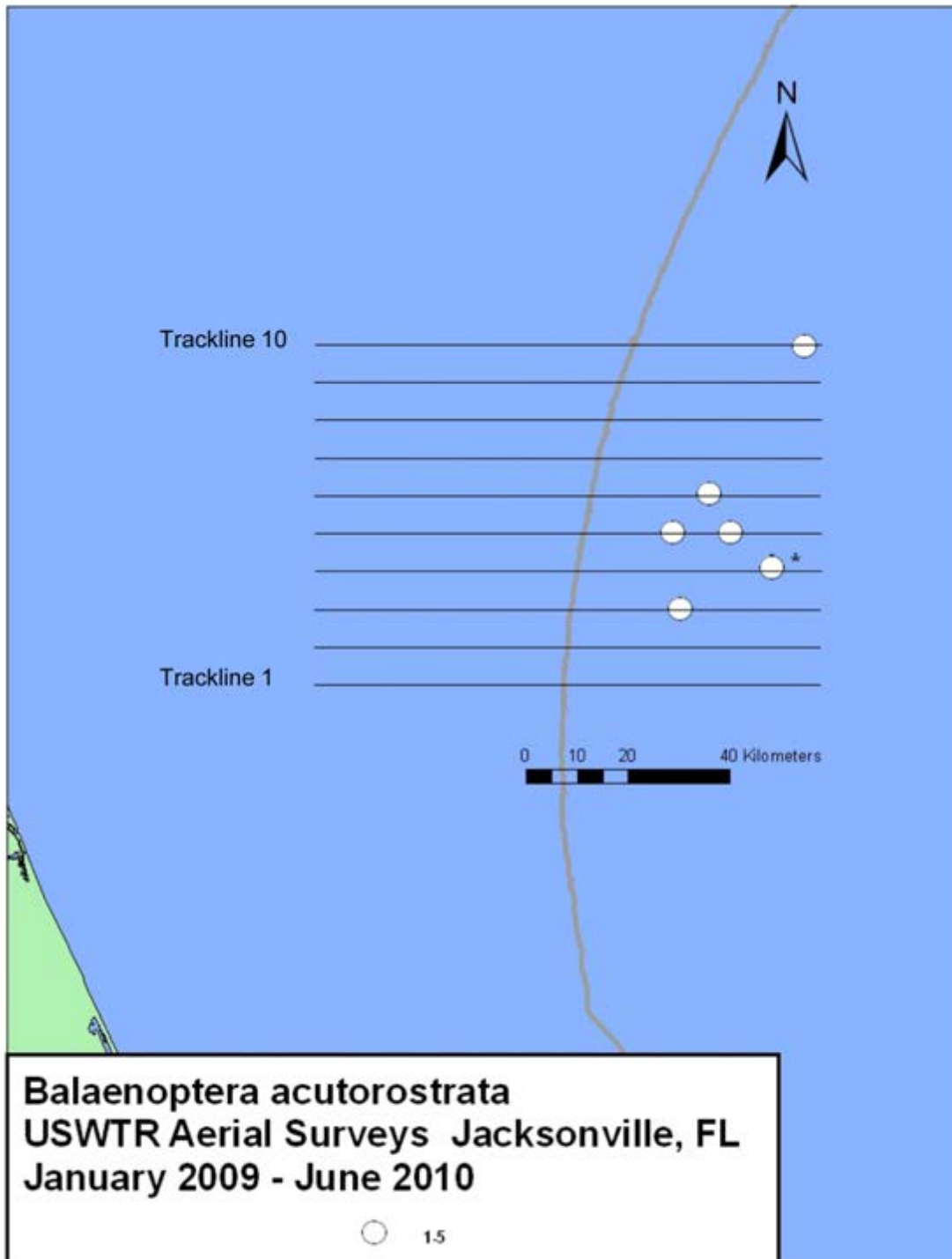


Figure 9. Minke whale (*Balaenoptera acutorostrata*) sightings indicating group size. Asterisk denotes assumed location of sighting that was not relocated.

North Atlantic Right Whale (*Eubalaena glacialis*) (Table 8, Fig. 10)

This species was encountered twice in the survey area on 20 March 2010. The first sighting involved a female right whale (Eg# 2360), which was observed for 15 minutes prior to giving birth. The second sighting that day was of a single adult male right whale (Eg# 2303). In addition, a right whale cow/calf pair was photographed on 2 April 2010 during transit to the range (*i.e.* off effort), approximately 3 km from the western edge of the survey area. The female was identified as Eg# 3360. The North Atlantic right whale is among the rarest of cetaceans and is listed as endangered under the Endangered Species Act. The best estimate of individually photographed whales that were still believed to be alive in 2007 was 415 (Pettis 2009).

Table 8. All North Atlantic right whale (*Eubalaena glacialis*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Mar-10	10:20	26	30.047163	-80.697271	E	2	4	90°	2
20-Mar-10	16:11	129	30.428521	-80.677282	E	8	3	45°	1
2-Apr-10	15:09	154	30.365645	-80.727758	E		2	45°	2

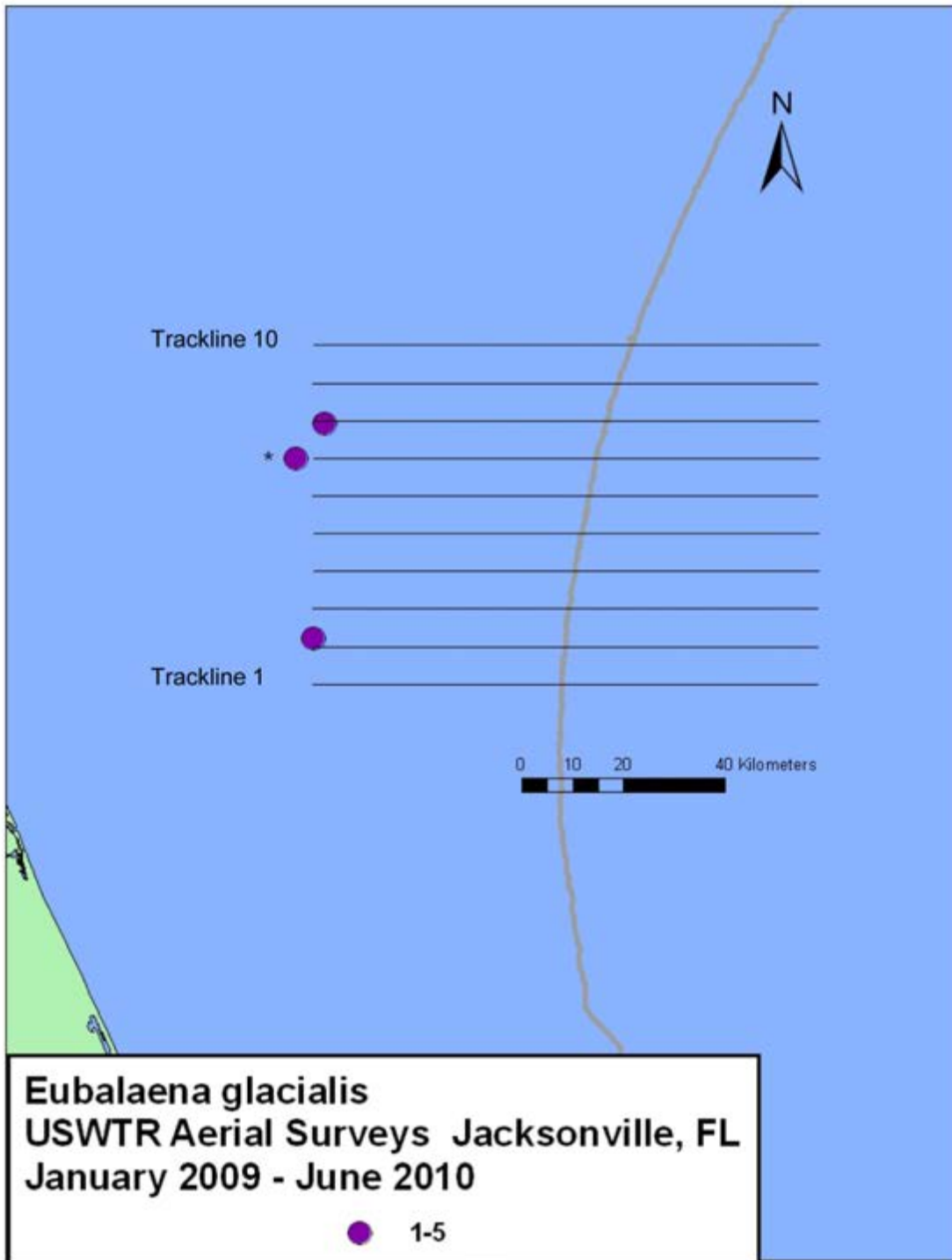


Figure 10. North Atlantic right whale (*Eubalaena glacialis*) sightings indicating group size. Asterisk denotes off effort sighting.

Short-finned Pilot Whale (*Globicephala macrorhynchus*) (Table 9, Fig. 11)

Short-finned pilot whales were encountered twice. On 2 April 2010, a group of five individuals was observed, and on 4 June 2010 a group of 14 individuals was encountered. Both encounters occurred offshore of the continental shelf. Due to the difficulty of differentiating short-finned and long-finned pilot whales (*Globicephala melas*) at sea, NMFS reports stock numbers and status as *Globicephala* spp. (Waring *et al.* 2009). The abundance estimate of *Globicephala* spp. (31139, CV=0.27) is based upon shipboard surveys along the outer continental shelf of the U.S. Atlantic between Florida and Maryland (Waring *et al.* 2009). The status of short-finned pilot whales in the U.S. Atlantic is currently unknown (Waring *et al.* 2009).

*Table 9.* All short-finned pilot whale (*Globicephala macrorhynchus*) sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
2-Apr-10	9:56	34	29.964526	-79.832764	E	1	2	120°	5
4-Jun-10	10:14	28	30.162127	-79.958743	W	4	3	115°	14

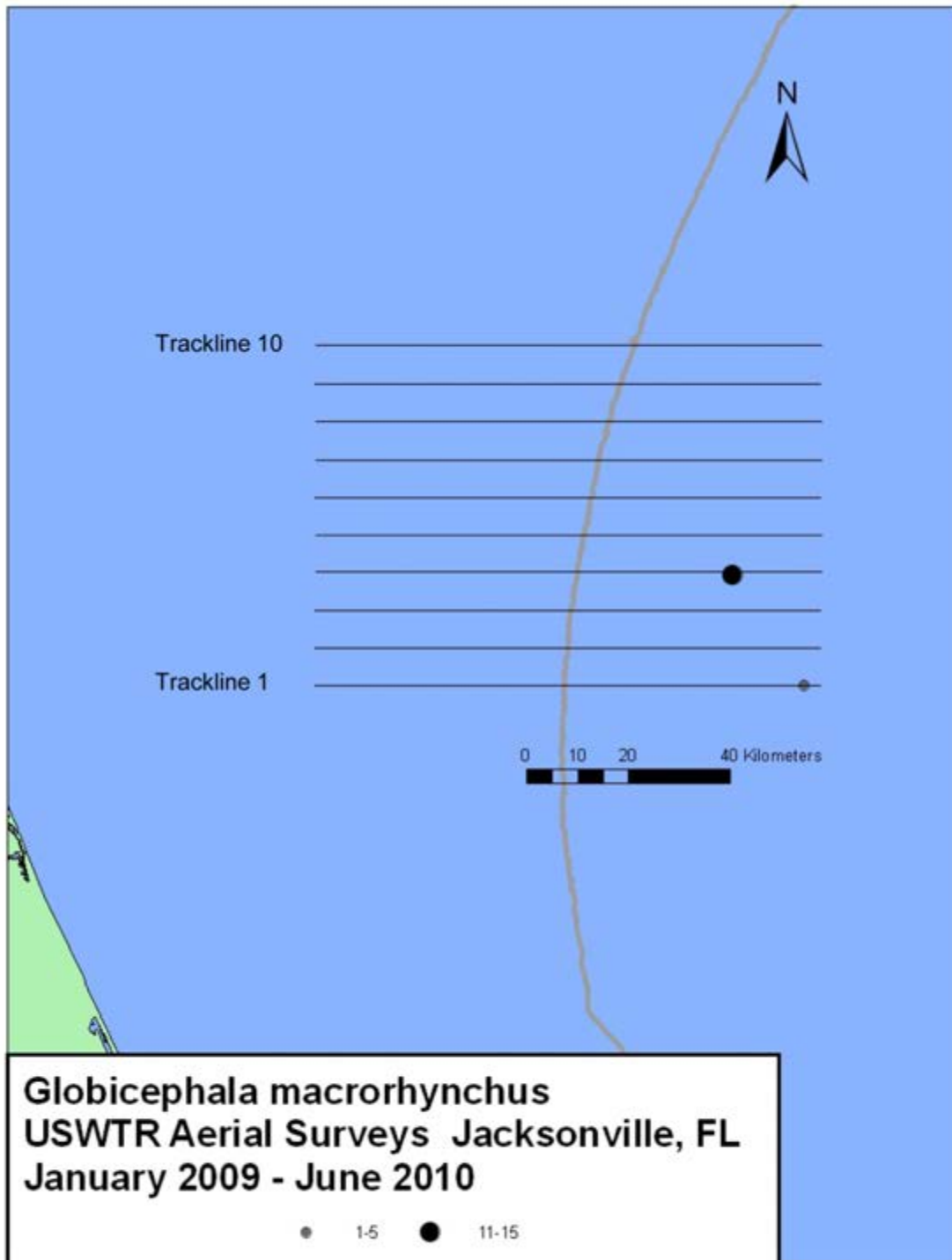


Figure 11. Short-finned pilot whale (*Globicephala macrorhynchus*) sightings indicating group size.

Sperm Whale (*Physeter macrocephalus*) (Table 10, Fig. 12)

Sperm whales were only encountered once. On 7 May 2010, two adult whales were observed offshore of the shelf break. The sperm whale is listed as endangered under the Endangered Species Act. The current best abundance estimate for sperm whales in the Atlantic Ocean is 4804 (CV=0.38) (Waring *et al.* 2007).

Table 10. The sperm whale (*Physeter macrocephalus*) sighting in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
7-May-10	10:00	12	30.148260	-80.148623	W	4	3	120°	2

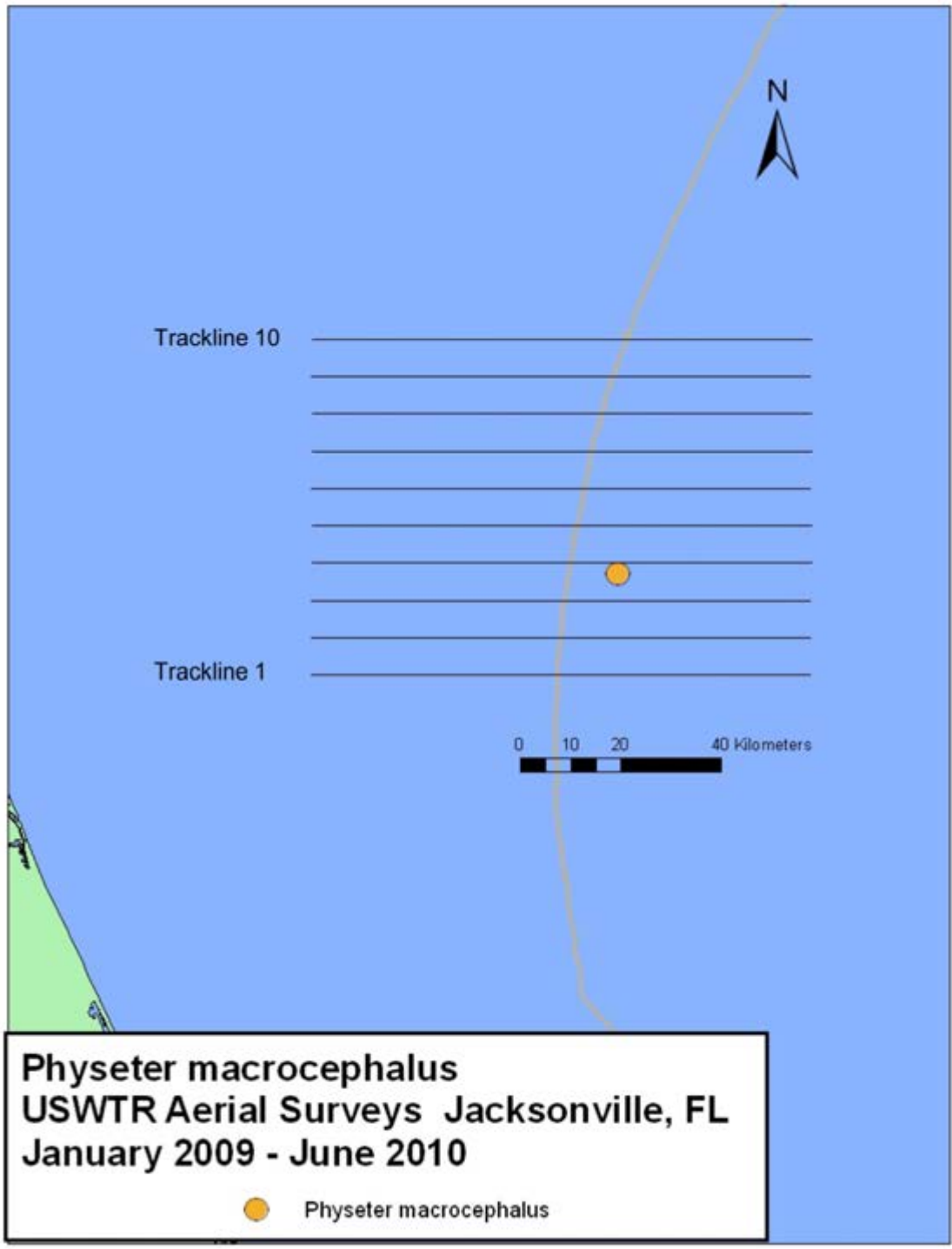


Figure 12. Sperm whale (*Physeter macrocephalus*) sighting.



Pygmy/Dwarf Sperm Whale (*Kogia* spp.) (Table 11, Fig. 13)

Pygmy (*Kogia breviceps*) and dwarf sperm whales (*Kogia sima*) are difficult to differentiate. A single *Kogia* spp. was encountered in deep, offshore waters on 18 November 2009. The best abundance estimate for *Kogia* spp. in the western North Atlantic is 395 (CV=0.40). The status of *Kogia* spp. is currently unknown (Waring *et al.* 2007).

*Table 11.* The dwarf or pygmy sperm whale (*Kogia* species) sighting in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
18-Nov-09	9:13	15	30.037136	-79.943718	W	2	3	100°	1

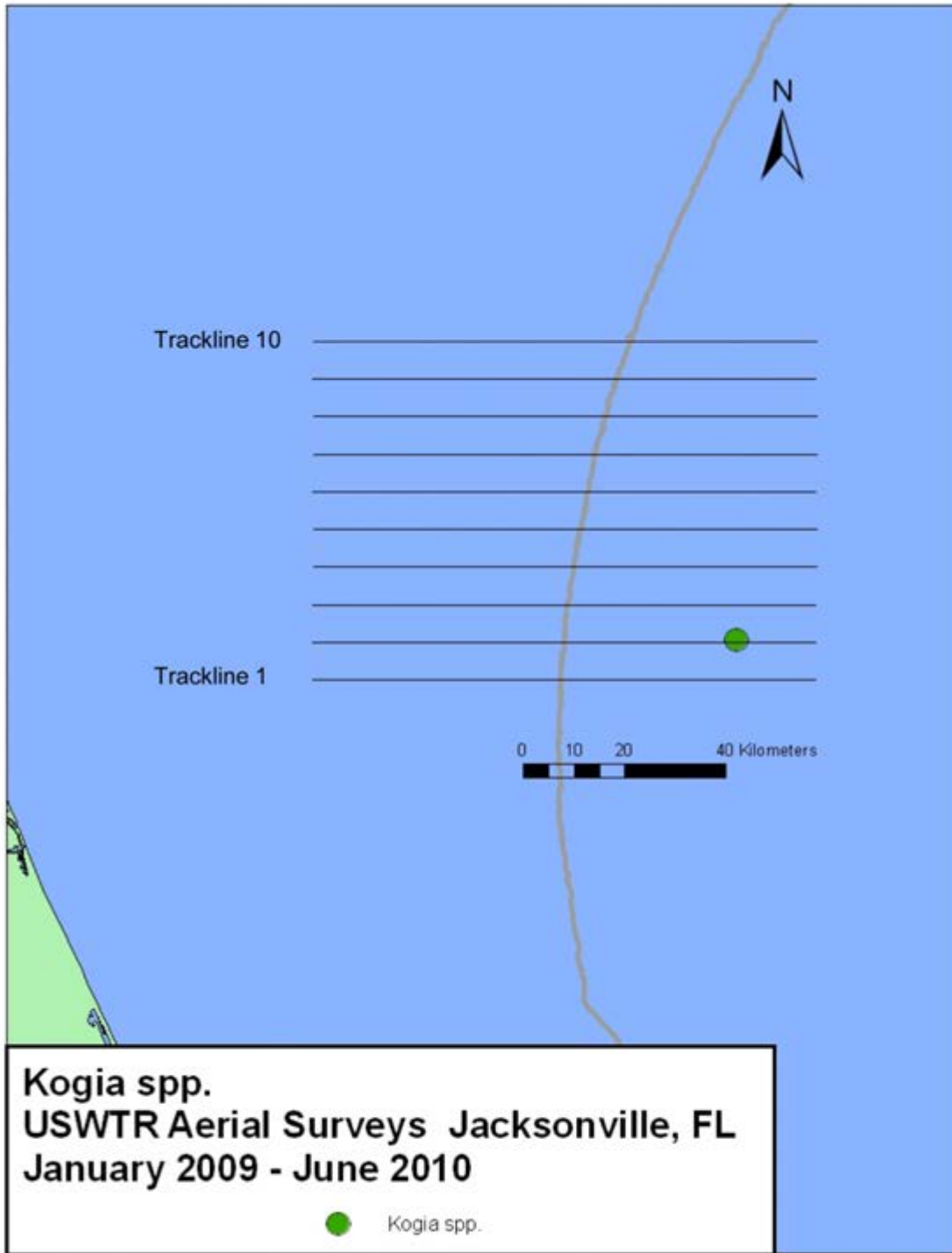


Figure 13. Dwarf or pygmy sperm whale (*Kogia* species) sighting.

Rough-toothed Dolphin (*Steno bredanensis*) (Table 12, Fig. 14)

This species was documented once during the reporting period, on 15 September 2009. The group encountered consisted of approximately 50 individuals. This species is rarely observed off the U.S. east coast and the current best abundance estimate (n = 274, CV = 1.03) is based on a ship board survey conducted in waters south of Maryland in 1998. The status of rough-toothed dolphins in the western North Atlantic is currently unknown (Waring *et al.* 2008).

Table 12. The rough-toothed dolphin (*Steno bredanensis*) sighting in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
15-Sep-09	10:57	24	30.102567	-80.662731	E	3	2	90°	50

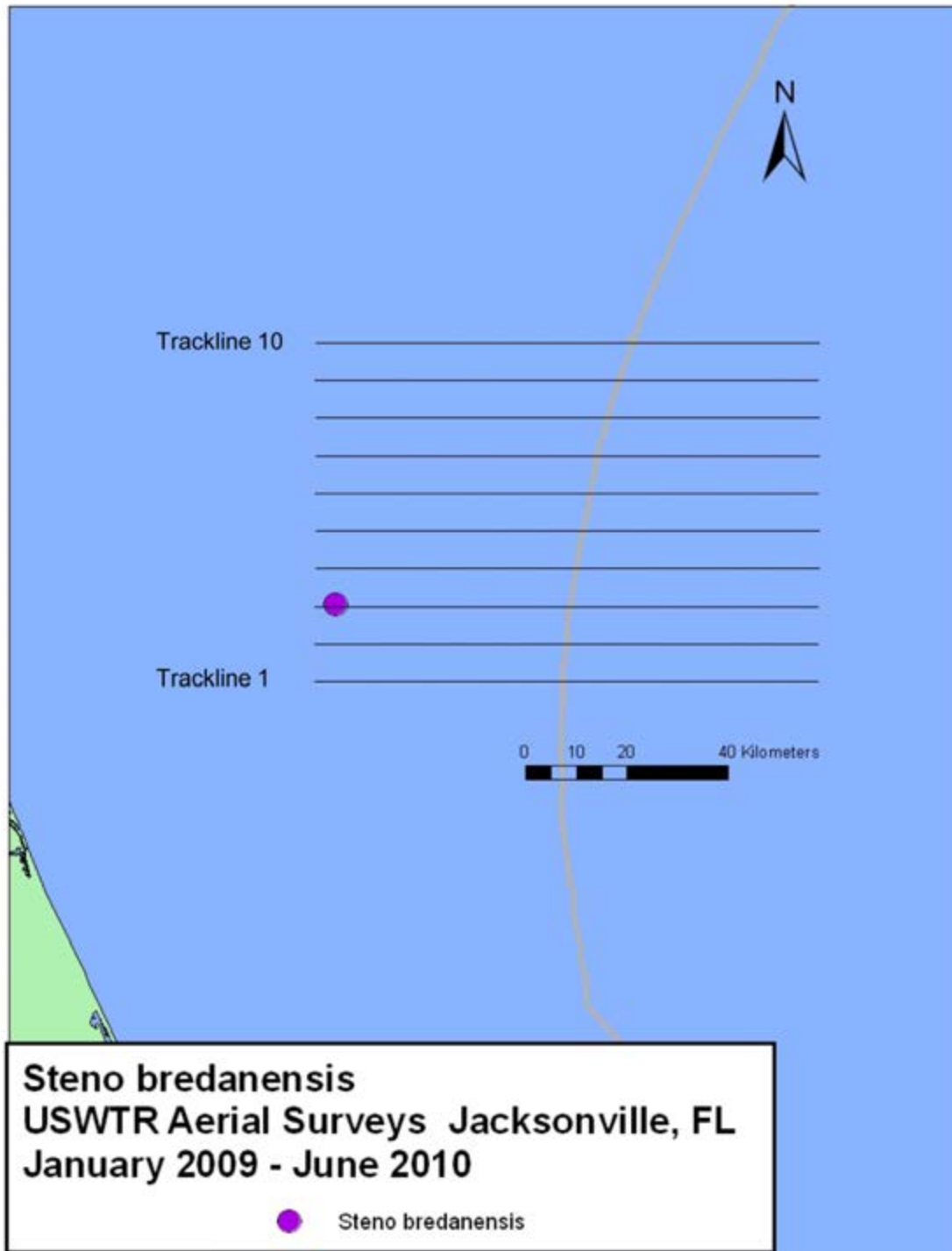


Figure 14. Rough-toothed dolphin (*Steno bredanensis*) sighting.

Unidentified delphinids (Table 13, Fig 15)

During sightings where animals could not be relocated after the initial sighting, no photos were taken or when a positive species identification could not be established from images obtained, the designation “unidentified delphinid” was used. A total of 38 groups of 148 unidentified delphinids were recorded.

*Table 13. All unidentified dolphin sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009-June 2010.*

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Feb-09	11:34	58	30.231648	-80.618515	E	5	2	120°	1
10-Jun-09	12:04	47	30.297996	-80.520986	W	6	1	75°	3
11-Jun-09	10:27	20	30.027809	-80.045970	E	2	1	160°	3
15-Jul-09	13:36	41	29.967081	-80.067598	E	1	2	90°	1
14-Sep-09	13:46	23	30.370925	-80.071616	W	7	1	100°	9
16-Sep-09	14:59	75	30.234286	-80.638299	E	5	2	75°	11
18-Sep-09	11:20	51	30.291406	-80.650391	E	6	3	90°	2
18-Sep-09	16:51	54	29.962245	-80.672895	W	1	1	100°	5
18-Nov-09	9:44	24	30.112692	-80.556471	E	3	2	100°	3
18-Nov-09	11:46	52	30.308959	-80.475456	W	6	2	100°	1
22-Dec-09	11:17	28	30.166376	-80.683375	W	4	2	100°	3
22-Dec-09	12:12	42	30.297574	-80.405397	W	6	2	100°	3
22-Dec-09	16:13	82	30.564581	-80.305144	W	10	1	90°	1
20-Jan-10	12:26	72	30.301264	-80.488315	W	6	3	90°	1
20-Jan-10	16:08	139	30.562322	-80.363101	W	10	1	100°	14
27-Jan-10	15:26	40	30.099334	-79.828985	W	3	2	120°	18
27-Jan-10	17:02	54	29.965491	-80.641395	W	1	2	110°	9
28-Jan-10	10:17	20	29.968545	-80.057141	E	1	3	130°	3
20-Feb-10	10:56	27	30.432762	-80.620269	E	8	2	90°	5
20-Feb-10	16:35	120	30.037500	-80.374863	E	2	3	90°	5
20-Feb-10	16:59	129	29.973820	-79.925572	W	1	3	120°	3
20-Mar-10	14:48	82	30.308002	-80.395258	E	6	2	110°	4
20-Mar-10	15:16	101	30.367844	-80.264885	W	7	2	90°	3
24-Mar-10	11:49	51	30.302538	-80.655800	E	6	3	95°	2
24-Mar-10	12:18	62	30.304547	-80.030007	E	6	2	100°	1
31-Mar-10	14:50	26	30.106320	-80.313623	E	3	2	110°	3
31-Mar-10	16:48	77	30.572718	-80.122620	W	10	3	110°	1
1-Apr-10	11:01	20	30.303537	-80.529192	E	6	3	30°	1
2-Apr-10	15:34	166	30.361301	-80.274064	E	7	2	90°	3
7-May-10	11:59	56	30.375496	-80.608868	E	7	2	140°	3

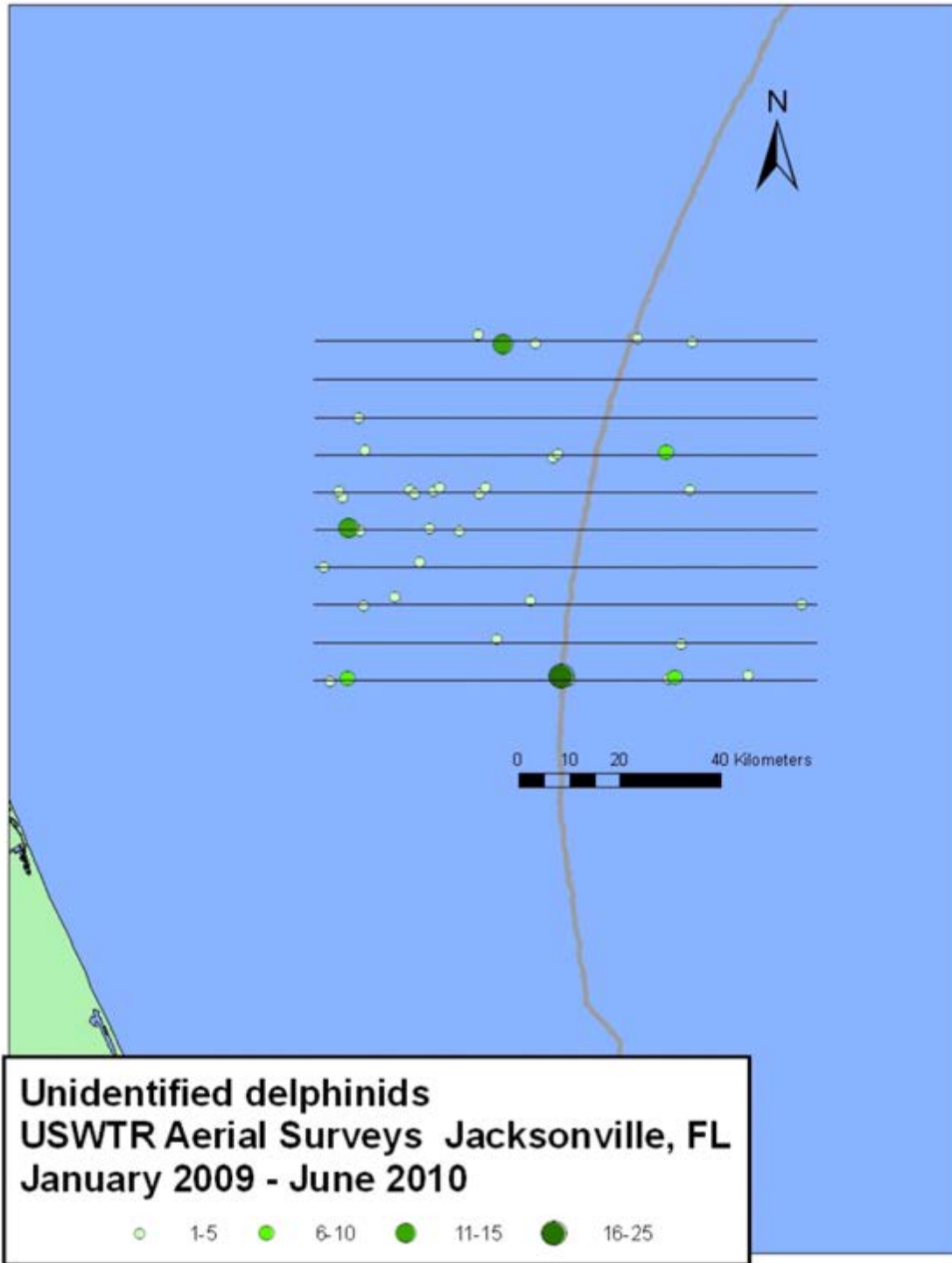


Figure 15. Unidentified delphinid sightings indicating group size.

## Sea Turtles

A total of 1543 sea turtles were observed during the reporting period. Sighting rates were negatively correlated with Beaufort Sea State, with rates declining at higher sea states (Figs. 16a-b). The low sighting rate calculated for a Beaufort Sea State 0 is due to little survey coverage in this sea state (*i.e.* 80.5 km or 0.3% of 29839.4 total km surveyed). Sea turtles were recorded in every month surveyed with an apparent general trend of higher densities observed during late spring and early summer (Fig. 16c). Abundances fluctuated from 79.9 sea turtles/1000 km in June 2009 to 9.6 sea turtles/1000 km in June 2010 to (Fig 16c). Loggerhead sea turtles (*Caretta caretta*) constituted the majority of sea turtle sightings (75.7%), followed by unidentified sea turtles, leatherback sea turtles (*Dermochelys coriacea*), and the Kemp's Ridley sea turtle (*Lepidochelys kempii*). Turtles labeled as unidentified were typically either of small size, submerged, or too far away for the observers to make an accurate identification to species. Sea turtle species are listed below in decreasing number of sightings.



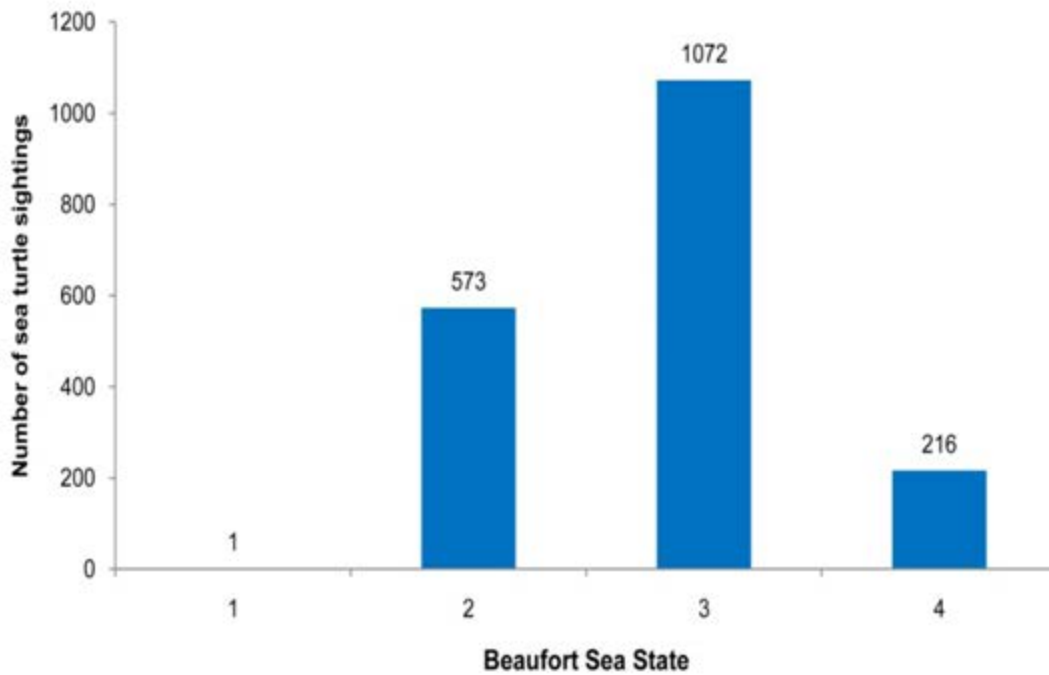


Figure 16a. Total number of sea turtle sightings by Beaufort Sea State in the proposed USWTR site off of Jacksonville, Florida during aerial surveys from January 2009 – June 2010.

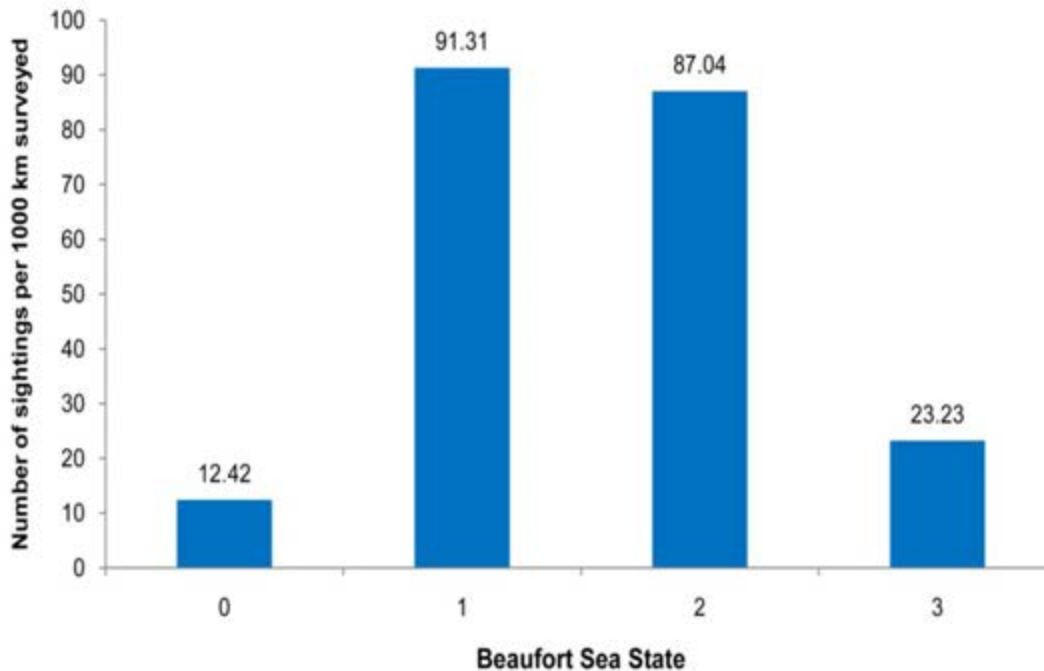


Figure 16b. Sea turtle sightings per 1000 km flown by Beaufort Sea State in the proposed USWTR site off of Jacksonville, Florida during aerial surveys from January 2009 – June 2010.

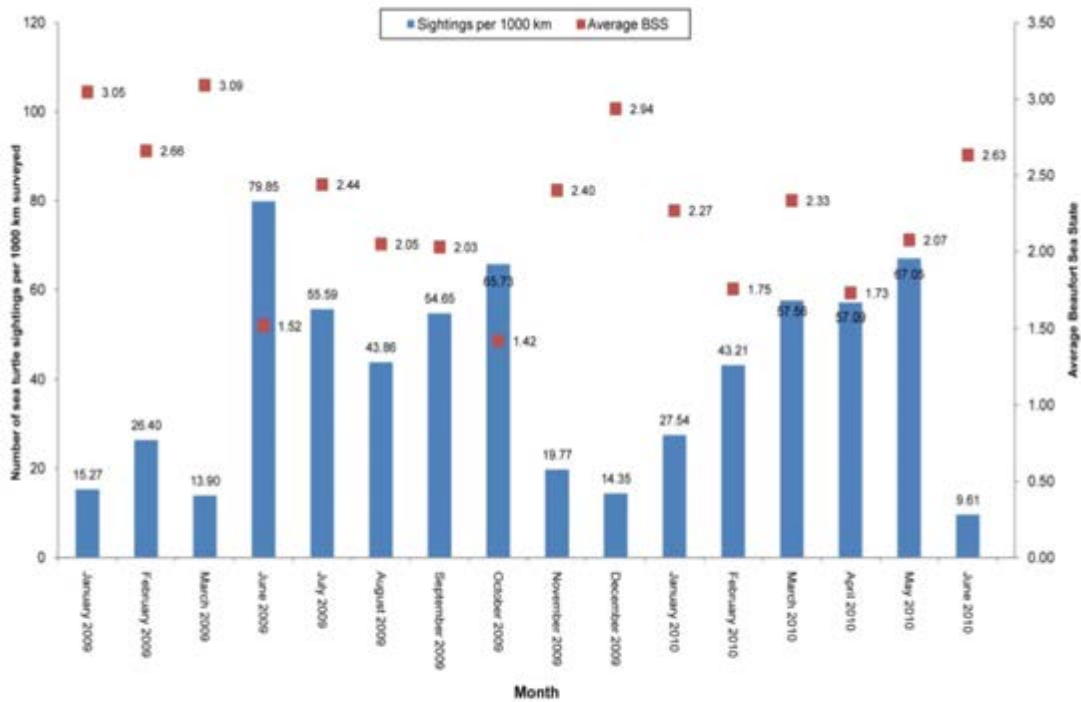


Figure 16c. Sea turtle sightings per 1000 km surveyed and the average Beaufort Sea State per month in the proposed USWTR site off of Jacksonville, Florida during aerial surveys from January 2009 – June 2010.

Loggerhead Sea Turtle (*Caretta caretta*) (Table 14, Fig.17)

A total of 1169 loggerhead sea turtles were observed. This species was observed every month during which aerial surveys were conducted. For management purposes, loggerheads along the U.S. Atlantic east coast are separated into five separate recovery units. The current best estimate for nests in the Peninsular Florida Recovery Unit (defined as loggerheads originating from nests between the Georgia/Florida border south to, but not including, the Florida keys) is 64513. Loggerhead sea turtles are currently listed as threatened under the Endangered Species Act (NMFS 2008).

Table 14. All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Jan-09	12:41	3	29.962717	-80.676670	E	1	1	90°	1
27-Jan-09	13:37	11	30.036203	-80.510090	W	2	1	90°	1
28-Jan-09	11:25	8	30.430300	-80.501035	W	8	2	90°	1
28-Jan-09	11:36	11	30.498540	-80.587838	E	9	2	90°	1
26-Feb-09	9:31	3	30.567629	-80.674304	E	10	2	100°	1
26-Feb-09	9:34	6	30.565524	-80.592060	E	10	2	90°	1
26-Feb-09	9:37	7	30.566645	-80.487691	E	10	1	90°	1
26-Feb-09	9:42	7	30.564760	-80.311825	E	10	1	90°	1
26-Feb-09	9:44	8	30.566594	-80.216860	E	10	3	90°	1
26-Feb-09	10:40	16	30.498498	80.258729	W	9	3	90°	1
26-Feb-09	10:48	19	30.500636	-80.535794	W	9	3	90°	1
26-Feb-09	10:50	21	30.498934	-80.588799	W	9	2	90°	3
26-Feb-09	10:50	21	30.499299	-80.576617	W	9	1	90°	1
26-Feb-09	10:51	22	30.497767	-80.632095	W	9	1	90°	1
26-Feb-09	10:51	22	30.498208	-80.620274	W	9	3	90°	1
26-Feb-09	10:52	23	30.497817	-80.659055	W	9	1	90°	1
26-Feb-09	10:52	24	30.498334	-80.678626	W	9	1	90°	1
26-Feb-09	10:52	23	30.498355	-80.671524	W	9	2	90°	1
26-Feb-09	11:22	34	30.432006	-80.434145	E	8	3	90°	1
26-Feb-09	11:24	32	30.433059	-80.367276	E	8	2	90°	1
26-Feb-09	13:45	48	30.299733	-80.445783	E	6	2	90°	1
26-Feb-09	14:38	47	30.231045	-80.315441	W	5	1	90°	1
26-Feb-09	15:52	61	30.030400	-80.520165	E	2	2	90°	1
27-Feb-09	8:54	4	29.965507	-80.606023	E	1	1	90°	1
27-Feb-09	8:54	5	29.965597	-80.591244	E	1	1	90°	1
27-Feb-09	9:03	8	29.967309	-80.533800	E	1	1	90°	1
27-Feb-09	9:05	9	29.966307	-80.434665	E	1	2	90°	1
27-Feb-09	9:51	21	30.030717	-80.341974	W	2	3	90°	1
27-Feb-09	9:52	22	30.030798	-80.352991	W	2	2	90°	2
27-Feb-09	9:52	23	30.031025	-80.376150	W	2	3	90°	1
27-Feb-09	9:55	22	30.031539	-80.475142	W	2	3	90°	1
27-Feb-09	9:55	25	30.031575	-80.464046	W	2	2	90°	1
27-Feb-09	9:56	26	30.031386	-80.517836	W	2	1	90°	1
27-Feb-09	10:02	29	30.032488	-80.600716	W	2	1	90°	1
27-Feb-09	10:04	30	30.030953	-80.660416	W	2	2	90°	1
27-Feb-09	10:13	31	30.098630	-80.557558	E	3	2	90°	1
27-Feb-09	10:14	32	30.098031	-80.522358	E	3	2	90°	2
27-Feb-09	10:59	48	30.166015	-80.376832	W	4	2	90°	1
27-Feb-09	11:42	61	30.233556	-80.555977	E	5	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Feb-09	11:44	62	30.233023	-80.485332	E	5	3	90°	2
27-Feb-09	11:55	66	30.233576	-80.340514	E	5	3	90°	1
27-Feb-09	11:58	68	30.233309	-80.227378	E	5	1	90°	1
27-Feb-09	12:28	61	30.299835	-80.379989	W	6	2	90°	1
27-Feb-09	12:32	62	30.299525	-80.521068	W	6	2	90°	1
27-Feb-09	14:44	86	30.367283	-80.376814	E	7	3	90°	1
27-Feb-09	14:46	87	30.367331	-80.293846	E	7	1	90°	1
27-Feb-09	15:38	98	30.500127	-80.601115	E	9	3	90°	1
31-Mar-09	15:06	3	30.235758	-80.658041	E	5	2	90°	1
31-Mar-09	15:12	5	30.233255	-80.417950	E	5	2	90°	1
31-Mar-09	15:47	8	30.301403	-80.437063	W	6	3	90°	1
31-Mar-09	16:00	12	30.367652	-80.544145	E	7	3	90°	1
31-Mar-09	16:02	13	30.364211	-80.492083	E	7	1	90°	1
31-Mar-09	16:52	25	30.496036	-80.574488	E	9	2	60°	1
9-Jun-09	13:12	4	30.567156	-80.681325	E	10	2	90°	1
9-Jun-09	13:13	4	30.564338	-80.636044	E	10	3	90°	2
9-Jun-09	13:13	5	30.565601	-80.610332	E	10	1	90°	1
9-Jun-09	13:14	6	30.567262	-80.584025	E	10	2	90°	1
9-Jun-09	13:16	5	30.566849	-80.513951	E	10	2	75°	1
9-Jun-09	13:16	7	30.565785	-80.525539	E	10	3	90°	1
9-Jun-09	13:16	8	30.567798	-80.493986	E	10	3	100°	1
9-Jun-09	13:18	6	30.565513	-80.420685	E	10	2	110°	1
9-Jun-09	13:18	9	30.565562	-80.421626	E	10	2	110°	1
9-Jun-09	13:19	7	30.567071	-80.381122	E	10	2	120°	1
9-Jun-09	13:22	8	30.567722	-80.287245	E	10	2	90°	1
9-Jun-09	13:55	17	30.499843	-80.234397	W	9	2	110°	1
9-Jun-09	13:57	17	30.499435	-80.316440	W	9	1	90°	1
9-Jun-09	13:59	18	30.501223	-80.372094	W	9	1	90°	1
9-Jun-09	14:00	19	30.496762	-80.413666	W	9	2	90°	1
9-Jun-09	14:10	22	30.499667	-80.535624	W	9	1	90°	1
9-Jun-09	14:11	23	30.499578	-80.577725	W	9	1	90°	1
9-Jun-09	14:13	23	30.499470	-80.655752	W	9	2	90°	4
9-Jun-09	14:13	25	30.499403	-80.656840	W	9	2	90°	1
9-Jun-09	14:17	28	30.434048	-80.677442	E	8	2	90°	1
9-Jun-09	14:18	26	30.434062	-80.620432	E	8	2	90°	1
9-Jun-09	14:19	27	30.433756	-80.599135	E	8	2	90°	1
9-Jun-09	14:20	28	30.433391	-80.572292	E	8	2	90°	3
9-Jun-09	14:21	30	30.433951	-80.509602	E	8	2	60°	1
9-Jun-09	14:22	29	30.433175	-80.471567	E	8	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
9-Jun-09	14:23	33	30.433501	-80.434726	E	8	1	90°	1
9-Jun-09	14:24	30	30.434314	-80.418364	E	8	2	75°	1
9-Jun-09	14:24	34	30.435821	-80.386605	E	8	1	60°	1
9-Jun-09	14:35	37	30.431885	-80.255430	E	8	2	100°	1
9-Jun-09	15:03	37	30.366183	-80.399778	W	7	2	90°	1
9-Jun-09	15:04	38	30.366912	-80.437332	W	7	2	90°	1
9-Jun-09	15:04	44	30.366681	-80.446110	W	7	2	110°	1
9-Jun-09	15:06	39	30.367461	-80.516973	W	7	2	75°	1
9-Jun-09	15:06	45	30.367329	-80.501678	W	7	1	90°	1
9-Jun-09	15:06	46	30.365548	-80.534814	W	7	2	90°	1
9-Jun-09	15:07	47	30.364718	-80.568133	W	7	1	60°	1
9-Jun-09	15:08	40	30.364513	-80.617354	W	7	3	75°	1
9-Jun-09	15:08	48	30.364621	-80.613793	W	7	1	90°	2
9-Jun-09	15:09	41	30.365256	-80.642000	W	7	1	90°	2
9-Jun-09	15:09	49	30.365123	-80.638784	W	7	1	90°	1
9-Jun-09	15:10	50	30.366887	-80.674321	W	7	1	90°	1
9-Jun-09	15:11	51	30.364501	-80.702961	W	7	1	90°	1
9-Jun-09	15:13	54	30.301129	-80.689894	E	6	1	135°	1
9-Jun-09	15:15	44	30.299933	-80.618592	E	6	2	75°	1
9-Jun-09	15:15	55	30.300391	-80.631262	E	6	2	60°	1
9-Jun-09	15:17	45	30.298765	-80.540695	E	6	2	75°	1
9-Jun-09	15:17	57	30.298774	-80.537869	E	6	1	90°	1
9-Jun-09	15:18	46	30.299340	-80.508963	E	6	2	75°	2
9-Jun-09	15:19	47	30.299651	-80.472905	E	6	2	90°	1
9-Jun-09	15:22	49	30.301660	-80.342552	E	6	2	90°	1
9-Jun-09	15:51	61	30.238296	-80.321698	W	5	3	110°	1
9-Jun-09	15:52	62	30.238956	-80.379864	W	5	2	100°	1
9-Jun-09	15:54	64	30.238248	-80.464537	W	5	2	90°	1
9-Jun-09	15:56	55	30.232950	-80.531585	W	5	2	75°	2
9-Jun-09	15:56	65	30.234956	-80.519376	W	5	1	90°	1
9-Jun-09	15:58	56	30.234953	-80.629916	W	5	1	90°	2
9-Jun-09	15:58	67	30.233555	-80.606452	W	5	1	90°	1
10-Jun-09	9:21	4	29.964953	-80.614129	E	1	2	90°	1
10-Jun-09	9:26	4	29.965327	-80.404573	E	1	2	90°	1
10-Jun-09	9:59	11	30.032131	-80.352507	W	2	2	90°	1
10-Jun-09	10:02	10	30.030888	-80.450792	W	2	1	60°	1
10-Jun-09	10:03	12	30.029927	-80.479060	W	2	2	90°	1
10-Jun-09	10:04	13	30.029335	-80.526848	W	2	2	90°	1
10-Jun-09	10:06	14	30.029806	-80.599411	W	2	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
10-Jun-09	10:14	16	30.098968	-80.602294	E	3	1	90°	1
10-Jun-09	10:15	17	30.099808	-80.529924	E	3	1	100°	1
10-Jun-09	10:17	17	30.103878	-80.447898	E	3	2	90°	1
10-Jun-09	11:07	28	30.167155	-80.470628	W	4	1	90°	1
10-Jun-09	11:08	29	30.167166	-80.499885	W	4	1	75°	1
10-Jun-09	11:09	30	30.166382	-80.527662	W	4	1	75°	1
10-Jun-09	11:09	24	30.166121	-80.538992	W	4	2	90°	1
10-Jun-09	11:10	31	30.165179	-80.556454	W	4	2	60°	1
10-Jun-09	11:11	25	30.163960	-80.589377	W	4	2	90°	2
10-Jun-09	11:13	26	30.166544	-80.661509	W	4	2	90°	1
10-Jun-09	11:21	35	30.242948	-80.512343	E	5	1	100°	1
10-Jun-09	11:22	36	30.235576	-80.461142	E	5	1	100°	1
10-Jun-09	11:25	37	30.234017	-80.355132	E	5	1	80°	1
10-Jun-09	11:54	43	30.300452	-80.322588	W	6	2	75°	1
10-Jun-09	11:55	32	30.299488	-80.367682	W	6	3	90°	1
10-Jun-09	11:55	44	30.299935	-80.355562	W	6	1	90°	1
10-Jun-09	11:57	33	30.297258	-80.417669	W	6	2	75°	1
10-Jun-09	11:57	45	30.297850	-80.441585	W	6	1	90°	1
10-Jun-09	14:34	44	30.363275	-80.595480	E	7	3	90°	1
10-Jun-09	14:37	45	30.363567	-80.490323	E	7	2	75°	1
10-Jun-09	14:38	46	30.361263	-80.423257	E	7	2	90°	1
10-Jun-09	14:38	65	30.363986	-80.455658	E	7	1	100°	1
10-Jun-09	14:40	47	30.364026	-80.375654	E	7	3	100°	1
10-Jun-09	14:41	68	30.363423	-80.300225	E	7	1	100°	1
10-Jun-09	14:42	69	30.364019	-80.253230	E	7	1	90°	1
10-Jun-09	15:11	80	30.433236	-80.242099	W	8	1	90°	1
10-Jun-09	15:12	53	30.433286	-80.264880	W	8	2	75°	2
10-Jun-09	15:16	82	30.431321	-80.407921	W	8	1	75°	1
10-Jun-09	15:40	90	30.434702	-80.650537	W	8	1	110°	1
10-Jun-09	15:45	61	30.497844	-80.623834	E	9	2	100°	1
10-Jun-09	15:46	62	30.498748	-80.590676	E	9	1	70°	1
10-Jun-09	15:46	94	30.498133	-80.614377	E	9	1	90°	2
10-Jun-09	15:47	96	30.499923	-80.547867	E	9	1	90°	2
10-Jun-09	15:49	97	30.502352	-80.476434	E	9	1	60°	2
10-Jun-09	16:00	65	30.501760	-80.355807	E	9	2	70°	1
10-Jun-09	16:01	102	30.501102	-80.328871	E	9	1	90°	1
10-Jun-09	16:05	66	30.496205	-80.181637	E	9	3	70°	1
10-Jun-09	16:36	73	30.570119	-80.140188	W	10	1	90°	2
10-Jun-09	16:39	74	30.566927	-80.279606	W	10	1	100°	2

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
10-Jun-09	16:41	112	30.567950	-80.379021	W	10	1	90°	1
10-Jun-09	16:43	113	30.568044	-80.462992	W	10	1	60°	3
10-Jun-09	16:44	75	30.568917	-80.504767	W	10	1	90°	2
10-Jun-09	16:44	114	30.567580	-80.486993	W	10	1	90°	3
10-Jun-09	16:45	115	30.568166	-80.521155	W	10	1	90°	1
10-Jun-09	16:46	117	30.568128	-80.582101	W	10	1	90°	2
10-Jun-09	16:46	116	30.566427	-80.557029	W	10	1	80°	1
11-Jun-09	8:57	4	30.161635	-80.569707	E	4	1	120°	1
11-Jun-09	8:58	5	30.163361	-80.540625	E	4	1	90°	1
11-Jun-09	8:59	4	30.166888	-80.472289	E	4	3	90°	1
11-Jun-09	9:01	5	30.167465	-80.422048	E	4	2	100°	1
11-Jun-09	9:36	10	30.099660	-80.545638	W	3	1	90°	1
11-Jun-09	9:37	9	30.101354	-80.568452	W	3	2	90°	1
11-Jun-09	10:09	17	30.036402	-80.616519	E	2	3	90°	1
11-Jun-09	11:32	26	29.964513	-80.528974	W	1	2	90°	1
11-Jun-09	11:32	27	29.965117	-80.561496	W	1	1	60°	1
11-Jun-09	11:35	36	29.966203	-80.669853	W	1	1	60°	1
11-Jun-09	11:36	37	29.966056	-80.689631	W	1	1	90°	3
15-Jul-09	13:18	28	29.967368	-80.649724	E	1	1	60°	1
15-Jul-09	13:18	37	29.967452	-80.645430	E	1	1	90°	1
15-Jul-09	13:19	29	29.965739	-80.630418	E	1	2	90°	1
15-Jul-09	13:19	30	29.964022	-80.604555	E	1	2	75°	1
15-Jul-09	13:19	38	29.966824	-80.637502	E	1	1	90°	1
15-Jul-09	13:19	39	29.964478	-80.618668	E	1	1	90°	1
15-Jul-09	13:20	40	29.965385	-80.590268	E	1	1	90°	1
15-Jul-09	13:20	41	29.967203	-80.577028	E	1	1	90°	1
15-Jul-09	13:21	32	29.969148	-80.557552	E	1	1	60°	1
15-Jul-09	13:21	42	29.968677	-80.565647	E	1	2	90°	1
15-Jul-09	13:22	43	29.964760	-80.520144	E	1	2	90°	1
15-Jul-09	13:24	45	29.966340	-80.450099	E	1	1	90°	1
15-Jul-09	13:25	46	29.966351	-80.409510	E	1	3	90°	1
15-Jul-09	13:27	35	29.966155	-80.321982	E	1	2	90°	1
15-Jul-09	13:27	48	29.966310	-80.314090	E	1	2	90°	1
15-Jul-09	13:32	38	29.967109	-80.157865	E	1	2	75°	1
15-Jul-09	14:16	50	30.032079	-80.280516	W	2	1	75°	1
15-Jul-09	14:17	51	30.031696	-80.344534	W	2	2	60°	1
15-Jul-09	14:17	57	30.032548	-80.325620	W	2	1	90°	1
15-Jul-09	14:17	58	30.031763	-80.340692	W	2	1	90°	1
15-Jul-09	14:20	59	30.031944	-80.452905	W	2	2	90°	1



Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
15-Jul-09	14:21	60	30.032042	-80.461970	W	2	2	90°	1
15-Jul-09	14:23	62	30.032878	-80.550123	W	2	2	90°	1
15-Jul-09	14:23	63	30.031269	-80.559502	W	2	2	90°	1
15-Jul-09	14:24	52	30.030146	-80.578839	W	2	1	90°	1
15-Jul-09	14:24	53	30.034083	-80.611373	W	2	2	90°	3
15-Jul-09	14:24	65	30.031163	-80.588983	W	2	1	90°	1
15-Jul-09	14:24	66	30.031824	-80.597445	W	2	1	90°	1
15-Jul-09	14:24	67	30.033875	-80.609214	W	2	1	90°	1
15-Jul-09	14:26	54	30.032807	-80.654042	W	2	2	90°	1
15-Jul-09	14:26	55	30.031230	-80.682173	W	2	1	90°	1
15-Jul-09	14:26	70	30.031206	-80.684923	W	2	1	90°	2
15-Jul-09	14:27	71	30.031944	-80.698539	W	2	1	90°	1
15-Jul-09	14:30	58	30.098847	-80.654708	E	3	1	90°	1
15-Jul-09	14:30	74	30.100310	-80.673173	E	3	1	90°	2
15-Jul-09	14:31	59	30.099432	-80.623825	E	3	2	90°	2
15-Jul-09	14:32	60	30.100945	-80.585137	E	3	2	90°	2
15-Jul-09	14:32	75	30.100186	-80.615472	E	3	1	90°	1
15-Jul-09	14:32	76	30.101525	-80.604712	E	3	2	90°	1
15-Jul-09	14:32	77	30.101695	-80.591899	E	3	1	90°	1
15-Jul-09	14:32	78	30.100298	-80.581210	E	3	1	90°	1
15-Jul-09	14:33	61	30.099352	-80.558739	E	3	2	90°	4
15-Jul-09	14:33	79	30.099286	-80.560168	E	3	1	90°	4
15-Jul-09	14:34	62	30.103049	-80.528851	E	3	2	60°	1
15-Jul-09	14:34	80	30.101230	-80.542859	E	3	1	90°	1
15-Jul-09	14:34	81	30.103523	-80.518905	E	3	1	90°	1
15-Jul-09	14:35	63	30.102778	-80.503844	E	3	2	90°	2
15-Jul-09	14:35	64	30.101889	-80.481675	E	3	2	90°	4
15-Jul-09	14:35	82	30.101917	-80.481955	E	3	1	90°	2
15-Jul-09	14:36	65	30.102441	-80.462503	E	3	1	75°	1
15-Jul-09	14:37	84	30.100271	-80.403669	E	3	1	90°	1
15-Jul-09	14:38	85	30.100676	-80.379872	E	3	2	90°	3
15-Jul-09	14:43	88	30.100729	-80.328100	E	3	1	90°	1
15-Jul-09	15:20	96	30.167207	-80.305056	W	4	1	90°	2
15-Jul-09	15:21	79	30.166186	-80.343439	W	4	2	90°	2
15-Jul-09	15:22	80	30.163681	-80.371858	W	4	2	110°	1
15-Jul-09	15:23	98	30.166150	-80.423454	W	4	1	90°	1
15-Jul-09	15:24	82	30.164338	-80.456457	W	4	2	75°	1
15-Jul-09	15:24	99	30.164390	-80.457202	W	4	3	90°	2
15-Jul-09	15:25	84	30.166370	-80.498522	W	4	1	90°	3



Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
15-Jul-09	15:25	85	30.166779	-80.520930	W	4	1	45°	1
15-Jul-09	15:25	100	30.166424	-80.488564	W	4	2	90°	4
15-Jul-09	15:28	86	30.165512	-80.611987	W	4	1	90°	1
15-Jul-09	15:28	101	30.165447	-80.606623	W	4	1	90°	1
15-Jul-09	15:29	87	30.166144	-80.670977	W	4	1	90°	1
15-Jul-09	16:09	108	30.233877	-80.416672	E	5	1	90°	1
15-Jul-09	16:14	101	30.234243	-80.345375	E	5	1	60°	1
15-Jul-09	16:44	110	30.299495	-80.321647	W	6	2	90°	1
15-Jul-09	16:45	111	30.303041	-80.369487	W	6	2	75°	1
15-Jul-09	16:45	116	30.303811	-80.369824	W	6	1	90°	1
15-Jul-09	16:47	112	30.301687	-80.448696	W	6	1	90°	2
15-Jul-09	16:47	117	30.302312	-80.432597	W	6	1	90°	1
15-Jul-09	16:48	119	30.301844	-80.481189	W	6	1	90°	2
15-Jul-09	16:51	120	30.302059	-80.607444	W	6	1	90°	1
15-Jul-09	16:52	113	30.300593	-80.630280	W	6	1	90°	2
16-Jul-09	13:41	26	30.166391	-80.489034	E	4	2	60°	2
16-Jul-09	14:18	31	30.099503	-80.378532	W	3	3	90°	2
16-Jul-09	14:21	32	30.100652	-80.486371	W	3	3	90°	1
16-Jul-09	14:23	33	30.098352	-80.564276	W	3	3	80°	2
16-Jul-09	14:30	36	30.031240	-80.646219	E	2	3	90°	1
16-Jul-09	14:50	44	30.033857	-80.476733	E	2	1	90°	1
16-Jul-09	15:03	50	30.031133	-80.392978	E	2	1	90°	1
16-Jul-09	15:04	51	30.027036	-80.342921	E	3	1	90°	1
16-Jul-09	15:49	65	29.968929	-80.383804	W	1	1	120°	1
16-Jul-09	16:09	71	29.967584	-80.550035	W	1	2	90°	2
16-Jul-09	16:11	73	29.962552	-80.629539	W	1	1	120°	1
17-Jul-09	9:51	11	30.434294	-80.636898	W	8	1	75°	1
17-Jul-09	10:38	20	30.566451	-80.575521	W	10	2	75°	1
4-Aug-09	11:58	3	30.567790	-80.647958	E	10	2	90°	2
4-Aug-09	12:24	8	30.566594	-80.316750	E	10	2	90°	3
4-Aug-09	12:33	8	30.560334	-80.167957	E	10	3	90°	1
4-Aug-09	12:56	14	30.502631	-80.224083	W	9	2	80°	1
4-Aug-09	12:57	13	30.500670	-80.271799	W	9	2	110°	1
4-Aug-09	12:59	15	30.501289	-80.325398	W	9	2	80°	1
4-Aug-09	13:01	15	30.504542	-80.409434	W	9	2	90°	1
4-Aug-09	13:02	16	30.510737	-80.427383	W	9	2	90°	1
4-Aug-09	13:10	18	30.500800	-80.518322	W	9	2	90°	1
4-Aug-09	13:12	19	30.501112	-80.598167	W	9	2	110°	1
4-Aug-09	13:20	22	30.438471	-80.560492	E	8	3	80°	3

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
4-Aug-09	13:39	27	30.432193	-80.285353	E	8	3	100°	1
4-Aug-09	14:12	29	30.374500	-80.301723	W	7	3	90°	2
4-Aug-09	14:16	30	30.369755	-80.421294	W	7	1	90°	1
4-Aug-09	14:18	32	30.365380	-80.516626	W	7	3	90°	1
4-Aug-09	14:20	33	30.364738	-80.585105	W	7	1	90°	1
4-Aug-09	14:33	42	30.299321	-80.630179	E	6	1	90°	1
4-Aug-09	14:33	40	30.299621	-80.620791	E	6	3	90°	1
4-Aug-09	14:44	45	30.298889	-80.427273	E	6	2	90°	1
4-Aug-09	14:45	47	30.298179	-80.400124	E	6	2	110°	1
4-Aug-09	14:48	48	30.297485	-80.278407	E	6	3	80°	1
4-Aug-09	15:26	55	30.230947	-80.541866	W	5	1	90°	1
5-Aug-09	8:59	6	29.966658	-80.607427	E	1	1	90°	1
5-Aug-09	8:59	4	29.966624	-80.606248	E	1	2	100°	1
5-Aug-09	9:40	12	30.031052	-80.451696	W	2	1	90°	1
5-Aug-09	9:42	13	30.032194	-80.543009	W	2	1	90°	1
5-Aug-09	9:50	16	30.099232	-80.663013	E	3	1	90°	1
5-Aug-09	9:53	20	30.101678	-80.543657	E	3	2	90°	1
5-Aug-09	9:54	21	30.101754	-80.532500	E	3	1	90°	1
5-Aug-09	9:54	22	30.100723	-80.516654	E	3	2	130°	1
5-Aug-09	9:57	17	30.100903	-80.412442	E	3	2	110°	1
5-Aug-09	10:53	35	30.230984	-80.681895	E	5	1	90°	1
5-Aug-09	10:53	36	30.230914	-80.664922	E	5	2	90°	1
5-Aug-09	10:56	37	30.232822	-80.582348	E	5	1	90°	1
5-Aug-09	11:09	27	30.232308	-80.100197	E	5	2	75°	4
5-Aug-09	11:36	45	30.299509	-80.446844	W	6	2	90°	1
5-Aug-09	11:41	32	30.300757	-80.636146	W	6	2	75°	2
5-Aug-09	13:27	52	30.365963	-80.508112	E	7	1	90°	1
6-Aug-09	8:58	5	29.962288	-80.569651	E	1	1	75°	1
6-Aug-09	9:58	10	30.031892	-80.472325	W	2	1	60°	1
6-Aug-09	10:11	21	30.103335	-80.469843	E	3	2	120°	1
6-Aug-09	10:13	16	30.101228	-80.385927	E	3	1	75°	1
6-Aug-09	11:07	21	30.164081	-80.348063	W	4	1	75°	1
6-Aug-09	11:08	22	30.162811	-80.369395	W	4	2	90°	1
6-Aug-09	11:11	25	30.163070	-80.492969	W	4	1	90°	2
6-Aug-09	11:13	27	30.170337	-80.604644	W	4	1	75°	1
6-Aug-09	11:25	30	30.494894	-80.675080	E	9	1	90°	1
6-Aug-09	11:30	33	30.501326	-80.510776	E	9	2	90°	1
6-Aug-09	12:28	41	30.565246	-80.502121	W	10	2	90°	2
6-Aug-09	12:30	47	30.565444	-80.582338	W	10	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
6-Aug-09	12:31	44	30.566159	-80.606290	W	10	1	90°	2
6-Aug-09	12:32	45	30.567010	-80.635041	W	10	1	60°	1
14-Sep-09	12:16	4	30.565153	-80.070534	E	10	1	90°	1
15-Sep-09	9:38	4	29.966616	-80.608965	E	1	1	90°	1
15-Sep-09	9:38	2	29.966575	-80.612117	E	1	1	90°	1
15-Sep-09	9:40	4	29.966192	-80.518688	E	1	2	110°	1
15-Sep-09	10:29	15	30.033682	-80.363872	W	2	1	90°	1
15-Sep-09	10:35	16	30.031342	-80.554592	W	2	2	45°	1
15-Sep-09	10:35	12	30.031333	-80.555969	W	2	2	90°	1
15-Sep-09	11:13	19	30.101363	-80.512162	E	3	2	90°	1
15-Sep-09	11:54	24	30.162316	-80.437389	W	4	3	80°	1
15-Sep-09	12:16	42	30.232158	-80.649082	E	5	2	135°	1
15-Sep-09	12:20	29	30.233227	-80.522898	E	5	2	90°	1
15-Sep-09	12:24	45	30.231676	-80.388550	E	5	1	90°	1
15-Sep-09	12:24	30	30.231731	-80.386280	E	5	1	90°	1
15-Sep-09	12:25	46	30.232784	-80.363975	E	5	2	60°	1
15-Sep-09	13:07	35	30.300245	-80.436785	W	6	2	75°	2
15-Sep-09	15:18	67	30.365265	-80.567799	E	7	2	60°	1
15-Sep-09	15:18	40	30.365213	-80.565675	E	7	1	75°	1
15-Sep-09	15:32	73	30.365124	-80.418794	E	7	2	75°	1
15-Sep-09	15:32	74	30.364638	-80.394295	E	7	1	90°	1
15-Sep-09	15:32	44	30.364985	-80.411069	E	7	1	90°	1
15-Sep-09	16:29	54	30.496631	-80.605218	E	9	2	75°	1
15-Sep-09	16:41	99	30.501491	-80.458835	E	9	1	75°	1
15-Sep-09	17:40	119	30.547411	-80.633760	W	10	1	90°	1
16-Sep-09	10:18	4	29.962952	-80.679307	E	1	1	90°	1
16-Sep-09	10:19	5	29.963136	-80.640004	E	1	2	90°	1
16-Sep-09	10:32	8	29.964361	-80.527422	E	1	1	90°	1
16-Sep-09	10:33	9	29.963691	-80.482406	E	1	2	90°	3
16-Sep-09	10:34	11	29.963633	-80.442474	E	1	1	90°	1
16-Sep-09	10:42	14	29.965542	-80.386811	E	1	2	90°	4
16-Sep-09	10:43	15	29.965225	-80.349425	E	1	1	90°	1
16-Sep-09	10:45	17	29.964320	-80.274704	E	1	1	90°	1
16-Sep-09	11:16	24	30.033119	-80.293579	W	2	1	90°	1
16-Sep-09	11:18	25	30.033457	-80.352897	W	2	2	90°	2
16-Sep-09	11:19	26	30.032924	-80.396245	W	2	2	90°	1
16-Sep-09	11:20	27	30.032091	-80.424508	W	2	2	90°	1
16-Sep-09	11:20	28	30.031687	-80.436201	W	2	2	90°	3
16-Sep-09	11:21	29	30.031317	-80.452960	W	2	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
16-Sep-09	11:24	24	30.031128	-80.575448	W	2	1	90°	1
16-Sep-09	11:24	30	30.031034	-80.566742	W	2	1	90°	1
16-Sep-09	11:32	34	30.033978	-80.627837	W	2	2	90°	1
16-Sep-09	11:34	30	30.029878	-80.702953	W	2	2	90°	1
16-Sep-09	11:39	36	30.098525	-80.629402	E	3	1	110°	1
16-Sep-09	11:49	39	30.100532	-80.442080	E	3	2	90°	1
16-Sep-09	11:50	40	30.100228	-80.409473	E	3	2	90°	1
16-Sep-09	12:31	53	30.100315	-79.800106	E	3	3	110°	1
16-Sep-09	12:49	49	30.168093	-80.357524	W	4	1	90°	1
16-Sep-09	12:51	56	30.165650	-80.433371	E	4	2	75°	1
16-Sep-09	12:55	52	30.162456	-80.458258	W	4	1	90°	3
16-Sep-09	15:09	79	30.234530	-80.529314	E	5	3	90°	3
16-Sep-09	15:09	69	30.234497	-80.529988	E	5	2	90°	1
16-Sep-09	15:10	80	30.237682	-80.470385	E	5	2	90°	3
16-Sep-09	15:10	70	30.236559	-80.490840	E	5	1	90°	2
16-Sep-09	15:11	81	30.236684	-80.438196	E	5	1	90°	2
16-Sep-09	15:11	71	30.237844	-80.457926	E	5	2	90°	3
16-Sep-09	15:17	84	30.233124	-80.355071	E	5	1	90°	2
16-Sep-09	15:17	73	30.233735	-80.371003	E	5	2	90°	2
16-Sep-09	15:26	89	30.231630	-80.244055	E	5	3	110°	1
16-Sep-09	16:03	86	30.296087	-80.461053	W	6	2	90°	2
16-Sep-09	16:14	90	30.296617	-80.649919	W	6	1	90°	1
18-Sep-09	8:51	4	30.561739	-80.661433	E	10	1	100°	1
18-Sep-09	10:04	25	30.499988	-80.464967	W	9	3	90°	1
18-Sep-09	10:15	29	30.431682	-80.608594	E	8	1	90°	1
18-Sep-09	10:18	31	30.437069	-80.533298	E	8	2	90°	1
18-Sep-09	10:20	21	30.434250	-80.460581	E	8	3	90°	1
18-Sep-09	10:33	39	30.433431	-80.318742	E	8	3	90°	1
18-Sep-09	10:38	25	30.432652	-80.158687	E	8	2	60°	1
18-Sep-09	11:07	34	30.364844	-80.429390	W	7	2	60°	1
18-Sep-09	11:09	35	30.366865	-80.511661	W	7	1	45°	1
18-Sep-09	11:15	36	30.365529	-80.703672	W	7	1	60°	1
18-Sep-09	11:38	53	30.297314	-80.608639	E	6	2	90°	1
18-Sep-09	11:40	54	30.298683	-80.533877	E	6	2	90°	1
18-Sep-09	11:43	56	30.300722	-80.430700	E	6	1	90°	1
18-Sep-09	11:45	57	30.299695	-80.340926	E	6	3	90°	1
18-Sep-09	12:14	48	30.231522	-80.281195	W	5	2	90°	1
18-Sep-09	12:17	49	30.232775	-80.379031	W	5	3	60°	1
18-Sep-09	12:36	53	30.234353	-80.519232	W	5	2	60°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
18-Sep-09	14:26	4	30.165496	-80.683391	E	4	2	60°	1
18-Sep-09	14:27	4	30.164268	-80.639883	E	4	1	90°	1
18-Sep-09	14:27	5	30.164437	-80.658348	E	4	1	45°	2
18-Sep-09	14:29	6	30.162705	-80.591365	E	4	2	90°	2
18-Sep-09	14:29	6	30.162814	-80.596902	E	4	2	45°	1
18-Sep-09	14:36	11	30.166013	-80.532243	E	4	1	90°	2
18-Sep-09	14:37	9	30.165299	-80.524536	E	4	2	60°	2
18-Sep-09	14:42	16	30.167596	-80.431073	E	4	2	90°	5
18-Sep-09	14:42	12	30.167280	-80.424156	E	4	2	90°	3
18-Sep-09	14:44	18	30.164391	-80.358584	E	4	2	90°	1
18-Sep-09	14:45	19	30.166106	-80.330274	E	4	1	90°	2
18-Sep-09	15:22	24	30.101020	-80.546629	W	3	2	80°	1
18-Sep-09	15:22	25	30.100280	-80.569734	W	3	2	80°	1
18-Sep-09	15:24	26	30.097174	-80.610830	W	3	2	90°	1
18-Sep-09	15:25	28	30.098737	-80.649298	W	3	2	75°	1
18-Sep-09	15:57	40	30.029878	-80.578983	E	2	2	90°	1
18-Sep-09	16:02	41	30.035378	-80.394552	E	2	1	90°	1
18-Sep-09	16:04	42	30.034808	-80.346286	E	2	2	60°	1
18-Sep-09	16:41	53	29.964455	-80.388545	W	1	1	75°	1
18-Sep-09	16:42	54	29.963596	-80.428651	W	1	2	75°	1
18-Sep-09	16:44	56	29.964234	-80.527287	W	1	2	75°	1
18-Sep-09	16:46	51	29.960694	-80.608005	W	1	1	90°	1
18-Sep-09	16:46	58	29.962595	-80.590207	W	1	2	90°	1
18-Sep-09	16:47	52	29.960179	-80.624267	W	1	2	90°	1
30-Sep-09	9:06	4	29.966193	-80.637225	E	1	1	90°	1
30-Sep-09	9:21	9	29.963353	-80.462160	E	1	2	90°	1
30-Sep-09	9:22	10	29.966223	-80.423800	E	1	1	100°	1
30-Sep-09	9:23	11	29.964584	-80.374881	E	1	2	90°	1
30-Sep-09	9:24	12	29.961044	-80.334684	E	1	2	90°	1
30-Sep-09	10:26	28	30.098697	-80.639585	E	3	1	100°	1
30-Sep-09	10:27	29	30.099154	-80.616774	E	3	1	90°	1
30-Sep-09	10:30	31	30.100864	-80.510610	E	3	2	80°	1
30-Sep-09	10:43	41	30.097530	-80.324259	E	3	1	90°	2
30-Sep-09	11:16	32	30.167334	-80.266921	W	4	2	120°	1
30-Sep-09	11:19	53	30.168613	-80.378134	W	4	2	90°	1
30-Sep-09	11:20	54	30.168124	-80.428213	W	4	2	60°	1
30-Sep-09	11:20	33	30.168394	-80.420473	W	4	2	90°	1
30-Sep-09	11:20	34	30.167662	-80.439326	W	4	1	90°	1
30-Sep-09	11:21	35	30.166365	-80.466601	W	4	1	80°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
30-Sep-09	11:54	71	30.229963	-80.522791	E	5	1	90°	2
30-Sep-09	12:34	51	30.299750	-80.489402	W	6	1	90°	1
30-Sep-09	12:37	52	30.299627	-80.583138	W	6	1	90°	1
30-Sep-09	12:38	53	30.299259	-80.638597	W	6	2	90°	1
30-Sep-09	14:24	84	30.365876	-80.608795	E	7	2	100°	1
30-Sep-09	15:25	99	30.567214	-80.685050	E	10	2	90°	1
30-Sep-09	15:27	100	30.566844	-80.615918	E	10	1	90°	1
30-Sep-09	15:29	101	30.564384	-80.559871	E	10	2	100°	1
30-Sep-09	15:30	102	30.563252	-80.522808	E	10	2	90°	1
30-Sep-09	15:40	107	30.570568	-80.279988	E	10	1	90°	1
1-Oct-09	8:56	5	30.566280	-80.412261	E	10	2	90°	1
1-Oct-09	8:59	6	30.566459	-80.315808	E	10	2	90°	1
1-Oct-09	9:18	11	30.501690	-80.036327	W	9	2	90°	1
1-Oct-09	9:21	12	30.498908	-80.147221	W	9	1	90°	1
1-Oct-09	9:25	10	30.501110	-80.293383	W	9	2	90°	2
1-Oct-09	9:26	13	30.500256	-80.324201	W	9	1	90°	1
1-Oct-09	9:28	14	30.498443	-80.389524	W	9	2	90°	1
1-Oct-09	9:51	22	30.433829	-80.626541	E	8	1	90°	1
1-Oct-09	10:03	28	30.433167	-80.407868	E	8	1	90°	1
1-Oct-09	10:51	43	30.365082	-80.310985	W	7	1	90°	1
1-Oct-09	10:51	44	30.365015	-80.320297	W	7	2	90°	2
1-Oct-09	10:56	45	30.366736	-80.494618	W	7	1	90°	1
1-Oct-09	10:57	47	30.367452	-80.556508	W	7	1	90°	1
1-Oct-09	10:58	27	30.367006	-80.561171	W	7	3	90°	1
1-Oct-09	11:17	55	30.296286	-80.512807	E	6	1	90°	1
1-Oct-09	11:21	56	30.297207	-80.357373	E	6	1	90°	1
1-Oct-09	11:22	57	30.297206	-80.340285	E	6	1	90°	1
1-Oct-09	11:44	35	30.233482	-80.020490	W	5	1	90°	1
1-Oct-09	11:58	38	30.231068	-80.377144	W	5	1	90°	1
1-Oct-09	12:01	39	30.234393	-80.492413	W	5	1	90°	1
1-Oct-09	12:04	64	30.232671	-80.590933	W	5	1	90°	1
1-Oct-09	12:05	65	30.232120	-80.629150	W	5	3	90°	1
1-Oct-09	12:05	66	30.232097	-80.651418	W	5	2	90°	2
1-Oct-09	14:01	81	30.165305	-80.590182	E	4	2	90°	2
1-Oct-09	14:10	86	30.165406	-80.535760	E	4	1	90°	2
1-Oct-09	14:11	87	30.166143	-80.513385	E	4	2	90°	2
1-Oct-09	14:11	88	30.166431	-80.495764	E	4	1	90°	1
1-Oct-09	14:16	92	30.162858	-80.399396	E	4	3	90°	2
1-Oct-09	14:58	102	30.100513	-80.283820	W	3	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
1-Oct-09	15:04	67	30.101724	-80.481887	W	3	3	90°	1
1-Oct-09	15:05	104	30.101996	-80.502765	W	3	1	90°	1
1-Oct-09	15:06	105	30.102238	-80.553790	W	3	1	90°	1
1-Oct-09	15:09	106	30.101755	-80.635778	W	3	2	90°	2
1-Oct-09	15:10	107	30.102546	-80.677445	W	3	2	90°	1
1-Oct-09	15:20	115	30.031617	-80.664644	E	2	2	90°	4
1-Oct-09	15:23	117	30.028819	-80.539874	E	2	2	90°	1
1-Oct-09	15:30	118	30.032029	-80.280653	E	2	2	90°	1
1-Oct-09	15:33	78	30.031802	-80.192395	E	2	1	90°	1
1-Oct-09	16:05	126	29.966803	-80.486004	W	1	2	90°	1
1-Oct-09	16:06	84	29.967737	-80.528164	W	1	2	90°	1
1-Oct-09	16:08	85	29.964699	-80.609571	W	1	1	90°	1
17-Nov-09	13:46	14	30.497981	-80.608554	W	9	1	45°	1
18-Nov-09	9:24	18	30.031563	-80.281005	W	2	1	90°	1
18-Nov-09	9:25	19	30.031432	-80.320789	W	2	1	90°	1
18-Nov-09	9:40	22	30.100308	-80.632180	E	3	1	90°	1
18-Nov-09	9:41	21	30.100346	-80.599675	E	3	2	100°	1
18-Nov-09	9:57	27	30.099592	-80.480660	E	3	2	110°	2
18-Nov-09	10:10	29	30.100742	-79.994173	E	3	2	125°	4
18-Nov-09	10:12	30	30.100583	-79.916373	E	3	2	90°	2
18-Nov-09	10:57	41	30.233074	-80.496728	E	5	2	120°	2
18-Nov-09	13:46	66	30.567595	-80.606113	E	10	1	120°	2
18-Nov-09	14:32	74	30.498722	-80.549057	W	9	1	90°	1
18-Nov-09	14:33	75	30.498640	-80.584340	W	9	1	80°	2
18-Nov-09	14:42	79	30.433646	-80.579279	E	8	3	110°	3
20-Nov-09	9:11	7	29.966521	-80.601115	E	1	1	90°	1
8-Dec-09	12:35	25	30.166432	-80.261243	E	4	1	90°	1
8-Dec-09	13:10	31	30.100306	-80.534221	W	3	1	100°	1
8-Dec-09	13:47	38	29.965570	-79.823295	E	2	2	90°	1
22-Dec-09	8:54	3	29.965498	-80.401568	E	1	1	80°	1
22-Dec-09	8:58	4	29.965947	-80.244734	E	1	1	75°	1
22-Dec-09	9:18	8	30.031820	-79.988273	W	2	2	90°	1
22-Dec-09	9:32	10	30.031990	-80.516822	W	2	1	90°	1
22-Dec-09	9:35	11	30.031993	-80.622506	W	2	1	90°	1
22-Dec-09	10:35	21	30.100800	-80.324777	E	3	1	110°	1
22-Dec-09	10:36	22	30.100410	-80.283564	E	3	2	100°	1
22-Dec-09	11:31	33	30.232466	-80.545990	E	5	1	90°	1
22-Dec-09	11:33	34	30.232962	-80.468077	E	5	2	100°	1
22-Dec-09	11:36	35	30.233110	-80.332826	E	5	1	80°	1



Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
22-Dec-09	12:06	34	30.300584	-80.275585	W	6	2	90°	1
22-Dec-09	12:07	35	30.300488	-80.291179	W	6	1	90°	1
22-Dec-09	14:05	44	30.365169	-80.549155	E	7	2	60°	1
22-Dec-09	14:07	51	30.365643	-80.485548	E	7	1	90°	1
22-Dec-09	14:49	51	30.433780	-80.375603	W	8	2	90°	2
22-Dec-09	15:09	65	30.499047	-80.505264	E	9	1	90°	1
22-Dec-09	15:14	67	30.499460	-80.302333	E	9	1	90°	1
22-Dec-09	15:15	68	30.499046	-80.270865	E	9	1	100°	1
22-Dec-09	16:11	65	30.567508	-80.285777	W	10	2	90°	1
22-Dec-09	16:23	67	30.567339	-80.424851	W	10	3	120°	1
7-Jan-10	10:32	6	30.030968	-80.257298	W	2	1	80°	1
7-Jan-10	10:39	7	30.030648	-80.491165	W	2	1	60°	1
7-Jan-10	11:57	21	30.165740	-80.441015	W	4	1	90°	1
7-Jan-10	13:14	33	30.299153	-80.557557	W	6	1	90°	1
7-Jan-10	14:59	40	30.366124	-80.667015	E	7	1	75°	1
7-Jan-10	15:25	43	30.368561	-80.481447	E	7	1	75°	1
7-Jan-10	15:30	44	30.367835	-80.287313	E	7	2	90°	1
7-Jan-10	16:16	52	30.432587	-80.392421	W	8	1	90°	1
7-Jan-10	16:25	55	30.432106	-80.493542	W	8	1	90°	2
7-Jan-10	16:27	56	30.432251	-80.551611	W	8	1	80°	1
7-Jan-10	16:35	55	30.496968	-80.652018	E	9	2	90°	1
7-Jan-10	16:37	59	30.499347	-80.583876	E	9	1	100°	1
7-Jan-10	16:37	56	30.499251	-80.585836	E	9	1	90°	1
7-Jan-10	16:38	57	30.500025	-80.538136	E	9	1	90°	1
7-Jan-10	16:40	59	30.500468	-80.474392	E	9	2	90°	1
7-Jan-10	17:26	63	30.565993	-80.585532	W	10	1	110°	1
19-Jan-10	9:56	10	30.434127	-80.352844	E	8	1	90°	1
19-Jan-10	10:00	11	30.434214	-80.209340	E	8	1	90°	1
19-Jan-10	11:39	29	30.232290	-80.274277	W	5	2	90°	1
19-Jan-10	13:35	37	30.166912	-80.625587	E	4	2	90°	1
19-Jan-10	13:38	36	30.167246	-80.536419	E	4	1	90°	1
19-Jan-10	13:39	38	30.167453	-80.494497	E	4	2	90°	2
19-Jan-10	13:45	39	30.168020	-80.272495	E	4	2	90°	1
19-Jan-10	13:46	38	30.167973	-80.262807	E	4	1	90°	1
19-Jan-10	14:41	48	30.099499	-80.658473	W	3	2	90°	1
19-Jan-10	15:57	68	29.964911	-80.644896	W	1	1	90°	1
20-Jan-10	9:06	5	29.966060	-80.596401	E	1	2	75°	1
20-Jan-10	9:13	8	29.966369	-80.295468	E	1	1	90°	2
20-Jan-10	9:53	16	30.031389	-80.358517	W	2	2	110°	1



Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Jan-10	10:20	24	30.030491	-80.694715	W	2	3	80°	1
20-Jan-10	10:20	25	30.030468	-80.697535	W	2	2	110°	1
20-Jan-10	10:40	32	30.100783	-80.408151	E	3	2	90°	1
20-Jan-10	10:43	40	30.100923	-80.321203	E	3	1	90°	1
20-Jan-10	10:44	33	30.100972	-80.272217	E	3	3	100°	1
20-Jan-10	10:44	34	30.100979	-80.270201	E	3	1	60°	1
20-Jan-10	11:32	54	30.165784	-80.588996	W	4	1	80°	1
20-Jan-10	11:33	47	30.165797	-80.615828	W	4	3	90°	1
20-Jan-10	11:50	61	30.233216	-80.289355	E	5	2	90°	1
20-Jan-10	14:12	85	30.364375	-80.602241	E	7	1	100°	1
20-Jan-10	14:13	86	30.367083	-80.571071	E	7	1	90°	1
20-Jan-10	14:18	93	30.366792	-80.434054	E	7	1	75°	1
20-Jan-10	14:18	74	30.366906	-80.421697	E	7	2	90°	1
20-Jan-10	14:19	75	30.366845	-80.383708	E	7	1	90°	1
20-Jan-10	14:58	109	30.432392	-80.231867	W	8	1	100°	1
20-Jan-10	15:00	110	30.432475	-80.324133	W	8	1	110°	1
20-Jan-10	15:03	84	30.432418	-80.412123	W	8	3	90°	2
20-Jan-10	15:04	85	30.431974	-80.464450	W	8	1	90°	1
20-Jan-10	15:10	88	30.431516	-80.586286	W	8	1	90°	2
20-Jan-10	15:17	119	30.499211	-80.645100	E	9	1	75°	1
27-Jan-10	10:50	8	30.497974	-80.588156	W	9	1	90°	1
27-Jan-10	11:41	17	30.365127	-80.337588	W	7	1	75°	1
27-Jan-10	14:58	33	30.167814	-80.655985	E	4	3	60°	1
27-Jan-10	15:03	34	30.167399	-80.480802	E	4	3	110°	1
27-Jan-10	16:56	51	29.964212	-80.519861	W	1	1	110°	1
27-Jan-10	16:58	52	29.963735	-80.612545	W	1	1	80°	1
28-Jan-10	9:44	9	29.966246	80.443662	E	1	1	90°	1
28-Jan-10	9:44	8	29.966243	-80.444693	E	1	2	90°	1
28-Jan-10	9:46	10	29.966443	-80.375928	E	1	3	90°	1
28-Jan-10	11:11	32	30.031393	-80.473511	W	2	2	100°	1
28-Jan-10	11:12	33	30.031482	-80.498770	W	2	2	90°	1
28-Jan-10	11:12	34	30.031421	-80.510538	W	2	2	90°	1
28-Jan-10	11:15	36	30.030842	-80.627892	W	2	1	90°	1
28-Jan-10	12:00	51	30.100546	-80.472517	E	3	2	80°	1
28-Jan-10	12:00	44	30.100648	-80.451952	E	3	2	90°	1
28-Jan-10	12:38	62	30.166299	-80.236667	W	4	1	75°	1
28-Jan-10	12:43	57	30.166211	-80.416667	W	4	2	90°	1
28-Jan-10	12:48	60	30.166066	-80.545775	W	4	2	90°	1
28-Jan-10	15:12	73	30.233323	-80.463677	E	5	2	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
28-Jan-10	15:13	74	30.233805	-80.436569	E	5	2	90°	1
28-Jan-10	15:14	75	30.233810	-80.407492	E	5	3	100°	1
28-Jan-10	15:29	89	30.233469	-80.350920	E	5	2	90°	2
28-Jan-10	15:31	90	30.234176	-80.287473	E	5	1	90°	1
28-Jan-10	15:31	78	30.233991	-80.276257	E	5	3	60°	1
28-Jan-10	16:22	92	30.299338	-80.402664	W	6	2	80°	1
28-Jan-10	16:29	93	30.299004	-80.637224	W	6	3	110°	1
19-Feb-10	10:18	10	30.099968	-80.614461	E	3	1	90°	1
19-Feb-10	11:58	22	30.300214	-80.500372	W	6	2	110°	1
19-Feb-10	12:02	24	30.300069	-80.611535	W	6	2	90°	1
19-Feb-10	13:44	25	30.365414	-80.562004	E	7	3	90°	1
19-Feb-10	13:47	26	30.365483	-80.477107	E	7	1	90°	1
19-Feb-10	13:54	29	30.366759	-80.328203	W	7	2	90°	1
19-Feb-10	14:38	43	30.433555	-80.472532	W	8	2	100°	2
19-Feb-10	14:49	40	30.498968	-80.626622	W	9	2	90°	1
19-Feb-10	14:51	42	30.499062	-80.577891	W	9	1	90°	1
19-Feb-10	14:52	43	30.499250	-80.514702	W	9	1	90°	1
19-Feb-10	15:31	50	30.567223	-80.365963	W	10	2	90°	2
19-Feb-10	15:37	53	30.566714	-80.603203	W	10	1	90°	1
19-Feb-10	15:39	55	30.566545	-80.666463	W	10	1	90°	2
20-Feb-10	9:44	5	30.565864	-80.625436	E	10	2	90°	3
20-Feb-10	9:44	6	30.565775	-80.623834	E	10	3	90°	1
20-Feb-10	9:45	7	30.566162	-80.585383	E	10	2	110°	1
20-Feb-10	9:53	8	30.566702	-80.321080	E	10	1	90°	1
20-Feb-10	9:54	9	30.566794	-80.266321	E	10	1	90°	1
20-Feb-10	10:22	10	30.499951	-80.217201	W	9	1	90°	1
20-Feb-10	10:23	21	30.499918	-80.260149	W	9	3	90°	2
20-Feb-10	10:24	13	30.499748	-80.303568	W	9	2	90°	2
20-Feb-10	10:24	22	30.499839	-80.278145	W	9	2	90°	1
20-Feb-10	10:30	26	30.499763	-80.377635	W	9	1	90°	1
20-Feb-10	10:31	27	30.499840	-80.399430	W	9	1	90°	1
20-Feb-10	10:39	31	30.499597	-80.485433	W	9	2	90°	1
20-Feb-10	10:40	32	30.499557	-80.537593	W	9	3	120°	1
20-Feb-10	10:41	33	30.499539	-80.580633	W	9	3	90°	5
20-Feb-10	10:41	34	30.499540	-80.585648	W	9	2	90°	2
20-Feb-10	10:42	20	30.499498	-80.595415	W	9	2	90°	3
20-Feb-10	10:49	37	30.499951	-80.646232	W	9	3	110°	2
20-Feb-10	10:50	38	30.499167	-80.684272	W	9	2	120°	1
20-Feb-10	11:17	29	30.433001	-80.498033	E	8	1	90°	3

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Feb-10	11:18	43	30.433422	-80.455525	E	8	1	110°	1
20-Feb-10	11:25	32	30.433512	-80.212100	E	8	2	90°	1
20-Feb-10	11:51	53	30.366200	-80.223566	W	7	1	90°	1
20-Feb-10	11:53	55	30.366056	-80.302827	W	7	1	30°	1
20-Feb-10	11:54	56	30.365928	-80.351623	W	7	3	90°	1
20-Feb-10	11:58	57	30.365756	-80.482424	W	7	3	130°	1
20-Feb-10	12:00	39	30.365752	-80.578061	W	7	2	90°	1
20-Feb-10	12:13	46	30.298076	-80.662381	E	6	1	90°	1
20-Feb-10	12:14	47	30.299376	-80.630461	E	6	2	90°	1
20-Feb-10	12:14	62	30.299111	-80.644859	E	6	2	145°	1
20-Feb-10	12:47	63	30.300131	-80.280769	E	6	2	90°	1
20-Feb-10	13:32	85	30.232779	-80.464949	W	5	3	90°	1
20-Feb-10	13:37	83	30.233441	-80.513720	W	5	2	90°	1
20-Feb-10	15:29	100	30.166229	-80.399973	E	4	1	90°	1
20-Feb-10	15:32	102	30.166474	-80.279310	E	4	1	90°	1
20-Feb-10	15:32	105	30.166356	-80.272266	E	4	1	90°	1
20-Feb-10	16:12	118	30.100528	-80.482959	W	3	2	100°	1
20-Feb-10	16:28	125	30.031373	-80.592192	E	2	2	110°	1
20-Feb-10	16:30	126	30.031640	-80.515057	E	2	2	90°	1
20-Feb-10	16:38	123	30.031639	-80.286655	E	2	2	90°	1
21-Feb-10	8:38	4	29.965243	-80.505803	E	1	2	90°	1
21-Feb-10	8:46	10	29.965437	-80.188799	E	1	1	90°	1
21-Feb-10	8:52	8	29.965144	-79.955871	E	1	3	90°	1
21-Feb-10	8:52	9	29.965056	-79.932900	E	1	2	90°	1
21-Feb-10	9:31	25	30.032338	-80.463837	W	2	1	75°	1
21-Feb-10	10:10	36	30.100339	-80.301111	E	3	1	80°	1
21-Feb-10	10:38	44	30.166338	-80.064786	W	4	1	60°	1
21-Feb-10	10:52	49	30.166730	-80.268801	W	4	2	90°	1
21-Feb-10	10:55	51	30.166745	-80.391231	W	4	2	80°	1
21-Feb-10	10:56	52	30.166688	-80.437198	W	4	1	90°	3
21-Feb-10	10:58	53	30.166491	-80.509623	W	4	1	90°	2
21-Feb-10	11:11	54	30.166056	-80.683378	W	4	2	90°	1
21-Feb-10	11:24	63	30.232575	-80.617937	E	5	1	90°	1
21-Feb-10	11:33	68	30.232177	-80.513457	E	5	1	90°	3
21-Feb-10	11:44	73	30.232581	-80.437825	E	5	2	90°	1
21-Feb-10	11:46	74	30.232836	-80.372772	E	5	2	90°	1
21-Feb-10	12:31	77	30.301000	-80.257254	W	6	2	90°	4
21-Feb-10	12:36	79	30.300284	-80.448465	W	6	1	90°	2
21-Feb-10	14:34	108	30.365615	-80.505194	E	7	1	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
21-Feb-10	14:55	102	30.365630	-80.296967	E	7	1	80°	1
21-Feb-10	15:37	134	30.433569	-80.207054	W	8	2	90°	3
21-Feb-10	15:38	135	30.433789	-80.278162	W	8	1	90°	1
21-Feb-10	15:47	141	30.433407	-80.490761	W	8	2	110°	1
21-Feb-10	15:47	119	30.433246	-80.484685	W	8	1	90°	1
21-Feb-10	15:55	144	30.497951	-80.666477	E	9	2	100°	1
21-Feb-10	15:57	146	30.498829	-80.609646	E	9	2	110°	1
21-Feb-10	15:58	147	30.499157	-80.574456	E	9	3	90°	3
21-Feb-10	15:59	148	30.498906	-80.508135	E	9	3	90°	2
21-Feb-10	16:08	153	30.499461	-80.268270	E	9	2	90°	1
21-Feb-10	16:10	154	30.499649	-80.219302	E	9	1	90°	1
21-Feb-10	16:11	129	30.499532	-80.188571	E	9	1	60°	1
21-Feb-10	16:32	157	30.567109	-80.165184	W	10	1	90°	1
21-Feb-10	16:34	158	30.567080	-80.230362	W	10	1	90°	1
21-Feb-10	16:35	159	30.567262	-80.254747	W	10	1	90°	2
21-Feb-10	16:40	164	30.567120	-80.341537	W	10	1	90°	1
21-Feb-10	16:47	140	30.566800	-80.579505	W	10	1	90°	1
20-Mar-10	9:26	4	29.965543	-80.373441	W	1	2	100°	1
20-Mar-10	9:26	5	29.965475	-80.386834	E	1	2	90°	1
20-Mar-10	9:57	13	30.032581	-80.274625	E	2	1	90°	1
20-Mar-10	10:05	17	30.032270	-80.466821	W	2	2	90°	1
20-Mar-10	10:18	20	30.031629	-80.649836	W	2	1	90°	1
20-Mar-10	12:52	34	30.099767	-80.626413	W	3	1	90°	1
20-Mar-10	13:37	34	30.166559	-80.206622	W	4	2	90°	1
20-Mar-10	13:38	35	30.166644	-80.221309	W	4	1	90°	1
20-Mar-10	13:45	40	30.166394	-80.353119	W	4	2	90°	1
20-Mar-10	13:47	41	30.166730	-80.430771	W	4	1	90°	1
20-Mar-10	13:48	42	30.166579	-80.471078	W	4	1	90°	1
20-Mar-10	13:57	45	30.166433	-80.565088	W	4	1	90°	1
20-Mar-10	14:00	58	30.166232	-80.679204	E	4	1	75°	1
20-Mar-10	14:00	46	30.166079	-80.663821	W	4	1	90°	1
20-Mar-10	14:05	49	30.232255	-80.621980	E	5	1	90°	1
20-Mar-10	14:07	61	30.232486	-80.522047	W	5	1	90°	3
20-Mar-10	14:09	62	30.232586	-80.460650	W	5	1	90°	3
20-Mar-10	14:11	64	30.232840	-80.347943	W	5	1	90°	1
20-Mar-10	14:39	57	30.300439	-80.216354	W	6	1	90°	1
20-Mar-10	14:55	63	30.301162	-80.439892	W	6	2	90°	1
20-Mar-10	14:56	85	30.300364	-80.474801	E	6	2	145°	1
20-Mar-10	14:59	87	30.300022	-80.601604	E	6	2	90°	2

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Mar-10	15:04	66	30.364085	-80.672022	E	7	1	90°	1
20-Mar-10	15:05	68	30.365132	-80.622735	E	7	2	90°	1
20-Mar-10	15:06	91	30.365252	-80.594722	W	7	2	90°	1
20-Mar-10	15:09	71	30.365471	-80.468543	E	7	2	90°	2
20-Mar-10	15:14	74	30.365686	-80.293390	E	7	2	90°	1
20-Mar-10	15:25	104	30.364523	-80.218230	W	7	2	90°	1
20-Mar-10	15:26	105	30.365535	-80.188521	W	7	2	90°	1
20-Mar-10	15:51	85	30.433802	-80.178189	W	8	2	90°	1
20-Mar-10	15:56	88	30.433446	-80.305929	W	8	1	90°	1
20-Mar-10	16:05	124	30.433720	-80.427749	E	8	1	90°	1
20-Mar-10	16:05	91	30.433679	-80.464695	W	8	3	90°	2
20-Mar-10	16:06	125	30.433523	-80.508589	E	8	2	90°	2
20-Mar-10	16:08	92	30.433309	-80.584302	W	8	2	90°	2
20-Mar-10	16:10	93	30.433423	-80.669506	W	8	1	90°	1
24-Mar-10	9:06	4	30.567294	-80.486973	E	10	2	90°	1
24-Mar-10	9:09	5	30.567326	-80.379917	E	10	2	100°	1
24-Mar-10	9:44	11	30.498713	-80.150725	W	9	2	110°	2
24-Mar-10	9:48	12	30.498978	-80.314899	W	9	1	90°	1
24-Mar-10	9:54	12	30.498803	-80.522280	W	9	2	110°	1
24-Mar-10	9:56	15	30.498500	-80.589576	W	9	1	80°	1
24-Mar-10	9:56	13	30.498499	-80.598616	W	9	1	75°	1
24-Mar-10	9:57	14	30.498289	-80.649904	W	9	2	90°	1
24-Mar-10	10:02	18	30.426862	-80.689727	E	8	1	100°	1
24-Mar-10	10:03	19	30.433451	-80.632588	E	8	1	90°	2
24-Mar-10	10:08	21	30.434016	-80.474235	E	8	2	90°	2
24-Mar-10	10:26	26	30.433955	-80.313701	E	8	1	100°	1
24-Mar-10	10:26	19	30.434115	-80.288908	E	8	1	110°	1
24-Mar-10	11:33	47	30.365562	-80.522841	W	7	1	60°	1
24-Mar-10	11:34	33	30.364885	-80.549990	W	7	1	90°	1
24-Mar-10	11:38	35	30.364613	-80.688866	W	7	2	90°	1
24-Mar-10	11:57	54	30.300623	-80.530066	E	6	2	75°	1
24-Mar-10	12:57	51	30.231972	-80.378059	W	5	1	90°	1
24-Mar-10	12:58	75	30.232259	-80.439790	W	5	1	75°	1
24-Mar-10	12:59	53	30.232141	-80.461687	W	5	1	90°	2
24-Mar-10	13:02	54	30.231948	-80.581830	W	5	1	75°	1
24-Mar-10	13:04	77	30.231922	-80.642595	W	5	2	60°	1
31-Mar-10	14:19	14	30.032073	-80.471281	W	2	2	90°	1
31-Mar-10	14:21	15	30.031944	-80.530676	W	2	2	110°	1
31-Mar-10	15:31	37	30.166325	-80.491997	W	4	1	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
31-Mar-10	15:40	31	30.166106	-80.655086	W	4	1	90°	1
31-Mar-10	15:40	32	30.166241	-80.673845	W	4	1	110°	1
31-Mar-10	15:52	44	30.498571	-80.656912	E	9	2	90°	2
31-Mar-10	15:52	35	30.498559	-80.656648	E	9	2	100°	1
31-Mar-10	15:53	36	30.498905	-80.631751	E	9	2	90°	3
31-Mar-10	15:54	45	30.499012	-80.597075	E	9	3	90°	3
31-Mar-10	15:54	46	30.499101	-80.573123	E	9	3	90°	3
31-Mar-10	15:54	37	30.499011	-80.592174	E	9	1	80°	2
31-Mar-10	15:55	47	30.499190	-80.531806	E	9	1	90°	3
31-Mar-10	16:17	48	30.499380	-80.221563	E	9	1	90°	1
31-Mar-10	17:13	93	30.566988	-80.502750	W	10	1	90°	1
31-Mar-10	17:13	68	30.567004	-80.499043	W	10	2	100°	1
31-Mar-10	17:15	70	30.566757	-80.597297	W	10	3	90°	1
31-Mar-10	17:16	94	30.566684	-80.619658	W	10	2	90°	5
31-Mar-10	17:16	71	30.566666	-80.648355	W	10	2	90°	2
31-Mar-10	17:17	95	30.566536	-80.685169	W	10	2	90°	5
31-Mar-10	17:17	72	30.566599	-80.675692	W	10	2	90°	1
1-Apr-10	10:42	18	30.366136	-80.366103	W	7	1	90°	1
1-Apr-10	10:46	21	30.365953	-80.516308	W	7	1	80°	1
1-Apr-10	12:29	35	30.233081	-80.444576	W	5	1	80°	1
1-Apr-10	14:17	48	30.165302	-80.697645	E	4	2	90°	1
1-Apr-10	14:19	49	30.165708	-80.644909	E	4	2	60°	1
1-Apr-10	14:33	60	30.166213	-80.433398	E	4	2	110°	1
1-Apr-10	15:47	90	30.100436	-80.498892	W	3	2	90°	1
1-Apr-10	15:48	91	30.100358	-80.529854	W	3	3	90°	1
1-Apr-10	15:49	92	30.100327	-80.550423	W	3	1	90°	1
1-Apr-10	15:52	95	30.100071	-80.682629	W	3	1	120°	1
1-Apr-10	15:57	98	30.031726	-80.668162	E	2	1	90°	1
1-Apr-10	15:58	99	30.031326	-80.635289	E	2	2	110°	1
1-Apr-10	15:58	100	30.031349	-80.610825	E	2	2	90°	1
1-Apr-10	15:59	101	30.031457	-80.595225	E	2	1	100°	1
1-Apr-10	15:59	102	30.031493	-80.569883	E	2	1	60°	1
1-Apr-10	16:00	74	30.031445	-80.554016	E	2	1	90°	1
1-Apr-10	16:01	75	30.031608	-80.505776	E	2	1	75°	1
1-Apr-10	16:12	107	30.031868	-80.275036	E	2	3	90°	1
1-Apr-10	16:43	87	29.965921	-80.370883	W	1	1	90°	1
1-Apr-10	16:55	91	29.965346	-80.649167	W	1	1	90°	1
2-Apr-10	9:12	6	29.965215	-80.545697	E	1	1	90°	1
2-Apr-10	9:21	9	29.965105	-80.419148	E	1	1	90°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
2-Apr-10	10:48	39	30.031734	-80.610540	W	2	2	90°	2
2-Apr-10	11:01	44	30.100746	-80.532937	E	3	2	90°	1
2-Apr-10	11:01	45	30.100106	-80.507810	E	3	1	90°	2
2-Apr-10	11:53	64	30.167511	-80.259354	W	4	2	90°	1
2-Apr-10	11:59	66	30.166671	-80.399993	W	4	2	90°	1
2-Apr-10	12:00	100	30.166586	-80.454301	W	4	1	90°	1
2-Apr-10	12:01	68	30.166542	-80.482073	W	4	3	90°	1
2-Apr-10	12:23	78	30.232389	-80.671304	E	5	2	90°	2
2-Apr-10	12:24	79	30.232254	-80.650172	E	5	1	90°	2
2-Apr-10	12:24	80	30.232279	-80.627037	E	5	1	90°	2
2-Apr-10	12:26	115	30.232537	-80.561596	E	5	2	90°	2
2-Apr-10	13:18	99	30.300425	-80.218023	W	6	3	90°	1
2-Apr-10	13:26	103	30.304767	-80.309144	W	6	2	90°	1
2-Apr-10	13:37	148	30.299726	-80.674536	W	6	1	90°	1
2-Apr-10	13:37	109	30.299710	-80.678288	W	6	1	90°	1
2-Apr-10	15:21	156	30.365127	-80.652659	E	7	2	90°	2
2-Apr-10	15:21	116	30.365109	-80.650647	E	7	2	90°	3
2-Apr-10	15:22	157	30.365242	-80.611985	E	7	2	90°	1
2-Apr-10	15:23	158	30.365276	-80.590156	E	7	2	90°	3
2-Apr-10	15:24	159	30.365401	-80.545544	E	7	1	90°	1
2-Apr-10	15:24	117	30.365395	-80.528076	E	7	2	90°	3
2-Apr-10	15:25	160	30.365447	-80.515283	E	7	1	90°	1
2-Apr-10	15:26	118	30.365470	-80.474578	E	7	2	90°	1
2-Apr-10	15:28	119	30.365683	-80.384327	E	7	1	90°	2
2-Apr-10	15:29	120	30.365692	-80.365171	E	7	1	90°	1
2-Apr-10	16:22	133	30.433736	-80.248053	W	8	1	90°	1
2-Apr-10	16:23	134	30.433720	-80.269359	W	8	2	90°	1
2-Apr-10	16:25	136	30.433697	-80.339620	W	8	1	90°	3
2-Apr-10	16:26	187	30.433605	-80.395444	W	8	1	90°	2
2-Apr-10	16:26	137	30.433623	-80.388464	W	8	2	90°	2
2-Apr-10	16:27	138	30.433650	-80.420986	W	8	1	90°	2
2-Apr-10	16:30	140	30.433431	-80.536213	W	8	1	90°	2
2-Apr-10	16:30	141	30.433361	-80.560756	W	8	1	90°	3
2-Apr-10	16:32	189	30.433118	-80.640198	W	8	2	90°	1
2-Apr-10	16:32	142	30.433261	-80.609786	W	8	1	90°	2
2-Apr-10	16:32	143	30.433150	-80.638273	W	8	2	90°	2
2-Apr-10	16:34	190	30.433202	-80.690055	W	8	2	90°	1
2-Apr-10	16:41	196	30.499229	-80.547945	E	9	1	90°	4
2-Apr-10	16:41	146	30.499196	-80.551560	E	9	2	90°	6



Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
2-Apr-10	16:52	149	30.499454	-80.318959	E	9	1	90°	1
2-Apr-10	17:00	205	30.499030	-80.133132	E	9	2	90°	1
2-Apr-10	17:18	156	30.567302	-80.085730	W	10	1	90°	1
2-Apr-10	17:23	215	30.567321	-80.195202	W	10	2	90°	1
2-Apr-10	17:25	216	30.567201	-80.262607	W	10	2	90°	2
2-Apr-10	17:30	162	30.567440	-80.336212	W	10	1	90°	1
2-Apr-10	17:43	225	30.566593	-80.645813	W	10	1	90°	1
2-Apr-10	17:43	165	30.566664	-80.642479	W	10	1	90°	1
2-Apr-10	17:43	166	30.566515	-80.655792	W	10	1	90°	3
3-Apr-10	10:44	57	30.365786	-80.559614	W	7	2	90°	1
3-Apr-10	10:51	55	30.367550	-80.693420	W	7	1	90°	1
3-Apr-10	10:55	58	30.299524	-80.644651	E	6	1	80°	1
3-Apr-10	10:58	65	30.299737	-80.535776	E	6	2	90°	1
6-May-10	9:50	5	29.965885	-80.522465	E	1	1	100°	1
6-May-10	10:46	15	30.031116	-80.454175	W	2	1	90°	1
6-May-10	13:39	37	30.099887	-80.572043	E	3	3	90°	1
6-May-10	13:40	24	30.099512	-80.565715	E	3	2	90°	1
6-May-10	13:54	44	30.101082	-80.418631	E	3	1	90°	1
6-May-10	13:56	45	30.100996	-80.343180	E	3	2	90°	1
7-May-10	9:25	4	30.101754	-80.286554	E	3	2	90°	1
7-May-10	10:32	24	30.165829	-80.465372	W	4	1	90°	1
7-May-10	10:32	18	30.166542	-80.443867	W	4	1	90°	2
7-May-10	10:35	25	30.165405	-80.563304	W	4	2	100°	1
7-May-10	10:38	20	30.165221	-80.666783	W	4	1	90°	1
7-May-10	10:44	28	30.233067	-80.615095	E	5	2	90°	1
7-May-10	10:46	30	30.233455	-80.537231	E	5	2	100°	1
7-May-10	10:48	31	30.233389	-80.485648	E	5	1	90°	1
7-May-10	10:48	23	30.233457	-80.461223	E	5	2	90°	1
7-May-10	10:49	32	30.233446	-80.441127	E	5	2	100°	2
7-May-10	10:50	33	30.233445	-80.417063	E	5	2	100°	1
7-May-10	10:50	24	30.233379	-80.420766	E	5	2	90°	1
7-May-10	10:59	38	30.233808	-80.292253	E	5	2	90°	1
7-May-10	11:00	28	30.233489	-80.242494	E	5	1	90°	1
7-May-10	11:33	36	30.299813	-80.208193	W	6	2	90°	1
7-May-10	11:43	40	30.299471	-80.527219	W	6	1	90°	1
7-May-10	11:44	52	30.299361	-80.563232	W	6	2	100°	1
7-May-10	11:45	42	30.298997	-80.626740	W	6	2	90°	2
7-May-10	12:03	59	30.366215	-80.554721	E	7	1	90°	1
7-May-10	12:07	60	30.366723	-80.386513	E	7	2	100°	1

Table 14 (continued). All loggerhead sea turtle (*Caretta caretta*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
7-May-10	12:09	62	30.366819	-80.333428	E	7	1	90°	1
7-May-10	12:40	53	30.433003	-80.336979	W	8	1	90°	1
7-May-10	12:45	54	30.432697	-80.500829	W	8	2	90°	1
7-May-10	14:28	82	30.500233	-80.618054	E	9	2	75°	2
7-May-10	14:30	83	30.500817	-80.539733	E	9	1	90°	1
7-May-10	14:33	66	30.500596	-80.449497	E	9	2	90°	1
7-May-10	14:57	69	30.500220	-80.055240	E	9	1	90°	1
7-May-10	15:16	71	30.566161	-80.131508	W	10	2	90°	1
7-May-10	15:33	100	30.565925	-80.500304	W	10	1	80°	1
7-May-10	15:34	76	30.565911	-80.506358	W	10	1	90°	2
7-May-10	15:36	78	30.565856	-80.597138	W	10	2	90°	1
7-May-10	15:37	79	30.565699	-80.632902	W	10	2	90°	2
4-Jun-10	10:32	25	30.168068	-80.422343	W	4	1	90°	1
4-Jun-10	10:37	34	30.166255	-80.589124	W	4	1	90°	1
4-Jun-10	13:38	47	30.366644	-80.565255	E	7	2	90°	1
4-Jun-10	14:34	66	30.500298	-80.500771	E	9	1	100°	1
4-Jun-10	15:12	63	30.566295	-80.423006	W	10	2	90°	1
5-Jun-10	11:20	28	30.231795	-80.617223	E	5	2	110°	1
5-Jun-10	13:12	47	29.964643	-80.549199	E	1	1	90°	1
5-Jun-10	13:14	41	29.964585	-80.605190	W	1	1	90°	1
5-Jun-10	13:14	48	29.964566	-80.605058	E	1	2	90°	1
6-Jun-10	9:52	16	30.100435	-80.642929	E	3	1	100°	1
6-Jun-10	9:53	17	30.100593	-80.601563	E	3	1	80°	1
6-Jun-10	9:55	18	30.100951	-80.514581	E	3	1	90°	2
6-Jun-10	10:33	28	30.165782	-80.421135	W	4	1	90°	2
6-Jun-10	10:34	17	30.165717	-80.445309	W	4	2	90°	1
6-Jun-10	10:36	18	30.165588	-80.531980	W	4	2	90°	1
6-Jun-10	10:49	21	30.165678	-80.672380	W	4	2	90°	1
6-Jun-10	11:37	31	30.299496	-80.484935	W	6	2	75°	1
6-Jun-10	11:37	32	30.299996	-80.492729	W	6	2	75°	1
6-Jun-10	11:40	33	30.304315	-80.598426	W	6	2	75°	1
6-Jun-10	11:41	42	30.300370	-80.639157	W	6	1	80°	1
6-Jun-10	13:38	49	30.366622	-80.290970	E	7	2	120°	1
7-Jun-10	11:17	21	30.233158	-80.307193	W	5	2	90°	1
7-Jun-10	11:19	22	30.233131	-80.391554	W	5	3	120°	1

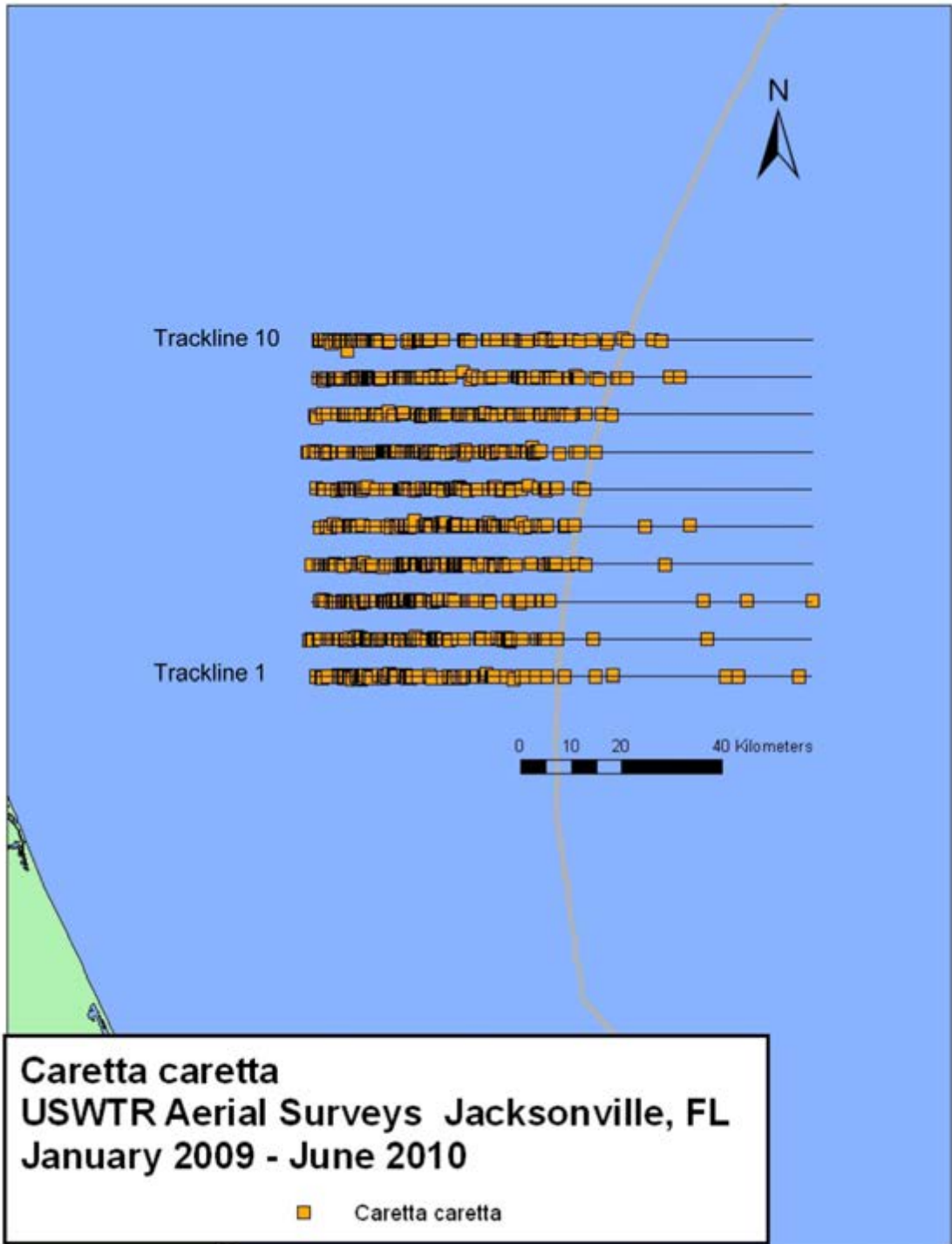


Figure 17. Loggerhead sea turtle (*Caretta caretta*) sightings.

Leatherback Sea Turtle (*Dermochelys coriacea*) (Table 15, Fig. 18)

A total of 50 leatherback sea turtles were recorded. This species was observed in February, September, October, and November of 2009, and in January, February, May and June of 2010. Leatherback nesting beaches in the Atlantic, as well as worldwide, have experienced severe to moderate declines the past several decades and this species is listed as endangered under the Endangered Species Act (NMFS 1992).

Table 15. All leatherback sea turtle (*Dermochelys coriacea*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
26-Feb-09	11:10	32	30.432594	-80.567253	E	8	1	90°	1
15-Sep-09	11:24	31	30.102473	-80.141565	E	3	2	90°	1
15-Sep-09	15:19	68	30.365253	-80.547139	E	7	1	90°	1
15-Sep-09	15:35	45	30.364647	-80.307711	E	7	1	90°	1
15-Sep-09	15:40	47	30.362933	-80.223799	E	7	1	90°	1
15-Sep-09	15:43	78	30.366484	-80.114936	E	7	1	90°	1
15-Sep-09	16:07	83	30.431987	-80.319924	W	8	1	75°	1
15-Sep-09	16:10	85	30.433524	-80.427422	W	8	2	90°	1
15-Sep-09	16:44	57	30.501598	-80.331004	E	9	2	110°	1
15-Sep-09	16:53	59	30.499167	-80.131070	E	9	2	80°	1
15-Sep-09	17:10	107	30.570570	-80.041129	W	10	2	90°	1
16-Sep-09	10:35	8	29.964026	-80.427463	E	1	3	75°	1
16-Sep-09	10:47	14	29.966112	-80.189186	E	1	3	110°	1
16-Sep-09	11:19	21	30.032525	-80.403183	W	2	1	90°	1
16-Sep-09	11:22	22	30.030559	-80.494821	W	2	2	45°	1
16-Sep-09	11:25	25	30.031977	-80.595213	W	2	2	90°	1
16-Sep-09	15:33	90	30.231419	-79.996132	E	5	2	90°	1
16-Sep-09	16:03	99	30.296061	-80.461976	W	6	2	120°	1
16-Sep-09	16:06	100	30.300613	-80.565902	W	6	2	90°	1
18-Sep-09	10:14	20	30.434453	-80.661408	E	8	2	110°	1
18-Sep-09	10:16	30	30.430317	-80.584241	E	8	3	90°	1
18-Sep-09	10:39	41	30.432713	-80.128712	E	8	3	90°	1
18-Sep-09	12:13	47	30.231750	-80.209874	W	5	3	60°	1
18-Sep-09	14:44	13	30.164822	-80.363408	E	4	1	75°	1
18-Sep-09	15:59	41	30.030705	-80.501454	E	2	2	45°	1
18-Sep-09	16:40	52	29.964603	-80.366836	W	1	2	90°	1
30-Sep-09	11:46	65	30.231798	-80.681592	E	5	1	100°	1
1-Oct-09	10:58	28	30.363842	-80.597710	W	7	3	90°	1
1-Oct-09	11:00	48	30.360800	-80.648262	W	7	2	90°	1
1-Oct-09	12:05	40	30.232225	-80.619627	W	5	1	90°	1
1-Oct-09	12:12	43	30.234498	-80.693697	W	5	1	90°	1
1-Oct-09	14:13	55	30.166979	-80.446214	E	4	1	90°	1
1-Oct-09	15:08	69	30.101718	-80.615030	W	3	1	90°	1
1-Oct-09	15:20	74	30.031704	-80.650425	E	2	3	90°	1
1-Oct-09	15:21	75	30.031577	-80.617114	E	2	2	90°	1
1-Oct-09	15:22	116	30.029015	-80.561634	E	2	1	90°	1
1-Oct-09	15:26	76	30.031049	-80.432883	E	2	2	90°	1
1-Oct-09	15:28	77	30.031237	-80.374363	E	2	1	90°	1
1-Oct-09	16:09	86	29.963225	-80.651804	W	1	1	90°	1

Table 15 (continued). All leatherback sea turtle (*Dermochelys coriacea*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
18-Nov-09	9:41	20	30.100327	-80.621817	E	3	3	130°	1
18-Nov-09	14:40	78	30.433853	-80.649288	E	8	1	130°	1
18-Nov-09	15:36	99	30.364511	-80.705937	W	7	3	110°	1
19-Jan-10	14:46	51	30.032010	-80.643162	E	2	1	90°	1
20-Jan-10	11:26	45	30.168326	-80.424652	W	4	3	90°	2
20-Jan-10	14:13	87	30.366684	-80.540792	E	7	1	80°	1
19-Feb-10	14:29	40	30.433916	-80.255053	W	8	3	95°	1
7-May-10	10:15	15	30.165886	-80.286109	W	4	3	90°	1
4-Jun-10	15:15	72	30.566087	-80.509882	W	10	1	120°	1

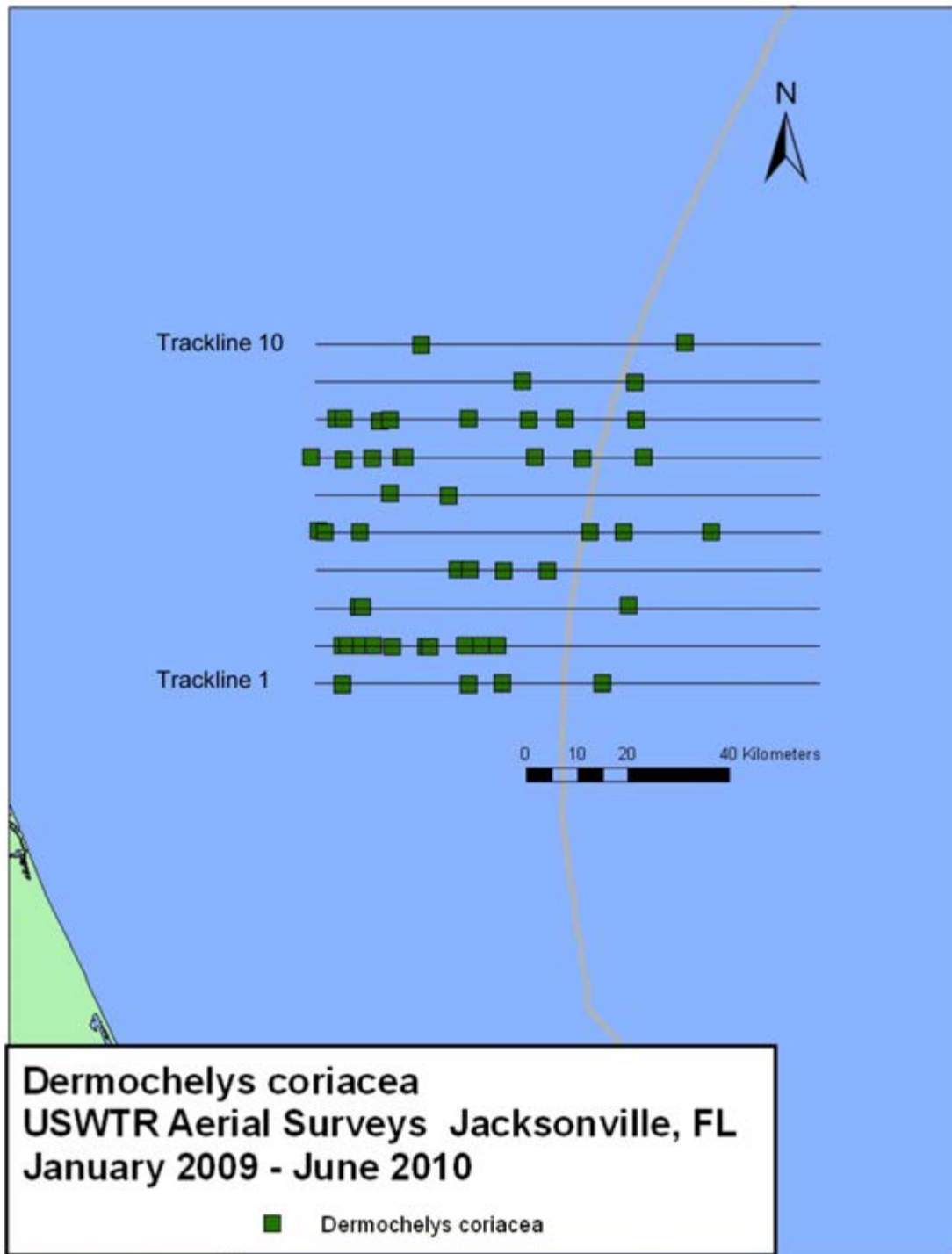


Figure 18. Leatherback sea turtle (*Derموchelys coriacea*) sightings.



Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) (Table 16, Fig. 19)

A single Kemp's Ridley sea turtle was recorded while on effort on 20 March 2010. Another Kemp's Ridley was photographed opportunistically while off effort for a dolphin sighting on 3 April 2010. It is suspected that a certain portion of sea turtles labeled as unidentified may be Kemp's Ridley sea turtles due to the prominence of smaller, lighter colored turtles with round carapaces in the former category. This species nests almost exclusively on a single beach on the Mexican Gulf coast, with an estimated total of 1100 nests in the 1991 nesting season (NMFS 1992). The Kemp's Ridley sea turtle is listed as endangered under the Endangered Species Act (NMFS 1992).

Table 16. The Kemp's ridley sea turtle (*Lepidochelys kempii*) sighting in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
20-Mar-10	16:03	123	30.433872	-80.380367	E	8	1	90°	1

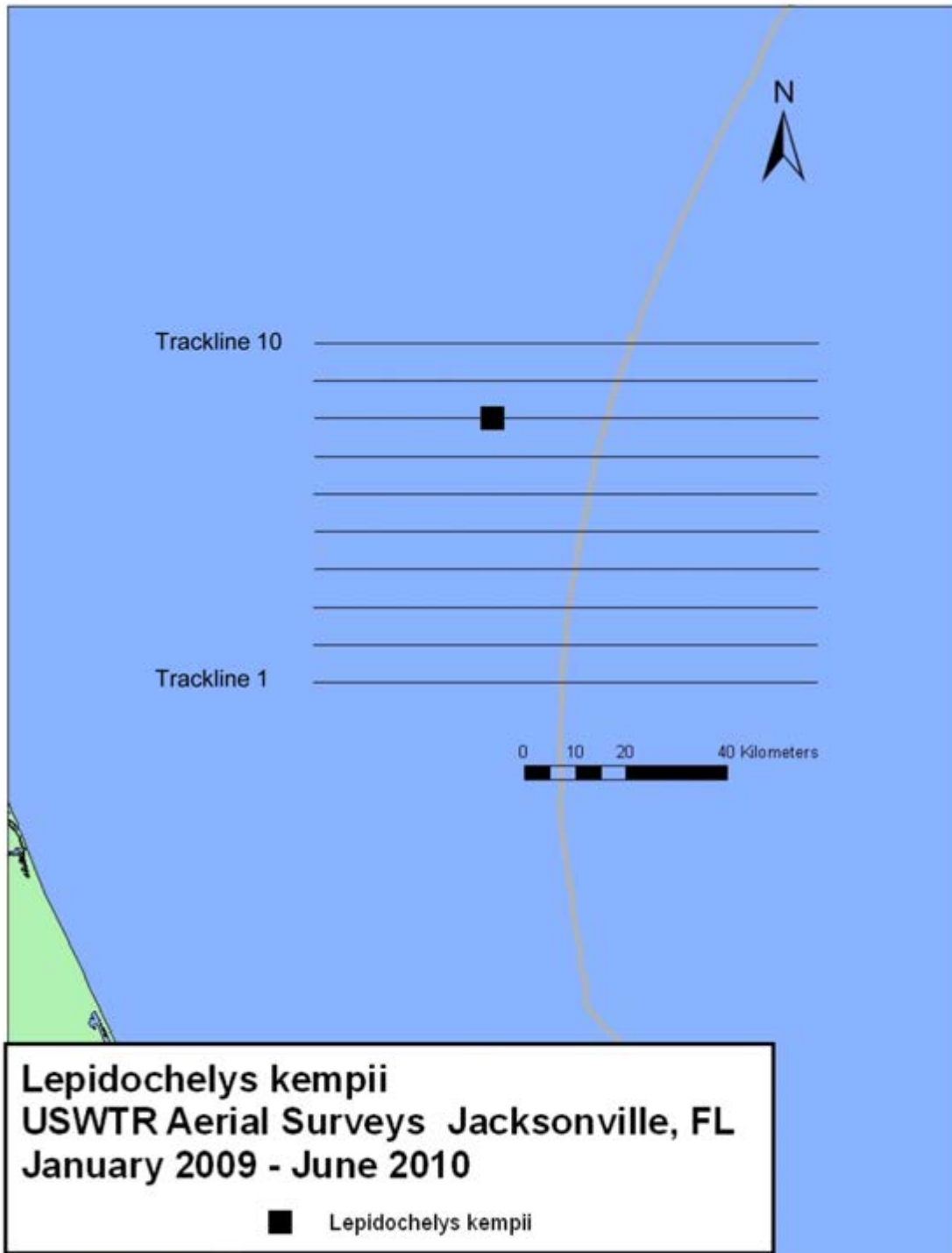


Figure 19. Kemp's Ridley sea turtle (*Lepidochelys kempii*) sighting.

Unidentified sea turtles (Table 17, Fig. 20)

A total of 323 unidentified sea turtles were observed during the reporting period. Unidentified sea turtles were recorded during every survey month except March and October 2009.

Table 17. All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
27-Jan-09	12:42	4	29.963703	-80.639777	E	1	2	90°	1
27-Jan-09	12:43	5	29.963145	-80.622678	E	1	2	90°	2
27-Jan-09	12:45	6	29.963928	-80.559498	E	1	1	90°	1
27-Jan-09	12:53	12	29.961885	-80.470028	E	1	1	90°	1
27-Jan-09	13:34	10	30.035048	-80.377003	W	2	1	90°	1
27-Jan-09	13:46	29	30.095317	-80.655945	E	3	1	90°	1
27-Jan-09	13:50	31	30.099132	-80.501400	E	3	2	90°	1
27-Jan-09	15:04	53	30.216962	-80.594047	E	5	3	90°	1
27-Jan-09	15:51	36	30.301543	-80.483648	W	6	2	90°	1
27-Feb-09	10:10	33	30.100157	-80.620321	E	3	2	90°	1
9-Jun-09	14:12	24	30.500239	-80.615830	W	9	1	90°	1
9-Jun-09	14:20	29	30.434013	-80.542311	E	8	2	90°	1
9-Jun-09	14:23	32	30.433348	-80.457472	E	8	1	130°	1
9-Jun-09	15:20	58	30.295107	-80.408161	E	6	2	135°	1
9-Jun-09	15:54	63	30.237318	-80.450577	W	5	1	135°	1
10-Jun-09	10:20	18	30.103098	-80.334260	E	3	1	90°	1
10-Jun-09	10:20	18	30.103098	-80.334260	E	3	1	90°	1
10-Jun-09	11:19	34	30.232778	-80.588997	E	5	1	80°	1
10-Jun-09	14:35	63	30.366263	-80.548797	E	7	1	90°	1
10-Jun-09	14:40	67	30.363603	-80.363192	E	7	2	110°	1
10-Jun-09	15:18	54	30.434846	-80.487527	W	8	1	100°	1
10-Jun-09	16:38	111	30.567353	-80.256643	W	10	2	80°	1
11-Jun-09	9:01	7	30.169294	-80.388163	E	4	2	90°	1
15-Jul-09	13:20	31	29.966174	-80.584901	E	1	2	90°	2
15-Jul-09	13:22	33	29.964844	-80.522382	E	1	2	45°	1
15-Jul-09	14:22	61	30.032122	-80.532001	W	2	1	90°	1
15-Jul-09	14:23	64	30.030218	-80.569081	W	2	2	90°	3
15-Jul-09	14:39	66	30.099504	-80.343922	E	3	2	45°	1
15-Jul-09	15:23	81	30.165170	-80.430593	W	4	2	90°	2
15-Jul-09	15:24	83	30.166441	-80.480618	W	4	1	90°	1
4-Aug-09	13:12	20	30.503147	-80.624101	W	9	1	90°	1
4-Aug-09	14:35	41	30.301272	-80.572978	E	6	1	90°	1
4-Aug-09	14:36	42	30.303321	-80.525158	E	6	1	90°	1
4-Aug-09	15:20	51	30.236193	-80.302727	W	5	2	90°	1
4-Aug-09	15:21	52	30.233527	-80.360478	W	5	3	135°	1
4-Aug-09	15:25	54	30.230677	-80.519806	W	5	1	90°	1
4-Aug-09	15:28	57	30.230294	-80.624343	W	5	2	90°	1
4-Aug-09	15:29	58	30.229411	-80.667231	W	5	1	90°	1
5-Aug-09	9:37	11	30.032263	-80.360320	W	2	2	90°	1

Table 17 (continued). All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
5-Aug-09	9:45	13	30.031985	-80.645809	W	2	3	90°	1
6-Aug-09	9:02	6	29.965529	-80.419336	E	1	2	90°	1
6-Aug-09	10:01	12	30.031778	-80.567179	W	2	2	60°	1
6-Aug-09	10:01	13	30.029295	-80.602454	W	2	2	75°	1
6-Aug-09	10:13	22	30.102396	-80.391621	E	3	1	90°	1
6-Aug-09	11:13	30	30.171472	-80.578094	W	4	3	110°	1
6-Aug-09	11:26	33	30.496919	-80.667802	E	9	1	90°	1
6-Aug-09	11:26	34	30.497821	-80.633398	E	9	2	90°	1
6-Aug-09	11:26	31	30.496165	-80.628339	E	9	2	110°	1
6-Aug-09	11:30	34	30.503659	-80.474301	E	9	2	110°	1
6-Aug-09	11:35	36	30.502688	-80.292746	E	9	2	90°	1
6-Aug-09	12:29	42	30.564465	-80.537486	W	10	1	75°	1
14-Sep-09	14:16	23	30.365129	-80.600418	W	7	2	90°	1
15-Sep-09	11:14	27	30.105616	-80.473886	E	3	1	90°	1
15-Sep-09	11:18	29	30.104384	-80.337510	E	3	2	110°	1
15-Sep-09	15:31	43	30.365664	-80.459110	E	7	1	100°	1
15-Sep-09	16:10	84	30.433175	-80.401972	W	8	2	90°	1
15-Sep-09	17:25	112	30.566566	-80.132323	W	10	2	110°	1
15-Sep-09	17:32	116	30.551724	-80.335036	W	10	2	90°	1
15-Sep-09	17:41	120	30.547037	-80.677651	W	10	2	90°	1
16-Sep-09	16:14	89	30.299006	-80.619675	W	6	2	90°	1
18-Sep-09	9:43	19	30.501625	-80.113564	W	9	1	90°	1
18-Sep-09	10:10	26	30.496916	-80.695673	W	9	2	90°	1
18-Sep-09	10:33	38	30.433761	-80.342940	E	8	2	90°	1
18-Sep-09	11:13	47	30.366308	-80.651260	W	7	1	90°	1
18-Sep-09	11:41	55	30.300876	-80.486997	E	6	1	90°	1
18-Sep-09	14:28	5	30.163966	-80.626539	E	4	1	90°	2
18-Sep-09	14:45	14	30.166101	-80.329726	E	4	1	90°	1
18-Sep-09	15:20	20	30.101937	-80.460164	W	3	2	75°	1
18-Sep-09	15:21	22	30.101097	-80.502033	W	3	3	90°	1
18-Sep-09	15:21	23	30.102618	-80.529827	W	3	2	90°	1
18-Sep-09	15:46	35	30.032513	-80.645667	E	2	2	90°	1
18-Sep-09	15:58	38	30.029101	-80.558675	E	2	1	75°	1
18-Sep-09	16:42	55	29.964730	-80.454091	W	1	1	90°	1
18-Sep-09	16:45	57	29.963995	-80.566872	W	1	3	110°	1
18-Sep-09	16:48	59	29.961944	-80.678821	W	1	3	90°	2
30-Sep-09	10:14	13	30.032227	-80.658381	W	2	1	2°	1
30-Sep-09	10:28	30	30.099107	-80.567206	E	3	2	90°	1
30-Sep-09	10:31	32	30.101734	-80.460286	E	3	3	100°	1

Table 17 (continued). All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
30-Sep-09	11:54	45	30.229693	-80.530337	E	5	2	140°	1
18-Nov-09	9:03	11	29.965742	-79.895195	E	1	2	90°	1
18-Nov-09	9:29	14	30.031389	-80.449454	W	2	2	90°	1
18-Nov-09	9:33	15	30.031155	-80.597250	W	2	2	110°	1
18-Nov-09	10:02	25	30.101027	-80.273826	E	3	2	110°	1
18-Nov-09	10:11	27	30.100415	-79.927603	E	3	1	90°	1
18-Nov-09	10:41	34	30.165983	-80.535203	W	4	2	90°	1
18-Nov-09	13:48	70	30.567611	-80.552910	E	10	3	100°	1
18-Nov-09	13:49	71	30.567788	-80.494182	E	10	2	90°	1
18-Nov-09	13:51	72	30.567852	-80.447954	E	10	1	80°	1
18-Nov-09	13:51	73	30.567862	-80.426204	E	10	2	90°	1
18-Nov-09	14:28	80	30.498835	-80.394840	W	9	3	90°	1
18-Nov-09	14:29	81	30.498963	-80.436781	W	9	2	60°	1
18-Nov-09	14:31	82	30.498782	-80.502024	W	9	1	110°	1
18-Nov-09	14:33	84	30.498675	-80.589073	W	9	1	90°	1
18-Nov-09	14:34	85	30.498559	-80.622809	W	9	2	90°	1
18-Nov-09	15:31	98	30.365115	-80.516913	W	7	2	90°	1
22-Dec-09	15:11	66	30.499153	-80.430882	E	9	2	100°	1
22-Dec-09	16:28	68	30.566978	-80.598099	W	10	3	90°	1
7-Jan-10	16:09	50	30.431476	-80.159948	W	8	1	90°	1
7-Jan-10	16:12	51	30.432876	-80.266783	W	8	2	100°	1
20-Jan-10	9:11	6	29.966406	-80.371544	E	1	2	90°	1
20-Jan-10	9:50	19	30.030892	-80.271656	W	2	1	90°	1
20-Jan-10	9:53	20	30.031303	-80.368874	W	2	2	60°	1
20-Jan-10	9:53	17	30.031389	-80.385767	W	2	2	90°	1
20-Jan-10	10:35	31	30.100388	-80.625006	E	3	2	100°	1
20-Jan-10	10:37	38	30.100492	-80.548021	E	3	2	90°	2
20-Jan-10	11:24	43	30.166170	-80.355583	W	4	1	90°	1
20-Jan-10	11:25	51	30.166121	-80.409776	W	4	1	80°	1
20-Jan-10	11:45	58	30.233285	-80.401017	E	5	2	90°	1
20-Jan-10	12:23	70	30.299760	-80.405974	W	6	1	80°	1
20-Jan-10	14:14	88	30.366801	-80.512023	E	7	2	75°	1
20-Jan-10	15:18	120	30.500477	-80.614815	E	9	2	90°	2
20-Jan-10	15:18	121	30.500534	-80.595852	E	9	2	90°	4
27-Jan-10	15:04	34	30.167142	-80.434641	E	4	2	75°	1
27-Jan-10	16:12	45	30.033084	-80.504018	E	2	2	100°	1
28-Jan-10	9:28	4	29.965874	-80.645810	E	1	2	90°	1
28-Jan-10	9:46	10	29.966357	-80.387729	E	1	2	110°	1
28-Jan-10	11:09	33	30.031518	-80.408018	W	2	1	90°	1

Table 17 (continued). All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
28-Jan-10	11:12	35	30.031395	-80.514661	W	2	1	90°	1
28-Jan-10	11:14	35	30.031067	-80.570732	W	2	1	90°	1
28-Jan-10	11:39	43	30.100337	-80.608193	E	3	2	90°	3
28-Jan-10	11:58	50	30.098813	-80.523909	E	3	2	75°	1
28-Jan-10	16:11	101	30.299000	-80.283856	W	6	2	100°	1
28-Jan-10	16:25	106	30.299149	-80.527143	W	6	2	90°	1
20-Feb-10	10:22	20	30.499932	-80.225575	W	9	2	90°	1
20-Feb-10	11:22	46	30.433410	-80.311014	E	8	3	100°	1
20-Feb-10	16:42	130	30.031465	-80.158169	E	2	1	90°	1
21-Feb-10	8:38	5	29.965257	-80.507573	E	1	1	90°	1
21-Feb-10	8:42	7	29.965443	-80.350439	E	1	2	100°	1
21-Feb-10	9:29	24	30.032120	-80.389601	W	2	2	100°	1
21-Feb-10	9:31	21	30.032181	-80.492934	W	2	1	90°	1
21-Feb-10	9:40	28	30.099365	-80.658357	E	3	2	90°	2
21-Feb-10	12:34	78	30.300402	-80.372948	W	6	2	90°	3
21-Feb-10	14:33	93	30.365226	-80.547975	E	7	2	80°	1
21-Feb-10	14:35	95	30.365147	-80.466082	E	7	1	80°	1
21-Feb-10	14:57	104	30.365819	-80.227714	E	7	2	90°	3
21-Feb-10	15:41	136	30.433950	-80.390762	W	8	3	90°	1
21-Feb-10	15:41	116	30.433978	-80.396392	W	8	2	90°	2
21-Feb-10	15:50	121	30.433055	-80.626976	W	8	1	90°	1
21-Feb-10	15:51	122	30.433280	-80.660645	W	8	2	90°	3
21-Feb-10	16:01	126	30.499395	-80.435228	E	9	2	80°	1
21-Feb-10	16:32	133	30.567108	-80.143254	W	10	1	90°	1
21-Feb-10	16:34	135	30.567175	-80.218925	W	10	1	110°	1
20-Mar-10	14:45	60	30.300431	-80.340154	W	6	3	90°	1
20-Mar-10	14:58	86	30.300091	-80.536718	E	6	2	110°	1
20-Mar-10	15:08	92	30.365387	-80.522324	W	7	4	90°	1
20-Mar-10	15:12	98	30.365617	-80.392292	W	7	3	90°	1
20-Mar-10	15:46	82	30.433636	-79.940230	W	8	2	90°	1
20-Mar-10	16:08	126	30.433315	-80.594983	E	8	3	100°	3
20-Mar-10	16:09	127	30.433194	-80.637071	E	8	3	90°	4
24-Mar-10	10:04	20	30.433766	-80.601294	E	8	2	90°	1
24-Mar-10	10:29	27	30.434117	-80.202388	E	8	2	90°	2
24-Mar-10	11:36	34	30.364837	-80.626302	W	7	3	75°	2
24-Mar-10	12:01	55	30.300728	-80.401245	E	6	1	100°	1
24-Mar-10	12:58	52	30.232154	-80.443375	W	5	3	90°	3
31-Mar-10	15:55	39	30.499158	-80.537305	E	9	1	100°	1
31-Mar-10	15:57	41	30.499302	-80.456003	E	9	2	90°	1



Table 17 (continued). All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
31-Mar-10	17:14	69	30.566836	-80.570466	W	10	2	130°	1
1-Apr-10	10:43	19	30.366155	-80.404105	W	7	2	100°	1
1-Apr-10	10:55	18	30.297457	-80.674508	E	6	2	90°	1
1-Apr-10	11:21	22	30.299970	-80.383497	E	6	2	90°	1
1-Apr-10	14:18	44	30.165732	-80.668910	E	4	2	80°	1
1-Apr-10	14:20	50	30.165861	-80.583087	E	4	3	90°	1
1-Apr-10	14:41	53	30.166421	-80.311689	E	4	2	90°	1
1-Apr-10	15:47	69	30.100480	-80.474476	W	3	2	80°	1
1-Apr-10	15:52	94	30.099968	-80.671037	W	3	1	90°	1
1-Apr-10	15:58	72	30.031340	-80.604619	E	2	2	90°	3
2-Apr-10	11:08	72	30.100360	-80.433341	E	3	2	110°	1
2-Apr-10	11:12	73	30.100262	-80.274858	E	3	2	90°	3
2-Apr-10	12:27	116	30.232617	-80.510335	E	5	3	75°	1
2-Apr-10	16:23	186	30.433681	-80.289136	W	8	2	90°	3
2-Apr-10	16:38	193	30.498598	-80.660643	E	9	2	110°	1
2-Apr-10	16:40	194	30.499023	-80.604308	E	9	1	90°	4
2-Apr-10	16:40	195	30.499147	-80.571885	E	9	1	90°	5
3-Apr-10	8:25	4	30.565911	-80.681409	E	10	2	90°	3
3-Apr-10	8:25	4	30.566042	-80.670227	E	10	1	90°	2
3-Apr-10	8:26	5	30.566182	-80.643714	E	10	1	80°	1
3-Apr-10	8:27	5	30.566382	-80.608878	E	10	3	90°	2
3-Apr-10	8:27	6	30.566249	-80.619345	E	10	2	90°	3
3-Apr-10	8:30	6	30.566609	-80.497587	E	10	1	90°	2
3-Apr-10	9:35	30	30.499595	-80.545578	W	9	2	90°	4
3-Apr-10	9:36	33	30.499414	-80.583656	W	9	2	90°	4
3-Apr-10	9:36	31	30.499438	-80.590211	W	9	2	90°	6
3-Apr-10	9:37	32	30.499323	-80.623452	W	9	2	90°	4
3-Apr-10	9:40	38	30.499813	-80.661395	W	9	2	100°	2
3-Apr-10	9:45	41	30.433353	-80.670301	E	8	3	90°	2
3-Apr-10	9:46	42	30.432876	-80.628565	E	8	2	110°	2
3-Apr-10	9:46	37	30.432850	-80.642903	E	8	1	90°	2
3-Apr-10	9:47	43	30.432965	-80.581628	E	8	3	90°	2
3-Apr-10	9:50	44	30.433172	-80.496739	E	8	1	90°	2
3-Apr-10	9:50	38	30.433160	-80.482546	E	8	2	90°	4
3-Apr-10	9:55	39	30.433354	-80.312309	E	8	2	90°	3
3-Apr-10	10:35	47	30.365981	-80.425846	W	7	2	90°	2
3-Apr-10	10:46	52	30.365598	-80.619618	W	7	1	80°	1
3-Apr-10	10:56	59	30.299539	-80.615208	E	6	2	90°	4
3-Apr-10	10:58	64	30.299651	-80.563760	E	6	2	90°	1

Table 17 (continued). All unidentified sea turtle sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
3-Apr-10	10:59	66	30.299811	-80.492393	E	6	2	90°	1
3-Apr-10	11:00	62	30.299817	-80.480669	E	6	2	90°	3
3-Apr-10	11:08	65	30.300065	-80.315070	E	6	2	90°	3
6-May-10	9:46	4	29.965177	-80.668963	E	1	1	145°	1
6-May-10	10:04	10	29.966334	-80.299699	E	1	1	110°	1
7-May-10	10:34	19	30.165508	-80.532059	W	4	2	90°	1
7-May-10	10:45	29	30.233375	-80.591664	E	5	1	90°	1
7-May-10	14:54	89	30.500558	-80.174878	E	9	1	90°	2
7-May-10	15:16	93	30.566103	-80.128995	W	10	2	90°	2
7-May-10	15:31	74	30.565963	-80.421856	W	10	1	90°	1
7-May-10	15:33	99	30.565990	-80.485165	W	10	2	90°	2
7-May-10	15:33	75	30.566031	-80.482399	W	10	2	90°	2
7-May-10	15:34	101	30.565842	-80.528303	W	10	2	90°	3
7-May-10	15:35	102	30.565793	-80.573770	W	10	2	90°	3
7-May-10	15:35	77	30.565837	-80.539089	W	10	2	90°	4
7-May-10	15:38	103	30.565552	-80.661221	W	10	2	90°	4
7-May-10	15:38	80	30.565496	-80.685179	W	10	3	90°	1
7-May-10	15:39	81	30.565429	-80.698184	W	10	3	90°	3
4-Jun-10	9:46	15	30.102523	-80.514510	E	3	2	110°	1
4-Jun-10	15:11	71	30.566360	-80.359100	W	10	1	110°	1
6-Jun-10	9:46	13	30.030629	-80.634998	W	2	2	75°	1
6-Jun-10	9:58	19	30.101044	-80.387801	E	3	1	100°	1
6-Jun-10	10:37	29	30.165447	-80.562730	W	4	1	80°	1

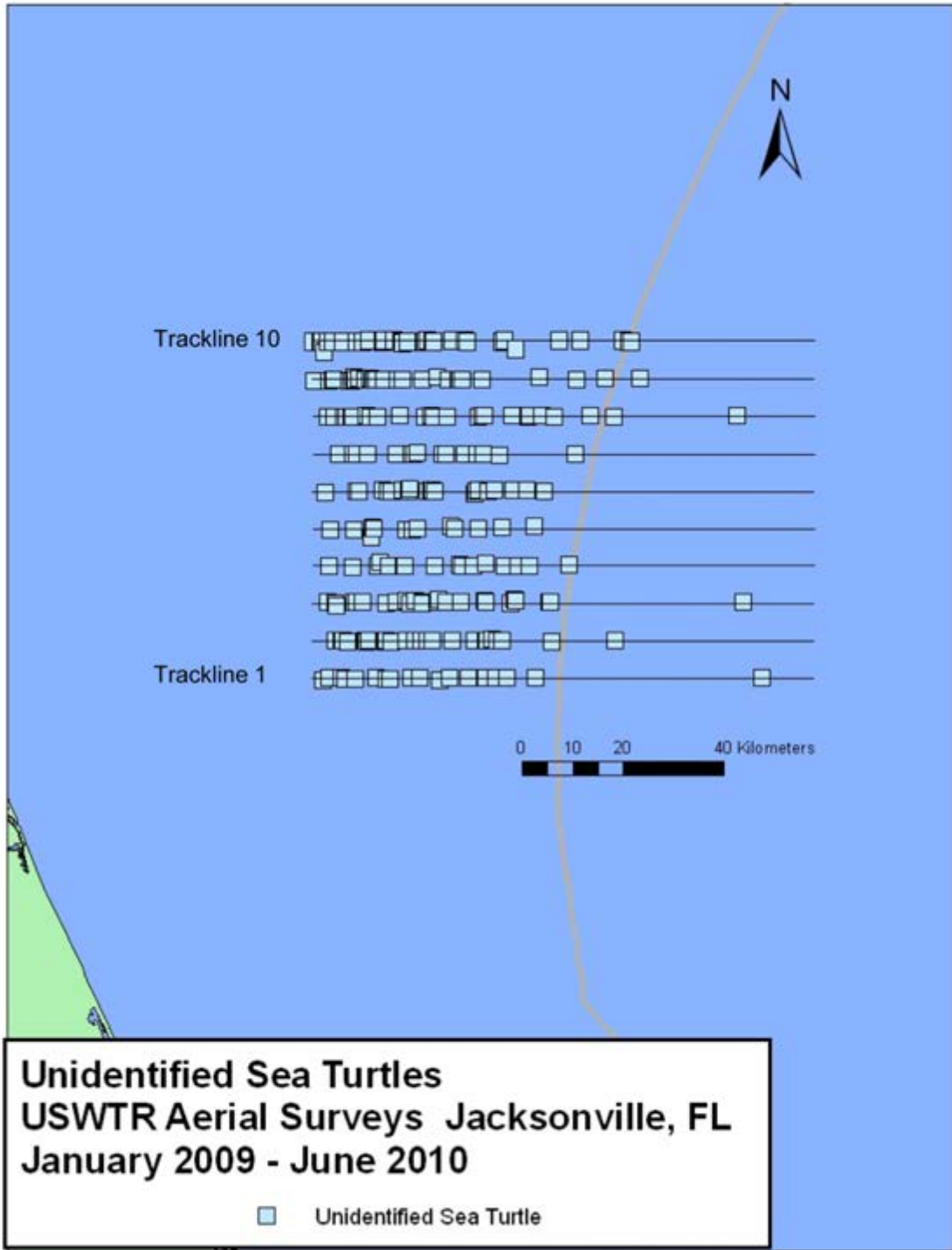


Figure 20. Unidentified sea turtle sightings.

Other Marine Vertebrate Sightings (Tables 18-22, Fig. 21)

Chondrichthyan fishes

A total of 129 sharks were recorded during the reporting period. Of these, 67 were identified as hammerhead sharks (*Sphyrna* spp.) and two as whale sharks (*Rhincodon typus*) (Tables 18 and 19). The whale shark sightings (both identified as juveniles) occurred in November 2009 and January 2010. Sharks were seen throughout the study period with no discernable spatial or temporal trends. Thirty-eight manta rays (*Manta birostris*) were observed during the study period (Table 20). Manta rays were observed in February, June, July, September, and October of 2009 and in March, April and May of 2010. There were also three sightings of rays that could not be identified to species and are listed as unidentified rays (Table 21).

Other fishes

Eleven ocean sunfish (*Mola mola*) were recorded during the survey period and were exclusively encountered during winter months (February 2009 and January 2010 through March 2010)(Table 22).

Table 18. All whale shark (*Rhincodon typus*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
18-Nov-09	10:49	39	30.241048	-80.687149	E	5	2	110°	1
20-Jan-10	9:43	12	30.040573	-80.014061	W	2	3	90°	1

Table 19. All other shark sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
27-Jan-09	13:09	17	29.960837	-80.099062	E	1	3	90°	1	Hammerhead
27-Jan-09	13:41	25	30.035085	-80.660795	W	2	1	90°	1	Hammerhead
27-Jan-09	15:05	54	30.212053	-80.549643	E	5	2	90°	1	Hammerhead
26-Feb-09	10:39	15	30.498671	-80.217854	W	9	2	90°	2	Hammerhead
27-Feb-09	9:06	10	29.966275	-80.425425	E	1	1	90°	1	Hammerhead
27-Feb-09	9:54	21	30.031347	-80.426560	W	2	3	90°	1	Hammerhead
27-Feb-09	10:12	35	30.099726	-80.571221	E	3	3	90°	1	Hammerhead
27-Feb-09	12:31	72	30.299713	-80.480397	W	6	2	90°	1	Hammerhead
9-Jun-09	14:22	31	30.433962	-80.486791	E	8	1	90°	1	Shark
9-Jun-09	15:16	56	30.298663	-80.559160	E	6	2	90°	1	Hammerhead
10-Jun-09	14:39	66	30.364164	-80.388544	E	7	2	90°	1	Shark
10-Jun-09	15:11	79	30.432995	-80.210113	W	8	1	90°	1	Hammerhead
10-Jun-09	16:49	118	30.566841	-80.686788	W	10	2	120°	1	Shark
15-Jul-09	13:23	34	29.963394	-80.480515	E	1	1	90°	1	Hammerhead
15-Jul-09	13:30	37	29.965093	-80.233078	E	1	2	90°	1	Shark
15-Jul-09	14:43	68	30.092841	-80.335504	E	3	2	45°	1	Hammerhead
15-Jul-09	14:50	71	30.101122	-80.082333	E	3	1	90°	1	Shark
15-Jul-09	16:23	102	30.232822	-80.006014	E	5	2	75°	1	Shark
15-Jul-09	16:27	105	30.232133	-79.859534	E	5	2	75°	1	Hammerhead
17-Jul-09	9:57	14	30.500535	-80.541540	E	9	2	110°	1	Shark
14-Sep-09	14:03	21	30.369352	-80.134905	W	7	1	90°	1	Shark
15-Sep-09	16:29	93	30.497733	-80.584060	E	9	1	90°	1	Shark
15-Sep-09	17:32	117	30.551285	-80.363941	W	10	2	100°	1	Shark
18-Sep-09	10:19	33	30.434360	-80.469909	E	8	1	90°	1	Hammerhead
18-Sep-09	14:43	17	30.166390	-80.406620	E	4	1	90°	1	
18-Sep-09	15:58	39	30.029255	-80.541755	E	2	2	90°	1	Shark
18-Sep-09	16:16	48	30.032810	-80.061160	E	2	1	90°	1	
30-Sep-09	10:27	29	30.099154	-80.616774	E	3	1	90°	1	Shark
1-Oct-09	10:37	23	30.367474	-79.828007	W	7	1	90°	2	Hammerhead
1-Oct-09	16:03	83	29.964775	-80.404166	W	1	2	90°	1	
18-Nov-09	8:45	10	29.965679	-80.595431	E	1	1	90°	1	Hammerhead
18-Nov-09	10:36	32	30.166074	-80.486014	W	4	3	110°	1	Shark
18-Nov-09	13:44	65	30.567134	-80.698263	E	10	2	110°	1	
18-Nov-09	14:49	90	30.434038	-80.320301	E	8	1	110°	1	Shark
20-Jan-10	11:26	45	30.168326	-80.424652	W	4	3	90°	1	Shark
20-Jan-10	11:42	57	30.232948	-80.543803	E	5	2	100°	1	
20-Jan-10	12:36	63	30.299250	-80.674193	W	6	2	90°	1	Shark
20-Jan-10	14:19	94	30.366829	-80.401901	E	7	2	90°	1	Hammerhead
20-Jan-10	14:30	99	30.367190	-80.192083	E	7	2	75°	1	Hammerhead

Table 19 (continued). All other shark sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
20-Jan-10	14:44	106	30.366336	-79.849591	E	7	2	100°	1	Hammerhead
28-Jan-10	9:51	14	29.967287	-80.283523	E	1	1	90°	1	Hammerhead
28-Jan-10	12:37	53	30.166490	-80.195832	W	4	2	110°	1	Hammerhead
28-Jan-10	12:42	56	30.166075	-80.386968	W	4	1	90°	1	Hammerhead
28-Jan-10	15:35	92	30.238195	-80.227962	E	5	1	100°	2	Hammerhead
28-Jan-10	16:30	108	30.301754	-80.638881	W	6	1	90°	1	Hammerhead
19-Feb-10	13:57	31	30.365905	-80.230392	W	7	2	90°	1	
19-Feb-10	15:35	52	30.566945	-80.529065	W	10	2	90°	1	
20-Feb-10	15:21	95	30.165867	-80.604040	E	4	2	90°	1	Hammerhead
20-Feb-10	15:30	101	30.166461	-80.348523	E	4	1	90°	1	
21-Feb-10	8:41	6	29.965306	-80.397385	E	1	1	100°	1	Shark
21-Feb-10	8:44	9	29.965250	-80.272447	E	1	1	90°	3	Hammerhead
21-Feb-10	9:16	18	30.033024	-79.884179	W	2	1	90°	1	
21-Feb-10	9:26	22	30.032469	-80.278211	W	2	2	100°	1	
21-Feb-10	12:12	72	30.299430	-79.876829	W	6	1	90°	1	Hammerhead
21-Feb-10	14:24	90	30.365063	-80.683588	E	7	1	90°	1	Hammerhead
21-Feb-10	14:57	122	30.365749	-80.249128	E	7	2	100°	1	
21-Feb-10	15:22	109	30.433346	-79.989605	W	8	1	90°	1	Hammerhead
21-Feb-10	15:35	133	30.434166	-80.156189	W	8	3	100°	1	
21-Feb-10	15:36	112	30.433960	-80.176926	W	8	1	90°	1	Hammerhead
21-Feb-10	15:38	114	30.433817	-80.281250	W	8	2	80°	1	
21-Feb-10	15:40	115	30.433776	-80.340839	W	8	2	110°	1	
21-Feb-10	15:48	120	30.433224	-80.548422	W	8	1	80°	1	Hammerhead
21-Feb-10	15:56	145	30.498718	-80.647647	E	9	2	110°	1	
21-Feb-10	16:45	139	30.566956	-80.523883	W	10	1	100°	1	Hammerhead
20-Mar-10	9:59	14	30.032347	-80.333172	E	2	1	90°	1	Hammerhead
20-Mar-10	10:01	15	30.032041	-80.402757	E	2	1	90°	1	
20-Mar-10	12:59	37	30.100124	-80.409043	W	3	2	130°	1	
20-Mar-10	13:38	36	30.166751	-80.248666	W	4	1	90°	1	Hammerhead
20-Mar-10	14:10	63	30.232757	-80.407625	W	5	1	90°	1	Hammerhead
20-Mar-10	14:12	65	30.232875	-80.316913	W	5	1	90°	1	
20-Mar-10	14:26	73	30.231156	-79.817503	W	5	2	110°	1	Hammerhead
20-Mar-10	15:08	70	30.365376	-80.522126	E	7	2	90°	1	
20-Mar-10	15:09	93	30.365534	-80.452204	W	7	3	110°	1	
20-Mar-10	15:50	84	30.433841	-80.151278	W	8	2	90°	5	
20-Mar-10	15:51	114	30.433742	-80.162415	E	8	2	110°	1	Hammerhead
24-Mar-10	10:30	28	30.434149	-80.146452	E	8	2	110°	1	Hammerhead
24-Mar-10	12:51	72	30.232347	-80.182280	W	5	1	60°	1	Hammerhead
24-Mar-10	12:52	73	30.232332	-80.222611	W	5	1	90°	2	Hammerhead

Table 19 (continued). All other shark sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
24-Mar-10	12:53	74	30.232385	-80.239014	W	5	1	75°	1	Hammerhead
24-Mar-10	12:53	50	30.232292	-80.245659	W	5	1	90°	2	Hammerhead
31-Mar-10	16:45	58	30.566988	-80.028211	W	10	2	90°	1	Hammerhead
1-Apr-10	16:12	78	30.031823	-80.276984	E	2	1	80°	1	Hammerhead
1-Apr-10	16:13	79	30.031871	-80.236616	E	2	1	90°	1	Hammerhead
1-Apr-10	16:40	86	29.965974	-80.253023	W	1	1	100°	1	Hammerhead
2-Apr-10	9:29	12	29.965547	-80.301701	E	1	2	90°	1	
2-Apr-10	9:30	17	29.965675	-80.257460	E	1	2	90°	8	Shark
2-Apr-10	10:18	28	30.032207	-80.221115	W	2	2	90°	1	
2-Apr-10	11:12	48	30.100369	-80.270877	E	3	2	90°	1	
2-Apr-10	11:13	74	30.100241	-80.248708	E	3	1	90°	1	Hammerhead
2-Apr-10	12:02	69	30.166487	-80.509732	W	4	2	90°	1	
2-Apr-10	13:29	108	30.301586	-80.366606	W	6	1	90°	1	
2-Apr-10	15:43	170	30.365702	-80.201346	E	7	3	90°	1	Hammerhead
2-Apr-10	15:46	173	30.365720	-80.111840	E	7	3	90°	1	Hammerhead
2-Apr-10	16:28	188	30.433575	-80.452593	W	8	2	90°	1	Hammerhead
2-Apr-10	16:57	202	30.499388	-80.168936	E	9	3	90°	1	Hammerhead
2-Apr-10	17:19	210	30.567207	-80.114085	W	10	3	90°	1	Hammerhead
3-Apr-10	10:59	61	30.299799	-80.492787	E	6	1	90°	1	Hammerhead
6-May-10	10:39	21	30.031226	-80.333485	W	2	2	90°	1	Hammerhead
7-May-10	11:36	37	30.300733	-80.308945	W	6	1	90°	1	Shark
7-May-10	12:22	63	30.366674	-79.800378	E	7	1	120°	1	Hammerhead
7-May-10	14:53	88	30.500746	-80.207887	E	9	2	100°	1	Shark
7-May-10	15:19	94	30.566305	-80.222107	W	10	1	80°	1	Hammerhead



Table 20. All manta ray (*Manta birostris*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
26-Feb-09	10:42	17	30.499065	-80.296745	W	9	2	90°	1	
9-Jun-09	15:48	52	30.234641	-80.194249	W	5	2	120°	1	Dark manta ray
9-Jun-09	15:51	53	30.237790	-80.314794	W	5	2	120°	1	Dark manta ray
9-Jun-09	15:56	66	30.231994	-80.553703	W	5	2	90°	1	Large black manta ray
10-Jun-09	14:41	48	30.363599	-80.313477	E	7	2	90°	1	
10-Jun-09	16:06	67	30.497121	-80.138479	E	9	2	90°	1	
15-Jul-09	13:25	47	29.965157	-80.400766	E	1	1	90°	1	Black Manta
15-Jul-09	16:09	97	30.232875	-80.439084	E	5	1	90°	1	Large, dark gray manta
15-Jul-09	16:12	99	30.234760	-80.417826	E	5	2	75°	1	Large, submerged Manta
18-Sep-09	11:52	58	30.299940	-80.096086	E	6	2	90°	1	
18-Sep-09	12:04	61	30.235119	-79.864736	W	5	3	90°	1	
18-Sep-09	15:24	27	30.098325	-80.634902	W	3	1	90°	1	
20-Mar-10	9:54	10	30.032015	-80.169610	E	2	2	100°	1	
20-Mar-10	15:14	99	30.365660	-80.314292	W	7	2	110°	4	
24-Mar-10	11:12	27	30.365259	-80.268316	W	7	3	90°	4	
31-Mar-10	14:38	20	30.099803	-80.506598	E	3	1	90°	4	Manta rays circling
2-Apr-10	12:45	126	30.223377	-80.286922	E	5	3	110°	1	
2-Apr-10	12:49	88	30.232777	-80.183837	E	5	2	90°	1	dark grey manta
3-Apr-10	8:35	7	30.566792	-80.293604	E	10	1	90°	1	
3-Apr-10	8:36	8	30.566796	-80.270851	E	10	1	80°	1	
3-Apr-10	9:25	25	30.499780	-80.378204	W	9	1	75°	1	
7-May-10	10:59	27	30.233773	-80.282447	E	5	1	90°	1	Black with white lobes
7-May-10	11:00	29	30.233592	-80.230105	E	5	2	90°	2	
7-May-10	11:33	49	30.299685	-80.223928	W	6	2	90°	1	
7-May-10	12:37	52	30.433038	-80.221988	W	8	3	90°	1	
4-Jun-10	9:49	16	30.101423	-80.415602	E	3	2	145°	1	
4-Jun-10	10:03	22	30.096668	-79.922225	E	3	2	90°	1	
6-Jun-10	10:54	36	30.233030	-80.634104	E	5	2	100°	1	

Table 21. All unidentified ray sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
11-Jun-09	10:48	23	30.033369	-79.892559	E	2	1	90°	1	Large ray
17-Jul-09	9:41	10	30.435083	-80.259841	W	8	1	90°	1	Dark gray ray
30-Sep-09	15:13	67	30.435873	-80.463483	W	8	2	90°	1	Unidentified large ray

Table 22. All ocean sunfish (*Mola mola*) sightings in the proposed USWTR site off Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number
26-Feb-09	10:59	27	30.486672	-80.683150	W	9	1	90°	1
27-Feb-09	9:06	8	29.966273	-80.407648	E	1	1	90°	1
27-Feb-09	9:07	9	29.966460	-80.365878	E	1	2	90°	1
20-Jan-10	14:11	84	30.361730	-80.624073	E	7	1	45°	1
20-Jan-10	14:39	105	30.367115	-80.037087	E	7	1	80°	1
28-Jan-10	16:08	88	30.299346	-80.205478	W	6	3	130°	1
20-Feb-10	13:04	75	30.232685	-79.859932	W	5	2	90°	2
20-Feb-10	16:51	132	30.031664	-79.806622	E	2	2	120°	2
24-Mar-10	9:02	4	30.567286	-80.651946	E	10	1	90°	1

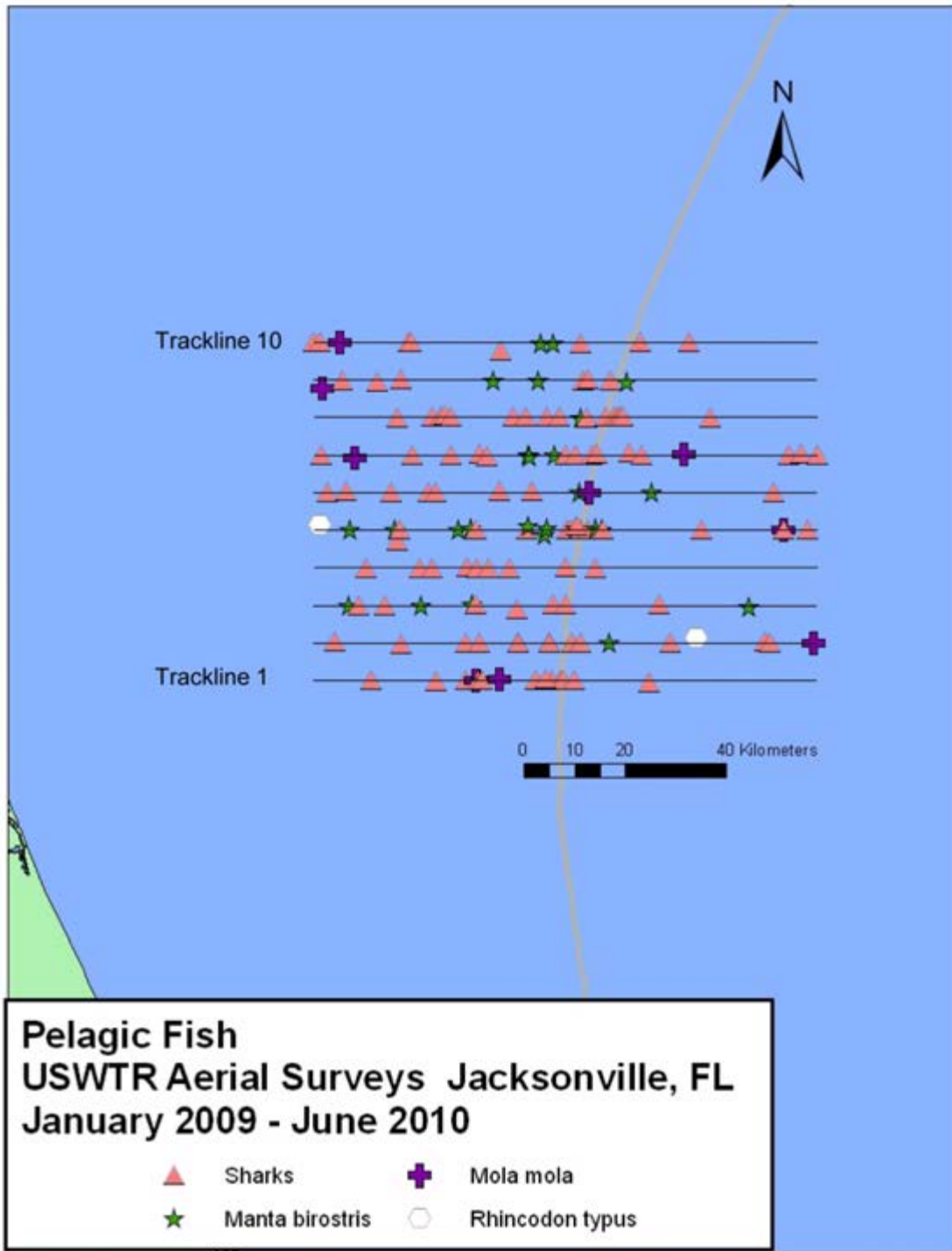


Figure 21. Whale shark (*Rhincodon typus*), unidentified sharks, manta ray (*Manta birostris*), ocean sunfish (*Mola mola*), and unidentified ray sightings.

## Vessel Sightings

### Commercial (Table 23, Fig. 22)

A total of 60 commercial vessels (*e.g.* tankers, car carriers, and container vessels) were observed in the study site.

Table 23. All commercial vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
27-Jan-09	12:45	4	29.963798	-80.556400	E	1	2	45°	1	Large tanker
27-Jan-09	13:45	28	30.098463	-80.681908	E	3	4	90°	1	Large container vessel
28-Jan-09	11:09	6	30.432567	-79.876427	W	8	4	30°	1	Large tanker heading south
26-Feb-09	15:48	60	30.030124	-80.681861	E	2	2	90°	1	Large cargo vessel
27-Feb-09	9:52	20	30.030728	-80.346591	W	2	3	30°	1	Large container heading south
31-Mar-09	15:08	4	30.232947	-80.588500	E	5	4	60°	1	Large container heading south
31-Mar-09	15:17	6	30.233000	-80.242817	E	5	4	45°	1	Large cargo vessel
10-Jun-09	14:53	75	30.365392	-80.004638	E	7	3	60°	1	Container ship
10-Jun-09	14:53	75	30.365392	-80.004638	E	7	3	60°	1	Container ship
11-Jun-09	9:00	6	30.167750	-80.428494	E	4	4	30°	1	Container vessel
15-Jul-09	16:22	111	30.235932	-80.077337	E	5	3	90°	1	Car carrier
5-Aug-09	9:04	6	29.966581	-80.406933	E	1	4	70°	1	Freighter
5-Aug-09	9:29	10	30.032215	-80.034982	W	2	3	60°	1	Cargo ship
5-Aug-09	9:41	12	30.031998	-80.503427	W	2	2	45°	1	Freighter
5-Aug-09	10:06	18	30.100922	-80.058129	E	3	3	90°	1	Cargo ship
5-Aug-09	10:17	28	30.166734	-79.851350	W	4	1	90°	1	Container ship
5-Aug-09	11:34	44	30.298831	-80.367626	W	6	3	90°	1	Cargo ship
15-Sep-09	10:08	8	29.964560	-79.925177	E	1	4	70°	1	Cargo
15-Sep-09	15:33	75	30.364940	-80.366937	E	7	4	15°	1	Container ship
16-Sep-09	10:18	2	29.963075	-80.682160	E	1	4	75°	1	Container ship
16-Sep-09	10:53	15	29.965683	-79.965953	E	1	4	25°	1	Cargo vessel
16-Sep-09	11:05	21	30.034551	-79.969488	W	2	3	90°	1	Cargo
16-Sep-09	12:39	47	30.161139	-80.000668	W	4	2	90°	1	Container ship
16-Sep-09	13:22	57	30.168243	-80.576439	W	4	3	90°	1	Container ship
16-Sep-09	14:58	66	30.234373	-80.648730	E	5	3	90°	1	Cargo ship
18-Sep-09	9:06	9	30.563600	-80.436510	E	10	4	90°	1	Cargo vessel
18-Sep-09	11:58	43	30.298896	-79.891329	E	6	1	30°	1	Large cargo vessel
30-Sep-09	10:52	44	30.102760	-79.954743	E	3	4	30°	1	Container vessel
30-Sep-09	14:23	83	30.368508	-80.631045	E	7	4	45°	1	Car carrier
30-Sep-09	14:37	87	30.363830	-80.058769	E	7	4	30°	1	Container ship
30-Sep-09	15:47	74	30.567011	-80.045292	E	10	3	90°	1	Tanker
20-Nov-09	10:50	20	30.166036	-80.143074	W	4	4	30°	1	Container vessel
8-Dec-09	10:11	7	30.500235	-79.989431	W	9	4	30°	2	Tug pulling barge
8-Dec-09	10:55	13	30.432783	-79.932671	E	8	2	20°	1	Car carrier
8-Dec-09	11:09	14	30.365831	-80.078456	W	7	3	90°	2	Oilers
8-Dec-09	11:47	20	30.299860	-80.019687	E	6	4	30°	1	Cargo
7-Jan-10	13:17	33	30.298657	-80.668845	W	6	4	60°	1	Large tug and tow
19-Jan-10	9:58	12	30.434071	-80.305804	E	8	2	30°	1	Freighter
19-Jan-10	10:03	12	30.434162	-80.107336	E	8	4	90°	1	Tug and barge

Table 23 (continued). All commercial vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
19-Jan-10	13:44	37	30.167740	-80.327292	E	4	2	45°	1	Freighter
20-Jan-10	10:18	30	30.030946	-80.595166	W	2	3	30°	1	Container vessel
27-Jan-10	10:07	4	30.567683	-80.415632	E	10	4	10°	1	Tanker
27-Jan-10	10:10	5	30.567987	-80.316677	E	10	4	20°	1	Car carrier
28-Jan-10	12:08	56	30.100663	-80.352112	E	3	4	45°	1	Tanker
19-Feb-10	9:23	4	29.965202	-80.596727	E	1	4	100°	1	Tug and barge
20-Feb-10	12:58	65	30.299496	-79.890352	E	6	4	90°	1	Container ship
20-Feb-10	17:17	138	29.965548	-80.627177	W	1	2	90°	1	Large unidentified vessel
21-Feb-10	11:15	58	30.231589	-80.668332	E	5	4	30°	1	Tug and barge
20-Mar-10	13:34	33	30.166608	-80.079551	W	4	2	90°	1	Car carrier
24-Mar-10	12:34	67	30.232138	-79.831643	W	5	2	20°	1	Cargo vessel
1-Apr-10	14:40	52	30.166835	-80.328405	E	4	4	60°	1	Cargo vessel
1-Apr-10	16:16	81	30.031777	-80.119178	E	2	2	45°	1	Trawler
3-Apr-10	9:57	45	30.433357	-80.253190	E	8	3	90°	1	Large vessel
7-May-10	14:27	81	30.500010	-80.679132	E	9	4	60°	1	Cargo vessel
4-Jun-10	10:00	20	30.101010	-80.022094	E	3	4	75°	1	Cargo
4-Jun-10	11:24	39	30.300039	-80.119386	W	6	4	45°	1	Cargo vessel
5-Jun-10	10:48	19	30.300641	-79.996361	E	6	3	90°	1	Container ship
6-Jun-10	11:30	29	30.299723	-80.223580	W	6	4	30°	1	Cargo
6-Jun-10	13:44	40	30.366023	-80.038662	E	7	4	30°	1	Cargo vessel

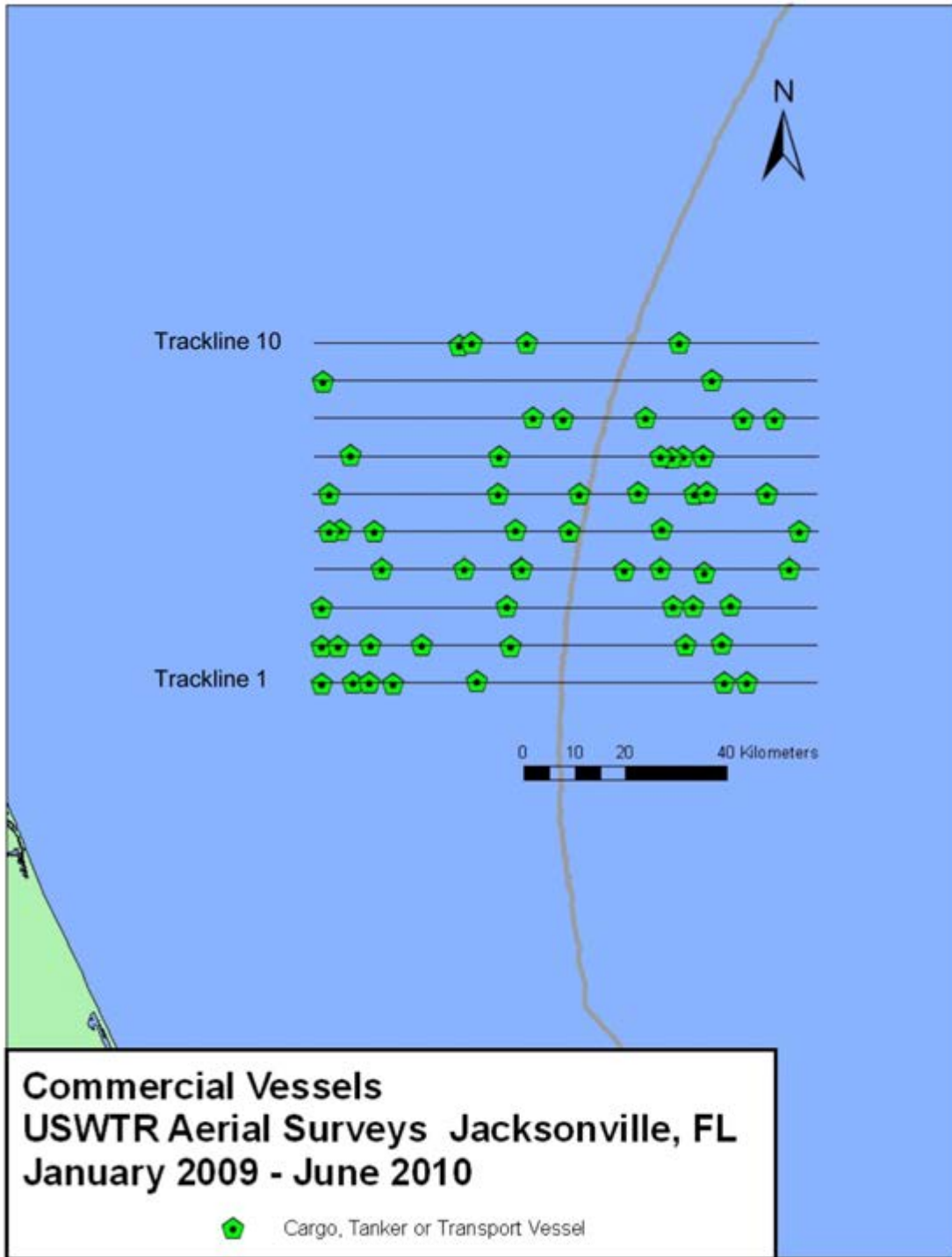


Figure 22. Large commercial shipping vessel sightings.

Military (Table 24, Fig, 23)

A total of 37 U.S. military vessels were seen during the study.

Table 24. All military vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
26-Feb-09	9:32	4	30.567374	-80.644477	E	10	4	90°	1	Navy frigate
26-Feb-09	12:01	36	30.364356	-80.430649	W	7	3	90°	1	Military vessel
27-Feb-09	15:00	78	30.368447	-80.020384	E	7	4	45°	1	Navy sub
31-Mar-09	16:42	19	30.431989	-80.583450	W	8	3	60°	1	Navy vessel with helicopter
9-Jun-09	15:19	48	30.299475	-80.449055	E	6	4	110°	1	Navy vessel
10-Jun-09	11:19	29	30.233370	-80.576034	E	5	4	30°	1	Warship
10-Jun-09	12:15	50	30.303484	-80.647134	W	6	4	45°	1	Large Navy vessel
10-Jun-09	12:15	50	30.303484	-80.647134	W	6	4	45°	1	Large Navy vessel
11-Jun-09	11:28	35	29.968349	-80.351004	W	1	4	30°	1	Warship
4-Aug-09	15:10	56	30.232750	-79.883809	W	5	3	45°	1	Navy frigate
6-Aug-09	9:31	12	29.962389	-80.089341	E	1	4	90°	1	Large Navy Vessel
14-Sep-09	14:18	28	30.364917	-80.692134	W	7	4	70°	1	Navy frigate
15-Sep-09	9:39	3	29.967259	-80.576767	E	1	3	45°	1	Frigate
16-Sep-09	10:47	14	29.966112	-80.189186	E	1	3	110°	1	Military vessel
16-Sep-09	11:08	22	30.034720	-80.092276	W	2	3	90°	1	Navy warship
18-Sep-09	12:00	44	30.294765	-79.801784	E	6	4	30°	1	Military vessel
18-Sep-09	12:38	66	30.232710	-80.586087	W	5	4	90°	1	Military vessel
18-Sep-09	14:48	15	30.163718	-80.214488	E	4	4	60°	1	Frigate
18-Sep-09	15:13	25	30.100653	-80.229399	W	3	3	90°	1	Frigate
18-Sep-09	16:33	50	29.963708	-80.102831	W	1	4	15°	1	Frigate
1-Oct-09	9:13	9	30.493002	-79.835457	W	9	4	75°	1	Aircraft carrier
17-Nov-09	13:34	16	30.498678	-80.149788	W	9	4	30°	3	Navy vessels - destroyers
17-Nov-09	13:57	21	30.434621	-80.484953	E	8	4	10°	1	Navy vessel - destroyer
17-Nov-09	15:28	40	30.231829	-80.253751	W	5	4	45°	1	Navy vessel
20-Nov-09	10:59	21	30.165755	-80.483740	W	4	4	45°	1	Aircraft carrier
20-Nov-09	11:00	23	30.165965	-80.542110	W	4	4	60°	1	Frigate
28-Jan-10	12:28	51	30.165555	-79.874844	W	4	4	80°	1	Aircraft carrier
24-Mar-10	13:01	76	30.232172	-80.535759	W	5	4	30°	1	Frigate
4-Jun-10	11:39	47	30.298669	-80.645588	W	6	3	90°	2	Frigates
6-Jun-10	10:26	25	30.165963	-80.177322	W	4	4	30°	1	Large Navy vessel
6-Jun-10	14:06	43	30.433820	-80.269354	W	8	3	30°	1	Frigate
6-Jun-10	14:11	55	30.433281	-80.444991	W	8	4	80°	1	Navy ship
6-Jun-10	14:12	56	30.433961	-80.493500	W	8	4	60°	1	Navy ship
6-Jun-10	14:26	60	30.499914	-80.491165	E	9	4	45°	1	Navy ship



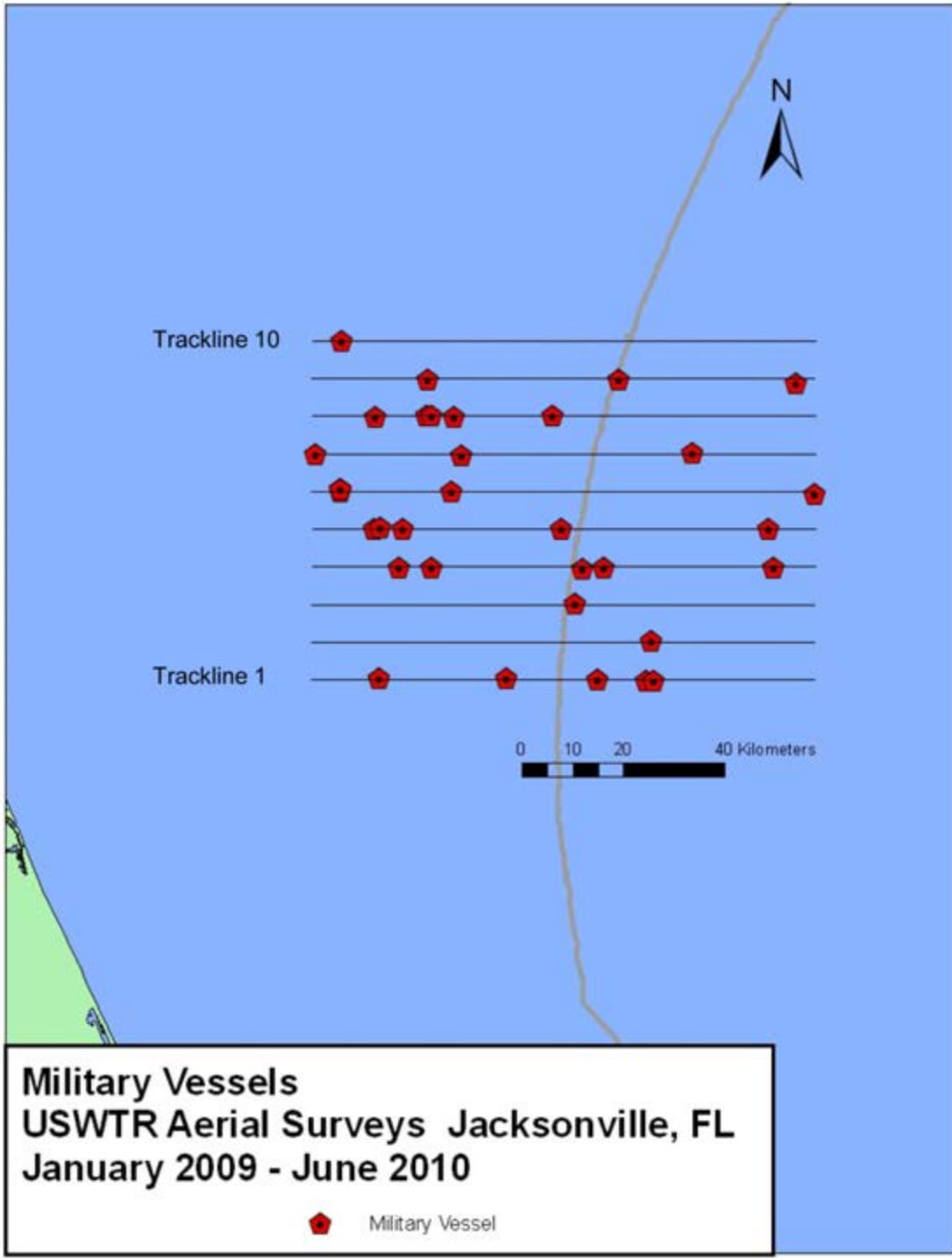


Figure 23. Military vessel sightings.

### Other Vessels (Table 25, Fig. 24)

A total of 479 other vessels were recorded in the survey area. Recreational sport fishing vessels constituted the majority of these sightings (n=440). This category also included head boats, sailing vessels and yachts.

Table 25. All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
27-Jan-09	12:57	13	29.963762	-80.314313	E	1	4	30°	1	Recreational fishing vessel
27-Jan-09	13:37	22	30.035443	-80.483597	W	2	4	45°	1	Recreational fishing vessel
27-Jan-09	15:02	52	30.227535	-80.662528	E	5	2	45°	1	Recreational fishing vessel
27-Jan-09	15:07	55	30.224100	-80.475308	E	5	2	45°	1	Recreational fishing vessel
27-Jan-09	15:09	31	30.234702	-80.415827	E	5	3	45°	1	Recreational fishing vessel
27-Jan-09	15:11	57	30.232040	-80.326377	E	5	2	60°	1	Recreational fishing vessel
28-Jan-09	11:18	6	30.432370	-80.221080	W	8	3	90°	1	Recreational fishing vessel
28-Jan-09	11:38	12	30.498375	-80.527993	E	9	2	45°	1	Research vessel
28-Jan-09	11:40	14	30.501470	-80.440618	E	9	1	90°	1	Research vessel
26-Feb-09	9:39	6	30.565872	-80.382674	E	10	2	90°	1	Large anchored fishing vessel
26-Feb-09	9:40	9	30.565324	-80.353256	E	10	2	90°	1	Head boat
26-Feb-09	9:46	10	30.566923	-80.159474	E	10	4	90°	1	Head boat
26-Feb-09	10:46	18	30.498749	-80.443653	W	9	3	90°	1	Head boat
26-Feb-09	15:03	51	30.167652	-80.262537	E	4	1	90°	1	Fishing vessel dragging object
26-Feb-09	15:03	62	30.167643	-80.259759	E	4	2	90°	1	Recreational fishing vessel
26-Feb-09	15:34	69	30.098577	-80.286986	W	3	4	90°	1	Unidentified small vessel
26-Feb-09	15:41	71	30.098177	-80.560501	W	3	4	90°	1	Recreational fishing vessel
26-Feb-09	15:58	76	30.033672	-80.305812	E	2	4	90°	1	Unidentified small vessel
27-Feb-09	8:53	3	29.965466	-80.631919	E	1	4	90°	2	Recreational fishing vessel
27-Feb-09	10:15	33	30.100738	-80.486576	E	3	4	30°	1	Recreational fishing vessel
27-Feb-09	10:57	47	30.166222	-80.332909	W	4	1	90°	1	Recreational fishing vessel
27-Feb-09	11:56	58	30.233341	-80.315722	E	5	3	60°	1	Recreational fishing vessel
27-Feb-09	14:31	71	30.366403	-80.638759	E	7	3	90°	1	Recreational fishing vessel
27-Feb-09	15:39	99	30.500169	-80.577866	E	9	3	90°	1	Recreational fishing vessel
27-Feb-09	15:39	85	30.500227	-80.552455	E	9	1	30°	1	Recreational fishing vessel
31-Mar-09	15:09	3	30.232464	-80.547458	E	5	4	90°	1	Recreational fishing vessel
31-Mar-09	15:15	4	30.235166	-80.317295	E	5	3	90°	1	Recreational fishing vessel
31-Mar-09	15:50	9	30.297021	-80.567776	W	6	2	60°	1	Recreational fishing vessel
31-Mar-09	16:00	14	30.367080	-80.557741	E	7	4	90°	1	Recreational fishing vessel
31-Mar-09	16:04	14	30.366341	-80.431640	E	7	2	60°	1	Recreational vessel
31-Mar-09	16:35	21	30.429681	-80.283188	W	8	3	60°	1	Recreational vessel
31-Mar-09	16:39	22	30.436926	-80.449472	W	8	2	60°	1	Recreational vessel
31-Mar-09	16:54	22	30.501739	-80.485719	E	9	2	90°	1	Recreational fishing vessel
31-Mar-09	16:55	26	30.502630	-80.473051	E	9	3	90°	1	Recreational fishing vessel
9-Jun-09	13:54	16	30.500298	-80.183687	W	9	3	45°	1	Recreational fishing vessel
9-Jun-09	15:54	54	30.237455	-80.452866	W	5	2	60°	2	Two recreational fishing vessels
10-Jun-09	9:44	8	30.030036	-79.820384	W	2	2	75°	1	Catamaran
10-Jun-09	9:48	9	30.030200	-79.981689	W	2	4	75°	1	Sailboat
10-Jun-09	10:01	9	30.030754	-80.429301	W	2	2	30°	1	Recreational fishing vessel

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
10-Jun-09	10:12	14	30.097061	-80.671979	E	3	1	75°	1	Recreational fishing vessel
10-Jun-09	10:12	14	30.097061	-80.671979	E	3	1	75°	1	Recreational fishing vessel
10-Jun-09	10:36	22	30.164653	-79.819635	W	4	4	75°	1	Small sailboat
10-Jun-09	10:36	22	30.164653	-79.819635	W	4	4	75°	1	Small sailboat
10-Jun-09	11:52	42	30.300278	-80.244008	W	6	1	60°	1	Recreational fishing vessel
10-Jun-09	11:52	42	30.300278	-80.244008	W	6	1	60°	1	Recreational fishing vessel
10-Jun-09	14:36	64	30.365295	-80.505891	E	7	4	45°	2	Recreational fishing vessel
10-Jun-09	14:36	64	30.365295	-80.505891	E	7	4	45°	2	Recreational fishing vessel
10-Jun-09	15:44	93	30.498112	-80.663010	E	9	1	30°	1	Recreational fishing vessel
10-Jun-09	15:44	93	30.498112	-80.663010	E	9	1	30°	1	Recreational fishing vessel
10-Jun-09	15:47	95	30.499101	-80.580287	E	9	1	60°	1	Recreational fishing vessel
10-Jun-09	15:47	95	30.499101	-80.580287	E	9	1	60°	1	Recreational fishing vessel
11-Jun-09	10:10	18	30.031475	-80.538536	E	2	3	60°	1	Recreational fishing vessel
11-Jun-09	11:26	34	29.967494	-80.285588	W	1	1	90°	1	Recreational fishing vessel
11-Jun-09	11:34	28	29.966270	-80.636657	W	1	3	45°	1	Recreational fishing vessel
15-Jul-09	13:28	36	29.967006	-80.276804	E	1	4	90°	1	Recreational fishing vessel
15-Jul-09	14:25	69	30.033116	-80.625140	W	2	3	90°	1	Head boat
15-Jul-09	14:25	68	30.034123	-80.615770	W	2	3	90°	1	Sport fishing vessel
15-Jul-09	14:36	83	30.103399	-80.448777	E	3	1	90°	1	Sport fishing vessel
15-Jul-09	14:49	70	30.101071	-80.122180	E	3	1	30°	1	Recreational fishing vessel
15-Jul-09	16:47	118	30.302578	-80.443221	W	6	4	90°	1	Sport fishing vessel
16-Jul-09	10:09	10	30.499394	-80.552078	W	9	3	45°	1	Recreational fishing vessel
16-Jul-09	10:09	15	30.499331	-80.541828	W	9	2	90°	1	Sport fishing vessel
16-Jul-09	10:09	14	30.498638	-80.523033	W	9	2	90°	1	Sport fishing vessel
16-Jul-09	10:12	11	30.497065	-80.641479	W	9	3	45°	1	Recreational fishing vessel
16-Jul-09	14:29	37	30.031651	-80.681815	E	2	3	90°	1	Sport fishing vessel
16-Jul-09	16:10	72	29.964087	-80.594572	W	1	3	90°	1	Sport fishing vessel
17-Jul-09	9:58	15	30.500868	-80.509779	E	9	3	90°	1	Recreational fishing vessel
5-Aug-09	9:44	14	30.032061	-80.603551	W	2	4	90°	1	Sport fishing vessel
5-Aug-09	14:06	43	30.435000	-80.460162	W	8	1	80°	1	Recreational fishing vessel
5-Aug-09	14:06	57	30.432749	-80.480753	W	8	2	90°	1	Sport fishing vessel
6-Aug-09	9:57	16	30.034216	-80.418158	W	2	3	60°	1	Recreational fishing vessel
6-Aug-09	9:59	17	30.033202	-80.524021	W	2	3	90°	1	Head boat
6-Aug-09	9:59	11	30.032313	-80.509984	W	2	2	30°	1	Recreational fishing vessel
6-Aug-09	10:03	18	30.030871	-80.653959	W	2	2	90°	1	Unidentified vessel - research?
6-Aug-09	11:28	35	30.501677	-80.555969	E	9	2	90°	1	Recreational fishing vessel
6-Aug-09	12:27	46	30.565642	-80.456062	W	10	4	80°	1	Recreational fishing vessel
14-Sep-09	12:07	4	30.563890	-80.408703	E	10	4	60°	1	Recreational fishing vessel
14-Sep-09	13:13	13	30.429299	-80.505859	E	8	4	30°	1	Small fishing vessel, longliner?

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
14-Sep-09	13:18	14	30.432004	-80.344827	E	8	4	45°	1	Recreational fishing vessel
14-Sep-09	13:18	16	30.432072	-80.347129	E	8	2	90°	1	Sport fishing vessel
14-Sep-09	14:05	27	30.368534	-80.224342	W	7	2	90°	1	Sport fishing vessel
14-Sep-09	14:11	22	30.367768	-80.429426	W	7	4	75°	1	Recreational fishing vessel
15-Sep-09	10:35	16	30.031342	-80.554592	W	2	2	45°	1	Recreational vessel
15-Sep-09	12:22	44	30.232272	-80.459481	E	5	1	90°	1	Recreational fishing vessel
15-Sep-09	12:34	52	30.234347	-80.259052	E	5	2	60°	1	Recreational fishing vessel
15-Sep-09	16:11	86	30.434124	-80.449872	W	8	3	60°	1	Recreational fishing vessel
15-Sep-09	16:39	98	30.502168	-80.524264	E	9	4	45°	1	Yacht
15-Sep-09	16:41	100	30.501451	-80.442957	E	9	4	30°	1	Recreational fishing vessel
15-Sep-09	17:34	118	30.551233	-80.406314	W	10	4	60°	1	Recreational fishing vessel
16-Sep-09	11:24	31	30.031108	-80.580216	W	2	2	90°	1	Sport fishing vessel
18-Sep-09	9:25	15	30.565033	-80.061632	E	10	3	45°	1	Sailboat
18-Sep-09	12:38	67	30.231665	-80.619274	W	5	4	90°	1	Large yacht
18-Sep-09	14:54	20	30.163518	-80.013086	E	4	3	90°	1	Sport fishing vessel
18-Sep-09	15:07	18	30.100904	-79.976464	W	3	4	60°	1	Yacht
18-Sep-09	15:59	40	30.029575	-80.518140	E	2	3	30°	1	Recreational fishing vessel
30-Sep-09	10:43	42	30.096864	-80.299236	E	3	2	15°	1	Recreational fishing vessel
30-Sep-09	10:43	23	30.096548	-80.308223	E	3	3	100°	3	3 recreational fishing vessels
1-Oct-09	8:59	7	30.567569	-80.289698	E	10	2	90°	1	Sport fishing vessel
1-Oct-09	10:30	38	30.434730	-79.946425	E	8	3	90°	1	Sport fishing vessel
1-Oct-09	10:42	25	30.365830	-79.966230	W	7	2	45°	1	Sport fishing vessel
1-Oct-09	10:56	26	30.366773	-80.498649	W	7	3	45°	1	Sport fishing vessel
1-Oct-09	14:12	54	30.166652	-80.487206	E	4	3	70°	1	Sport fishing vessel
1-Oct-09	14:15	91	30.162928	-80.420625	E	4	3	110°	1	Sport fishing vessel
1-Oct-09	14:25	59	30.166030	-80.063784	E	4	2	60°	1	Sport fishing vessel
1-Oct-09	15:06	68	30.102284	-80.547681	W	3	1	90°	1	Sport fishing vessel
1-Oct-09	15:10	107	30.102546	-80.677445	W	3	2	90°	1	Sport fishing vessel
17-Nov-09	14:42	30	30.364591	-80.573681	W	7	3	60°	1	Recreational fishing vessel
17-Nov-09	15:37	43	30.231670	-80.588373	W	5	4	75°	1	Sailboat
18-Nov-09	9:33	16	30.031073	-80.614887	W	2	4	30°	1	Recreational fishing vessel
18-Nov-09	10:29	30	30.166131	-80.224617	W	4	4	45°	1	Recreational fishing vessel
18-Nov-09	10:34	31	30.165845	-80.423977	W	4	4	60°	2	2 recreational fishing vessels
18-Nov-09	10:56	39	30.232820	-80.546164	E	5	3	90°	1	Sailing vessel
18-Nov-09	10:58	40	30.233139	-80.486137	E	5	4	70°	1	Recreational fishing vessel
18-Nov-09	11:20	46	30.299016	-79.859384	W	6	4	30°	1	Recreational fishing vessel
18-Nov-09	11:33	50	30.299885	-80.228210	W	6	2	90°	1	Recreational fishing vessel
18-Nov-09	14:26	79	30.498677	-80.326960	W	9	2	60°	1	Recreational fishing vessel
18-Nov-09	14:35	86	30.498581	-80.647906	W	9	1	30°	1	Recreational fishing vessel

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
20-Nov-09	9:16	7	29.966762	-80.410461	E	1	2	100°	1	Sport fishing vessel
20-Nov-09	9:38	10	30.030813	-79.900999	W	2	4	90°	1	Sport fishing vessel
20-Nov-09	10:08	13	30.030882	-80.580102	W	2	4	15°	1	Long liner
20-Nov-09	10:15	18	30.099740	-80.682098	E	3	4	90°	1	Sport fishing vessel
20-Nov-09	10:59	22	30.165887	-80.509999	W	4	1	60°	1	Long liner
8-Dec-09	11:12	17	30.366223	-80.223648	W	7	3	45°	1	Long liner
8-Dec-09	13:29	34	30.031909	-80.306354	E	2	3	90°	1	Sport fishing vessel
22-Dec-09	9:25	10	30.032059	-80.233439	W	2	4	60°	1	Fishing vessel
22-Dec-09	12:09	36	30.300357	-80.369392	W	6	2	90°	1	Sport fishing vessel
22-Dec-09	14:14	52	30.365908	-80.217778	E	7	4	30°	1	Recreational fishing vessel
22-Dec-09	15:05	64	30.498699	-80.651004	E	9	1	45°	1	Recreational fishing vessel
7-Jan-10	9:52	4	29.966108	-80.602799	E	1	3	60°	1	Recreational fishing vessel
7-Jan-10	10:01	5	29.966391	-80.302119	E	1	4	45°	1	Recreational fishing vessel
7-Jan-10	11:14	12	30.102339	-80.329161	E	3	2	30°	1	Recreational fishing vessel
7-Jan-10	11:48	17	30.166060	-80.309542	W	4	3	30°	1	R/V Volute
7-Jan-10	12:27	27	30.233886	-80.285684	E	5	3	30°	1	Recreational fishing vessel
7-Jan-10	15:32	44	30.367541	-80.241315	E	7	2	45°	1	Fishing vessel
7-Jan-10	15:34	45	30.368866	-80.147815	E	7	4	30°	1	R/V Volute
7-Jan-10	16:39	58	30.500473	-80.521120	E	9	4	45°	1	Recreational fishing vessel
19-Jan-10	9:07	4	30.567735	-80.153580	E	10	2	90°	1	Sport fishing vessel
19-Jan-10	9:31	7	30.498916	-80.194212	W	9	2	90°	1	Sport fishing vessel
19-Jan-10	9:32	7	30.498756	-80.245317	W	9	3	45°	2	Recreational fishing vessel
19-Jan-10	9:41	9	30.498725	-80.560927	W	9	2	45°	1	Recreational fishing vessel
19-Jan-10	10:38	21	30.365371	-80.199827	W	7	3	45°	6	Recreational fishing vessel
19-Jan-10	14:20	44	30.099934	-80.262465	W	3	3	45°	1	Recreational fishing vessel
19-Jan-10	15:49	62	29.964877	-80.384324	W	1	2	30°	1	Recreational fishing vessel
20-Jan-10	9:03	4	29.965534	-80.681012	E	1	4	60°	1	Recreational fishing vessel
20-Jan-10	9:12	7	29.966356	-80.342831	E	1	4	80°	1	Recreational fishing vessel
20-Jan-10	9:13	4	29.966296	-80.299834	E	1	3	110°	1	Recreational fishing vessel
20-Jan-10	9:14	5	29.966485	-80.269966	E	1	2	90°	1	Recreational fishing vessel
20-Jan-10	9:15	9	29.966360	-80.246742	E	1	4	90°	3	Fishing vessels
20-Jan-10	9:51	15	30.031040	-80.279908	W	2	3	60°	1	Recreational fishing vessel
20-Jan-10	10:02	20	30.031628	-80.451808	W	2	4	90°	1	Recreational fishing vessel
20-Jan-10	10:38	39	30.100508	-80.487656	E	3	4	75°	1	Recreational fishing vessel
20-Jan-10	10:44	41	30.100957	-80.253611	E	3	4	60°	1	Recreational fishing vessel
20-Jan-10	11:20	49	30.166030	-80.226508	W	4	3	20°	1	Recreational fishing vessel
20-Jan-10	11:21	42	30.166098	-80.255511	W	4	4	60°	1	Recreational fishing vessel
20-Jan-10	11:49	52	30.233458	-80.338097	E	5	4	60°	1	Unidentified mid-sized vessel
20-Jan-10	11:50	53	30.233382	-80.280425	E	5	4	90°	1	Recreational fishing vessel

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
20-Jan-10	15:04	112	30.432201	-80.477579	W	8	2	30°	1	Long liner
20-Jan-10	15:17	91	30.498198	-80.663331	E	9	2	90°	1	Yacht
20-Jan-10	15:19	122	30.500110	-80.565464	E	9	3	90°	2	Recreational fishing vessel
20-Jan-10	15:34	95	30.501025	-80.260058	E	9	2	90°	1	Recreational fishing vessel
27-Jan-10	11:06	13	30.434425	-80.359564	E	8	3	60°	1	Head boat
27-Jan-10	11:45	18	30.364432	-80.488151	W	7	4	30°	1	Long liner
27-Jan-10	12:42	26	30.231813	-80.398660	W	5	4	20°	1	Unidentified vessel
28-Jan-10	9:45	9	29.966230	-80.397776	E	1	4	90°	1	Recreational fishing vessel
28-Jan-10	9:46	11	29.966509	-80.359401	E	1	4	80°	1	Recreational fishing vessel
28-Jan-10	9:47	11	29.966570	-80.354634	E	1	4	30°	1	Recreational fishing vessel
28-Jan-10	9:50	14	29.967164	-80.296979	E	1	4	90°	3	3 recreational fishing vessels
28-Jan-10	10:13	19	29.964481	-80.211326	E	1	3	90°	3	Recreational fishing vessels
28-Jan-10	10:13	17	29.965387	-80.201084	E	1	4	90°	3	3 recreational fishing vessels
28-Jan-10	10:56	25	30.031573	-80.168782	W	2	4	90°	1	Recreational fishing vessel
28-Jan-10	10:57	28	30.031622	-80.199476	W	2	4	90°	1	Recreational fishing vessel
28-Jan-10	11:00	27	30.031496	-80.279421	W	2	4	90°	4	4 recreational fishing vessels
28-Jan-10	11:16	37	30.030857	-80.643838	W	2	4	90°	1	Recreational fishing vessel
28-Jan-10	12:09	47	30.100955	-80.318533	E	3	4	60°	3	Recreational fishing vessel
28-Jan-10	12:09	57	30.100983	-80.313937	E	3	3	30°	4	Recreational fishing vessels
28-Jan-10	12:14	59	30.101098	-80.148774	E	3	2	45°	1	Recreational fishing vessel
28-Jan-10	12:38	54	30.166182	-80.248065	W	4	4	90°	4	4 recreational fishing vessels
28-Jan-10	15:31	79	30.233959	-80.263940	E	5	4	90°	2	3 recreational fishing vessels
28-Jan-10	16:09	89	30.299074	-80.228467	W	6	4	90°	1	Recreational fishing vessel
19-Feb-10	9:31	4	29.965920	-80.293741	E	1	2	90°	1	Sport fishing vessel
19-Feb-10	10:01	7	30.031911	-80.296459	W	2	2	45°	1	Recreational fishing vessel
19-Feb-10	10:01	9	30.032119	-80.291237	W	2	3	90°	1	Sport fishing vessel
19-Feb-10	10:27	12	30.100370	-80.274202	E	3	2	90°	1	Sport fishing vessel
19-Feb-10	10:58	15	30.166571	-80.341002	W	4	3	90°	1	Sport fishing vessel
19-Feb-10	11:01	16	30.166727	-80.462567	W	4	4	90°	1	Sport fishing vessel
19-Feb-10	11:51	21	30.300606	-80.241793	W	6	1	90°	1	Sport fishing vessel
19-Feb-10	13:55	30	30.365627	-80.290494	W	7	2	45°	1	Recreational fishing vessel
19-Feb-10	14:50	41	30.499080	-80.607919	W	9	2	45°	1	Recreational fishing vessel
20-Feb-10	9:55	10	30.566785	-80.249336	E	10	3	60°	1	Recreational fishing vessel
20-Feb-10	9:55	6	30.566730	-80.244786	E	10	1	90°	2	Sport fishing vessels
20-Feb-10	9:56	11	30.566841	-80.190108	E	10	4	45°	3	3 recreational fishing vessels
20-Feb-10	10:00	13	30.566450	-80.076616	E	10	3	80°	1	Recreational fishing vessel
20-Feb-10	10:19	17	30.499805	-80.104982	W	9	3	45°	1	Recreational fishing vessel
20-Feb-10	10:21	18	30.499711	-80.166025	W	9	3	70°	2	Recreational fishing vessels
20-Feb-10	10:23	12	30.499951	-80.257601	W	9	3	90°	1	Sport fishing vessel



Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
20-Feb-10	11:19	44	30.433284	-80.422050	E	8	3	90°	1	Recreational fishing vessel
20-Feb-10	11:20	45	30.433369	-80.378408	E	8	1	90°	1	Unidentified vessel
20-Feb-10	11:22	47	30.433353	-80.298532	E	8	4	90°	1	Recreational fishing vessel
20-Feb-10	11:22	31	30.433389	-80.316924	E	8	1	90°	1	Sport fishing vessel
20-Feb-10	11:25	49	30.433492	-80.210262	E	8	1	90°	1	Recreational fishing vessel
20-Feb-10	11:25	33	30.433442	-80.198276	E	8	3	90°	1	Sport fishing vessel
20-Feb-10	11:26	50	30.433354	-80.168364	E	8	4	120°	1	Recreational fishing vessel
20-Feb-10	11:51	54	30.366062	-80.238532	W	7	3	25°	1	Recreational fishing vessel
20-Feb-10	11:51	37	30.366165	-80.224784	W	7	2	90°	1	Sport fishing vessel
20-Feb-10	12:46	70	30.299948	-80.298509	E	6	3	60°	1	Recreational fishing vessel
20-Feb-10	13:22	80	30.233586	-80.219858	W	5	1	60°	1	Recreational fishing vessel
20-Feb-10	13:23	81	30.233046	-80.246810	W	5	3	45°	2	Recreational fishing vessel
20-Feb-10	13:24	82	30.233236	-80.301142	W	5	2	90°	1	Recreational fishing vessel
20-Feb-10	15:29	103	30.166348	-80.412457	E	4	3	80°	1	Recreational fishing vessel
20-Feb-10	15:30	104	30.166488	-80.367434	E	4	4	60°	1	Recreational fishing vessel
20-Feb-10	15:33	106	30.166402	-80.261071	E	4	4	150°	1	Recreational fishing vessel
20-Feb-10	16:07	115	30.100649	-80.293715	W	3	4	70°	1	Recreational fishing vessel
20-Feb-10	16:10	117	30.100760	-80.408612	W	3	2	90°	1	Recreational fishing vessel
20-Feb-10	16:26	123	30.031242	-80.636736	E	2	3	90°	1	Recreational fishing vessel
20-Feb-10	16:28	124	30.031370	-80.594105	E	2	4	90°	1	Recreational fishing vessel
20-Feb-10	16:30	127	30.031659	-80.513103	E	2	3	90°	1	Recreational fishing vessel
20-Feb-10	17:19	139	29.965007	-80.705210	W	1	4	45°	1	Sailing vessel
21-Feb-10	8:36	4	29.965085	-80.570923	E	1	3	75°	1	Recreational fishing vessel
21-Feb-10	8:40	5	29.965363	-80.416248	E	1	4	45°	1	Recreational fishing vessel
21-Feb-10	8:43	6	29.965442	-80.303850	E	1	4	60°	1	Recreational fishing vessel
21-Feb-10	8:43	8	29.965428	-80.302501	E	1	2	90°	2	Recreational fishing vessel
21-Feb-10	8:45	7	29.965650	-80.242056	E	1	2	75°	1	Recreational fishing vessel
21-Feb-10	9:23	20	30.029313	-80.170863	W	2	3	90°	7	Recreational fishing vessels
21-Feb-10	9:29	20	30.032129	-80.388044	W	2	3	75°	2	Recreational fishing vessel
21-Feb-10	9:32	22	30.031998	-80.509835	W	2	3	75°	2	Recreational fishing vessel
21-Feb-10	10:10	35	30.100138	-80.326096	E	3	3	60°	2	Recreational fishing vessel
21-Feb-10	10:10	35	30.100165	-80.329679	E	3	3	90°	4	Recreational fishing vessels
21-Feb-10	10:12	37	30.100438	-80.244495	E	3	2	90°	4	Recreational fishing vessels
21-Feb-10	10:51	48	30.166867	-80.233026	W	4	2	60°	2	Recreational fishing vessel
21-Feb-10	10:52	50	30.166818	-80.250277	W	4	3	60°	1	Recreational fishing vessel
21-Feb-10	11:55	69	30.233233	-80.254824	E	5	2	90°	3	Recreational fishing vessel
21-Feb-10	11:56	83	30.232906	-80.209035	E	5	2	45°	2	Recreational fishing vessel
21-Feb-10	12:31	91	30.300450	-80.282578	W	6	3	45°	1	Recreational fishing vessel
21-Feb-10	14:34	94	30.365595	-80.507666	E	7	1	75°	1	Recreational fishing vessel



Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
21-Feb-10	15:37	113	30.433661	-80.211039	W	8	1	80°	1	Recreational fishing vessel
21-Feb-10	15:59	125	30.498949	-80.526624	E	9	2	45°	1	Recreational fishing vessel
21-Feb-10	16:32	134	30.567136	-80.164595	W	10	3	60°	1	Recreational fishing vessel
20-Mar-10	9:24	4	29.965405	-80.442936	E	1	2	90°	1	Sport fishing vessel
20-Mar-10	9:28	5	29.965618	-80.320747	W	1	3	85°	5	Recreational fishing vessel
20-Mar-10	9:28	6	29.965630	-80.318289	E	1	2	90°	2	Sport fishing vessel
20-Mar-10	9:28	7	29.965657	-80.299516	E	1	2	90°	2	Sport fishing vessel
20-Mar-10	9:28	8	29.965489	-80.289174	E	1	4	90°	1	Sport fishing vessel
20-Mar-10	9:30	6	29.966034	-80.227038	W	1	3	75°	1	Recreational fishing vessel
20-Mar-10	9:57	12	30.032618	-80.252962	E	2	3	75°	6	Recreational fishing vessel
20-Mar-10	10:00	14	30.032215	-80.370052	W	2	3	90°	1	Sport fishing vessel
20-Mar-10	10:06	20	30.032039	-80.494857	E	2	2	60°	3	Recreational fishing vessel
20-Mar-10	10:19	21	30.031535	-80.677812	W	2	3	90°	1	Sport fishing vessel
20-Mar-10	13:14	46	30.098707	-80.283797	W	3	2	75°	5	Recreational fishing vessel
20-Mar-10	13:37	51	30.166580	-80.186105	E	4	3	60°	3	Recreational fishing vessel
20-Mar-10	14:11	50	30.232641	-80.373472	E	5	2	90°	1	Sport fishing vessel
20-Mar-10	15:05	67	30.365093	-80.628397	E	7	4	90°	1	Sport fishing vessel
20-Mar-10	15:07	69	30.365349	-80.540195	E	7	3	90°	1	Sport fishing vessel
24-Mar-10	9:51	13	30.498885	-80.409094	W	9	4	90°	12	Fishing vessels (12)
24-Mar-10	9:54	14	30.498806	-80.529135	W	9	3	45°	1	Long liner
24-Mar-10	11:11	26	30.365469	-80.217044	W	7	2	75°	1	Recreational fishing vessel
24-Mar-10	11:21	30	30.365337	-80.384316	W	7	3	45°	1	Sailing vessel
31-Mar-10	13:37	7	29.965578	-80.259123	E	1	1	90°	1	Recreational fishing vessel
31-Mar-10	14:06	11	30.032225	-80.282244	W	2	4	90°	1	Recreational fishing vessel
31-Mar-10	14:21	15	30.031936	-80.521611	W	2	2	90°	1	Sport fishing vessel
31-Mar-10	14:37	22	30.100032	-80.516402	E	3	3	90°	1	Sport fishing vessel
31-Mar-10	14:51	28	30.099921	-80.270551	E	3	3	90°	2	Sport fishing vessel
31-Mar-10	15:54	38	30.499068	-80.579337	E	9	1	90°	1	Recreational fishing vessel
31-Mar-10	15:57	40	30.499239	-80.470925	E	9	3	60°	13	Recreational fishing vessels
1-Apr-10	9:20	4	30.566769	-80.137010	E	10	3	90°	1	Recreational fishing vessel
1-Apr-10	9:49	7	30.499743	-80.402926	W	9	4	90°	1	Recreational fishing vessel
1-Apr-10	9:49	8	30.499763	-80.391555	W	9	4	45°	1	Recreational fishing vessel
1-Apr-10	9:51	9	30.499692	-80.457930	W	9	4	60°	1	Long liner
1-Apr-10	10:07	12	30.433207	-80.437235	E	8	4	80°	1	Long liner
1-Apr-10	10:38	17	30.366132	-80.208367	W	7	2	60°	1	Recreational fishing vessel
1-Apr-10	10:45	20	30.365992	-80.483667	W	7	4	45°	1	Recreational fishing vessel
1-Apr-10	10:47	15	30.365772	-80.554187	W	7	3	90°	1	Sailboat
1-Apr-10	12:10	32	30.233194	-80.182214	W	5	4	45°	1	Recreational fishing vessel
1-Apr-10	14:33	61	30.166222	-80.416000	E	4	4	60°	1	Recreational fishing vessel

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
1-Apr-10	15:59	73	30.031416	-80.593560	E	2	4	60°	1	Recreational fishing vessel
2-Apr-10	9:22	10	29.965367	-80.405667	E	1	4	90°	2	Sport fishing vessel
2-Apr-10	9:28	15	29.965308	-80.327660	E	1	4	60°	1	Recreational fishing vessel
2-Apr-10	9:30	16	29.965589	-80.277965	E	1	2	90°	1	Recreational fishing vessel
2-Apr-10	10:15	43	30.032075	-80.093375	W	2	3	60°	1	Recreational fishing vessel
2-Apr-10	10:20	44	30.032208	-80.271337	W	2	2	60°	3	Recreational fishing vessel
2-Apr-10	11:24	52	30.099895	-79.918006	E	3	2	90°	1	Sport fishing vessel
2-Apr-10	11:53	97	30.167718	-80.254790	W	4	2	110°	2	Recreational fishing vessel
2-Apr-10	12:47	87	30.232937	-80.253059	E	5	2	90°	1	Sport fishing vessel
2-Apr-10	13:18	139	30.300408	-80.226106	W	6	1	75°	2	Recreational fishing vessel
2-Apr-10	13:18	100	30.300430	-80.226481	W	6	1	90°	1	Sport fishing vessel
2-Apr-10	13:26	104	30.304581	-80.317527	W	6	3	90°	1	Sport fishing vessel
2-Apr-10	15:41	169	30.365492	-80.242065	E	7	3	45°	1	Recreational fishing vessel
2-Apr-10	16:27	139	30.433605	-80.445163	W	8	3	130°	14	Sport fishing vessel
3-Apr-10	8:44	11	30.566752	-80.138561	E	10	3	60°	1	Recreational fishing vessel
3-Apr-10	8:45	12	30.566716	-80.112627	E	10	1	45°	1	Recreational fishing vessel
3-Apr-10	8:47	13	30.566691	-80.057854	E	10	3	90°	1	Recreational fishing vessel
3-Apr-10	9:15	20	30.499522	-80.067695	W	9	3	30°	1	Recreational fishing vessel
3-Apr-10	9:15	21	30.499577	-80.054118	W	9	3	60°	1	Recreational fishing vessel
3-Apr-10	9:26	24	30.499684	-80.420212	W	9	4	75°	24	Recreational fishing vessels(24)
3-Apr-10	10:04	42	30.433344	-80.166197	E	8	4	60°	1	Recreational fishing vessel
3-Apr-10	10:43	51	30.366282	-80.534787	W	7	4	75°	1	Recreational fishing vessel
7-May-10	9:25	4	30.101751	-80.281256	E	3	1	90°	1	2 recreational fishing vessels
7-May-10	9:29	6	30.101469	-80.139285	E	3	3	60°	1	Recreational fishing vessel
7-May-10	10:07	15	30.166003	-80.199334	W	4	3	90°	1	Recreational fishing vessel
7-May-10	10:59	39	30.233735	-80.269463	E	5	1	90°	1	Recreational fishing vessel
7-May-10	11:07	44	30.233837	-80.200552	E	5	3	90°	1	Recreational fishing vessel
7-May-10	12:14	49	30.366633	-80.119975	E	7	3	45°	1	Recreational fishing vessel
7-May-10	12:36	66	30.432908	-80.203905	W	8	3	90°	1	Recreational fishing vessel
7-May-10	14:30	65	30.500784	-80.531937	E	9	2	45°	1	Recreational fishing vessel
7-May-10	15:19	94	30.566305	-80.222107	W	10	3	45°	1	Recreational fishing vessel
4-Jun-10	8:49	4	29.966655	-80.552596	E	1	2	70°	1	Recreational fishing vessel
4-Jun-10	9:32	11	30.034070	-80.487975	W	2	4	60°	1	Recreational fishing vessel
4-Jun-10	9:53	18	30.099590	-80.282795	E	3	2	45°	1	Recreational fishing vessel
4-Jun-10	9:53	16	30.098859	-80.259753	E	3	4	75°	1	Recreational fishing vessel
4-Jun-10	13:41	55	30.366378	-80.440425	E	7	4	30°	1	Recreational fishing vessel
4-Jun-10	15:10	62	30.566346	-80.344892	W	10	4	45°	1	Recreational fishing vessel
5-Jun-10	9:01	5	30.567699	-80.150017	E	10	3	75°	1	Recreational fishing vessel
5-Jun-10	9:05	7	30.567319	-80.005364	E	10	2	90°	1	Recreational fishing vessel

Table 25 (continued). All other vessel sightings in the proposed USWTR site off of Jacksonville, Florida for aerial surveys conducted from January 2009 – June 2010.

Date	Time	Waypoint	Latitude	Longitude -1	Heading	Track Number	Angle Out	Degree Forward	Best Number	Comments
5-Jun-10	12:08	30	30.099784	-80.238805	W	3	1	90°	1	Sport fishing vessel
5-Jun-10	12:33	40	30.032601	-80.295307	W	2	3	30°	1	Recreational fishing vessel
5-Jun-10	12:34	33	30.032581	-80.277238	E	2	2	90°	1	Sport fishing vessel
5-Jun-10	13:03	38	29.965037	-80.228200	W	1	3	90°	1	Sport fishing vessel
5-Jun-10	13:04	46	29.964941	-80.272221	E	1	3	30°	1	Recreational fishing vessel
5-Jun-10	13:04	39	29.965006	-80.280635	W	1	4	90°		Sport fishing vessel
6-Jun-10	8:50	4	29.964159	-80.684290	E	1	2	30°	1	Recreational fishing vessel
6-Jun-10	10:01	20	30.101086	-80.307451	E	3	3	60°	1	Recreational fishing vessel
6-Jun-10	10:28	26	30.165926	-80.237026	W	4	4	45°	1	Recreational fishing vessel
6-Jun-10	10:32	27	30.165871	-80.373154	W	4	4	75°	1	Recreational fishing vessel
6-Jun-10	14:24	59	30.497019	-80.555517	E	9	1	90°	1	Head boat
6-Jun-10	14:29	61	30.500118	-80.368344	E	9	4	30°	1	Recreational fishing vessel
6-Jun-10	15:08	50	30.565992	-80.581742	W	10	2	75°	1	Recreational fishing vessel
7-Jun-10	8:51	4	30.567734	-80.320032	E	10	3	90°	1	Sailing vessel

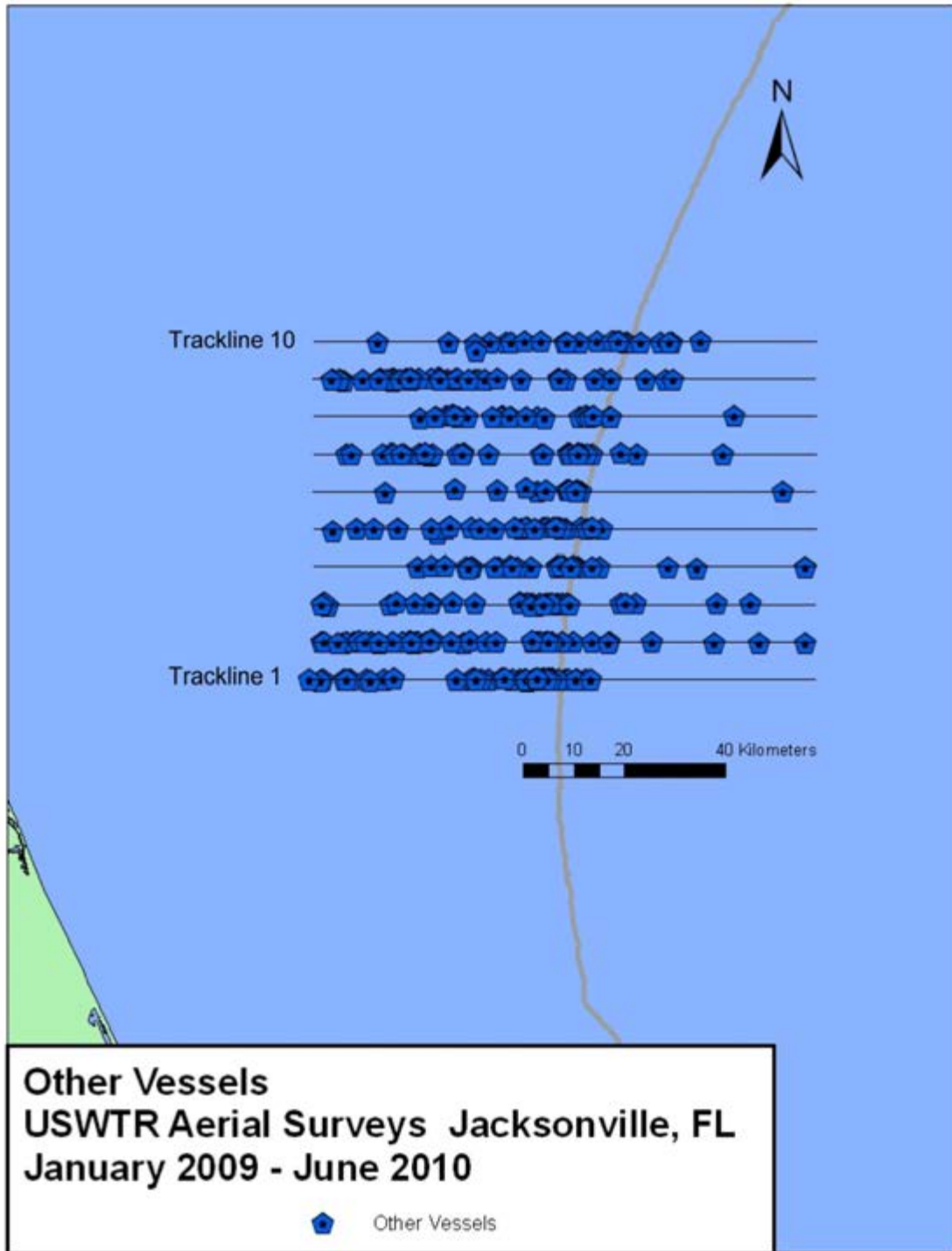


Figure 24. Other vessel sightings.

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Tuesday, January 27, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 12:46 WP#: 8 Lat: 29.96406 Long: -80.496005  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:47 WP#: 9 Lat: 29.95344 Long: -80.496258  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12/15/15  
Features used in Species ID: Robust dolphins with blunt snouts, gray overall coloration with darker gray cape  
Representative images used for Species ID: 2773, 2774, 2778, 2779, 2785, 2789, 2791, 2792  
Photographer: PBN Frame Numbers: 2766-2803 Spacer: 2804  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 12:52 WP#: 10 Lat: 29.95503 Long: -80.493835  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Animals were widely spaced and traveling slowly at the surface. Group had varied direction of travel, animals spent little time at the surface, but when they did surface they created a lot of disturbance

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Tuesday, January 27, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 13:00 WP#: 14 Lat: 29.963691 Long: -80.270123  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 3  
Observer: RJM Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:05 WP#: 15 Lat: 29.964498 Long: -80.243931  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: N/A

Representative images used for Species ID: No images obtained  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: 2.5 km

**Final Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Four animals swimming belly to belly near the surface with a fifth animal trailing. Animals were not relocated after initial sighting

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Tuesday, January 27, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 14:12 WP#: 36 Lat: 30.167443 Long: -79.901763  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:22 WP#: 37 Lat: 30.173666 Long: -79.887883  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Elongated, slender looking cetacean with pointed rostrum.  
Distinct band on pectoral flippers  
Representative images used for Species ID: None obtained  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: 1.5 km

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Plane broke track but was unable to relocate animal. Animal was seen motionless just under the surface, with head tilted up towards the surface

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Tuesday, January 27, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 14:40 WP#: 43 Lat: 30.164866 Long: -80.572730  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:40 WP#: 44 Lat: 30.176813 Long: -80.572701  
Species: *Stenella frontalis* Numbers (Low/High/Best): 80/100/100  
Features used in Species ID: Alternating dorsal bands of light and dark coloration, white rostrum tips, some individuals with obvious spotted pattern, light flank blaze  
Representative images used for Species ID: 2857, 2865, 2866, 2867, 2908, 2911  
Photographer: PBN Frame Numbers: 2805 - 2911 Spacer: 2912  
Calculated Distance from Track Line: 1.3 km

**Final Time and Position of Sighting**

Time: 14:53 WP#: 45 Lat: 30.177178 Long: -80.569800  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Multiple groups of 20-30 dolphins, some tight groups traveling fast in multiple directions, others engaged in milling. Some animals appeared to be engaged in foraging.

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Tuesday, January 27, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 15:20 WP#: 58 Lat: 30.233941 Long: -80.008966  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:21 WP#: 60 Lat: 30.228130 Long: -80.008411  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 18/25/25  
Features used in Species ID: Sturdy gray animal with short rostrums

Representative images used for Species ID: 2937, 2981, 2993  
Photographer: PBN Frame Numbers: 2928 - 2994 Spacer: 2995  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:25 WP#: 61 Lat: 30.239593 Long: -80.005026  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Group traveling at slow to moderate speed at the surface causing some splash when surfacing.  
Uniform gray coloration. The entire group was made up of 2-3 smaller sub groups.

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Thursday, February 26, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 09:59 WP#: 13 Lat: 30.564943 Long: -79.829102  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 09:59 WP#: 14 Lat: 30.565175 Long: -79.827777  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 11/15/12  
Features used in Species ID: Stocky bodies, short rostrums, distinct cape, and overall gray coloration.  
Representative images used for Species ID: 4271, 4316, 4317,  
Photographer: RJM Frame Numbers: 4258 - 4319 Spacer: 4320  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 10:18 WP#: 16 Lat: 30.571697 Long: -79.841274  
Calculated Distance Traveled: 1.5 km

**Behavior and Additional Comments**

Socializing, chasing, non-directional movement, 10-12 animals in small sub-groups, a couple of pairs swimming belly to belly.

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Thursday, February 26, 2009 Sighting # 2

**Initial Sighting on Track**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Track Line: 10 Beaufort Sea State: 3  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:06 WP#: 15 Lat: 30.565997 Long: -79.830736  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Small to medium sized (7-8m) whale, slender, dark grayish coloration with prominent white band on pectoral fins.  
Representative images used for Species ID: None  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Animal spotted while circling on a group of bottlenose dolphins traveling fast just beneath the surface. Whale seen twice then not relocated despite searching for 10 minutes.

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Thursday, February 26, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:53 WP#: 25 Lat: 30.498278 Long: -80.688160  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:53 WP#: 26 Lat: 30.489811 Long: -80.682168  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Light flank blaze to caudal edge of dorsal fin, white rostrum tip, alternating light and dark pattern dorsally  
Representative images used for Species ID: 4336, 4340, 4349  
Photographer: RJM Frame Numbers: 4320 - 4354 Spacer: 4355  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Slow travel, animals not relocated for a final position

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Thursday, February 26, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 14:08 WP#: 53 Lat: 30.231874 Long: -79.957889  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 3  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:08 WP#: 54 Lat: 30.235458 Long: -79.960768  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Small baleen whales (7-8 m) somewhat slender, dark gray body with distinctive white flipper bands  
Representative images used for Species ID: 4376, 4403, 4411, 4412, 4413, 4418, 4419, 4431  
Photographer: RJM Frame Numbers: 4320 - 4354 Spacer: 4355  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 14:29 WP#: 56 Lat: 30.242482 Long: -79.996356  
Calculated Distance Traveled: 3.5 km

**Behavior and Additional Comments**

Mother/calf pair with a third adult animal traveling slightly behind the pair. The calf performed several low breaches reminiscent of leaping in dolphins. The trio traveled a few meters below the surface in a westerly direction.

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Thursday, February 26, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 15:25 WP#: 66 Lat: 30.098636 Long: -80.048278  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 3  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:26 WP#: 67 Lat: 30.101772 Long: -80.051190  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Small baleen whale (7-8m), dark gray coloration with white flipper marks  
Representative images used for Species ID: None obtained  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Animal travelling very fast in a westerly direction  
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Friday, February 27, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 8:56 WP#: 4 Lat: 29.966110 Long: -80.54550  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 8:56 WP#: 5 Lat: 29.960482 Long: -80.551935  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Bulky thoracic region of body, stubby rostrum, dorsal fin placed further back on body, uniformly grey body coloration with darker gray dorsal cape  
Representative images used for Species ID: 4510, 4515, 4516, 4518-4523, 4525, 4527, 4528  
Photographer: PBN Frame Numbers: 4503-4533 Spacer: 4534  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 9:01 WP#: 6 Lat: 29.960601 Long: -80.543797  
Calculated Distance Traveled: 0.8

**Behavior and Additional Comments**

Single animal traveling at moderate speed close to the surface with occasional fast surfacings. Would occasionally mill at the surface before moving quicker again. Many dives out of view to deeper water.

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Friday, February 27, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:14 WP#: 11 Lat: 29.96619 Long: -80.143372  
Vertical Angle: 4 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 3  
Observer: RJM Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:18 WP#: 12 Lat: 29.975986 Long: -80.134317  
Species: *Grampus griseus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Blunt melon with no external rostrum, long sharply curved pectoral fins, tall dorsal fin, dark dorsal coloration and lighter side coloration, narrow peduncle.  
Representative images used for Species ID: 4538, 4539, 4546, 4548, 4555, 4565 – 4570, 4587  
Photographer: PBN Frame Numbers: 4535-4624 Spacer: 4625  
Calculated Distance from Track Line: 1.4 km

**Final Time and Position of Sighting**

Time: 9:25 WP#: 13 Lat: 29.981299 Long: -80.141176  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Animals were sharply changing directions underwater. Group made up of single animal or pairs traveling at moderate speed mostly deep underwater.

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Friday, February 27, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 9:58 WP#: 23 Lat: 30.031278 Long: -80.55348  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:58 WP#: 24 Lat: 30.035786 Long: -80.553049  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Uniform grey coloration, sturdy body with blunt rostrum. Dorsal fin placed further back on body.  
Representative images used for Species ID: 4627, 4628, 4632, 4633, 4639, 4641, 4645  
Photographer: PBN Frame Numbers: 4626-4652 Spacer: 4654  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:01 WP#: 25 Lat: 30.038902 Long: -80.55499  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals spaced well apart from one another traveling at a moderate rate of speed with frequent surfacing. Animals would occasionally hang at the surface leisurely then diving out of sight to deeper water before reappearing

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Friday, February 27, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 10:14 WP#: 34 Lat: 30.100584 Long: -80.468352  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: RJM Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:16 WP#: 35 Lat: 30.102491 Long: -80.471207  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 19/21/19  
Features used in Species ID: Animals evenly spaced not interacting much with one another. Uniform grey coloration, short stubby rostrum, stocky body.  
Representative images used for Species ID: 4655, 4656, 4658 - 4660, 4672, 4673, 4681 - 4683  
Photographer: PBN Frame Numbers: 4655-4697 Spacer: 4698  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:20 WP#: 36 Lat: 30.098243 Long: -80.463881  
Calculated Distance Traveled: 0.8

**Behavior and Additional Comments**

A few groups of 3-4 animals and some single animals on the purifier, group spent most of their time near the surface with frequently surfacing. Animals were slow traveling at first but then most formed into a closer group but continued same rate of travel.

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Friday, February 27, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 11:00 WP#: 47 Lat: 30.166043 Long: -80.42729  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 48 Lat: 30.169046 Long: -80.42919  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: White peduncle region, stubby rostrum and thick body with broad pectoral flippers.  
Representative images used for Species ID: 4713 - 4716  
Photographer: PBN Frame Numbers: 4699-4721 Spacer: 4722  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:09 WP#: 49 Lat: 30.177095 Long: -80.425155  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Three animals seen in a tight group traveling at moderate speed with most of their time spent below the surface. Animals surfacings followed by periods of traveling at depth. Animals spent more time further below surface once circling began.

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Friday, February 27, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 11:21 WP#: 51 Lat: 30.16608 Long: -80.50916  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: 3  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:13 WP#: 52 Lat: 30.167427 Long: -80.509722  
Species: *Stenella frontalis* Numbers (Low/High/Best): 7/7/7  
Features used in Species ID: Animals with alternating light, dark, light, dark pattern on body. Light coloration on tip of rostrum. Sharper curve to dorsal fin.  
Representative images used for Species ID: 4723, 4727 - 4734, 4741 - 4743, 4750, 4751, 4753  
Photographer: PBN Frame Numbers: 4723-4761 Spacer: 4762  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 11:17 WP#: 54 Lat: 30.173383 Long: -80.506422  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Animals milling and hanging close to the surface traveling at a very slow rate of speed. A second group was seen just off the main group containing 3-4 animals. Both groups showed some animals swimming belly to belly with one another.

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Friday, February 27, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 11:29 WP#: 57 Lat: 30.232767 Long: -80.61212  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:34 WP#: 58 Lat: 30.231678 Long: -80.618515  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: N/A

Representative images used for Species ID: N/A

Photographer: PBN Frame Numbers: 4763 to 4770 Spacer: 4771  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 11:40 WP#: 59 Lat: 30.223551 Long: -80.622452  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

The animal was difficult to locate because it was traveling deep to the surface and diving out of sight. Exhibited elusive behavior -possibly avoidance of plane?

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Friday, February 27, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 11:46 WP#: 63 Lat: 30.233359 Long: -80.447931  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: RJM Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:51 WP#: 64 Lat: 30.230772 Long: -80.440394  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: N/A

Representative images used for Species ID: N/A

Photographer: N/A Frame Numbers: No Photos obtained Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Unable to locate single animal after initial sighting.

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Friday, February 27, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 12:23 WP#: 73 Lat: 30.299344 Long: -80.589066  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:37 WP#: 74 Lat: 30.295815 Long: -80.583819  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: : Evenly spaced animals. Animals body uniform grey with lighter coloration on caudal peduncle. All animals had stocky body and short rostrum.  
Representative images used for Species ID: 4776 – 4781, 4785, 4790, and 4795  
Photographer: PBN Frame Numbers: 4775 to 4795 Spacer: 4797  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 12:39 WP#: 75 Lat: 30.2989 Long: -80.584954  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

A group of 4 animals were seen in a tight bunch with a single animal trailing behind.

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Friday, February 27, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 14:35 WP#: 82 Lat: 30.366772 Long: -80.47939  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 3  
Observer: RJM Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:40 WP#: 83 Lat: 30.366118 Long: -80.489115  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Animal had lighter blaze that trailed to middle or posterior portion of dorsal fin. Animal had a stocky body, short rostrum and nearly uniform grey body.  
Representative images used for Species ID: 4815, 4816, 4828, 4829, 4834, and 4835  
Photographer: PBN Frame Numbers: 4814- 4838 Spacer: 4839  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 14:41 WP#: 84 Lat: 30.366604 Long: -80.479999  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Single animal traveling slowly at surface and surfacing regularly.

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Friday, February 27, 2009 Sighting # 11

**Initial Sighting on Track**

Time: 14:48 WP#: 88 Lat: 30.367626 Long: -80.231613  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:48 WP#: 89 Lat: 30.367579 Long: -80.22393  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: All animals had uniform grey body coloration with stocky bodies and short rostrums. Animals had little interactions with one another while traveling.  
Representative images used for Species ID: 4840 - 4843, 4854, 4855, 4856, 4862, 4863, 4868  
Photographer: PBN Frame Numbers: 4840 - 4881 Spacer: 4882  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 14:55 WP#: 90 Lat: 30.357853 Long: -80.220953  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Eight animals sighted at the surface in a fairly tight group traveling slowly at surface and milling about. A single animal breaching and a single calf present.

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Friday, February 27, 2009 Sighting # 12

**Initial Sighting on Track**

Time: 16:08 WP#: 104 Lat: 30.565576 Long: 80.026118  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: 3  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: PBN

**Actual Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: N/A

Representative images used for Species ID: None obtained

Photographer: PBN Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Unable to relocate animal.

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Tuesday, June 9, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 13:41 WP#: 12 Lat: 30.499885 Long: -79.963026  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:42 WP#: 13 Lat: 30.502732 Long: -79.953532  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/10/8  
Features used in Species ID: dark gray cape narrowing to sharp point rostrally of blow hole, light caudal peduncle, robust body  
Representative images used for Species ID: 0142, 0164-0166, 0170-0172  
Photographer: PBN Frame Numbers: 0126 - 0174 Spacer: 0175  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 13:48 WP#: 14 Lat: 30.497689 Long: -79.951248  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Scattered, three sub-groups with 2-3 animals in each, travel at moderate pace  

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Tuesday, June 9, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 14:01 WP#: 19 Lat: 30.501601 Long: -80.456263  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:02 WP#: 20 Lat: 30.50566 Long: -80.452111  
Species: *Stenella frontalis* Numbers (Low/High/Best): 13/15/14  
Features used in Species ID: white rostrum tip, alternating light and dark coloration dorsally, light blaze continuing to posterior of dorsal fin, visible spotting pattern  
Representative images used for Species ID: 0189-0191, 0196, 0206, 0210  
Photographer: PBN Frame Numbers: 0176-0222 Spacer: 223  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: \_\_\_\_\_ WP#: \_\_\_\_\_ Lat: 30.506304 Long: -80.453673  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

One group in close association travelling slowly; milling  

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Tuesday, June 9, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 14:26 WP#: 31 Lat: 30.433695 Long: -80.339951  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:27 WP#: 32 Lat: 30.434622 Long: -80.341820  
Species: Stenella frontalis Numbers (Low/High/Best): 3/6/6  
Features used in Species ID: white rostrum tip, alternating light and dark coloration dorsally, brownish, mottled appearance  
Representative images used for Species ID: 0224-0227, 0238, 0239, 0241  
Photographer: PBN Frame Numbers: 0224-0252 Spacer: 253  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

Spread out  
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Wednesday, June 10, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 10:54 WP#: 24 Lat: 30.166286 Long: -80.402954  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:55 WP#: 25 Lat: 30.161913 Long: -80.401118  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/12/8  
Features used in Species ID: Uniform gray coloration with darker gray cape, light-colored peduncle, short rostrum with well-defined crease at melon  
Representative images used for Species ID: 0285, 0286, 0293, 0294  
Photographer: RCH Frame Numbers: 0254 to 0297 Spacer: 299  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 11:05 WP#: 26 Lat: 30.160568 Long: -80.394812  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Three to four small sub-groups, porpoising quickly and coming out of the water a lot, no calves observed

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Wednesday, June 10, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 11:59 WP#: 46 Lat: 30.298401 Long: -80.522205  
Vertical Angle: 1 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:04 WP#: 47 Lat: 30.297996 Long: -80.520986  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 2/4/3  
Features used in Species ID: Due to the elusive nature of the animals near the surface a definitive ID was not possible  
Representative images used for Species ID: 0304, 0305, 0306, 0307, 0308  
Photographer: RCH Frame Numbers: 0300 to 0308 Spacer: 309  
Calculated Distance from Track Line: 0.1km

**Final Time and Position of Sighting**

Time: 12:11 WP#: 48 Lat: 30.295621 Long: -80.510295  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Animals were elusive and did not surface frequently. The animals dove often and too deeply to easily track

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Wednesday, June 10, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 12:16 WP#: 51 Lat: 30.300569 Long: -80.683864  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:18 WP#: 52 Lat: 30.288698 Long: -80.673378  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15/22/18  
Features used in Species ID: Broad-based dorsal fin, light-colored peduncle, short rostrum with well-defined crease at melon, uniform gray coloration with darker gray cap  
Representative images used for Species ID: 0347, 0348, 0353, 0372, 0375  
Photographer: RCH Frame Numbers: 0310 to 0398 Spacer: 399  
Calculated Distance from Track Line: 1.7 km

**Final Time and Position of Sighting**

Time: 12:22 WP#: 53 Lat: 30.292229 Long: -80.673454  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

One group of eight animals, including one calf, and three to four smaller sub-groups of two to five animals. Animals spent a lot of time at the surface and were porpoising energetically.

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Wednesday, June 10, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 12:24 WP#: 55 Lat: 30.305039 Long: -80.706595  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:25 WP#: 56 Lat: 30.30267 Long: -80.704548  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12/18/16  
Features used in Species ID: Broad-based dorsal fin, light-colored peduncle, short rostrum with well-defined crease at melon, uniform gray coloration with darker gray cape  
Representative images used for Species ID: 0416, 0417, 0418, 0430  
Photographer: RCH Frame Numbers: 0400 to 0443 Spacer: 444  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 12:28 WP#: 57 Lat: 30.296539 Long: -80.707018  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Small, tight group, surfacing often, straight line travel, later noticed several lone animals separate from the main group

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Wednesday, June 10, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 14:47 WP#: 70 Lat: 30.366990 Long: -80.04106  
Vertical Angle: 3 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:50 WP#: 72 Lat: 30.376196 Long: -80.040349  
Species: *Grampus griseus* Numbers (Low/High/Best): 14/14/14  
Features used in Species ID: Large, tall dorsal fin, long pectoral fins, blunt head with cleft in melon, visible scarring patterns, Highly variable coloration  
Representative images used for Species ID: 0445, 0454, 0456, 0459, 0474  
Photographer: RCH Frame Numbers: 0445 to 0493 Spacer: 0494  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 14:52 WP#: 73 Lat: 30.376078 Long: -80.045071  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

One, tight, slow-moving group of 14, surfacing frequently.  

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Wednesday, June 10, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 15:30 WP#: 86 Lat: 30.432861 Long: -80.557906  
Vertical Angle: 2 Horizontal Bearing in Degrees: 80 Sighting Cue: Splash  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:32 WP#: 87 Lat: 30.428722 Long: -80.554191  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/10/10  
Features used in Species ID: White-tipped rostrum, spinal blaze, small, falcate dorsal fin with narrow base  
Representative images used for Species ID: 0498,0499,0520,0561,0562  
Photographer: RCH Frame Numbers: 0495 to 0572 Spacer: 0573  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:37 WP#: 88 Lat: 30.421615 Long: -80.558491  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Single group of 10 animals travelling slowly at surface.  

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Wednesday, June 10, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 15:50 WP#: 98 Lat: 30.503369 Long: -80.432152  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Splash  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:51 WP#: 99 Lat: 30.511654 Long: -80.435801  
Species: *Stenella frontalis* Numbers (Low/High/Best): 7/7/7  
Features used in Species ID: white-tipped rostrum, spinal blaze, small, falcate dorsal fin with narrow base, variable spotting  
Representative images used for Species ID: 0577, 0578, 0584, 0612, 0618  
Photographer: RCH Frame Numbers: 0574 to 0628 Spacer: 0629  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 15:58 WP#: 100 Lat: 30.507906 Long: -80.436733  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Seven animals were observed in association with probable Scombridae species, very active and surfacing often, frequent changes in direction. One sub-adult was present (and photographed) with no discernible spotting.

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Wednesday, June 10, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 16:06 WP#: 103 Lat: 30.496511 Long: -80.119075  
Vertical Angle: 1 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:07 WP#: 104 Lat: 30.493967 Long: -80.117448  
Species: *Grampus griseus* Numbers (Low/High/Best): 28/33/32  
Features used in Species ID: Large, tall dorsal fin, blunt head with a cleft in melon, long, narrow pectoral fins, variable scarring and coloration from dark to light and mottled  
Representative images used for Species ID: 0634, 0655, 0659, 0664, 0715, 0717, 0737  
Photographer: RCH Frame Numbers: 0630 to 0743 Spacer: 0744  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 16:17 WP#: 106 Lat: 30.492623 Long: -80.117227  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Three sub-groups present, a group of four, a group of 11, & a group of 17-18. The group of 17-18 had at least 5 mother calf pairs. Largest group in front, group of 11 in middle, 4 in rear. All were traveling slowly in the same general direction. One calf still had visible fetal folds(0655)

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Thursday, June 11, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:42 WP#: 13 Lat: 30.095770 Long: -80.662581  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:44 WP#: 14 Lat: 30.091657 Long: -80.659760  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Uniform gray coloration, broad-based dorsal fin, robust cranial region  
Representative images used for Species ID: 0747, 0748, 0749, 0750, 0751  
Photographer: RCH Frame Numbers: 0745 to 0782 Spacer: 0783  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:02 WP#: 15 Lat: 30.100131 Long: -80.670581  
Calculated Distance Traveled: 1.4 km

**Behavior and Additional Comments**

Animals were elusive and spent little time at the surface; only one animal was able to be tracked after initial sighting of all four animals. There were two sub-groups, one with three animals and one lone animal.

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Thursday, June 11, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 10:22 WP#: 19 Lat: 30.028040 Long: -80.040539  
Vertical Angle: 1 Horizontal Bearing in Degrees: 160 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:27 WP#: 20 Lat: 30.027809 Long: -80.045970  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Due to elusive nature and severe glare, photos sufficient for identification were not obtained  
Representative images used for Species ID: 0804  
Photographer: RCH Frame Numbers: 0784 to 0828 Spacer: 0829  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:45 WP#: 21 Lat: 30.031700 Long: -80.031444  
Calculated Distance Traveled: 1.5 km

**Behavior and Additional Comments**

Animals were elusive and spent little time at the surface. The animals were difficult to re-sight and glare was a severe hindrance to tracking the animals.

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Thursday, June 11, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:52 WP#: 26 Lat: 29.968391 Long: -79.816046  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:53 WP#: 27 Lat: 29.967194 Long: -79.804484  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12/15/14  
Features used in Species ID: Light-colored peduncle, blunt rostrum with well-defined crease at melon, broad-based dorsal fin  
Representative images used for Species ID: 0837, 0839, 0880, 0936, 0938  
Photographer: RCH Frame Numbers: 0830 to 0967 Spacer: 0967  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 10:59 WP#: 28 Lat: 29.969052 Long: -79.802684  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

At least one mother / calf pair were present. Animals were swimming energetically and surfacing frequently.

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Thursday, June 11, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 11:04 WP#: 30 Lat: 29.964809 Long: -79.946595  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:08 WP#: 31 Lat: 29.969022 Long: -79.941584  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 14/18/16  
Features used in Species ID: Light-colored peduncle with otherwise fairly uniform darker gray coloration, short rostrum and well-defined crease at melon, broad-based dorsal fin  
Representative images used for Species ID: 0982, 1022, 1045, 1069, 1075, 1084  
Photographer: RCH Frame Numbers: 0968 to 1104 Spacer: 1105  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 11:18 WP#: 32 Lat: 29.975404 Long: -79.957692  
Calculated Distance Traveled: 1.7 km

**Behavior and Additional Comments**

Animals were quite energetic at the surface, porpoising quickly, breaching and showing their bellies. Blows were quite visible and enduring.

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Wednesday, July 15, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 13:34 WP#: 40 Lat: 29.965550 Long: -80.061841  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:36 WP#: 41 Lat: 29.967081 Long: -80.067598  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Animal was elusive and hard to track and photograph. Species identification was not possible.  
Representative images used for Species ID: None  
Photographer: HJF Frame Numbers: 1323 to 1325 Spacer: 1326  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 13:50 WP#: 42 Lat: 29.961542 Long: -80.064672  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

One animal, fairly large, surfacing briefly while porpoising quickly in a single direction of travel. Animal was elusive and difficult to track and photograph. The animal appeared to have broad flukes, large dorsal fin, and uniform gray coloration.

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Wednesday, July 15, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 15:09 WP#: 75 Lat: 30.166654 Long: -80.121267  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:10 WP#: 76 Lat: 30.162002 Long: -80.116169  
Species: Tursiops truncatus Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Short, robust rostrum with well-defined crease, light-colored peduncle, broad flukes, blaze extending to posterior of large, falcate dorsal fin  
Representative images used for Species ID: 1348, 1352, 1353, 1354, 1356, 1363  
Photographer: HJF Frame Numbers: 1327 to 1371 Spacer: 1372  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 15:14 WP#: 77 Lat: 30.164936 Long: -80.116744  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Four animals in a line, milling at the surface, minimal disturbance to the water when porpoising, animals generally surfaced in pairs

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Wednesday, July 15, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 15:33 WP#: 90 Lat: 30.232068 Long: -80.674435  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:35 WP#: 91 Lat: 30.233127 Long: -80.675794  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/6/4  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 1373, 1385, 1387, 1414,  
Photographer: HJF Frame Numbers: 1373 to 1419 Spacer: 1420  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 15:55 WP#: 92 Lat: 30.230589 Long: -80.643397  
Calculated Distance Traveled: 3.1 km

**Behavior and Additional Comments**

Two animals seen initially at surface in loose association, on re-sight, two were close together and one further behind. Animals were porpoising quickly and coming mostly out of the water when surfacing. Animals separated and moved very quickly.

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Wednesday, July 15, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 16:53 WP#: 114 Lat: 30.299564 Long: -80.671078  
Vertical Angle: 2 Horizontal Bearing in Degrees: 45 Sighting Cue: Bodies  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:54 WP#: 115 Lat: 30.307943 Long: -80.677572  
Species: *Stenella frontalis* Numbers (Low/High/Best): 12/18/16  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 1424, 1440, 1444,  
Photographer: HJF Frame Numbers: 1421 to 1480 Spacer: n/a  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 17:00 WP#: 116 Lat: 30.307195 Long: -80.663111  
Calculated Distance Traveled: 1.4 km

**Behavior and Additional Comments**

One large, tightly grouped school with at least one smaller sub-group and one individual. Animals were active swimmers, porpoising with spray and some showing their bellies.

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Thursday, July 16, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:23 WP#: 7 Lat: 30.568348 Long: -79.834768  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 3  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:29 WP#: 8 Lat: 30.566033 Long: -79.834290  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 9/15/12  
Features used in Species ID: blunt rostrum, broad dorsal fluke, dark gray cape, light coloration of caudal peduncle  
Representative images used for Species ID: 1493, 1512, 1517, 1534  
Photographer: RCH Frame Numbers: 1481 - 1567 Spacer: 1568  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 9:41 WP#: 9 Lat: 30.573235 Long: -79.836365  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Originally sighted as a single large group, individuals began to spread apart with the largest congregation comprised of 9 animals. Moderate swimming was observed, with little time spent at the surface of the water. Final position was estimated from last known position.

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Thursday, July 16, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 14:30 WP#: 37 Lat: 30.031883 Long: -80.638464  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:35 WP#: 38 Lat: 30.039753 Long: -80.637413  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: dark gray cape with blaze extending to posterior of falcate dorsal fin, blunt rostrum, broad fluke, light peduncle  
Representative images used for Species ID: 1578, 1596, 1607  
Photographer: RCH Frame Numbers: 1569 - 1650 Spacer: 1651  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 14:44 WP#: 39 Lat: 30.040069 Long: -80.631538  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Two subgroups of 3 individuals each observed for majority of sighting. Groups were tightly packed and traveling together

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Thursday, July 16, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 14:52 WP#: 46 Lat: 30.034825 Long: -80.428645  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:54 WP#: 47 Lat: 30.037417 Long: -80.432347  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/15/12  
Features used in Species ID: alternating dark and light banding commencing with white tipped rostrum, visible spotting patterns, small dorsal fins with narrow base  
Representative images used for Species ID: 1674, 1716, 1717, 1755, 1757,  
Photographer: RCH Frame Numbers: 1652 - 1758 Spacer: 1759  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 15:01 WP#: 48 Lat: 30.041698 Long: -80.424853  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

One large cluster of 5-6 individuals observed with several outliers present.  

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Thursday, July 16, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 15:23 WP#: 58 Lat: 29.966717 Long: -79.872952  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:30 WP#: 61 Lat: 29.95899 Long: -79.87434  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: light peduncle, short, robust rostrum, dark gray cape, falcate dorsal fin  
Representative images used for Species ID: 1781, 1827, 1830, 1846  
Photographer: RCH Frame Numbers: 1760 - 1879 Spacer: 1880  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 15:35 WP#: 62 Lat: 29.954412 Long: -79.875597  
Calculated Distance Traveled: 1.4 km

**Behavior and Additional Comments**

Animals were very widely separated, with approximately 5 individuals in a close unit and a few outliers.  

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Thursday, July 16, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 15:54 WP#: 66 Lat: 29.96511 Long: -80.529185  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:58 WP#: 67 Lat: 29.969852 Long: -80.518172  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 11/15/13  
Features used in Species ID: dark gray cape with blaze terminating posterior to falcate dorsal fin, broad flukes, robust body, light coloration of peduncle  
Representative images used for Species ID: 1919, 1920, 1924, 1942 - 1945, 1947, 1948, 1952  
Photographer: RCH Frame Numbers: 1881 - 1956 Spacer: 1957  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 16:08 WP#: 68 Lat: 29.963819 Long: -80.520687  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

One main group of 7-10 individuals observed porpoising in synchrony, with a few individuals on outskirts of group. Calves observed.

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Tuesday, August 4, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 12.00 WP#: 4 Lat: 30.564040 Long: -80.590190  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12.05 WP#: 5 Lat: 30.570400 Long: -80.603840  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/4/4  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 2002-2020, 2025,2026  
Photographer: PBN Frame Numbers: 2002-2030 Spacer: 2031  
Calculated Distance from Track Line: 1.5 km

**Final Time and Position of Sighting**

Time: 12.16 WP#: 6 Lat: 30.565730 Long: -80.600240  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Loose group travelling at surface, elusive

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Tuesday, August 4, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 13.01 WP#: 16 Lat: 30.505030 Long: -80.423980  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13.03 WP#: 17 Lat: 30.507260 Long: -80.413700  
Species: *Stenella frontalis* Numbers (Low/High/Best): 17/30/25  
Features used in Species ID: Short, white-tipped rostrum, dark gray cape with blaze terminating mid-dorsal area, some were heavily spotted, slender pectoral fins, .  
Representative images used for Species ID: 2038,2044,2045,2047,2049,2050,2052,2053,2059  
Photographer: PBN Frame Numbers: 2032-2073 Spacer: 2074  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 13.07 WP#: 18 Lat: 30.503790 Long: -80.414620  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Travelling at surface, very active, tight pod with 2 - 3 sub-groups

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Tuesday, August 4, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 13.21 WP#: 23 Lat: 30.439310 Long: -80.509190  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13.23 WP#: 24 Lat: 30.440880 Long: -80.520350  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/7/6  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 2080-2083,2065,2086,2092-2094,2096,2097  
Photographer: PBN Frame Numbers: 2075-2097 Spacer: 2098  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 14:00 WP#: 25 Lat: 30.438040 Long: -80.514440  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Two or three groups travelling at surface with single mother and calf sub-group. Loosely grouped. Appeared to be two mother and calf pairs

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Tuesday, August 4, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 13.56 WP#: 30 Lat: 30.363450 Long: -79.862210  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13.58 WP#: 31 Lat: 30.359850 Long: -79.840650  
Species: *Stenella frontalis* Numbers (Low/High/Best): 23/25/24  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 2102,2104,2107,2117,2125,2126,2128-2132,2136  
Photographer: PBN Frame Numbers: 2099-2137 Spacer: 2138  
Calculated Distance from Track Line: 2.1 km

**Final Time and Position of Sighting**

Time: 14.00 WP#: 32 Lat: 30.359130 Long: -79.844040  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Travelling slowly, tight group. No sub-groups

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Tuesday, August 4, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 14.37 WP#: 43 Lat: 30.302250 Long: -80.486440  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14.38 WP#: 44 Lat: 30.297390 Long: -80.483850  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/8/7  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, some heavily spotted.  
Representative images used for Species ID: 2139,2153-2156  
Photographer: PBN Frame Numbers: 2139-2158 Spacer: 2159  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 14.42 WP#: 45 Lat: 30.296410 Long: -80.476740  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Travelling quickly at surface, One group of 3/4 animals with 2 single loosely associated with main group

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Tuesday, August 4, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 14.54 WP#: 50 Lat: 30.303310 Long: -80.021940  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 0  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14.56 WP#: 51 Lat: 30.303780 Long: -80.014140  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 29/40/35  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 2171,2172,2175,2179,2180,2188,2189,2195,2196  
Photographer: PBN Frame Numbers: 2160-2197 Spacer: 2198  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 15.00 WP#: 52 Lat: 30.300570 Long: -80.024140  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Very active at surface travelling quickly, One large group of 30 animals with 2 smaller groups

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Thursday, August 6, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 8:35 WP#: 4 Lat: 29.962723 Long: -80.651867  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Splash  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 8:37 WP#: 5 Lat: 29.960847 Long: -80.659663  
Species: *Stenella frontalis* Numbers (Low/High/Best): 15/25/20  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 2313, 2343, 2394, 2406, 2464  
Photographer: REH Frame Numbers: 2199-2469 Spacer: 2470  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 8:55 WP#: 6 Lat: 29.957501 Long: -80.656626  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Multiple groups with lots of leaps observed. Several individuals observed interacting with octopii.

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Thursday, August 6, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:09 WP#: 9 Lat: 29.966408 Long: -80.162451  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:10 WP#: 10 Lat: 29.961709 Long: -80.161598  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 18/22/20  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 2471, 2475, 2477 - 2479, 2488, 2504, 2513  
Photographer: REH Frame Numbers: 2471 - 2525 Spacer: 2526  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

Two groups of tightly-bunched animals observed, one with 8-10 individuals and another with 10-12.

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Thursday, August 6, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:37 WP#: 26 Lat: 30.172955 Long: -80.022675  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:37 WP#: 27 Lat: 30.172326 Long: -80.033970  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 15/20/17  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 2542, 2589, 2630 - 2632, 2647 - 2650  
Photographer: REH Frame Numbers: 2527 - 2659 Spacer: 2660  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 10:58 WP#: 28 Lat: 30.174719 Long: -80.045581  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Animals observed in several small subgroups of 2-3 individuals and one large group, which had approximately 10 individuals.

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Thursday, August 6, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 12:03 WP#: 39 Lat: 30.570891 Long: -80.342161  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:08 WP#: 40 Lat: 30.577324 Long: -80.330336  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/8/6  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 2677 - 2681, 2716 - 2721  
Photographer: REH Frame Numbers: 2661 - 2723 Spacer: 2724  
Calculated Distance from Track Line: 1.3 km

**Final Time and Position of Sighting**

Time: 12:15 WP#: 41 Lat: 30.579387 Long: -80.320378  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Animals observed in a couple of small sub-groups, with approximately 2-3 individuals per group

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Thursday, August 6, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 12:18 WP#: 43 Lat: 30.573597 Long: -80.406978  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Splash  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:25 WP#: 44 Lat: 30.579529 Long: -80.408211  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: \_\_\_\_\_

Representative images used for Species ID: n/a  
Photographer: n/a Frame Numbers: n/a Spacer: n/a  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

Animals were never relocated after initially sighted from the trackline. Actual time and position of animals is assumed.

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Monday, September 14, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 12:42 WP#: 9 Lat: 30.500930 Long: -80.371000  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:51 WP#: 10 Lat: 30.502628 Long: -80.365528  
Species: *Stenella frontalis* Numbers (Low/High/Best): 7/10/8  
Features used in Species ID: White-tipped rostrum, slender pectoral fins, slender body,  
dark cape with blaze terminating at dorsal fin  
Representative images used for Species ID: 3106, 3112, 3117  
Photographer: REH Frame Numbers: 3091 - 3141 Spacer: 3142  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 12:54 WP#: 11 Lat: 30.507498 Long: -80.371294  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Tightly packed group of approx. 8 individuals. Dolphins were evasive and difficult to relocate.

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Monday, September 14, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 13:43 WP#: 22 Lat: 30.376649 Long: -80.071964  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:46 WP#: 23 Lat: 30.370925 Long: -80.071616  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 8/10/9  
Features used in Species ID: Photographs were not good enough for a definitive identification  
Representative images used for Species ID: 3152, 3153  
Photographer: REH Frame Numbers: 3143-3212 Spacer: 3213  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 14:00 WP#: 24 Lat: 30.378394 Long: -80.067467  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Animals were actively jumping and leaping out of water. Sighting consisted of distinct  
subgroups that were swimming quickly in a variety of directions.

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Tuesday, September 15, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 09:56 WP#: 8 Lat: 29.965909 Long: -79.974323  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 09:57 WP#: 9 Lat: 29.962785 Long: -79.982730  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Short "stubby" rostrum, grey coloration with dark gray cape, light colored dorsal caudal peduncle, relatively broad flukes  
Representative images used for Species ID: 3235, 3259, 3260, 3269 to 3273, 3289  
Photographer: RCH Frame Numbers: 3214 to 3295 Spacer: 3296  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 10:05 WP#: 10 Lat: 29.956203 Long: -79.984944  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Fast travel, two dolphins "stacking" vertically (m/c pair). Fast surfacings, fairly long dive times, extended travel just sub-surface, looks like *T. truncatus* through binoculars. Behavior seem to indicate evasiveness in response to the plane - count as a "take".

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Tuesday, September 15, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 10:36 WP#: 17 Lat: 30.030769 Long: -80.596084  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:40 WP#: 18 Lat: 30.028446 Long: -80.584039  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/8/7  
Features used in Species ID: Long, white-tipped rostrum. light flank blaze  
Representative images used for Species ID: 3314, 3339, 3340, 3346 - 3348, 3350, 3362  
Photographer: RCH Frame Numbers: 3297 to 3366 Spacer: 3367  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 10:49 WP#: 19 Lat: 30.028226 Long: -80.594661  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Group consisted of smaller, sub -groups with 2 to 3 individuals each. Short surface times.

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Tuesday, September 15, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:56 WP#: 23 Lat: 30.101813 Long: -80.668628  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:57 WP#: 23 Lat: 30.102567 Long: -80.662731  
Species: *Steno bredanensis* Numbers (Low/High/Best): 45/60/50  
Features used in Species ID: Long snout, absence of pronounced melon, white lower jaw.  
Large triangular pectoral fins, pronounced "erect" dorsal fin, distinctive cape shape.  
Representative images used for Species ID: 3396-3399, 3402, 3418, 3430, 3438, 3467  
Photographer: RCH Frame Numbers: 3368 to 3560 Spacer: 3561  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 11:09 WP#: 25 Lat: 30.089881 Long: -80.656334  
Calculated Distance Traveled: 1.5 km

**Behavior and Additional Comments**

Dolphins in 3-4 sub-groups, one of which contained the majority of animals. One group of  
closely packed group (n~8) seemed to stay by themselves. A multitude of fish and birds as well  
as a manta ray were seen in the immediate vicinity of dolphins - feeding on same food source?

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Tuesday, September 15, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 11:54 WP#: 36 Lat: 30.160677 Long: -80.468741  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:56 WP#: 37 Lat: 30.155112 Long: -80.468606  
Species: *Stenella frontalis* Numbers (Low/High/Best): 30/45/40  
Features used in Species ID: White beak tip, long rostrum, light dark dorsal "banding" pattern.  
Distinctive light flank blaze  
Representative images used for Species ID: 3587, 3603, 3368, 3681, 3686, 3689, 3690, 3714  
Photographer: RCH Frame Numbers: 3562 to 3735 Spacer: 3736  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 12:05 WP#: 38 Lat: 30.158009 Long: -80.472135  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Several sub-groups, leisurely/slow travel. Several dolphins swimming on their backs showing  
white bellies. One dolphin photographed "feeding" on an octopus at the surface.  
Bull shark (?) circling a loggerhead sea turtle with several remora in tow.

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Tuesday, September 15, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 12:25 WP#: 48 Lat: 30.233541 Long: -80.350833  
Vertical Angle: 2 Horizontal Bearing in Degrees: 135 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:27 WP#: 49 Lat: 30.235518 Long: -80.357595  
Species: *Stenella frontalis* Numbers (Low/High/Best): 33/40/36  
Features used in Species ID: White beak tip, relatively long rostrum, visible spotted pattern.  
Light flank blaze and overall coloration pattern.  
Representative images used for Species ID: 3740, 3781, 3788, 3796, 3802, 3831  
Photographer: RCH Frame Numbers: 3737 to 3831 Spacer: 3832  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 12:31 WP#: 50 Lat: 30.237456 Long: -80.353966  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

One group. Slow travel in a patch of sargassum. At least one calf observed.

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Tuesday, September 15, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 13:11 WP#: 56 Lat: 30.299069 Long: -80.586644  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:13 WP#: 57 Lat: 30.302087 Long: -80.586596  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: Alternating light and dark "banding pattern" on dorsal surface.  
Light tipped beak, elongated rostrum. Spots visible.  
Representative images used for Species ID: 3836 - 3838, 3844 - 3846, 3861, 3904, 3905  
Photographer: RCH Frame Numbers: 3833 to 3915 Spacer: 3916  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 13:23 WP#: 58 Lat: 30.309339 Long: -80.580128  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Spread out into smaller groups. Medium to fast travel - difficult to photograph.

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Tuesday, September 15, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 15:20 WP#: 69 Lat: 30.363320 Long: -80.497555  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:21 WP#: 70 Lat: 30.358729 Long: -80.501714  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: white-tipped rostrum, bark cape with blaze terminating at dorsal fin, visible spots that are variable among individuals  
Representative images used for Species ID: 3930, 3941, 3944, 3972, 3973  
Photographer: RCH Frame Numbers: 3917 to 3974 Spacer: 3975  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:27 WP#: 71 Lat: -30.360309 Long: -80.505196  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals were porpoising through the water in a generally straight line. One mother and calf pair was present.

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Tuesday, September 15, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 16:14 WP#: 87 Lat: 30.431906 Long: -80.561818  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:17 WP#: 88 Lat: 30.429269 Long: -80.558831  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Short, heavy rostrum, robust body with uniform gray coloration, broad flukes  
Representative images used for Species ID: 4006, 4014, 4015, 4016  
Photographer: RCH Frame Numbers: 3976 to 4021 Spacer: 4022/4023  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 16:20 WP#: 89 Lat: 30.431404 Long: -80.565099  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

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Tuesday, September 15, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 16:31 WP#: 94 Lat: 30.497570 Long: -80.546267  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:32 WP#: 95 Lat: 30.492564 Long: -80.550183  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/9/8  
Features used in Species ID: Short, robust rostrum with well-defined crease at melon, broad flukes, uniform gray coloration  
Representative images used for Species ID: 4029, 4041, 4064, 4093, 4119  
Photographer: RCH Frame Numbers: 4024 to 4121 Spacer: 4122  
Calculated Distance from Track Line: 0.70 km

**Final Time and Position of Sighting**

Time: 16:38 WP#: 96 Lat: 30.499530 Long: -80.546738  
Calculated Distance Traveled: 0.80 km

**Behavior and Additional Comments**

Animals were porpoising quickly and often, blows were sometimes visible. Three small sub-groups were present - a single animal, three to four animals and four or more animals.

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Tuesday, September 15, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 17:11 WP#: 108 Lat: N 30.570448 Long: W 80.059358  
Vertical Angle: 2 Horizontal Bearing in Degrees: 145 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 17:12 WP#: 109 Lat: N 30.571831 Long: W 80.067951  
Species: *Grampus griseus* Numbers (Low/High/Best): 30/40/36  
Features used in Species ID: Square melon with vertical crease, tall dorsal fin, varying dark and light coloration with scarring, some animals with dark cape  
Representative images used for Species ID: 4212, 4215, 4228, 4243, 4280, 4324, 4398  
Photographer: RCH Frame Numbers: 4155 to 4427 Spacer: 4428  
Calculated Distance from Track Line: 0.80 km

**Final Time and Position of Sighting**

Time: 17:22 WP#: 110 Lat: N 30.570990 Long: W 80.078707  
Calculated Distance Traveled: 1.00 km

**Behavior and Additional Comments**

Multiple mother/calf pairs, photos show eight calves. Varying degrees of white with gray and black. At least four sub-groups present. The largest group of at least 16 animals was the only group with calves.

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Wednesday, September 16, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 10:20 WP#: 3 Lat: 29.961589 Long: -80.585552  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:22 WP#: 4 Lat: 29.954849 Long: -80.593794  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/9/9  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 4472-4484,4505-4509,4522  
Photographer: HJF Frame Numbers: 4429-4522 Spacer: 4523  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 10:28 WP#: 5 Lat: 29.959222 Long: -80.597073  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Some acrobatic activity observed, animals were diving deeper and spending less time at the surface, no calves visible

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Wednesday, September 16, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 10:35 WP#: 8 Lat: 29.964026 Long: -80.427463  
Vertical Angle: 3 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:37 WP#: 9 Lat: 29.972613 Long: -80.436649  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/25/25  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 4534,4538,4541,4554,4569,4571  
Photographer: HJF Frame Numbers: 4524-4605 Spacer: 4606  
Calculated Distance from Track Line: 1.3 km

**Final Time and Position of Sighting**

Time: 10:40 WP#: 10 Lat: 29.973252 Long: -80.437525  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Slow moving closely associated group, one animal was noticed to be particularly acrobatic

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Wednesday, September 16, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 11:25 WP#: 25 Lat: 30.031977 Long: -80.595213  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:26 WP#: 26 Lat: 30.036121 Long: -80.595111  
Species: *Stenella frontalis* Numbers (Low/High/Best): 12/12/12  
Features used in Species ID: Some animals displayed heavy spotting, slender pectoral fins, long, white-tipped rostrum, alternating dark/light "banding" dorsally  
Representative images used for Species ID: 4607-4614,4623  
Photographer: HJF Frame Numbers: 4607-4672 Spacer: 4673  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:28 WP#: 27 Lat: 30.035291 Long: -80.597056  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Travelling in one group, no calves observed  

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Wednesday, September 16, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 11:39 WP#: 36 Lat: 30.098525 Long: -80.629402  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:40 WP#: 37 Lat: 30.098577 Long: -80.630170  
Species: *Stenella frontalis* Numbers (Low/High/Best): 46/50/48  
Features used in Species ID: Long, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 4681,4684,4695-4700,4703-4708,4729  
Photographer: HJF Frame Numbers: 4674-4747 Spacer: 4748  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 11:42 WP#: 38 Lat: 30.094688 Long: -80.629736  
Calculated Distance Traveled: 0.4

**Behavior and Additional Comments**

One large group with several smaller groups travelling close by, some animals observed swimming belly up, calves present  

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Wednesday, September 16, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 11:50 WP#: 42 Lat: 30.100187 Long: -80.394185  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:51 WP#: 43 Lat: 30.097543 Long: -80.397718  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 4764,4770,4771,4781,4813,4822-4824  
Photographer: HJF Frame Numbers: 4749-4828 Spacer: 4829  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 11:58 WP#: 45 Lat: 30.093080 Long: -80.398887  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

One group of 7 animals with a smaller group of 3 and several single animals. Loosely associated group. Some deeper diving observed. Calves present

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Wednesday, September 16, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 12:01 WP#: 48 Lat: 30.101249 Long: -80.312913  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:05 WP#: 49 Lat: 30.109295 Long: -80.326179  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin. Short, robust rostrum with well-defined crease at base of melon.  
Representative images used for Species ID: \_\_\_\_\_  
Photographer: HJF Frame Numbers: 4830-4884 Spacer: 4885  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 12:17 WP#: 50 Lat: 30.105837 Long: -80.332837  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Travelling in one group with calves present

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Wednesday, September 16, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 12:51 WP#: 56 Lat: 30.165650 Long: -80.433371  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:52 WP#: 57 Lat: 30.164620 Long: -80.426851  
Species: *Stenella frontalis* Numbers (Low/High/Best): 12/12/12  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 4888-4900,4911-4916  
Photographer: HJF Frame Numbers: 4886-4925 Spacer: 4926  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 12:54 WP#: 58 Lat: 30.166512 Long: -80.426013  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

One group travelling slowly, some inverted swimming observed.  
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Wednesday, September 16, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 12:55 WP#: 60 Lat: 30.163212 Long: -80.468417  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:56 WP#: 61 Lat: 30.149300 Long: -80.473643  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Short, robust rostrum with well-defined crease, broad flukes, dark gray cape with blaze terminating at posterior of large, falcate dorsal fin  
Representative images used for Species ID: 4940,4953,4954,4960,4962-4964,4967  
Photographer: HJF Frame Numbers: 4927-4969 Spacer: 4970  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 13:06 WP#: 62 Lat: 30.151633 Long: -80.470262  
Calculated Distance Traveled: 1.6 km

**Behavior and Additional Comments**

Travelling rapidly, elusive. Originally observed as two small groups which later joined into one group.  
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Wednesday, September 16, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 13:11 WP#: 64 Lat: 30.169747 Long: -80.510894  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:12 WP#: 65 Lat: 30.174440 Long: -80.501961  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/7/7  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 4984,5004,5006,5008,5022,5041-5043  
Photographer: HJF Frame Numbers: 4871-5043 Spacer: 5044  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 13:19 WP#: 66 Lat: 30.177922 Long: -80.507244  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Observed throwing fish out of the water repeatedly, loose grouping with several single animals at the edges, fast travelling. A shark was observed and photographed close to the group

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Wednesday, September 16, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 13:25 WP#: 68 Lat: 30.166367 Long: -80.688584  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:26 WP#: 69 Lat: 30.170953 Long: -80.685147  
Species: *Stenella frontalis* Numbers (Low/High/Best): 16/16/16  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 5114,5120,5124,5134,5141-5167  
Photographer: HJF Frame Numbers: 5045-5213 Spacer: 5214  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 13:35 WP#: 70 Lat: 30.166820 Long: -80.686157  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

A leatherback turtle was observed with a dense cloud of small fish surrounding it. Larger fish were attracted and the dolphins followed. Vigorous feeding activity was observed during the entire encounter. Calves were present.

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Wednesday, September 16, 2009 Sighting # 11

**Initial Sighting on Track**

Time: 14:58 WP#: 74 Lat: 30.235062 Long: -80.632629  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:59 WP#: 75 Lat: 30.234286 Long: -80.638299  
Species: Unidentified Delphinid Numbers (Low/High/Best): 8/12/11  
Features used in Species ID: N/A

Representative images used for Species ID: 5220,5240,5448,5253-5255,5263  
Photographer: HJF Frame Numbers: 5215-5263 Spacer: 5264  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:05 WP#: 76 Lat: 30.243345 Long: -80.636864  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Tight group travelling quickly, most animals were observed swimming in pairs

Wednesday, September 16, 2009 Sighting # 12

**Initial Sighting on Track**

Time: 15:17 WP#: 84 Lat: 30.233124 Long: -80.355071  
Vertical Angle: 2 Horizontal Bearing in Degrees: 85 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:18 WP#: 85 Lat: 30.223357 Long: -80.357840  
Species: Stenella frontalis Numbers (Low/High/Best): 22/24/23  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 854,0855,0856,0859,0867,0869  
Photographer: HJF Frame Numbers: 0820-0871 Spacer: 0872  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 15:22 WP#: 86 Lat: 30.225622 Long: -80.355513  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Travelling in close group, no calves observed



Wednesday, September 16, 2009 Sighting # 13

**Initial Sighting on Track**

Time: 15:41 WP#: 93 Lat: 30.300652 Long: -79.802603  
Vertical Angle: 3 Horizontal Bearing in Degrees: 170 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:42 WP#: 94 Lat: 30.303848 Long: -79.787409  
Species: *Grampus griseus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Large, tall dorsal fin, long pectoral fins, blunt head with cleft in melon, visible scarring patterns  
Representative images used for Species ID: 879,0880,0889,0888  
Photographer: HJF Frame Numbers: 0872-0913 Spacer: 0914  
Calculated Distance from Track Line: 1.5 km

**Final Time and Position of Sighting**

Time: 15:44 WP#: 95 Lat: 30.301772 Long: -79.789834  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Two mother calf pairs were observed with no other animals observed.

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Wednesday, September 16, 2009 Sighting # 14

**Initial Sighting on Track**

Time: 16:06 WP#: 100 Lat: 30.300613 Long: -80.565902  
Vertical Angle: 2 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:07 WP#: 101 Lat: 30.298897 Long: -80.554275  
Species: *Stenella frontalis* Numbers (Low/High/Best): 33/38/36  
Features used in Species ID: Short, white-tipped rostrum, small, falcate dorsal fin, dark gray cape with blaze terminating mid-dorsal area, slender pectoral fins, some were heavily spotted.  
Representative images used for Species ID: 0915,0921,0925,0933,0949,0963,0972,0995  
Photographer: HJF Frame Numbers: 1914-1000 Spacer: 1001  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 16:11 WP#: 102 Lat: 30.301012 Long: -80.552611  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Observed a large group with several smaller groups at the edges, travelling quickly possibly chasing fish, calves present

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Friday, September 18, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 8:55 WP#: 5 Lat: 30.564449 Long: -80.513042  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 3  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 8:56 WP#: 6 Lat: 30.564918 Long: -80.519281  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/20/17  
Features used in Species ID: Alternating light and dark pattern down the body, white tip on the rostrum, white flank blaze terminates mid-dorsally  
Representative images used for Species ID: 023, 024, 033  
Photographer: RJM Frame Numbers: 1 to 88 Spacer: 89  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 9:03 WP#: 7 Lat: 30.560970 Long: -80.520047  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Animals were spread out, moving fast, jumping and splashing, active at the surface.

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Friday, September 18, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:08 WP#: 11 Lat: 30.562775 Long: -80.377244  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 3  
Observer: EWC Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:10 WP#: 11 Lat: 30.571772 Long: -80.382930  
Species: *Stenella frontalis* Numbers (Low/High/Best): 19/30/24  
Features used in Species ID: Alternating light and dark pattern down the body, white tip on the rostrum, light colored flank blaze terminating mid-dorsally  
Representative images used for Species ID: 121, 128, 129, 207  
Photographer: RJM Frame Numbers: 90 to 238 Spacer: 239  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 9:16 WP#: 12 Lat: 30.566977 Long: -80.375850  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Sub-group of six individuals. All moving east as a tight group, hanging at the surface or just below. Some doing deeper dives.

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Friday, September 18, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 9:50 WP#: 21 Lat: 30.497510 Long: -80.389473  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: EWC Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:51 WP#: 22 Lat: 30.500495 Long: -80.387744  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/12/12  
Features used in Species ID: Alternating light and dark pattern down the body. White tip on the rostrum, light flank blaze terminating mid-dorsally  
Representative images used for Species ID: 248, 252, 256, 260, 261, 263, 277, 296  
Photographer: RJM Frame Numbers: 240 - 386 Spacer: 387  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 10:00 WP#: 23 Lat: 30.490680 Long: -80.387463  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

One group of 8 and one group of 4 individuals. Both travelling at surface or just beneath.  
Moving South, and some belly to belly swimming.

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Friday, September 18, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 10:21 WP#: 34 Lat: 30.434675 Long: -80.426475  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: EWC Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:22 WP#: 35 Lat: 30.441061 Long: -80.427384  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40/50/50  
Features used in Species ID: Alternating light and dark pattern down the body. White tip on the rostrum, visible spotting  
Representative images used for Species ID: 404, 423, 430, 482  
Photographer: RJM Frame Numbers: 388 - 558 Spacer: 559  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:30 WP#: 36 Lat: 30.431570 Long: -80.427382  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Surface to just below surface swimming. Calves present. There were two groups with at least 20 in each group. Traveling east in a tight formation, some doing deeper dives and some belly to belly swimming.

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Friday, September 18, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 11:19 WP#: 50 Lat: 30.299226 Long: -80.649428  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:20 WP#: 51 Lat: 30.291406 Long: -80.650391  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Most likely Stenella frontalis, but pictures are inconclusive.

Representative images used for Species ID: N/A (best images 565, 566)  
Photographer: RJM Frame Numbers: 560 - 568 Spacer: 569  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

The animals were not sighted again for a final waypoint. Animals were traveling spread out, followed by a deep dive. They may have been showing some avoidance behavior.

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Friday, September 18, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 12:18 WP#: 62 Lat: 30.233594 Long: -80.419848  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: RJM Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:19 WP#: 63 Lat: 30.238101 Long: -80.415326  
Species: Tursiops truncatus Numbers (Low/High/Best): 10/18/16  
Features used in Species ID: Robust animals with a uniform grey color throughout, short rostrum

Representative images used for Species ID: 570, 574, 575, 609, 626  
Photographer: RJM Frame Numbers: 570 - 684 Spacer: 685  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 12:33 WP#: 64 Lat: 30.231760 Long: -80.410858  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Animals were jumping high out of the water, playing, darting different directions, some were swimming belly to belly. Most were swimming just below the surface moving southeast.

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Friday, September 18, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 14:30 WP#: 7 Lat: 30.163411 Long: -80.555860  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:33 WP#: 8 Lat: 30.160878 Long: -80.563221  
Species: *Stenella frontalis* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: White-tipped rostrum, dark cape with blaze terminating near dorsal fin, variable spotting present between individuals  
Representative images used for Species ID: 5367, 5368, 5369, 5370  
Photographer: REH Frame Numbers: 5349-5382 Spacer: 5383  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 14:35 WP#: 9 Lat: 30.156092 Long: -80.562976  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Animals swimming consistently in one direction. Sighting consisted of several separate individuals who did not form a cohesive group.

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Friday, September 18, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 14:37 WP#: 12 Lat: 30.164431 Long: -80.502899  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:38 WP#: 13 Lat: 30.168336 Long: -80.505832  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: robust rostrum and well-defined crease between melon and rostrum, uniform gray coloration, broad flukes  
Representative images used for Species ID: 5394, 5396, 5398, 5402  
Photographer: REH Frame Numbers: 5384 - 5407 Spacer: 5408  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 14:40 WP#: 14 Lat: 30.164341 Long: -80.507410  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Animals were tightly grouped and swimming together.

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Friday, September 18, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 15:26 WP#: 26 Lat: 30.099408 Long: -80.694116  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:26 WP#: 27 Lat: 30.100683 Long: -80.694371  
Species: *Stenella frontalis* Numbers (Low/High/Best): 5/8/7  
Features used in Species ID: white-tipped rostrum, dark cape, some with blaze terminating near dorsal fin, variable spotting among individuals  
Representative images used for Species ID: 5423, 5448, 5456  
Photographer: REH Frame Numbers: 5409 - 5480 Spacer: 5481  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 15:34 WP#: 28 Lat: 30.096741 Long: -80.689057  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Sighting consisted of one group of three individuals with several outliers. Animals were swimming consistently in one direction. At least one individual photographed with an octopus.

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Friday, September 18, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 15:38 WP#: 32 Lat: 30.031971 Long: -80.690751  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:41 WP#: 33 Lat: 30.032023 Long: -80.699443  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12/17/15  
Features used in Species ID: short, robust rostrum, fairly uniform gray coloration with darker gray cape, well-defined crease at melon, broad flukes  
Representative images used for Species ID: 5503, 5514, 5518  
Photographer: REH Frame Numbers: 5482 - 5520 Spacer: 5521  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 15:44 WP#: 34 Lat: 30.029037 Long: -80.701106  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Sighting consisted of several groups of approximately four individuals each.

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Friday, September 18, 2009 Sighting # 11

**Initial Sighting on Track**

Time: 15:47 WP#: 36 Lat: 30.031929 Long: -80.628495  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:52 WP#: 37 Lat: 30.039557 Long: -80.636833  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Robust rostrum with well-defined crease at melon, broad flukes, fairly uniform gray coloration  
Representative images used for Species ID: 5536, 5538, 5549, 5550  
Photographer: REH Frame Numbers: 5522 - 5557 Spacer: 5558  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 15:55 WP#: 38 Lat: 30.036280 Long: -80.636358  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Individuals were swimming tightly together.  
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Friday, September 18, 2009 Sighting # 12

**Initial Sighting on Track**

Time: 16:08 WP#: 42 Lat: 30.032582 Long: -80.177934  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:10 WP#: 43 Lat: 30.026112 Long: -80.183865  
Species: *Grampus griseus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Square melon with vertical crease, tall dorsal fin, robust body and large flukes, some with dark, straight cape, variable dark and light coloration and scarring  
Representative images used for Species ID: 5574, 5596, 5597, 5599, 5601, 5605  
Photographer: REH Frame Numbers: 5559 - 5611 Spacer: 5612  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 16:12 WP#: 44 Lat: 30.026529 Long: -80.185354  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Animals were swimming in close proximity to each other.  
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Wednesday, September 30, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:10 WP#: 5 Lat: 29.966322 Long: -80.488793  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:12 WP#: 6 Lat: 29.960539 Long: -80.492943  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/5/5  
Features used in Species ID: White-tipped rostrum, cape with blaze terminating at the dorsal fin, spotting on some animals  
Representative images used for Species ID: 6635, 6642, 6681, 6682, 6710, 6711  
Photographer: PBN Frame Numbers: 6619 to 6749 Spacer: 6750  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 9:19 WP#: 7 Lat: 29.960620 Long: -80.495537  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

One group, jumping from water when porpoising, rapid rate of travel, one mother / calf pair, one animal was showing its belly

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Wednesday, September 30, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:59 WP#: 18 Lat: 30.031530 Long: -80.410441  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:00 WP#: 19 Lat: 30.034495 Long: -80.412547  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: White-tipped rostrum, dark cape with blaze terminating at dorsal fin, variable spotting among individuals  
Representative images used for Species ID: 6795, 6796  
Photographer: PBN Frame Numbers: 6751 to 6798 Spacer: 6799  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 10:08 WP#: 20 Lat: 30.039895 Long: -80.424291  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

One main group, traveling in a tight group, at least one individual and one pair traveling further from the group, one animal photographed throwing an octopus from the water

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Wednesday, September 30, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:19 WP#: 24 Lat: 30.099785 Long: -80.670942  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Splash  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:19 WP#: 25 Lat: 30.109130 Long: -80.676868  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/15/12  
Features used in Species ID: White-tipped rostrum, dark cape with lighter blaze terminating at dorsal fin, variable spotting among individuals  
Representative images used for Species ID: 6813, 6820, 6824, 6856  
Photographer: PBN Frame Numbers: 6800 to 6860 Spacer: 6861  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 10:25 WP#: 26 Lat: 30.105128 Long: -80.677213  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals were very active at the surface, group was spread out, at least one mother / calf pair

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Wednesday, September 30, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 10:31 WP#: 33 Lat: 30.101382 Long: -80.445833  
Vertical Angle: 2 Horizontal Bearing in Degrees: 125 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:33 WP#: 34 Lat: 30.095493 Long: -80.448507  
Species: *Stenella frontalis* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: White-tipped rostrum, dark cape with lighter blaze terminating at the dorsal fin, some individuals are heavily spotted  
Representative images used for Species ID: 6874, 6889, 6895, 6896  
Photographer: PBN Frame Numbers: 6862 to 6945 Spacer: 6946  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:36 WP#: 35 Lat: 30.095637 Long: -80.445367  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Animals were traveling very quickly, jumping clear of the water when porpoising, a school of fairly large fish present as well

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Wednesday, September 30, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 10:38 WP#: 37 Lat: 30.098520 Long: -80.397580  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:40 WP#: 38 Lat: 30.089326 Long: -80.407715  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/26/23  
Features used in Species ID: White-tipped, slender rostrum, alternate light/dark banding on dorsal side, light-colored blaze terminating mid-dorsal  
Representative images used for Species ID: 6958, 6975, 6983, 6990, 6991  
Photographer: PBN Frame Numbers: 6947 to 6996 Spacer: 6997  
Calculated Distance from Track Line: 1.4 km

**Final Time and Position of Sighting**

Time: 10:41 WP#: 39 Lat: 30.090463 Long: -80.406134  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

4-5 subgroups, 16 in one group and then smaller numbers in surrounding groups, at least two mother / calf pairs

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Wednesday, September 30, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 11:05 WP#: 47 Lat: 30.165561 Long: -80.035880  
Vertical Angle: 2 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:06 WP#: 48 Lat: 30.169024 Long: -80.034752  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: Robust bodies, short rostrum, well-defined crease at melon, light-colored peduncle, large flukes, mostly uniform gray coloration  
Representative images used for Species ID: 7026, 7027, 7038, 2039, 7046  
Photographer: PBN Frame Numbers: 6998 to 7055 Spacer: 7056  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:09 WP#: 49 Lat: 30.170270 Long: -80.030787  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals were leaping and traveling quickly

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Wednesday, September 30, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 11:25 WP#: 55 Lat: 30.167374 Long: -80.605349  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:27 WP#: 56 Lat: 30.163869 Long: -80.607505  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/4/4  
Features used in Species ID: White-tipped rostrum, light-colored blaze terminating mid-dorsal, spotted pattern visible on some individuals  
Representative images used for Species ID: 7064, 7066, 7082, 7109  
Photographer: PBN Frame Numbers: 7057 to 7155 Spacer: 7156  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:32 WP#: 57 Lat: 30.163285 Long: -80.600294  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

One small group, porpoising quickly, moving in one direction, then changing direction and swimming more erratically- possible foraging observed, at least one mother/calf pair present

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Wednesday, September 30, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 11:35 WP#: 59 Lat: 30.166125 Long: -80.696189  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:36 WP#: 60 Lat: 30.162798 Long: -80.684799  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: White-tipped, long rostrum, light-colored blaze terminating mid-dorsal  
Representative images used for Species ID: 7172, 7173, 7179, 7025  
Photographer: PBN Frame Numbers: 7157 to 7210 Spacer: 7211  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 11:42 WP#: 61 Lat: 30.169959 Long: -80.698699  
Calculated Distance Traveled: 1.6 km

**Behavior and Additional Comments**

Animals were porpoising quickly, lots of splashing, one dolphin in the vicinity of a large school of fish, birds circling, possibly foraging

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Wednesday, September 30, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 11:48 WP#: 66 Lat: 30.229897 Long: -80.627199  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:48 WP#: 67 Lat: 30.240264 Long: -80.626807  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/10/9  
Features used in Species ID: Light-colored blaze terminating mid-dorsal, white-tipped rostrum, very narrow peduncle at fluke insertion, variable spotting among individuals  
Representative images used for Species ID: 7229, 7245, 7251, 7256, 7260, 7268  
Photographer: PBN Frame Numbers: 7212 to 7278 Spacer: 7279  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 11:52 WP#: 68 Lat: 30.239559 Long: -80.634311  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

One group of animals tightly grouped together, swimming rapidly in the same direction

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Wednesday, September 30, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 14:52 WP#: 91 Lat: 30.435534 Long: -80.014199  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:55 WP#: 92 Lat: 30.443106 Long: -80.010302  
Species: *Grampus griseus* Numbers (Low/High/Best): 24/30/26  
Features used in Species ID: Vertical crease in blunt melon, tall, dark dorsal fin, varying color patterns of black, gray, and white- some with dark cape, some mottled, variable scarring  
Representative images used for Species ID: 7306, 7310, 7316, 7326, 7357  
Photographer: PBN Frame Numbers: 7289 to 7361 Spacer: 7362  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 14:59 WP#: 93 Lat: 30.442096 Long: -80.017633  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Large group, closely grouped with a few individuals more widely dispersed on the fringe. One direction of travel, surfacing frequently, no calves present (first of the large pods of Grampus we have seen with no calves present).

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Wednesday, September 30, 2009 Sighting # 11

**Initial Sighting on Track**

Time: 15:35 WP#: 103 Lat: 30.564806 Long: -80.336784  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:36 WP#: 104 Lat: 30.568879 Long: -80.340131  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/10/9  
Features used in Species ID: White-tipped rostrum, variable spotting among individuals,  
light-colored blaze terminating mid-dorsal  
Representative images used for Species ID: 7369, 7375, 7422  
Photographer: PBN Frame Numbers: 7363 to 7429 Spacer: 7430  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:38 WP#: 105 Lat: 30.567619 Long: -80.336968  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Animals were moving quickly in one tight group, seemed to be a lot of rolling and tactile  
interaction

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Thursday, October 1, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:28 WP#: 15 Lat: 30.498309 Long: -80.396071  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:35 WP#: 16 Lat: 30.499122 Long: -80.404954  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: White rostum tip, visible spotting pattern, light blaze continuing to posterior of dorsal fin  
Representative images used for Species ID: 7462-7464,7467,7468,775  
Photographer: RCH Frame Numbers: 7431-7480 Spacer: 7481  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 9:28 WP#: 17 Lat: 30.494907 Long: -80.402497  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Two sets of two animals, swimming in unison  

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Thursday, October 1, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:57 WP#: 15 Lat: 30.436015 Long: -80.451151  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:58 WP#: 25 Lat: 30.441838 Long: -80.454912  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/30/25  
Features used in Species ID: White rostum tip, visible spotting pattern, light blaze continuing to posterior of dorsal fin, Alternating light and dark coloration dorsally  
Representative images used for Species ID: 7488,7490,7523,7526,7538,7539,7541,7544,7546  
Photographer: RCH Frame Numbers: 7482-7551 Spacer: 7552  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:01 WP#: 25 Lat: 30.433327 Long: -80.450960  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

One large group of approximately 20 animals with several individuals at fringes, numerous calves in group.  

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Thursday, October 1, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 10:06 WP#: 29 Lat: 30.432057 Long: -80.318377  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:08 WP#: 30 Lat: 30.429398 Long: -80.324880  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: White rostrum tip, visible spotting pattern, light blaze continuing to posterior of dorsal fin, alternating light and dark coloration dorsally  
Representative images used for Species ID: 7555,7567,7569,7586,7587,7588,7604  
Photographer: RCH Frame Numbers: 7553-7613 Spacer: 7614  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 31 WP#: 31 Lat: 30.430156 Long: -80.319189  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

One group of 5 individuals including a mother/calf pair, one individual on fringe of group

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Thursday, October 1, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 10:17 WP#: 34 Lat: 30.431388 Long: -80.250943  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:18 WP#: 35 Lat: 30.424412 Long: -80.257176  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/15/12  
Features used in Species ID: White rostrum tip, visible spotting pattern, dark and light bands visible on dorsal surface  
Representative images used for Species ID: 7632-7635,7640,7646,7662,7667,7669,7684  
Photographer: RCH Frame Numbers: 7615-7685 Spacer: 7686  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 10:21 WP#: 36 Lat: 30.426360 Long: -80.254575  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

One large group with several individuals at fringe, one mother/calf pair

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Thursday, October 1, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 11:07 WP#: 51 Lat: 30.301451 Long: -80.587053  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:09 WP#: 52 Lat: 30.295678 Long: -80.592304  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: White rostrum tip, visible spotting pattern, light blaze continuing to posterior of dorsal fin, alternating light and dark coloration dorsally  
Representative images used for Species ID: 7708,7710,7722,7730,7746,7750,7751  
Photographer: RCH Frame Numbers: 7687-7778 Spacer: 7779  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 11:12 WP#: 53 Lat: 30.297804 Long: -80.587380  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Two spaced groups of three individuals, no calves observed

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Thursday, October 1, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 11:46 WP#: 60 Lat: 30.235327 Long: -80.095845  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:48 WP#: 61 Lat: 30.237722 Long: -80.092674  
Species: *Grampus griseus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Large erect dorsal, blunt head with no beak, visible crease in forehead, visible scarring  
Representative images used for Species ID: 7780,7781,7791,7792,7801,7802,7804,7805,7806  
Photographer: RCH Frame Numbers: 7780-7825 Spacer: 7826  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:50 WP#: 62 Lat: 30.236170 Long: -80.087619  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Widely spaced group, no calves observed

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Thursday, October 1, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 12:06 WP#: 67 Lat: 30.232311 Long: -80.676261  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:08 WP#: 68 Lat: 30.234899 Long: -80.674308  
Species: *Stenella frontalis* Numbers (Low/High/Best): 9/9/9  
Features used in Species ID: White rostum tip, Visible spotting pattern, Light blaze continuing to posterior of dorsal fin, Alternating light and dark coloration dorsally  
Representative images used for Species ID: 7827,7828,7830,7832,7843,7849,7851,7856,7857  
Photographer: RCH Frame Numbers: 7828-7893 Spacer: 7894  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 12:11 WP#: 69 Lat: 30.230637 Long: -80.673126  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

One group of seven individual with subgroup of two individuals, very tight group, actively feeding

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Thursday, October 1, 2009 Sighting # 8

**Initial Sighting on Track**

Time: 13:53 WP#: 77 Lat: 30.161284 Long: -80.692937  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:56 WP#: 78 Lat: 30.152214 Long: -80.695794  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: White rostum tip, Visible spotting pattern, Light blaze continuing to posterior of dorsal fin, Alternating light and dark coloration dorsally  
Representative images used for Species ID: 7897,7899,7915,7916,7923-7925  
Photographer: RCH Frame Numbers: 7895-7961 Spacer: 7962  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 13:57 WP#: 79 Lat: 30.151990 Long: -80.694249  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Two groups of three individuals, two mother/calf pairs, actively feeding

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Thursday, October 1, 2009 Sighting # 9

**Initial Sighting on Track**

Time: 14:01 WP#: 82 Lat: 30.163849 Long: -80.561371  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:04 WP#: 83 Lat: 30.163510 Long: -80.562485  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/10/10  
Features used in Species ID: Overall gray coloration, broad flukes, Broad based dorsal fin

Representative images used for Species ID: 7970,7982,7983,7986  
Photographer: RCH Frame Numbers: 7964-7997 Spacer: 7998  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 14:06 WP#: 84 Lat: 30.165968 Long: -80.568529  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Very little time spent at surface, deep dives, three mother/calf pairs  

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Thursday, October 1, 2009 Sighting # 10

**Initial Sighting on Track**

Time: 14:32 WP#: 94 Lat: 30.166305 Long: -79.821608  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:34 WP#: 95 Lat: 30.169987 Long: -79.828164  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 35/45/40  
Features used in Species ID: Overall gray coloration, broad flukes, visible crease between melon and beak

Representative images used for Species ID: 8008, 8009,8018,8020,8023,8030,8031,8043,8068  
Photographer: RCH Frame Numbers: 7999-8081 Spacer: 8082  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 14:38 WP#: 96 Lat: 30.173389 Long: -79.828432  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Large loosely associated group, numerous calves observed  

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Thursday, October 1, 2009 Sighting # 11

**Initial Sighting on Track**

Time: 15:10 WP#: 108 Lat: 30.102525 Long: -80.679810  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:13 WP#: 109 Lat: 30.110079 Long: -80.682445  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: White rostrum tip, Visible spotting pattern, Light blaze continuing to posterior of dorsal fin, Alternating light and dark coloration dorsally  
Representative images used for Species ID: 8102,8104,8106  
Photographer: RCH Frame Numbers: 8083-8107 Spacer: 8108  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 15:16 WP#: 110 Lat: 30.104370 Long: -80.681425  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Loosely associated group, No calves observed  

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Tuesday, November 17, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 12:40 WP#: 3 Lat: 30.600043 Long: -81.207447  
Vertical Angle: 1 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: Transit leg Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:42 WP#: 4 Lat: 30.605846 Long: -81.209670  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 38/54/50  
Features used in Species ID: Slate gray coloration, short rostrum, robust body, broad flukes

Representative images used for Species ID: 8170, 8173, 8190  
Photographer: HJF Frame Numbers: 8162 to 8198 Spacer: 8199  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 12:45 WP#: 6 Lat: 30.604350 Long: -81.211078  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Tightly packed group that was very active at the surface; one individual was seen tail-slapping on its back for most of the sighting. Some mother/calf pairs present.

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Tuesday, November 17, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 15:54 WP#: 48 Lat: 30.199932 Long: -81.232597  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Breach  
On/Off Effort: On Track Line: Transit leg Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:56 WP#: 49 Lat: 30.219379 Long: -81.242952  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 17/21/19  
Features used in Species ID: broad flukes, dark gray cape, and overall robust shape

Representative images used for Species ID: 8231, 8252, 8265  
Photographer: HJF Frame Numbers: 8220 to 8277 Spacer: 8278  
Calculated Distance from Track Line: 2.4 km

**Final Time and Position of Sighting**

Time: 16:04 WP#: 50 Lat: 30.200150 Long: -81.237419  
Calculated Distance Traveled: 2.2 km

**Behavior and Additional Comments**

Animals were traveling quickly and were active at the surface. Two tightly packed sub-groups. One group had 5-7 animals, the other had 12-14 animals. Some animals breaching. At least one mom/calf. Due to turbidity and lack of sunlight penetration the animals were hard to follow.

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Wednesday, November 18, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:12 WP#: 14 Lat: 30.031187 Long: -79.942816  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:13 WP#: 15 Lat: 30.037136 Long: -79.943718  
Species: Unidentified Kogia Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Single blowhole located to the left of centerline. Overall grey body with lighter ventral surface, large flukes, flippers located far forward, pointed, shark-like head  
Representative images used for Species ID: 8280-8284  
Photographer: PBN Frame Numbers: 8279-8323 Spacer: 8324  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 9:15 WP#: 16 Lat: 30.039294 Long: -79.939205  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Initially observed logging at surface, animal dove while circling for photographs - it may have been disturbed by presence of aircraft - count as a take

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Wednesday, November 18, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 9:43 WP#: 23 Lat: 30.102677 Long: -80.538514  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:44 WP#: 24 Lat: 30.112692 Long: -80.556471  
Species: Unidentified Delphinid Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Images inconclusive as to species identity

Representative images used for Species ID: 8325,8327,8335-8337  
Photographer: PBN Frame Numbers: 8325-8340 Spacer: 8341  
Calculated Distance from Track Line: 2.0 km

**Final Time and Position of Sighting**

Time: 9:55 WP#: 25 Lat: 30.103868 Long: -80.556621  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Difficult to track due to turbidity of water

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Wednesday, November 18, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 11:40 WP#: 51 Lat: 30.299799 Long: -80.476741  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:46 WP#: 52 Lat: 30.308959 Long: -80.475456  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: No images obtained

Representative images used for Species ID: No images obtained  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 11:46 WP#: 53 Lat: 30.312744 Long: -80.471680  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Single animal that was never located, travelling quickly, no photos taken

Wednesday, November 18, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 15:01 WP#: 81 Lat: 30.433983 Long: -79.899666  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:02 WP#: 82 Lat: 30.429478 Long: -79.897009  
Species: Grampus griseus Numbers (Low/High/Best): 25/45/40  
Features used in Species ID: Large, tall dorsal fin, long pectoral fins, blunt head with cleft in melon, visible scarring patterns

Representative images used for Species ID: 8375,8376,8389,8413  
Photographer: PBN Frame Numbers: 8346-8419 Spacer: 8420  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:07 WP#: 83 Lat: 30.433962 Long: -79.882567  
Calculated Distance Traveled: 1.5 km

**Behavior and Additional Comments**

Numerous sub-groups, travelling quickly

Wednesday, November 18, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 15:58 WP#: 96 Lat: 30.403655 Long: -81.297067  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: Transit Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:59 WP#: 97 Lat: 30.402734 Long: -81.294347  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/15/15  
Features used in Species ID: Broad flukes, overall gray coloration, short stubby rostrum, stout body  
Representative images used for Species ID: 8431,8435,8436  
Photographer: PBN Frame Numbers: 8421-8449 Spacer: 8450  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 16:01 WP#: 98 Lat: 30.407699 Long: -81.295668  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

One group of 4 to 5 animals with two smaller sub-groups and several singletons

Friday, November 20, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 9:46 WP#: 12 Lat: 30.031023 Long: -80.175930  
Vertical Angle: 2 Horizontal Bearing in Degrees: 95 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:48 WP#: 13 Lat: 30.031926 Long: -80.179763  
Species: Grampus griseus Numbers (Low/High/Best): 11/30/20  
Features used in Species ID: Vertical crease in distinctly square melon, varying coloration on bodies, scarring observed, tall dorsal fin.  
Representative images used for Species ID: 8463, 8464, 8475  
Photographer: REH Frame Numbers: 8452-8477 Spacer: 8478  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 9:55 WP#: 14 Lat: 30.016391 Long: -80.179660  
Calculated Distance Traveled: 1.7 km

**Behavior and Additional Comments**

Several distinct subgroups of 2-9 individuals, widely spaced and moving to the southwest.

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Tuesday, December 22, 2009 Sighting # 1

**Initial Sighting on Track**

Time: 10:22 WP#: 17 Lat: 30.099674 Long: -80.615172  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:27 WP#: 18 Lat: 30.097936 Long: -80.611650  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: None

Representative images used for Species ID: No images obtained  
Photographer: N/A Frame Numbers: None Spacer: None  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Lone delphinid spotted but was not relocated or photographed.  
Note that actual time and position is estimated.

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Tuesday, December 22, 2009 Sighting # 2

**Initial Sighting on Track**

Time: 11:15 WP#: 27 Lat: 30.166579 Long: -80.683433  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:17 WP#: 28 Lat: 30.166376 Long: -80.683375  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: No images obtained

Representative images used for Species ID: No images obtained  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: 0.02 km

**Final Time and Position of Sighting**

Time: 11:23 WP#: 29 Lat: 30.165143 Long: -80.684029  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Very elusive. Resighted only 2-3 times and unable to line up for photographs. Animals dove deeply and spent little time at the surface.

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Tuesday, December 22, 2009 Sighting # 3

**Initial Sighting on Track**

Time: 12:10 WP#: 41 Lat: 30.300499 Long: -80.408532  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:12 WP#: 42 Lat: 30.297574 Long: -80.405397  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: No images obtained

Representative images used for Species ID: No images obtained

Photographer: N/A Frame Numbers: None Spacer: None  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 12:20 WP#: 43 Lat: 30.299542 Long: -80.397155  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Elusive. Not spotted while lined up for photographs. Only spotted 3-4 times. Dove deeply and spent little time at the surface.

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Tuesday, December 22, 2009 Sighting # 4

**Initial Sighting on Track**

Time: 14:15 WP#: 53 Lat: 30.365891 Long: -80.199956  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:16 WP#: 54 Lat: 30.363803 Long: -80.206578  
Species: Tursiops truncatus Numbers (Low/High/Best): 40/60/50  
Features used in Species ID: Large, robust animals, light-colored peduncle, broad flukes, stubby rostrum, fairly uniform gray color

Representative images used for Species ID: 8553, 8575, 8578, 8579, 8588, 8592

Photographer: PBN Frame Numbers: 8541 to 8629 Spacer: 8630  
Calculated Distance from Track Line: 0.7

**Final Time and Position of Sighting**

Time: 14:19 WP#: 55 Lat: 30.360186 Long: -80.197431  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Large group, very spread out and traveling quickly. One large hammerhead shark in the vicinity of the dolphins (image numbers: 8583-8585).

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Tuesday, December 22, 2009 Sighting # 5

**Initial Sighting on Track**

Time: 15:16 WP#: 69 Lat: 30.499201 Long: -80.226864  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:23 WP#: 70 Lat: 30.499372 Long: -80.249891  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/5/4  
Features used in Species ID: Broad, large flukes, stubby rostrum, uniform gray coloration with darker cape  
Representative images used for Species ID: 8642, 8674  
Photographer: PBN Frame Numbers: 8631 to 8674 Spacer: 8675  
Calculated Distance from Track Line: 2.2 km

**Final Time and Position of Sighting**

Time: 15:33 WP#: 71 Lat: 30.495354 Long: -80.253988  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Animals were elusive and hard to track or re-sight. Little opportunity to clearly photograph.

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Tuesday, December 22, 2009 Sighting # 6

**Initial Sighting on Track**

Time: 15:44 WP#: 73 Lat: 30.503751 Long: -79.810167  
Vertical Angle: 2 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:45 WP#: 74 Lat: 30.497783 Long: -79.816314  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/4/3  
Features used in Species ID: Light-colored peduncle, large, broad flukes, stubby rostrum, uniform gray coloration  
Representative images used for Species ID: 8690, 8705, 8706, 8713, 8758, 8773  
Photographer: PBN Frame Numbers: 8676 to 8774 Spacer: 8775  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 15:53 WP#: 76 Lat: 30.498453 Long: -79.803403  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Animals were traveling slowly at first and diving deeply. They then began swimming more erratically and began making more white-water and splashing more. Generally spent little time at the surface for clear photography and observation.

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Tuesday, December 22, 2009 Sighting # 7

**Initial Sighting on Track**

Time: 16:11 WP#: 81 Lat: 30.567497 Long: -80.305570  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:13 WP#: 82 Lat: 30.564581 Long: -80.305144  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Images not conclusive as to species identity

Representative images used for Species ID: No usable images  
Photographer: PBN Frame Numbers: 8776 to 8777 Spacer: 8778  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 16:20 WP#: 83 Lat: 30.566848 Long: -80.313099  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Single animal surfacing infrequently and was very elusive to re-sight despite few whitecaps.  
Animal was definitely a delphinid but could not be identified to species.

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Thursday, January 7, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:45 WP#: 9 Lat: 30.030693 Long: -80.694178  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:50 WP#: 10 Lat: 30.028720 Long: -80.690989  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Distinct dark cape, short and stubby rostrum, elongated body

Representative images used for Species ID: 8779, 8782, 8783, 8792, 8793  
Photographer: REH Frame Numbers: 8779 to 8797 Spacer: 8798/8799  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

Single animal, slow travel, surfaced several times. Animal not re-sighted for final position

Thursday, January 7, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 12:01 WP#: 22 Lat: 30.165146 Long: -80.560350  
Vertical Angle: 3 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:02 WP#: 22 Lat: 30.164537 Long: -80.559666  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/2  
Features used in Species ID: Broad flukes, distinctly darker cape, short and stubby rostrum  
Robust body

Representative images used for Species ID: 8816-8819, 8821, 8827-8829  
Photographer: REH Frame Numbers: 8814 to 8846 Spacer: 8847  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 12:06 WP#: 23 Lat: 30.170049 Long: -80.564328  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Low angled leaps, one mother/juvenile pair

Thursday, January 7, 2010 Sighting # 3

**Initial Sighting on Track**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: Off Track Line: n/a Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:17 WP#: 41 Lat: 30.349972 Long: -80.619776  
Species: *Stenella frontalis* Numbers (Low/High/Best): 52/70/65  
Features used in Species ID: White rostrum tips, obvious spotting, light flank blaze  
very narrow caudal peduncle  
Representative images used for Species ID: 8886, 8867\_2c, 8882\_2c, 8884  
Photographer: REH Frame Numbers: 8848 to 8892 Spacer: 8893  
Calculated Distance from Track Line: n/a

**Final Time and Position of Sighting**

Time: 15:20 WP#: 42 Lat: 30.351625 Long: -80.626263  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Off effort sighting while investigating large splash in the distance. Fairly large, cohesive main group, with a couple of smaller "outlier" groups.

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Thursday, January 7, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 15:50 WP#: 48 Lat: 30.432042 Long: -79.895859  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Splash  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:54 WP#: 48 Lat: 30.439802 Long: -79.890082  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 40/55/45  
Features used in Species ID: Robust animals w/ elongated bodies and short, stubby rostrums.  
Gray color with distinct darker gray dorsal cape  
Representative images used for Species ID: \_\_\_\_\_  
Photographer: REH Frame Numbers: 8894 to 8955 Spacer: 8956  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 16:00 WP#: 49 Lat: 30.440173 Long: -79.882488  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Large, spread out group with multiple cohesive sub-groups. Some splashes, lots of activity  
Fairly intense social interactions including chasing etc

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Tuesday, January 19, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:15 WP#: 15 Lat: 30.365439 Long: -79.839967  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:18 WP#: 16 Lat: 30.368094 Long: -79.839572  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/11/10  
Features used in Species ID: Slate gray coloration with dark cape, broad flukes, well-defined crease between rostrum and melon, robust body shape  
Representative images used for Species ID: 9101, 9117 - 9119  
Photographer: RCH Frame Numbers: 9083-9131 Spacer: 9132  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:19 WP#: 17 Lat: 30.367087 Long: -79.835676  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

One widely distributed, evenly spaced group which stayed mostly subsurface. One individual observed on its back for majority of the sighting

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Tuesday, January 19, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:22 WP#: 19 Lat: 30.366181 Long: -79.881100  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:23 WP#: 20 Lat: 30.362928 Long: -79.864591  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: broad flukes, short, stubby rostrum, dark grey cape, robust bodies  
Representative images used for Species ID: 9141, 9171, 9173  
Photographer: RCH Frame Numbers: 9133-9176 Spacer: 9177  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 10:28 WP#: 21 Lat: 30.362837 Long: -79.860984  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Two small groups observed approximately 1 mile from Sighting 1, north of the trackline. Moving in tightly packed groups of few individuals.

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Tuesday, January 19, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 11:17 WP#: 26 Lat: 30.299393 Long: -79.818627  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:20 WP#: 27 Lat: 30.300247 Long: -79.821877  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 11/12/11  
Features used in Species ID: Robust bodies, grey coloration with darker cape, short rostrums

Representative images used for Species ID: 9186, 9187, 9196, 9212  
Photographer: RCH Frame Numbers: 9178-9243 Spacer: 9244  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 11:21 WP#: 28 Lat: 30.303125 Long: -79.825200  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Densely packed group  
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Tuesday, January 19, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 14:23 WP#: 44 Lat: 30.099598 Long: -80.392198  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Splash  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:27 WP#: 46 Lat: 30.091970 Long: -80.385131  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: grey coloration on robust bodies, short rostrum with definition before melon

Representative images used for Species ID: 9252, 9264, 9265, 9278  
Photographer: RCH Frame Numbers: 9245 - 9281 Spacer: 9282  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 14:32 WP#: 47 Lat: 30.085366 Long: -80.387523  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

One mom/calf pair and two individuals observed. Possible avoidance behavior observed; animals were originally acrobatic at the water's surface, but after circling to photograph, all of the time was spent below the surface and animals only came to the surface to breathe.  
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Tuesday, January 19, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 14:51 WP#: 52 Lat: 30.038072 Long: -80.486643  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:54 WP#: 53 Lat: 30.035396 Long: -80.486387  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 24/24/24  
Features used in Species ID: robust bodies with short, well-defined rostrum, broad flukes, slate gray coloration with darker cape  
Representative images used for Species ID: 9285, 9301, 9311, 9316, 9329  
Photographer: RCH Frame Numbers: 9283 - 9334 Spacer: 9335  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 14:56 WP#: 54 Lat: 30.029278 Long: -80.486280  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Several tightly packed groups observed

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Tuesday, January 19, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 15:00 WP#: 56 Lat: 30.033356 Long: -80.364352  
Vertical Angle: 1 Horizontal Bearing in Degrees: 95 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:02 WP#: 57 Lat: 30.034382 Long: -80.374406  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Overall gray color, broad flukes, and robust bodies  
Representative images used for Species ID: 9344, 9351  
Photographer: RCH Frame Numbers: 9336 - 9358 Spacer: 9359  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 15:05 WP#: 58 Lat: 30.033985 Long: -80.366418  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Two lone individuals spending lots of time at the surface of the water with frequent breaths.

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Tuesday, January 19, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 15:17 WP#: 61 Lat: 30.034243 Long: -79.980957  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 3  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:23 WP#: 62 Lat: 30.026904 Long: -79.988553  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/6/5  
Features used in Species ID: Robust bodies with broad flukes and overall grey coloration

Representative images used for Species ID: 9362, 9365, 9377  
Photographer: RCH Frame Numbers: 9360 - 9378 Spacer: 9379  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 15:24 WP#: 63 Lat: 30.030125 Long: -79.988356  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Mom/calf pairs observed in group. Individuals were in groups of 1-2 and evenly spaced out.

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Wednesday, January 20, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 9:54 WP#: 21 Lat: 30.031437 Long: -80.406705  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:55 WP#: 22 Lat: 30.035027 Long: -80.409063  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Obvious spotting, long, white-tipped rostrum, very narrow peduncle  
Representative images used for Species ID: 9401, 9403, 9414, 9416, 9417, 9420, 9434, 9435  
Photographer: PBN Frame Numbers: 9397-9456 Spacer: 9457  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:00 WP#: 24 Lat: 30.031832 Long: -80.409156  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Animals were traveling slowly, surfacing fairly often

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Wednesday, January 20, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:02 WP#: 26 Lat: 30.031087 Long: -80.477814  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:03 WP#: 27 Lat: 30.030747 Long: -80.479153  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/4/3  
Features used in Species ID: Short, stubby rostrum with well-defined crease at melon, broad flukes  
Representative images used for Species ID: 9462-9465, 9477, 9491, 9492  
Photographer: PBN Frame Numbers: 9458-9493 Spacer: 9494  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 10:14 WP#: 28 Lat: 30.039095 Long: -80.473002  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Elusive, mom/calf pair, two sub-groups possible, possible plane avoidance behavior- animals began surfacing quickly and swimming was explosive and erratic, at least one animal with atypical coloration

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Wednesday, January 20, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:23 WP#: 33 Lat: 30.099497 Long: -80.685493  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:26 WP#: 34 Lat: 30.098657 Long: -80.691225  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Broad flukes, uniform gray coloration w/ lighter colored peduncle, long, robust body  
Representative images used for Species ID: 9501-9504, 9508, 9510, 9517  
Photographer: PBN Frame Numbers: 9495-9417 Spacer: 9518  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:32 WP#: 36 Lat: 30.106567 Long: -80.686708  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Elusive animals even with great conditions, possible mom/calf pair  

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Wednesday, January 20, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 10:48 WP#: 42 Lat: 30.101009 Long: -80.116509  
Vertical Angle: 1 Horizontal Bearing in Degrees: 60 Sighting Cue: Splash  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:48 WP#: 42 Lat: 30.101009 Long: -80.116509  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 35/45/40  
Features used in Species ID: Short, stubby rostrum with well-defined crease at melon, light-colored peduncle, robust bodies  
Representative images used for Species ID: 9522, 9532-9536, 9544, 9561, 9568-9571  
Photographer: PBN Frame Numbers: 9519-9578 Spacer: 9579  
Calculated Distance from Track Line: <0.1 km

**Final Time and Position of Sighting**

Time: 10:52 WP#: 43 Lat: 30.101381 Long: -80.116344  
Calculated Distance Traveled: <0.1 km

**Behavior and Additional Comments**

Multiple sub-groups, some animals tightly grouped and interacting, mom/calf pairs present  

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Wednesday, January 20, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 10:56 WP#: 37 Lat: 30.100560 Long: -79.983744  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:57 WP#: 45L Lat: 30.104286 Long: -79.992491  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/6/5  
Features used in Species ID: Short, stubby rostrum with well-defined crease at melon, light-colored peduncle  
Representative images used for Species ID: 9596, 9597, 9608, 9611, 9620, 9637, 9646  
Photographer: PBN Frame Numbers: 9580-9652 Spacer: 9653  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 11:01 WP#: 46 Lat: 30.104868 Long: -79.992841  
Calculated Distance Traveled: <0.1 km

**Behavior and Additional Comments**

Slow travel, animals spending a lot of time at the surface, At least two pairs of animals, possible single animals as well

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Wednesday, January 20, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 12:06 WP#: 65 Lat: 30.299165 Long: -79.860069  
Vertical Angle: 1 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:07 WP#: 66 Lat: 30.298620 Long: -79.858260  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 13/32/29  
Features used in Species ID: Broad flukes and light-colored peduncle, short, stubby rostrum and well-defined crease at melon, some animals had sharp, clear 'widow's peak' dorsal cape  
Representative images used for Species ID: 9696-9701, 9707, 9709, 9710  
Photographer: PBN Frame Numbers: 9666-9712 Spacer: 9713  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 12:09 WP#: 67 Lat: 30.301300 Long: -79.859943  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Tightly packed group with at least one outlier, one direction of travel, Another large sub-group found on final circle

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Wednesday, January 20, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 12:25 WP#: 71 Lat: 30.299726 Long: -80.487497  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:26 WP#: 72 Lat: 30.301264 Long: -80.488315  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Species ID not possible from images obtained

Representative images used for Species ID: 9716-9721

Photographer: PBN Frame Numbers: 9714-9723 Spacer: 9724  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Lone animal that was elusive, animals was lost without a final position  
Most likely Tursiops, but animal was not resighted often enough for definite id

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Wednesday, January 20, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 14:06 WP#: 80 Lat: 30.367373 Long: -80.678038  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:07 WP#: 81 Lat: 30.368279 Long: -80.678521  
Species: Stenella frontalis Numbers (Low/High/Best): 20/40/30  
Features used in Species ID: Some animals obviously spotted, overhead alternate light/dark banding, white-tipped rostrum, blaze terminating mid-dorsal

Representative images used for Species ID: 9729-9731, 9736, 9739, 9742, 9744, 9745, 9752  
Photographer: HJF Frame Numbers: 9725-9760 Spacer: 9761  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 14:09 WP#: 82 Lat: 30.360224 Long: -80.676308  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Animals were porpoising quickly and were quite spread out

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Wednesday, January 20, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 14:14 WP#: 89 Lat: 30.366820 Long: -80.496756  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:15 WP#: 90 Lat: 30.363624 Long: -80.499746  
Species: *Stenella frontalis* Numbers (Low/High/Best): 15/15/15  
Features used in Species ID: Overhead alternate light/dark banding, some animals with obvious spotting, blaze terminating mid-dorsal, white-tipped rostrum  
Representative images used for Species ID: 9762, 9763, 9767, 9768, 9770, 9776, 9780  
Photographer: HJF Frame Numbers: 9762-9790 Spacer: 9791  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 14:16 WP#: 91 Lat: 30.365745 Long: -80.496426  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

One main group of animals, tightly grouped, few stragglers before and after main group.  
Mom/calf pair present

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Wednesday, January 20, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 14:22 WP#: 95 Lat: 30.366983 Long: -80.280246  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Splash  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:23 WP#: 96 Lat: 30.372688 Long: -80.289967  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Broad flukes, broad melon with well-defined crease before short, stubby rostrum  
Representative images used for Species ID: 9795, 9796, 9800, 9801, 9803-9806  
Photographer: HJF Frame Numbers: 9792-9809 Spacer: 9810  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 14:28 WP#: 97 Lat: 30.375008 Long: -80.283027  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Slow, lazy travel

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Wednesday, January 20, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 14:33 WP#: 101 Lat: 30.367087 Long: -80.080392  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:34 WP#: 102 Lat: 30.361459 Long: -80.084967  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 12/16/14  
Features used in Species ID: Stubby, short beak, broad flukes, long, robust body

Representative images used for Species ID: 9811-9816, 9820-9822, 9824-9826  
Photographer: HJF Frame Numbers: 9811-9831 Spacer: 9832  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 14:38 WP#: 103 Lat: 30.362634 Long: -80.085675  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

One large group, two small groups, one group had mom/calf pair, large group tightly packed initially and then began to spread out

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Wednesday, January 20, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 15:05 WP#: 113 Lat: 30.432054 Long: -80.498414  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:06 WP#: 114 Lat: 30.436033 Long: -80.506570  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/8/8  
Features used in Species ID: Dark, distinct cape with 'widow's peak', broad flukes, short, stubby rostrum, light-colored peduncle

Representative images used for Species ID: 9833-9836  
Photographer: HJF Frame Numbers: 9833-9844 Spacer: 9845  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 15:08 WP#: 115 Lat: 30.438059 Long: -80.510754  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Some animals were tightly grouped, others were more spread out over a wide area  
Mom/calf pair present

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Wednesday, January 20, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 15:20 WP#: 123 Lat: 30.500388 Long: -80.530440  
Vertical Angle: 3 Horizontal Bearing in Degrees: 135 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:22 WP#: 124 Lat: 30.501224 Long: -80.530414  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/8/7  
Features used in Species ID: White-tipped rostrum, blaze on flank terminating mid-dorsal,  
obvious spotting on some animals  
Representative images used for Species ID: 9847, 9852-9855, 9863, 9864, 9868  
Photographer: HJF Frame Numbers: 9846-9871 Spacer: 9872  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 15:27 WP#: 125 Lat: -30.511561 Long: -80.532564  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Splashing from fish in the area also, possible interaction or foraging, some animals were  
porpoising clear of the water, some animals in pairs but very spread out

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Wednesday, January 20, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 15:47 WP#: 132 Lat: 30.565638 Long: -79.821924  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:48 WP#: 133 Lat: 30.567242 Long: -79.818377  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 13/16/15  
Features used in Species ID: Broad flukes, light-colored peduncle, uniform gray coloration  
with distinct cape, short, stubby rostrum  
Representative images used for Species ID: 9876-9879, 9885, 9886, 9892, 9895-9897  
Photographer: HJF Frame Numbers: 9873-9902 Spacer: 9903  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 15:53 WP#: 135 Lat: 30.566981 Long: -79.821218  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Some animals energetically porpoising, fairly spread out in groups of two to three, some  
swimming really rapidly underwater, animals were more grouped at the conclusion of  
sighting

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Wednesday, January 20, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 16:07 WP#: 138 Lat: 30.565741 Long: -80.363439  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:08 WP#: 139 Lat: 30.562322 Long: -80.363101  
Species: Unidentified Delphinid Numbers (Low/High/Best): 10/16/14  
Features used in Species ID: Images not conclusive as to species identity

Representative images used for Species ID: 9908-9910, 9913, 9915, 9917  
Photographer: HJF Frame Numbers: 9904-9917 Spacer: 9918  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 16:17 WP#: 140 Lat: 30.555459 Long: -80.364618  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Animals were very spread out and elusive, afternoon glare was a severe hindrance to tracking, fish were in the area, animals were moving quickly, possibly foraging, porpoising clear of the water at times. Most likely S. frontalis but images are not conclusive

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Wednesday, January 27, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 15:26 WP#: 40 Lat: 30.099334 Long: -79.828985  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: N/A (unidentified delphinid)

Representative images used for Species ID: None taken

Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Unable to relocate after initial sighting

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Wednesday, January 27, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 16:59 WP#: 53 Lat: 29.963628 Long: -80.643552  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Bodies  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 17:02 WP#: 54 Lat: 29.965491 Long: -80.641395  
Species: Unidentified Delphinid Numbers (Low/High/Best): 7/9/10  
Features used in Species ID: Overall small body, Stenella like appearance

Representative images used for Species ID: \_\_\_\_\_

Photographer: REH Frame Numbers: 9919 to 9940 Spacer: 9941  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 17:20 WP#: 55 Lat: 29.955820 Long: -80.635997  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Very small and fast animals in a loose aggregation, spread out. Fast travel with little time close to the surface. Difficult to work.

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Thursday, January 28, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 9:30 WP#: 5 Lat: 29.965918 Long: -80.584850  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State:         
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:32 WP#: 6 Lat: 29.959962 Long: -80.573048  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/5/5  
Features used in Species ID: Short, stubby rostrum, with marked crease at base of melon.  
Robust, sturdy looking animals. Light colored dorsal peduncle, broad flukes  
Representative images used for Species ID: 9952, 9973, 9974, 9975  
Photographer: PBN Frame Numbers: 9942 to 9980 Spacer: 9981  
Calculated Distance from Track Line: 1.3 km

**Final Time and Position of Sighting**

Time: 9:40 WP#: 7 Lat: 29.959584 Long: -80.571333  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

Small group, somewhat spread out, possible mom/calf pair in group. Surfacing often and slowly.

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Thursday, January 28, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 9:51 WP#: 15 Lat: 29.966740 Long: -80.256365  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:52 WP#: 16 Lat: 29.970192 Long: -80.259753  
Species: *Stenella frontalis* Numbers (Low/High/Best): 16/20/18  
Features used in Species ID: Narrow peduncle, alternating dark/light dorsal banding, longer, white-tipped rostrum  
Representative images used for Species ID: 0004, 0010, 0021, 0025, 0026  
Photographer: PBN Frame Numbers: 9982 to 0029 Spacer: 0030  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:11 WP#: 17 Lat: 29.959212 Long: -80.264583  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

Two sub-groups, each with 7 - 10 animals. Fish in area - possible foraging. Mother/calf pair present.

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Thursday, January 28, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:17 WP#: 220 Lat: 29.968545 Long: -80.057141  
Vertical Angle: 3 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Species: Unidentified Delphinid Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: N/A

Representative images used for Species ID: N/A  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Pod of dolphins spotted twice but unable to relocate for another waypoint or for photographs.

Thursday, January 28, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 11:02 WP#: 29 Lat: 30.031582 Long: -80.368702  
Vertical Angle: 1 Horizontal Bearing in Degrees: 150 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:04 WP#: 30 Lat: 30.028005 Long: -80.366154  
Species: Stenella frontalis Numbers (Low/High/Best): 10/12/11  
Features used in Species ID: Relatively short flank blaze terminating mid-dorsal fin, spotted appearance, white rostrum tip, light/dark dorsal "banding".  
Representative images used for Species ID: 0057, 0058, 0072, 0075, 0076  
Photographer: PBN Frame Numbers: 0031 to 0077 Spacer: 0078  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 11:07 WP#: 31 Lat: 30.030288 Long: -80.368683  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Tight group spending lots of time at surface

Thursday, January 28, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 11:16 WP#: 37 Lat: 30.030943 Long: -80.663225  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:18 WP#: 38 Lat: 30.030443 Long: -80.658599  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Short, stubby rostrum and well-defined crease at melon, overall gray coloration with darker dorsal cape  
Representative images used for Species ID: 0082-0085, 0099, 0100  
Photographer: PBN Frame Numbers: 0079 to 0104 Spacer: 0105  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:31 WP#: 39 Lat: 30.029608 Long: -80.659774  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Two animals- mother/calf pair, visible blow from larger animal at times. Elusive, not at the surface often. Traveling slowly.

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Thursday, January 28, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 11:39 WP#: 44 Lat: 30.100404 Long: -80.584374  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:41 WP#: 45 Lat: 30.101081 Long: -80.585021  
Species: *Stenella frontalis* Numbers (Low/High/Best): 17/22/20  
Features used in Species ID: Long, dark, white tipped beak, spotting apparent, light/dark "banding" dorsally  
Representative images used for Species ID: 0115, 0116, 0170, 0171  
Photographer: PBN Frame Numbers: 0106 to 0172 Spacer: 0173  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 11:57 WP#: 48 Lat: 30.101601 Long: -80.579077  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Traveling slowly, diving deep. Found two more sub-groups after first 2.42. Large shark in area. Shark was photographed.

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Thursday, January 28, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 12:01 WP#: 52 Lat: 30.100475 Long: -80.441549  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:02 WP#: 53 Lat: 30.096646 Long: -80.444014  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/6/5  
Features used in Species ID: Long, white-tipped rostrum, alternating light/dark dorsal banding, variable spotting among individuals  
Representative images used for Species ID: 0176, 0200, 0220, 0221  
Photographer: PBN Frame Numbers: 0174 to 0224 Spacer: 0225  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 12:05 WP#: 54 Lat: 30.099430 Long: -80.442883  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Very rapid bursts of extremely fast swimming

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Thursday, January 28, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 12:54 WP#: 69 Lat: 30.165613 Long: -80.683999  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: Reh Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:59 WP#: 70 Lat: 30.163580 Long: -80.684992  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Short, stubby rostrum, well defined crease at base of melon, broad flukes, overall light gray color  
Representative images used for Species ID: 0252, 0267, 0284, 0286  
Photographer: PBN Frame Numbers: 0226 to 0289 Spacer: 0290  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 13:03 WP#: 71 Lat: 30.158925 Long: -80.683062  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Pair of animals surfacing slowly

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Thursday, January 28, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 15:05 WP#: 80 Lat: 30.233756 Long: -80.521093  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:08 WP#: 81 Lat: 30.230264 Long: -80.524258  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Short, stubby rostrum with well-defined crease at melon, robust bodies, overall gray coloration with darker dorsal cape  
Representative images used for Species ID: 0302, 0304, 0310-0313  
Photographer: PBN Frame Numbers: 0291 to 0321 Spacer: 0322  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 15:10 WP#: 82 Lat: 30.229053 Long: -80.523290  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

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Thursday, January 28, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 15:14 WP#: 85 Lat: 30.233964 Long: -80.389692  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:23 WP#: 86 Lat: 30.238250 Long: -80.398262  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Long, robust body shape, gray color with darker gray dorsal cape, short, stubby rostrum with well-defined crease at base of melon  
Representative images used for Species ID: 0323, 0324, 0330  
Photographer: PBN Frame Numbers: 0323 to 0335 Spacer: 0336  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 15:27 WP#: 87 Lat: 30.242828 Long: -80.397685  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Three animals, elusive, one pair pretty far from one another

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Thursday, January 28, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 16:01 WP#: 96 Lat: 30.298516 Long: -80.120912  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:02 WP#: 97 Lat: 30.302032 Long: -80.120480  
Species: *Grampus griseus* Numbers (Low/High/Best): 5/8/7  
Features used in Species ID: Blunt rostrum with visible cleft, variable dark to lightest gray color with visible scarring, tall dorsal fins  
Representative images used for Species ID: 0369, 0374, 0388, 0398  
Photographer: PBN Frame Numbers: 0361 to 0400 Spacer: 0401  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 16:05 WP#: 99 Lat: N 30.295333 Long: W 80.119047  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Large animals, most in a chorus line, equally spaced and one direction of travel

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Thursday, January 28, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 16:12 WP#: 102 Lat: 30.299355 Long: -80.339597  
Vertical Angle: 2 Horizontal Bearing in Degrees: 150 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:14 WP#: 103 Lat: 30.300036 Long: -80.337468  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/4/3  
Features used in Species ID: Short, stubby rostrum, robust bodies, broad flukes, overall gray coloration, well-defined crease at melon  
Representative images used for Species ID: 0418, 0419, 0421  
Photographer: PBN Frame Numbers: 0402 to 0436 Spacer: 0437  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 16:20 WP#: 104 Lat: 30.296256 Long: -80.341635  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

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Saturday, February 20, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:31 WP#: 28 Lat: 30.500295 Long: -80.402576  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:33 WP#: 17 Lat: 30.499955 Long: -80.396613  
Species: *Stenella frontalis* Numbers (Low/High/Best): 16/18/17  
Features used in Species ID: white rostrum tip, banding pattern alternating light and dark, spotted pattern  
Representative images used for Species ID: 2844, 2848, 2856, 2858  
Photographer: PBN Frame Numbers: 2843 - 2880 Spacer: 2881  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:35 WP#: 18 Lat: 30.502578 Long: -80.393409  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

A large, tightly-packed group traveling mostly at the surface of the water

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Saturday, February 20, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:42 WP#: 35 Lat: 30.499366 Long: -80.620985  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:48 WP#: 22 Lat: 30.500891 Long: -80.618709  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: white rostrum tip, light and dark alternating pattern, and spotted pattern  
Representative images used for Species ID: 2888, 2893, 2912  
Photographer: PBN Frame Numbers: 2882 - 2921 Spacer: 2922  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:48 WP#: 23 Lat: 30.501595 Long: -80.618999  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

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Saturday, February 20, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:56 WP#: 27 Lat: 30.432762 Long: -80.620269  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Species: Unidentified Delphinid Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: N/A

Representative images used for Species ID: None obtained

Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

At least 2 subgroups, never resighted

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Saturday, February 20, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 12:02 WP#: 40 Lat: 30.365463 Long: -80.655332  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:05 WP#: 41 Lat: 30.368241 Long: -80.652563  
Species: Stenella frontalis Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: small pectoral fins, white rostrum tip, banding and spotted pattern

Representative images used for Species ID: 2925, 2926, 2944, 2965

Photographer: PBN Frame Numbers: 2923-2995 Spacer: 2996  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 42 WP#: 42 Lat: 30.368857 Long: -80.655225  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Two small subgroups

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Saturday, February 20, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 12:18 WP#: 49 Lat: 30.295976 Long: -80.599638  
Vertical Angle: \_\_\_\_\_ Horizontal Bearing in Degrees: \_\_\_\_\_ Sighting Cue: N/A  
On/Off Effort: Off Track Line: N/A Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: white rostrum tip, spotted pattern

Representative images used for Species ID: 3019, 3023, 3025  
Photographer: PBN Frame Numbers: 2997-3028 Spacer: 3029  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Off track investigating what turned out to be trash when dolphins were spotted;  
one mom/calf pair with a singleton.

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Saturday, March 20, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 12:26 WP#: 51 Lat: 30.298931 Long: -80.506767  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:27 WP#: 52 Lat: 30.303476 Long: -80.516636  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: Overall gray coloration, broad flukes, white peduncle

Representative images used for Species ID: 3032, 3039, 3060 - 3064  
Photographer: PBN Frame Numbers: 3030-3069 Spacer: 3070  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 12:31 WP#: 53 Lat: 30.301707 Long: -80.511194  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Traveling in groups of two and three animals

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Saturday, February 20, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 12:33 WP#: 55 Lat: 30.298252 Long: -80.461393  
Vertical Angle: 1 Horizontal Bearing in Degrees: 165 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:36 WP#: 56 Lat: 30.298273 Long: -80.473435  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: white rostrum tip, spotted pattern, alternating light and dark banding.  
Representative images used for Species ID: 3084, 3089, 3115 - 3119, 3134  
Photographer: PBN Frame Numbers: 3071-3136 Spacer: 3137  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 12:36 WP#: 57 Lat: 30.301503 Long: -80.476442  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

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Saturday, February 20, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 12:40 WP#: 59 Lat: 30.300218 Long: -80.347526  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:42 WP#: 60 Lat: 30.307844 Long: -80.346851  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40/50/45  
Features used in Species ID: Slender, white tipped rostrum, Banding pattern visible on dorsal surface  
Representative images used for Species ID: 3152 - 3159, 3177 - 3186, 3213  
Photographer: PBN Frame Numbers: 3138-3237 Spacer: 3238  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 12:45 WP#: 61 Lat: 30.312041 Long: -80.348847  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Large, cohesive group chasing large schools of fish  

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Saturday, February 20, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 13:13 WP#: 72 Lat: 30.233169 Long: -80.067443  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 56 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:15 WP#: 73 Lat: 30.234682 Long: -80.064016  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: large, long, slim dark body with short, white banded pectoral fins

Representative images used for Species ID: 3260, 3275  
Photographer: PBN Frame Numbers: 3260-3290 Spacer: 3291  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 13:18 WP#: 74 Lat: 30.242601 Long: -80.065392  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Lone individual who remained subsurface for majority of sighting

Saturday, February 20, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 13:33 WP#: 79 Lat: 30.233016 Long: -80.492936  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:35 WP#: 80 Lat: 30.220544 Long: -80.489406  
Species: *Stenella frontalis* Numbers (Low/High/Best): 50/70/60  
Features used in Species ID: spotted pattern, alternating banding pattern on dorsal surface, white rostrum tip

Representative images used for Species ID: 3299, 3303, 3309  
Photographer: PBN Frame Numbers: 3292-3226 Spacer: 3327  
Calculated Distance from Track Line: 1.4 km

**Final Time and Position of Sighting**

Time: 13:36 WP#: 81 Lat: 30.230403 Long: -80.481872  
Calculated Distance Traveled: 1.3 km

**Behavior and Additional Comments**

At least 4 groups with 10-12 individuals in each group

Saturday, February 20, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 13:42 WP#: 91 Lat: 30.233946 Long: -80.697610  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:45 WP#: 85 Lat: 30.238398 Long: -80.693274  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: broad fluke, slate gray coloration, defined crease between melon and rostrum  
Representative images used for Species ID: 3330 - 3334  
Photographer: PBN Frame Numbers: 3328 - 3336 Spacer: 3337  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 13:45 WP#: 86 Lat: 30.238925 Long: -80.693226  
Calculated Distance Traveled: <0.1 km

**Behavior and Additional Comments**

One lone individual.

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Saturday, February 20, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 15:23 WP#: 101 Lat: 30.166299 Long: -80.510827  
Vertical Angle: 2 Horizontal Bearing in Degrees: 150 Sighting Cue: bodies  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:26 WP#: 96 Lat: 30.169151 Long: -80.521569  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: long rostrum, white beak tip, spotted pattern, blaze  
Representative images used for Species ID: 3348, 3377 - 3379  
Photographer: PBN Frame Numbers: 3338 - 3382 Spacer: 3383  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 15:26 WP#: 97 Lat: 30.173604 Long: -80.517800  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

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Saturday, February 20, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 15:43 WP#: 109 Lat: 30.165113 Long: -79.880627  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:46 WP#: 106 Lat: 30.163147 Long: -79.885885  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: stubby rostrum, peak on dorsal melon, robust body

Representative images used for Species ID: 3399, 3411

Photographer: PBN Frame Numbers: 3384 - 3417 Spacer: 3418  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:49 WP#: 107 Lat: 30.164940 Long: -79.887226  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Three individual traveling together as a group.

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Saturday, February 20, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 16:14 WP#: 119 Lat: 30.100308 Long: -80.545387  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:17 WP#: 115 Lat: 30.103998 Long: -80.545810  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: long, white-tipped rostrum and spotted pattern

Representative images used for Species ID: 3442, 3443, 3444

Photographer: PBN Frame Numbers: 3419 - 3450 Spacer: 3451  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

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Saturday, February 20, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 16:34 WP#: 119 Lat: 30.031684 Long: -80.374122  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:35 WP#: 120 Lat: 30.037500 Long: -80.374863  
Species: Unidentified Delphinid Numbers (Low/High/Best): 4/6/5  
Features used in Species ID: Imagines not conclusive as to species identity

Representative images used for Species ID: 3454, 3484 - 3485  
Photographer: PBN Frame Numbers: 3452 - 3490 Spacer: 3491  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 16:36 WP#: 121 Lat: 30.035351 Long: -80.376998  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

traveling together in a loose group.  

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Saturday, February 20, 2010 Sighting # 16

**Initial Sighting on Track**

Time: 16:57 WP#: 135 Lat: 29.966141 Long: -79.935040  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:59 WP#: 129 Lat: 29.973820 Long: -79.925572  
Species: Unidentified Delphinid Numbers (Low/High/Best): 5/7/6  
Features used in Species ID: Images not conclusive as to species identity

Representative images used for Species ID: 3507  
Photographer: PBN Frame Numbers: 3492 - 3521 Spacer: 3522  
Calculated Distance from Track Line: 1.3 km

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

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Sunday, February 21, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 8:59 WP#: 12 Lat: 30.032506 Long: -79.809163  
Vertical Angle: 1 Horizontal Bearing in Degrees: 150 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:00 WP#: 13 Lat: 30.034156 Long: -79.805427  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Light colored peduncle, robust bodies with broad flukes, uniform gray coloration with darker dorsal cape  
Representative images used for Species ID: 0476, 0477, 0481  
Photographer: REH Frame Numbers: 0469 to 0482 Spacer: 0483  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 9:06 WP#: 14 Lat: 30.034990 Long: -79.801969  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Two mother/calf pairs, traveling slowly at the surface.

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Sunday, February 21, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 9:09 WP#: 16 Lat: 30.032988 Long: -79.853577  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:10 WP#: 17 Lat: 30.033649 Long: -79.848469  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 13/18/15  
Features used in Species ID: Broad based dorsal fin, light colored peduncle, short, stubby rostrum, broad flukes, robust body, dark gray cape  
Representative images used for Species ID: 0486-0488, 0500, 0503, 0504  
Photographer: RCH Frame Numbers: 0484 to 0507 Spacer: 0508  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 9:14 WP#: 18 Lat: 30.034585 Long: -79.854841  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Three groups of 5-6 animals each, at least two calves present

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Sunday, February 21, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 9:52 WP#: 27 Lat: 30.100155 Long: -80.498271  
Vertical Angle: 2 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:55 WP#: 28 Lat: 30.090595 Long: -80.509092  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: Broad flukes, robust body, short, stubby rostrum with well-defined crease at melon, broad base dorsal fin  
Representative images used for Species ID: 0510, 0511, 0514  
Photographer: REH Frame Numbers: 0509 to 0516 Spacer: 0517  
Calculated Distance from Track Line: 1.5 km

**Final Time and Position of Sighting**

Time: 9:58 WP#: 29 Lat: 30.086212 Long: -80.506268  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Mother/calf pair present

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Sunday, February 21, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 10:01 WP#: 31 Lat: 30.100044 Long: -80.411441  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:02 WP#: 32 Lat: 30.085494 Long: -80.414333  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40/60/50  
Features used in Species ID: White-tipped rostrum, light/dark dorsal banding, some animals heavily spotted  
Representative images used for Species ID: 0520, 0521, 0531, 0535  
Photographer: REH Frame Numbers: 0518 to 0539 Spacer: 0540  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 10:06 WP#: 33 Lat: 30.085057 Long: -80.420573  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Two large sub-groups, rapid travel, groups merged somewhat while the plane circled.

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Sunday, February 21, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 10:22 WP#: 36 Lat: 30.099297 Long: -79.859953  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:23 WP#: 37 Lat: 30.104639 Long: -79.864820  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 20/30/26  
Features used in Species ID: Broad flukes, short stubby rostrum, overall gray coloration with darker cape  
Representative images used for Species ID: 0543, 0547, 0561  
Photographer: REH Frame Numbers: 0541 to 0561 Spacer: 0562  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 10:26 WP#: 38 Lat: 30.107189 Long: -79.859710  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Lots of fish were present in the area. Loose group of animals traveling slowly.  

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Sunday, February 21, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 10:42 WP#: 44 Lat: 30.167341 Long: -80.154404  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:43 WP#: 45 Lat: 30.168803 Long: -80.153954  
Species: *Grampus griseus* Numbers (Low/High/Best): 7/7/7  
Features used in Species ID: Blunt rostrum with cleft, some animals heavily scarred, tall dorsal fin  
Representative images used for Species ID: 0573, 0574, 0576, 0578  
Photographer: REH Frame Numbers: 0563 to 0578 Spacer: 0579  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 10:48 WP#: 46 Lat: 30.182060 Long: -80.145738  
Calculated Distance Traveled: 1.8 km

**Behavior and Additional Comments**

Tight group swimming leisurely.  

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Sunday, February 21, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 10:59 WP#: 50 Lat: 30.166656 Long: -80.559801  
Vertical Angle: 2 Horizontal Bearing in Degrees: 95 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 51 Lat: 30.175268 Long: -80.557259  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Broad flukes, robust body, broad base dorsal fin, short, stubby rostrum with well defined crease at melon  
Representative images used for Species ID: 0581, 0585, 0586, 0588, 0589  
Photographer: REH Frame Numbers: 0580 to 0590 Spacer: 0591  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 11:07 WP#: 52 Lat: 30.178033 Long: -80.550563  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Elusive, tight group. Diving deep.  

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Sunday, February 21, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 11:16 WP#: 59 Lat: 30.234183 Long: -80.671958  
Vertical Angle: 1 Horizontal Bearing in Degrees: 150 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:18 WP#: 60 Lat: 30.228045 Long: -80.672911  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Broad flukes, uniform gray coloration, darker cape with clean lines  
Representative images used for Species ID: 0592, 0595, 0596, 0597  
Photographer: REH Frame Numbers: 0592 to 0598 Spacer: 0599  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 11:22 WP#: 61 Lat: 30.228885 Long: -80.676582  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Single elusive animal. Diving deep.  

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Sunday, February 21, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 11:26 WP#: 64 Lat: 30.232520 Long: -80.555330  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:27 WP#: 65 Lat: 30.237415 Long: -80.561136  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Broad flukes, broad based dorsal fin, robust body, short, stubby rostrum  
Representative images used for Species ID: 0600, 0602, 0606-0609  
Photographer: REH Frame Numbers: 0600 to 0611 Spacer: 0612  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 11:32 WP#: 66 Lat: 30.235902 Long: -80.557079  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Loose group, widely spaced

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Sunday, February 21, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 11:34 WP#: 69 Lat: 30.232544 Long: -80.483504  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:35 WP#: 70 Lat: 30.236873 Long: -80.491644  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Broad flukes, robust body, broad base dorsal fin, uniform gray coloration  
Representative images used for Species ID: 0614, 0615, 0620  
Photographer: REH Frame Numbers: 0613 to 0625 Spacer: 0626  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 11:42 WP#: 71 Lat: 30.246719 Long: -80.493520  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Loosely grouped animals.

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Sunday, February 21, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 11:47 WP#: 76 Lat: 30.231106 Long: -80.349880  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:47 WP#: 77 Lat: 30.238243 Long: -80.348145  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/7/7  
Features used in Species ID: White-tipped rostrum, alternate light/dark dorsal banding, some animals heavily spotted  
Representative images used for Species ID: 0628, 0632, 0634, 0640, 0642  
Photographer: REH Frame Numbers: 0627-0645 Spacer: 646  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 11:49 WP#: 78 Lat: 30.232268 Long: -80.347060  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Tight group  
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Sunday, February 21, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 11:51 WP#: 79 Lat: 30.232149 Long: -80.287397  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:52 WP#: 80 Lat: 30.236288 Long: -80.292178  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: Broad flukes, robust bodies, uniform gray coloration with darker dorsal cape  
Representative images used for Species ID: \_\_\_\_\_  
Photographer: REH Frame Numbers: 0647-0666 Spacer: 0667  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 11:54 WP#: 81 Lat: 30.235332 Long: -80.292371  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Elusive tight pod, deep diving, mother/calf pair observed  
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\_\_\_\_\_

Sunday, February 21, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 12:16 WP#: 86 Lat: 30.302437 Long: -80.011553  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:16 WP#: 87 Lat: 30.303635 Long: -79.999596  
Species: *Balaenoptera acutorostrata* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Sharply pointed head, vivid white bands on both pectoral flippers  
Representative images used for Species ID: 0672, 0673  
Photographer: REH Frame Numbers: 0668-0675 Spacer: 0676  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 12:20 WP#: 88 Lat: 30.310825 Long: -79.996581  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Whale "hanging" just below surface  
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Sunday, February 21, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 12:36 WP#: 92 Lat: 30.300264 Long: -80.467628  
Vertical Angle: 4 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:37 WP#: 93 Lat: 30.307680 Long: -80.465500  
Species: *Stenella frontalis* Numbers (Low/High/Best): 40/60/50  
Features used in Species ID: White-tipped rostrum, alternate light/dark dorsal banding, some animals heavily spotted  
Representative images used for Species ID: \_\_\_\_\_  
Photographer: REH Frame Numbers: 0691-0702 Spacer: 0703  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 12:39 WP#: 94 Lat: 30.304954 Long: -80.462959  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Tight group of 20 with numerous subgroups of 2-4 animals, several mother/calf pairs noted  
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Sunday, February 21, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 14:26 WP#: 104 Lat: 30.365291 Long: -80.611492  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:26 WP#: 105 Lat: 30.350682 Long: -80.618624  
Species: *Stenella frontalis* Numbers (Low/High/Best): 60/70/70  
Features used in Species ID: Light/dark alternating dorsal banding, white-tipped rostrum, some animals heavily spotted  
Representative images used for Species ID: 0714, 0717, 0718, 0719  
Photographer: REH Frame Numbers: 0704-720 Spacer: 0721  
Calculated Distance from Track Line: 1.7 km

**Final Time and Position of Sighting**

Time: 14:31 WP#: 106 Lat: 30.353518 Long: -80.620754  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Large pod of 30-40 with two smaller groups and several singletons, very active

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Sunday, February 21, 2010 Sighting # 16

**Initial Sighting on Track**

Time: 14:36 WP#: 109 Lat: 30.365422 Long: -80.458395  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:36 WP#: 110 Lat: 30.370790 Long: -80.462578  
Species: *Stenella frontalis* Numbers (Low/High/Best): 18/20/18  
Features used in Species ID: Light/dark alternating dorsal banding, white-tipped rostrum, some animals heavily spotted  
Representative images used for Species ID: 0726, 0729, 0730, 0733, 0734, 0736  
Photographer: REH Frame Numbers: 0722-0736 Spacer: 0737  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 14:39 WP#: 111 Lat: 30.375524 Long: -80.459766  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Moving rapidly

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Sunday, February 21, 2010 Sighting # 17

**Initial Sighting on Track**

Time: 14:42 WP#: 113 Lat: 30.365357 Long: -80.390477  
Vertical Angle: 1 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:42 WP#: 114 Lat: 30.368036 Long: -80.389323  
Species: *Stenella frontalis* Numbers (Low/High/Best): 13/50/50  
Features used in Species ID: White-tipped rostrum, alternating light/dark dorsal banding,  
some animals heavily spotted  
Representative images used for Species ID: 0745, 0746, 0747, 0748  
Photographer: REH Frame Numbers: 0738-0762 Spacer: 0763  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 14:47 WP#: 115 Lat: 30.365462 Long: -80.383327  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Large group of 20, two groups of 15 animals with several 1-2 animal outliers, Foraging behavior  
noted

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Sunday, February 21, 2010 Sighting # 18

**Initial Sighting on Track**

Time: 14:48 WP#: 117 Lat: 30.364417 Long: -80.367672  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Splash  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:50 WP#: 118 Lat: 30.354268 Long: -80.344896  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Short rostrum with well defined crease at melon, broad flukes,  
robust bodies, uniform gray color with darker, sharply defined cape  
Representative images used for Species ID: 0769, 0773, 0774  
Photographer: REH Frame Numbers: 0764-0776 Spacer: 0777  
Calculated Distance from Track Line: 2.5 km

**Final Time and Position of Sighting**

Time: 14:54 WP#: 119 Lat: 30.354235 Long: -80.339222  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Slow surface movement

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Sunday, February 21, 2010 Sighting # 19

**Initial Sighting on Track**

Time: 15:06 WP#: 123 Lat: 30.364179 Long: -79.887461  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:10 WP#: 124 Lat: 30.364399 Long: -79.885563  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Short, stubby rostrum, broad flukes, robust body, light colored peduncle  
Representative images used for Species ID: 0778, 0779, 0783, 0784, 0786  
Photographer: REH Frame Numbers: 0778-0788 Spacer: 0789  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 15:12 WP#: 125 Lat: 30.368331 Long: -79.894240  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Elusive

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Sunday, February 21, 2010 Sighting # 20

**Initial Sighting on Track**

Time: 15:23 WP#: 129 Lat: 30.433631 Long: -80.030979  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:23 WP#: 130 Lat: 30.430170 Long: -80.025826  
Species: None Numbers (Low/High/Best): 10/15/13  
Features used in Species ID: Short, stubby rostrum, broad flukes, overall gray coloration, light coloration on dorsal part of caudal peduncle  
Representative images used for Species ID: 0833, 0838, 0839, 0840  
Photographer: REH Frame Numbers: 0790-0842 Spacer: 0843  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 15:31 WP#: 131 Lat: 30.432907 Long: -80.027751  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Group of 7 or 8 animals with several 1-2 animal outliers

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Sunday, February 21, 2010 Sighting # 21

**Initial Sighting on Track**

Time: 15:43 WP#: 137 Lat: 30.433545 Long: -80.455094  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:43 WP#: 138 Lat: 30.440175 Long: -80.456014  
Species: *Stenella frontalis* Numbers (Low/High/Best): 12/12/12  
Features used in Species ID: White-tipped rostrum, dark cape w/ blaze terminating mid-dorsal, narrow peduncle, some animals heavily spotted  
Representative images used for Species ID: 0847, 0852, 0854 - 0857  
Photographer: REH Frame Numbers: 0844-0865 Spacer: 0866  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 15:43 WP#: 139 Lat: 30.434356 Long: -80.456176  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Very tight group

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Sunday, February 21, 2010 Sighting # 22

**Initial Sighting on Track**

Time: 16:03 WP#: 149 Lat: 30.499141 Long: -80.355864  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:04 WP#: 150 Lat: 30.493992 Long: -80.358464  
Species: *Stenella frontalis* Numbers (Low/High/Best): 22/35/30  
Features used in Species ID: Alternate light/dark dorsal banding, white-tipped rostrum, some animals heavily spotted, narrow peduncle  
Representative images used for Species ID: 0873, 0877, 0878, 0881, 0882, 0885  
Photographer: REH Frame Numbers: 0867-0900 Spacer: 0901  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 16:06 WP#: 151 Lat: 30.494698 Long: -80.355353  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Group of 15 animals travelling slowly at surface with a smaller group of 5 animals and several singletons

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Sunday, February 21, 2010 Sighting # 23

**Initial Sighting on Track**

Time: 16:35 WP#: 160 Lat: 30.567408 Long: -80.274241  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:36 WP#: 161 Lat: 30.572472 Long: -80.277572  
Species: *Stenella frontalis* Numbers (Low/High/Best): 17/20/18  
Features used in Species ID: Slender, white-tipped rostrum, narrow peduncle, alternate light/dark dorsal banding  
Representative images used for Species ID: 906, 910 - 912, 915  
Photographer: REH Frame Numbers: 0867-0900 Spacer: 0901  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 16:38 WP#: 162 Lat: 30.566447 Long: -80.274396  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Tight group travelling quickly at surface with some surface activity noted  

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Sunday, February 21, 2010 Sighting # 24

**Initial Sighting on Track**

Time: 16:48 WP#: 165 Lat: 30.566582 Long: -80.605385  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:51 WP#: 166 Lat: 30.566559 Long: -80.608603  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/20/18  
Features used in Species ID: Slender, white-tipped rostrum, alternate light/dark banding, narrow peduncle, some animals heavily spotted  
Representative images used for Species ID: 0936, 0946 - 0949  
Photographer: REH Frame Numbers: 0927-0952 Spacer: 0953  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 16:52 WP#: 167 Lat: 30.569156 Long: -80.605979  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

One loose group of 12 animals with numerous outliers.  

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Saturday, March 20, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:01 WP#: 16 Lat: 30.032158 Long: -80.429973  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:02 WP#: 17 Lat: 30.028323 Long: -80.425266  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/7/7  
Features used in Species ID: White tipped rostrum, Dark and light banding on dorsal surface,  
Visible spotting pattern  
Representative images used for Species ID: 0997,0999,1004,1007  
Photographer: HJF Frame Numbers: 0995-1007 Spacer: 1008  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:04 WP#: 18 Lat: 30.034822 Long: -80.428173  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Travelling at surface, tight group  

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Saturday, March 20, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:06 WP#: 21 Lat: 30.031966 Long: -80.506810  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:08 WP#: 22 Lat: 30.036836 Long: -80.502131  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: White tipped rostrum, Dark and light banding on dorsal surface,  
Visible spotting pattern  
Representative images used for Species ID: 1009,1013,1015  
Photographer: HJF Frame Numbers: 1009-1016 Spacer: 1017  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:14 WP#: 23 Lat: 30.039551 Long: -80.503568  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Two groups of two animals travelling at surface  

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Saturday, March 20, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:19 WP#: 25 Lat: 30.031790 Long: -80.700264  
Vertical Angle: 4 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:20 WP#: 26 Lat: 30.047163 Long: -80.697271  
Species: *Eubalaena glacialis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Large black cetacean, No dorsal fin observed, Large paddle-like flipper, Visible callosities observed  
Representative images used for Species ID: 1086,1210,1273,1306  
Photographer: HJF Frame Numbers: 1018-1415 Spacer: 1416  
Calculated Distance from Track Line: 1.7 km

**Final Time and Position of Sighting**

Time: 11:06 WP#: 28 Lat: 30.049637 Long: -80.705735  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Animal was observed at surface travelling slowly. During encounter animal gave birth.

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Tuesday, April 20, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 13:00 WP#: 38 Lat: 30.100191 Long: -80.365508  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:01 WP#: 39 Lat: 30.099889 Long: -80.367558  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/2  
Features used in Species ID: Robust body with overall gray coloration, Short rostrum with visible crease at melon, Broad flukes  
Representative images used for Species ID: 8498,8499,8504,8508,8509  
Photographer: HJF Frame Numbers: 8491-8510 Spacer: 8511  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: \_\_\_\_\_ WP#: 40 Lat: 30.100018 Long: -80.371707  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Very slow travel at surface, somewhat elusive

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Saturday, March 20, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 13:08 WP#: 42 Lat: 30.100229 Long: -80.343489  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:10 WP#: 43 Lat: 30.100872 Long: -80.336616  
Species: *Stenella frontalis* Numbers (Low/High/Best): 29/31/29  
Features used in Species ID: Visible spotting pattern, Dark and light banding pattern on dorsal surface, Light rostrum  
Representative images used for Species ID: 8519,8520,8525,8526  
Photographer: HJF Frame Numbers: 8512-8532 Spacer: 8533  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 13:12 WP#: 44 Lat: 30.099451 Long: -80.324375  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

One main group with two smaller groups

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Saturday, March 20, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 13:40 WP#: 52 Lat: 30.166452 Long: -80.330322  
Vertical Angle: 2 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Species: None Numbers (Low/High/Best): \_\_\_\_\_  
Features used in Species ID: No photos taken

Representative images used for Species ID: N/A  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Animals never aquired

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Saturday, March 20, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 13:49 WP#: 54 Lat: 30.166525 Long: -80.514394  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:49 WP#: 55 Lat: 30.174741 Long: -80.512669  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Unable to identify to species with images obtained

Representative images used for Species ID: 8534,8535,8536  
Photographer: HJF Frame Numbers: 8534-8538 Spacer: 8539  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 13:56 WP#: 56 Lat: 30.176956 Long: -80.509506  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Deep diving and elusive

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Saturday, March 20, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 14:13 WP#: 66 Lat: 30.232665 Long: -80.273324  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:14 WP#: 67 Lat: 30.232452 Long: -80.270676  
Species: Stenella frontalis Numbers (Low/High/Best): 34/40/34  
Features used in Species ID: White rostrum tip, Dark and light banding pattern on dorsal surface, Visible spotting pattern

Representative images used for Species ID: 8556,8557,8560,8562  
Photographer: HJF Frame Numbers: 8540-8565 Spacer: 8566  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 14:15 WP#: 68 Lat: 30.229928 Long: -80.267443  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Two large groups

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Saturday, March 20, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 14:40 WP#: 77 Lat: 30.300645 Long: -80.251263  
Vertical Angle: 2 Horizontal Bearing in Degrees: 145 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:41 WP#: 78 Lat: 30.292360 Long: -80.240354  
Species: *Stenella frontalis* Numbers (Low/High/Best): 19/22/19  
Features used in Species ID: Visible spotting pattern, White tipped rostrum, Flank blaze below dorsal fin, Dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 8567,8569,8572,8583  
Photographer: HJF Frame Numbers: 8567-8584 Spacer: 8585  
Calculated Distance from Track Line: 1.4 km

**Final Time and Position of Sighting**

Time: 14:43 WP#: 79 Lat: 30.296899 Long: -80.243474  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

One large group travelling quickly at surface

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Saturday, March 20, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 14:47 WP#: 81 Lat: 30.300432 Long: -80.397569  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:48 WP#: 82 Lat: 30.308002 Long: -80.395258  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Unable to identify to species with images obtained  
Representative images used for Species ID: 8586,8589  
Photographer: HJF Frame Numbers: 8586-8599 Spacer: 8600  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 14:53 WP#: 83 Lat: 30.311724 Long: -80.391741  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Tight group travelling at surface, elusive and deep diving

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Saturday, March 20, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 15:10 WP#: 94 Lat: 30.365365 Long: -80.437196  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:10 WP#: 95 Lat: 30.362502 Long: -80.432803  
Species: *Stenella frontalis* Numbers (Low/High/Best): 13/22/20  
Features used in Species ID: White tipped rostrum, Visible banding pattern on dorsal surface, Visible spotting pattern  
Representative images used for Species ID: 8601,8602,8603,8604  
Photographer: HJF Frame Numbers: 8601-8605 Spacer: 8606  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 15:11 WP#: 96 Lat: 30.366401 Long: -80.434135  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

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Saturday, March 20, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 15:15 WP#: 100 Lat: 30.365659 Long: -80.257279  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: Rch Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:16 WP#: 101 Lat: 30.367844 Long: -80.264885  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 4/5/4  
Features used in Species ID: Unable to identify to species with images obtained  
Representative images used for Species ID: 8610  
Photographer: HJF Frame Numbers: 8607-8612 Spacer: 8613  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 15:20 WP#: 102 Lat: 30.372629 Long: -80.265724  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Elusive and spread out, two groups  

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Saturday, March 20, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 15:32 WP#: 107 Lat: 30.365482 Long: -79.906029  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 3  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:33 WP#: 108 Lat: 30.361425 Long: -79.911819  
Species: *Grampus griseus* Numbers (Low/High/Best): 3/6/6  
Features used in Species ID: Large head with no visible rostrum, Visible cleft in melon

Representative images used for Species ID: 8617,8618,8619

Photographer: HJF Frame Numbers: 8614-8621 Spacer: 8622  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 15:38 WP#: 109 Lat: 30.365566 Long: -79.913909  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Calves present

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Saturday, March 20, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 15:53 WP#: 115 Lat: 30.433849 Long: -80.278499  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 15:55 WP#: 116 Lat: 30.434805 Long: -80.269575  
Species: *Stenella frontalis* Numbers (Low/High/Best): 21/21/21  
Features used in Species ID: Visible spotting pattern, Banding pattern on dorsal surface, White tipped rostrum

Representative images used for Species ID: 8629,8638

Photographer: HJF Frame Numbers: 8623-8638 Spacer: 8639  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 15:55 WP#: 117 Lat: 30.435032 Long: -80.266839  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

One large group with smaller group, calves present

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Saturday, March 20, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 15:58 WP#: 119 Lat: 30.433805 Long: -80.373572  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:59 WP#: 120 Lat: 30.442233 Long: -80.378832  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/3/2  
Features used in Species ID: White tipped rostrum, Visible blaze below dorsal fin, Visible spotting pattern, Banding along dorsal surface  
Representative images used for Species ID: 8642,8647,8662,8663  
Photographer: HJF Frame Numbers: 8640-8663 Spacer: 8664  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 16:02 WP#: 121 Lat: 30.436685 Long: -80.364039  
Calculated Distance Traveled: 1.6 km

**Behavior and Additional Comments**

Group of two with a singleton, somewhat elusive

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Saturday, March 20, 2010 Sighting # 16

**Initial Sighting on Track**

Time: 16:10 WP#: 128 Lat: 30.433815 Long: -80.678146  
Vertical Angle: 3 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:11 WP#: 129 Lat: 30.428521 Long: -80.677282  
Species: *Eubalaena glacialis* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: No dorsal fin visible, Callosities visible on head, Large black cetacean with paddle like flippers  
Representative images used for Species ID: 8667,8668,8674  
Photographer: HJF Frame Numbers: 8665-8683 Spacer: 8684  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 16:28 WP#: 130 Lat: 30.436285 Long: -80.665533  
Calculated Distance Traveled: 1.4 km

**Behavior and Additional Comments**

Single animal travelling at surface

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24 March 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:11 WP#: 22 Lat: 30.434226 Long: -80.377119  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:16 WP#: 23 Lat: 30.431388 Long: -80.386431  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: Alternate light/dark banding from above, dark cape w/ blaze  
terminating mid-dorsal, white-tipped beak, some animals heavily spotted  
Representative images used for Species ID: 8711, 8712, 8715, 8720, 8724  
Photographer: RCH Frame Numbers: 8686 - 8724 Spacer: 8725  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 10:23 WP#: 24 Lat: 30.435645 Long: -80.393807  
Calculated Distance Traveled: 1.7 km

**Behavior and Additional Comments**

Tightly grouped; swimming quickly at surface. One single away from the group.

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24 March 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:33 WP#: 31 Lat: 30.433920 Long: -80.037715  
Vertical Angle: 2 Horizontal Bearing in Degrees: 140 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:36 WP#: 32 Lat: 30.429088 Long: -80.037463  
Species: *Grampus griseus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Variable dark and light gray coloration, blunt melon, tall dorsal  
fin, broad flukes  
Representative images used for Species ID: 8726, 8727  
Photographer: RCH Frame Numbers: 8726-8730 Spacer: 8731  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 10:49 WP#: 34 Lat: 30.433398 Long: -80.035460  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Spread out, not elusive but hard to keep with glare. Very few photos.

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24 March 2010 Sighting # 3

**Initial Sighting on Track**

Time: 11:13 WP#: 39 Lat: 30.365240 Long: -80.293025  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:14 WP#: 40 Lat: 30.362014 Long: -80.294141  
Species: *Stenella frontalis* Numbers (Low/High/Best): 9/11/10  
Features used in Species ID: White-tipped rostrum, dark cape with blaze terminating mid-dorsal, some animals heavily spotted  
Representative images used for Species ID: 8734-35, 8746-47, 8744, 8741, 8775-76  
Photographer: RCH Frame Numbers: 8732-8779 Spacer: 8780  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 11:19 WP#: 41 Lat: 30.358830 Long: -80.292275  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Tight group, surfacing frequently, mom/calf pair (at least one) split away from the group.

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24 March 2010 Sighting # 4

**Initial Sighting on Track**

Time: 11:23 WP#: 43 Lat: 30.365268 Long: -80.461788  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:25 WP#: 44 Lat: 30.370039 Long: -80.461945  
Species: *Stenella frontalis* Numbers (Low/High/Best): 5/7/7  
Features used in Species ID: White-tipped rostrum, dark cape with blaze terminating mid-dorsal, some animals heavily spotted  
Representative images used for Species ID: 8798-8801, 8804, 8807, 8809, 8817-20  
Photographer: RCH Frame Numbers: 8781-8820 Spacer: 8821  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 11:31 WP#: 45 Lat: 30.370116 Long: -80.460610  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

One group of 3, two groups of 2

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24 March 2010 Sighting # 5

**Initial Sighting on Track**

Time: 11:42 WP#: 50 Lat: 30.300304 Long: -80.649542  
Vertical Angle: 3 Horizontal Bearing in Degrees: 95 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:49 WP#: 51 Lat: 30.302538 Long: -80.655800  
Species: Unidentified Delphinid Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: N/A

Representative images used for Species ID: No photos

Photographer: RCH Frame Numbers: No photos Spacer: No photos  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 11:54 WP#: 52 Lat: 30.300817 Long: -80.647341  
Calculated Distance Traveled: 0.8 km est

**Behavior and Additional Comments**

Mom/calf pair. Elusive, no photos, surfaced rarely. Note: final time and position is the best estimate, not actual (2.41).

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24 March 2010 Sighting # 6

**Initial Sighting on Track**

Time: 12:10 WP#: 56 Lat: 30.300709 Long: -80.113288  
Vertical Angle: 2 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:11 WP#: 57 Lat: 30.302457 Long: -80.113317  
Species: Grampus griseus Numbers (Low/High/Best): 7/9/9  
Features used in Species ID: Blunt melon with cleft, variable dark/light gray coloration, tall dorsal fin, wide flukes, extensive scarring on some individuals

Representative images used for Species ID: 8848-50, 8854-55, 8858

Photographer: RCH Frame Numbers: 8822-8872 Spacer: 8873  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 12:14 WP#: 58 Lat: 30.303329 Long: -80.113967  
Calculated Distance Traveled: 0.1

**Behavior and Additional Comments**

Grouped together, mother/calf pair- calf is almost all black

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Wednesday, March 24, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 12:17 WP#: 61 Lat: 30.300631 Long: -80.026045  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:18 WP#: 62 Lat: 30.304547 Long: -80.030007  
Species: Unidentified Delphinid Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: \_\_\_\_\_

Representative images used for Species ID: No photos  
Photographer: RCH Frame Numbers: No photos Spacer: No photos  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 12:23 WP#: 63 Lat: 30.301248 Long: -80.027332  
Calculated Distance Traveled: 0.4 km est

**Behavior and Additional Comments**

Animals were very elusive, only sighted a few times in persistent glare, surfaced infrequently.  
No photos.

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Wednesday, March 31, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 14:07 WP#: 12 Lat: 30.032243 Long: -80.325486  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 3  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:08 WP#: 11 Lat: 30.032377 Long: -80.325045  
Species: *Stenella frontalis* Numbers (Low/High/Best): 16/20/18  
Features used in Species ID: visible spotting pattern, long, white-tipped rostrum, small fluke

Representative images used for Species ID: 8894, 8895, 8924

Photographer: PBN Frame Numbers: 8874 - 8936 Spacer: 8937

Calculated Distance from Track Line: 0.04 km

**Final Time and Position of Sighting**

Time: 14:15 WP#: 12 Lat: 30.027919 Long: -80.317858  
Calculated Distance Traveled: 0.85 km

**Behavior and Additional Comments**

Two distinct groups: one with approx. 10 individuals and one with about 8. Slow subsurface travel and at least one mother/calf pair was observed.

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Wednesday, March 31, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 14:29 WP#: 18 Lat: 30.093329 Long: -80.672633  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:30 WP#: 19 Lat: 30.099076 Long: -80.680099  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/6/5  
Features used in Species ID: broad dorsal flukes, overall grey coloration, short rostrum,

Representative images used for Species ID: 8969, 8970, 9028, 9030

Photographer: PBN Frame Numbers: 8938 - 9031 Spacer: 9032

Calculated Distance from Track Line: 0.96 km

**Final Time and Position of Sighting**

Time: 14:33 WP#: 20 Lat: 30.097612 Long: -80.680876  
Calculated Distance Traveled: 0.18 km

**Behavior and Additional Comments**

Several individuals widely spaced out over a large area. Possible feeding observed.

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Wednesday, March 31, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 14:44 WP#: 25 Lat: 30.100282 Long: -80.310850  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:50 WP#: 26 Lat: 30.106320 Long: -80.313623  
Species: Unidentified Delphinid Numbers (Low/High/Best): n/a  
Features used in Species ID: n/a

Representative images used for Species ID: n/a  
Photographer: n/a Frame Numbers: n/a Spacer: n/a  
Calculated Distance from Track Line: n/a

**Final Time and Position of Sighting**

Time: n/a WP#: n/a Lat: n/a Long: n/a  
Calculated Distance Traveled: n/a

**Behavior and Additional Comments**

2.41 taken for presumed location - animals were never relocated

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Wednesday, March 31, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 15:25 WP#: 27 Lat: 30.166595 Long: -80.453439  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:26 WP#: 33 Lat: 30.169487 Long: -80.458317  
Species: Stenella frontalis Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: long, white-tipped rostrum with visible spotting pattern

Representative images used for Species ID: 9060, 9061,  
Photographer: PBN Frame Numbers: 9057 - 9068 Spacer: 9069  
Calculated Distance from Track Line: 0.57 km

**Final Time and Position of Sighting**

Time: 15:29 WP#: 34 Lat: 30.170463 Long: -80.457100  
Calculated Distance Traveled: 0.16 km

**Behavior and Additional Comments**

Somewhat evasive individuals which were difficult to relocated and photograph.  
Dolphins spend very little time at the surface of the water.

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Wednesday, March 31, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 15:32 WP#: 38 Lat: 30.166349 Long: -80.541524  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:36 WP#: 39 Lat: 30.171467 Long: -80.540148  
Species: *Stenella frontalis* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: long white-tipped rostrum, visible spotting pattern, alternating pattern of light and dark coloration.  
Representative images used for Species ID: 9082 - 9084  
Photographer: PBN Frame Numbers: 9070 - 9089 Spacer: 9090  
Calculated Distance from Track Line: 0.58 km

**Final Time and Position of Sighting**

Time: 15:36 WP#: 40 Lat: 30.174907 Long: -80.535907  
Calculated Distance Traveled: 0.56 km

**Behavior and Additional Comments**

Quick sighting in which little to no behavior was observed

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Wednesday, March 31, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 15:59 WP#: 48 Lat: 30.499367 Long: -80.365051  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:02 WP#: 49 Lat: 30.502046 Long: -80.372564  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: short, stubby rostrum, overall grey coloration and broad dorsal flukes  
Representative images used for Species ID: 9101 - 9104  
Photographer: PBN Frame Numbers: 9091 - 9107 Spacer: 9108  
Calculated Distance from Track Line: 0.78 km

**Final Time and Position of Sighting**

Time: 16:03 WP#: 50 Lat: 30.503715 Long: -80.375254  
Calculated Distance Traveled: 0.32 km

**Behavior and Additional Comments**

Single individual

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Wednesday, March 31, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 16:04 WP#: 52 Lat: 30.498666 Long: -80.331542  
Vertical Angle: 3 Horizontal Bearing in Degrees: 140 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:06 WP#: 53 Lat: 30.502116 Long: -80.340091  
Species: *Stenella frontalis* Numbers (Low/High/Best): 60/100/80  
Features used in Species ID: alternating light and dark banding, long, white-tipped rostrum, visible spotting patterns  
Representative images used for Species ID: 9117, 9118, 9124, 9126 - 9128, 9139  
Photographer: PBN Frame Numbers: 9109 - 9041 Spacer: 9142  
Calculated Distance from Track Line: 0.90 km

**Final Time and Position of Sighting**

Time: 16:07 WP#: 54 Lat: 30.501800 Long: -80.340231  
Calculated Distance Traveled: 0.04 km

**Behavior and Additional Comments**

Three very large groups with juveniles present.  

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Wednesday, March 31, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 16:08 WP#: 56 Lat: 30.499312 Long: -80.289172  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:09 WP#: 57 Lat: 30.503607 Long: -80.291330  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: short, stubby rostrum, broad flukes and overall slate grey coloration  
Representative images used for Species ID: 9158 - 9161  
Photographer: PBN Frame Numbers: 9143 - 9166 Spacer: 9167  
Calculated Distance from Track Line: 0.52 km

**Final Time and Position of Sighting**

Time: 16:15 WP#: 59 Lat: 30.504148 Long: -80.296535  
Calculated Distance Traveled: 0.50 km

**Behavior and Additional Comments**

Lone individual observed essentially on trackline. Very little time was spent at the surface of the water, but lots of subsurface traveling observed.  

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Wednesday, March 31, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 16:19 WP#: 61 Lat: 30.499413 Long: -80.144164  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:21 WP#: 62 Lat: 30.500793 Long: -80.151141  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: wide flukes, short rostrum with defined crease between melon, grey coloration  
Representative images used for Species ID: 9169, 9199, 9200, 9202  
Photographer: PBN Frame Numbers: 9168 - 9206 Spacer: 9207  
Calculated Distance from Track Line: 0.69 km

**Final Time and Position of Sighting**

Time: 16:21 WP#: 63 Lat: 30.504673 Long: -80.148242  
Calculated Distance Traveled: 0.51 km

**Behavior and Additional Comments**

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Wednesday, March 31, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 16:27 WP#: 65 Lat: 30.498996 Long: -79.891956  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:29 WP#: 66 Lat: 30.504652 Long: -79.895241  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/10/10  
Features used in Species ID: robust body, broad flukes, dark grey cape over light grey coloration, short rostrum  
Representative images used for Species ID: 9218 - 9220, 9225 - 9230  
Photographer: PBN Frame Numbers: 9208 - 9232 Spacer: n/a  
Calculated Distance from Track Line: 0.70 km

**Final Time and Position of Sighting**

Time: 16:32 WP#: 67 Lat: 30.505887 Long: -79.896958  
Calculated Distance Traveled: 0.21 km

**Behavior and Additional Comments**

One tightly packed group.  

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Wednesday, March 31, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 16:33 WP#: 69 Lat: 30.498702 Long: -79.827256  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:35 WP#: 70 Lat: 30.501375 Long: -79.831675  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 18/20/18  
Features used in Species ID: robust body size, white coloration on caudal peduncle, dark grey cape over lighter grey coloration, distinct blaze, short rostrum  
Representative images used for Species ID: 9244, 9247, 9251  
Photographer: PBN Frame Numbers: 9233 - 9255 Spacer: 9256  
Calculated Distance from Track Line: 0.52 km

**Final Time and Position of Sighting**

Time: 16:36 WP#: 71 Lat: 30.503796 Long: -79.827822  
Calculated Distance Traveled: 0.46 km

**Behavior and Additional Comments**

One large group with several outliers. Located on the very eastern-most point of trackline 9.

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Wednesday, March 31, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 16:48 WP#: 59 Lat: 30.574687 Long: -80.127042  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:48 WP#: 77 Lat: 30.572718 Long: -80.122620  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: While photos were obtained, identification to species level was not possible  
Representative images used for Species ID: N/A  
Photographer: PBN Frame Numbers: 9257 - 9300 Spacer: 9301  
Calculated Distance from Track Line: 0.48 km

**Final Time and Position of Sighting**

Time: 16:51 WP#: 78 Lat: 30.572430 Long: -80.123914  
Calculated Distance Traveled: 0.13 km

**Behavior and Additional Comments**

A few individuals spaced widely apart throughout area.

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Wednesday, March 31, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 16:52 WP#: 61 Lat: 30.568623 Long: -80.170132  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:54 WP#: 82 Lat: 30.572921 Long: -80.169614  
Species: *Stenella frontalis* Numbers (Low/High/Best): 22/30/25  
Features used in Species ID: alternating pattern of light and dark coloration beginning with long white-tipped rostrum, visible spotting pattern  
Representative images used for Species ID: 9307, 9310, 9311, 9314  
Photographer: PBN Frame Numbers: 9302 - 9322 Spacer: 9323  
Calculated Distance from Track Line: 0.48 km

**Final Time and Position of Sighting**

Time: 16:55 WP#: 83 Lat: 30.577859 Long: -80.170213  
Calculated Distance Traveled: 0.55 km

**Behavior and Additional Comments**

One large group widely spaced apart.  
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Wednesday, March 31, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 16:57 WP#: 85 Lat: 30.567832 Long: -80.216843  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 17:01 WP#: 86 Lat: 30.562104 Long: -80.212544  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: uniform grey coloration, robust body with broad flukes, short rostrum with well-defined crease at melon  
Representative images used for Species ID: 9331, 9342, 9343, 9349  
Photographer: PBN Frame Numbers: 9324 - 9352 Spacer: 9353  
Calculated Distance from Track Line: 0.76 km

**Final Time and Position of Sighting**

Time: 17:01 WP#: 87 Lat: 30.560459 Long: -80.216937  
Calculated Distance Traveled: 0.46 km

**Behavior and Additional Comments**

Small tightly-packed group traveling together. Defecation observed.  
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Wednesday, March 31, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 17:04 WP#: 65 Lat: 30.567280 Long: -80.316056  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 2  
Observer: PBN Observer Side: Right

**Actual Time and Position of Sighting**

Time: 17:05 WP#: 90 Lat: 30.568151 Long: -80.309380  
Species: Stenella frontalis Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: long, white-tipped rostrum, alternating banding pattern of light and dark coloration, small flukes and relatively small body size  
Representative images used for Species ID: 9361, 9375, 9378, 9380  
Photographer: PBN Frame Numbers: 9354 - 9393 Spacer: 9394  
Calculated Distance from Track Line: 0.65 km

**Final Time and Position of Sighting**

Time: 17:07 WP#: 91 Lat: 30.569304 Long: -80.316714  
Calculated Distance Traveled: 0.71 km

**Behavior and Additional Comments**

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1 April 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:59 WP#: 19 Lat: 30.298797 Long: -80.522242  
Vertical Angle: 3 Horizontal Bearing in Degrees: 30 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 20 Lat: 30.303537 Long: -80.529192  
Species: Unidentified Delphinid Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Images not conclusive as to species ID

Representative images used for Species ID: 9395, 9396, 9400  
Photographer: REH Frame Numbers: 9395-9407 Spacer: 9408  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: None WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Single dolphin, "weird" looking cape. Note: no final location was obtained for this sighting  
Possible unidentified Stenella spp.

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1 April 2010 Sighting # 2

**Initial Sighting on Track**

Time: 11:27 WP#: 24 Lat: 30.309072 Long: -80.212149  
Vertical Angle: 2 Horizontal Bearing in Degrees: 140 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:32 WP#: 25 Lat: 30.306852 Long: -80.213772  
Species: Tursiops truncatus Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Short, stubby rostrum, well-defined crease at melon, broad flukes, uniform gray coloration

Representative images used for Species ID: 9414, 9418, 9419  
Photographer: REH Frame Numbers: 9409-9422 Spacer: 9423  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 11:44 WP#: 26 Lat: 30.296740 Long: -80.219131  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Mother/juvenile and a single animal

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1 April 2010 Sighting # 3

**Initial Sighting on Track**

Time: 12:15 WP#: 34 Lat: 30.233211 Long: -80.369598  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:21 WP#: 35 Lat: 30.240809 Long: -80.355085  
Species: *Stenella frontalis* Numbers (Low/High/Best): 9/12/11  
Features used in Species ID: Alternating light/dark banding from above, white-tipped rostrum, some animals heavily spotted, narrow peduncle  
Representative images used for Species ID: 9426-9428  
Photographer: REH Frame Numbers: 9424-9428 Spacer: 9429  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 12:27 WP#: 36 Lat: 30.244484 Long: -80.366442  
Calculated Distance Traveled: 1.2 km

**Behavior and Additional Comments**

Semi-tight group, lots of interaction, showing bellies

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1 April 2010 Sighting # 4

**Initial Sighting on Track**

Time: 12:33 WP#: 38 Lat: 30.232801 Long: -80.583697  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:36 WP#: 40 Lat: 30.239016 Long: -80.583593  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Alternate light/dark banding from above, white-tipped, slender rostrum, narrow peduncle  
Representative images used for Species ID: 9430-9432, 9434  
Photographer: REH Frame Numbers: 9430-9436 Spacer: 9437  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 12:39 WP#: 41 Lat: 30.238345 Long: -80.576273  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Medium-paced travel

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1 April 2010 Sighting # 5

**Initial Sighting on Track**

Time: 14:21 WP#: 51 Lat: 30.165911 Long: -80.567348  
Vertical Angle: 2 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:25 WP#: 53 Lat: 30.173926 Long: -80.535763  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Short, stubby rostrum, well-defined crease at melon, broad flukes, sharp dark gray cape over lighter gray coloration, sharp blaze  
Representative images used for Species ID: 9439-9441, 9444  
Photographer: REH Frame Numbers: 9438-9447 Spacer: 9448  
Calculated Distance from Track Line: 3.2 km

**Final Time and Position of Sighting**

Time: 14:26 WP#: 54 Lat: 30.168311 Long: -80.527317  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Leisurely travel

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1 April 2010 Sighting # 6

**Initial Sighting on Track**

Time: 14:28 WP#: 56 Lat: 30.166503 Long: -80.488016  
Vertical Angle: 3 Horizontal Bearing in Degrees: 70 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:30 WP#: 57 Lat: 30.170693 Long: -80.491403  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Broad flukes, large, falcate dorsal fin, sharp, dark cape over lighter gray coloration, short, stubby rostrum  
Representative images used for Species ID: 9452, 9454, 9456, 9458  
Photographer: REH Frame Numbers: 9449-9458 Spacer: 9459  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 14:31 WP#: 58 Lat: 30.170266 Long: -80.492578  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

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1 April 2010 Sighting # 7

**Initial Sighting on Track**

Time: 14:34 WP#: 62 Lat: 30.166219 Long: -80.383962  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:36 WP#: 63 Lat: 30.175791 Long: -80.389746  
Species: *Stenella frontalis* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: White-tipped rostrum, alternate light/dark banding from above, adults were spotted, narrow peduncle  
Representative images used for Species ID: 9463, 9468, 9472, 9473  
Photographer: REH Frame Numbers: 9460-9477 Spacer: 9478  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 14:39 WP#: 64 Lat: 30.178466 Long: -80.389631  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Two mother/calf pairs and two singletons, one joined the group of two pairs

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1 April 2010 Sighting # 8

**Initial Sighting on Track**

Time: 14:42 WP#: 66 Lat: 30.166332 Long: -80.269480  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 14:44 WP#: 67 Lat: 30.165493 Long: -80.270584  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/7/7  
Features used in Species ID: Short, stubby rostrum, broad flukes, robust bodies, sharp, dark cape over lighter gray coloration  
Representative images used for Species ID: 9488, 9491, 9492, 9494, 9500  
Photographer: REH Frame Numbers: 9479-9504 Spacer: 9505  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 14:50 WP#: 68 Lat: 30.164606 Long: -80.273329  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

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1 April 2010 Sighting # 9

**Initial Sighting on Track**

Time: 14:58 WP#: 72 Lat: 30.166080 Long: -79.962957  
Vertical Angle: 1 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:00 WP#: 73 Lat: 30.163185 Long: -79.962582  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/12/11  
Features used in Species ID: Sharply defined dark cape over lighter gray coloration, lighter gray peduncle, short, stubby rostrum with well-defined crease at melon  
Representative images used for Species ID: 9507-9510, 9513  
Photographer: REH Frame Numbers: 9506-9514 Spacer: 9515  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 15:03 WP#: 74 Lat: 30.162102 Long: -79.944084  
Calculated Distance Traveled: 1.8 km

**Behavior and Additional Comments**

Spread-out group  
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1 April 2010 Sighting # 10

**Initial Sighting on Track**

Time: 15:22 WP#: 78 Lat: 30.100598 Long: -80.187572  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:24 WP#: 79 Lat: 30.102853 Long: -80.187906  
Species: *Grampus griseus* Numbers (Low/High/Best): 10/12/11  
Features used in Species ID: Blunt head with creased melon, tall dorsal fin, ample scarring and rake marks, variable dark gray to light gray coloration  
Representative images used for Species ID: 9516, 9520, 9522, 9531  
Photographer: REH Frame Numbers: 9516-9535 Spacer: 9536  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 15:26 WP#: 80 Lat: 30.102102 Long: -80.189447  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Group in "chorus-line" formation  
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1 April 2010 Sighting # 11

**Initial Sighting on Track**

Time: 15:29 WP#: 82 Lat: 30.100606 Long: -80.314324  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:31 WP#: 83 Lat: 30.099932 Long: -80.317157  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Short, stubby rostrum, overall gray coloration, robust body and broad flukes  
Representative images used for Species ID: 9539, 9540, 9545, 9548  
Photographer: REH Frame Numbers: 9537-9550 Spacer: 9551  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 15:34 WP#: 84 Lat: 30.096442 Long: -80.314747  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

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1 April 2010 Sighting # 12

**Initial Sighting on Track**

Time: 15:35 WP#: 86 Lat: 30.100799 Long: -80.365531  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:37 WP#: 87 Lat: 30.107272 Long: -80.363344  
Species: *Stenella frontalis* Numbers (Low/High/Best): 5/6/6  
Features used in Species ID: Slender, white-tipped rostrum, wide, prominent blaze terminating mid-dorsal, narrow peduncle  
Representative images used for Species ID: 9562, 9564, 9565  
Photographer: REH Frame Numbers: 9552-9587 Spacer: 9588  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 15:43 WP#: 88 Lat: 30.100386 Long: -80.365163  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Scattered group, languid at surface  

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1 April 2010 Sighting # 13

**Initial Sighting on Track**

Time: 16:02 WP#: 103 Lat: 30.031666 Long: -80.485093  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:03 WP#: 104 Lat: 30.035986 Long: -80.485707  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Broad flukes, short, stubby rostrum, overall gray coloration, robust body  
Representative images used for Species ID: 9593, 9594, 9596, 9604, 9605  
Photographer: REH Frame Numbers: 9589-9605 Spacer: 9606  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 16:07 WP#: 105 Lat: 30.035323 Long: -80.482034  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Mother / calf pair

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1 April 2010 Sighting # 14

**Initial Sighting on Track**

Time: 16:45 WP#: 116 Lat: 29.965765 Long: -80.435832  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On1 Track Line: 1 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:47 WP#: 117 Lat: 29.962665 Long: -80.435568  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Alternate light/dark banding from above, white-tipped rostrum, narrow peduncle, some animals heavily spotted  
Representative images used for Species ID: 9608, 9615, 9619, 9638  
Photographer: REH Frame Numbers: 9607-9640 Spacer: 9641  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 16:49 WP#: 118 Lat: 29.961485 Long: -80.428432  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Dolphins and a school of fish. Dolphins may be herding the fish, possible foraging behavior

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Friday, April 2, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 9:08 WP#: 4 Lat: 29.965040 Long: -80.624709  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:09 WP#: 5 Lat: 29.961342 Long: -80.623578  
Species: *Stenella frontalis* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: White tipped rostrum, Visible spotting on some individuals,  
Dark dorsal surface with pale blaze along flanks  
Representative images used for Species ID: 9648,9657,9658  
Photographer: HJF Frame Numbers: 9642-9658 Spacer: 9659  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 9:10 WP#: 6 Lat: 29.962838 Long: -80.633078  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Juveniles present

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Friday, April 2, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 9:15 WP#: 8 Lat: 29.965402 Long: -80.449753  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:15 WP#: 9 Lat: 29.959600 Long: -80.446274  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/3/3  
Features used in Species ID: Robust body, overall grey coloration, visible crease at rostrum  
and melon  
Representative images used for Species ID: 9669,9673,9675  
Photographer: HJF Frame Numbers: 9660-9676 Spacer: 9677  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 9:20 WP#: 10 Lat: 29.959404 Long: -80.453037  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Widely spaced, elusive

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Friday, April 2, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 9:40 WP#: 20 Lat: 29.965272 Long: -80.010595  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:40 WP#: 21 Lat: 29.961503 Long: -80.013987  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Robust body with overall grey coloration, short thick rostrum, large flukes  
Representative images used for Species ID: 9733,9734,9735  
Photographer: HJF Frame Numbers: 9706-9741 Spacer: 9742  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 9:45 WP#: 22 Lat: 29.962368 Long: -80.014319  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Slow travel in tight group  

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Friday, April 2, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 9:48 WP#: 25 Lat: 29.965170 Long: -79.913647  
Vertical Angle: 2 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:48 WP#: 26 Lat: 29.963709 Long: -79.918157  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/10/8  
Features used in Species ID: Visible crease at rostrum and melon, Robust body with overall grey coloration, Short thick rostrum  
Representative images used for Species ID: 9752,9769,9772  
Photographer: HJF Frame Numbers: 9743-9772 Spacer: 9773  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 9:51 WP#: 27 Lat: 29.968893 Long: -79.919120  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Travelling in sets of two, lots of surface activity, one calf observed  

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Friday, April 2, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 9:53 WP#: 29 Lat: 29.965018 Long: -79.848911  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:53 WP#: 30 Lat: 29.958657 Long: -79.850725  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Broad flukes, short heavy beak

Representative images used for Species ID: 9776,9779,9781,9788  
Photographer: HJF Frame Numbers: 9774-9792 Spacer: 9793  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 9:55 WP#: 31 Lat: 29.960253 Long: -79.846540  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 9:56 WP#: 33 Lat: 29.965447 Long: -79.826545  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:56 WP#: 34 Lat: 29.964526 Long: -79.832764  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Overall black body, rounded and falcate dorsal, blunt head

Representative images used for Species ID: 9801, 9814,9815,9822,9823  
Photographer: HJF Frame Numbers: 9794-9823 Spacer: 9824  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:01 WP#: 35 Lat: 29.967561 Long: -79.827742  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Surface active

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Friday, April 2, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 10:08 WP#: 39 Lat: 30.031793 Long: -79.896664  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:09 WP#: 40 Lat: 30.037085 Long: -79.894317  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 9831,9821, 9839-9845  
Photographer: HJF Frame Numbers: 9825-9848 Spacer: 9849  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:10 WP#: 41 Lat: 30.033557 Long: -79.898570  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Juvenile present  
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Friday, April 2, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 10:26 WP#: 47 Lat: 30.032179 Long: -80.376694  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:26 WP#: 48 Lat: 30.032868 Long: -80.373894  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 9/20/15  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 9863-9866  
Photographer: HJF Frame Numbers: 9850-9871 Spacer: 9872  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:29 WP#: 49 Lat: 30.026895 Long: -80.376175  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Loose grouping with surface activity  
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Friday, April 2, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 10:35 WP#: 53 Lat: 30.035649 Long: -80.489070  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:36 WP#: 54 Lat: 30.033836 Long: -80.482236  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Visible spotting, Dark and light banding pattern on dorsal surface, White tipped rostrum  
Representative images used for Species ID: 9881,9883,9885  
Photographer: HJF Frame Numbers: 9873-9892 Spacer: 9893  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:39 WP#: 55 Lat: 30.037609 Long: -80.489286  
Calculated Distance Traveled: 0.8 km

**Behavior and Additional Comments**

Elusive

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Friday, April 2, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 10:41 WP#: 57 Lat: 30.032033 Long: -80.520688  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:42 WP#: 58 Lat: 30.032604 Long: -80.513773  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/15/12  
Features used in Species ID: Visible spotting, Dark and light banding pattern on dorsal surface, White tipped rostrum  
Representative images used for Species ID: 0894,9897,9905  
Photographer: HJF Frame Numbers: 9894-9915 Spacer: 9916  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 10:44 WP#: 59 Lat: 30.025139 Long: -80.519687  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Several groups with singletons

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Friday, April 2, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 10:57 WP#: 64 Lat: 30.099912 Long: -80.551487  
Vertical Angle: 3 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:58 WP#: 65 Lat: 30.092114 Long: -80.551591  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/12/11  
Features used in Species ID: Visible spotting, dark and light banding on dorsal surface, white tipped rostrum  
Representative images used for Species ID: 9918,9929,9930  
Photographer: HJF Frame Numbers: 9917-9935 Spacer: 9936  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 11:00 WP#: 66 Lat: 30.090001 Long: -80.550873  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

All travelling in sets of two, Juveniles present

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Friday, April 2, 2010 Sighting # 12

**Initial Sighting on Track**

Time: 11:02 WP#: 68 Lat: 30.099760 Long: -80.475294  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:03 WP#: 69 Lat: 30.099114 Long: -80.481895  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 7/12/10  
Features used in Species ID: Visible crease at rostrum and melon, broad flukes, overall grey coloration  
Representative images used for Species ID: 9947,9949,9950  
Photographer: HJF Frame Numbers: 9937-9952 Spacer: 9947  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 11:06 WP#: 70 Lat: 30.102349 Long: -80.477691  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Diving out of sight, elusive, calf present

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Friday, April 2, 2010 Sighting # 13

**Initial Sighting on Track**

Time: 11:20 WP#: 76 Lat: 30.099872 Long: -79.979997  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:21 WP#: 77 Lat: 30.104917 Long: -79.977374  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 9956,9959,9961,9966  
Photographer: HJF Frame Numbers: 9954-9969 Spacer: 9970  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 11:22 WP#: 78 Lat: 30.104888 Long: -79.983667  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Two small groups  
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Friday, April 2, 2010 Sighting # 14

**Initial Sighting on Track**

Time: 11:25 WP#: 80 Lat: 30.099596 Long: -79.869164  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:26 WP#: 81 Lat: 30.092008 Long: -79.867933  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/2/1  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes, visible crease between rostrum and melon

Representative images used for Species ID: 9974,9977,9983,9986  
Photographer: HJF Frame Numbers: 9971-9988 Spacer: 9989  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 11:29 WP#: 82 Lat: 30.094371 Long: -79.873833  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 15

**Initial Sighting on Track**

Time: 11:34 WP#: 86 Lat: 30.166832 Long: -79.813857  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:35 WP#: 87 Lat: 30.176137 Long: -79.815244  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 35/40/38  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes, visible crease between rostrum and melon  
Representative images used for Species ID: 0006,0006,0008,0010,0011  
Photographer: HJF Frame Numbers: 9990-0011 Spacer: 0012  
Calculated Distance from Track Line: 1.04 km

**Final Time and Position of Sighting**

Time: 11:36 WP#: 88 Lat: 30.171829 Long: -79.812558  
Calculated Distance Traveled: 0.54 km

**Behavior and Additional Comments**

One large group with several smaller groups of 2-3 animals, juveniles present

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Friday, April 2, 2010 Sighting # 16

**Initial Sighting on Track**

Time: 11:38 WP#: 90 Lat: 30.166338 Long: -79.893500  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:39 WP#: 91 Lat: 30.163063 Long: -79.889926  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes, visible crease between rostrum and melon  
Representative images used for Species ID: 0015,0016,0025,0017,0021  
Photographer: HJF Frame Numbers: 0013-0026 Spacer: 0027  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 11:41 WP#: 91 Lat: 30.166505 Long: -79.888697  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 17

**Initial Sighting on Track**

Time: 12:02 WP#: 101 Lat: 30.166468 Long: -80.513411  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: HJF Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:03 WP#: 102 Lat: 30.172578 Long: -80.512579  
Species: *Stenella frontalis* Numbers (Low/High/Best): 23/25/25  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0032, 0037, 0044  
Photographer: HJF Frame Numbers: 0028-0046 Spacer: 0047  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 12:04 WP#: 103 Lat: 30.169508 Long: -80.519265  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

One large group with several sub-groups of four individuals each

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Friday, April 2, 2010 Sighting # 18

**Initial Sighting on Track**

Time: 12:06 WP#: 105 Lat: 30.166242 Long: -80.616661  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:08 WP#: 106 Lat: 30.166215 Long: -80.616192  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Broad flukes, short heavy rostrum, overall grey coloration  
Representative images used for Species ID: 0048,0055,0056,0057,0060  
Photographer: HJF Frame Numbers: 0048-0061 Spacer: 0062  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 12:12 WP#: 107 Lat: 30.167117 Long: -80.613435  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Travelling singly, elusive

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Friday, April 2, 2010 Sighting # 19

**Initial Sighting on Track**

Time: 12:15 WP#: 109 Lat: 30.166118 Long: -80.669611  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:15 WP#: 110 Lat: 30.175159 Long: -80.671960  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Broad flukes, short heavy beak, overall grey coloration

Representative images used for Species ID: 0066,0067,0068  
Photographer: HJF Frame Numbers: 0063-0070 Spacer: 0071  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 12:18 WP#: 111 Lat: 30.167693 Long: -80.664375  
Calculated Distance Traveled: 1.1 km

**Behavior and Additional Comments**

Mom and calf travelling rapidly at surface  

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Friday, April 2, 2010 Sighting # 20

**Initial Sighting on Track**

Time: 12:28 WP#: 117 Lat: 30.232694 Long: -80.481851  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 12:30 WP#: 118 Lat: 30.244618 Long: -80.494633  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Broad flukes, short heavy beak, overall grey coloration

Representative images used for Species ID: 0087,0091,0094,0095,0101  
Photographer: HJF Frame Numbers: 0072-0105 Spacer: 0106  
Calculated Distance from Track Line: 1.8 km

**Final Time and Position of Sighting**

Time: 12:33 WP#: 119 Lat: 30.250412 Long: -80.491135  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Elusive and deep diving  

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Friday, April 2, 2010 Sighting # 21

**Initial Sighting on Track**

Time: 12:38 WP#: 121 Lat: 30.232706 Long: -80.438851  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:39 WP#: 122 Lat: 30.225323 Long: -80.439020  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Broad flukes, short heavy beak, overall grey coloration

Representative images used for Species ID: 0109,0114  
Photographer: HJF Frame Numbers: 0107-0116 Spacer: 0117  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 12:40 WP#: 123 Lat: 30.231430 Long: -80.445105  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 22

**Initial Sighting on Track**

Time: 12:53 WP#: 131 Lat: 30.232665 Long: -80.043291  
Vertical Angle: 3 Horizontal Bearing in Degrees: 92 Sighting Cue: Splash  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:53 WP#: 132 Lat: 30.218106 Long: -80.045485  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/5/5  
Features used in Species ID: Broad flukes, short heavy beak, overall grey coloration

Representative images used for Species ID: 0146,0147  
Photographer: HJF Frame Numbers: 0127-0147 Spacer: 0148  
Calculated Distance from Track Line: 1.6 km

**Final Time and Position of Sighting**

Time: 12:56 WP#: 133 Lat: 30.219690 Long: -80.049919  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 23

**Initial Sighting on Track**

Time: 13:19 WP#: 140 Lat: 30.300428 Long: -80.268661  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 13:20 WP#: 141 Lat: 30.299055 Long: -80.265751  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Broad flukes, short heavy beak, overall grey coloration

Representative images used for Species ID: 0152,0160-0164  
Photographer: HJF Frame Numbers: 0149-0165 Spacer: 0166  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 13:24 WP#: 142 Lat: 30.295519 Long: -80.274482  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Elusive and deep diving  

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Friday, April 2, 2010 Sighting # 24

**Initial Sighting on Track**

Time: 13:26 WP#: 144 Lat: 30.300506 Long: -80.328149  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:26 WP#: 145 Lat: 30.306456 Long: -80.335262  
Species: *Stenella frontalis* Numbers (Low/High/Best): 17/18/18  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern visible on dorsal surface

Representative images used for Species ID: 0177,0180,0181,0182  
Photographer: HJF Frame Numbers: 0167-0186 Spacer: 0187  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 13:28 WP#: 146 Lat: 30.306701 Long: -80.332838  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Two large groups  

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Friday, April 2, 2010 Sighting # 25

**Initial Sighting on Track**

Time: 15:30 WP#: 161 Lat: 30.365682 Long: -80.320392  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:30 WP#: 162 Lat: 30.365679 Long: -80.319100  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/30/28  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0249,0257,0262  
Photographer: HJF Frame Numbers: 0249-0265 Spacer: 0266  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 15:32 WP#: 163 Lat: 30.363160 Long: -80.322536  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Several groups of 5-6 individuals  

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Friday, April 2, 2010 Sighting # 26

**Initial Sighting on Track**

Time: 15:33 WP#: 165 Lat: 30.365713 Long: -80.272585  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:34 WP#: 166 Lat: 30.361301 Long: -80.274064  
Species: *Unidentified Delphinid* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Images not conclusive  
Representative images used for Species ID: 0267  
Photographer: HJF Frame Numbers: 0267 Spacer: 0276  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 15:38 WP#: 167 Lat: 30.363760 Long: -80.278163  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Elusive and deep diving, Frames 0268-0275 all are of Hammerhead shark  

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Friday, April 2, 2010 Sighting # 27

**Initial Sighting on Track**

Time: 15:53 WP#: 175 Lat: 30.365142 Long: -79.853165  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:54 WP#: 176 Lat: 30.365067 Long: -79.855610  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 11/22/18  
Features used in Species ID: Short heavy rostrum, heavy flukes, overall grey coloration

Representative images used for Species ID: 0281,0282,0296,0297  
Photographer: HJF Frame Numbers: 0277-0306 Spacer: 0307  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 15:56 WP#: 177 Lat: 30.365598 Long: -79.858090  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Large group with several smaller sub-groups, juveniles present  

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Friday, April 2, 2010 Sighting # 28

**Initial Sighting on Track**

Time: 16:10 WP#: 182 Lat: 30.434085 Long: -80.174373  
Vertical Angle: 3 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 16:11 WP#: 183 Lat: 30.435725 Long: -80.175345  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Short heavy rostrum, heavy flukes, overall grey coloration

Representative images used for Species ID: 0308,0315,0321,0326,0324  
Photographer: HJF Frame Numbers: 0306-0355 Spacer: 0356  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 16:17 WP#: 184 Lat: 30.434550 Long: -80.178424  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Deep diving and elusive, numerous sharks present  

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Friday, April 2, 2010 Sighting # 29

**Initial Sighting on Track**

Time: 16:44 WP#: 198 Lat: 30.499346 Long: -80.454873  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 16:44 WP#: 199 Lat: 30.498584 Long: -80.456330  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Short heavy rostrum, heavy flukes, overall grey coloration

Representative images used for Species ID: 0360,0361,0363  
Photographer: HJF Frame Numbers: 0357-0365 Spacer: 0366  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 16:49 WP#: 200 Lat: 30.501016 Long: -80.456751  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Juveniles present

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Friday, April 2, 2010 Sighting # 30

**Initial Sighting on Track**

Time: 17:20 WP#: 211 Lat: 30.566897 Long: -80.140693  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 17:21 WP#: 212 Lat: 30.567434 Long: -80.140728  
Species: *Stenella frontalis* Numbers (Low/High/Best): 17/20/18  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern visible on dorsal surface

Representative images used for Species ID: 0373,0374,0375  
Photographer: HJF Frame Numbers: 0367-0382 Spacer: 0383  
Calculated Distance from Track Line: 0.1 km

**Final Time and Position of Sighting**

Time: 17:21 WP#: 213 Lat: 30.561438 Long: -80.141277  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 31

**Initial Sighting on Track**

Time: 17:25 WP#: 217 Lat: 30.567197 Long: -80.278616  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 17:26 WP#: 218 Lat: 30.567027 Long: -80.285993  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/25/22  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0386,0387,0396,0414  
Photographer: HJF Frame Numbers: 0384-0419 Spacer: 0420  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 17:28 WP#: 219 Lat: 30.566551 Long: -80.278425  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

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Friday, April 2, 2010 Sighting # 32

**Initial Sighting on Track**

Time: 17:34 WP#: 221 Lat: 30.566906 Long: -80.496152  
Vertical Angle: 1 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 17:36 WP#: 222 Lat: 30.567220 Long: -80.489157  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0429,0439,0440,0447,0448  
Photographer: HJF Frame Numbers: 0421-0454 Spacer: 0455  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 17:39 WP#: 223 Lat: 30.570876 Long: -80.497685  
Calculated Distance Traveled: 0.9 km

**Behavior and Additional Comments**

Elusive and deep diving  
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Saturday, April 3, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 8:36 WP#: 7 Lat: 30.566823 Long: -80.251450  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 8:37 WP#: 8 Lat: 30.563400 Long: -80.250618  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 0456,0457,0458,0459,0460  
Photographer: REH Frame Numbers: 0456-0462 Spacer: 0463  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: 8:40 WP#: 9 Lat: 30.559192 Long: -80.254905  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Fast surface travel  

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Saturday, April 3, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 8:53 WP#: 12 Lat: 30.566140 Long: -79.848942  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 3  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 8:55 WP#: 13 Lat: 30.558371 Long: -79.861974  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 0466,0467,0468,0470,0471-0473  
Photographer: REH Frame Numbers: 0464-0474 Spacer: 0475  
Calculated Distance from Track Line: 1.5 km

**Final Time and Position of Sighting**

Time: 8:59 WP#: 14 Lat: 30.552875 Long: -79.860827  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

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Saturday, April 3, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 9:26 WP#: 25 Lat: 30.499663 Long: -80.447011  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:27 WP#: 26 Lat: 30.502812 Long: -80.443168  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/12/12  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0478, 0479, 0485, 0486  
Photographer: REH Frame Numbers: 0476-0486 Spacer: 0487  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 9:29 WP#: 27 Lat: 30.504082 Long: -80.443493  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Slow travel at surface, travelling in a line, mom/calf pairs  

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Saturday, April 3, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 9:31 WP#: 29 Lat: 30.499296 Long: -80.489091  
Vertical Angle: 1 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:32 WP#: 30 Lat: 30.498981 Long: -80.486959  
Species: *Stenella frontalis* Numbers (Low/High/Best): 9/9/9  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0488, 0489, 0494, 0496  
Photographer: REH Frame Numbers: 0488-0497 Spacer: 0498  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 9:33 WP#: 31 Lat: 30.498327 Long: -80.485859  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Tight fast group, mom/calf Pair  

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Saturday, April 3, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 9:37 WP#: 34 Lat: 30.499282 Long: -80.628019  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 9:38 WP#: 35 Lat: 30.496229 Long: -80.624682  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/10/10  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface  
Representative images used for Species ID: 0500, 0502, 0510, 0511  
Photographer: REH Frame Numbers: 0499-0514 Spacer: 0515  
Calculated Distance from Track Line: 0.5 km

**Final Time and Position of Sighting**

Time: 9:39 WP#: 36 Lat: 30.498798 Long: -80.625765  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

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Saturday, April 3, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 9:57 WP#: 46 Lat: 30.433382 Long: -80.241031  
Vertical Angle: 1 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:57 WP#: 47 Lat: 30.428283 Long: -80.241561  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 10/10/10  
Features used in Species ID: Overall grey coloration, broad flukes, broad based dorsal, short heavy rostrum  
Representative images used for Species ID: 0518, 0521, 0526, 0528, 0530  
Photographer: REH Frame Numbers: 0516-0542 Spacer: 0543  
Calculated Distance from Track Line: 0.6 km

**Final Time and Position of Sighting**

Time: 10:01 WP#: 48 Lat: 30.429643 Long: -80.238361  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Elusive, two groups of five  

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Saturday, April 3, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 10:37 WP#: 53 Lat: 30.365836 Long: -80.501559  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:37 WP#: 54 Lat: 30.370552 Long: -80.507992  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Elongated rostrum with white tip, slender flippers

Representative images used for Species ID: 0555, 0559, 0562  
Photographer: REH Frame Numbers: 0544-0562 Spacer: 0563  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 10:42 WP#: 55 Lat: 30.369183 Long: -80.508131  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Large fish visible in some photos  
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Saturday, April 3, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 10:46 WP#: 58 Lat: 30.365524 Long: -80.639441  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 1  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:47 WP#: 59 Lat: 30.364375 Long: -80.636263  
Species: *Stenella frontalis* Numbers (Low/High/Best): 24/24/24  
Features used in Species ID: White tipped rostrum, visible spotting, dark and light banding pattern on dorsal surface

Representative images used for Species ID: 0564, 0673, 0576, 0581, 0589, 0590  
Photographer: REH Frame Numbers: 0564-0594 Spacer: 0595  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:49 WP#: 60 Lat: 30.365535 Long: -80.637906  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Four mom/calf pairs  
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Saturday, April 3, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 11:00 WP#: 67 Lat: 30.299814 Long: -80.455537  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 68 Lat: 30.293566 Long: -80.463537  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 1/1/1  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes

Representative images used for Species ID: 0598, 0600, 0601, 0604, 0605  
Photographer: REH Frame Numbers: 0596-0614 Spacer: 0615  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 11:04 WP#: 69 Lat: 30.292965 Long: -80.464025  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

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Saturday, April 3, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 11:09 WP#: 71 Lat: 30.300084 Long: -80.261358  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:10 WP#: 72 Lat: 30.294518 Long: -80.257094  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Overall grey coloration, short heavy rostrum, broad flukes,  
Visible crease between rostrum and melon

Representative images used for Species ID: 0616, 0617, 0618  
Photographer: REH Frame Numbers: 0616-0631 Spacer: 0632  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 11:18 WP#: 73 Lat: 30.302511 Long: -80.268706  
Calculated Distance Traveled: 1.4 km

**Behavior and Additional Comments**

Numerous sharks present

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Saturday, April 3, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 11:30 WP#: 75 Lat: 30.299422 Long: -79.799405  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 6 Beaufort Sea State: 1  
Observer: REH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 11:30 WP#: 76 Lat: 30.296693 Long: -79.808363  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/15/12  
Features used in Species ID: Overall grey coloration, broad flukes, short heavy rostrum

Representative images used for Species ID: 0633, 0641, 0642, 0643, 0651, 0656  
Photographer: REH Frame Numbers: 0633-0668 Spacer: 0669  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 11:34 WP#: 77 Lat: 30.297999 Long: -79.809178  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

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Thursday, May 6, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 9:51 WP#: 6 Lat: N 29.966025 Long: W 80.493724  
Vertical Angle: 2 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 9:53 WP#: 7 Lat: N 29.958342 Long: W 80.487387  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/12/10  
Features used in Species ID: Broad flukes, slate gray, defined crease at base of melon, short rostrum  
Representative images used for Species ID: 0674, 0678, 0679, 0681  
Photographer: HJF Frame Numbers: 0672 to 0683 Spacer: 0684  
Calculated Distance from Track Line: 1.1 km

**Final Time and Position of Sighting**

Time: 9:58 WP#: 8 Lat: N 29.962182 Long: W 80.486394  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Multiple sub-groups of duos and trios, animals were elusive and frequently dove out of sight.  
Mom/calf pair observed.

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Thursday, May 6, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:04 WP#: 11 Lat: N 29.966377 Long: W 80.282685  
Vertical Angle: 2 Horizontal Bearing in Degrees: 135 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:05 WP#: 12 Lat: N 29.972346 Long: W 80.290129  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 18/26/24  
Features used in Species ID: Slate gray, broad flukes, defined crease at base of melon  
Representative images used for Species ID: 0686, 0692, 0706, 0709, 0714  
Photographer: HJF Frame Numbers: 0685 to 0726 Spacer: 0727  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 10:09 WP#: 14 Lat: N 29.974630 Long: W 80.282202  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

One large group and one pair, at least one mom/calf pair present

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Thursday, May 6, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:36 WP#: 22 Lat: N 30.031217 Long: W 80.339161  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:41 WP#: 23 Lat: N 30.031996 Long: W 80.336320  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 6/6/6  
Features used in Species ID: Robust body, broad flukes, overall gray coloration

Representative images used for Species ID: 0740, 0750, 0751

Photographer: HJF Frame Numbers: 0728 to 0763 Spacer: 0764  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:43 WP#: 24 Lat: N 30.034157 Long: W 80.336828  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Very active, showing bellies and rolling, some animals were breaching. At least two sub-groups with one mom/calf pair observed.

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Thursday, May 6, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 10:47 WP#: 26 Lat: N 30.030981 Long: W 80.513239  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Track Line: 2 Beaufort Sea State: 2  
Observer: \_\_\_\_\_ Observer Side: \_\_\_\_\_

**Actual Time and Position of Sighting**

Time: 10:49 WP#: 27 Lat: N 30.030748 Long: W 80.510834  
Species: *Stenella frontalis* Numbers (Low/High/Best): 20/50/40  
Features used in Species ID: Alternating light and dark "banding", visible spotted pattern, long, white-tipped rostrum

Representative images used for Species ID: 0773, 0793, 0804, 0805

Photographer: HJF Frame Numbers: 0765 to 0808 Spacer: 0809  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 10:52 WP#: 28 Lat: N 30.029568 Long: W 80.518337  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

5 sub-groups with 8-10 animals per group, several outlying single animals, at least one mom/calf pair, energetic porpoising, directional travel, possibly foraging

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Thursday, May 6, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 13:40 WP#: 38 Lat: 30.097735 Long: -80.546461  
Vertical Angle: 2 Horizontal Bearing in Degrees: 60 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:42 WP#: 39 Lat: 30.096822 Long: -80.544239  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Long, white-tipped rstrum, visible spotted pattern

Representative images used for Species ID: 0810, 0813  
Photographer: HJF Frame Numbers: 0810-0816 Spacer: 0817  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Some surface activity, looks like *S. frontalis* from the plane. Mom/calf pair observed.

Thursday, May 6, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 13:46 WP#: 41 Lat: 30.101141 Long: -80.488933  
Vertical Angle: 2 Horizontal Bearing in Degrees: 80 Sighting Cue: Body  
On/Off Effort: On Track Line: 3 Beaufort Sea State: 2  
Observer: HJF Observer Side: Right

**Actual Time and Position of Sighting**

Time: 13:52 WP#: 42 Lat: 30.102411 Long: -80.481820  
Species: *Stenella frontalis* Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Visible spots, long and white-tipped rostrum, alternating light and dark "banding".

Representative images used for Species ID: 0821, 0829, 0840  
Photographer: HJF Frame Numbers: 0818-0830 Spacer: 831  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Surface travel. Two mom/calf (or mom/juvenile) pairs.

Friday, May 7, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 09:41 WP#: 9 Lat: 30.167105 Long: -79.811998  
Vertical Angle: 2 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: None WP#:  Lat: N/A Long: N/A  
Species: Unidentified Delphinid Numbers (Low/High/Best): 5/6/5  
Features used in Species ID: Could not establish species identity due to brevity of the encounter.  
Representative images used for Species ID: N/A  
Photographer: N/A Frame Numbers: N/A Spacer: N/A  
Calculated Distance from Track Line: N/A

**Final Time and Position of Sighting**

Time: N/A WP#: N/A Lat: N/A Long: N/A  
Calculated Distance Traveled: N/A

**Behavior and Additional Comments**

Group observed once after breaking track, however the animals could not be relocated a second time to confirm species.

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Friday, May 7, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:00 WP#: 11 Lat: 30.146586 Long: -80.150290  
Vertical Angle: 3 Horizontal Bearing in Degrees: 120 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 3  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:00 WP#: 12 Lat: 30.148260 Long: -80.148623  
Species: Physeter macrocephalus Numbers (Low/High/Best): 2/2/2  
Features used in Species ID: Large, dark gray whale, with large triangular flukes, large, square head, wrinkled appearance to the caudal 2/3 of body. Angled blow from single blowhole.  
Representative images used for Species ID: 0866, 0867, 0877, 0888  
Photographer: RCH Frame Numbers: 0832-0895 Spacer: 0896  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 10:06 WP#: 13 Lat: 30.153845 Long: -80.145834  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

Initially encountered two sperm whales traveling in a southerly direction at the surface, one animal was lost after breaking track. The remaining whale traveled at the surface, with short and shallow "dives" or sub-surface travel.

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Friday, May 7, 2010 Sighting # 3

**Initial Sighting on Track**

Time: 10:08 WP#: 16 Lat: 30.165909 Long: -80.226561  
Vertical Angle: 2 Horizontal Bearing in Degrees: 45 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 10:10 WP#: 17 Lat: 30.167974 Long: -80.229344  
Species: None Numbers (Low/High/Best): 70/80/75  
Features used in Species ID: Spotted appearance, long, white-tipped beak, dorsal light and dark "banding".  
Representative images used for Species ID: 0913, 0914, 0927, 0929, 0932  
Photographer: RCH Frame Numbers: 0897 - 0931 Spacer: 0932  
Calculated Distance from Track Line: 0.4 km

**Final Time and Position of Sighting**

Time: \_\_\_\_\_ WP#: 18 Lat: 30.167487 Long: -80.225958  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

Large, very spread out group. Slow travel, milling. Two hammerhead sharks in close vicinity of the group.

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Friday, May 7, 2010 Sighting # 4

**Initial Sighting on Track**

Time: 10:18 WP#: 20 Lat: 30.165726 Long: -80.378162  
Vertical Angle: 1 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:19 WP#: 21 Lat: 30.164865 Long: -80.375852  
Species: None Numbers (Low/High/Best): 4/4/4  
Features used in Species ID: Robust, gray dolphins with darker gray cape, broad flukes, short stubby rostrum.  
Representative images used for Species ID: 0954, 0966, 0967, 0974  
Photographer: RCH Frame Numbers: 0933 - 0975 Spacer: 0976  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 10:29 WP#: 22 Lat: 30.162396 Long: -80.385546  
Calculated Distance Traveled: 1.0 km

**Behavior and Additional Comments**

Fast travel, with synchronized leaping.

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Friday, May 7, 2010 Sighting # 5

**Initial Sighting on Track**

Time: 10:51 WP#: 34 Lat: 30.233727 Long: -80.386614  
Vertical Angle: 2 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 5 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:51 WP#: 35 Lat: 30.234612 Long: -80.389831  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Gray dolphins with darker gray cape, robust bodies, broad flukes

Representative images used for Species ID: 0977, 0978, 0984  
Photographer: RCH Frame Numbers: 0977 - 0987 Spacer: 0988  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 10:55 WP#: 36 Lat: 30.237201 Long: -80.390477  
Calculated Distance Traveled: 0.3 km

**Behavior and Additional Comments**

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Friday, May 7, 2010 Sighting # 6

**Initial Sighting on Track**

Time: 11:01 WP#: 40 Lat: 30.234844 Long: -80.227206  
Vertical Angle: 3 Horizontal Bearing in Degrees: 130 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:01 WP#: 41 Lat: 30.231191 Long: -80.239313  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 8/8/8  
Features used in Species ID: Short, stubby rostrum, with well defined melon, gray overall color with darker gray cape, broad flukes

Representative images used for Species ID: 0992, 0998, 1005, 1006  
Photographer: RCH Frame Numbers: 0989 - 1008 Spacer: 1009  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 11:05 WP#: 42 Lat: 30.228963 Long: -80.235403  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Three groups (3, 2, 3). Medium paced surface travel.

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Friday, May 7, 2010 Sighting # 7

**Initial Sighting on Track**

Time: 11:53 WP#: 55 Lat: 30.366279 Long: -80.601871  
Vertical Angle: 2 Horizontal Bearing in Degrees: 140 Sighting Cue: Body  
On/Off Effort: On Track Line: 7 Beaufort Sea State: 2  
Observer: PBN Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:59 WP#: 56 Lat: 30.375496 Long: -80.608868  
Species: Unidentified Delphinid Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: Most likely S. frontalis, but pictures inconclusive.

Representative images used for Species ID: 1016, 1021  
Photographer: RCH Frame Numbers: 1010 - 1025 Spacer: 1026  
Calculated Distance from Track Line: 1.2 km

**Final Time and Position of Sighting**

Time: 12:01 WP#: 57 Lat: 30.376343 Long: -80.605169  
Calculated Distance Traveled: 0.4 km

**Behavior and Additional Comments**

Non-directional travel, milling.

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Friday, May 7, 2010 Sighting # 8

**Initial Sighting on Track**

Time: 12:47 WP#: 67 Lat: 30.432619 Long: -80.576658  
Vertical Angle: 3 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:48 WP#: 68 Lat: 30.439407 Long: -80.575846  
Species: Stenella frontalis Numbers (Low/High/Best): 17/20/18  
Features used in Species ID: Alternating light and dark dorsal "banding", long, white-tipped rostrum, visible spotted pattern on some animals  
Representative images used for Species ID: 1027, 1028, 1029, 1031  
Photographer: RCH Frame Numbers: 1027 - 1054 Spacer: 1055  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 12:50 WP#: 69 Lat: 30.439824 Long: -80.576365  
Calculated Distance Traveled: <0.1 km

**Behavior and Additional Comments**

Fairly tight group, leisurely travel.

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Friday, May 7, 2010 Sighting # 9

**Initial Sighting on Track**

Time: 12:55 WP#: 71 Lat: 30.432248 Long: -80.693197  
Vertical Angle: 1 Horizontal Bearing in Degrees: 90 Sighting Cue: Body  
On/Off Effort: On Track Line: 8 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 12:55 WP#: 72 Lat: 30.432984 Long: -80.695540  
Species: *Stenella frontalis* Numbers (Low/High/Best): 15/20/17  
Features used in Species ID: Long, white-tipped beaks, alternating dark and light dorsal  
"banding"  
Representative images used for Species ID: 1058, 1059, 1060, 1075  
Photographer: RCH Frame Numbers: 1056 - 1086 Spacer: 1087  
Calculated Distance from Track Line: 0.2 km

**Final Time and Position of Sighting**

Time: 12:58 WP#: 73 Lat: 30.434105 Long: -80.695353  
Calculated Distance Traveled: 0.1 km

**Behavior and Additional Comments**

Semi-tight group with one or two outliers. Both adults and juveniles in group.

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Friday, May 7, 2010 Sighting # 10

**Initial Sighting on Track**

Time: 14:38 WP#: 84 Lat: 30.500499 Long: -80.259762  
Vertical Angle: 2 Horizontal Bearing in Degrees: 145 Sighting Cue: Body  
On/Off Effort: On Track Line: 9 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 14:39 WP#: 85 Lat: 30.496633 Long: -80.267536  
Species: *Tursiops truncatus* Numbers (Low/High/Best): 5/5/5  
Features used in Species ID: Short rostrum with well-defined crease at base of melon, robust  
body, overall gray coloration, darker cape over lighter gray sides  
Representative images used for Species ID: 1105, 1106, 1116, 1118, 1119  
Photographer: RCH Frame Numbers: 1088 to 1124 Spacer: 1125  
Calculated Distance from Track Line: 0.9 km

**Final Time and Position of Sighting**

Time: 14:50 WP#: 86 Lat: 30.491949 Long: -80.265479  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Animals were a bit elusive and difficult to photograph well.

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Friday, May 7, 2010 Sighting # 11

**Initial Sighting on Track**

Time: 15:21 WP#: 95 Lat: 30.566262 Long: -80.292462  
Vertical Angle: 2 Horizontal Bearing in Degrees: 75 Sighting Cue: Body  
On/Off Effort: On Track Line: 10 Beaufort Sea State: 1  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 15:23 WP#: 96 Lat: 30.566378 Long: -80.289206  
Species: *Stenella frontalis* Numbers (Low/High/Best): 3/3/3  
Features used in Species ID: White-tipped rostrum, narrow peduncle, dark cape with blaze and heavily spotted  
Representative images used for Species ID: 1135, 1136  
Photographer: RCH Frame Numbers: 1126 to 1138 Spacer: 1139  
Calculated Distance from Track Line: 0.3 km

**Final Time and Position of Sighting**

Time: 15:27 WP#: 97 Lat: 30.572313 Long: -80.289317  
Calculated Distance Traveled: 0.7 km

**Behavior and Additional Comments**

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Friday, June 4, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 10:13 WP#: 27 Lat: 30.168007 Long: -79.964207  
Vertical Angle: 3 Horizontal Bearing in Degrees: 115 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:14 WP#: 28 Lat: 30.162127 Long: -79.958743  
Species: *Globicephala macrorhynchus* Numbers (Low/High/Best): 13/15/14  
Features used in Species ID: Big, black animals with bulbous melons. Elongated flippers.  
Broad-based dorsal fins.  
Representative images used for Species ID: 1207, 1212 to 1216, 1218, 1230  
Photographer: PBN Frame Numbers: 1198 - 1237 Spacer: 1238  
Calculated Distance from Track Line: 0.8 km

**Final Time and Position of Sighting**

Time: 10:18 WP#: 29 Lat: 30.166125 Long: -79.962299  
Calculated Distance Traveled: 0.6 km

**Behavior and Additional Comments**

Slow travel, with several small groups of individuals in a line

Saturday, June 5, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 11:29 WP#: 31 Lat: 30.166886 Long: -80.571309  
Vertical Angle: 3 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: RCH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 11:30 WP#: 32 Lat: 30.172613 Long: -80.579141  
Species: *Stenella frontalis* Numbers (Low/High/Best): 30/50/40  
Features used in Species ID: distinct alternating banding pattern, white-tipped, long rostrum,  
obvious spotting pattern  
Representative images used for Species ID: 1260  
Photographer: HJF Frame Numbers: 1249 - 1274 Spacer: 1275  
Calculated Distance from Track Line: 1.0 km

**Final Time and Position of Sighting**

Time: 11:32 WP#: 33 Lat: 30.171619 Long: -80.577003  
Calculated Distance Traveled: 0.2 km

**Behavior and Additional Comments**

Two - three large groups of at least 10-15 individuals were observed with innumerable outlying  
individuals. Dolphins were engaging in fast, energetic travel and swimming

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Sunday, June 6, 2010 Sighting # 1

**Initial Sighting on Track**

Time: 8:57 WP#: 5 Lat: 29.966164 Long: -80.430339  
Vertical Angle: 2 Horizontal Bearing in Degrees: 110 Sighting Cue: Body  
On/Off Effort: On Track Line: 1 Beaufort Sea State: 2  
Observer: RCH Observer Side: Right

**Actual Time and Position of Sighting**

Time: 8:59 WP#: 6 Lat: 29.961922 Long: -80.435265  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/10/10  
Features used in Species ID: Alternating dark/light dorsal banding pattern, white-tipped rostrum  
some animals spotted  
Representative images used for Species ID: 1291,1292,1295,1303,1308  
Photographer: RCH Frame Numbers: 1276-1319 Spacer: 1320  
Calculated Distance from Track Line: 0.7 km

**Final Time and Position of Sighting**

Time: 9:04 WP#: 7 Lat: 29.957164 Long: -80.434890  
Calculated Distance Traveled: 0.5 km

**Behavior and Additional Comments**

Surfacing frequently, slow, single direction of travel, 1-2 animals showing their bellies,  
possible mother/calf pair

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Sunday, June 6, 2010 Sighting # 2

**Initial Sighting on Track**

Time: 10:39 WP#: 30 Lat: 30.165367 Long: -80.628664  
Vertical Angle: 3 Horizontal Bearing in Degrees: 100 Sighting Cue: Body  
On/Off Effort: On Track Line: 4 Beaufort Sea State: 2  
Observer: REH Observer Side: Left

**Actual Time and Position of Sighting**

Time: 10:40 WP#: 31 Lat: 30.147797 Long: -80.621601  
Species: *Stenella frontalis* Numbers (Low/High/Best): 10/14/12  
Features used in Species ID: Dark cape with 'smudgy' blaze, white-tipped rostrum, some  
animals heavily spotted  
Representative images used for Species ID: 1361,1360,1357,1358  
Photographer: RCH Frame Numbers: 1321-1363 Spacer: 1363  
Calculated Distance from Track Line: 2.1 km

**Final Time and Position of Sighting**

Time: 10:47 WP#: 32 Lat: 30.152503 Long: -80.624714  
Calculated Distance Traveled: 0.6 km

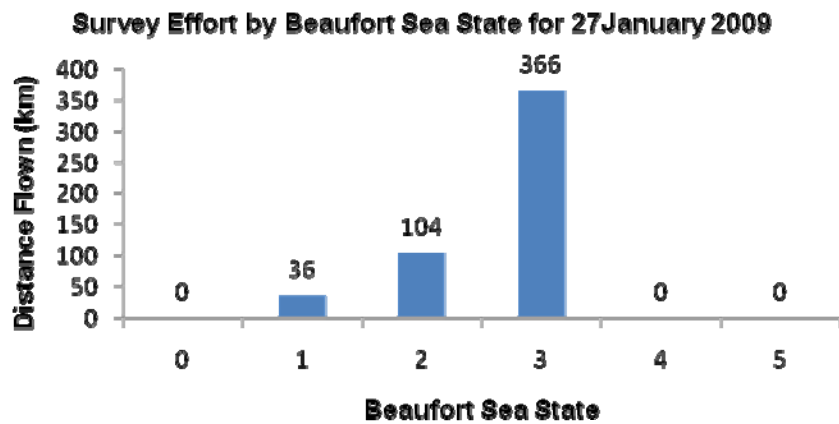
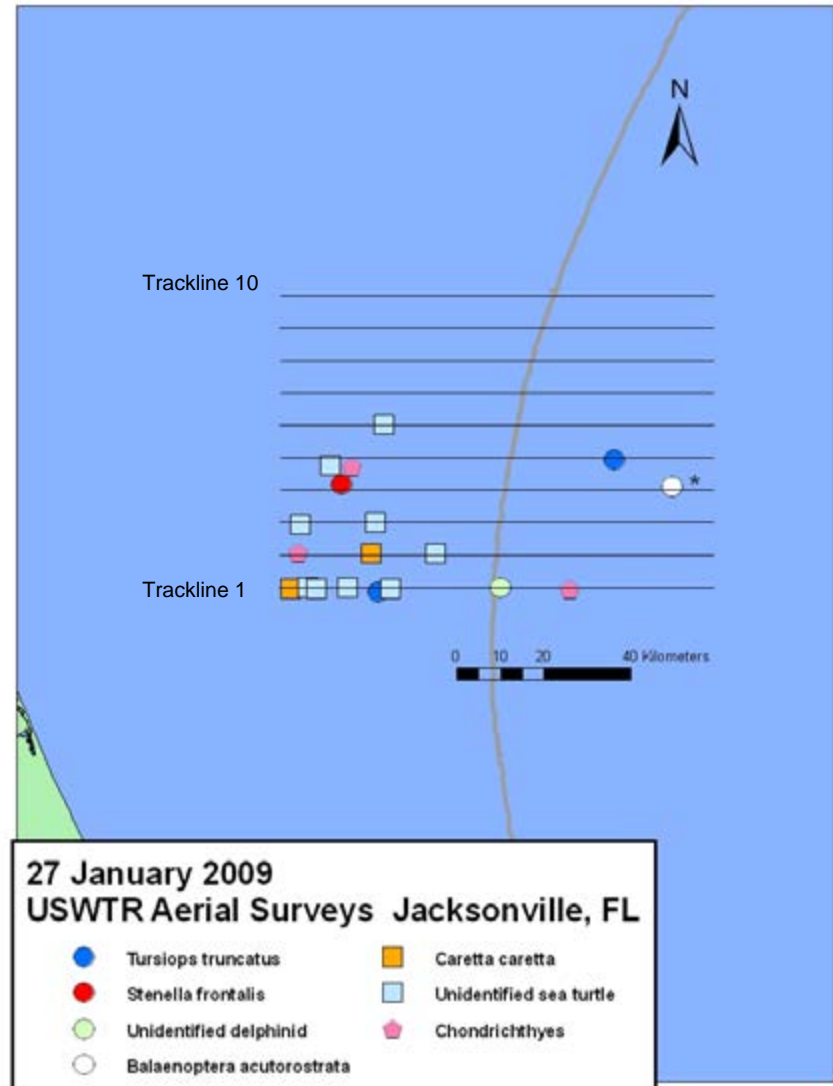
**Behavior and Additional Comments**

Tight group with at least one straggler, possible mother/calf pair, multi-directional travel,  
possibly foraging

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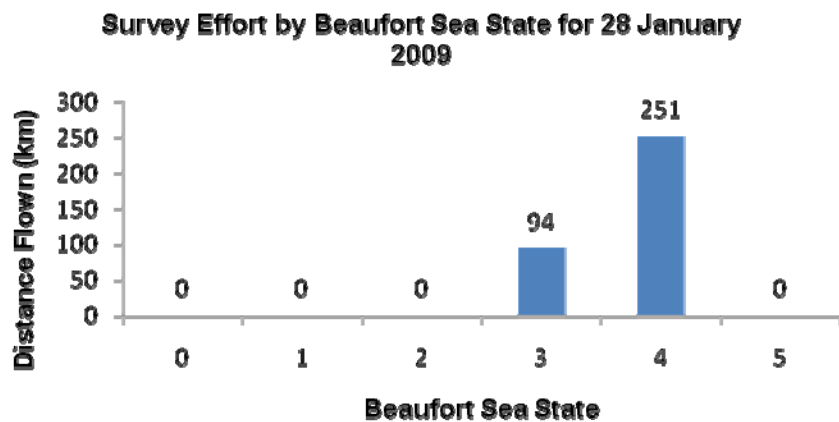
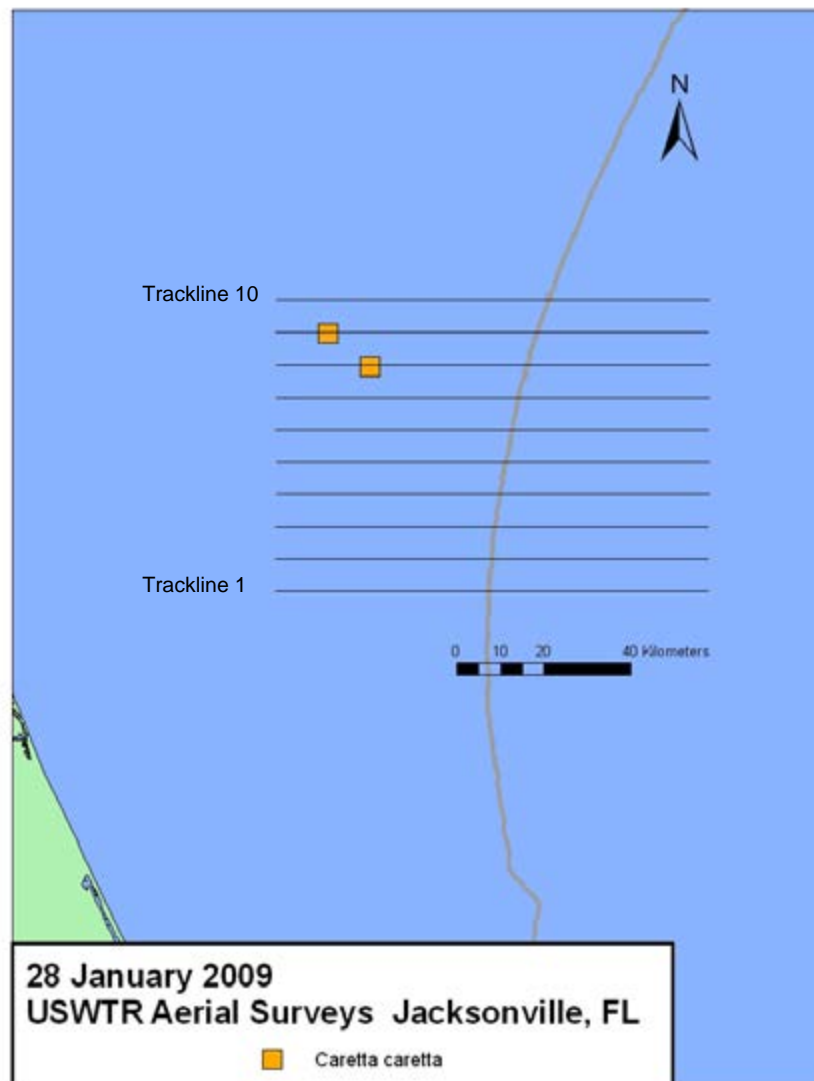
## 27 January 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	15	2	1
<i>Tursiops truncatus</i>	1	25	3	5
<i>Stenella frontalis</i>	1	100	2	4
Unidentified delphinid	1	5	3	1
<i>Balaenoptera acutorostrata</i>	1	1	3	4
<i>Caretta caretta</i>	2	2	1-2	-
Unidentified sea turtle	9	10	1-3	-
Chondrichthyes	3	3	1-3	-



# 28 January 2009

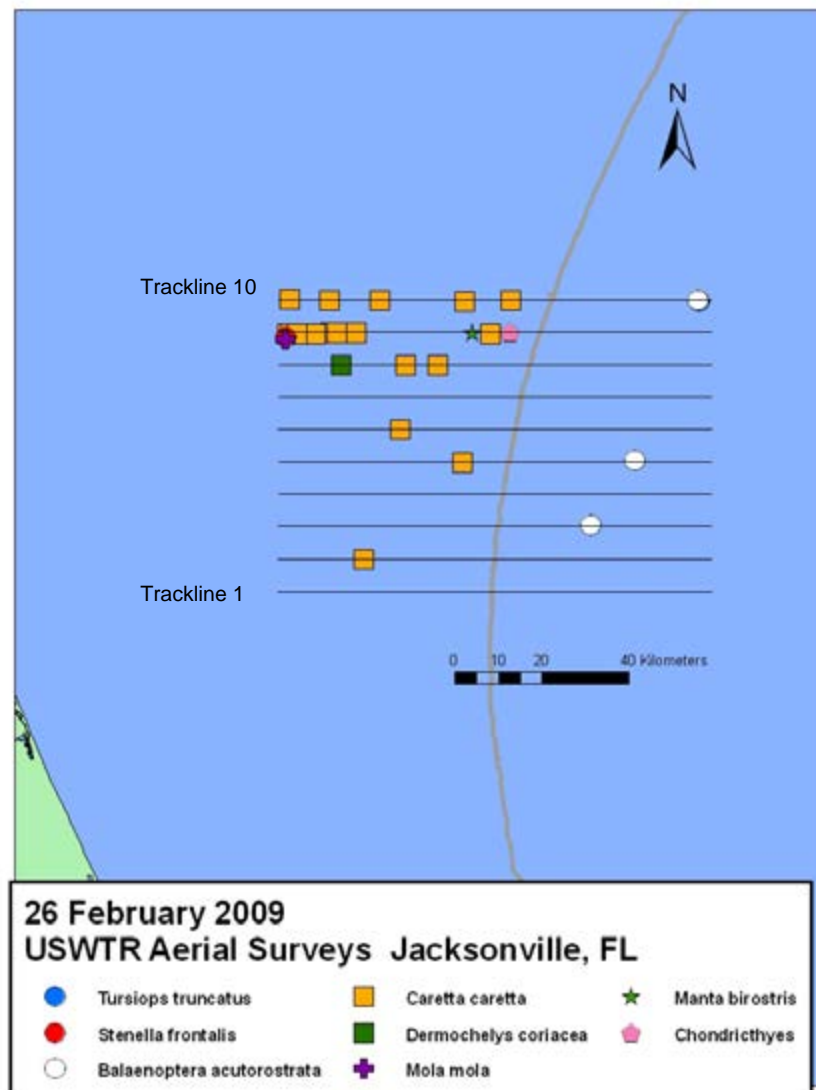
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	2	2	3	-



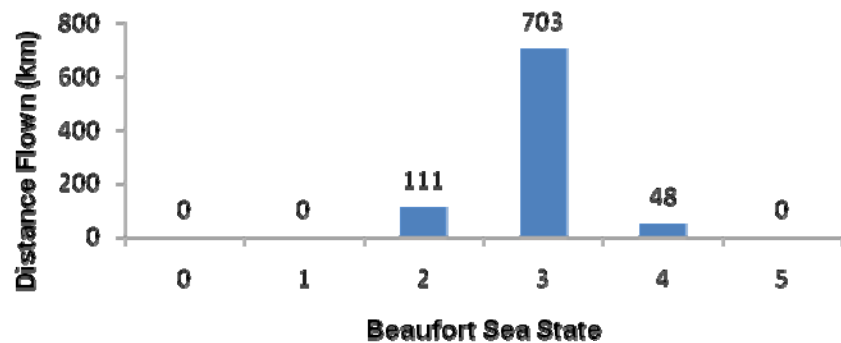


26 February 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	12	3	10
<i>Stenella frontalis</i>	1	2	2	9
<i>Balaenoptera acutorostrata</i>	1	1	3	10
<i>Balaenoptera acutorostrata</i>	1	3	3	5
<i>Balaenoptera acutorostrata</i>	1	1	3	3
<i>Caretta caretta</i>	19	21	2-3	-
<i>Dermochelys coriacea</i>	1	1	2	-
<i>Manta birostris</i>	1	1	3	-
Chondrichthyes	1	2	3	-

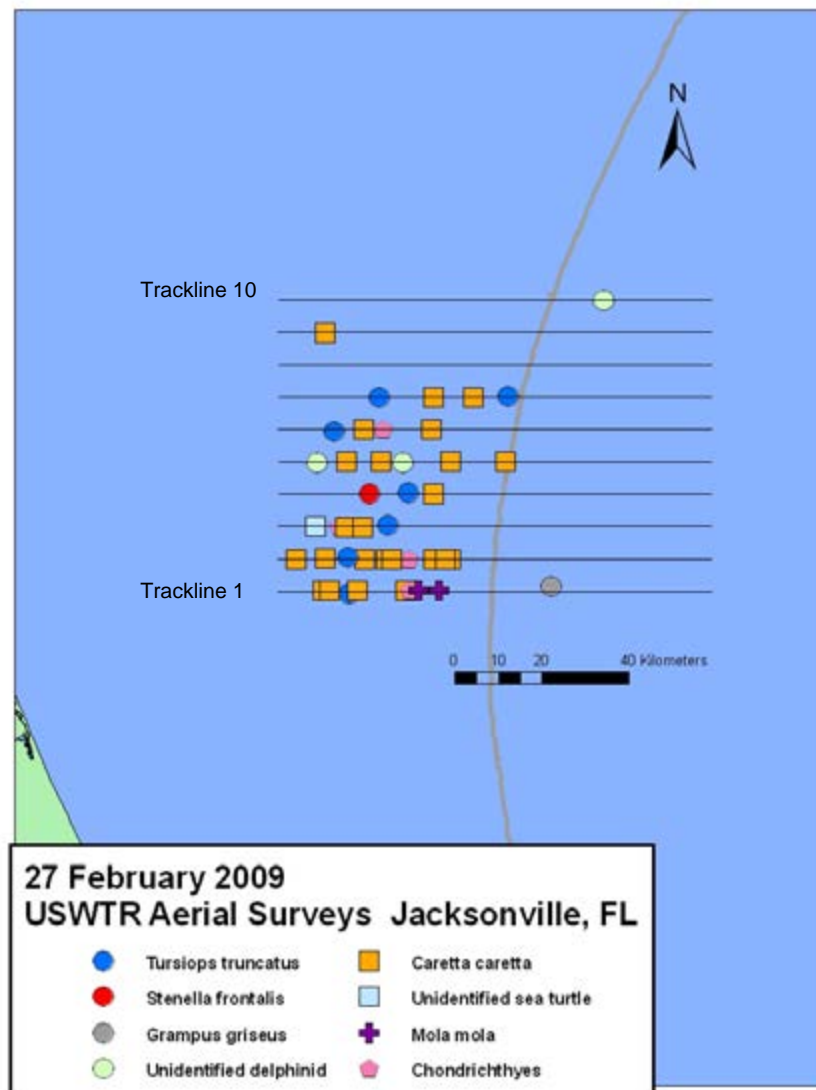


**Survey Effort by Beaufort Sea State for 26 February 2009**

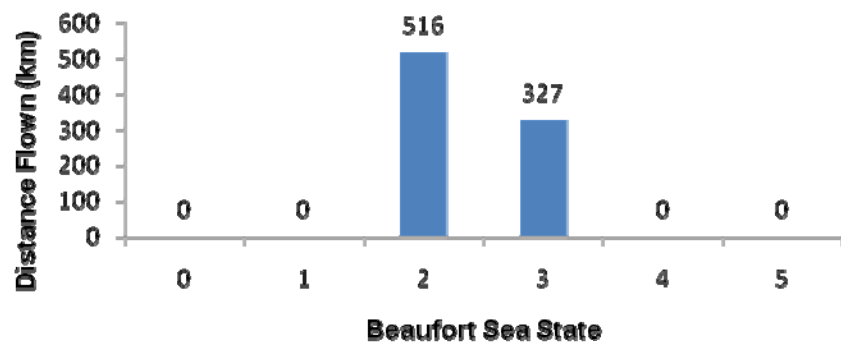


## 27 February 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	3	2	2
<i>Tursiops truncatus</i>	1	19	2	3
<i>Tursiops truncatus</i>	1	3	2	4
<i>Tursiops truncatus</i>	1	5	2	6
<i>Tursiops truncatus</i>	2	9	3	7
<i>Stenella frontalis</i>	1	7	2	4
<i>Grampus griseus</i>	1	5	3	1
Unidentified delphinid	2	2	2	5
Unidentified delphinid	1	1	2	10
<i>Caretta caretta</i>	24	27	2-3	-
Unidentified sea turtle	1	1	2	-
<i>Mola mola</i>	2	2	2	-
Chondrichthyes	4	4	2	-

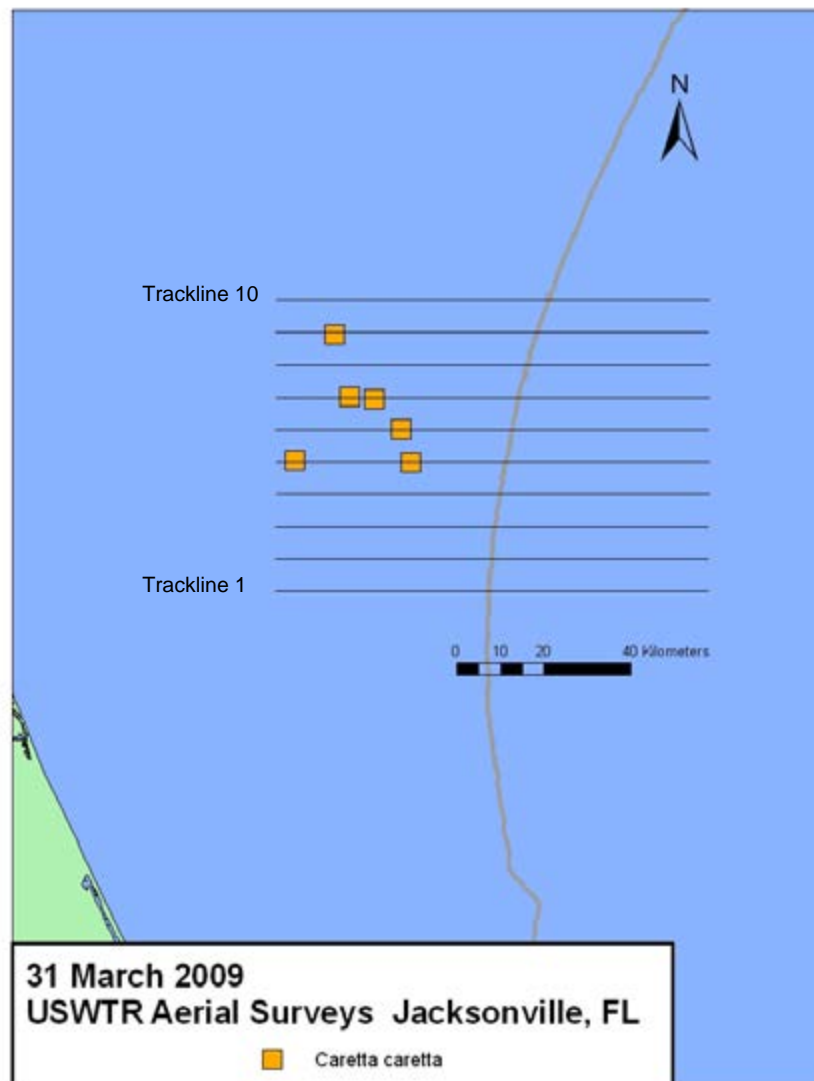
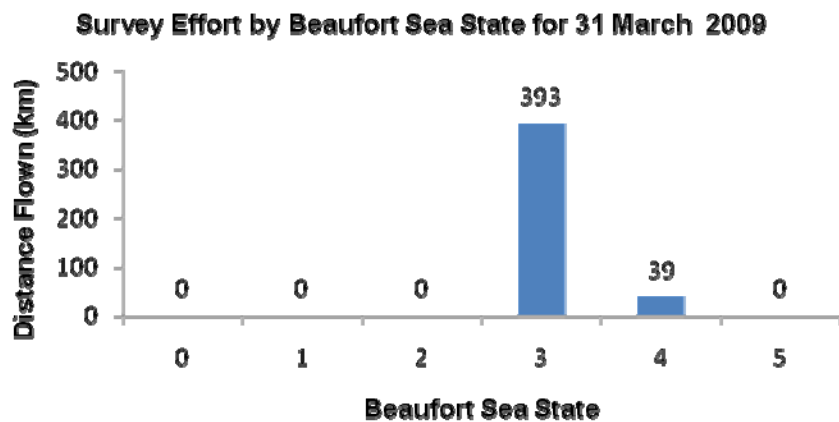


**Survey Effort by Beaufort Sea State for 27 February 2009**



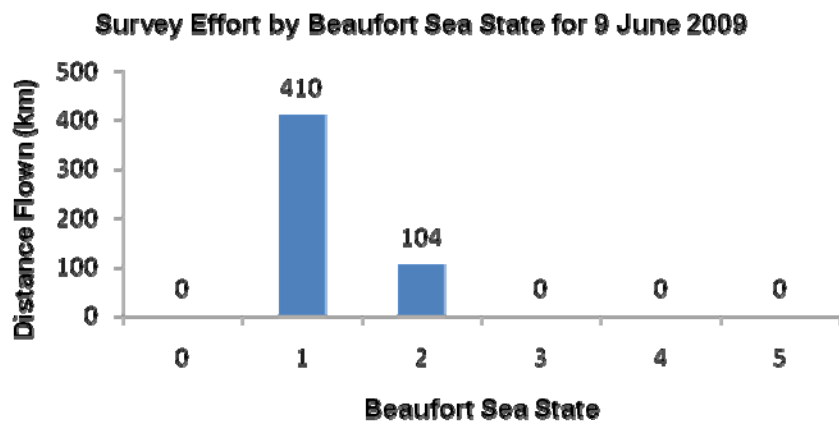
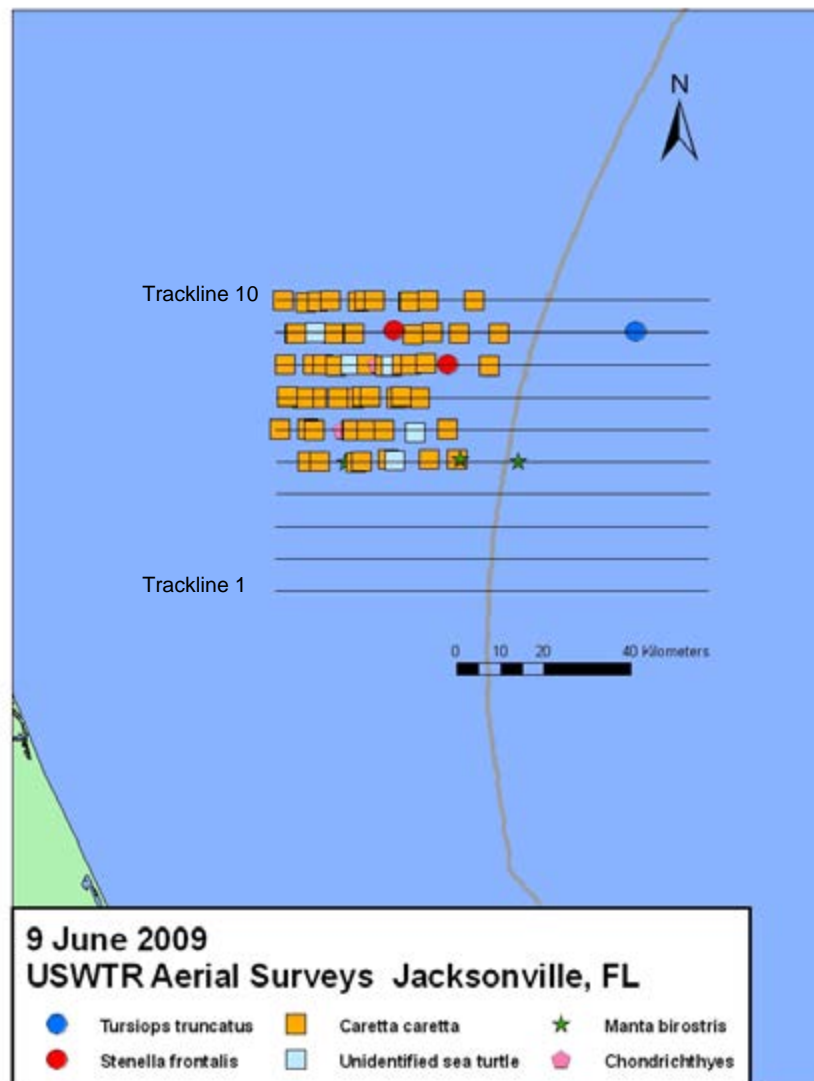
# 31 March 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	6	6	3	-



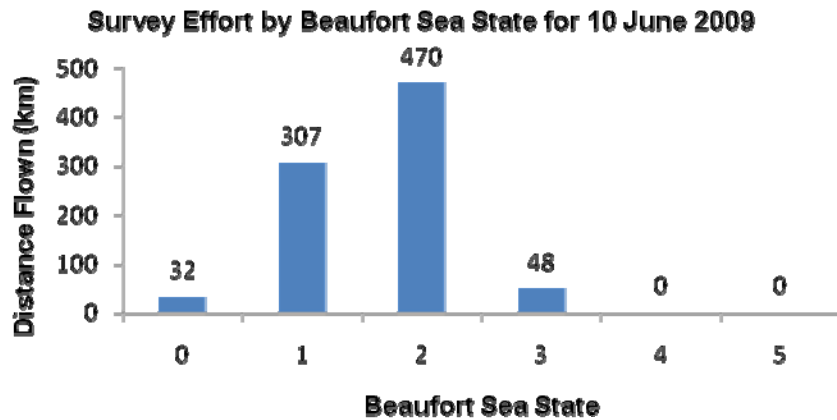
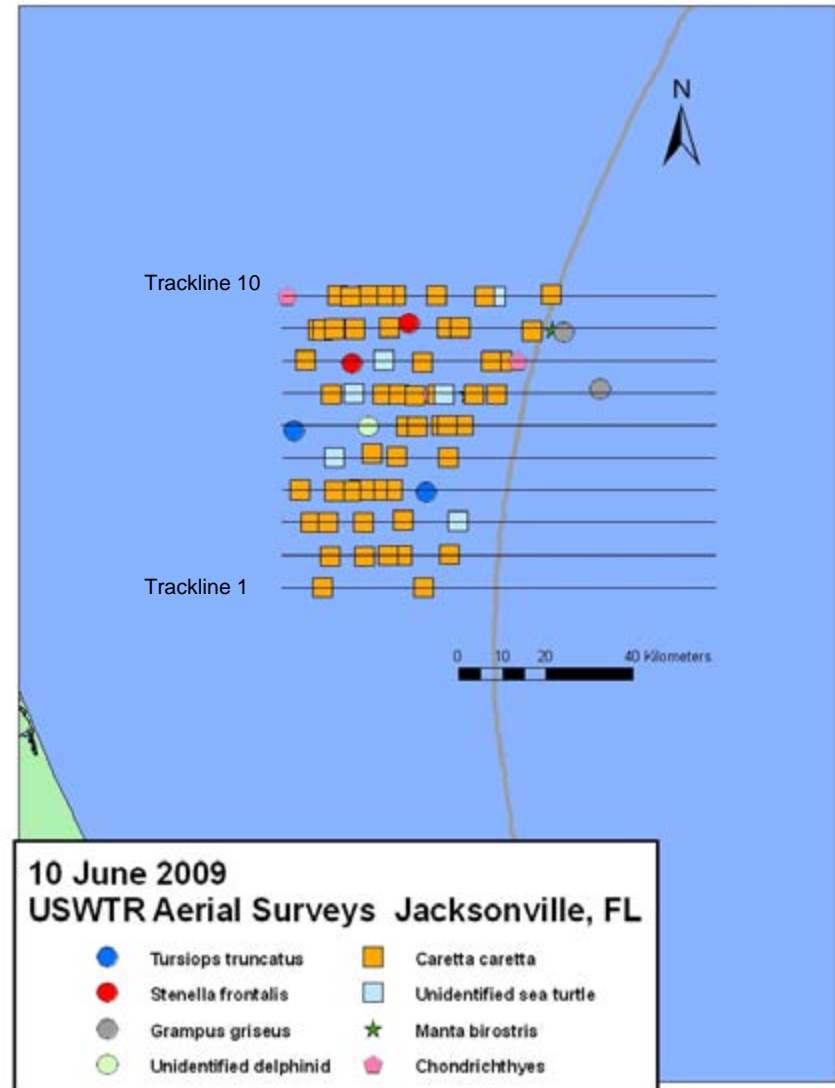
9 June 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	8	2	9
<i>Stenella frontalis</i>	1	14	1	9
<i>Stenella frontalis</i>	1	6	1	8
<i>Caretta caretta</i>	57	69	1-2	-
Unidentified sea turtle	5	5	1	-
Chondrichthyes	2	2	1	-



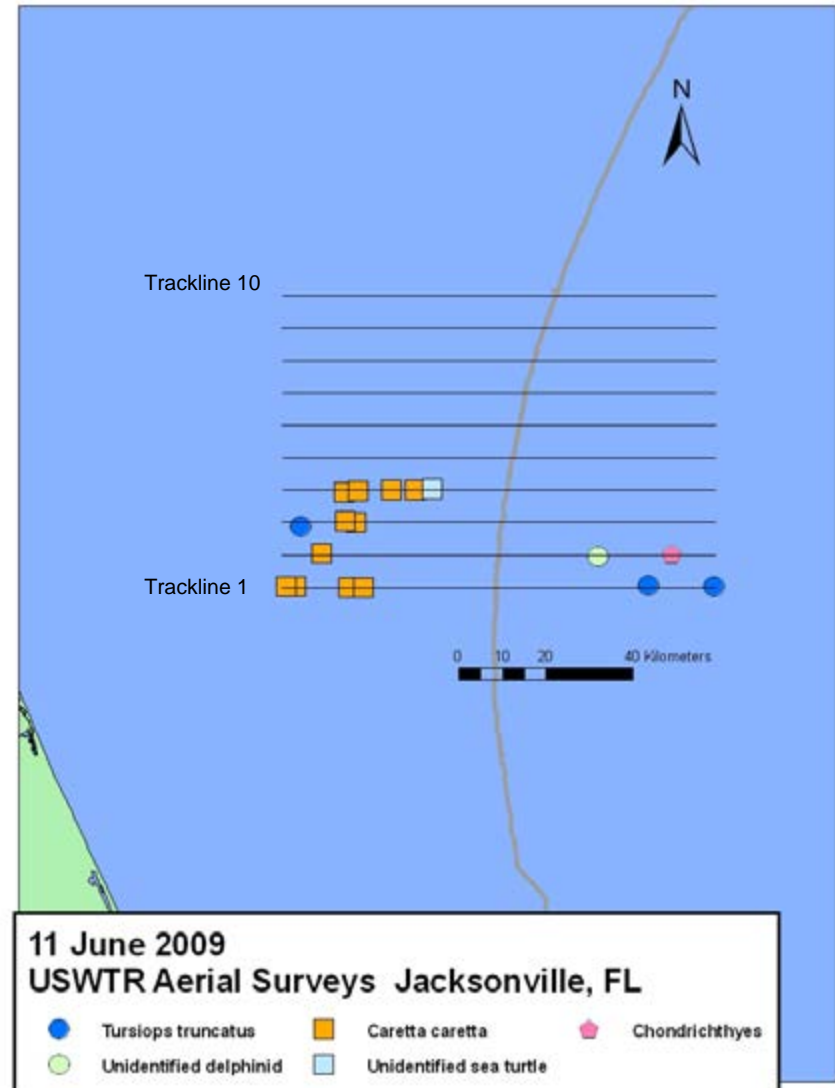
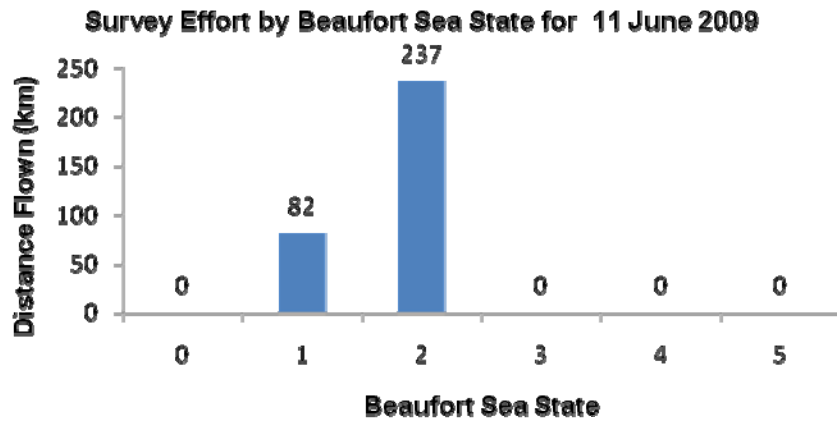
# 10 June 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	8	2	4
<i>Tursiops truncatus</i>	2	34	2	6
<i>Stenella frontalis</i>	1	10	1	8
<i>Stenella frontalis</i>	1	7	1	9
<i>Grampus griseus</i>	1	14	1	7
<i>Grampus griseus</i>	1	32	1	9
Unidentified delphinid	1	3	1-2	6
<i>Caretta caretta</i>	54	67	0-3	-
Unidentified sea turtle	7	7	1-2	-
<i>Manta birostris</i>	3	3	1	-
Chondrichthyes	2	2	1-2	-



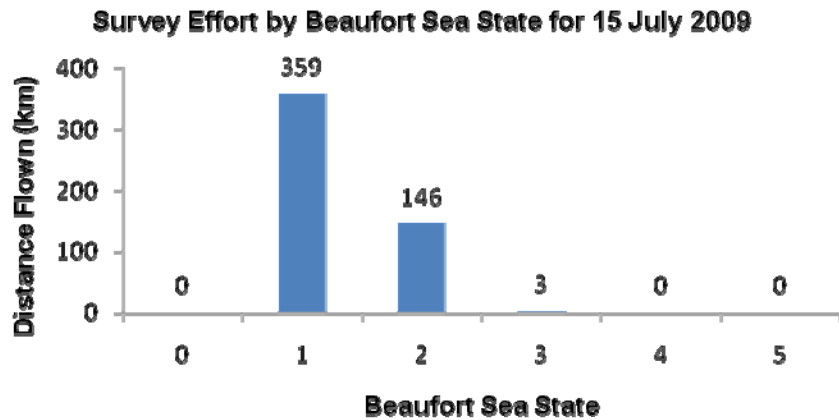
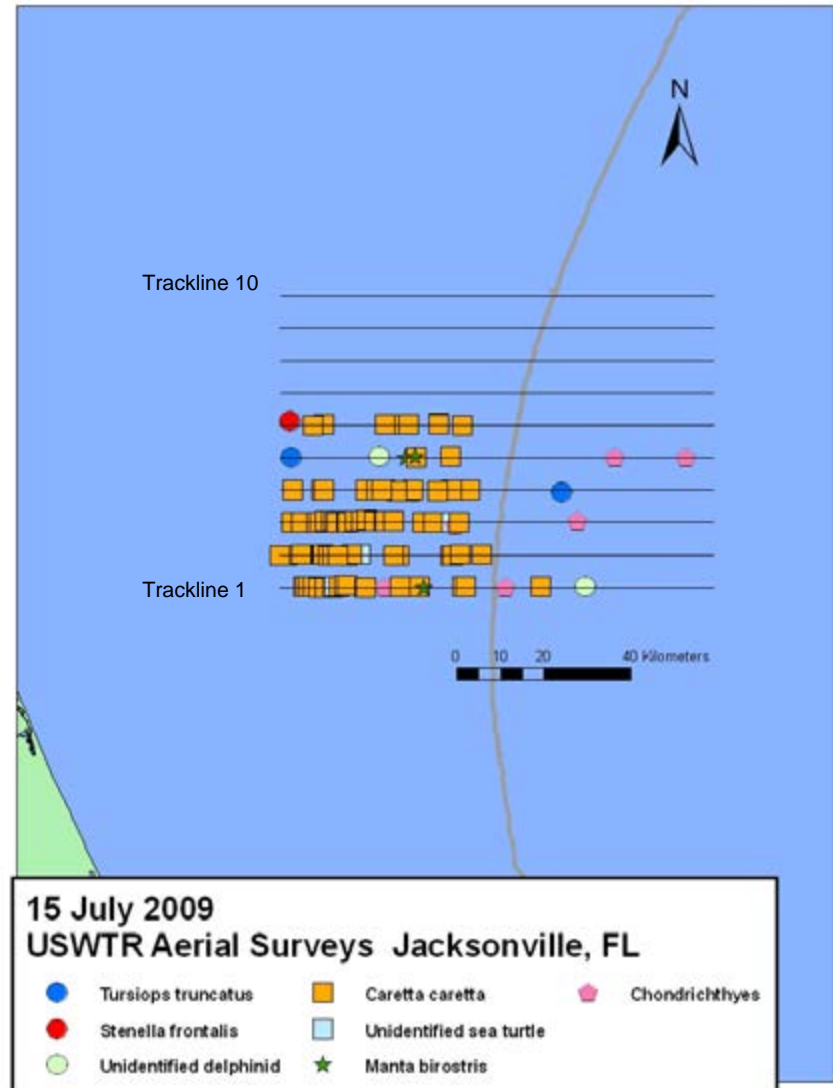
11 June 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	4	2	3
<i>Tursiops truncatus</i>	2	30	2	1
Unidentified delphinid	1	3	2	2
<i>Caretta caretta</i>	11	13	1-2	-
Unidentified sea turtle	1	1	2	-
Chondrichthyes	1	1	2	-



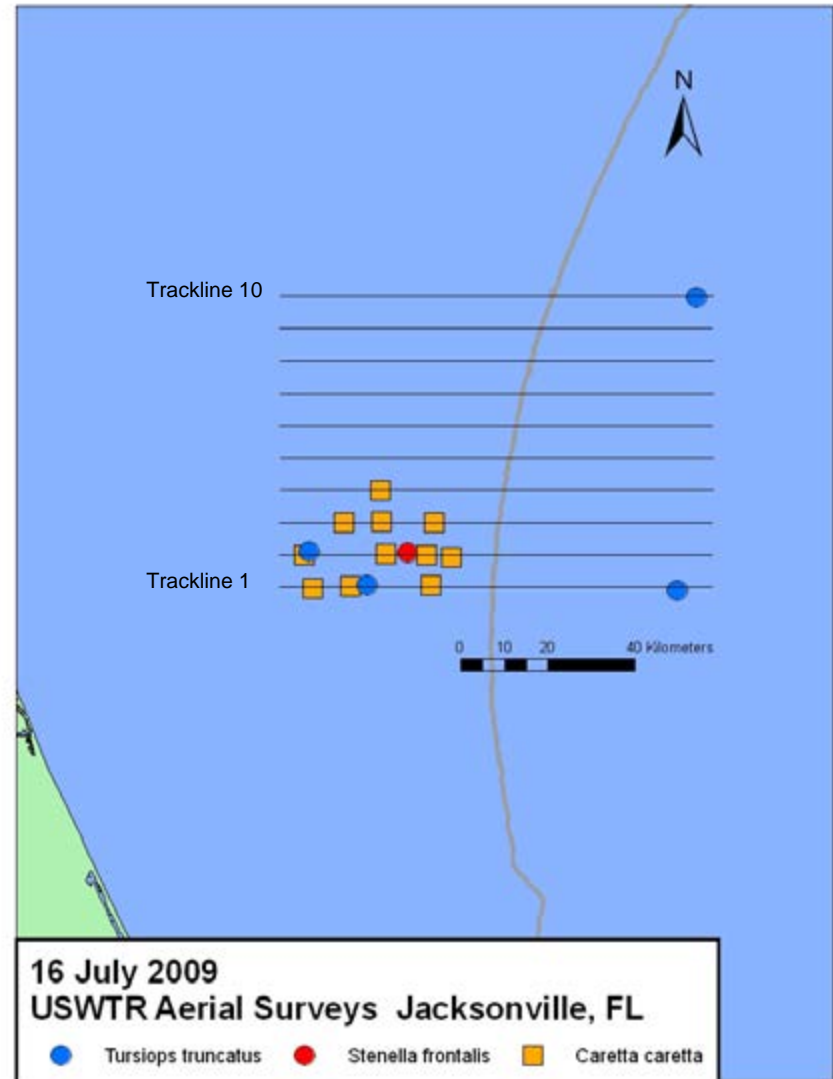
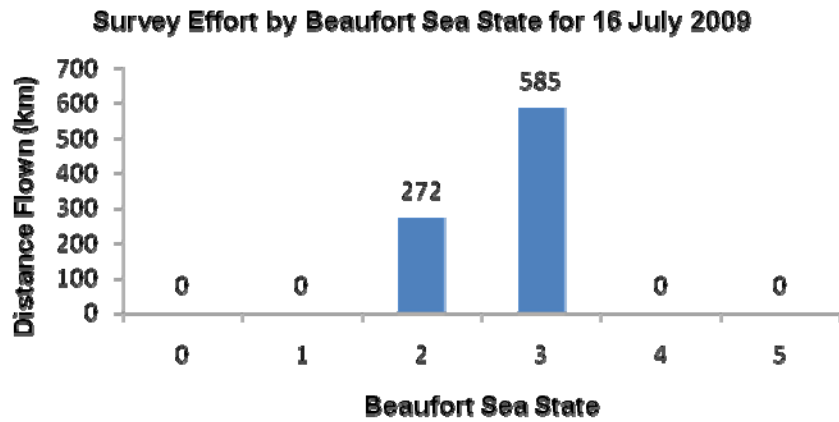
15 July 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	4	2	4
<i>Tursiops truncatus</i>	1	4	1	5
<i>Stenella frontalis</i>	1	16	1	6
Unidentified delphinid	1	1	2	1
Unidentified delphinid	1	2	1	5
<i>Caretta caretta</i>	75	106	1-2	-
Unidentified sea turtle	7	7	1	-
<i>Manta birostris</i>	3	3	1	-
Chondrichthyes	6	6	1	-



16 July 2009

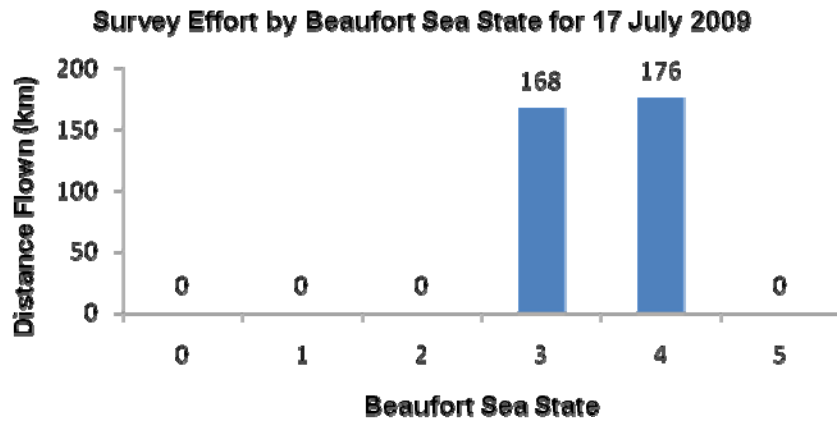
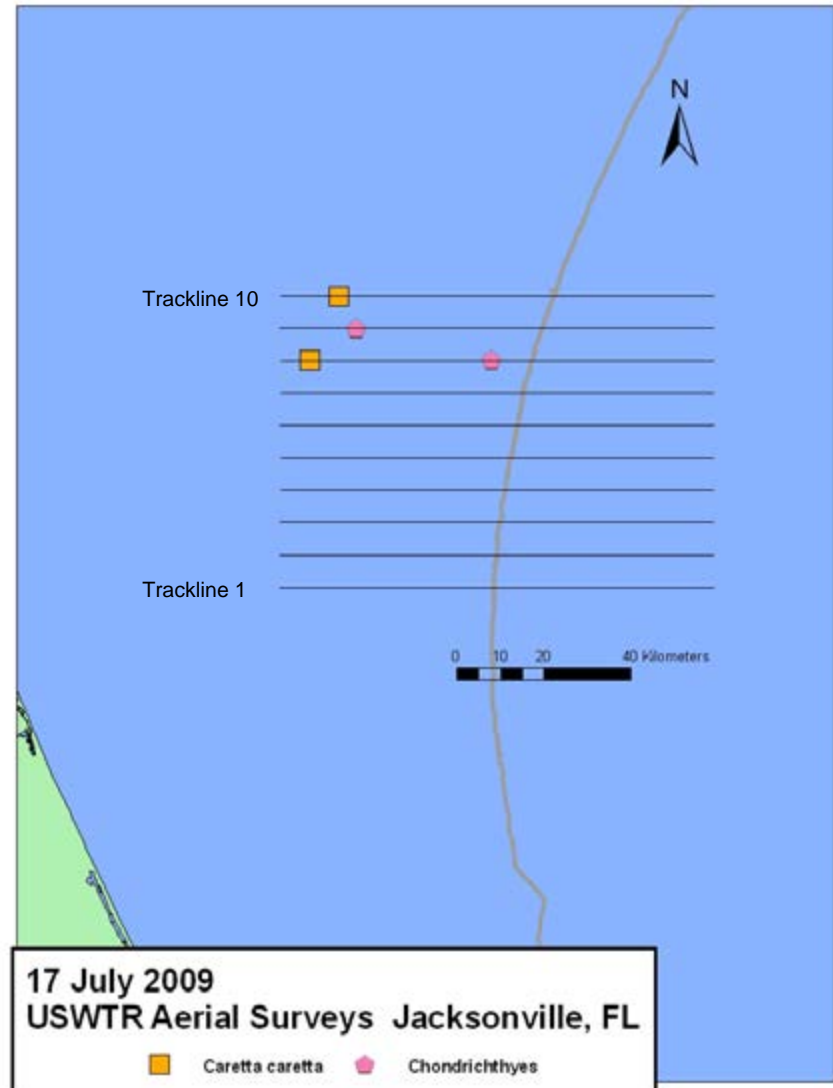
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	12	3	10
<i>Tursiops truncatus</i>	1	6	2	2
<i>Tursiops truncatus</i>	2	23	1-2	1
<i>Stenella frontalis</i>	1	12	2	2
<i>Caretta caretta</i>	11	15	1-2	-





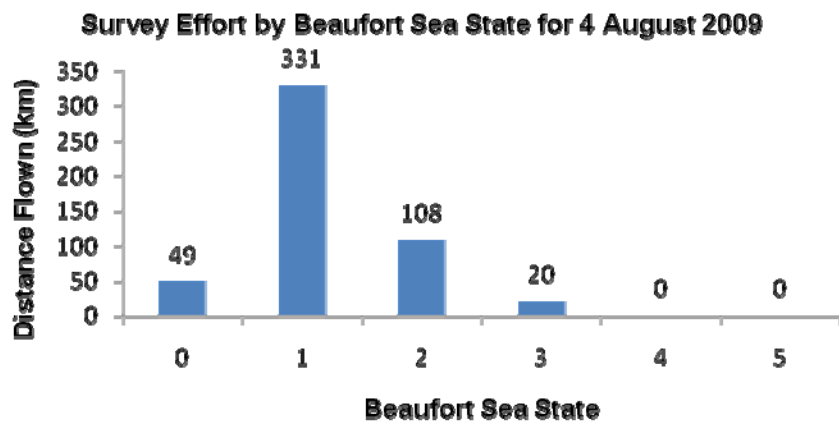
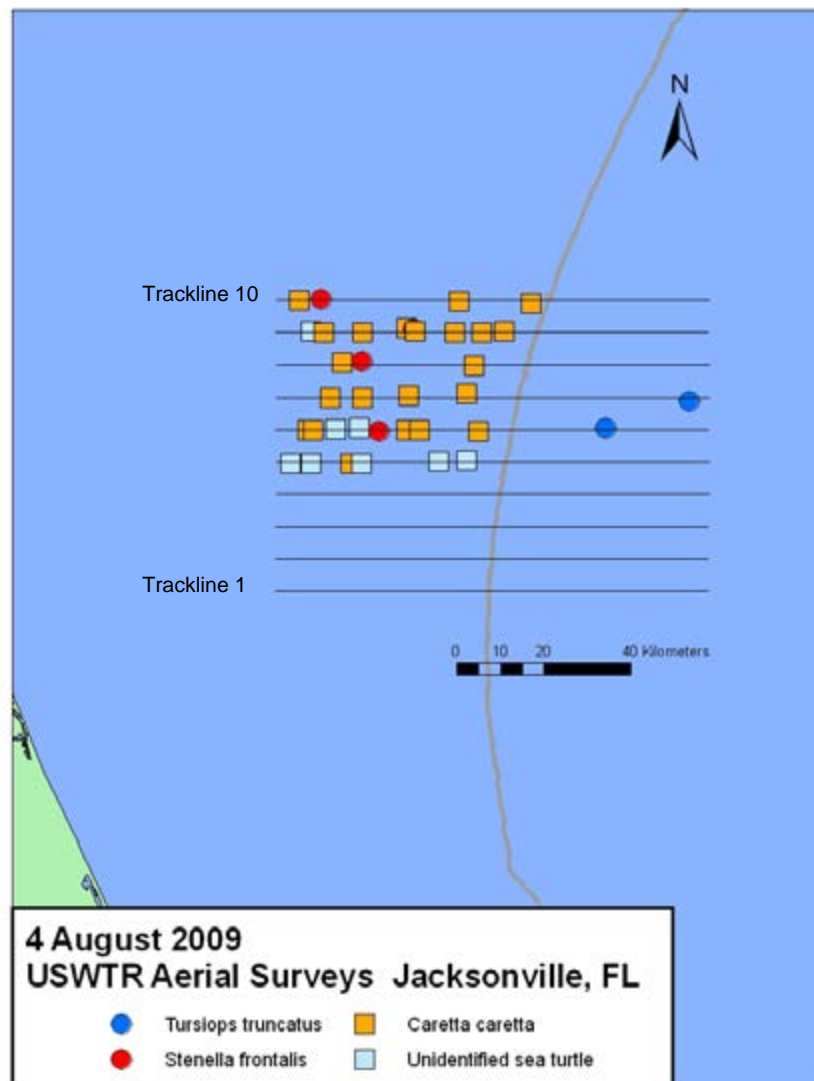
17 July 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	2	2	3	-
Chondrichthyes	2	2	3	-



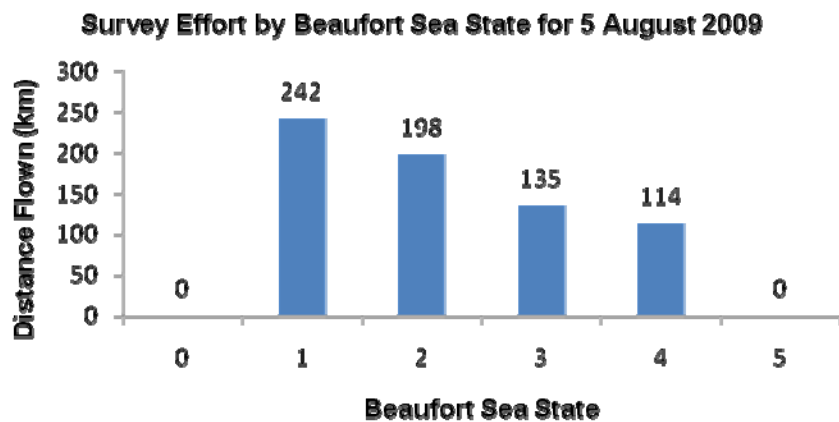
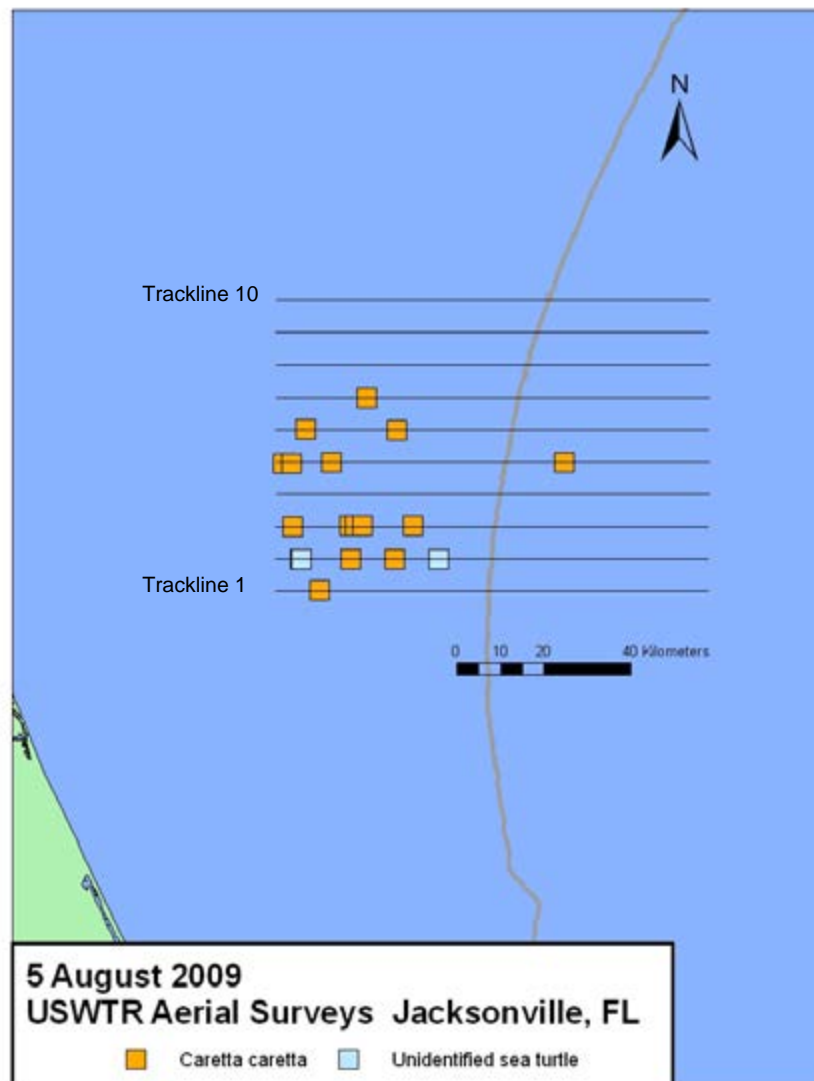
# 4 August 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	24	1	7
<i>Tursiops truncatus</i>	1	35	0	6
<i>Stenella frontalis</i>	1	4	1	10
<i>Stenella frontalis</i>	1	25	1	9
<i>Stenella frontalis</i>	1	6	1	8
<i>Stenella frontalis</i>	1	7	1	6
<i>Caretta caretta</i>	22	28	1-3	-
Unidentified sea turtle	8	8	1-3	-



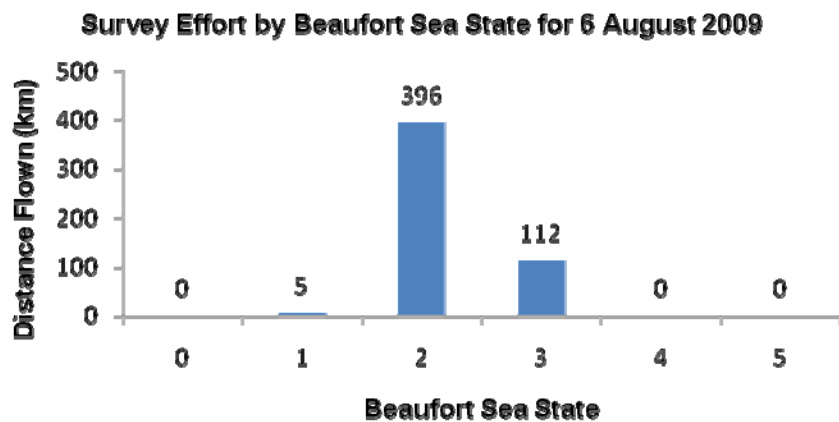
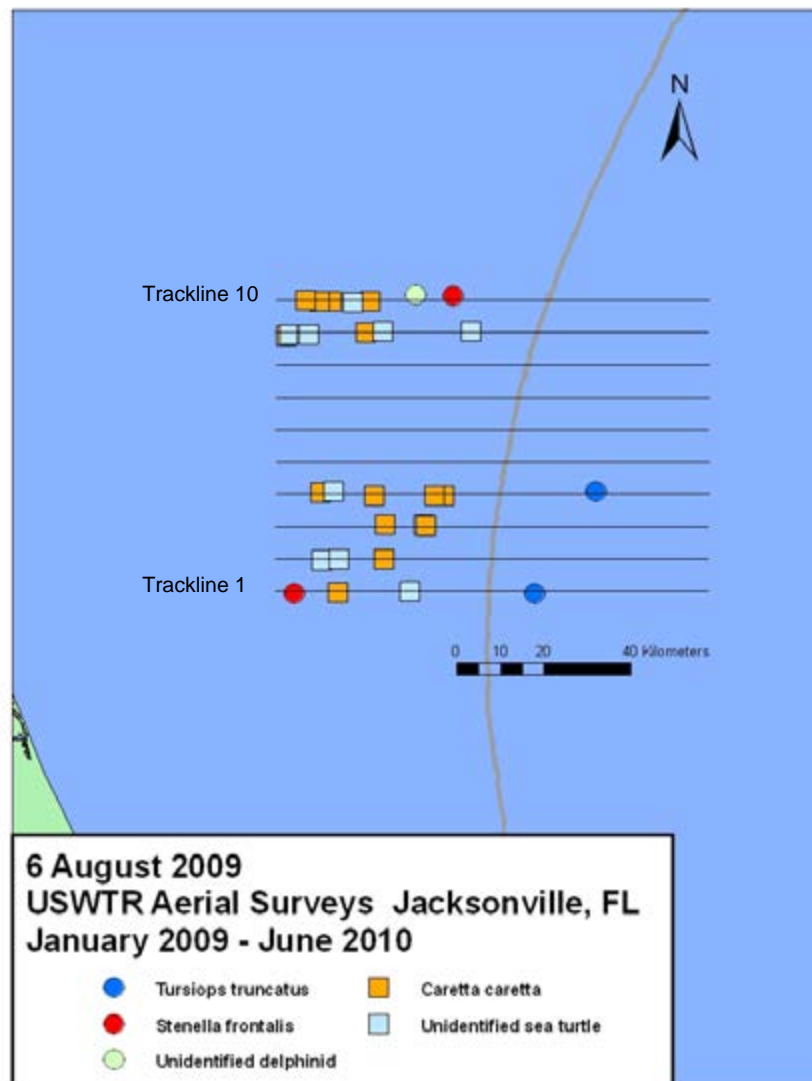
## 5 August 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	16	20	1-3	-
Unidentified sea turtle	3	3	1-2	-



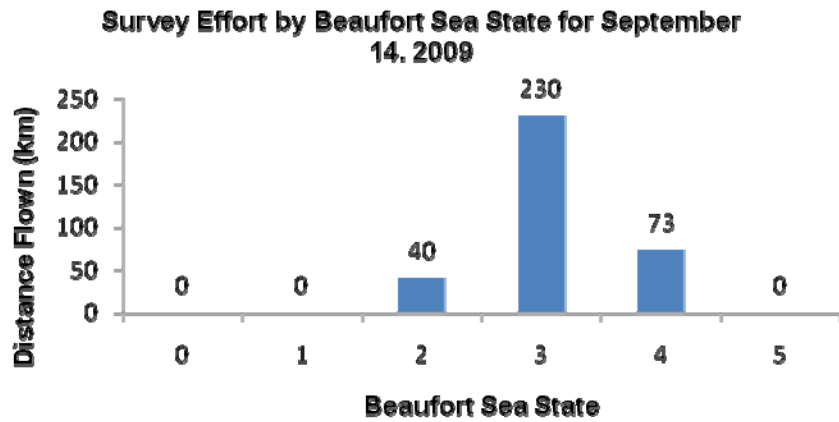
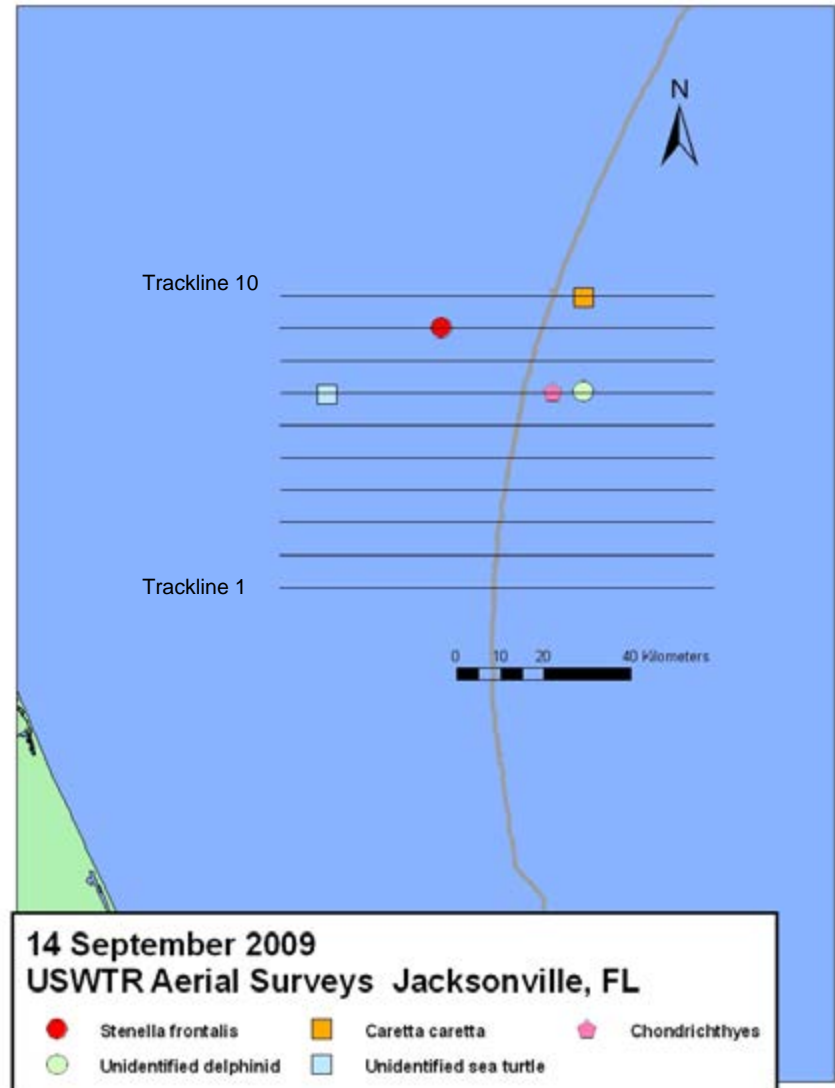
## 6 August 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	20	2	1
<i>Tursiops truncatus</i>	1	17	3	4
<i>Stenella frontalis</i>	1	20	2	1
<i>Stenella frontalis</i>	1	6	2	10
Unidentified delphinid	1	3	2	10
<i>Caretta caretta</i>	15	20	1-2	-
Unidentified sea turtle	10	10	2	-



14 September 2009

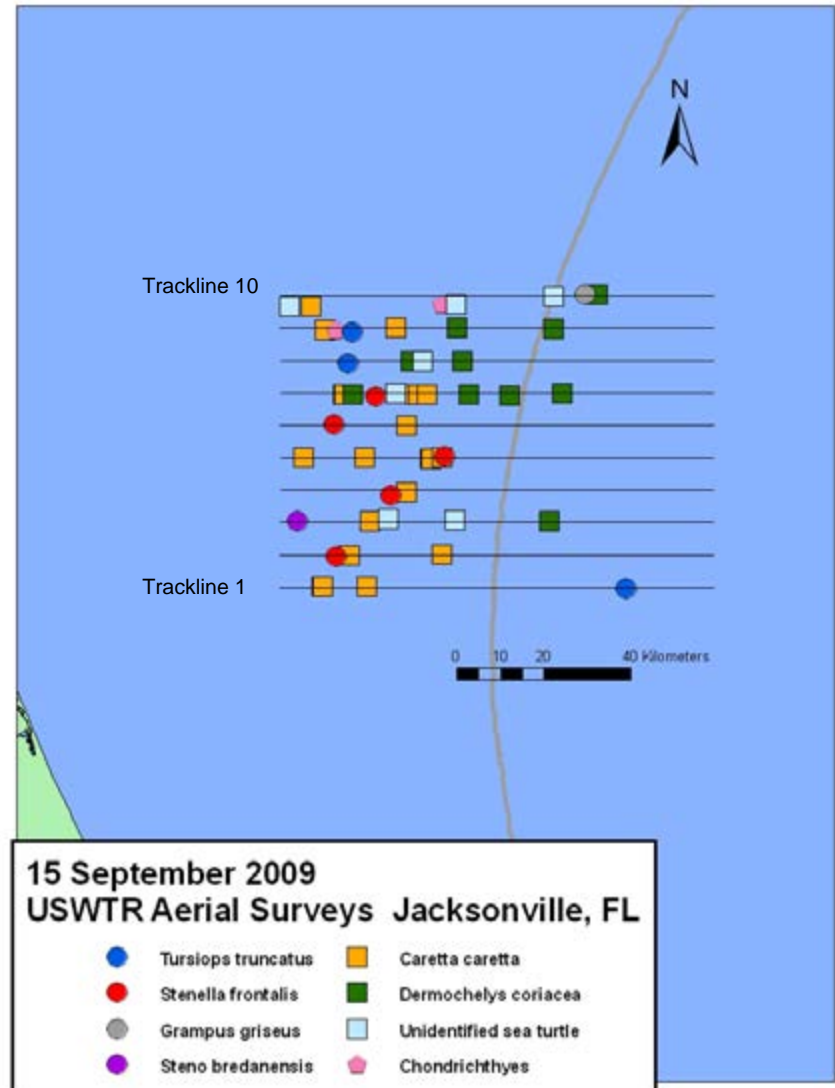
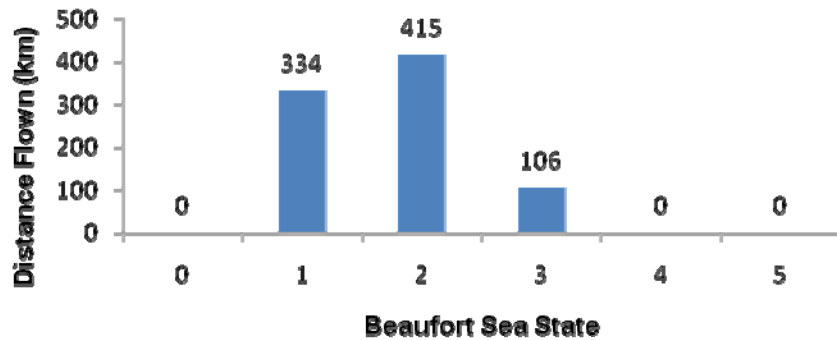
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Stenella frontalis</i>	1	8	3	9
Unidentified delphinid	1	9	3	7
<i>Caretta caretta</i>	1	1	3	-
Unidentified sea turtle	1	1	3	-
Chondrichthyes	1	1	3	-



# 15 September 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	3	2	1
<i>Tursiops truncatus</i>	1	2	1	8
<i>Tursiops truncatus</i>	1	8	1	9
<i>Stenella frontalis</i>	1	7	2	2
<i>Stenella frontalis</i>	1	40	2	4
<i>Stenella frontalis</i>	1	36	2	5
<i>Stenella frontalis</i>	1	10	1	6
<i>Stenella frontalis</i>	1	36	1	7
<i>Grampus griseus</i>	1	36	1	10
<i>Steno bredanensis</i>	1	50	1	3
<i>Caretta caretta</i>	22	23	1-3	-
<i>Dermochelys coriacea</i>	10	10	1-3	-
Unidentified sea turtle	7	7	1-2	-
Chondrichthyes	2	2	1	-

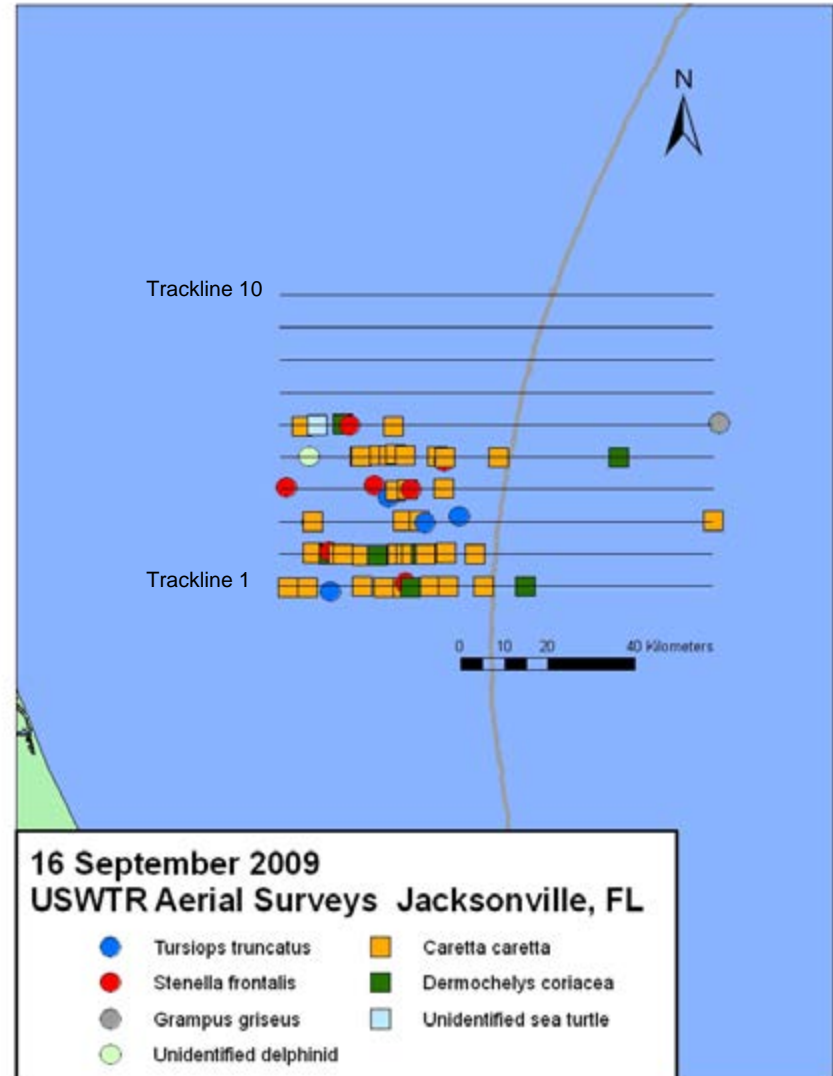
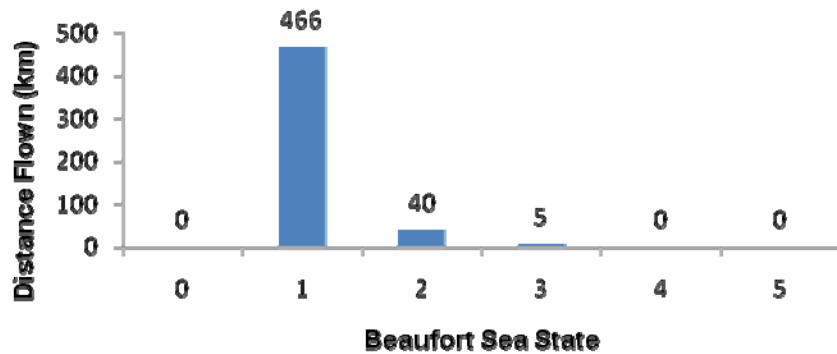
**Survey Effort by Beaufort Sea State for 15 September 2009**



# 16 September 2009

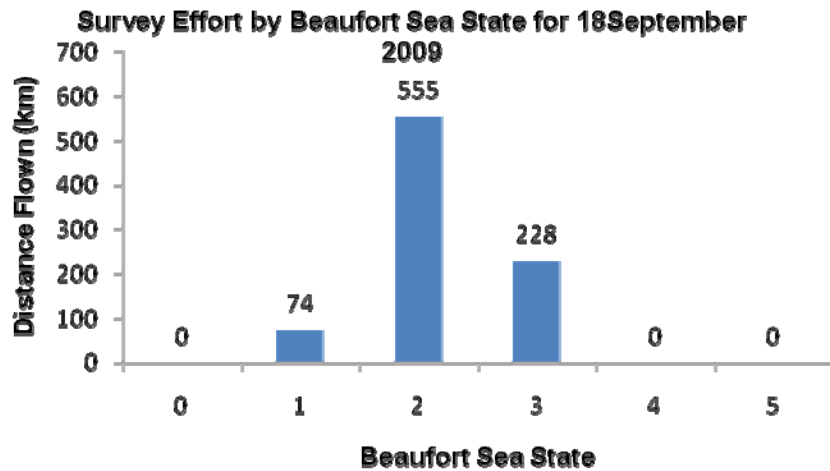
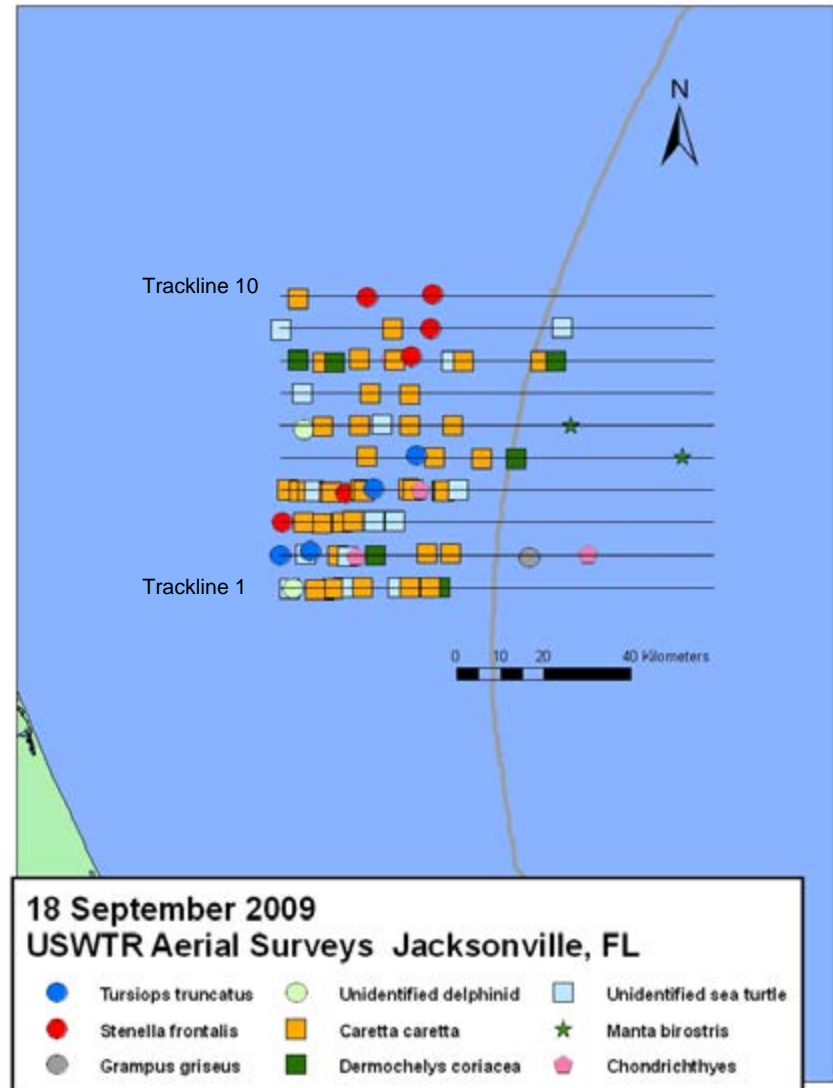
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	9	1	1
<i>Tursiops truncatus</i>	2	14	1	3
<i>Tursiops truncatus</i>	1	6	1	4
<i>Stenella frontalis</i>	1	25	1	1
<i>Stenella frontalis</i>	1	12	1	2
<i>Stenella frontalis</i>	1	48	1	3
<i>Stenella frontalis</i>	3	35	1	4
<i>Stenella frontalis</i>	1	23	1	5
<i>Stenella frontalis</i>	1	36	1	6
<i>Grampus griseus</i>	1	4	1	6
Unidentified delphinid	1	11	1	5
<i>Caretta caretta</i>	37	58	1	-
<i>Dermochelys coriacea</i>	8	8	1	-
Unidentified sea turtle	1	1	1	-

**Survey Effort by Beaufort Sea State for 16 September 2009**



# 18 September 2009

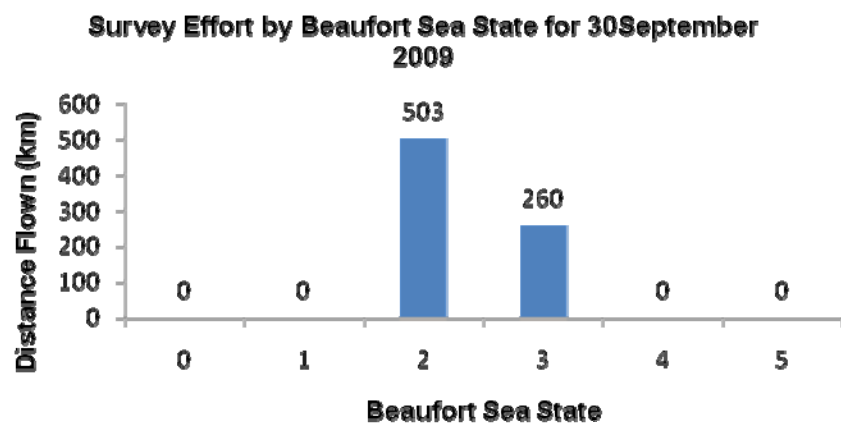
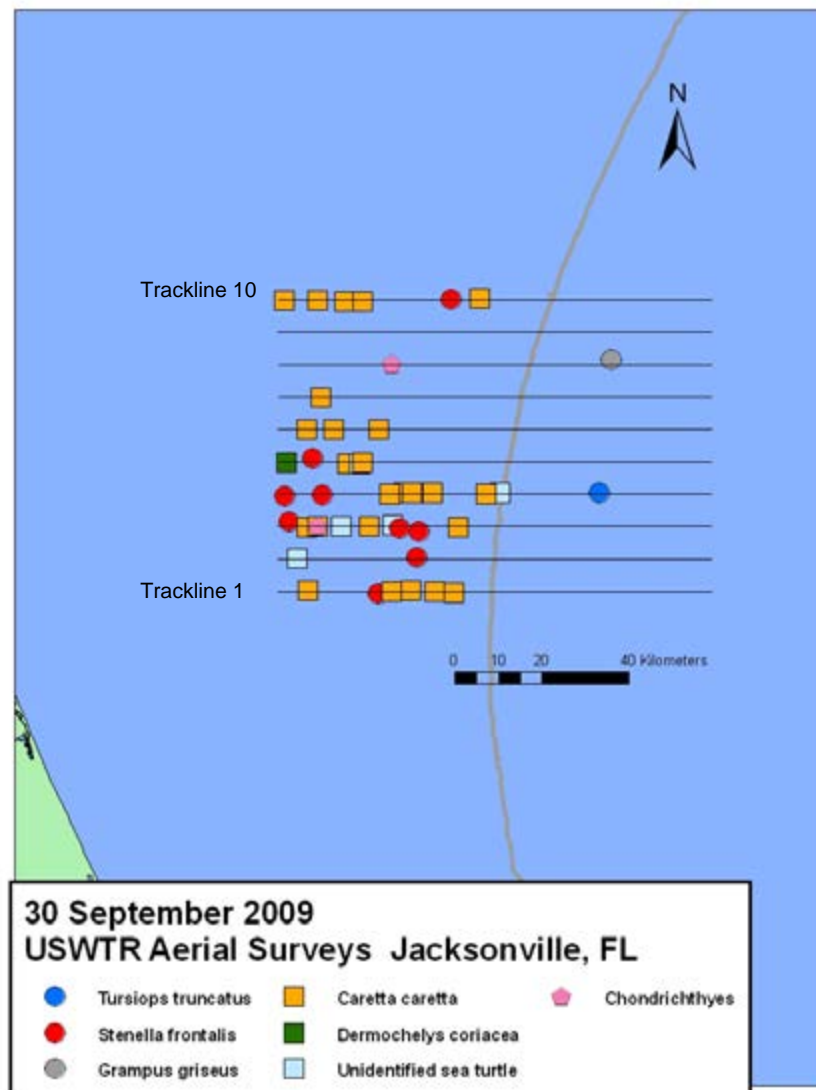
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	16	2	5
<i>Tursiops truncatus</i>	1	5	2	4
<i>Tursiops truncatus</i>	2	19	2	2
<i>Stenella frontalis</i>	2	41	3	10
<i>Stenella frontalis</i>	1	12	2	9
<i>Stenella frontalis</i>	1	50	2	8
<i>Stenella frontalis</i>	1	5	2	4
<i>Stenella frontalis</i>	1	7	2	3
<i>Grampus griseus</i>	1	5	2	2
Unidentified delphinid	1	2	2	6
Unidentified delphinid	1	5	2	1
<i>Caretta caretta</i>	41	52	1-3	-
<i>Dermochelys coriacea</i>	7	7	1-3	-
Unidentified sea turtle	15	16	1-3	-
<i>Manta birostris</i>	3	3	1-2	-
Chondrichthyes	4	4	1-2	-





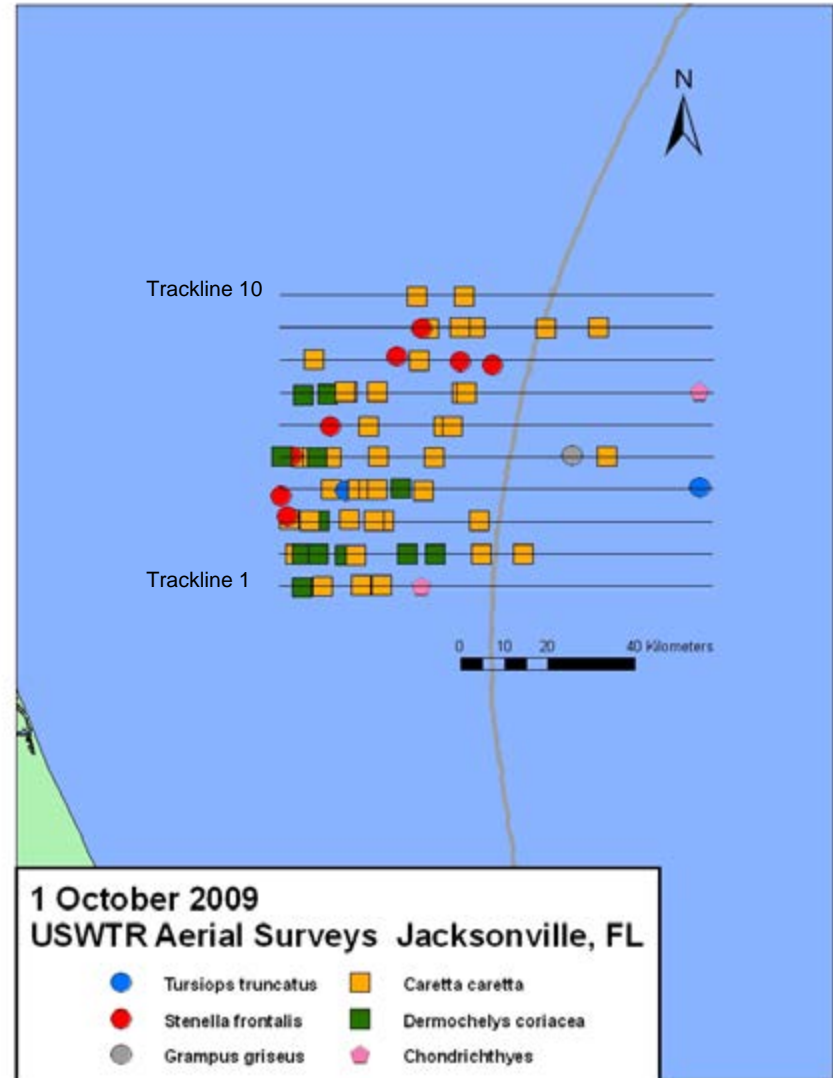
# 30 September 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	5	3	4
<i>Stenella frontalis</i>	1	5	2	1
<i>Stenella frontalis</i>	1	10	2	2
<i>Stenella frontalis</i>	3	40	2	3
<i>Stenella frontalis</i>	2	9	2	4
<i>Stenella frontalis</i>	1	9	2	5
<i>Stenella frontalis</i>	1	9	2	10
<i>Grampus griseus</i>	1	26	2	8
<i>Caretta caretta</i>	26	30	1-3	-
<i>Dermochelys coriacea</i>	1	1	2	-
Unidentified Sea Turtle	5	5	2	-
Chondrichthyes	2	2	2-3	-

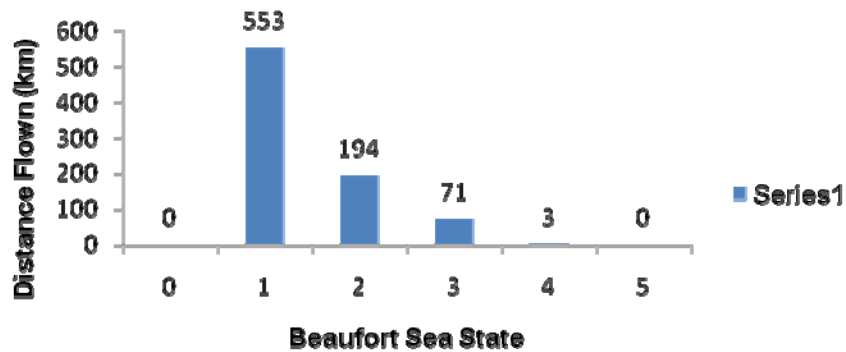


# 1 October 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	2	50	1-2	4
<i>Stenella frontalis</i>	1	4	2	9
<i>Stenella frontalis</i>	3	43	2	8
<i>Stenella frontalis</i>	1	6	2	6
<i>Stenella frontalis</i>	1	9	1	5
<i>Stenella frontalis</i>	1	6	1	4
<i>Stenella frontalis</i>	1	4	1	3
<i>Grampus griseus</i>	1	4	1	5
<i>Caretta caretta</i>	42	53	1-3	-
<i>Dermochelys coriacea</i>	12	12	1	-
Chondrichthyes	2	2	1	-

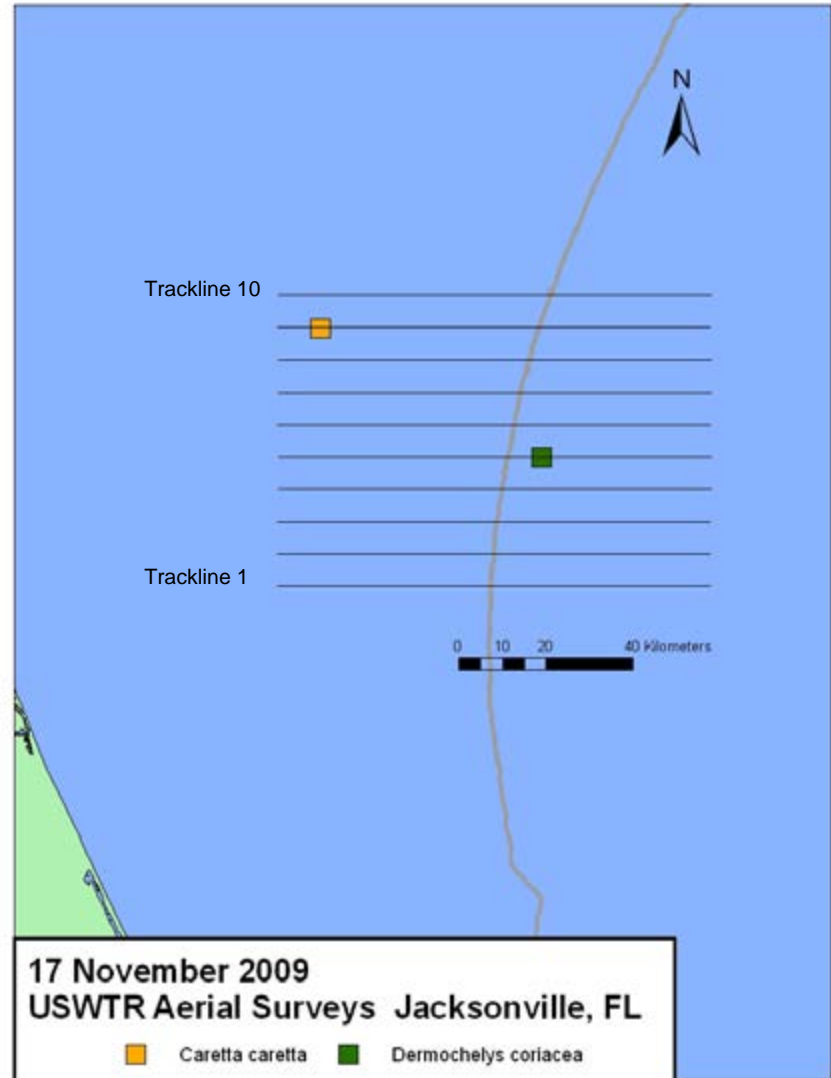
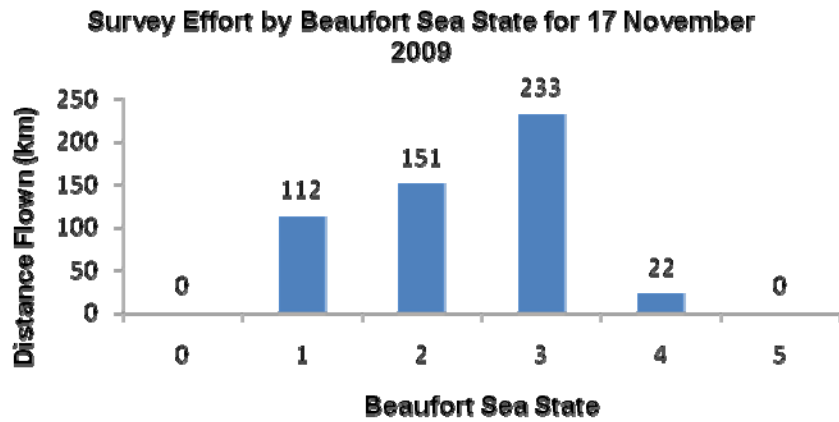


Survey effort by Beaufort Sea State for 1 October 2009



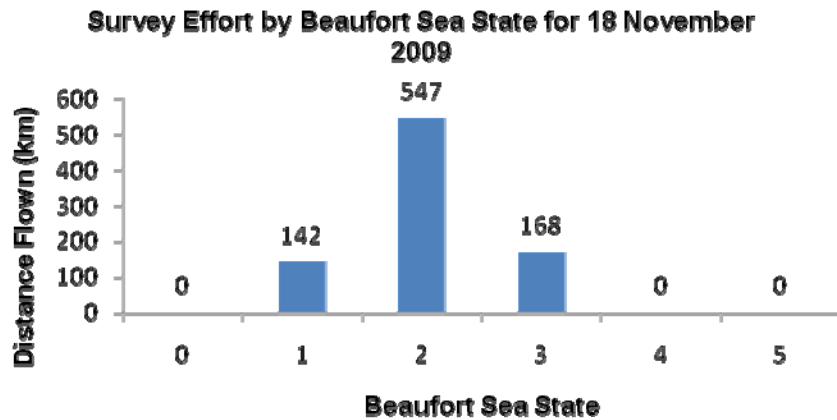
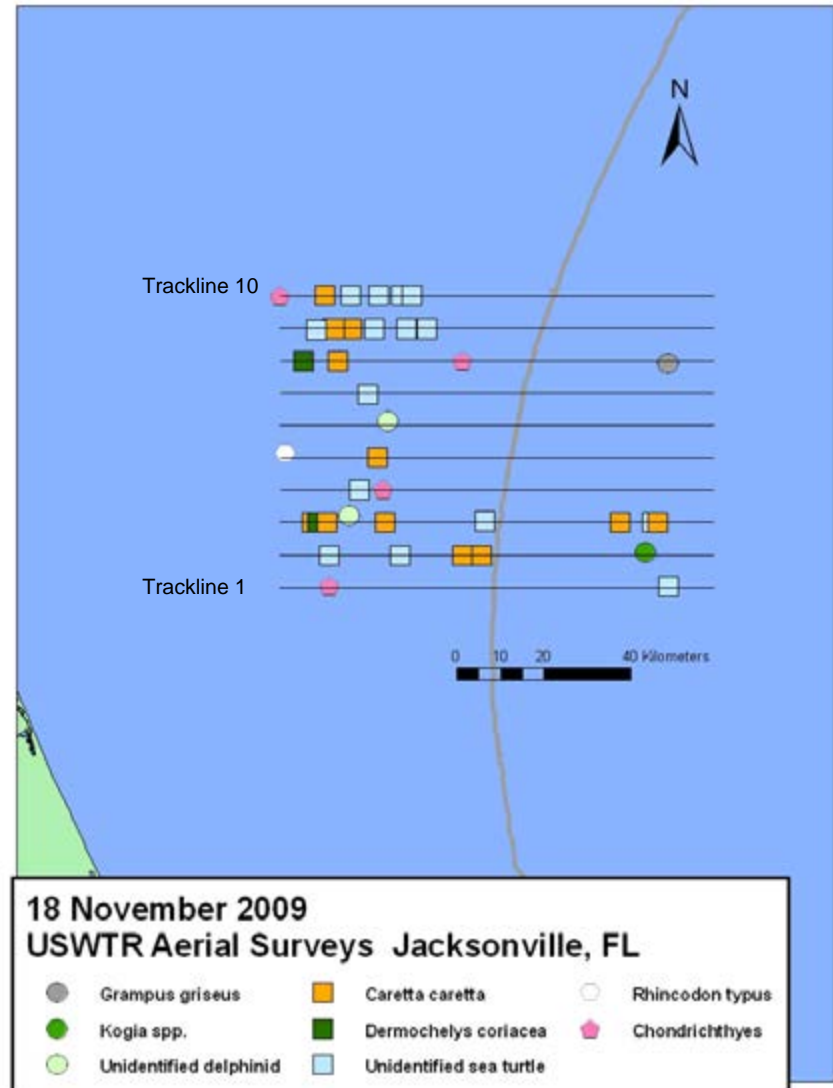
17 November 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	1	1	2	-
<i>Dermochelys coriacea</i>	1	1	1	-



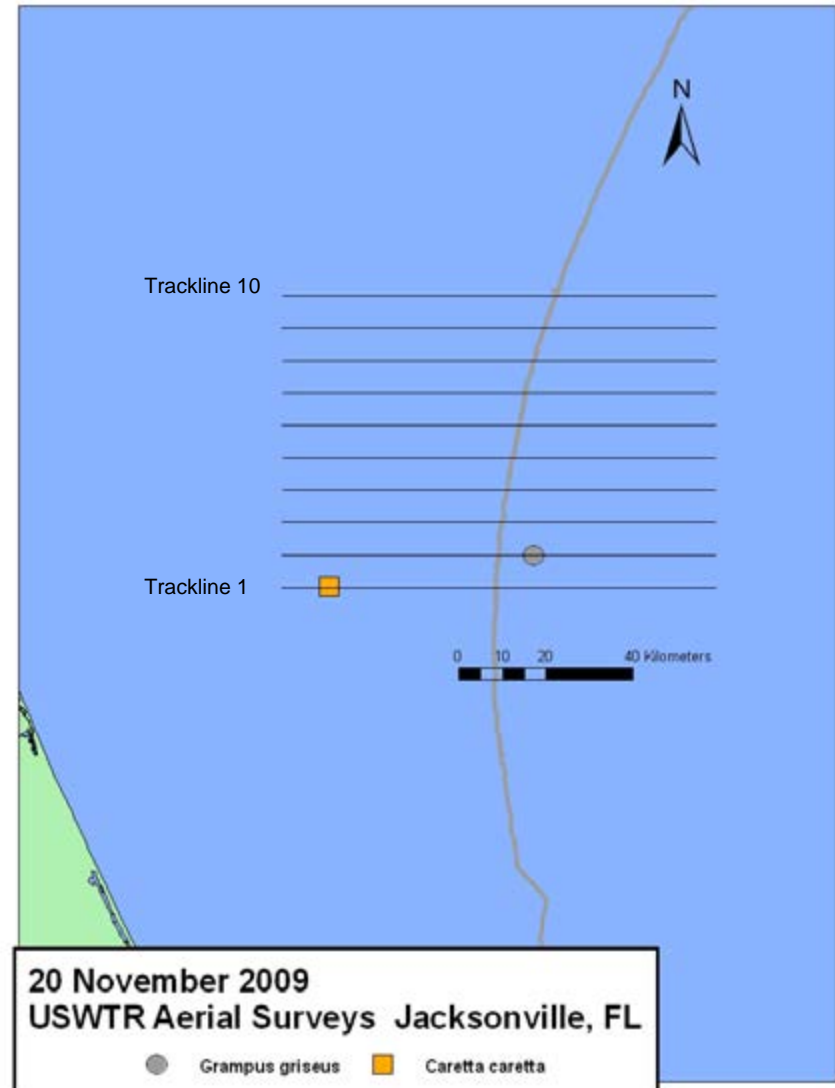
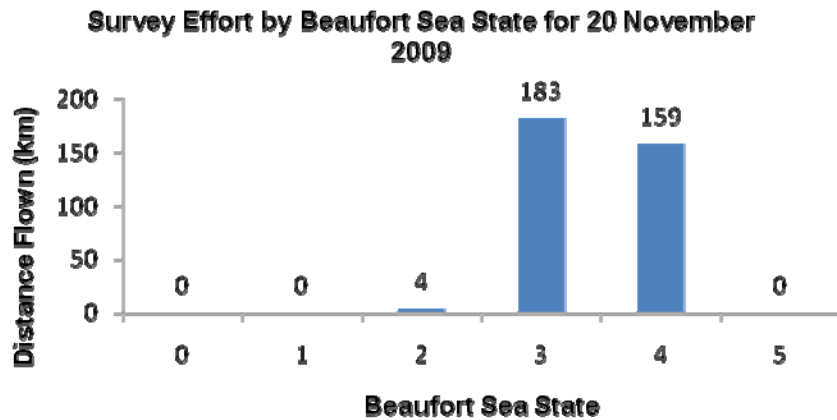
# 18 November 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Grampus griseus</i>	1	40	3	8
<i>Kogia</i> spp.	1	1	1	2
Unidentified delphinid	1	3	1	3
Unidentified delphinid	1	1	2	6
<i>Caretta caretta</i>	12	22	1-2	-
<i>Dermochelys coriacea</i>	3	3	1-2	-
Unidentified sea turtle	16	16	1-2	-
<i>Rhincodon typus</i>	1	1	2	-
Chondrichthyes	4	4	1-2	-



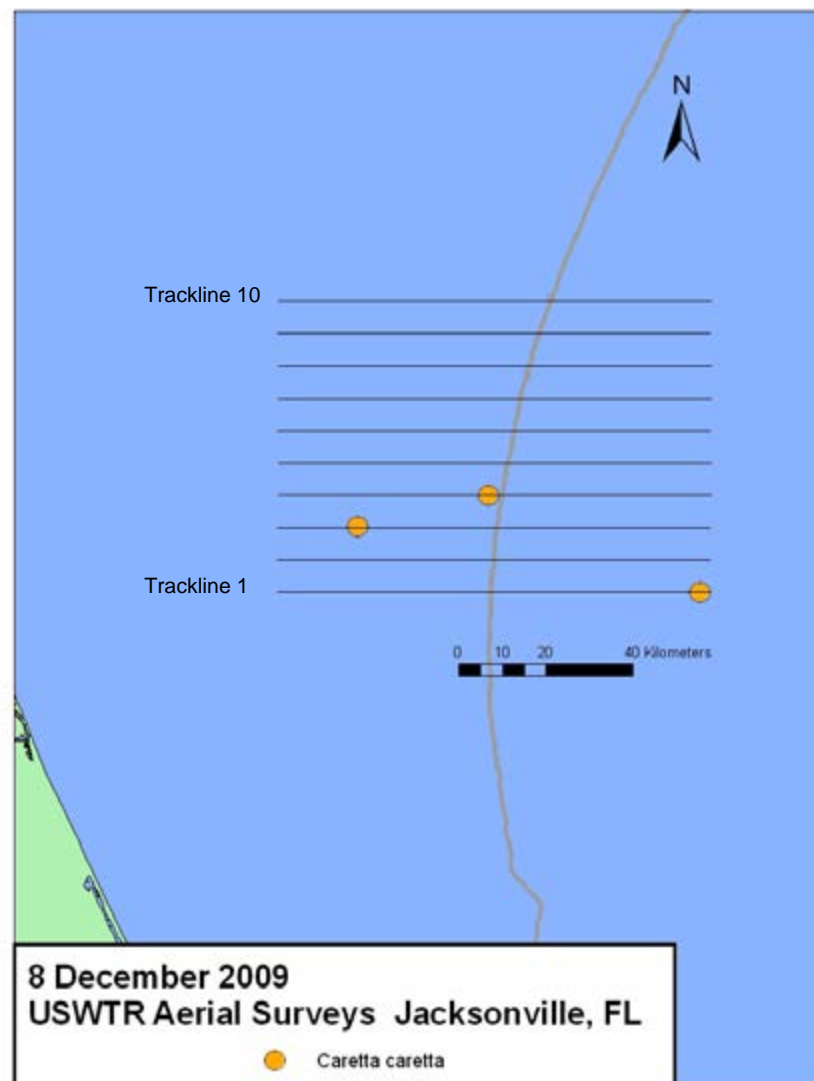
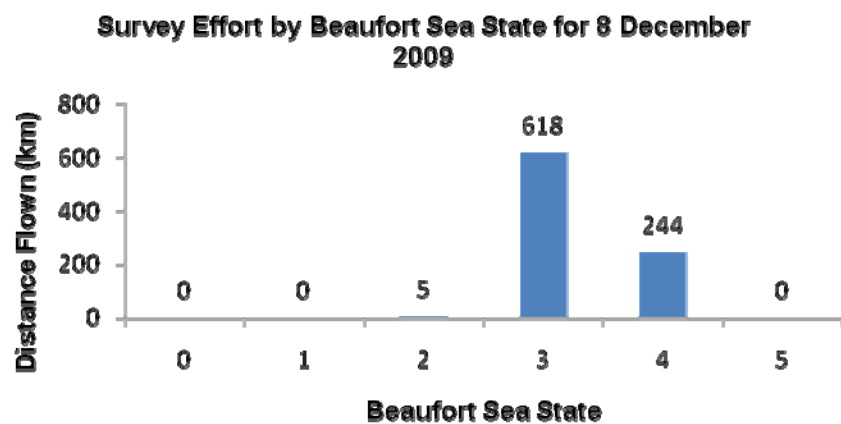
## 20 November 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Grampus griseus</i>	1	20	4	2
<i>Caretta caretta</i>	1	1	3	-



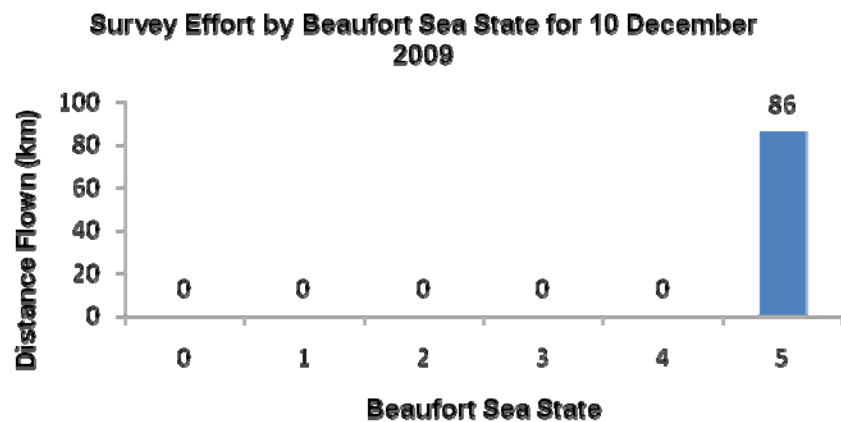
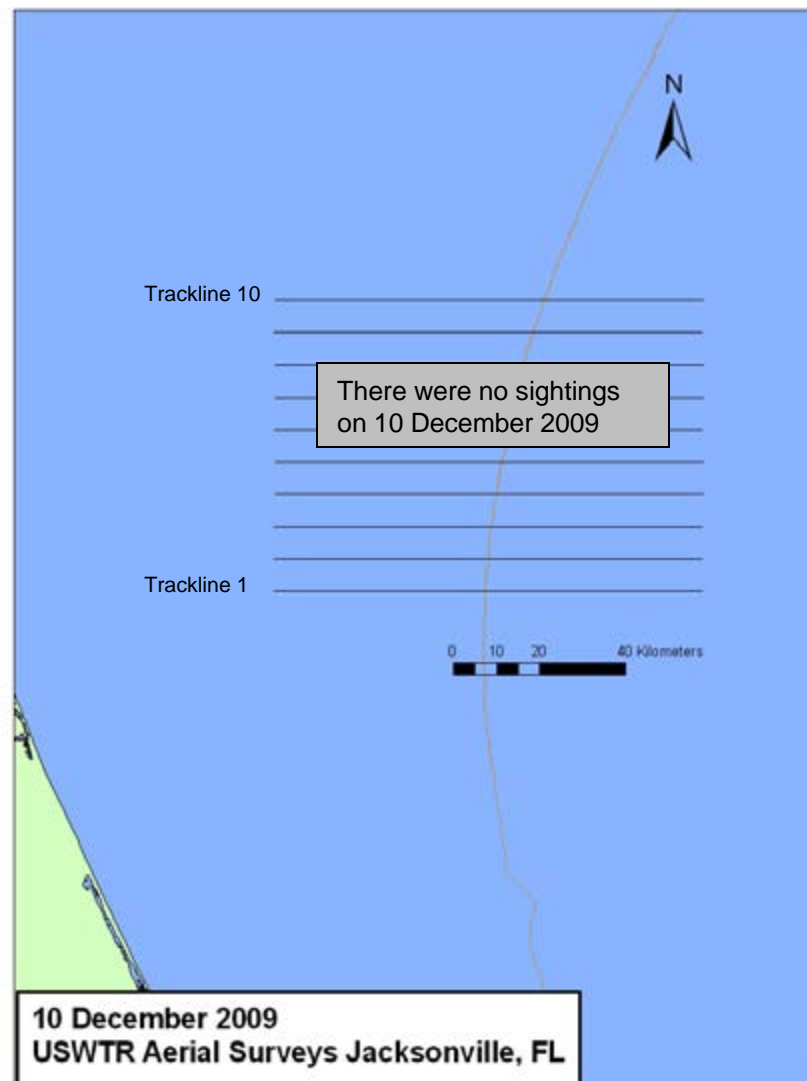
## 8 December 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	3	3	3	-



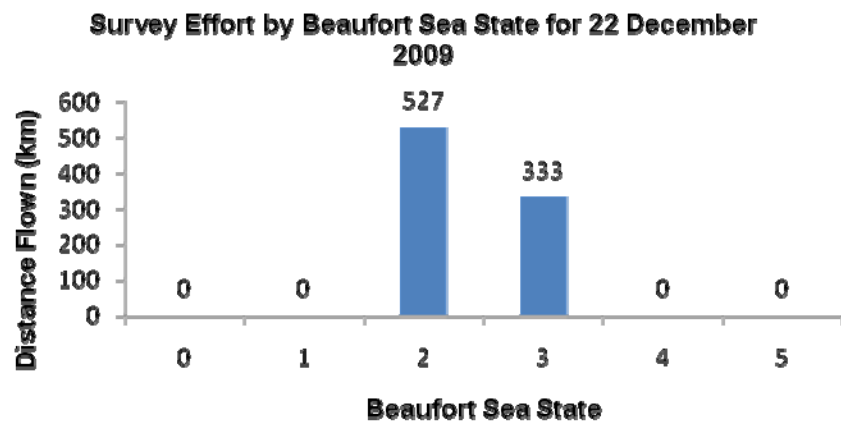
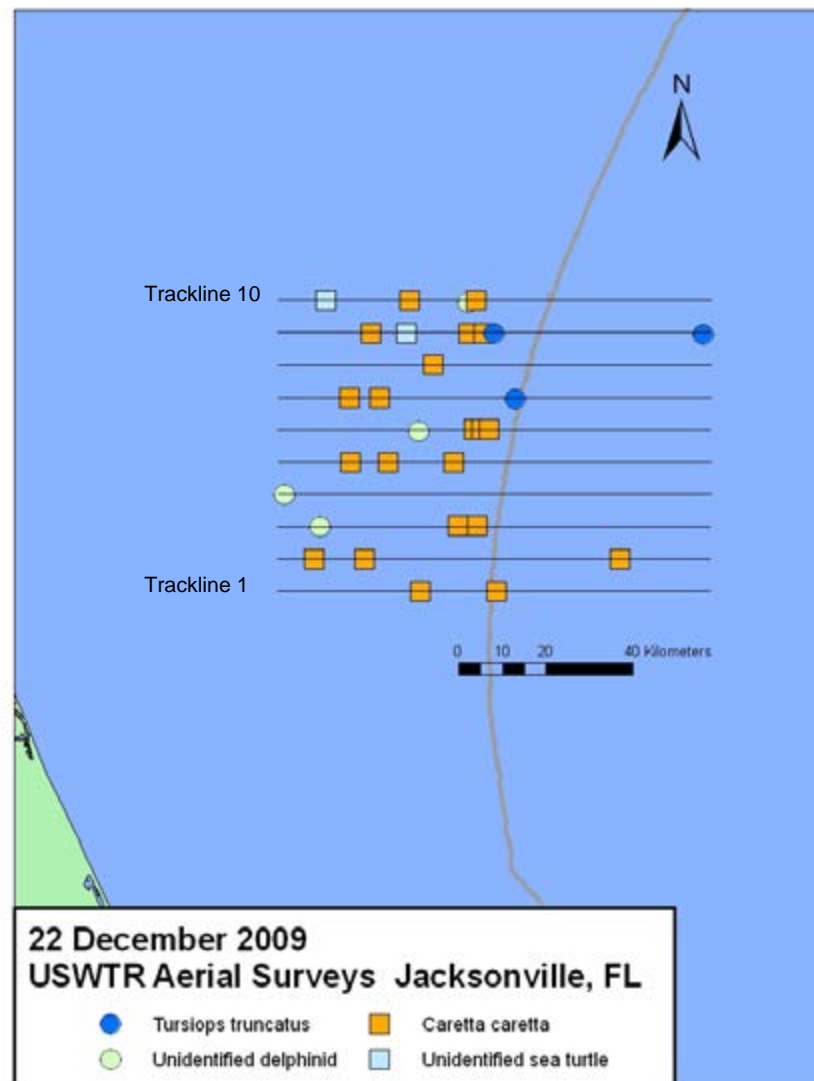
# 10 December 2009

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
N/A				
N/A				
N/A				
N/A	No sighting for 10/12/09			
N/A				
N/A				



22 December 2009

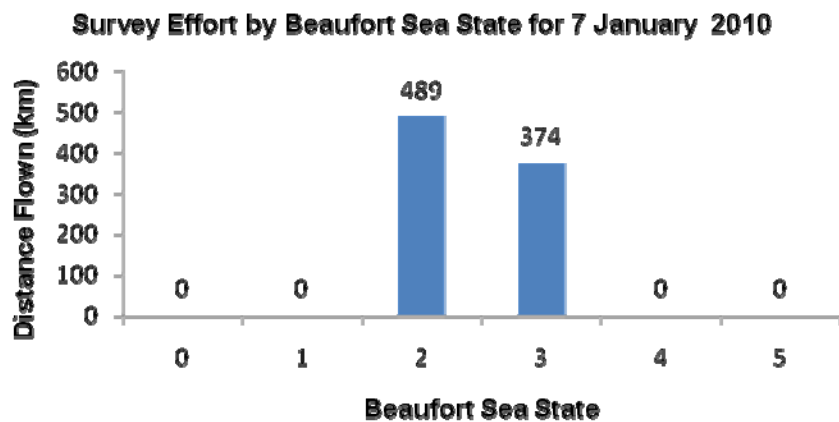
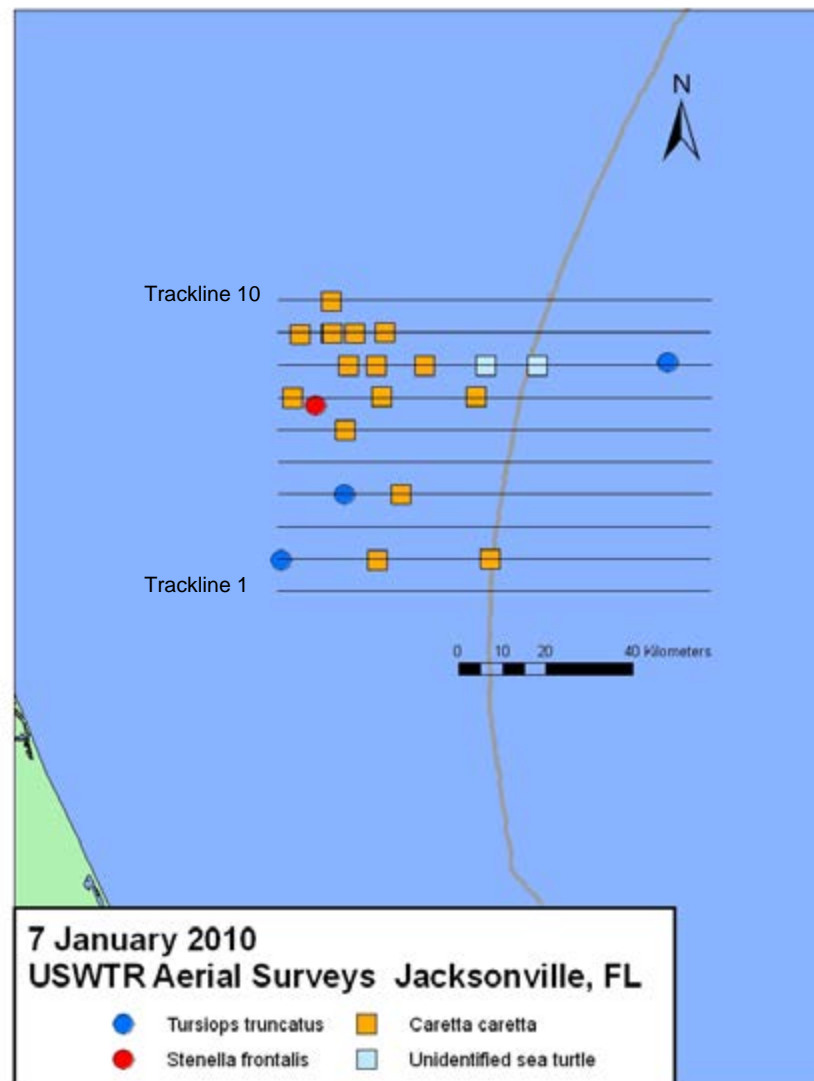
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	50	2	7
<i>Tursiops truncatus</i>	2	7	2	9
Unidentified delphinid	1	1	2	3
Unidentified delphinid	1	3	2	4
Unidentified delphinid	1	3	2	6
Unidentified delphinid	1	1	2	10
<i>Caretta caretta</i>	21	22	2-3	-
Unidentified sea turtle	2	2	2	-





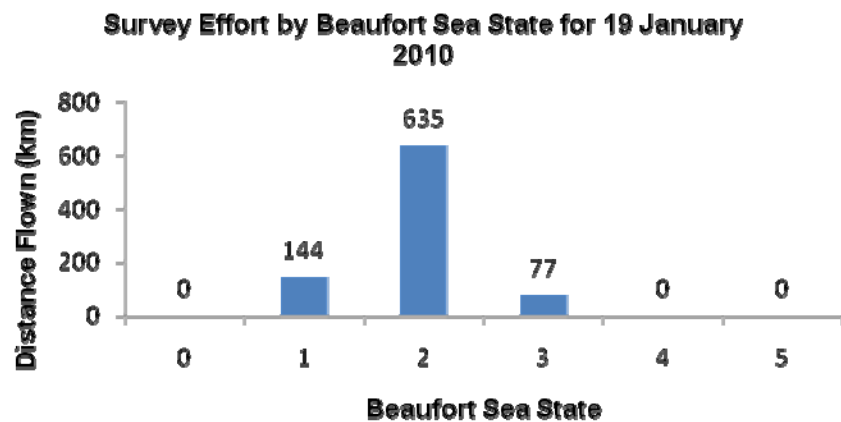
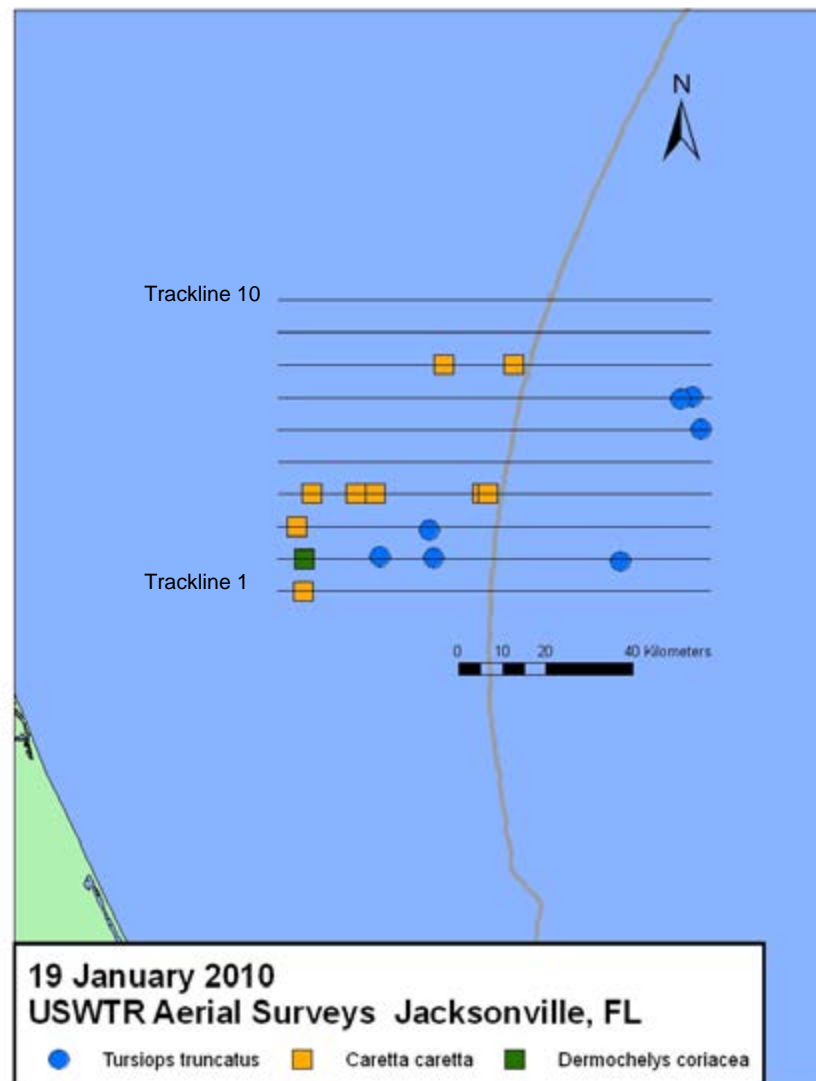
# 7 January 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	1	3	2
<i>Tursiops truncatus</i>	1	2	3	4
<i>Tursiops truncatus</i>	1	45	2	8
<i>Stenella frontalis</i>	1	65	2	7
<i>Caretta caretta</i>	16	17	2-3	-
Unidentified Sea Turtle	2	2	2	-



# 19 January 2010

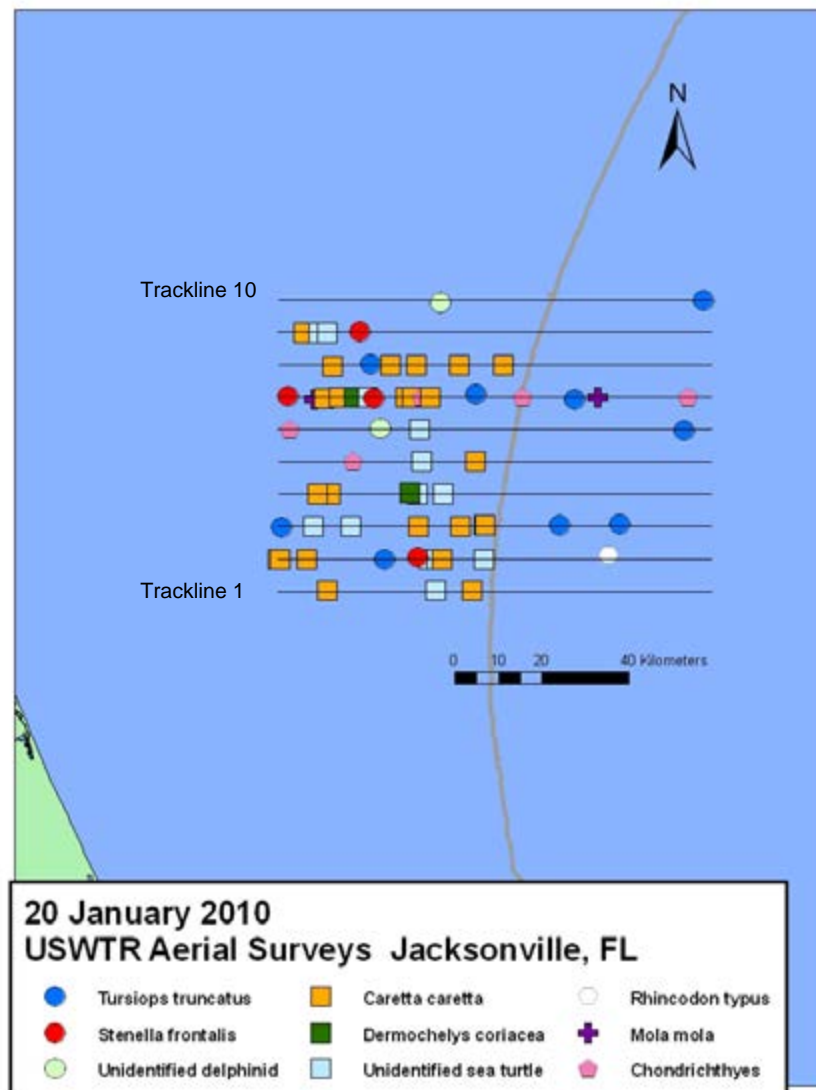
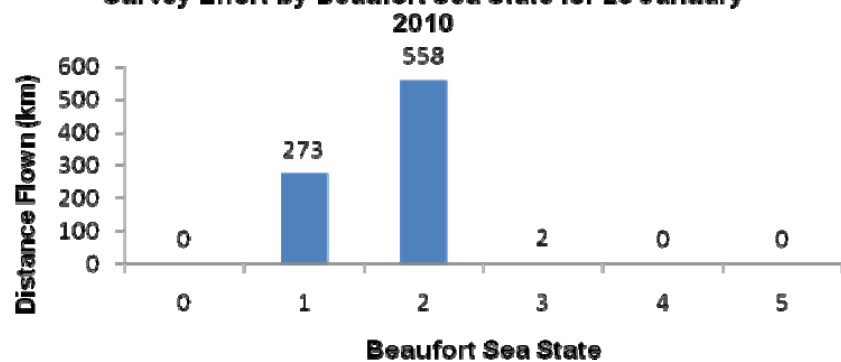
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	2	15	2	7
<i>Tursiops truncatus</i>	1	11	2	6
<i>Tursiops truncatus</i>	1	4	2	3
<i>Tursiops truncatus</i>	3	31	2-3	2
<i>Caretta caretta</i>	11	12	1-2	-
<i>Dermochelys coriacea</i>	1	1	2	-



20 January 2010

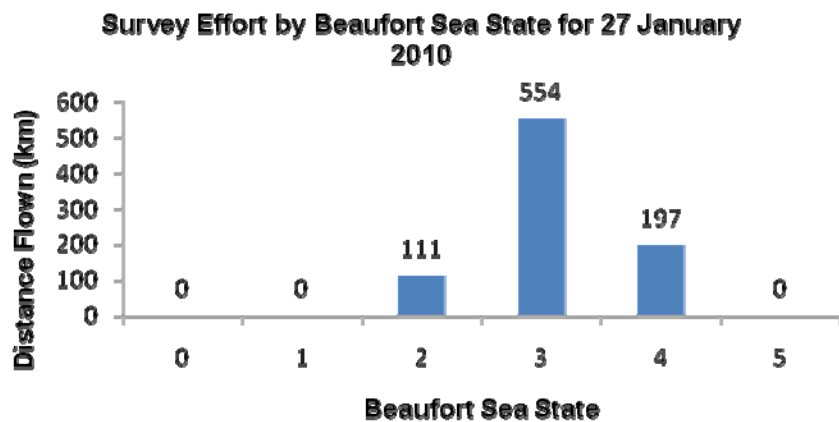
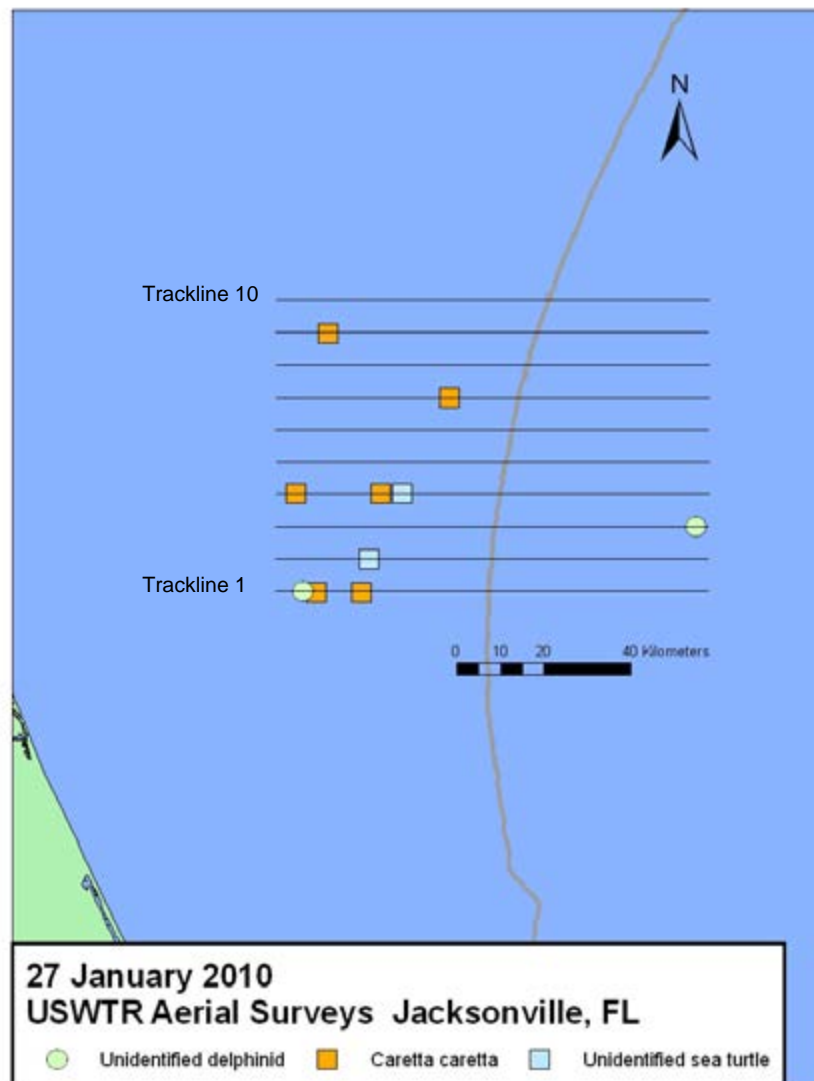
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	3	2	2
<i>Tursiops truncatus</i>	3	48	2	3
<i>Tursiops truncatus</i>	1	29	2	6
<i>Tursiops truncatus</i>	2	17	1-2	7
<i>Tursiops truncatus</i>	1	7	2	8
<i>Tursiops truncatus</i>	1	16	1	10
<i>Stenella frontalis</i>	1	3	2	2
<i>Stenella frontalis</i>	2	45	1	7
<i>Stenella frontalis</i>	1	7	1	9
Unidentified delphinid	1	1	1	6
Unidentified delphinid	1	14	2	10
<i>Caretta caretta</i>	24	27	1-2	-
<i>Dermochelys coriacea</i>	2	3	1-2	-
Unidentified sea turtle	13	18	1-2	-
<i>Mola mola</i>	2	2	1-2	-
<i>Rhincodon typus</i>	1	1	2	-
Chondrichthyes	6	6	1-2	-

Survey Effort by Beaufort Sea State for 20 January 2010



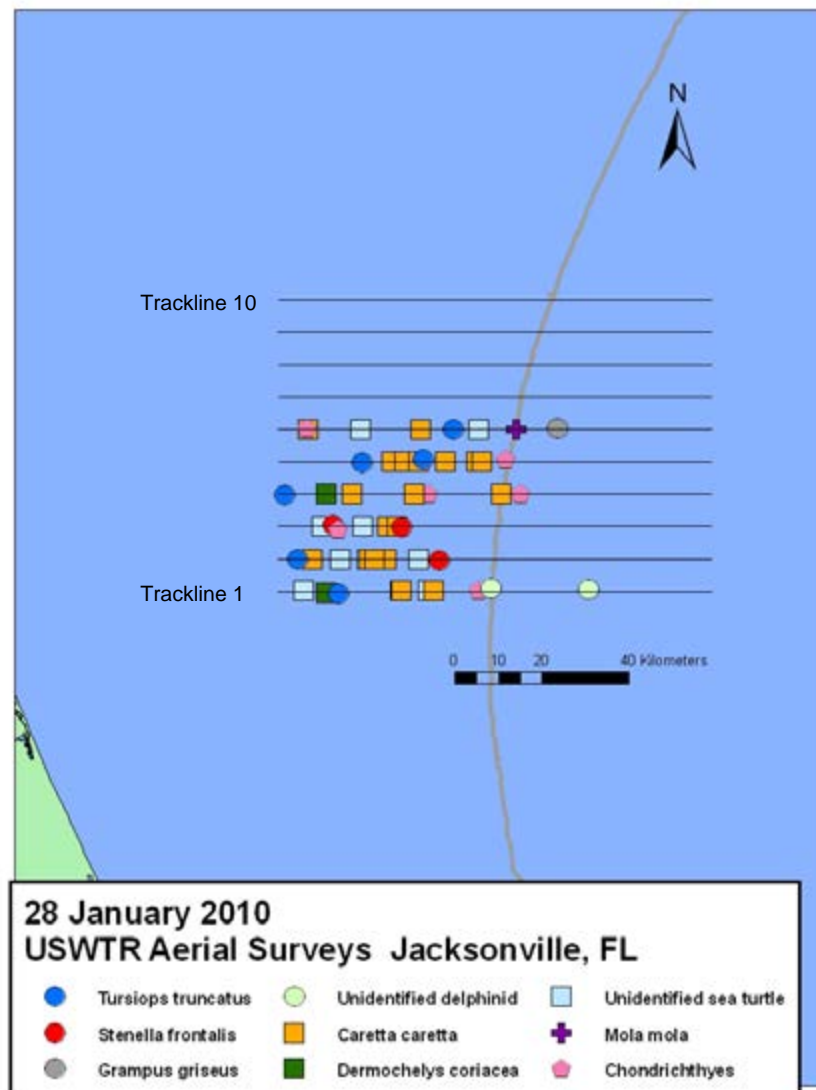
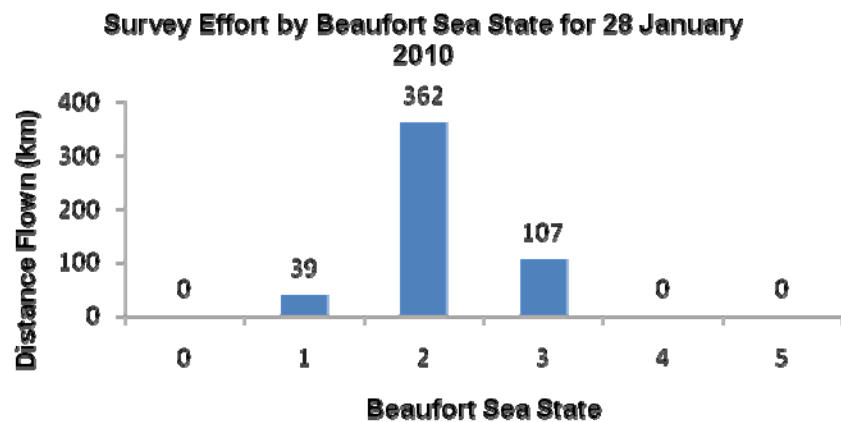
27 January 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
Unidentified delphinid	1	9	3	1
Unidentified delphinid	1	1	2	3
<i>Caretta caretta</i>	6	6	2-3	-
Unidentified sea turtle	2	2	2	-



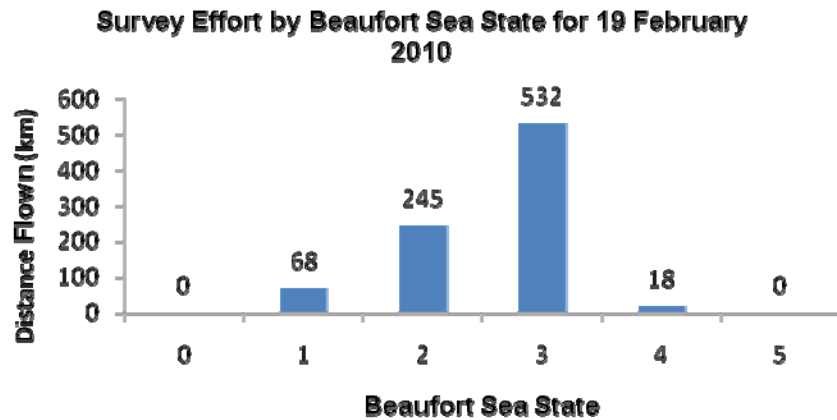
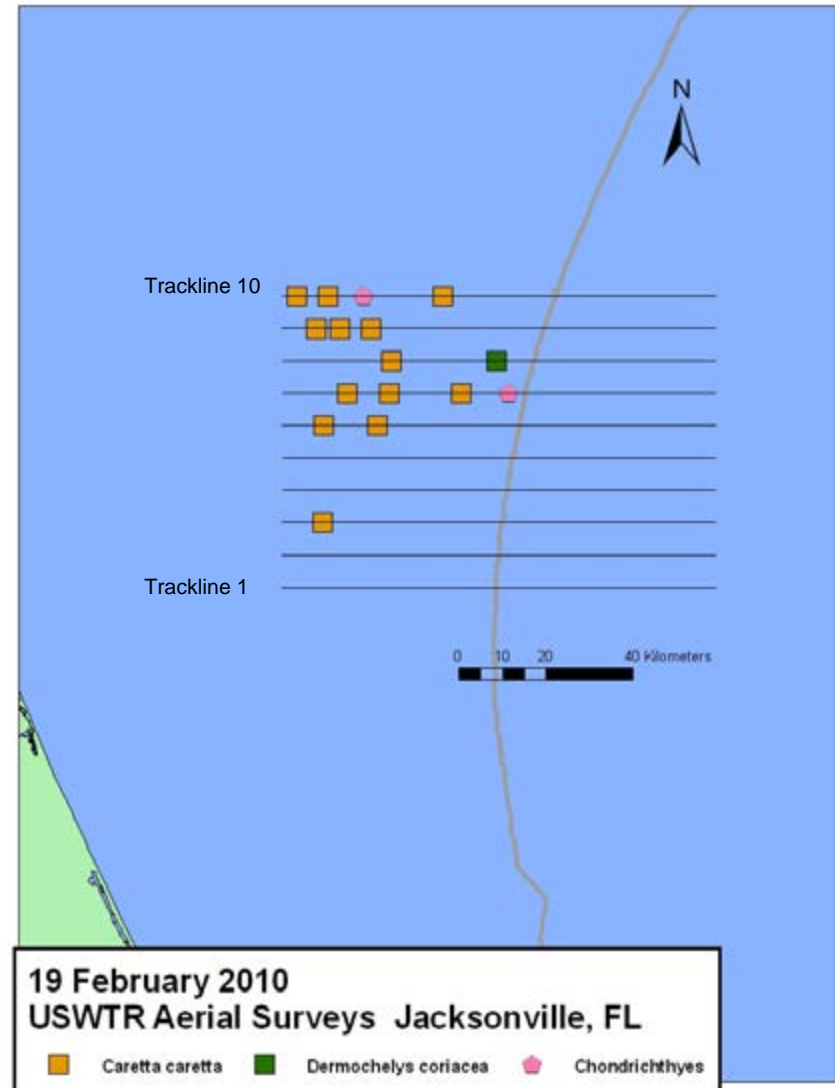
## 28 January 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	5	2	1
<i>Tursiops truncatus</i>	1	2	1	2
<i>Tursiops truncatus</i>	1	2	1	4
<i>Tursiops truncatus</i>	2	6	2	5
<i>Tursiops truncatus</i>	1	3	2	6
<i>Stenella frontalis</i>	1	11	2	2
<i>Stenella frontalis</i>	2	18	1	3
<i>Grampus griseus</i>	1	7	2	6
Unidentified delphinid	2	28	2	1
<i>Caretta caretta</i>	21	23	1-2	-
Unidentified sea turtle	10	12	1-2	-
<i>Mola mola</i>	1	1	2	-
Chondrichthyes	5	6	1-2	-



19 February 2010

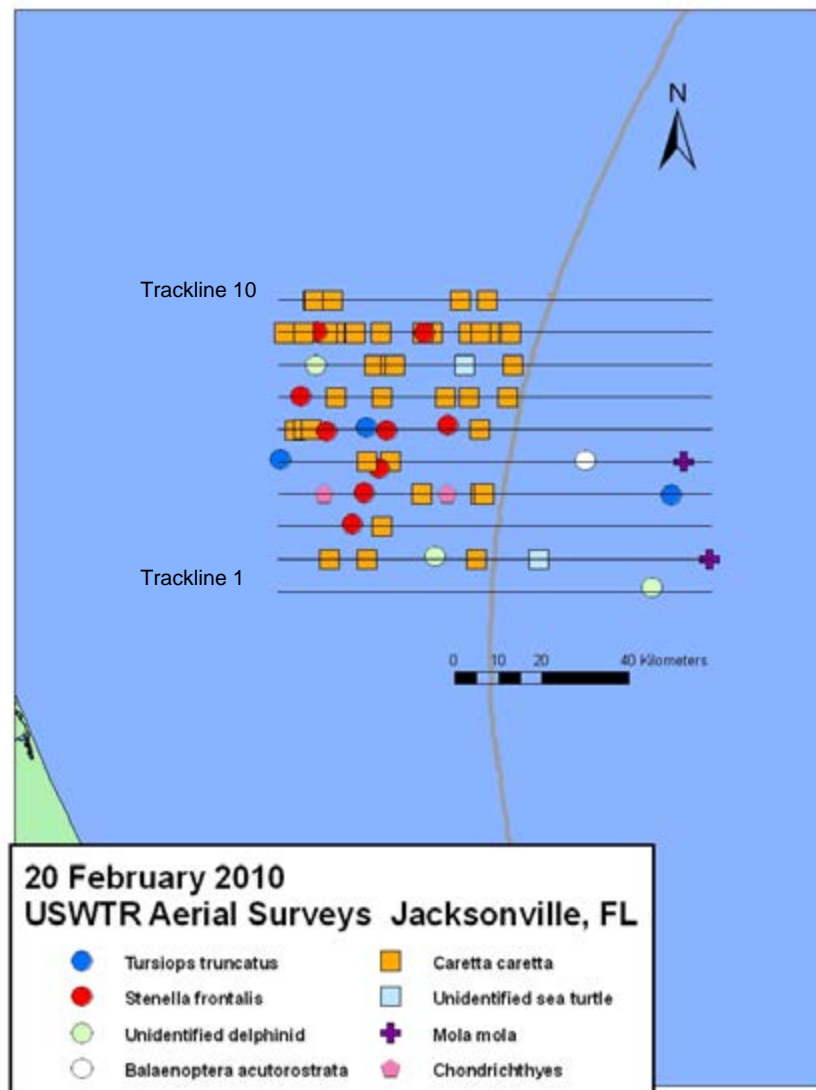
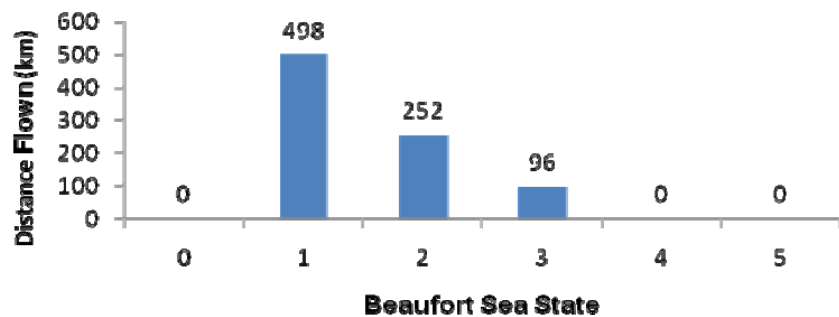
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	13	16	1-3	-
<i>Dermochelys coriacea</i>	1	1	2	-
Chondrichthyes	2	2	2	-



## 20 February 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	12	1	6
<i>Tursiops truncatus</i>	1	1	1	5
<i>Tursiops truncatus</i>	1	3	1	4
<i>Stenella frontalis</i>	2	19	1	9
<i>Stenella frontalis</i>	1	10	1	7
<i>Stenella frontalis</i>	2	48	1	6
<i>Stenella frontalis</i>	1	60	1	5
<i>Stenella frontalis</i>	1	2	1	4
<i>Stenella frontalis</i>	1	4	1	3
<i>Balaenoptera acutorostrata</i>	1	1	3	5
Unidentified delphinid	1	3	1	8
Unidentified delphinid	1	5	1	2
Unidentified delphinid	1	5	1	1
<i>Caretta caretta</i>	40	56	1-2	-
Unidentified sea turtles	3	3	1-2	-
<i>Mola mola</i>	2	2	1-2	-
Chondrichthyes	2	2	1	-

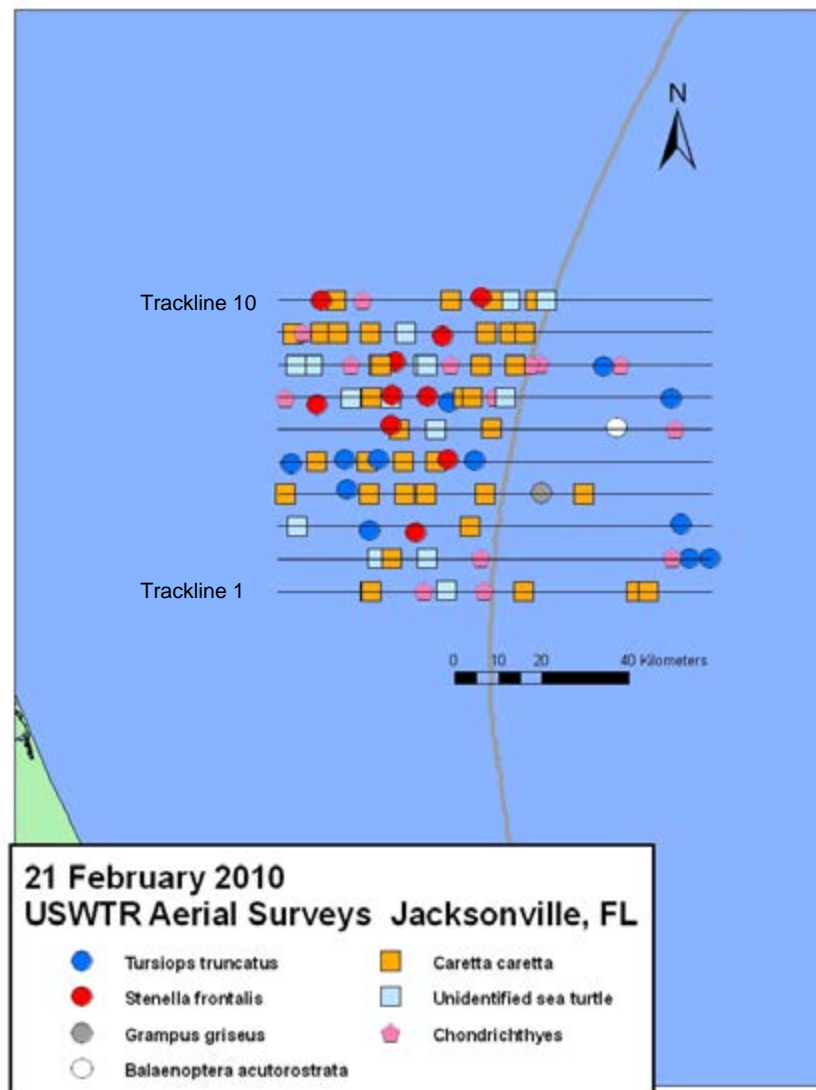
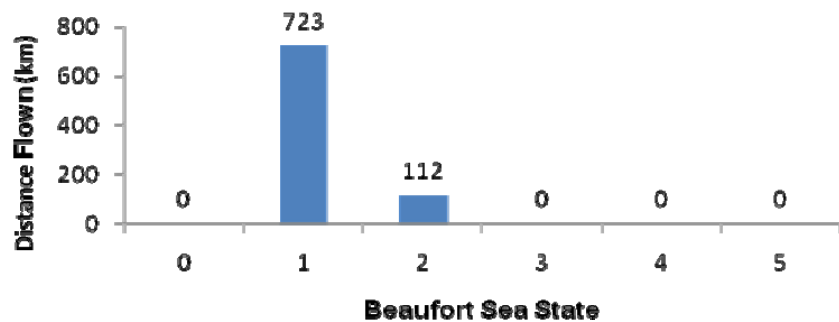
**Survey Effort by Beaufort Sea State for 20 February 2010**



21 February 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	2	24	1	2
<i>Tursiops truncatus</i>	2	34	1	3
<i>Tursiops truncatus</i>	1	6	1	4
<i>Tursiops truncatus</i>	4	15	1	5
<i>Tursiops truncatus</i>	2	9	1	7
<i>Tursiops truncatus</i>	1	13	1	8
<i>Stenella frontalis</i>	1	50	1	3
<i>Stenella frontalis</i>	1	7	1	5
<i>Stenella frontalis</i>	1	40	1	6
<i>Stenella frontalis</i>	3	128	1	7
<i>Stenella frontalis</i>	1	12	1	8
<i>Stenella frontalis</i>	1	30	1	9
<i>Stenella frontalis</i>	2	36	1	10
<i>Grampus griseus</i>	1	7	1	1
<i>Balaenoptera acutorostrata</i>	1	1	1	6
<i>Caretta caretta</i>	37	52	1-2	-
Unidentified sea turtle	16	25	1-2	-
Chondrichthyes	15	17	1-2	-

Survey Effort by Beaufort Sea State for 21 February 2010

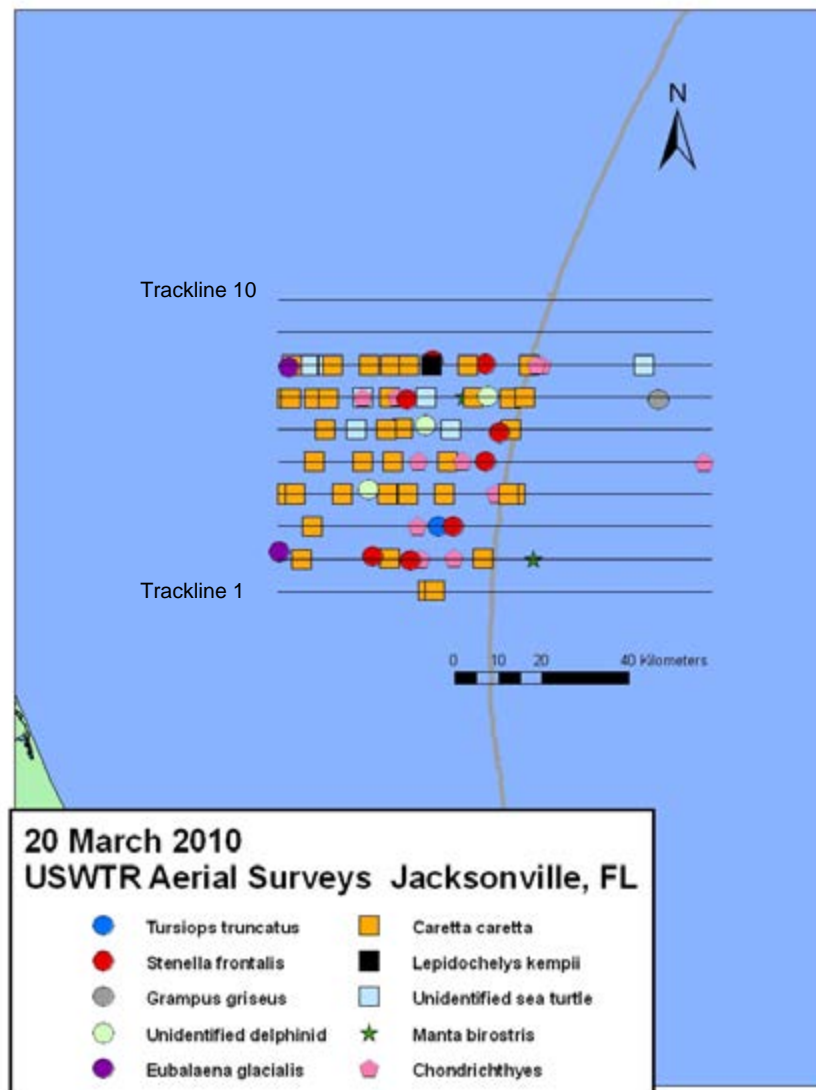
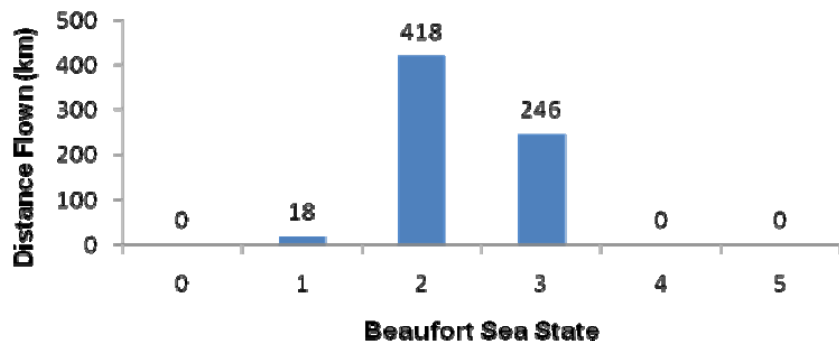




20 March 2010

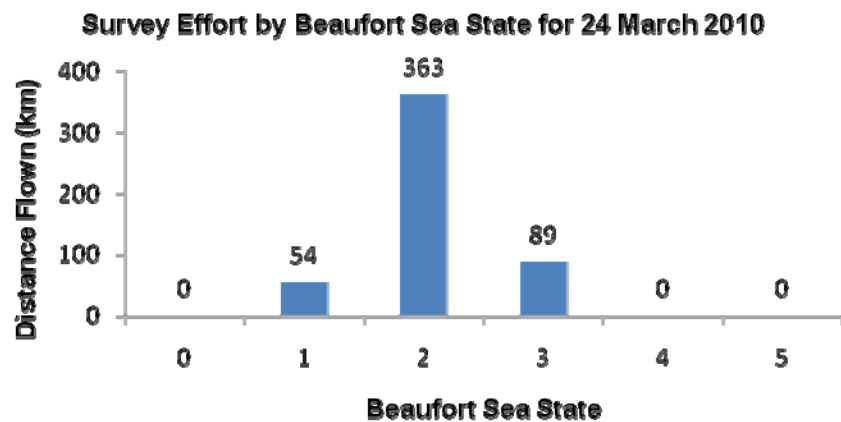
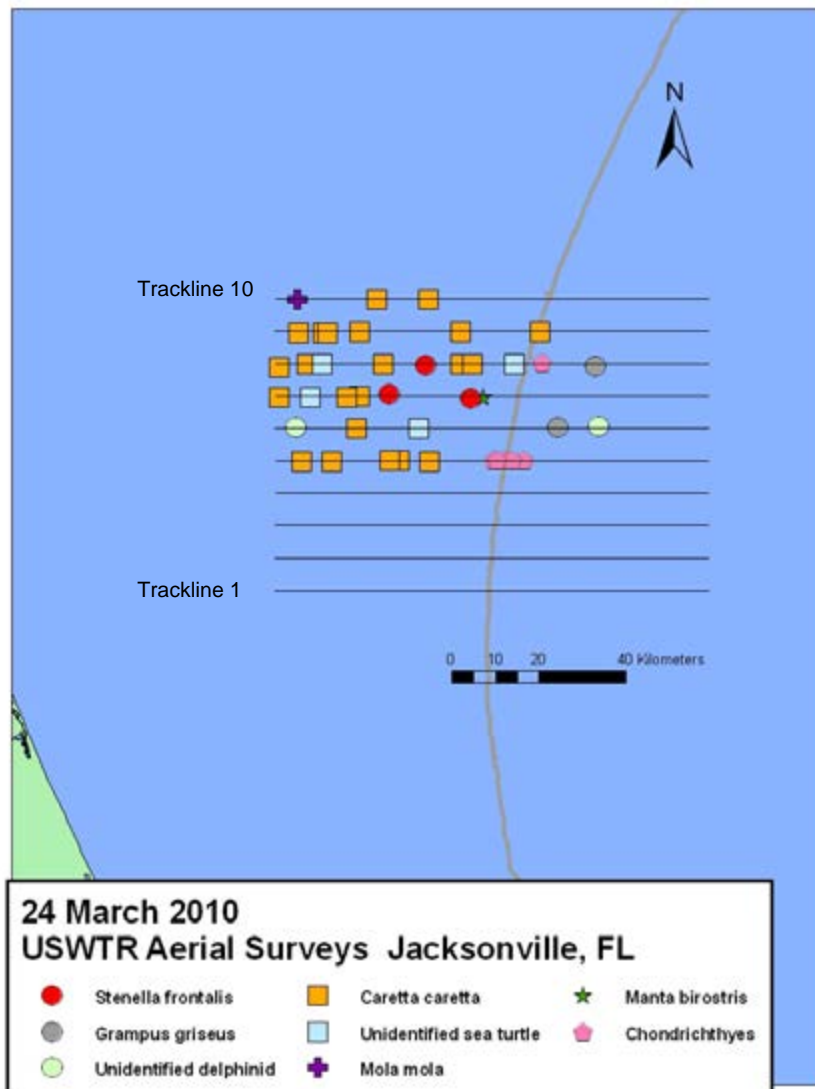
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	2	1	3
<i>Stenella frontalis</i>	2	11	2	2
<i>Stenella frontalis</i>	1	29	2	3
<i>Stenella frontalis</i>	1	34	2	5
<i>Stenella frontalis</i>	1	19	2	6
<i>Stenella frontalis</i>	1	20	2	7
<i>Stenella frontalis</i>	2	23	2	8
<i>Grampus griseus</i>	1	6	3	7
<i>Eubalaena glacialis</i>	1	2	2	2
<i>Eubalaena glacialis</i>	1	1	2	8
Unidentified delphinid	1	2	2	4
Unidentified delphinid	1	3	2	6
Unidentified delphinid	1	4	2	7
<i>Caretta caretta</i>	37	48	1-3	-
<i>Lepidochelys kempii</i>	1	1	2	-
Unidentified sea turtles	7	12	2-3	-
<i>Manta birostris</i>	2	5	2-3	-
Chondrichthyes	11	15	1-3	-

Survey Effort by Beaufort Sea State for 20 March 2010



# 24 March 2010

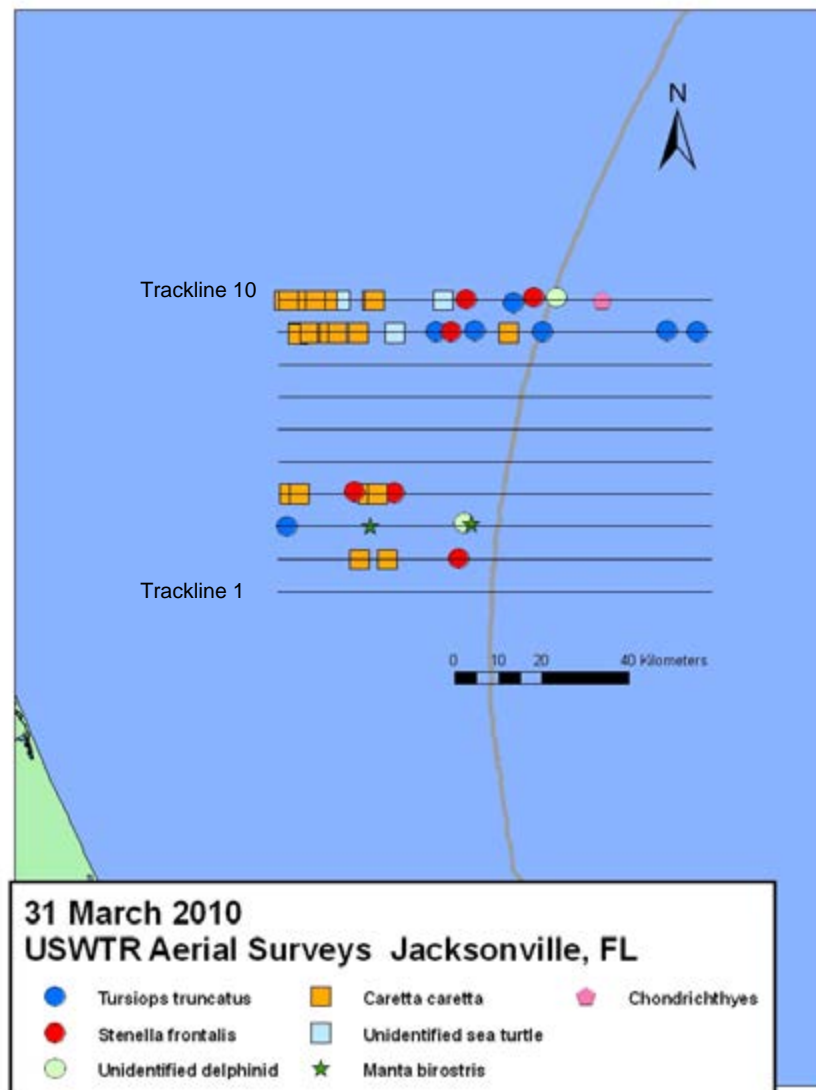
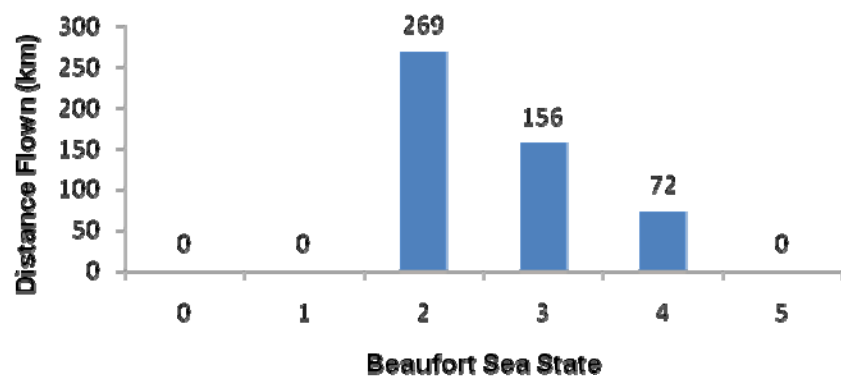
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Stenella frontalis</i>	1	10	1	8
<i>Stenella frontalis</i>	2	18	2	7
<i>Grampus griseus</i>	1	2	1	8
<i>Grampus griseus</i>	1	9	2	6
Unidentified delphinid	2	5	1-2	6
<i>Caretta caretta</i>	22	26	1-2	-
Unidentified sea turtle	5	9	1-2	-
<i>Mola mola</i>	1	1	2	-
<i>Manta birostris</i>	1	4	2	-
Chondrichthyes	6	11	1-2	-



## 31 March 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	5	2	3
<i>Tursiops truncatus</i>	5	32	2	9
<i>Tursiops truncatus</i>	1	3	2	10
<i>Stenella frontalis</i>	1	18	3	2
<i>Stenella frontalis</i>	2	4	2	4
<i>Stenella frontalis</i>	1	80	2	9
<i>Stenella frontalis</i>	2	27	2	10
Unidentified delphinid	1	1	2	3
Unidentified delphinid	1	3	2	10
<i>Caretta caretta</i>	21	40	2	-
Unidentified sea turtle	4	4	2	-
<i>Manta birostris</i>	1	1	2	-
Chondrichthyes	1	4	2	-

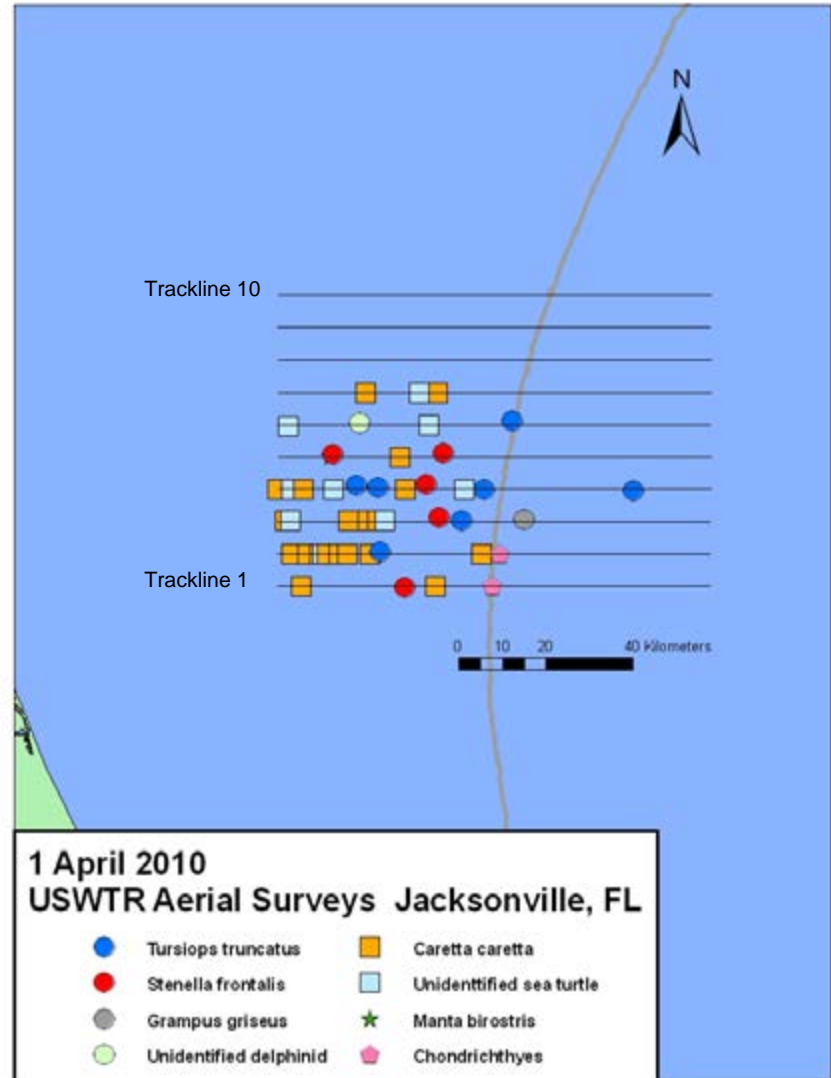
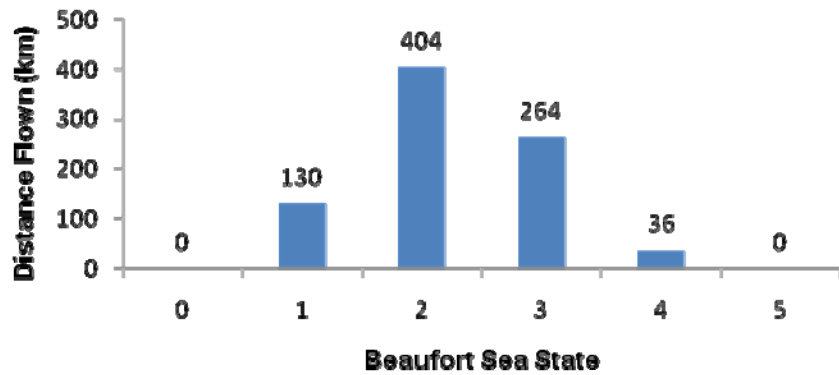
**Survey Effort by Beaufort Sea State for 31 March 2010**



1 April 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	3	3	6
<i>Tursiops truncatus</i>	4	21	1-3	4
<i>Tursiops truncatus</i>	1	1	2	3
<i>Tursiops truncatus</i>	1	3	1	2
<i>Stenella frontalis</i>	2	14	2	5
<i>Stenella frontalis</i>	1	6	1	4
<i>Stenella frontalis</i>	1	6	2	3
<i>Stenella frontalis</i>	1	4	2	1
<i>Grampus griseus</i>	1	11	2	3
Unidentified delphinid	1	1	2	6
<i>Caretta caretta</i>	20	20	1-2	-
Unidentified sea turtle	9	11	1-2	-
<i>Manta birostris</i>	1	1	2	-
Chondrichthyes	3	3	1-2	-

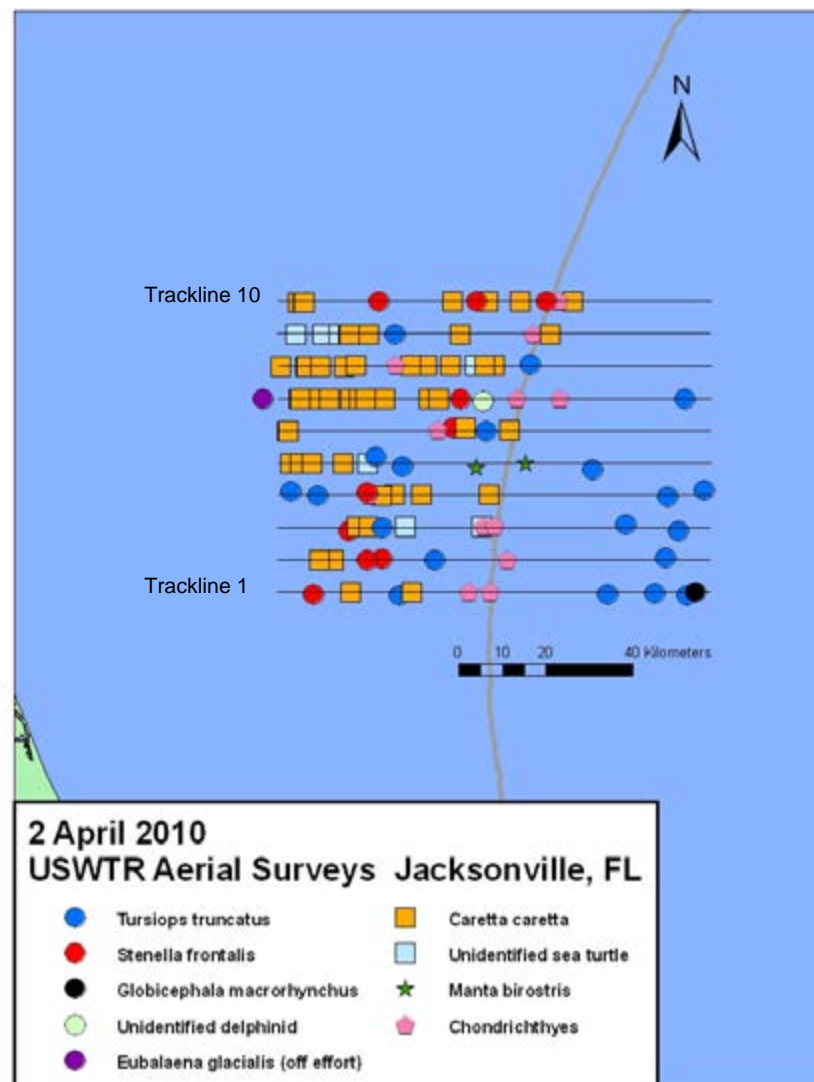
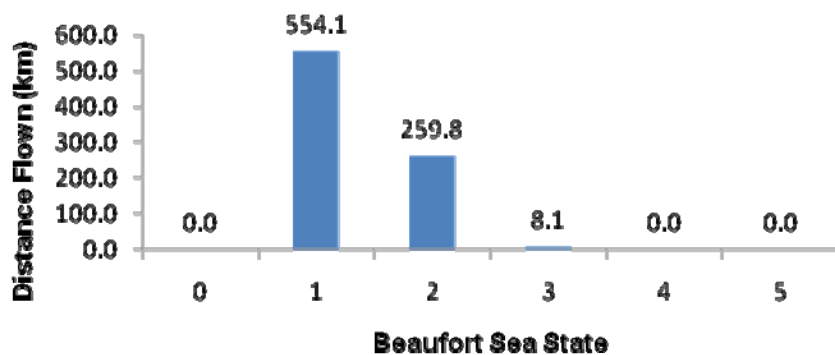
Survey Effort by Beaufort Sea State for April 1 2010



2 April 2010

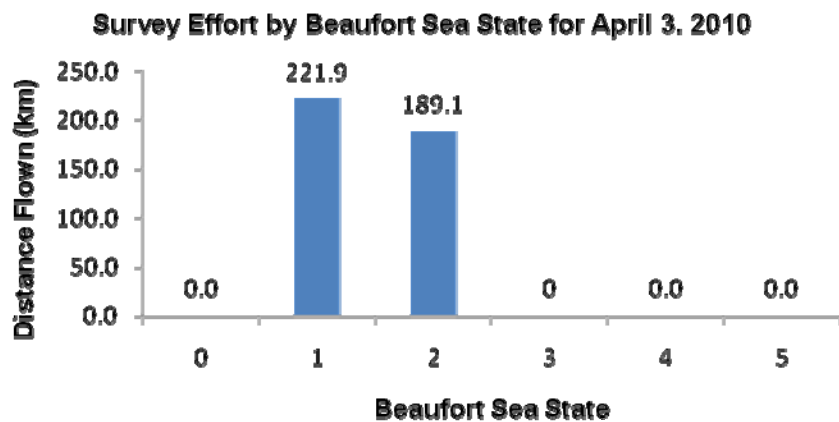
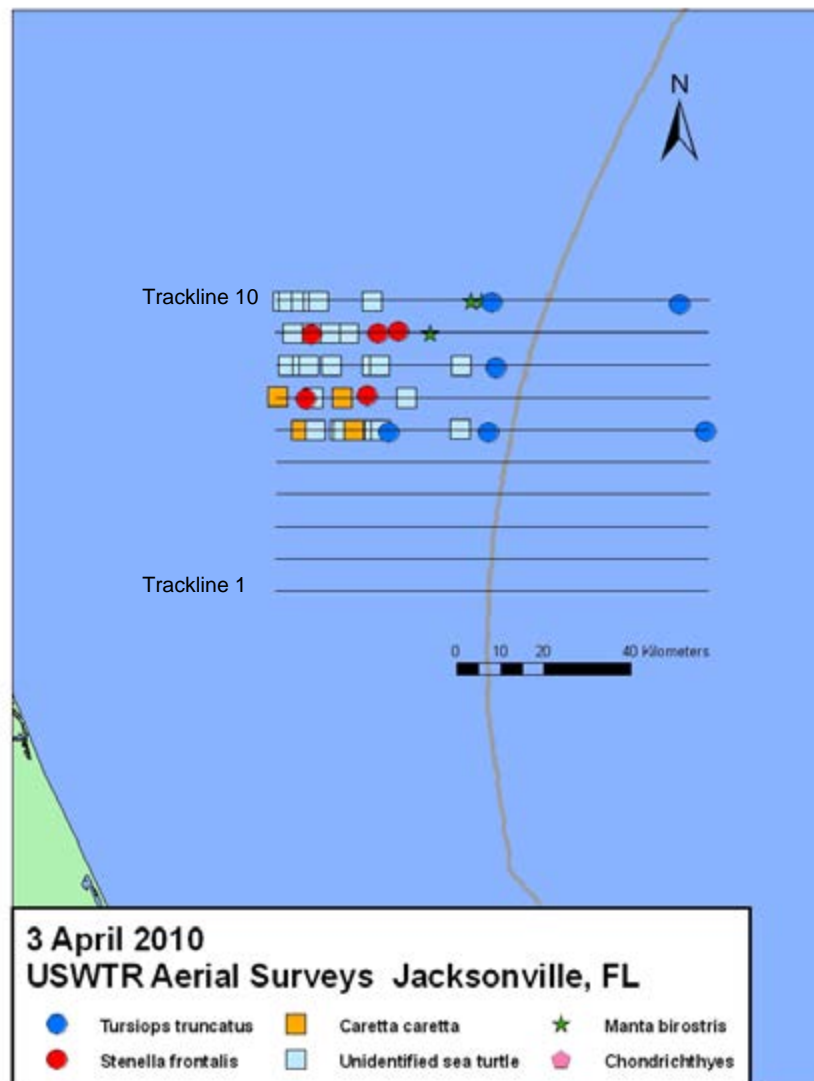
Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	4	18	1-2	1
<i>Tursiops truncatus</i>	2	19	1	2
<i>Tursiops truncatus</i>	3	17	1-2	3
<i>Tursiops truncatus</i>	4	47	1-2	4
<i>Tursiops truncatus</i>	3	7	1-2	5
<i>Tursiops truncatus</i>	1	6	2	6
<i>Tursiops truncatus</i>	1	10	2	7
<i>Tursiops truncatus</i>	1	12	1	8
<i>Tursiops truncatus</i>	1	4	1	9
<i>Stenella frontalis</i>	1	8	1	1
<i>Stenella frontalis</i>	2	15	1	2
<i>Stenella frontalis</i>	1	11	1	3
<i>Stenella frontalis</i>	1	25	1	4
<i>Stenella frontalis</i>	1	18	1	5
<i>Stenella frontalis</i>	1	28	2	6
<i>Stenella frontalis</i>	3	44	1	10
<i>Globicephala macrorhynchus</i>	1	5	1	1
<i>Eubalaena glacialis</i> (off effort)	1	2	1	N/A
Unidentified delphinid	1	1	1	7
<i>Caretta caretta</i>	52	89	1-2	-
Unidentified sea turtle	7	18	1	-
<i>Manta birostris</i>	2	2	1	-
Chondrichthyes	12	19	1-2	-

Survey Effort by Beaufort Sea State for April 2, 2010



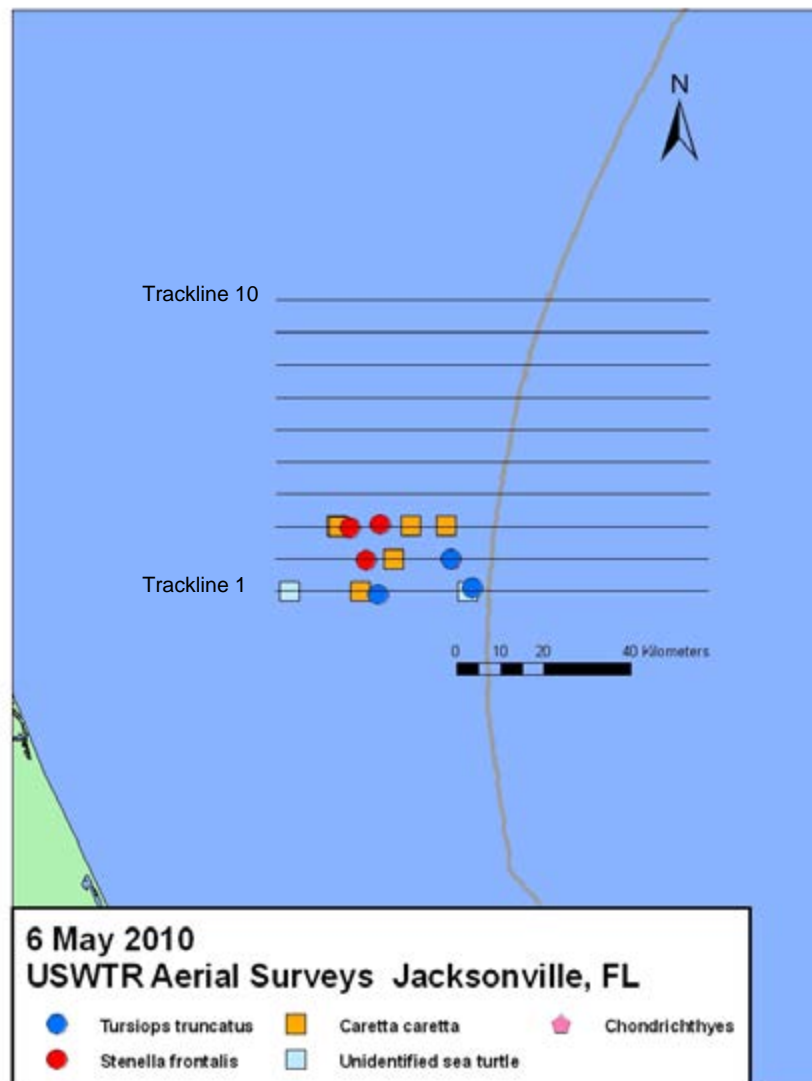
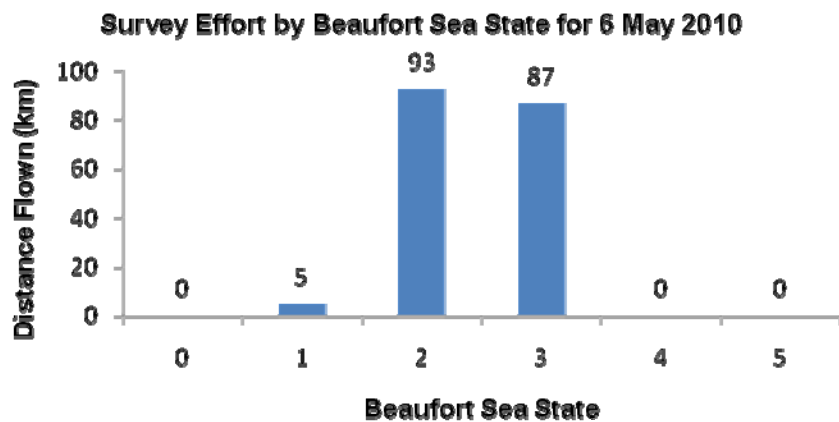
# 3 April 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	2	20	1-2	10
<i>Tursiops truncatus</i>	1	10	1	8
<i>Tursiops truncatus</i>	3	16	1-2	6
<i>Stenella frontalis</i>	3	31	1	9
<i>Stenella frontalis</i>	2	27	1	7
<i>Caretta caretta</i>	11	4	1	-
Unidentified sea turtle	26	66	1-2	-
<i>Manta birostris</i>	3	3	1	-
Chondrichthyes	1	1	1	-



6 May 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	2	34	2	1
<i>Tursiops truncatus</i>	1	6	3	2
<i>Stenella frontalis</i>	1	40	2	2
<i>Stenella frontalis</i>	2	7	2	3
<i>Caretta caretta</i>	6	6	2	-
Unidentified sea turtles	2	2	2	-
Chondrichthyes	1	1	3	-

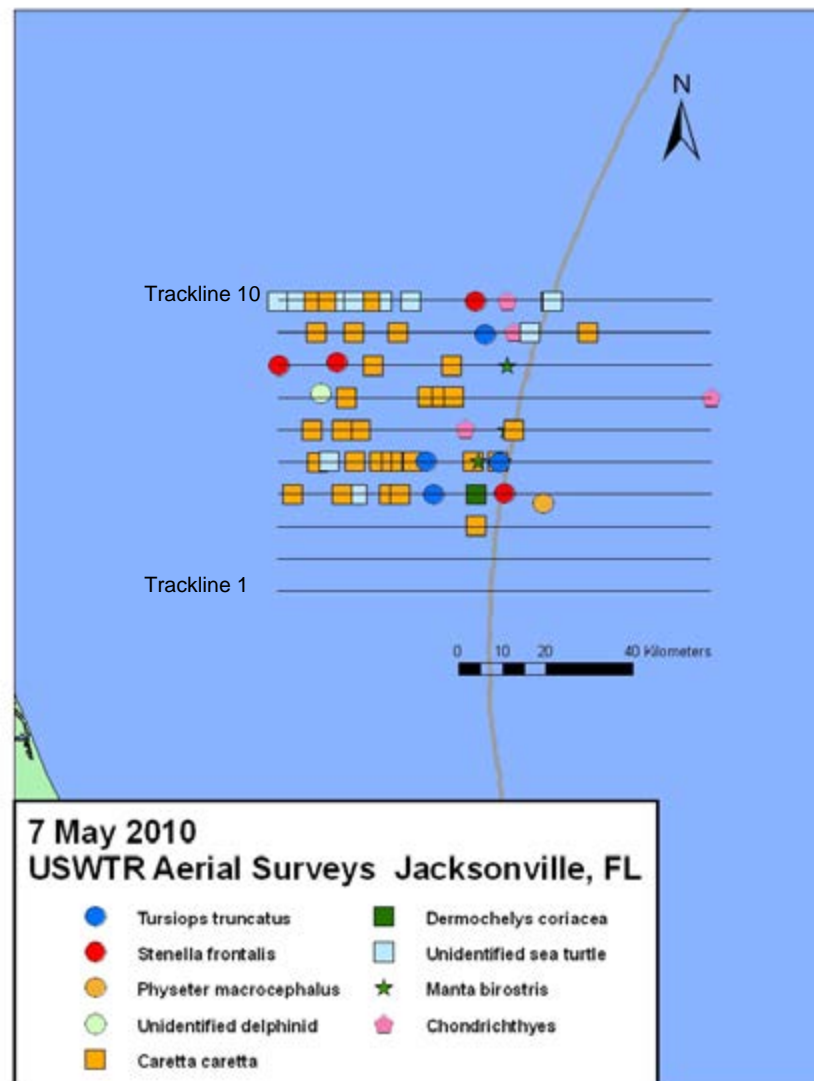
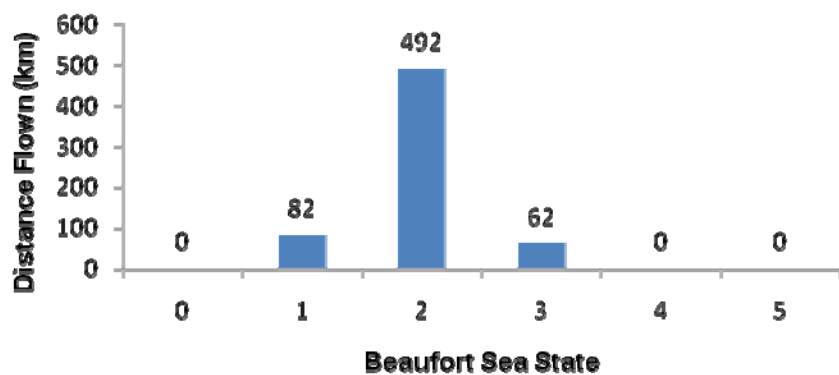




7 May 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Tursiops truncatus</i>	1	4	3	4
<i>Tursiops truncatus</i>	2	13	2	5
<i>Tursiops truncatus</i>	1	5	2	9
<i>Stenella frontalis</i>	1	75	2	4
<i>Stenella frontalis</i>	2	35	2	8
<i>Stenella frontalis</i>	1	3	1	10
<i>Physeter macrocephalus</i>	1	2	3	4
Unidentified delphinid	1	3	2	7
<i>Caretta caretta</i>	33	39	2	-
<i>Dermochelys coriacea</i>	1	1	2	-
Unidentified sea turtle	13	29	1-2	-
<i>Manta birostris</i>	4	5	2	-
Chondrichthyes	5	5	1-2	-

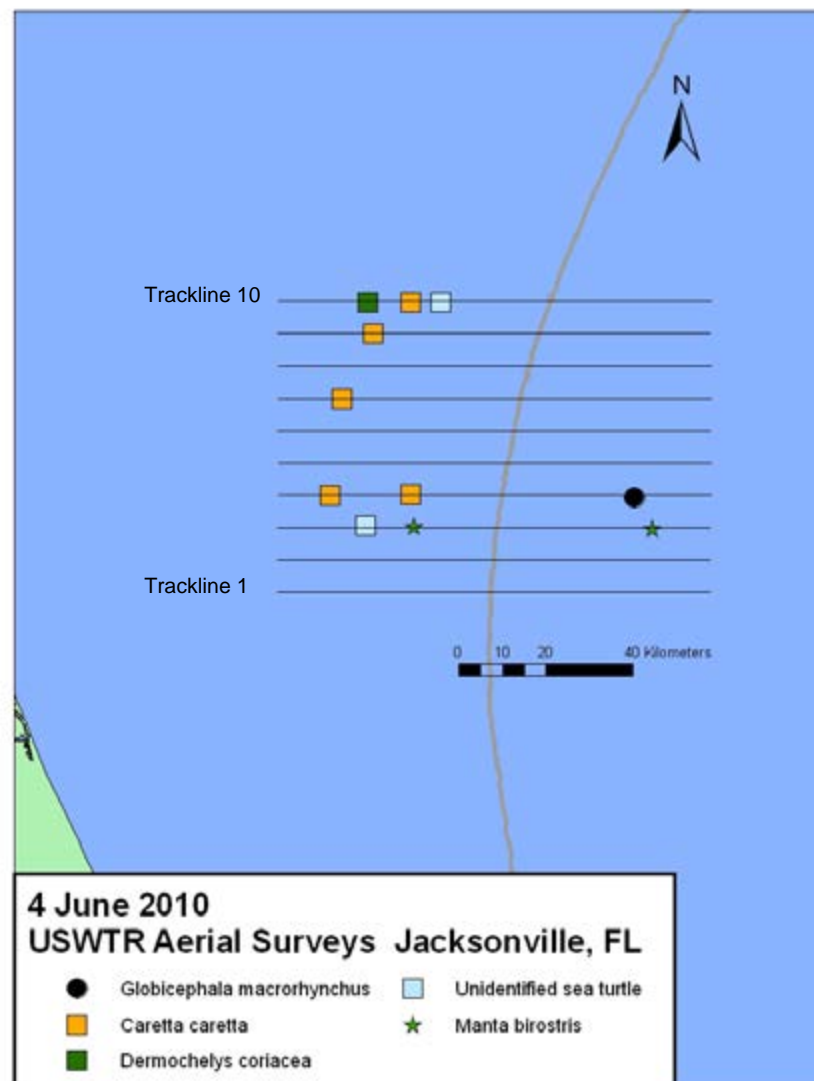
Survey Effort by Beaufort Sea State for 7 May 2010



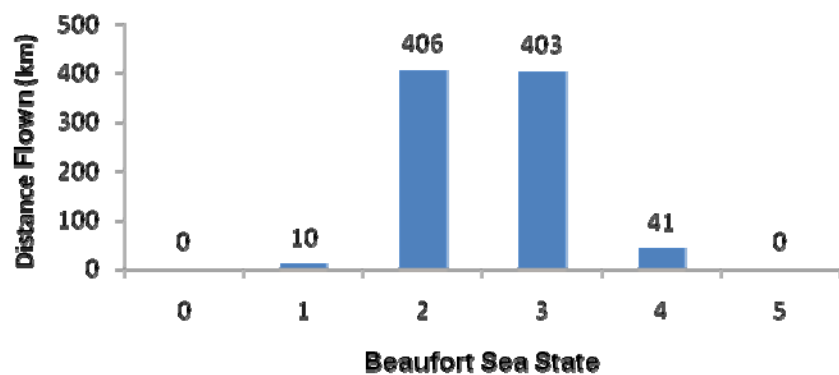


4 June 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Globicephala macrorhynchus</i>	1	14	2	4
<i>Caretta caretta</i>	5	5	2-3	-
<i>Dermochelys coriacea</i>	1	1	2	-
Unidentified sea turtle	2	2	2	-
<i>Manta birostris</i>	2	2	2	-

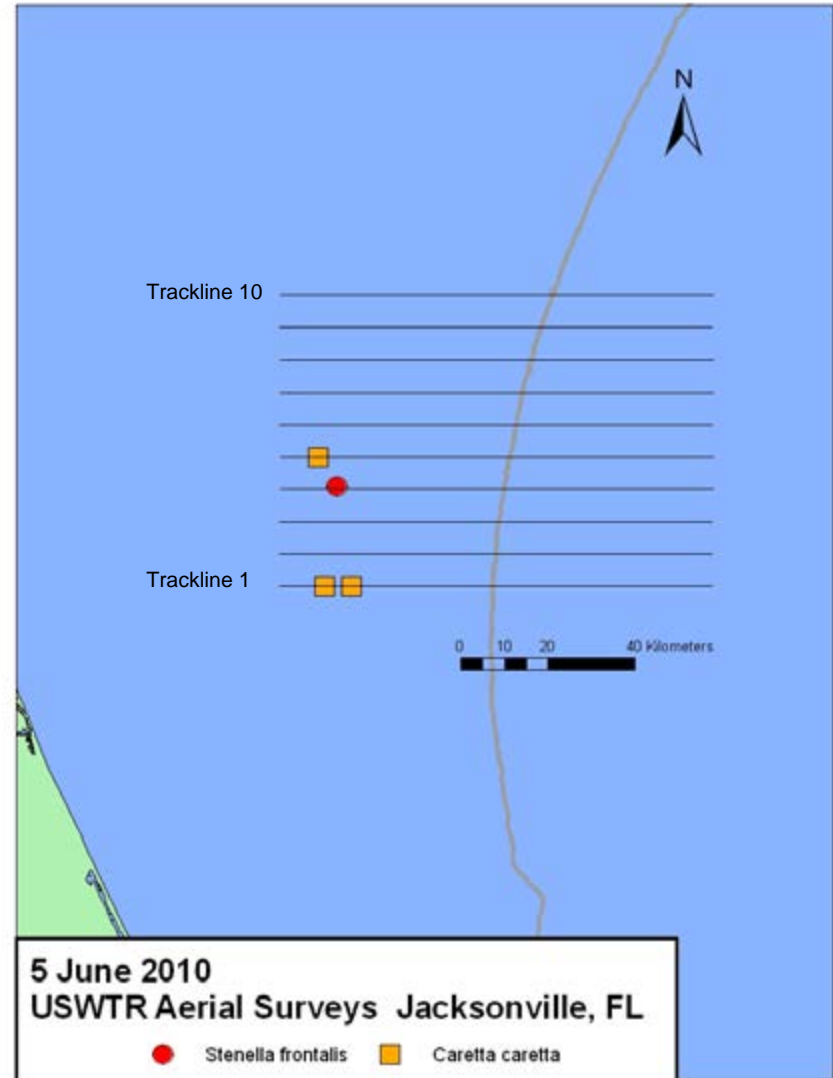
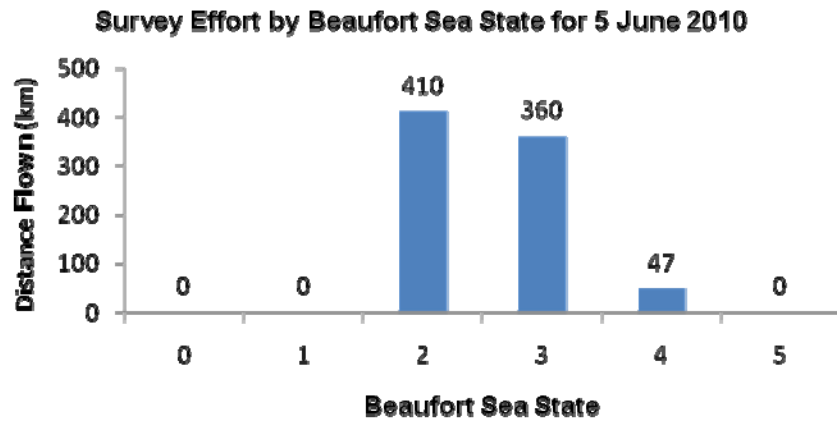


Survey Effort by Beaufort Sea State for 4 June 2010



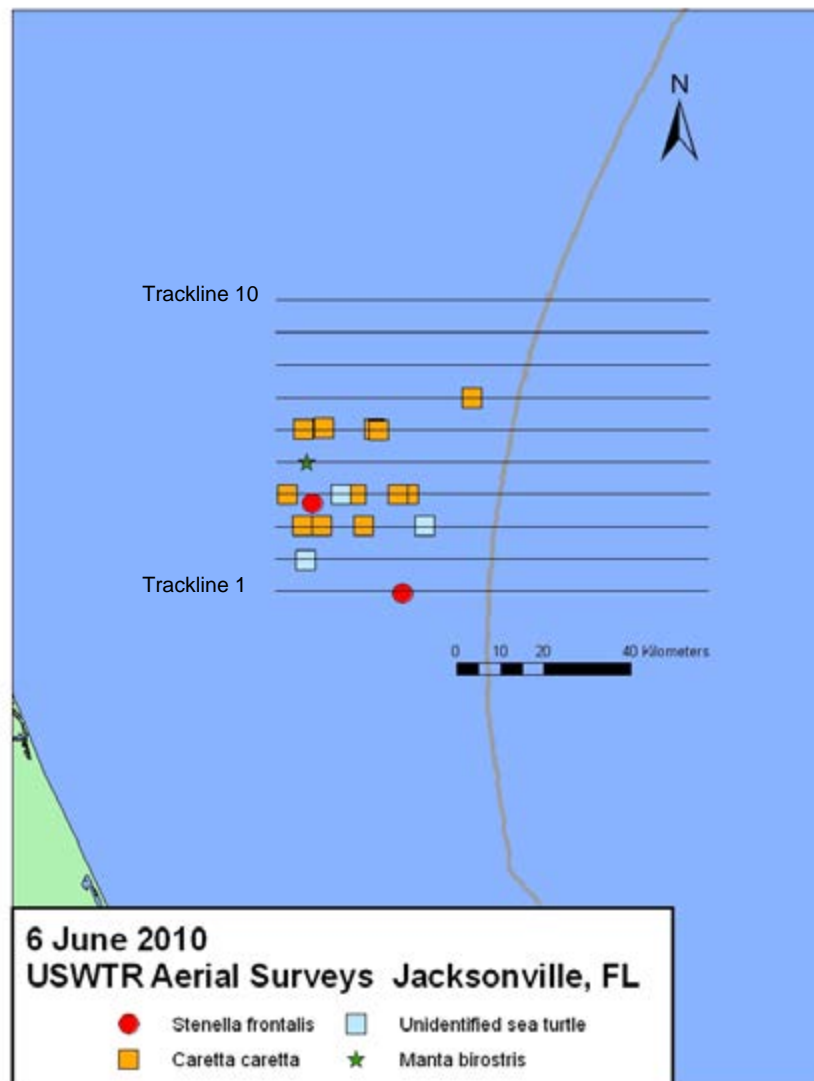
5 June 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Stenella frontalis</i>	1	40	2	4
<i>Caretta caretta</i>	4	4	2	-

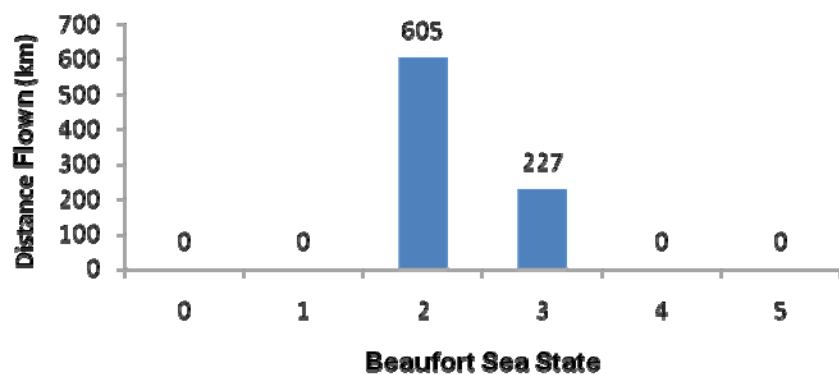


# 6 June 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Stenella frontalis</i>	1	10	2	1
<i>Stenella frontalis</i>	1	12	2	4
<i>Caretta caretta</i>	12	14	2-3	-
Unidentified sea turtle	3	3	2	-
<i>Manta birostris</i>	1	1	2	-

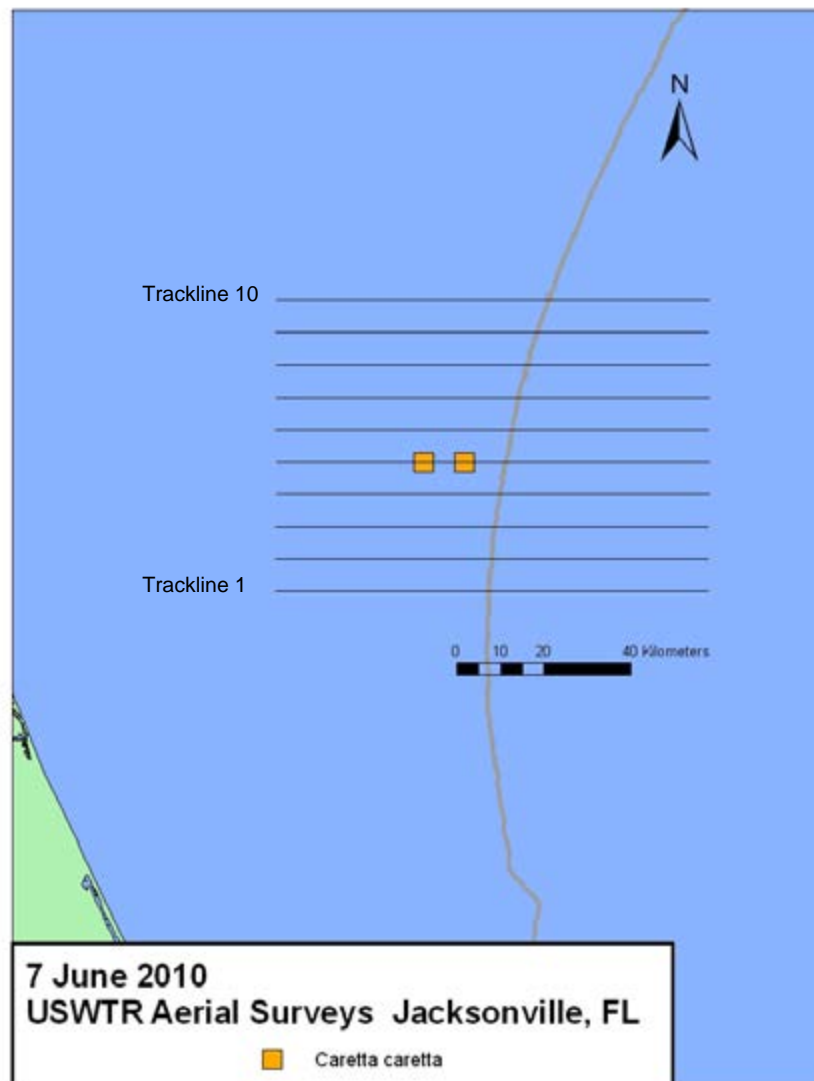
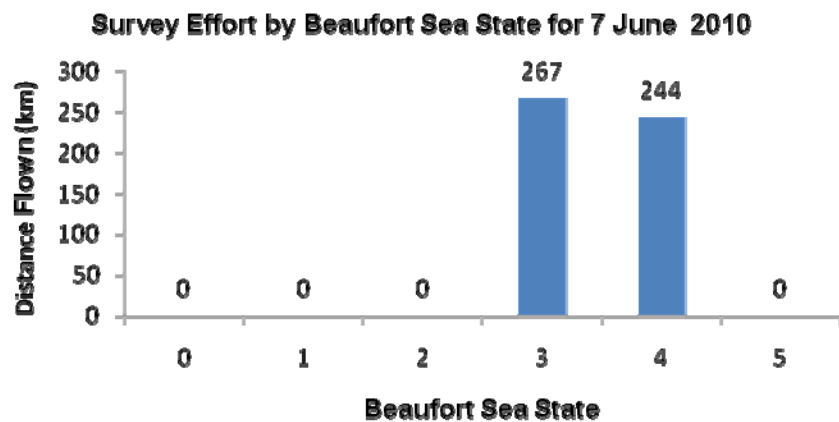


**Survey Effort by Beaufort Sea State for 6 June 2010**



7 June 2010

Species	Number of Sightings	Number of Individuals	Beaufort Sea State	Line Number
<i>Caretta caretta</i>	2	2	3-4	-



**VESSEL-BASED SURVEYS AND PASSIVE ACOUSTIC MONITORING OF THE  
PROPOSED UNDERSEA WARFARE TRAINING RANGE (USWTR)  
OFF OF JACKSONVILLE, FLORIDA  
JULY 2009 THROUGH JUNE 2010**



Andrew Read Dave Johnston  
Melissa Soldevilla  
Peter Nilsson Heather Foley  
Rachel Hardee Richard Holt  
Erin Cummings Ryan McAlarney

Duke University Marine Laboratory  
135 Duke Marine Lab Road  
Beaufort, NC 28516

Department of Biology and Marine Biology  
University of North Carolina at Wilmington  
601 South College Road, Wilmington, NC 28403

Submitted to:  
**The Department of the Navy**  
**Norfolk, VA**

## **Jacksonville Vessel Surveys**

### **Methodology**

#### **Study Area**

The proposed Jacksonville (JAX) USWTR area is 25 nm (46 km) long and 20 nm (37 km) wide (approximately 1700 km<sup>2</sup>) (Fig. 1). The study area consists of ten 39 nm (72.5 km) long tracklines, spaced 4 nm (7.4 km) apart, which transect the USWTR area and cover approximately 2675 nm<sup>2</sup> (4960 km<sup>2</sup>). The survey area straddles the continental shelf and Blake Plateau and include both neritic, shelf waters and more pelagic, off shore waters (Fig. 1). Aerial survey tracklines in this study area were longer (86km) than those flown in the Onslow Bay study area to minimize the area without aerial coverage between the USWTR surveys and Early Warning System (EWS) aerial surveys for North Atlantic right whales (*Eubalaena glacialis*). Whenever possible, the extended 86 km tracklines were attempted during vessel surveys.

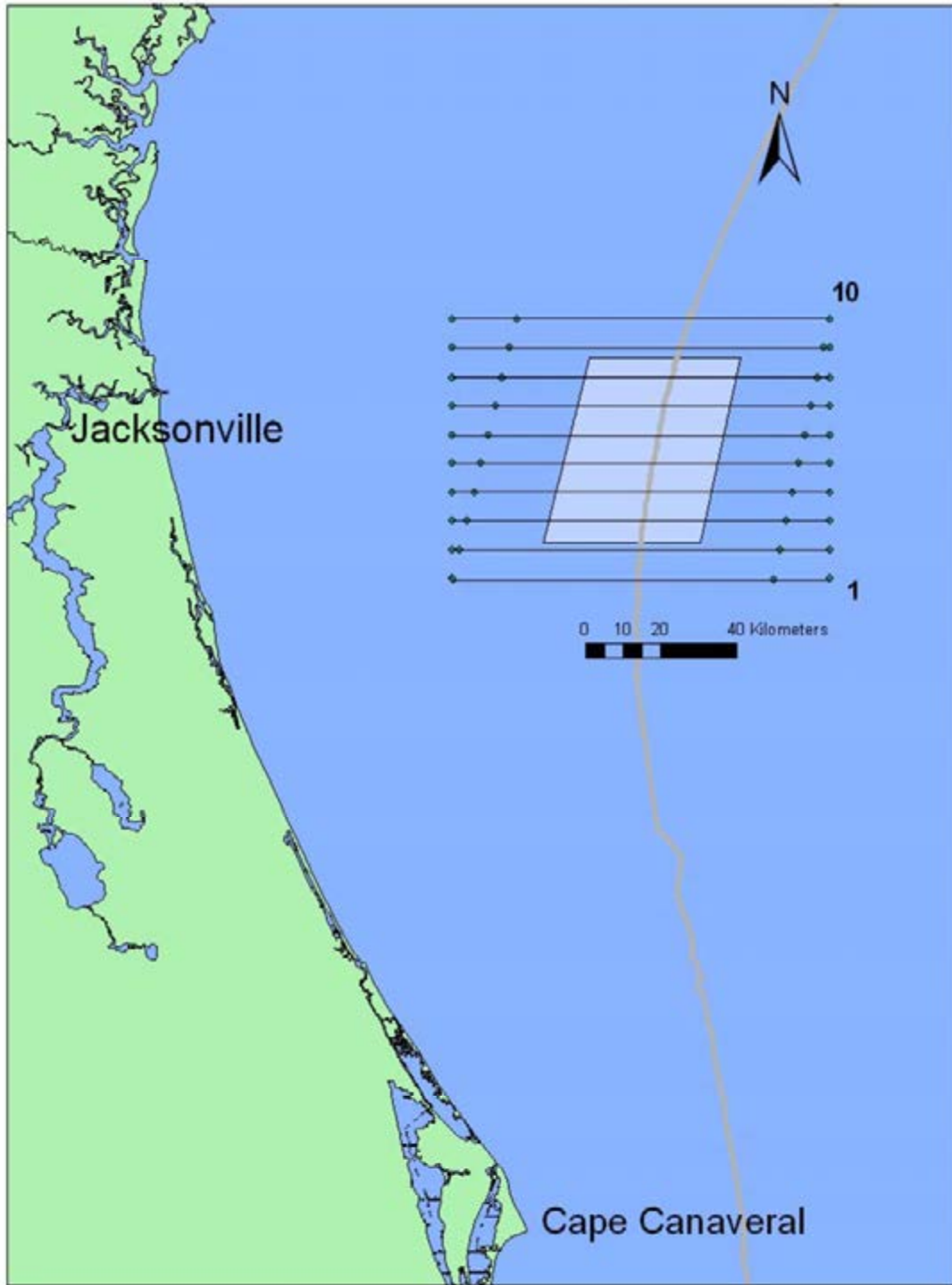


Figure 1. Map of the study area, the proposed USWTR site (shaded box).

## Vessel Survey Data Collection

### Visual Surveys

Vessel-based survey platforms provide a greater probability of sighting deep-diving species than aerial surveys (Barlow and Gisiner 2006). Shipboard observers are also more likely to be able to confirm species identity, particularly for animals that are difficult to distinguish from the air.

Additionally, vessel-based platforms allow for photographic identification.

To ensure maximum detection rates, we employed a traditional visual survey approach, supplemented by passive acoustic monitoring using a towed hydrophone array. Visual surveys for marine mammals and sea turtles were conducted from the R/V *Volute*, a 13 m modified Duffy sport fishing vessel (Figure 2).



*Figure 2.* Photograph of the R/V *Volute*, taken during aerial surveys of the proposed USWTR site off of Jacksonville, Florida.

Observations were made from the flying bridge (4.0 m above water line) by naked eye and 7x50 binoculars. Two observers (one port and one starboard) scanned constantly from straight ahead to 90° abeam either side of the trackline. A center observer monitored the trackline, coordinated with the vessel skipper and acted as data recorder. Observations were conducted following standard distance sampling/line transect methods for cetaceans, similar to those employed in Barlow (2006). The location, species and behavior of each cetacean group were recorded. If turtles were encountered, the location and species were recorded. Each observer estimated group size independently and individual estimates were averaged at the end of the survey to generate an



overall estimate of group size. Environmental conditions (weather, sea state, depth and sea surface temperature) were recorded every 30 minutes or whenever sighting conditions changed. Sighting and environmental data were entered into an at-sea data collection system (Vis-Survey, developed by Dr. Lance Garrison, NOAA/SEFSC) linked with the onboard GPS.

In addition, we monitored cetacean use of the USWTR and adjacent areas by individual animals using photo-identification techniques. This approach is used frequently to identify individual sperm whales, beaked whales, humpback whales, bottlenose dolphins, spotted dolphins, pilot whales and Risso's dolphins through unique patterns in pigmentation and scarring. Thus, whenever possible, we obtained photographs of cetaceans for individual photo-identification (we also use these photographs to confirm species identification at each sighting and to compare identification features with those used by the aerial survey team). Photographs were taken with Canon or Nikon digital SLRs (equipped with 100-400 mm zoom lenses) in 24-bit color at a resolution of 3072 X 2048 pixels and saved in jpg format.

#### Passive Acoustic Monitoring

Passive acoustic data were collected in the proposed Jacksonville USWTR range using two methods: a towed hydrophone array and autonomous bottom-mounted recorders.

##### *Towed Array*

A four-element hydrophone array was towed behind the survey vessel to allow acoustic detection of nearby cetaceans. The towed array (Seiche Instruments, UK) consisted of four hydrophone elements with approximate linear sensitivity to frequencies between 1 and 100 kHz (this is the same model of hydrophone array we employ in Onslow Bay). The array was towed 150 m behind the vessel and acoustic signals were routed to an analog-to-digital converter/mixer (MOTU Traveler, MOTU, Cambridge, MA) sampling at 192 kHz. These signals were then passed to a personal computer outfitted with software for real-time visualization/recording (*Ishmael* 1.0) of cetacean sounds. Acoustic monitoring was conducted by members of the Jacksonville survey team as part of their monitoring rotation. Survey team members monitored the array over half-hour periods and made recordings of all potential cetacean sounds detected, as well as other novel sounds.

### *Bottom-mounted Recorders*

To collect time-series of acoustic data in the Jacksonville USWTR study area, autonomous High Frequency Acoustic Recording Packages (HARPs; Wiggins and Hildebrand 2007) were utilized. The HARP moored data-logging system includes a 16-bit A/D converter, up to 1.9 TB of storage capacity, a hydrophone suspended 10 m above the seafloor, an acoustic release system, ballast weights and flotation. The data-loggers are capable of sampling up to 200 kHz and can be set to record continuously or on a duty cycle to accommodate variable deployment durations. A combination of high and low frequency hydrophone elements allow detection of both odontocete and mysticete whale vocalizations and sample rates are high enough to capture the echolocation clicks of many odontocetes.

HARPs were deployed at two sites between lines 5 and 6 in the middle of the proposed Jacksonville USWTR range over three deployment periods (Table 1). The first site (B) is at the western edge of the USWTR study area at 80°26' W and 30°15'N at 40 m depth while the second site (A) is near the center of the USWTR study area at 80°13' W and 30°17'N at 85 m depth (Figure 3). 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 ten minutes, resulting in data with a 0.01-100 kHz bandwidth and a 1/3 duty cycle.

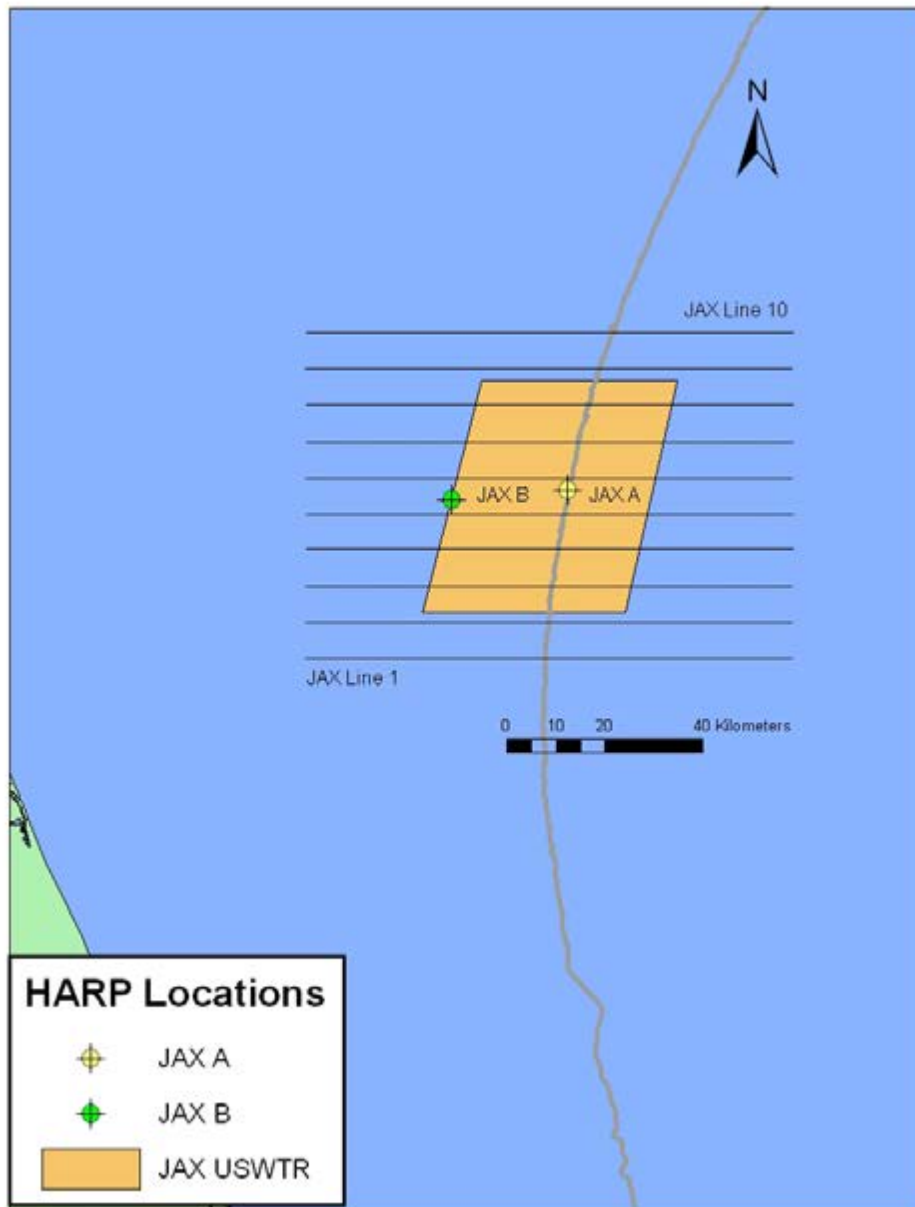


Figure 3. Location of HARP deployments off Jacksonville, FL.

Table 1. HARP deployments in proposed Jacksonville USWTR range

	Deployment Date	Recovery Date	Latitude	Longitude	Depth	Available Data (TB)
JAX01 B	30-Mar-09	16-Sep-09	30.258	-80.428	40m	2
JAX01 A	30-Mar-09	16-Sep-09	30.277	-80.216	80m	0.8
JAX02 B	23-Sep-09	21-Feb-10	30.258	-80.428	40m	0
JAX02 A	16-Sep-09	21-Feb-10	30.281	-80.216	85m	1.3
JAX04 B	9-Mar-10	Aug 23-27	30.259	-80.426	40m	--
JAX03 A	21-Feb-10	Aug 23-27	30.281	-80.215	90m	--

## Data Analysis

Vessel survey effort and sighting data were compiled and mapped using ArcGIS 9.2 to illustrate the location of effort and sightings within the study area. All sighting data (including radial distance and bearing estimates for each cue) were forwarded to our colleagues at CREEM at the University of St. Andrews, UK for density estimation. Vessel based survey tracks and sighting locations from July 2009 through June 2010 have been posted on OBIS-SEAMAP (<http://seamap.env.duke.edu/>).

## Acoustic Analysis

Towed hydrophone array recordings were analyzed with custom programs written in Matlab (Mathworks, Natick MA, USA). Selections of whistles and clicks with positive species identifications from concurrent visual observations were saved for future analysis of species-specific patterns. Statistical algorithms, including Gaussian mixture models (GMMs), hidden Markov models (HMMs) and autoregression techniques, will be compared to determine the best species classifier for clicks, whistles, and mixed call types (*e.g.* Roch *et al.* 2009). We also plan to look for species-specific patterns, such as consistent peaks and notches, in the recorded clicks using techniques similar to those employed by Soldevilla *et al.* (2008). Analyses of variance (ANOVAs) will be used to determine if there are species-specific frequency differences in peaks and notches of echolocation clicks.

HARP data requires processing prior to analysis, including backing up data in original format, converting data to wav format, decimating wav data by factors of 10 and 100 to aid in baleen whale detection, and creating long-term spectral averages (LTSAs) (described below). Data from deployments JAX01A, JAX01B and JAX02A have all been processed. Each HARP deployment results approximately 2 TB of data, which is impractical to analyze manually in original form. Therefore, these data were compressed for visual overview by creating LTSAs (Wiggins and Hildebrand, 2007) from the wav files. LTSAs are effectively compressed spectrograms created using the Welch algorithm (Welch, 1967) by coherently averaging 500 spectra created from 2000-point, 0%-overlapped, Hann-windowed data and displaying these averaged spectra sequentially over time. The resulting LTSAs had resolutions of 5 s in time and 100 Hz, 10 Hz and 1 Hz in frequency, for the original, decimation factor (df) 10 and df 100 data,

respectively. Using LTSAs, high energy acoustic events can easily be distinguished from background noise (e.g., Wiggins and Hildebrand, 2007), allowing an efficient review of these large data sets.

To date, all original high-frequency LTSAs and df 100 low-frequency LTSAs have been reviewed for JAX01B and JAX02A deployments, and the df 10 mid-frequency LTSAs from these deployments have been partially reviewed. Detected acoustic events include odontocete whistles, odontocete echolocation clicks, shipping noise, sonar, weather events (rain, wind or waves) and an unidentified low-frequency stereotyped call. Sonar includes mid-frequency active sonar, 12 kHz, 28 kHz, and 50 kHz fish- and depth-sounders, and 75 kHz ADCP sources. Diel and longer term trends in occurrence are presented for all acoustic events, and calling bout durations and inter-bout intervals are presented for odontocete whistles and clicks.

To extract whistle and click features for use in automated species classification algorithms, individual clicks and whistles must be detected. A custom MATLAB-based spectral domain whistle and click detector was run on all JAX01B data. This detector had poor performance (high false alarm rates) due to high noise in the shallow water environment, possibly caused by snapping shrimp and proximity to the sea-surface. A time domain click train detector is currently being developed. Once individual whistles and click trains have been detected, spectral or cepstral features will be extracted. These will then be processed using the classifiers developed on towed array data to determine to which species the sounds most likely belong

#### Data Storage

All acoustic and visual data are archived on digital media at the field office in Fernandina Beach, FL, and backed up on a Duke University network server.

## **Results**

### Vessel Survey Effort

Between 1 July 2009 and 30 June 2010, 22 vessel surveys were performed (1570 km) totaling approximately 96 hours of marine mammal and sea turtle surveys (86 hours on effort, 10 hours off effort)(Table 2). Vessel surveys were conducted in Beaufort Sea States 1 to 4, with most

survey effort (78%) performed in a Beaufort 2 to 3 and 22 % in optimal (Beaufort 0 to 1) sighting conditions (Fig. 4a-b).

*Table 2.* Tracklines and km surveyed during vessel surveys of the proposed USWTR site off of Jacksonville, Florida from July 2009 – June 2010.

<b>Date</b>	<b>Trackline</b>	<b>Total (km)</b>	<b>Survey time</b>
19-Jul-09	10	80.2	4:50
20-Jul-09	9	85.4	4:39
14-Aug-09	6	61.0	3:24
16-Aug-09	8	84.7	5:15
18-Aug-09	5	30.4	2:35
19-Aug-09	7	79.5	4:44
17-Sep-09	9	79.0	4:47
20-Sep-09	2	18.8	4:36
20-Sep-09	1	32.2	
26-Sep-09	4	80.0	4:54
4-Oct-09	3	78.2	4:55
6-Oct-09	1	58.7	3:31
13-Jan-10	10	79.9	4:49
14-Jan-10	8	69.5	3:57
28-Jan-10	6	58.4	3:42
1-Mar-10	4	67.3	4:15
10-Mar-10	2	74.0	4:39
20-May-10	9	64.8	4:07
23-May-10	7	80.5	4:36
10-Jun-10	5	78.2	4:06
12-Jun-10	3	75.9	4:53
14-Jun-10	1	78.2	4:12
16-Jun-10	10	77.0	4:50

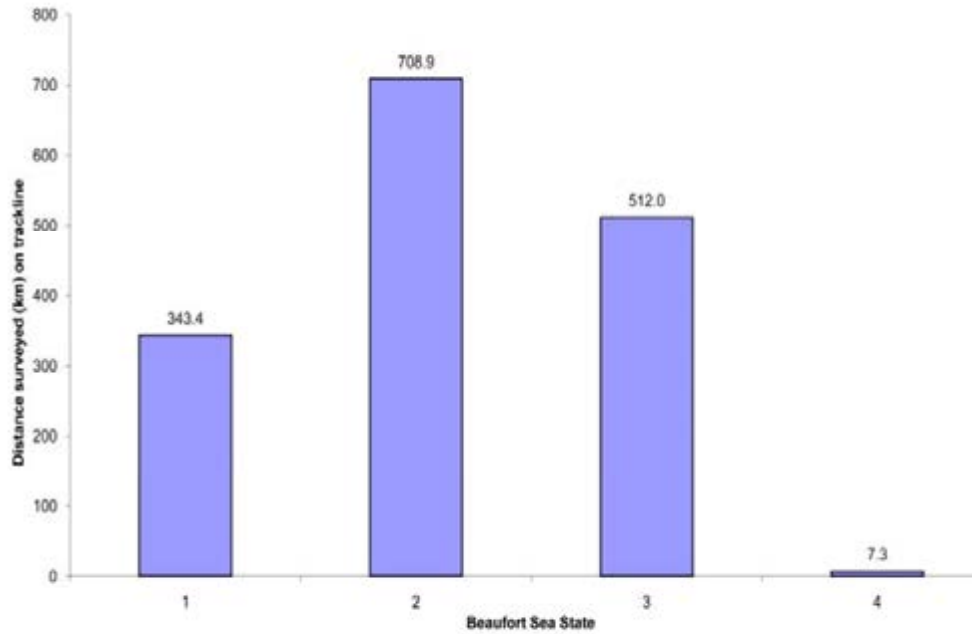


Figure 4a. Total distance surveyed per Beaufort Sea State during the January 2009 – June 2010 vessel surveys of the proposed USWTR survey site off Jacksonville, Florida.

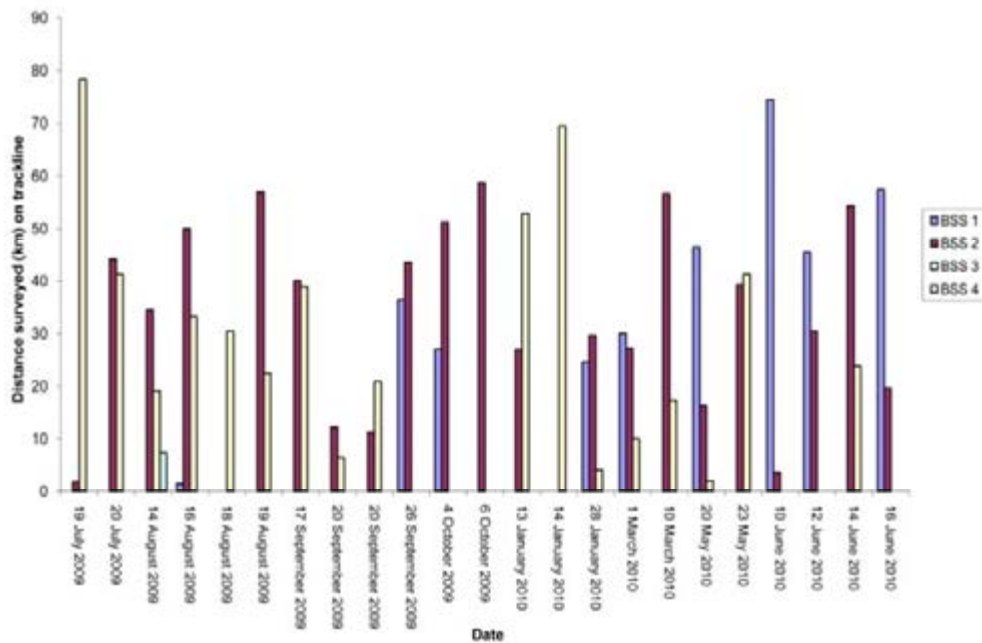


Figure 4b. Effort by Beaufort Sea State for each survey day during the July 2009 – June 2010 vessel surveys of the proposed USWTR site off of Jacksonville, Florida.

### Marine Mammal and Sea Turtle Line Transect Sightings (Table 3)

Fifty-six cetacean sightings were made during the reporting period (48 on effort, 8 off effort)(Table 4). Four cetacean species were encountered in the study area: bottlenose dolphins (*Tursiops truncatus*; n=15; all on effort)(Figure 5), Atlantic spotted dolphins (*Stenella frontalis*; n=24; 21 on effort)(Figure 6), short-finned pilot whales (*Globicephala macrorhynchus*; n=3; all off effort), and Risso's dolphins (*Grampus griseus*; n=2; all on effort). In addition unidentified delphinids were recorded 12 times (10 on effort)(Figure 7). No mixed species groups were observed (Table 4). Sightings per unit effort were highest in a Beaufort Sea State of 1, with rates declining with increasing sea state (Figure 8).

A total of 57 sea turtles were observed in the study area (53 on effort; 4 off effort)(Table 5 and Figure 9). Loggerhead sea turtles (*Caretta caretta*, n=48; 45 on effort) were most frequently sighted, followed by leatherback sea turtles (*Dermochelys coriacea*; n=5; all on effort). We sighted one Kemp's Ridley sea turtle (*Lepidochelys kempii*) off effort. In addition, 3 sea turtles where species identity could not be determined were recorded (all on effort).

In general, bottlenose dolphins were found in deeper (mean water depth of 144 m versus 43 m) and slightly warmer waters (25.8°C versus 24.8°C) than Atlantic spotted dolphins (Figures 10 and 11). The majority of spotted dolphins were encountered in 30-42 m depth (23 out of 24 sightings), with one encounter in waters 181 m deep. Group size averages were slightly larger for bottlenose dolphins (6.5 versus 5.5 in spotted dolphins)(Table 5).

Mean water depth and temperature for loggerhead sea turtles were 37 m and 27.4°C (Figure 12).



Table 3. Cetacean and sea turtle sightings made in the proposed USWTR site off of Jacksonville, Florida during vessel surveys from July 2009 – June 2010.

Date	Time	Latitude	Longitude -1	Line	Depth (m)	Temp (C°)	Common Name	Group Size	Effort
19-Jul-09	14:13	30.568363	-80.299465	10	40	29.7	Loggerhead sea turtle	1	On
19-Jul-09	14:52	30.571995	-80.422180	10	37	27.0	Atlantic spotted dolphin	10	On
19-Jul-09	15:26	30.567469	-80.526572	10	No data	No data	Bottlenose dolphin	6	On
19-Jul-09	15:59	30.571028	-80.594118	10	31	29.0	Unidentified delphinid	3	On
20-Jul-09	11:50	30.500307	-80.576753	9	37	28.4	Unidentified delphinid	2	On
20-Jul-09	13:22	30.500282	-80.283378	9	42	28.4	Loggerhead sea turtle	1	On
16-Aug-09	9:58	30.422987	-80.705815	8	29	25.0	Kemp's Ridley sea turtle	1	Off
16-Aug-09	10:08	30.425092	-80.699873	8	30	25.0	Atlantic spotted dolphin	5	Off
16-Aug-09	10:31	30.427164	-80.634801	8	30	25.0	Leatherback sea turtle	1	On
16-Aug-09	10:54	30.427785	-80.563746	8	33	28.1	Loggerhead sea turtle	1	On
16-Aug-09	11:47	30.430309	-80.404033	8	36	26.5	Loggerhead sea turtle	1	On
18-Aug-09	11:23	30.285429	-80.348503	5	41	27.0	Loggerhead sea turtle	1	On
18-Aug-09	12:12	30.288574	-80.480643	5	No data	No data	Loggerhead sea turtle	1	On
18-Aug-09	12:14	30.287930	-80.486021	5	37	27.0	Loggerhead sea turtle	1	On
18-Aug-09	12:15	30.288535	-80.488625	5	37	27.0	Loggerhead sea turtle	1	On
18-Aug-09	12:23	30.287994	-80.492955	5	37	27.0	Atlantic spotted dolphin	3	On
18-Aug-09	13:26	30.242230	-80.658233	5	31	27.4	Atlantic spotted dolphin	6	On
19-Aug-09	16:29	30.369685	-80.406607	7	41	27.1	Atlantic spotted dolphin	4	Off
19-Aug-09	17:23	30.359725	-80.589176	7	36	26.2	Bottlenose dolphin	4	On
17-Sep-09	10:44	30.506465	-80.607440	9	33	28.4	Atlantic spotted dolphin	2	On
17-Sep-09	12:44	30.506844	-80.237128	9	No data	No data	Loggerhead sea turtle	1	On
17-Sep-09	12:53	30.505059	-80.210338	9	No data	No data	Leatherback sea turtle	1	On
17-Sep-09	13:10	30.506082	-80.157305	9	88	29.7	Leatherback sea turtle	1	On
17-Sep-09	14:03	30.506904	-80.012645	9	303	31.0	Risso's dolphin	35	On
20-Sep-09	11:41	30.015321	-80.598513	2	39	29.0	Atlantic spotted dolphin	4	On
20-Sep-09	11:43	30.016014	-80.594325	2	39	29.0	Loggerhead sea turtle	1	Off
20-Sep-09	11:56	30.017311	-80.552788	2	41	28.3	Unidentified delphinid	1	On
20-Sep-09	12:07	30.017009	-80.522811	2	No data	No data	Loggerhead sea turtle	1	On
20-Sep-09	12:10	30.018587	-80.513920	2	41	28.3	Loggerhead sea turtle	1	Off
20-Sep-09	13:05	30.021941	-80.364973	2	44	27.8	Loggerhead sea turtle	1	On
20-Sep-09	15:10	29.967412	-80.586441	1	36	27.2	Unidentified delphinid	2	On
20-Sep-09	15:40	29.968891	-80.678701	1	34	28.1	Loggerhead sea turtle	1	On
26-Sep-09	10:39	30.161727	-80.616101	4	33	28.1	Atlantic spotted dolphin	1	On
26-Sep-09	12:31	30.160432	-80.318435	4	45	30.7	Bottlenose dolphin	20	On
26-Sep-09	15:24	30.182111	-79.955000		No data	No data	Short-finned pilot whale	35	Off
26-Sep-09	16:06	30.208278	-80.023972		No data	No data	Short-finned pilot whale	50	Off
04-Oct-09	14:43	30.098851	-80.029564	3	400	28.4	Bottlenose dolphin	9	On
04-Oct-09	16:23	30.099172	-80.325845	3	42	29.9	Atlantic spotted dolphin	3	On
04-Oct-09	16:40	30.101447	-80.350797	3	41	29.8	Unidentified delphinid	2	On
04-Oct-09	16:50	30.101266	-80.373382	3	44	29.8	Unidentified delphinid	1	On
04-Oct-09	17:18	30.104809	-80.464366	3	40	29.3	Loggerhead sea turtle	1	On
04-Oct-09	17:32	30.104019	-80.514553	3	39	24.1	Loggerhead sea turtle	1	On
04-Oct-09	17:46	30.102039	-80.561501	3	37	25.1	Loggerhead sea turtle	1	On
04-Oct-09	17:55	30.101092	-80.590033	3	37	27.6	Loggerhead sea turtle	1	On
04-Oct-09	18:01	30.100714	-80.610691	3	37	29.3	Loggerhead sea turtle	1	On
04-Oct-09	18:04	30.101071	-80.621400	3	36	29.3	Loggerhead sea turtle	1	On
04-Oct-09	18:05	30.101216	-80.624046	3	36	29.3	Loggerhead sea turtle	2	On
04-Oct-09	18:13	30.101586	-80.650825	3	33	29.3	Loggerhead sea turtle	1	On
04-Oct-09	18:16	30.100502	-80.663343	3	33	29.1	Loggerhead sea turtle	1	On

Table 3 (continued). Cetacean and sea turtle sightings made in the proposed USWTR site off of Jacksonville, Florida during vessel surveys from July 2009 – June 2010.

Date	Time	Latitude	Longitude -1	Line	Depth (m)	Temp (C°)	Common Name	Group Size	Effort
04-Oct-09	18:20	30.099064	-80.675898	3	33	29.1	Unidentified delphinid	2	On
06-Oct-09	11:08	29.966821	-80.555040	1	38	29.2	Bottlenose dolphin	2	On
06-Oct-09	11:35	29.967867	-80.465110	1	41	29.0	Atlantic spotted dolphin	1	On
06-Oct-09	12:02	29.968554	-80.409355	1	43	29.3	Bottlenose dolphin	1	On
13-Jan-10	10:29	30.567982	-80.628400	10	30	18.0	Bottlenose dolphin	5	On
13-Jan-10	11:06	30.564430	-80.512458	10	33	17.4	Loggerhead sea turtle	1	On
13-Jan-10	11:35	30.564930	-80.432060	10	36	17.2	Bottlenose dolphin	2	On
13-Jan-10	11:53	30.569257	-80.395757	10	37	18.5	Bottlenose dolphin	2	On
13-Jan-10	12:45	30.572975	-80.254310	10	44	17.7	Unidentified delphinid	1	Off
13-Jan-10	13:05	30.573375	-80.194413	10	46	22.1	Leatherback sea turtle	1	On
13-Jan-10	14:51	30.569478	-79.858819	10	232	24.7	Unidentified delphinid	1	On
14-Jan-10	13:47	30.441682	-80.398922	8	36	22.0	Unidentified delphinid	3	On
14-Jan-10	13:52	30.441505	-80.379987	8	37	22.1	Loggerhead sea turtle	1	On
14-Jan-10	14:13	30.430632	-80.362470	8	38	22.9	Atlantic spotted dolphin	8	On
14-Jan-10	14:25	30.427455	-80.338912	8	40	22.9	Atlantic spotted dolphin	7	On
14-Jan-10	15:04	30.441954	-80.205903	8	51	22.1	Loggerhead sea turtle	1	On
28-Jan-10	14:16	30.302944	-80.353822	6	42	20.8	Atlantic spotted dolphin	5	On
28-Jan-10	14:24	30.302467	-80.377815	6	No data	No data	Loggerhead sea turtle	1	On
28-Jan-10	14:27	30.302740	-80.389045	6	No data	No data	Leatherback sea turtle	1	On
28-Jan-10	14:39	30.300664	-80.406183	6	38	20.7	Bottlenose dolphin	3	On
28-Jan-10	15:11	30.300260	-80.486600	6	37	21.1	Unidentified delphinid	3	On
28-Jan-10	15:44	30.297800	-80.587080	6	No data	No data	Loggerhead sea turtle	1	On
01-Mar-10	14:44	30.171021	-80.277950	4	48	21.0	Loggerhead sea turtle	1	On
01-Mar-10	15:05	30.169377	-80.349359	4	No data	No data	Atlantic spotted dolphin	2	On
01-Mar-10	16:33	30.166664	-80.589490	4	34	23.0	Atlantic spotted dolphin	2	On
01-Mar-10	16:45	30.166619	-80.608868	4	33	23.0	Atlantic spotted dolphin	3	On
01-Mar-10	17:03	30.165464	-80.648855	4	31	23.0	Atlantic spotted dolphin	9	On
01-Mar-10	17:16	30.165281	-80.679358	4	32	21.8	Atlantic spotted dolphin	17	On
01-Mar-10	17:17	30.164639	-80.684001	4	No data	No data	Atlantic spotted dolphin	5	On
10-Mar-10	14:29	30.032257	-80.223955	2	181	20.6	Atlantic spotted dolphin	4	On
10-Mar-10	15:44	30.036257	-80.442362	2	42	17.0	Atlantic spotted dolphin	4	On
10-Mar-10	16:42	30.029437	-80.586483	2	38	20.6	Atlantic spotted dolphin	13	Off
20-May-10	14:12	30.506195	-80.295272	9	42	26.6	Atlantic spotted dolphin	1	On
20-May-10	14:23	30.505725	-80.330123	9	41	26.6	Loggerhead sea turtle	1	On
20-May-10	15:01	30.509397	-80.450341	9	37	26.6	Loggerhead sea turtle	1	On
20-May-10	15:26	30.513175	-80.484023	9	37	24.9	Atlantic spotted dolphin	16	On
20-May-10	15:45	30.510552	-80.542606	9	35	26.4	Loggerhead sea turtle	1	On
20-May-10	15:52	30.511185	-80.563626	9	34	26.5	Loggerhead sea turtle	1	On
20-May-10	15:56	30.511745	-80.579101	9	32	26.6	Loggerhead sea turtle	1	On
20-May-10	16:19	30.507112	-80.620221	9	31	26.0	Bottlenose dolphin	2	On
23-May-10	15:34	30.367712	-80.319432	7	42	27.0	Bottlenose dolphin	8	On
23-May-10	16:58	30.368032	-80.587025	7	38	27.0	Loggerhead sea turtle	1	On
23-May-10	17:03	30.368362	-80.603263	7	37	27.0	Loggerhead sea turtle	1	On
23-May-10	17:04	30.368954	-80.609633	7	31	27.0	Loggerhead sea turtle	1	On
10-Jun-10	12:22	30.245583	-79.901683		No data	No data	Short-finned pilot whale	15	Off
10-Jun-10	15:18	30.243697	-80.367558	5	42	30.4	Loggerhead sea turtle	1	On
10-Jun-10	15:41	30.243932	-80.450660	5	39	30.7	Loggerhead sea turtle	1	On
10-Jun-10	15:45	30.243774	-80.465003	5	37	30.7	Loggerhead sea turtle	1	On
10-Jun-10	16:01	30.239685	-80.522905	5	16	30.5	Loggerhead sea turtle	1	On

Table 3 (continued). Cetacean and sea turtle sightings made in the proposed USWTR site off of Jacksonville, Florida during vessel surveys from July 2009 – June 2010.

Date	Time	Latitude	Longitude -1	Line	Depth (m)	Temp (C°)	Common Name	Group Size	Effort
10-Jun-10	16:05	30.238952	-80.535578	5	13	30.5	Loggerhead sea turtle	1	On
12-Jun-10	12:37	30.111181	-79.944292	3	600	30.4	Bottlenose dolphin	16	On
12-Jun-10	13:01	30.110376	-80.002467	3	600	30.7	Bottlenose dolphin	15	On
12-Jun-10	16:21	30.103611	-80.563661	3	36	29.0	Bottlenose dolphin	4	On
12-Jun-10	16:40	30.104279	-80.630623	3	34	29.5	Unidentified turtle	1	On
12-Jun-10	16:40	30.104277	-80.634041	3	35	29.5	Unidentified turtle	1	On
14-Jun-10	14:52	29.974706	-80.405760	1	43	28.5	Loggerhead sea turtle	1	Off
14-Jun-10	14:54	29.974656	-80.410498	1	43	28.5	Loggerhead sea turtle	1	On
14-Jun-10	16:01	29.971806	-80.643988	1	37	29.4	Loggerhead sea turtle	1	On
16-Jun-10	12:59	30.587273	-79.910252	10	350	31.2	Risso's dolphin	8	On
16-Jun-10	16:24	30.575813	-80.536796	10	32	27.6	Loggerhead sea turtle	1	On
16-Jun-10	16:35	30.572567	-80.576375	10	29	29.9	Loggerhead sea turtle	1	On
16-Jun-10	17:08	30.567690	-80.667065	10	29	31.0	Unidentified delphinid	1	Off
16-Jun-10	17:14	30.567735	-80.686223	10	27	31.0	Unidentified turtle	1	On

Table 4. Number of cetacean sightings and mean group size by species during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.

Species	Common Name	Sightings	Mean Group Size
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	3	33.3
<i>Grampus griseus</i>	Risso's dolphin	2	21.5
<i>Stenella frontalis</i>	Atlantic spotted dolphin	24	5.6
<i>Tursiops truncatus</i>	Bottlenose dolphin	15	6.6
Unidentified delphinid	Unidentified delphinid	12	1.8
	<b>Total:</b>	<b>56</b>	

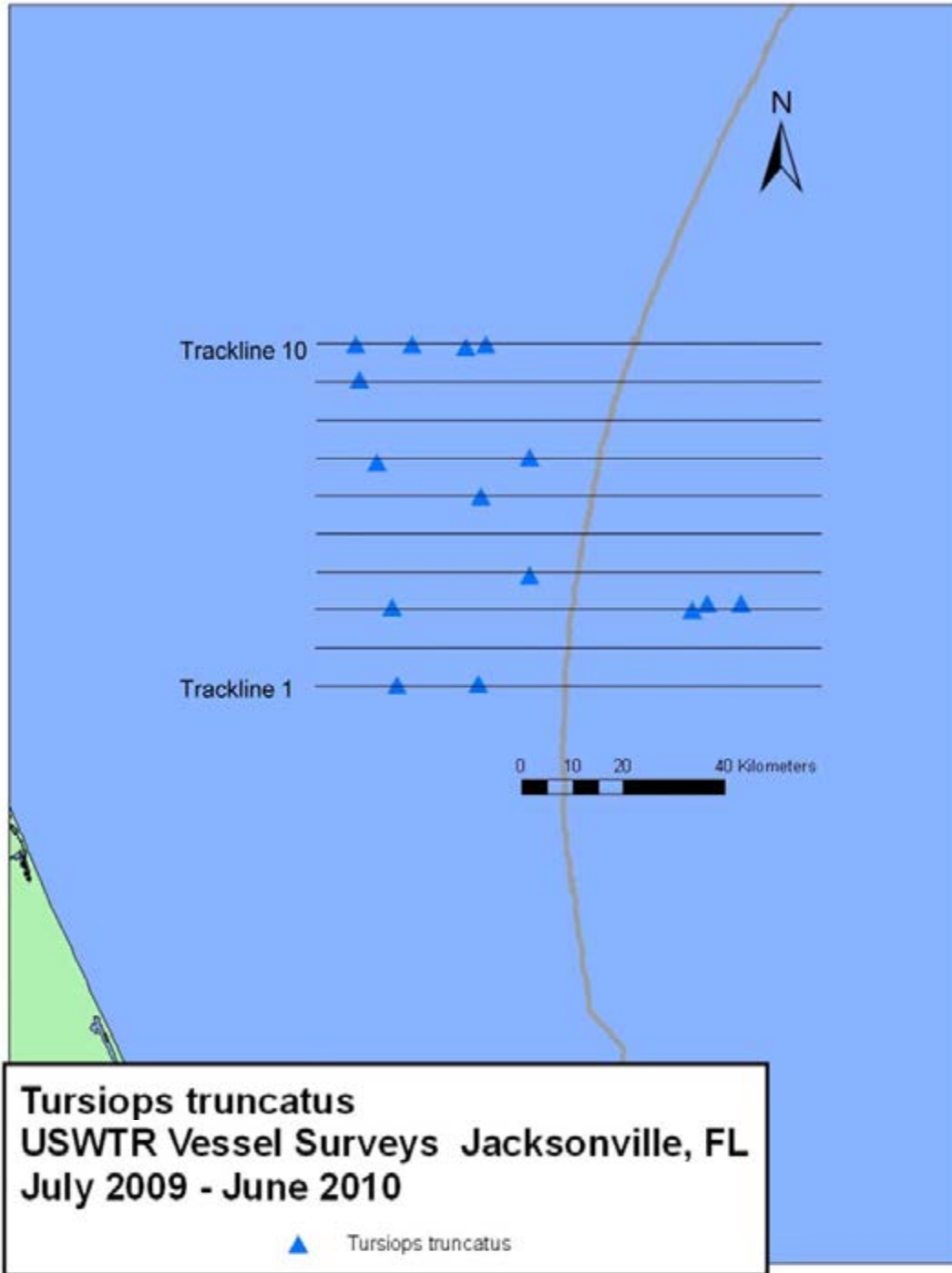


Figure 5. Distribution of bottlenose dolphin (*Tursiops truncatus*) sightings made during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.

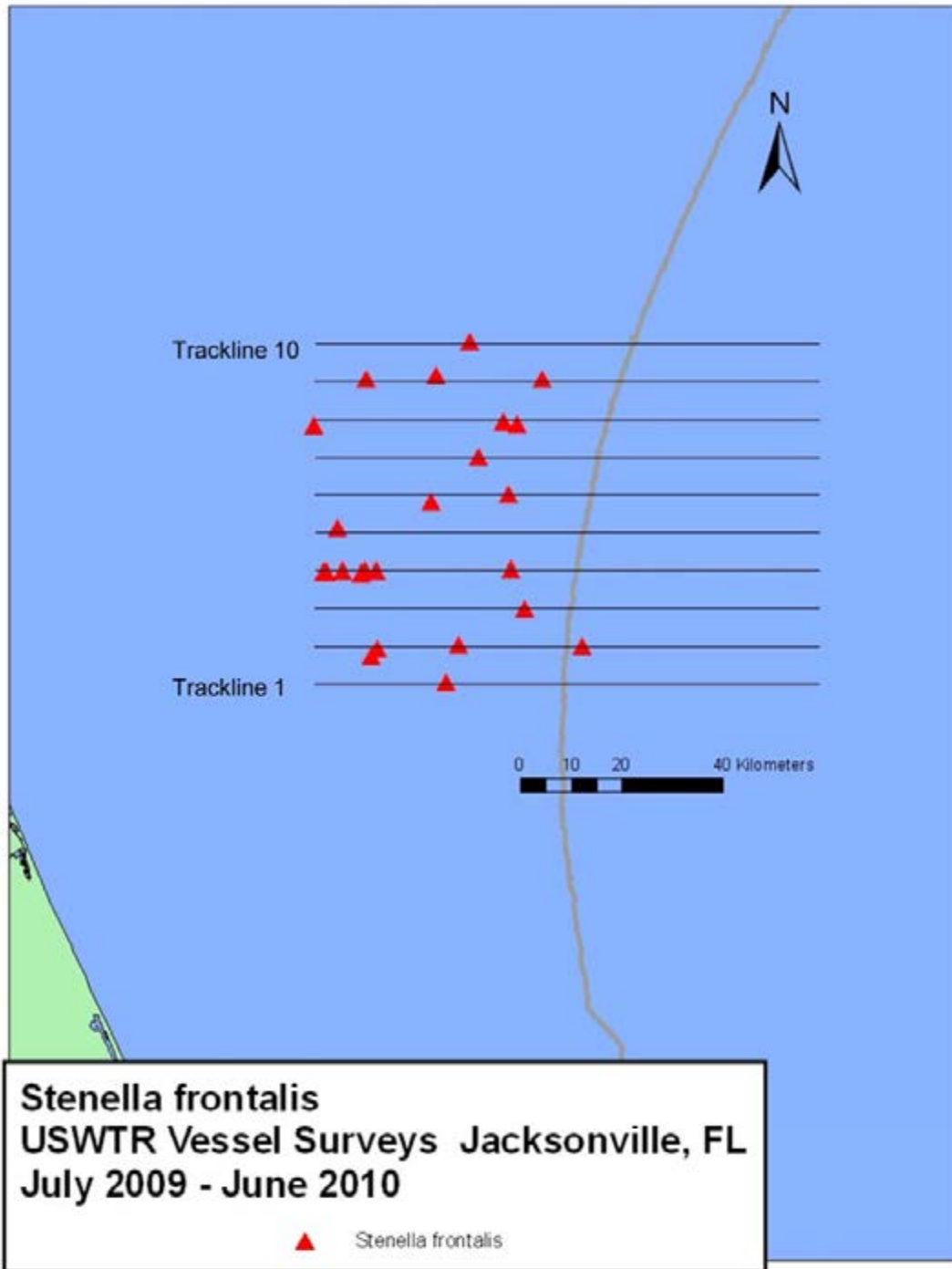
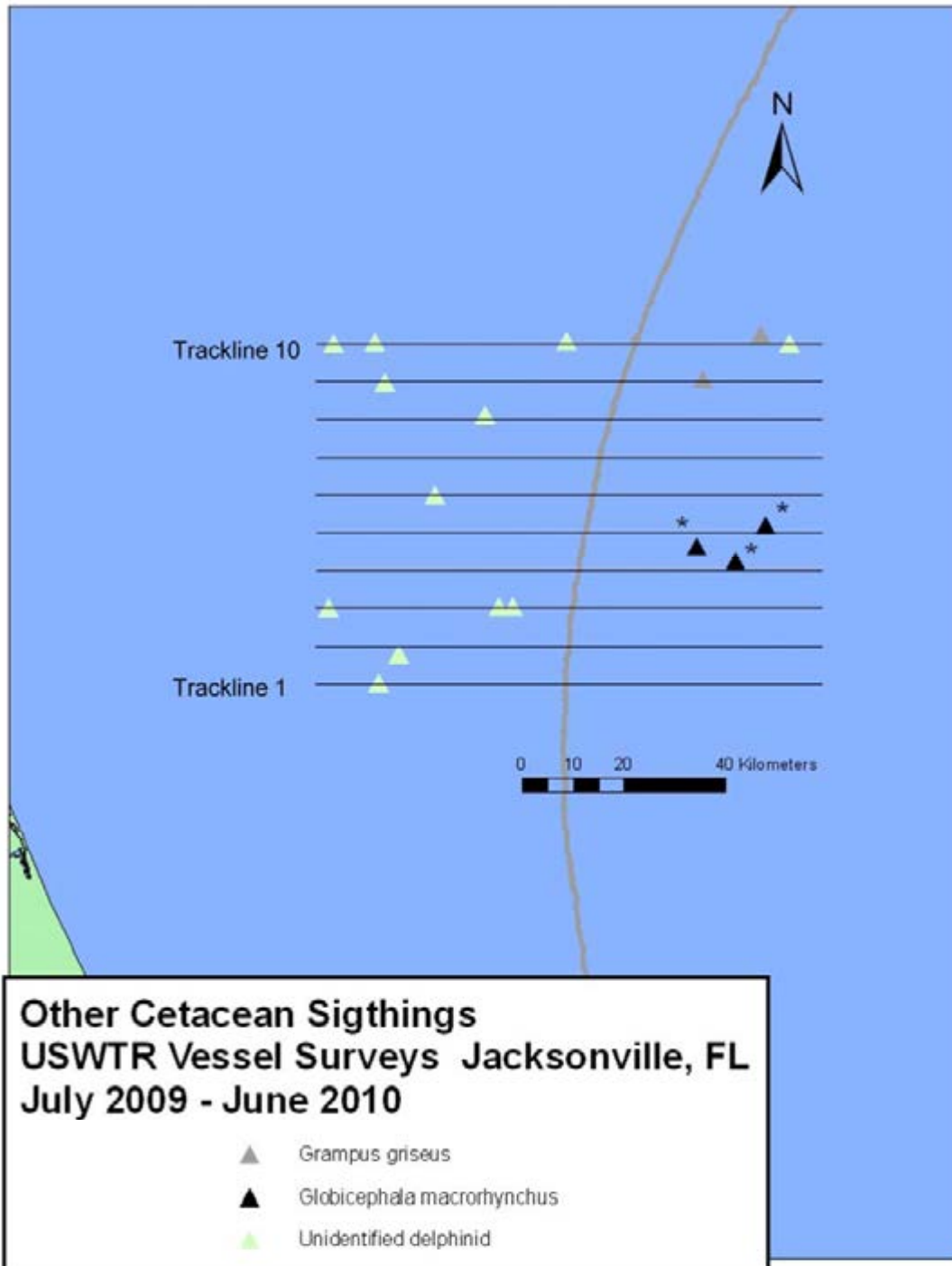


Figure 6. Distribution of Atlantic spotted dolphin (*Stenella frontalis*) sightings made during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.



*Figure 7.* Distribution of all other cetacean sightings made during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010. Asterisk denotes off effort sighting.

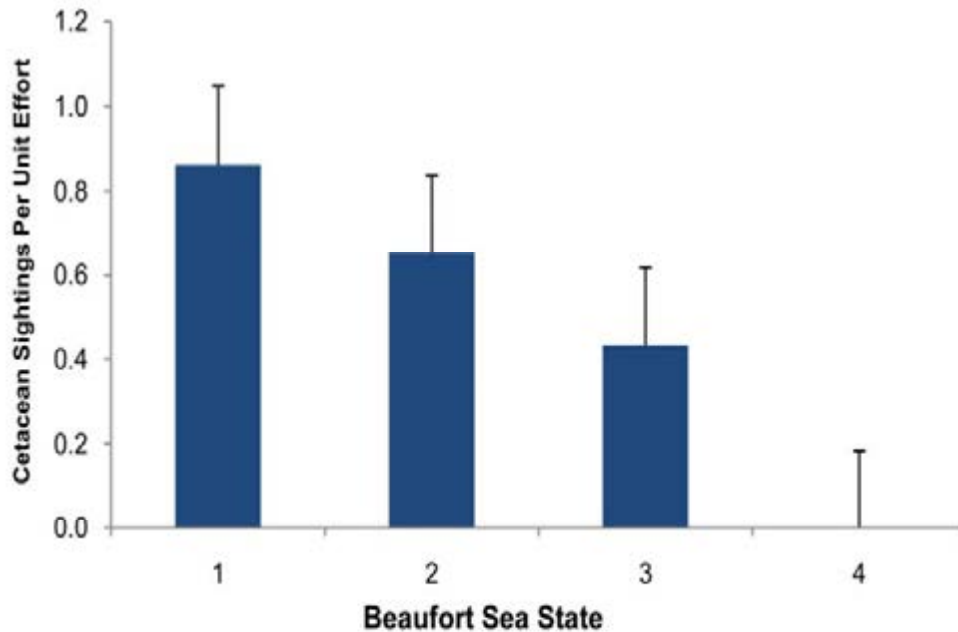


Figure 8. Number of cetacean sightings corrected for hours on effort in each Beaufort Sea State for July 2009 – June 2010 vessel surveys of the proposed USWTR site off of Jacksonville, Florida.

Table 5. Number of sea turtles seen by species during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010..

Species	Common Name	Turtles Observed
<i>Caretta caretta</i>	Loggerhead sea turtle	48
<i>Dermochelys coriacea</i>	Leatherback sea turtle	5
<i>Lepidochelys kempii</i>	Kemp's Ridley sea turtle	1
Unidentified Sea Turtle	Unidentified Sea Turtle	3
<b>Total:</b>		<b>57</b>



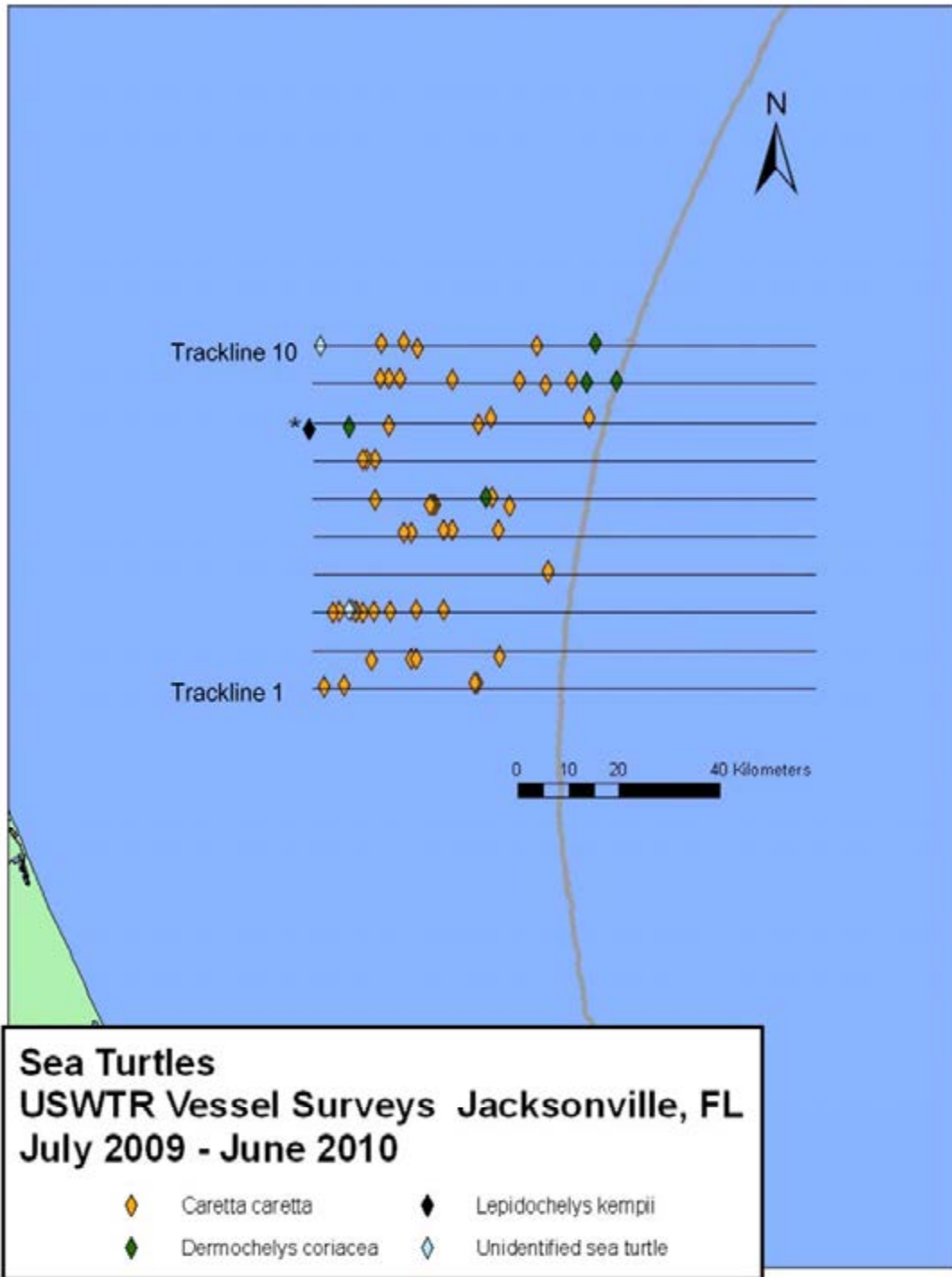


Figure 9. Distribution of all sea turtle sightings made during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.



### Bottlenose dolphin (*Tursiops truncatus*)

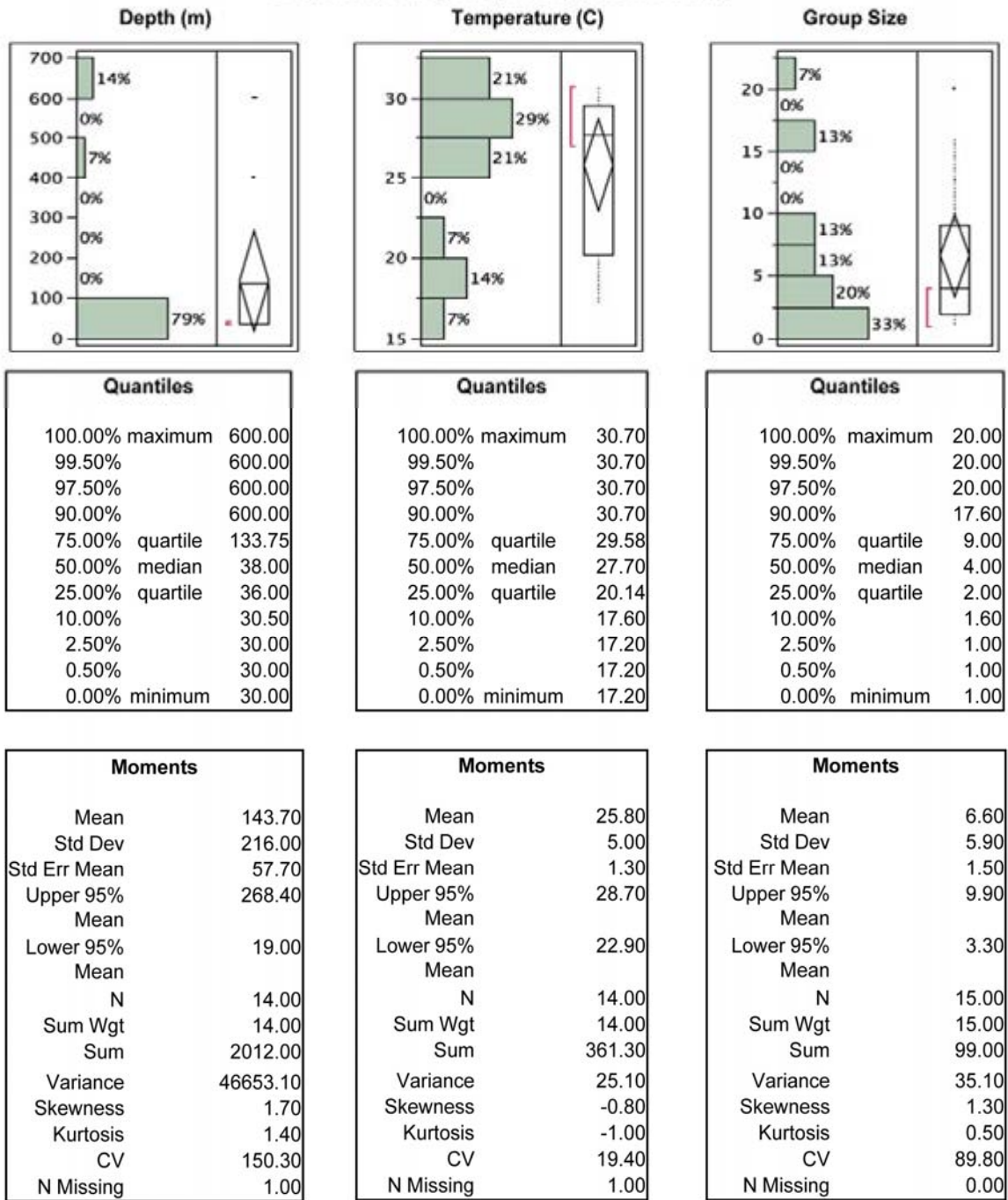


Figure 10. Descriptive statistics for depth, sea surface temperature, and group size estimates for bottlenose dolphin (*Tursiops truncatus*) sightings during vessel surveys of the proposed USWTR survey site off of Jacksonville, Florida, July 2009 – June 2010 .

### Atlantic spotted dolphin (*Stenella frontalis*)

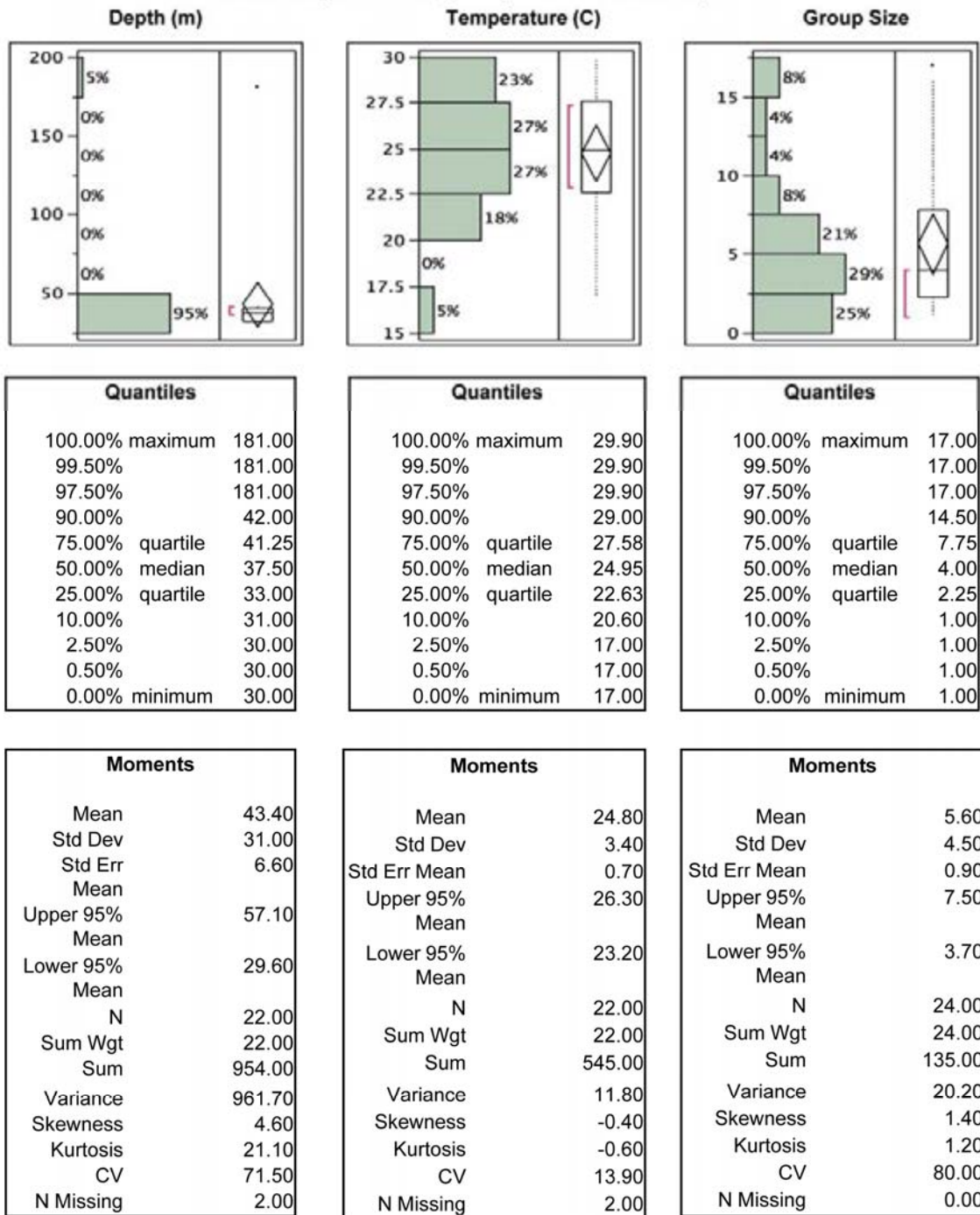


Figure 11. Descriptive statistics for depth, sea surface temperature, and group size estimates for Atlantic spotted dolphin (*Stenella frontalis*) sightings during vessel surveys of the proposed USWTR survey site off of Jacksonville, Florida, July 2009 – June 2010 .

### Loggerhead sea turtle (*Caretta caretta*)

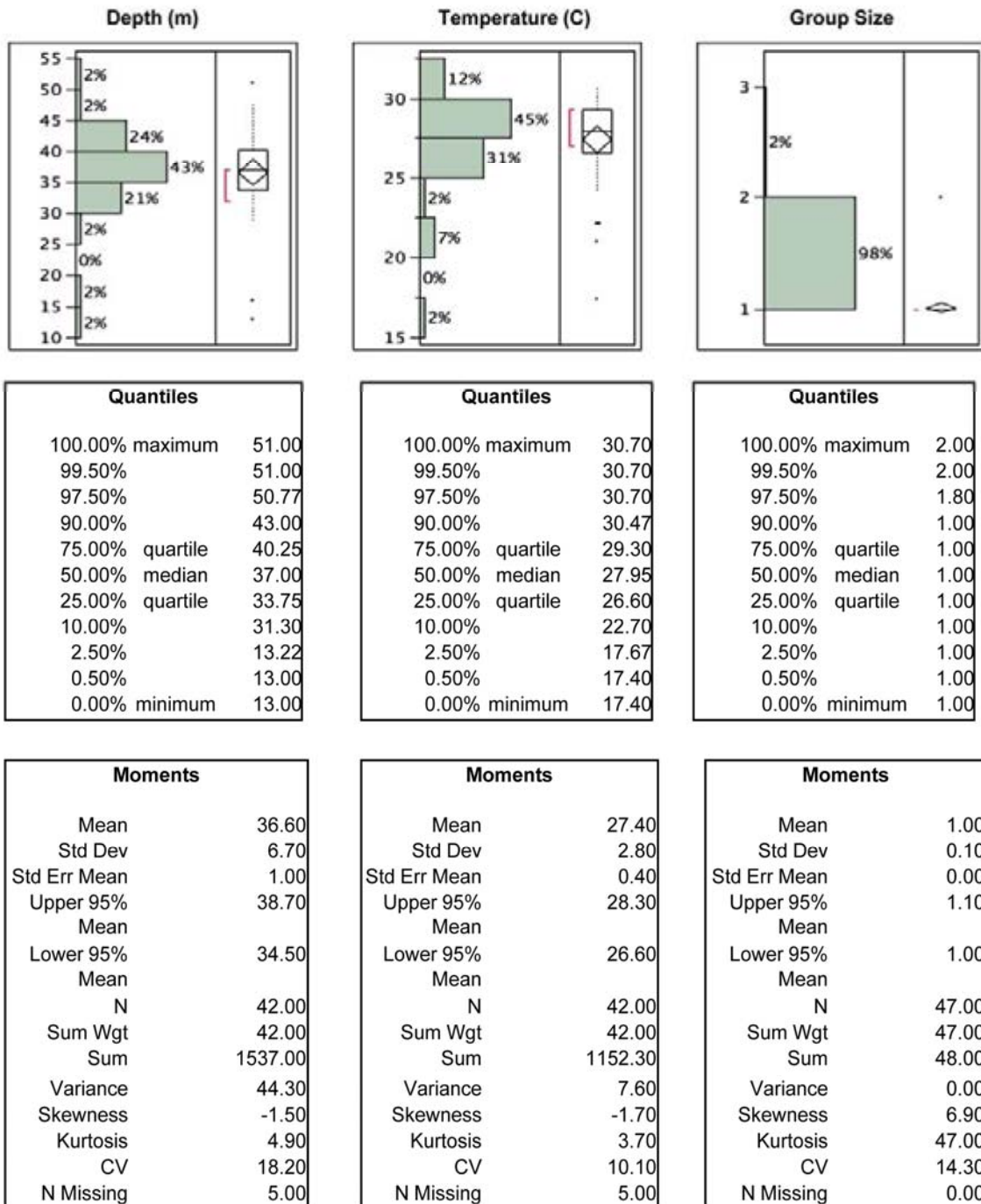


Figure 12. Descriptive statistics for depth, sea surface temperature, and group size estimates for loggerhead sea turtle (*Caretta caretta*) sightings during vessel surveys of the proposed USWTR survey site off of Jacksonville, Florida, July 2009 – June 2010 .

## Distributions and Habitat Associations of Cetaceans

The distribution of marine mammals and sea turtles are presented in Figures 5, 6, 7, and 9. Atlantic spotted dolphins were largely restricted to the relatively shallow shelf waters, whereas bottlenose dolphins were encountered throughout the survey area with some groups detected in deep, offshore waters. Risso's dolphins and short-finned pilot whales, which are known to be deep diving species, were all exclusively encountered in waters off shore of the shelf break. Loggerhead sea turtles were only observed in shallower waters over the continental shelf.

## Seasonality of Effort and Sightings

Due to unfavorable survey conditions, there was no survey effort in four months of the reporting period. Any seasonal trends in cetacean or sea turtle distribution are, therefore, difficult to establish at this point. The number of sightings were graphed by species for both cetaceans and sea turtles during each month surveyed (Figure 13a and b).

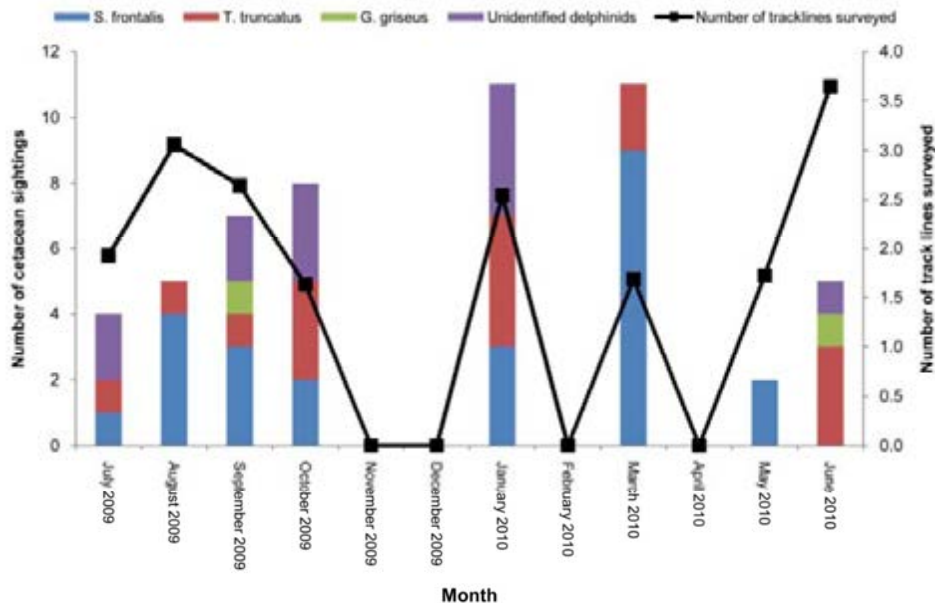


Figure 13a. Number of cetacean sightings by month and effort (number of tracklines surveyed) for July 2009 – June 2010 vessel surveys conducted in the proposed USWTR site off of Jacksonville, Florida.

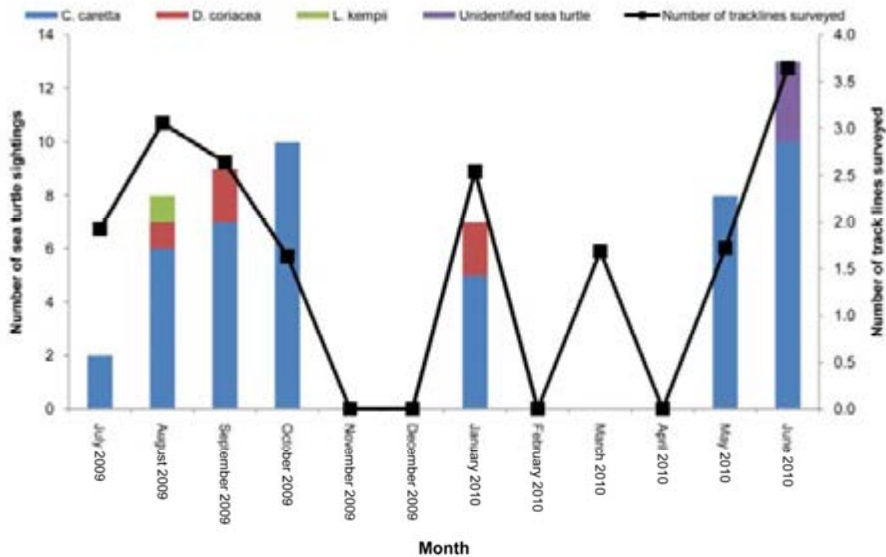


Figure 13b. Number of sea turtle sightings by month and effort (number of tracklines surveyed) for July 2009 – June 2010 vessel surveys conducted in the proposed USWTR site off of Jacksonville, Florida.

### Photographic Efforts

Approximately 3300 digital images were taken for species confirmation and individual identification (Table 6). The goal is to develop a photo-identification catalogue for cetacean species encountered in the survey area to investigate a variety of ecological parameters (*e.g.* residency patterns and population size). Future efforts will include comparison of photo identification catalogues between the USWTR sites in Onslow Bay, NC and the USWTR site off of Jacksonville, FL, to look for re-sightings between sites. This type of data may help elucidate the poorly known residency and migration patterns of offshore delphinids in the western Atlantic.

Table 6. Number of images taken per species during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.

Species	Common Name	Sightings	Images
<i>Grampus griseus</i>	Risso's dolphin	2	405
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	3	1368
<i>Tursiops truncatus</i>	Bottlenose dolphin	15	779
<i>Stenella frontalis</i>	Atlantic spotted dolphin	24	781
<b>Total:</b>		<b>44</b>	<b>3333</b>

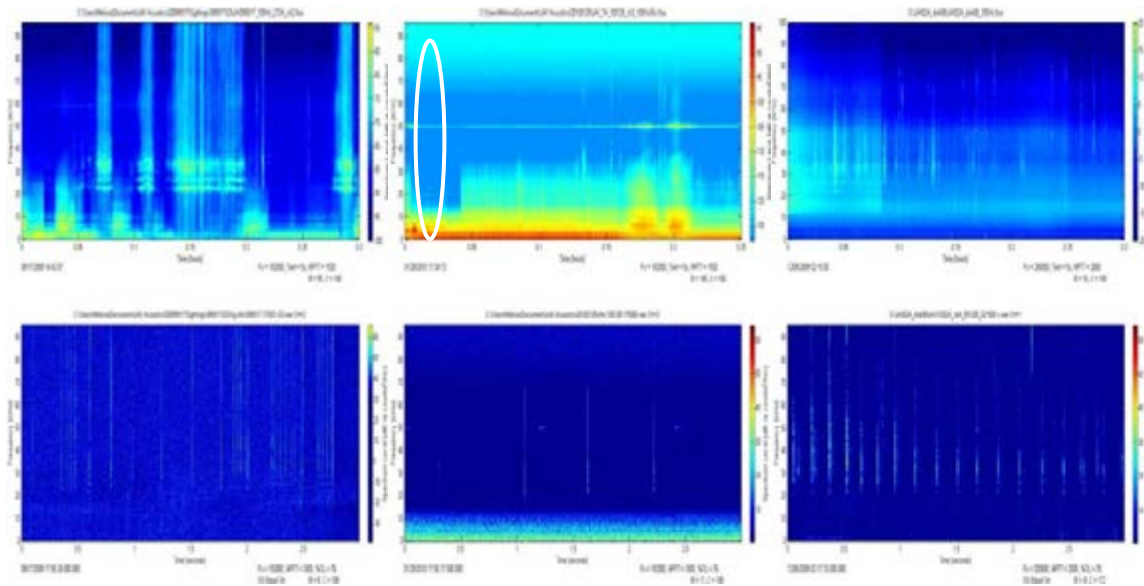


### Passive Acoustic Monitoring

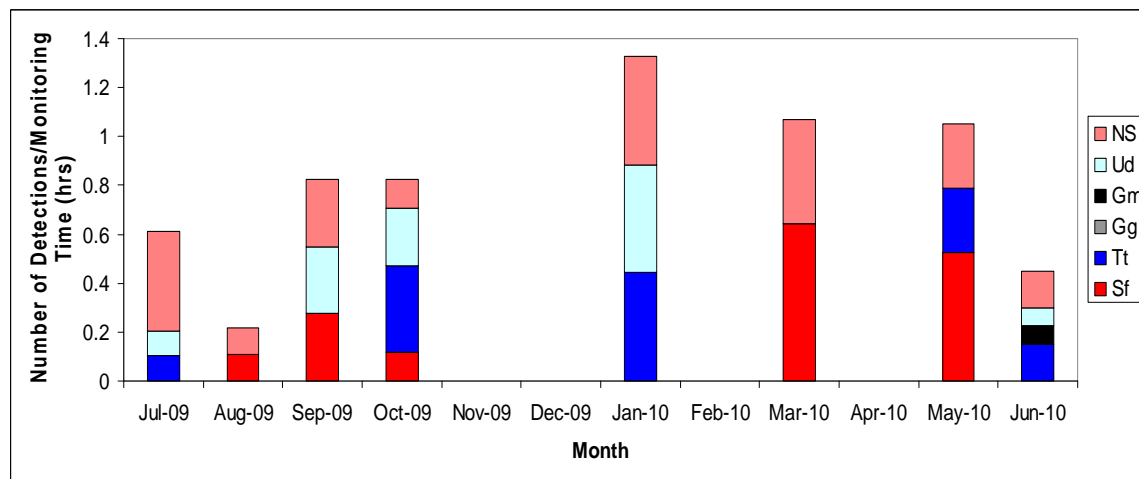
From 1 January 2009 to 30 June 2010, 19 USWTR line-transect surveys were conducted with the towed hydrophone array off Jacksonville, FL. Fourteen of these surveys were conducted with dedicated acoustic monitoring, while the remaining five included recordings only during sightings. During these surveys, a total of 54 odontocete groups were acoustically detected and recorded, 19 of which were positively identified to species by the visual observers. These 19 visually identified groups included 8 bottlenose dolphin groups, 8 Atlantic spotted dolphin groups, 2 Risso's dolphin groups and 1 pilot whale group (Table 7). One of the 15 recordings of animals that were not sighted featured echolocation click spectral patterns similar to those recorded in the presence of Risso's dolphins (Figure 14). Figure 15 shows the number of towed array detections per monitoring time for each species by month. Future work includes reviewing recordings to confirm species identification by localizing cetacean vocalizations using time difference of arrival (TDOA) techniques involving two or more hydrophone elements and using *Ishmael* and *Whaltrak* software. Acoustic species identification algorithms (described above) utilizing these recordings will be developed and tested over the next few months.

**Table 7. Number of recordings made using towed array between 1 January 2009 – 30 June 2010 off Jacksonville FL.** Total dedicated monitoring time was 58.4 hours and an additional 4.2 hours of recordings were made during sightings only.

<b>Species</b>	<b>Total # of Days Detected</b>	<b>Total # of Detections</b>	<b>Total Duration of Recordings (hh:mm)</b>
<i>Stenella frontalis</i>	8	17	3:16
<i>Tursiops truncatus</i>	8	12	2:57
<i>Grampus griseus</i>	2	2	0:40
<i>Globicephala macrorhynchus</i>	1	1	0:10
Unidentified delphinid	6	7	2:49
Not sighted	10	15	1:29



**Figure 14.** Echolocation clicks in LTSA and spectrograms illustrating similar spectral patterns with peaks and notches, as has been described for North Pacific Risso's dolphins (Soldevilla *et al.*, 2008). Clicks from Risso's dolphins during visually verified towed array recording (A), clicks with same pattern in towed array recording with no sighting (B) and clicks with same pattern in autonomous HARP recording (C).



**Figure 15.** Number of monthly towed array detections off Jacksonville FL per monitoring time for each species. No detections occurred in Nov 09, Dec 09, Feb 10 and Apr 10 because there was no monitoring effort due to rough weather. Only data from days with dedicated acoustic monitoring are included.

The first round of HARP deployments resulted in good quality data from 2 April 2009 to 4 September 2009 at site B (JAX01B). High-frequency data analysis has been performed and the results are described below. Low-frequency data have also been analyzed. Many fish calls are evident, but no known baleen whale calls were detected. Mid-frequency data analysis is in

progress. The HARP deployed at site A during this period (JAX01A) had a bad chip on the RAM board which resulted in timing errors and some failures in writing the data. These errors became progressively worse during the course of the deployment. The timing errors have been corrected and the JAX01A data appear usable from 2 April 2009 to 25 May 2009 despite the writing errors. These will be analyzed over the next few months. HARPs from the second round of deployments resulted in good quality data at site A (JAX02A) from 14 September 2009 to 15 December 2009. The high- and low-frequency data have been analyzed and results are presented below. Mid-frequency data analysis is still in progress. On 13 December 2009, the oil-filled hydrophone was bitten by a shark or marine mammal, and data quality progressively deteriorated over the next two days until salt water intrusion shorted out the pre-amplifier board. The HARP at site B (JAX02B) did not record any data over this period due to an unknown error.

During the JAX01B deployment, 161 days of data recordings were made and odontocete whistles and clicks were detected on 146 days (90%) and 154 days (96%), respectively (Table 6). During the JAX02A deployment, 91 days of data recordings were made and odontocete whistles and clicks were detected on 79 days (86%) and 91 days (100%), respectively (Table 6). Shipping was the most frequently heard non-biological noise, heard on 131 and 77 days at sites B and A, respectively. The detailed timing of acoustic events as a function of date and time of day are presented in Figure 16. The frequent occurrence of short duration whistle and echolocation click bouts is evident. Further analyses confirm that whistle and click bout durations are typically short (Table 7), with 90% lasting less than 30 and 45 minutes, respectively (Figure 17 a, c). Clustering in duration histograms is due to use of 1/3 duty cycle during recording. Whistle and click inter-bout intervals are also short (Table 7), with 90% occurring within 12 and 6 hours of a previous bout, respectively (Figure 17 b, d). The short duration of whistle bouts, which often occur as a single whistle, make them difficult to detect in LTSAs, particularly at the noisy, shallow water site B. A summary of hourly occurrence per day illustrates the continual occurrence of odontocetes in the area over several months at both sites and suggests a possible cyclical pattern to odontocete whistle and click bout occurrence or detectability at site B (Figure 18). Weather events are sporadic and appear to mask the detection of odontocete calls (Figure 18). A summary of diel occurrence of acoustic events suggests differences in occurrence patterns across call types and deployments (Figure 19). During the



JAX01B deployment, echolocation clicks are uniformly distributed throughout the day and night, while whistles increase in occurrence diurnally (Figure 19 a, c). Conversely, during the JAX02A deployment, both echolocation clicks and whistles exhibit nocturnal increases in occurrence (Figure 19 b, d). These differences may represent differences in call usage or detectability (*e.g.* due to ambient noise masking) and may reflect site-specific, season-specific, or species-specific differences. Future work analyzing data from continuing deployments, species classification results and trends in ambient noise levels should provide insights to causes of these diel differences. One detection of probable Risso’s dolphin clicks occurred on Dec. 5, 2009 at Site A (Figure 14c).

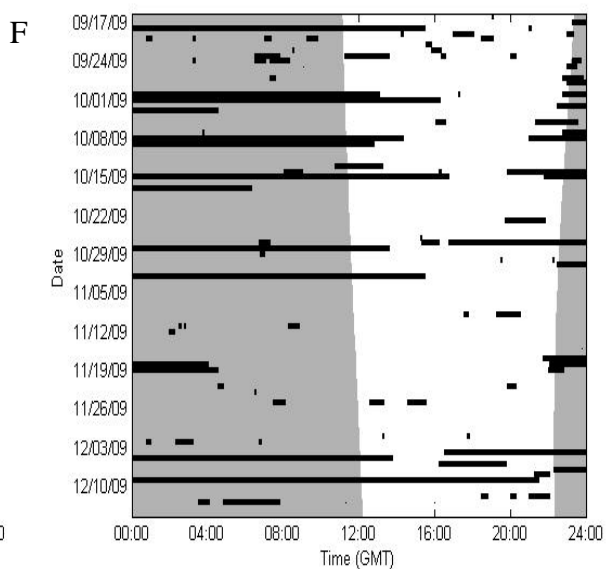
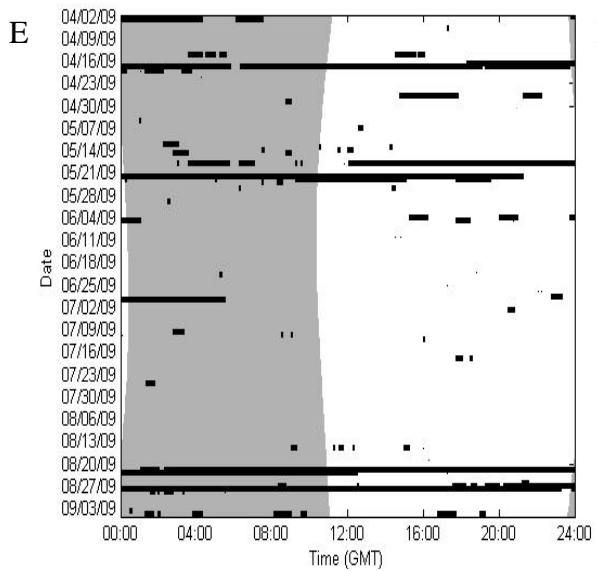
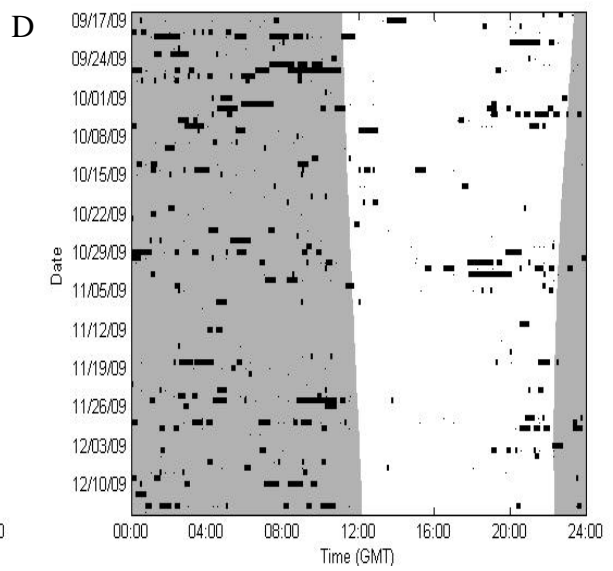
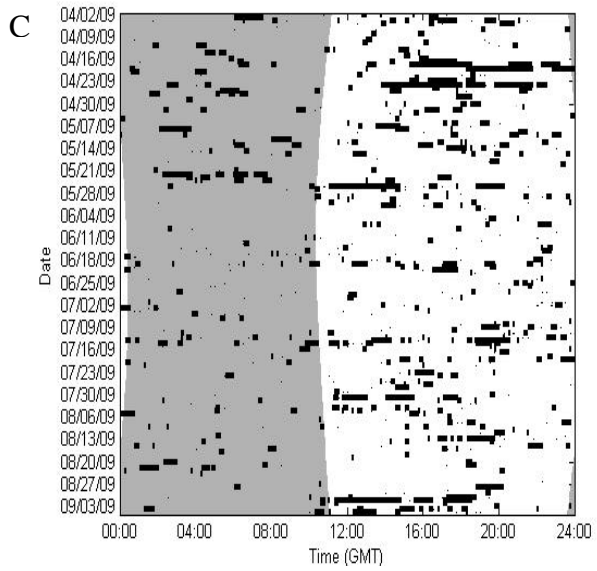
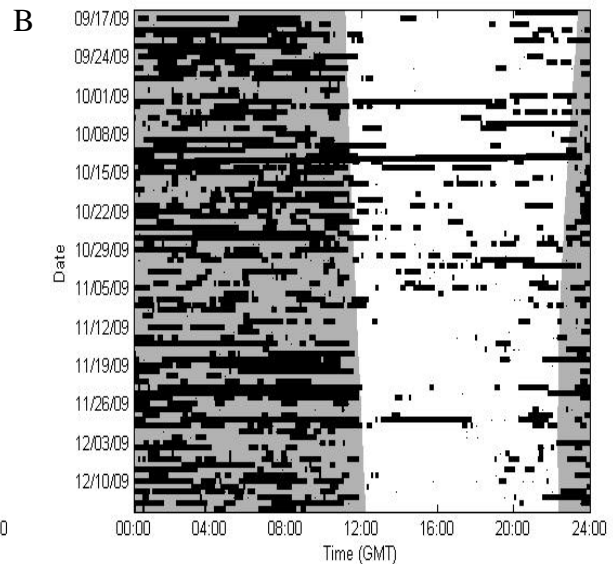
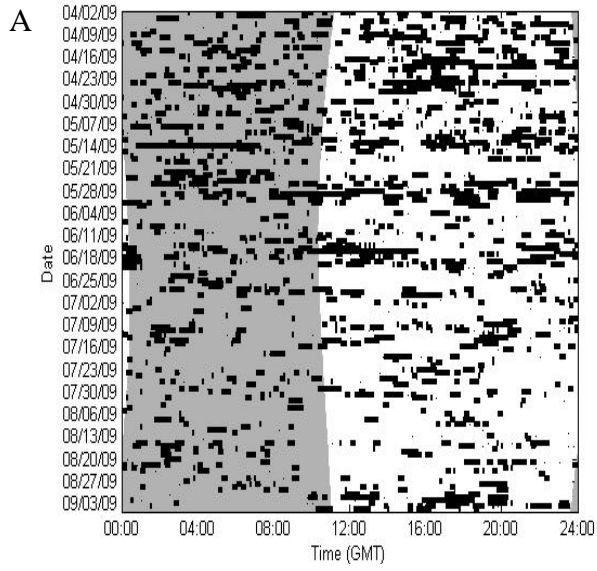
Analysis of the low-frequency data for baleen whales during the JAX02A deployment revealed the presence of many fish sounds and an unusual stereotyped call of unknown source (Figure 20a). The latter call appears to have a pulsed nature with amplitude modulation, pulse-rate modulation, and non-linear frequency jumps and it may exhibit formant structure. Additionally, a chorusing pattern is evident (Figure 20b). The call occurs regularly throughout the recording period and exhibits a trend toward increased nocturnal occurrence (Figure 20). Further analysis of the 6 weeks of JAX01A data and future HARPs will allow seasonal occurrence of this call to be examined. This call could be made by fish, baleen whales or odontocetes. No other known baleen whale calls were identified, though an unidentified call which appears to exhibit shallow-water modal frequency dispersion (Figure 21) merits further analysis.

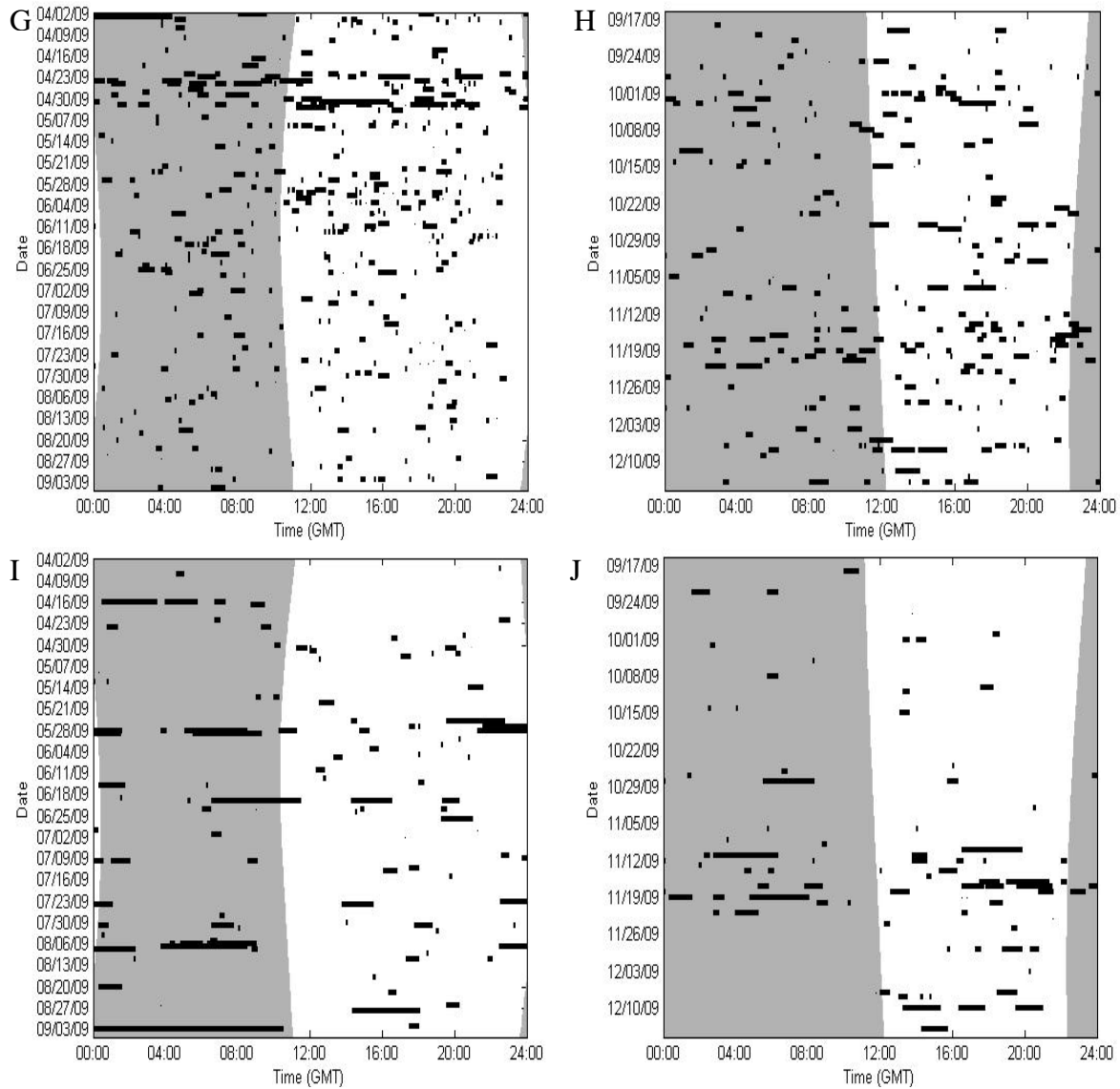
**Table 6. Number of days and hours recorded and total number of, number of days with, and number of hours with vocal events for JAX01B and JAX02A HARP deployments.**

	JAX01B	JAX02A
# Days Recorded	161	91
# Days with Click Detections	146	79
# Days with Whistle Detections	154	91
# Hours Recorded	3837	2152
# 1-hr Bins with Click Detections	640	387
# 1-hr Bins with Whistle Detections	1376	1097
Total # of Whistle Bouts	687	437
Total # of Click Bouts	1401	778

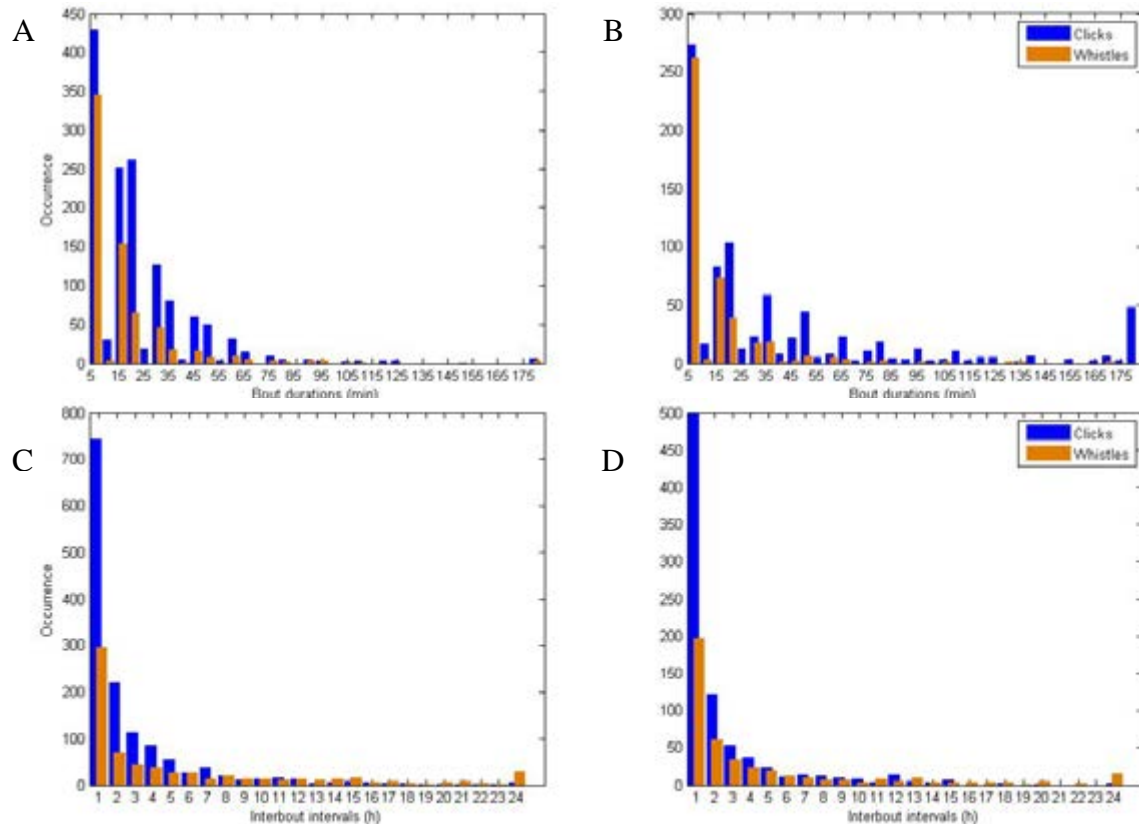
**Table 7. Odontocete acoustic event durations (min) and inter-bout intervals (min) for HARP deployments off Jacksonville, FL.**

	JAX01B			JAX02A		
	median	range		median	range	
Whistle bout durations	4.3	0.2	- 255.0	2.3	0.2	- 167.3
Whistle interbout intervals	1.7	0.2	- 72.0	1.3	0.4	- 88.8
Click bout durations	14.4	0.1	- 391.2	16.0	0.1	- 754.5
Click interbout intervals	0.9	0.9	- 40.0	0.7	0.9	- 24.0

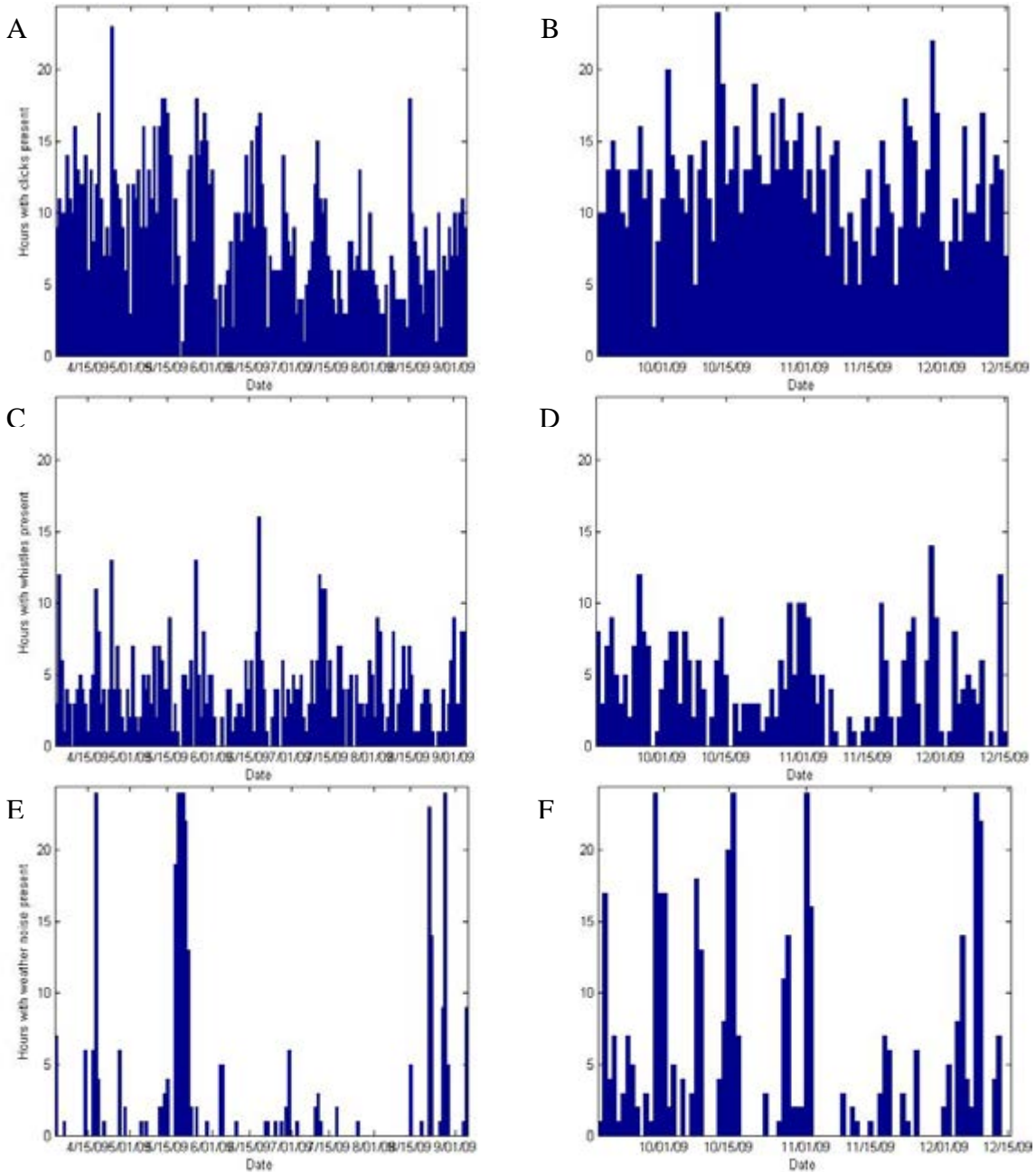




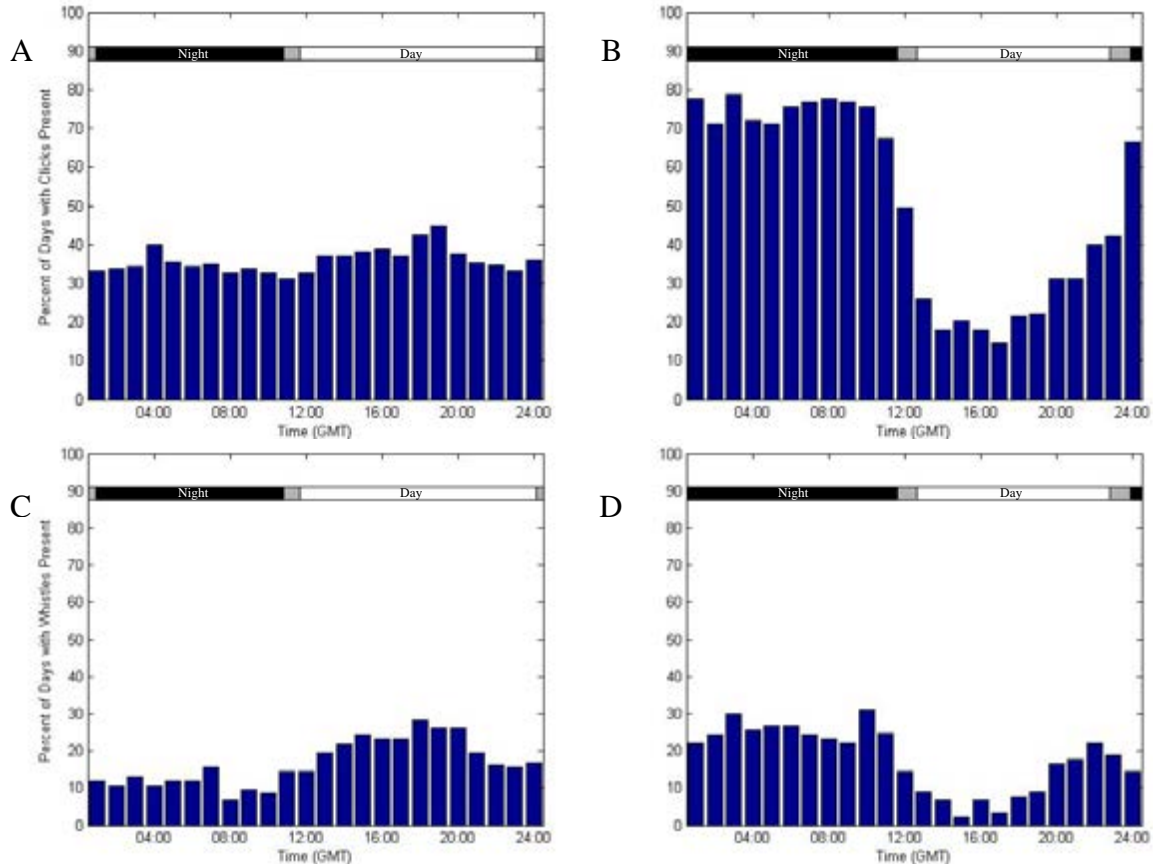
**Figure 16. Acoustic event occurrence by date and time. Odontocete click events during JAX02B (A) and JAX01A (B); odontocete whistle events during JAX02B (C) and JAX01A (D); weather events during JAX02B (E) and JAX01A (F); ship noise events during JAX02B (G) and JAX01A (H); and sonar events during JAX02B (I) and JAX01A (J). Shading indicates periods of darkness, determined from the U.S. Naval Observatory (<http://aa.usno.navy.mil>).**



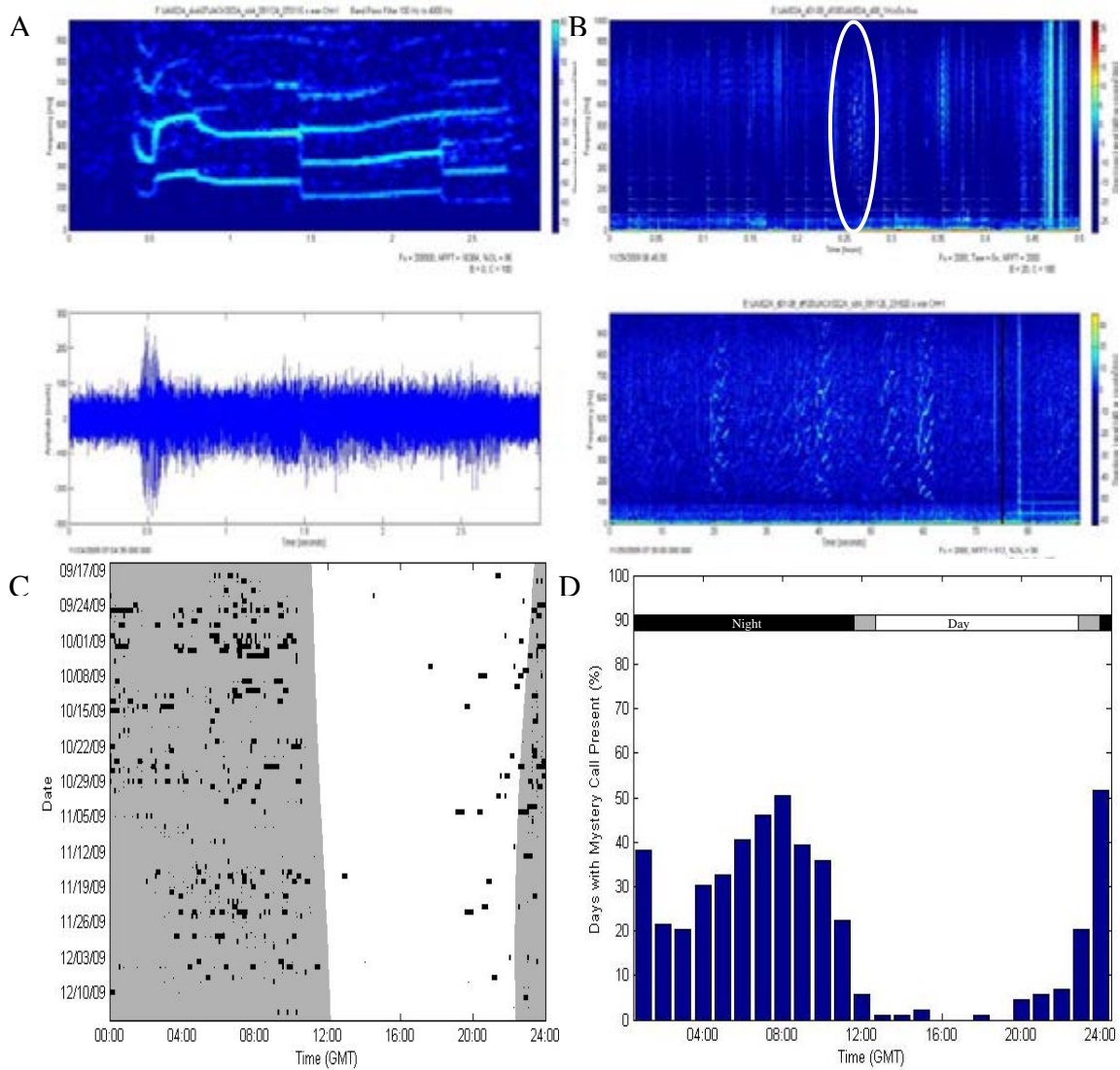
**Figure 17.** Odontocete acoustic event (whistle and click bouts) durations during JAX01B (A) and JAX02A (B) and interbout intervals during JAX01B (C) and JAX02A (D). Due to the long tail in these histograms, durations greater than 180 min or interbout intervals greater than 24 h are lumped into the final histogram bins.



**Figure 18.** Hours with acoustic event detections for each day during the HARP deployments. Odontocete click events during JAX02B (A) and JAX01A (B); odontocete whistle events during JAX02B (C) and JAX01A (D); and weather events during JAX02B (E) and JAX01A (F). Acoustic events were found using LTSAs.

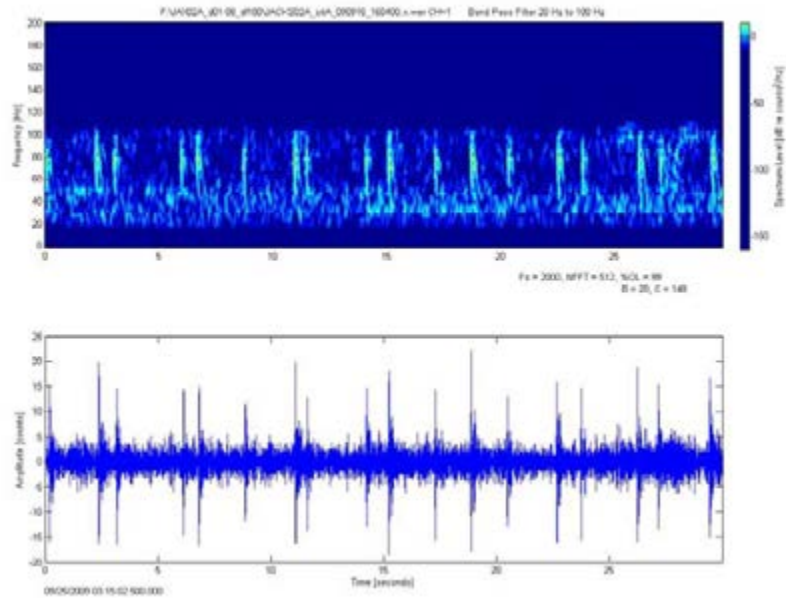


**Figure 19.** Percent of days with calls by time of day. Odontocete click events during JAX02B (A) and JAX01A (B); odontocete whistle events during JAX02B (C) and JAX01A (D).



**Figure 20.** Low frequency stereotyped call spectrogram and time-series (A), calling bout LTSA and spectrogram (B), call bout timing (C) and diel occurrence (D) during JAX02A deployment.





**Figure 21.** Spectrogram and time-series of low-frequency call that may exhibit shallow-water modal frequency dispersion.

### Vessel Sightings

A total of 45 vessels were observed in the study area during vessel surveys, including cargo, commercial fishing and recreational fishing vessels (Figure 22).

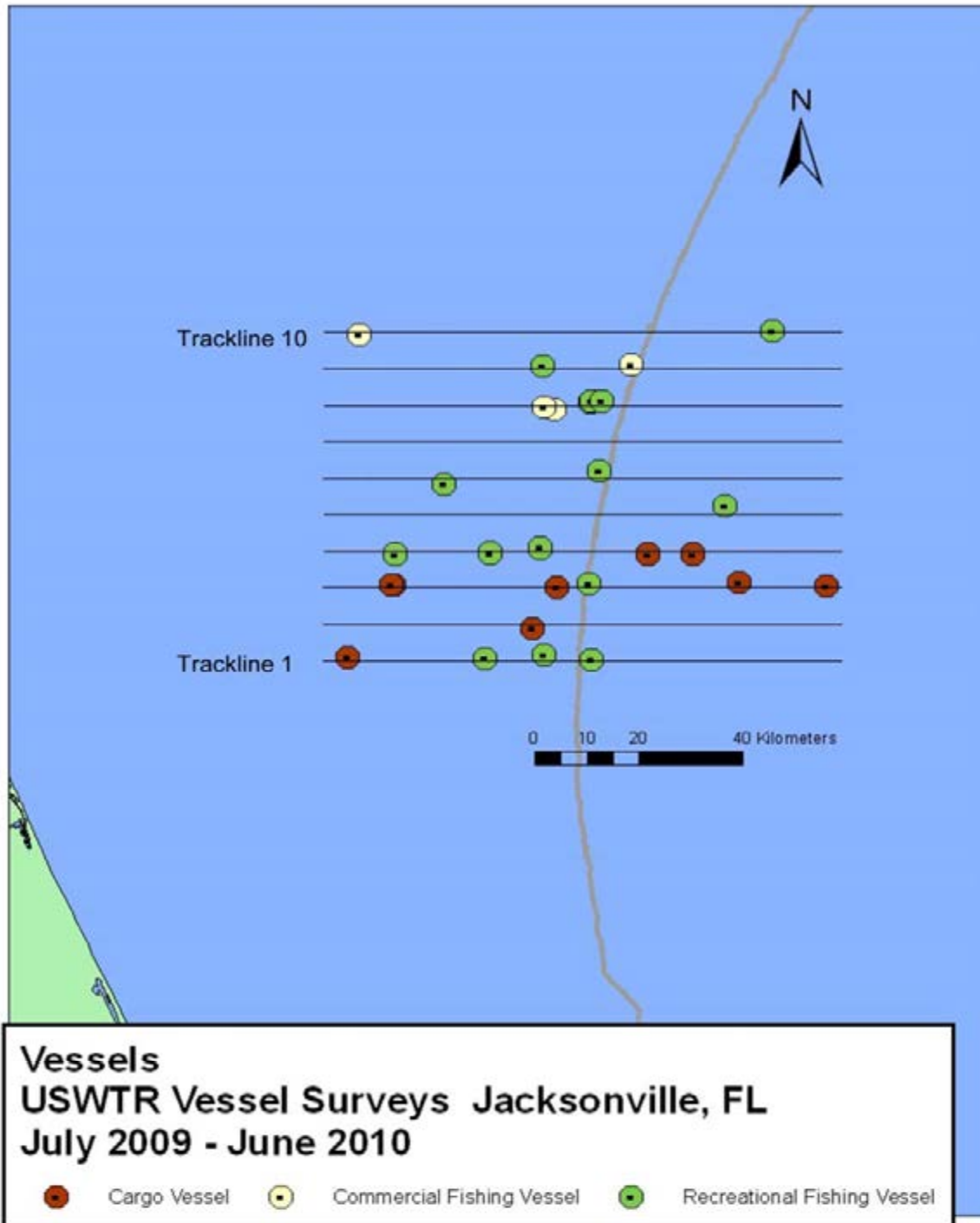


Figure 22. Distribution of all vessels seen during vessel surveys of the proposed USWTR site off of Jacksonville, Florida, July 2009 – June 2010.

## **Acknowledgements**

We thank Joel Bell (Naval Facilities Engineering Command Atlantic) for support and guidance. Dr. Lance Garrison modified VisSurvey for our use. For assistance with the HARP we thank Dr. John Hildebrand, Chris Garsha and Tim Boynton. Special thanks goes to captain Alex Loer. We would also like to thank Kelly Slivka for assistance with vessel surveys. Surveys were conducted under NOAA Scientific Permit No. 948-1692-00, held by the UNCW.

**Analysis of the UNCW and Duke University aerial and shipboard surveys of the USWTR on the Atlantic Coast of the USA for the period June 2007 to June 2010 (also including the UNCW aerial survey data 1998 –1999)**

*C.G.M. Paxton, D.L. Borchers and M.L. Burt*

*CREEM, University of St Andrews*

**Abstract**

Analysis of data from aerial and shipboard surveys of the USWTR, undertaken by Duke University and the University of North Carolina at Wilmington, for the period June 2007 to June 2010, combined with that of earlier aerial surveys of the UNCW for Onslow Bay 1998 and 1999, allowed maps of animal density to be estimated. The species of interest were bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella frontalis*), pilot and beaked whales combined and loggerhead turtles (*Caretta caretta*). As well as estimating abundance, the statistical models developed also provided some evidence of the environmental correlates of the animals distributions.

Detection functions were estimated from the multi-platform, multi-year USWTR survey data with additional data from the UNCW right whale surveys, the 1998/1999 UNCW aerial surveys of Wallop Island and additional sightings data from the shipboard surveys that took place off Cape Hatteras. Detection functions were not fitted to all of the detected species owing to a paucity of data (namely shipboard whale sightings) but fitted to a species group. Estimates of species abundance were obtained for the core USWTR region and an outer region, using the estimated detection probabilities and then separately estimating (a) animal presence/absence using a logistic general additive model and (b) density given presence.

Depending on the spatial models chosen, estimates were obtained either as an average for the entire time period, for each year or for each month. At the highest resolution, separate estimates were obtained for the USWTR core region and the outer region for the time period September 1998 to July 1999 and June 2007 to June 2010. Estimated bottlenose dolphin numbers varied between 29 (95% CI: 16 - 137, July 2008) and 100 (32 - 202, April 1999) for the core USWTR region and from 77 (43 - 380, July 2008) to 264 (84 – 540, April 1999) for the outer region. Estimated spotted dolphin numbers varied from 0 (0 – 0) in 1998/1999 to 344 (125 - 660, October 2009) in the core region and from 0 (0 – 0) in 1998/1999 to 854 (361 - 1548, in October 2009) in the outer region. Spotted dolphins only appeared in the region of interest from 2007. Pilot and beaked whale numbers were very low; 5 (1 – 9) in the inner region and 8 (1 – 18) in the outer region throughout the survey period. Estimated loggerhead turtle numbers varied from 2 (1 – 4; July 1999) to 176 (41 – 390; March 2009) in the core USWTR region and from 4 (1 – 8; July 1999) to 350 (82 – 775; March 2009) in the outside region.

These abundance estimates are based on the assumption that detection is certain on the trackline. Small sample sizes result in very little power to detect trend in abundance but there was no evidence of a systematic decline in any species in the last ten years and evidence for an increase in spotted dolphin numbers.

There was evidence that the abundance of bottlenose dolphins, spotted dolphins and loggerhead turtles fluctuated throughout the year, perhaps in response to sea surface temperature.

## Introduction

The USWTR aerial and shipboard surveys for 2007 – 2010 were carried out by the University of North Carolina at Wilmington (UNCW) and Duke University, respectively. The aim of these surveys was to establish baseline data on the density of marine mammals in the USWTR region (Fig. 1). This document describes the analysis of this data to develop a density surface of animals in the region of interest and potentially identify environmental predictors of marine animal density as well as any trends in abundance. Given the paucity of actual sightings within the region of interest such an analysis can supply only a preliminary investigation of animal numbers and all conclusions from this analysis should be regarded as tentative. Fortunately, additional survey data for the region of interest was available from the aerial surveys conducted by UNCW off Onslow Bay from September 1998 to July 1999. Additionally sightings data undertaken from the same aerial platform was available from ongoing right whale surveys carried out by UNCW closer to the coastline and the surveys undertaken near Wallop Island in 1998 and 1999. Additional shipboard sightings data was also available from a dedicated survey off Cape Hatteras in 2007.

The analysis undertaken here integrated the sightings and effort data from the 1998-1999 Onslow Bay survey (hereafter “Onslow survey”), the current ongoing aerial survey by UNCW (“USWTR aerial”) and the ongoing shipboard survey by Duke University (“USWTR ship” survey). The sightings data are augmented with data from the 1998 – 1999 Wallop Island surveys (“Wallop”), ship sightings data from Cape Hatteras (“Hatteras”) and the ongoing aerial right whale surveys (“right whale”) to increase to precision associated with the estimation of the detection functions and ultimately abundance.

## Survey methods

### *Region of interest and survey area*

The USWTR core region of interest is shown in Figure 1. The boundaries are approximately 25nm long (SW to NE) by 20nm wide (NW to SE). The survey region extended beyond the USWTR core region by 20nm (see grey transect lines in Fig. 2) so the total survey area is 1,800nm<sup>2</sup>, with 500nm<sup>2</sup> of this (28%) within the USWTR core region. Abundance estimates were obtained for both the core USWTR region and the outer region separately.

### *Survey effort*

The realised aerial survey effort consisted of 12,821km in 1998 and 1999 and 42,676km from June 2007 to June 2010 (Figure 2).

The region covered by the shipboard survey was almost identical to that of the USWTR aerial survey (Fig. 3) except there was no realised effort from the shore to the region of interest. Two vessels were used (*Sensation* and *Cetus*) and there was no evidence that detection varied between them (see results). The total realised effort for these shipboards surveys was 5,209km.

The temporal coverage of the surveys is given in Table 1 and realised effort is shown in Table 2.

## Statistical methods

### *Overview*

To generate an estimated density map for each species/taxa of interest, and where possible identify environmental variables driving animal abundance, the data were analysed by first estimating the probability of detection associated with each sighting and then estimating abundance per segment of realised trackline within the truncation distance. The detection probabilities were estimated assuming that detection of an animal on the trackline was certain (see later for discussion). The estimated densities were obtained from a two stage modelling process: firstly, probability of presence was

modelled (as a logistic generalized additive model (GAM)) and secondly, estimated density, given animals were present, was modelled. Predictions were obtained from these two models for the region of interest and the product of these two prediction surfaces gives an estimated relative density surface for the region. Abundance for the region of interest was obtained by numerically integrating under these surfaces. Note that the resulting abundances are relative (rather than absolute) because they do not take into account the amount of time animals are submerged (and therefore unavailable for detection) and imperfect detection on the trackline.

All animal species were considered initially but small sample sizes meant that only four taxa were modelled in detail; bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella frontalis*), medium sizes whales (i.e. pilot whales *Globicephala* sp. and ziphids) and loggerhead turtles (*Caretta caretta*). It may be that with future surveys data for other species will become adequate for analysis.

#### *Estimation of detection probabilities*

In conventional line transect sampling, the probability of detection depends only on the perpendicular distance of the sighting to the transect and at zero perpendicular distance this is assumed to be one (denoted by  $g(0)=1$ ). Either a hazard-rate ( $1-\exp(-y/\sigma)^{-b}$ ) or half-normal form ( $\exp(-y^2/2\sigma^2)$ ) was used for the detection function ( $\sigma$  is the scale parameter) (Buckland et al. 2001). The effects of covariates, other than perpendicular distance, were incorporated into the detection function model by setting the scale parameter in the model to be an exponential function of the covariates (Marques 2001). Thus, the probability of detection becomes a multivariate function,  $g(y, \mathbf{v})$ , representing the probability of detection at perpendicular distance  $y$  and covariates  $\mathbf{v}$  ( $\mathbf{v} = v_1, \dots, v_Q$  where  $Q$  is the number of covariates). The scale term,  $\sigma$ , has the form:

$$\sigma_k = \exp\left(\beta_0 + \sum_{q=1}^Q (\beta_q v_{kq})\right)$$

and  $\beta_0$  and  $\beta_q$  ( $q=1, \dots, Q$ ) are parameters to be estimated. With this formulation, it is assumed that the covariates may affect the rate at which detection probability decreases as a function of distance, but not the shape of the detection function.

A backward, stepwise selection procedure was used (starting from the previous best models) to decide which covariates to include in the model, with a minimum Akaike's Information Criterion (AIC) inclusion criterion. All model selection was performed in the program *Distance* (v5.0; Thomas *et al.* 2002), and then the final selected models were re-fitted using a set of customised functions (mrds v.1.3.9) in the statistical programming package *R* (*R* Developmental Core Team, 2002). This facilitated estimation of variance within *R* (see below).

This procedure was used to estimate detection probability for dolphins and aerial sightings of whales. The paucity of turtle sightings and shipboard whale sightings required a slightly different approach: here sightings were considered as coming from narrow strip transects and detection within the strip was assumed to be certain.

#### *Estimation of density surfaces*

A modified version of the 'count model' of Hedley et al. (1999) was implemented to model the trend in spatial distribution of the different species. The response variable for this model is the estimated number of individuals for a small segment  $i$  of trackline,  $\hat{N}_i$ , calculated using an estimator similar to the Horvitz-Thompson estimator (Horvitz and Thompson 1952), as follows:

$$\hat{N}_i = \sum_{j=1}^{n_i} \frac{s_{ij}}{\int_0^w \hat{g}(y, v_{ij}) \pi(y) dy}, \quad i = 1, \dots, T,$$

where, for segment  $i$ ,  $\int_0^w \hat{g}(y, v_{ij})\pi(y)dy$  is the estimated probability of detection of the  $j$ th detected pod,  $n_i$  is the number of detected pods in the segment and  $s_{ij}$  is the size of the  $j$ th pod. The total number of transect segments is denoted by  $T$ . By assumption,  $\pi(y)$ , the probability density function of actual (not necessarily observed) perpendicular distances is uniform up to the truncation distance; this is satisfied by locating transects randomly.

Having obtained the estimated number of individuals in each segment, the density in segment  $i$ ,  $\hat{D}_i$ , was estimated from  $\hat{N}_i / a_i$  where  $a_i$  is the area of segment  $i$ . Segment area was calculated as the length of the segment multiplied by twice the truncation distance used to model the detection function. The survey tracklines were initially divided up into distinct segments based on when vessels had gone on or off effort and whether there was a change in environmental characteristics. A variety of segment lengths were tried in the range of 5km to 13km; 10km was selected as an appropriate compromise between maximising the ratio of non-zero to zero segments, maintaining environmental resolution and giving some measure of spatial independence (see results).

In most cases, the number of segments where detections occurred was extremely low (Table 7) which made fitting of models difficult and so a variety of modelling approaches were undertaken. Attempts to model density directly (as in the approach described above) were unsuccessful because of the high frequency of zeros and so zero-inflated methods were tried, however, these proved impossible to implement successfully for data upto August 2009 (Paxton and Borchers, 2009). Therefore, a two-stage process was implemented: the presence or absence of animals in a particular segment was modelled using a logistic GAM and then non-zero density in a segment was modelled. The predicted probability of presence of animals in a segment was multiplied by the predicted non-zero density in a segment to obtain the predicted density of animals in a segment. Again because of the paucity of the data attempts to model varying non-zero density proved unsuccessful so in all cases the mean of the non-zero density was used. This two-stage process may introduce a potential bias, in that zeros are over represented because some zeros are not true zeros (no animals present) but simply segments of low density where the animals though present were not observed.

The covariates considered for inclusion in the models were longitude (*Lon*) and latitude (*Lat*), sea surface temperature (*Temp*) and depth (*Depth*), day of the year (*Dayofyear*) and year of survey (*Year*). *Dayofyear* was considered as a cyclic cubic spline so the second derivative of the curve for *Dayofyear* would meet at the beginning and end of the year. Sea surface temperatures were collected during the shipboard survey but for the aerial survey and the prediction grid they were obtained from the National Oceanic and Atmospheric Administration (NOAA, <http://dss.ucar.edu/datasets/ds277.0/data/oiv2/>) at one degree and weekly resolution and were an updated set (based on the analysis of Reynolds et al. 2002). Depths were obtained from the ETOPO2 2 minute resolution relief data available from National Oceanographic and Atmospheric Administration (<http://www.ngdc.noaa.gov/mgg/image/2minrelief.html>). Temperatures and depths were associated with effort segments by finding the closest point in the temperature and bathymetry data to the midpoint of the effort segments using great circle distances (and additionally, time for temperature). Finally, *Survey* was a factor variable which indicated the survey platform used (either a plane, *Cetus* or *Sensation*) but this was only considered in a model if the estimated value of the regression coefficient associated the plane was lower than those associated with the ships i.e. the use of *Survey* reflected differences in  $g(0)$  between aerial and shipboard surveys.

Scatterplots of the explanatory variables are shown in Figure 3. Unsurprisingly, *Temp* and *Dayofyear* were strongly correlated with each other as were *Lon*, *Lat* and *Depth*, thus, the inclusion of only one of these correlated variables in the final models should not be interpreted as necessarily precluding the influence of others. As *Temp* and *Dayofyear* were correlated, *Dayofyear* was used in the abundance analyses.

Unbiased risk estimation implemented in the *mgcv* package (v. 1.5-2, Wood 2009) in *R* (v. 2.9.0) was used for covariate selection in the logistic model, augmented with diagnostic plots, using the principles described in Wood (2001). All covariates were considered for inclusion in the model as 1D smooths of untransformed covariate values. In addition, 2D smooths of *Lat* and *Lon* (but transformed as kilometre deviations from the equator and longitude 77W, respectively) were considered for inclusion into the GAM. A maximum of 4 degrees of freedom (5 knots) were allowed in the selection of 1D smooths for *Depth*, *Temp* and *Dayofyear*. In the case of *Lat* and *Lon*, 6 degrees of freedom (7 knots) and up to 13 degrees of freedom (14 knots) were allowed in the case of 2D smooths, thus allowing moderate flexibility but reducing the possibility of overfitting. The presence of unexplained spatial variation was checked by inspection of semivariograms of the residuals of the models. Models were fitted to all data across all years.

Due to gaps in search effort, changes in direction and changes in environmental conditions along transects, effort could not always be split into segments of the desired length (see later). Therefore, the size of each segment varied and so the model was weighted by segment area.

The presence only data was modelled in the same way as above although sometimes models were simplified in order not generate spuriously high results in the bootstrap.

The aim of all the modelling process described above was to estimate a density surface (see below) and estimate abundance. To investigate the underlying biological basis of the distributions of the animals, model selection for the presence-absence models for bottlenose dolphins, spotted dolphins and loggerhead turtles was repeated without considering *Lon* and *Lat* and *Temp* was considered as a replacement for *Dayofyear*.

### *Prediction*

The final models were used to predict density of marine animals in the core USWTR region and the outer region using a 2 minute resolution prediction grid. Animal abundance was estimated by numerically integrating under this predicted density surface. If survey platform was included in the model, abundance was predicted assuming the survey mode with the largest coefficient value in the model as this would reflect the best detection on the trackline. Predictions were made for June for each of the survey years (although June was not surveyed in 1998) to allow comparison between years. Obviously, models that did not contain temporal covariates (*Dayofyear*, *Temp* or *Year*) produced identical predictions for all years and months.

### *Variance estimation*

Variance was estimated by repeating (a large number of times) the entire abundance estimation process on samples, drawn at random from the data, to obtain a distribution of abundance estimates. Confidence intervals were obtained from this distribution using the 2.5% and 97.5% percentiles to obtain the upper and lower limits. Samples were obtained by sampling transects, with replacement, such that the selected effort reflected the effort in the original sample. Sometimes, extreme samples could result in unrealistically high abundance estimates and so models were simplified to avoid this problem.

## **Results**

### *Aerial survey sightings*

The USWTR and right whale aerial surveys were carried out from the observation plane flying at a height of 305m (1000ft). The aerial surveys in 1998 and 1999 were carried out with a similar protocol, except that the plane flew at 230m (750ft). Thus, the sightings data from the earlier and ongoing surveys could be combined. Sightings were grouped together based on the *a priori* similarity of form of the species seen. The numbers of sightings that could be assigned to reasonably specific taxonomic categories are shown in Table 3. There were three morphologically similar groups; dolphins (all species



commonly referred to as dolphins), turtles (all turtles species) and whales (baleanopterids, pilot whales and beaked whales). Increased sample sizes obtained from future surveys may allow splitting of these groups.

#### *Shipboard survey sightings*

There were fewer sightings from the shipboard surveys, even when complemented by the additional sightings off Cape Hatteras (Table 3).

#### *Aerial survey detection functions*

Estimates of perpendicular distance were obtained either by reference to direct estimates of distance by observers, trigonometry from the declination angle of the plane to the observed animals or by trigonometry from the position of the plane at first observation of the animals and subsequent location directly above the animals. However for some sightings (primarily turtles) distance estimates were not available or could not be calculated. It was assumed that such sightings occurred at random so detection probabilities (and hence estimated numbers, see below) were allocated to these sightings after estimation of the detection function with a proportion assumed lost due to being beyond the truncation distance (as in the sample with known distance sightings). Table 3 gives the number of sightings before and after truncation, for taxa where there were sufficient numbers to allow further investigation.

The detection functions fitted to aerial sightings are summarised in Table 6. In the case of dolphins and turtles, sightings data were initially fitted in *Distance* (Thomas et al. 2009), to aid in model selection, and then integrated into the whole analysis. Dolphin sightings were binned into 150m widths and right truncated at 1.5km and the best fit detection function was a half normal function with Beaufort sea state as a covariate (in addition to perpendicular distance) (Figure 4). Medium whale sightings were binned into 100m intervals and the best fit detection function was a hazard rate function with Beaufort sea state as a covariate (Figure 4).

The perpendicular distance distribution of turtle detections did not conform to the usual assumption of monotonically declining detection probability with increasing distance and so detection was assumed to be certain out to 500m (corresponding to a strip transect survey with a strip of 1000m width). The reasons for the unusual distribution are not known but it may have been caused in part by rounding of distances.

#### *Ship survey detection functions*

Sightings were combined to determine shipboard detection functions for each species group. The number of sightings with distances are given in Table 5.

Detection functions fitted to the shipboard sightings are summarised in Table 6. Dolphin sightings were binned into 100m widths and right truncated at 300m. The best fit detection function was a half-normal with Beaufort sea state and weather as covariates (Figure 5). Turtles were assumed to have constant (and certain) detectability in a strip transect with half-width 80m. Medium size whales were also assumed to be in a strip transect with a half-width of 200m.

#### *Estimation of density surfaces*

The realised trackline for both aerial and shipboard surveys was divided into 7,180 segments (5,873 aerial and 1,307 shipboard). The final fitted models for predicting density and for biological explanation are given in Table 7.

### Bottlenose dolphins

Bottlenose dolphins were detected in 178 segments (2.5%). Figure 6 shows monthly predicted abundances and their confidence intervals. Estimated bottlenose dolphin numbers varied between 29 (95% CI: 16 - 137, July 2008) and 100 (32 - 202, April 1999) for the core USWTR region and from 77 (43 - 380, July 2008) to 264 (84 - 540, April 1999) for the outer region. Note that the upper limit of the 95% CI of the estimates are high especially for the outer zone. This is probably caused by edge effects in the bootstrap.

A depth association can possibly be discerned (Figure 7) but the pattern probably reflects depth describing the data spatially rather than a real preference for 300-400m depths. Differences occur both across and within years (Figure 6) with numbers peaking in spring and to a lesser extent in autumn (Figure 7) presumably as a response to temperature changes.

### Spotted dolphin

Spotted dolphins were detected in 71 segments (1%). A predictive model was fitted consisting of smooths of *Depth* and *Dayofyear* with *Year* and *Survey* as factors. Given the small numbers detected, the estimates were, unsurprisingly, associated with a wide confidence interval. Figure 8 gives the predicted abundances for each month of interest. Spotted dolphins were not seen in the region during the UNCW 1997 - 1998 surveys and only appeared in 2007 since then its predicted numbers have increased considerably. Estimated spotted dolphin numbers varied from 0 (0 - 0) in 1998/1999 to 344 (125 - 660, October 2009) in the core region and from 0 (0 - 0) in 1998/1999 to 854 (361 - 1548, in October 2009) in the outer region. Although year was selected as a covariate in the model, the resultant jump in numbers between December and January look unrealistic.

For the explanatory model, replacing *Dayofyear* with *Temp* gave a slight improvement in model fit. Spotted dolphins appear to be associated with shallower water (Figure 9).

### Ziphiids and pilot whales

In the case of the ziphiids and pilot whales only 11 segments had non-zero estimates of density, thus no attempt was made to model density spatially or temporally. As the estimates were not based on temporal variables the values did not vary. The best average estimate of these whales abundance is 5 (1 - 9) in the inner zone and 8 (1 - 18) in the outer zone. Little interpretation can be made of these results at this stage but it should be stressed that these abundance estimates represent animals at the surface only.

### Loggerhead turtles

In the case of loggerhead turtles there were 413 non-zero segments. Presence/absence was modelled with smooths of *Depth* and *Dayofyear* with *Year* and *Survey* as factors. Figure 10 shows the estimates by month. Loggerhead numbers varied from 2 (1 - 4; July 1999) to 176 (41 - 390; March 2009) in the core USWTR region and from 4 (1 - 8; July 1999) to 350 (82 - 775; March 2009) in the outside region.

Explanatory model selection suggested that both *Depth* and *Dayofyear* were significant with turtles more likely to be present in shallower waters (Figure 11). Replacing *Dayofyear* with *Temp* did not improve the model fit and the relationship corresponded to a decrease in numbers in July.

## Discussion

Given the lack of sightings any conclusions about the reasons for the estimated distributions in the region should be regarded as extremely tentative. The lack of sightings for species other than those analysed above precluded analysis. Nonetheless, it seems reasonable to conclude that the region as a whole has few large marine fauna (save perhaps turtles, see below), data are inadequate to estimate trend except perhaps rather crudely for spotted dolphins and there is no evidence that any species has reduced in numbers over the time period considered. However, the above results are all based on single

observers with  $g(0)$  (detection probability on the trackline) assumed to be one for the species of interest.

There are two reasons that  $g(0)$  may be less than one. Firstly, there is an availability bias associated with the presence of species at the surface. Cetaceans and turtles can spend only a small proportion of their time at the surface (see below). This bias was ameliorated in models that contained survey type by only predicting with the factor coefficient associated with ships (this effectively makes the  $g(0)$  estimate for aircraft no more negatively biased than that for ships). The second reason for  $g(0) < 1$  is perception bias: animals are missed on the trackline even if they are at the surface. Smaller cetaceans that do not form highly detectable pods and some of the more cryptic species may not be detected even when on the trackline. Both availability bias and perception bias tend to be greater for fast-moving observers and are therefore greater for aircraft than for ships (see comparisons of  $g(0)$  in Palka 2005a and 2005b)

It might be expected that *Survey* platform should always appear in the models as  $g(0)$  should generally be higher for a ship than a plane. This was not always the case here - due in part to the low power to detect this effect because of the low number of sightings. In the case of bottlenose dolphins, a higher density was associated with aerial surveys! *Survey* was not included in the final models if this was the case.

A correction for availability bias can be obtained if the expected times of availability and unavailability are known, as well as the transit speed of the observation vessel (e.g. Laake et al. 1997, Hedley and Bannister 2004, Paxton et al. submitted). These correction methods are less reliable if the speed of the survey platform is similar to that of the animals. Therefore, they may not work well for shipboard surveys but are likely to be adequate for aerial surveys. They do, however, depend on having reliable estimates of mean times of availability and unavailability. We have not used them here because mean times were not available for all species, they may differ within the species groups used in our analysis (groups determined in part by small sample size) and mean times may be location-dependent. We corrected perception bias for aircraft to be no greater than that from ships and accepted that density and abundance estimates are likely negatively biased by some unknown amount.

Where it has been investigated *Mesoplodon densirostris* has been found to spend c. 26% of the time underwater (Baird *et al.* 2004) and Barlow (1999) estimated  $g(0)$ s of 0.45 and 0.23 for *Mesoplodon* and *Ziphius* respectively.

Forney et al. (1995) estimated  $g(0)$  to be 0.67 for smaller dolphin groups and Palka (2005a and b) estimated  $g(0)$  for small cetaceans to be in the range 0.58 – 0.95 depending on the craft used.

Where investigated loggerhead turtles have been found to spend c. 90% of their time diving (Houghton et al. 2002) but animals who are just submerged (which can be 60% of the time, Polovina *et al.* 2003) may be amenable to detection especially from air dependent on water opaqueness. Perception bias for this species could vary considerably and the abundance estimates given here could be severely biased. No attempt was made (at this stage) to include sightings of animals recorded only as ‘unspecified’ turtles.

Numbers in the core and outer regions were clearly correlated suggesting that there is no reason to believe animals were being displaced from the USWTR core region.

The limited tentative biological conclusions that can be drawn reflect existing knowledge in the literature. The bottlenose dolphins prefer deeper water compared to spotted dolphins and there appears to be a cyclic nature to the animals presence, possibly associated to temperature.

#### *Recommendations for the future*

Assuming the USWTR survey work is ongoing, issues of potential interest in the future work might include:

1. Improving detection function and density estimates by supplementing existing detections with those from future surveys.

2. Investigation of reliable methods for estimating  $g(0)$  without double-observer survey. Options include cue-based methods and use of appropriate availability correction methods based on data on availability patterns for each species.
3. Further elucidation of the environmental drivers of cetacean density in the area of interest, perhaps by the use of additional variables.
4. Records of water opaqueness may be useful in the generation of detection functions of turtles.

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Table 1. Temporal coverage of surveys (A=Aerial, S=Shipboard).

Month	1998	1999	2007	2008	2009	2010
January		A			A,S	A, S
February				A	A,S	A
March		A		A,S	A,S	A, S
April		A		A	A,S	A, S
May		A		A,S	A	S
June		A	A,S	A,S	A, S	A, S
July		A	A,S	A,S	A, S	
August			A,S	A,S	A, S	
September	A		A,S	A,S	A, S	
October	A		A,S	A	A, S	
November	A		A,S	A,S	A	
December	A		A	A	A	

Table 2. Survey effort (km) by year.

Year	Aerial	Shipboard	Total
1998	6063		6063
1999	6758		6758
2007	8306	1812	10118
2008	12464	1263	13727
2009	15219	1570	16789
2010	6688	563	7251
Total	55497	5209	60706

Table 3. Numbers of sightings by survey.

Type	Survey	Turtles	Dolphins	Whales	Total
Aerial	Onslow	73	59	3	135
	Right whale	806	666	19	1491
	Wallop	53	90	29	172
	USWTR	851	196	8	1055
Ship	Ship	93	113	11	217

Table 4. Numbers of aerial sightings by species group used for detection function modelling (ie. those with perpendicular distances).

<b>Sightings group</b>	<b>Species within group (where identified)</b>	<b>Number of sightings before truncation</b>	<b>Truncation distance</b>	<b>Number of sightings after truncation</b>
Dolphins	Bottlenose, common, Risso's, spotted, rough toothed and unidentified dolphins	285	1500 m	273
Whales	Beaked whales, pilot whales, other whales	42	1500 m	37
Turtles	Loggerhead, Leatherback, Kemp's ridley and unidentified turtles	852	500 m	632

Table 5. Numbers of shipboard sightings by species group used for detection function modelling (includes sightings from aerial surveys off Wallop Island and right whale surveys as well as shipboard surveys off Cape Hatteras).

<b>Sightings group</b>	<b>Species within group (where identified)</b>	<b>Number of sightings before truncation</b>	<b>Truncation distance</b>	<b>Number of sightings after truncation</b>
Dolphins	Bottlenose, common, Risso's, spotted, rough toothed and unidentified dolphins	109	300 m	76
Whales	Beaked whales and pilot whales	10	200 m	6
Turtles	Loggerhead, Leatherback, Kemp's ridley and unidentified turtles	89	80 m	58

Table 6. Detection functions for both aerial and shipboard sightings: HN indicates a half normal form was chosen and HR a hazard rate form. The covariates included (in addition to perpendicular distance) are Beaufort sea state (BSS) and weather (fitted as a factor variable with 5 levels). 'Strip' indicates that a strip transect methodology was used.

<b>Sightings group</b>	<b>Aerial surveys</b>	<b>Shipboard surveys</b>
Dolphins	HN: BSS	HN: BSS + Weather <sub>5</sub>
Whales	HR: BSS	Strip
Turtles	Strip	Strip

Table 7. Predictive and explanatory biological models for each species. The term  $s()$  indicates a smoothed function of the variable of interest. The final column gives the number of the relevant figure.

Species	Number of non-zero segments	Model	Terms in model	Figure
<i>Tursiops truncatus</i>	178	Predictive, logistic component	$s(\text{Depth}) + s(\text{Dayofyear}) + \text{Year}$	6
		Explanatory logistic component.	$s(\text{Depth}) + s(\text{Dayofyear}) + \text{Year}$	7
		Non-zero density component	$\text{Year}$	6
<i>Stenella frontalis</i>	71	Predictive, logistic component	$\text{Survey} + s(\text{Depth}) + s(\text{Dayofyear}) + \text{Year}$	8
		Explanatory logistic component	$\text{Survey} + s(\text{Depth}) + s(\text{Temp}) + \text{Year}$	9
		Non-zero density component	$\text{Year}$	8
Collective medium sized whales	11	Predictive, logistic component.	None	
		Explanatory logistic component	None	
		Non-zero density component	None	
<i>Caretta caretta</i>	413	Predictive, logistic component.	$s(\text{Depth}) + s(\text{Dayofyear}) + \text{Year}$	10
		Explanatory logistic component	$s(\text{Depth}) + s(\text{Dayofyear}) + \text{Year}$	11
		Non-zero density component	$\text{Year}$	10



Figure 1. The core USWTR region (box) and depths (m) at 2 minute intervals. Each colour represents 200m intervals up to 4200m depth (violet in lower right hand corner).

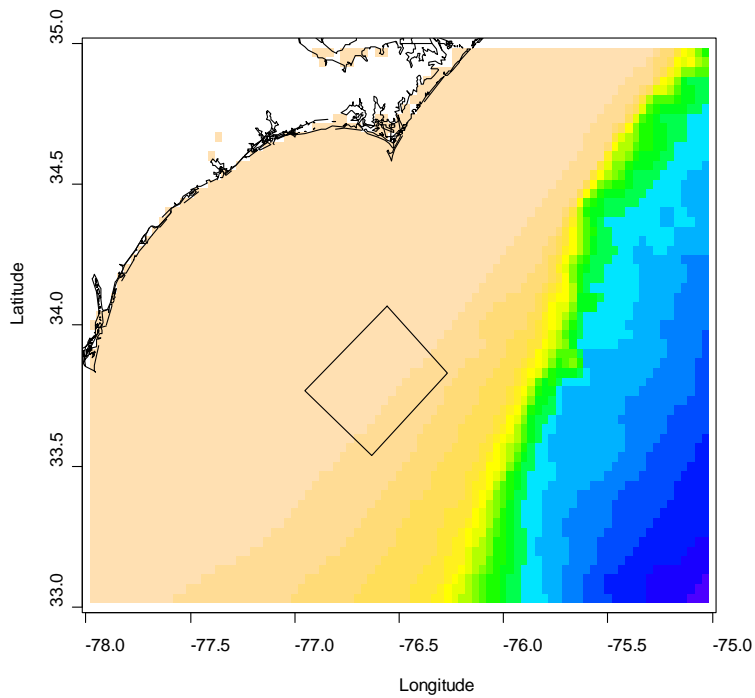


Figure 2. Realised effort segments for a) Aerial surveys, USWTR (grey) and Onslow 1998/1999 (blue) and b) Shipboard surveys USWTR (grey). Individual points represent the midpoints of each segment. The boxed indicate the boundaries of the core USWTR region and the outer region.

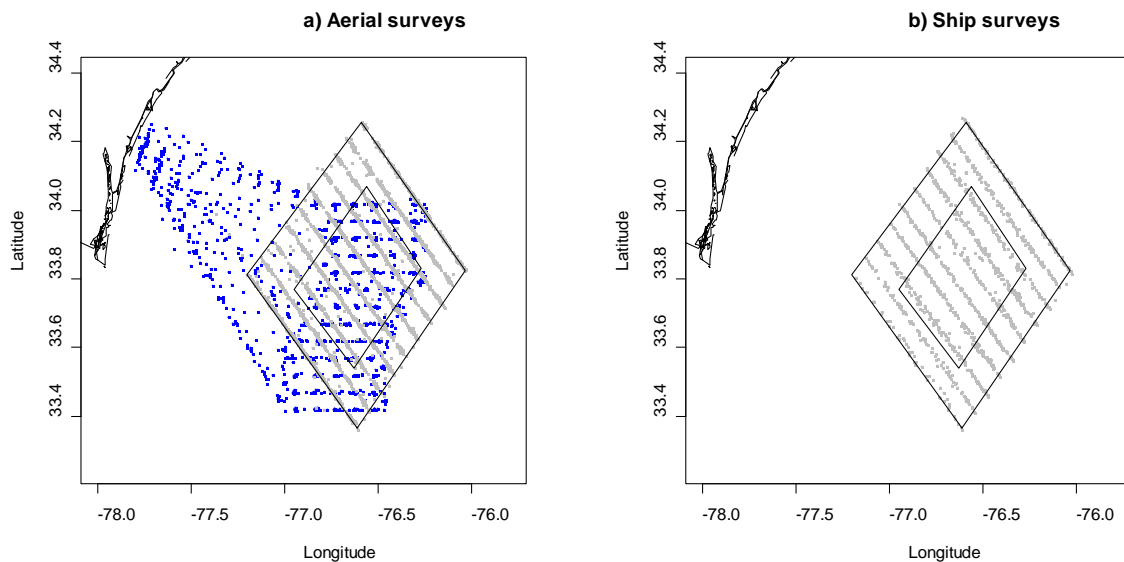


Figure 3. Relationship of potential, explanatory, continuous variables used in density surface modelling.

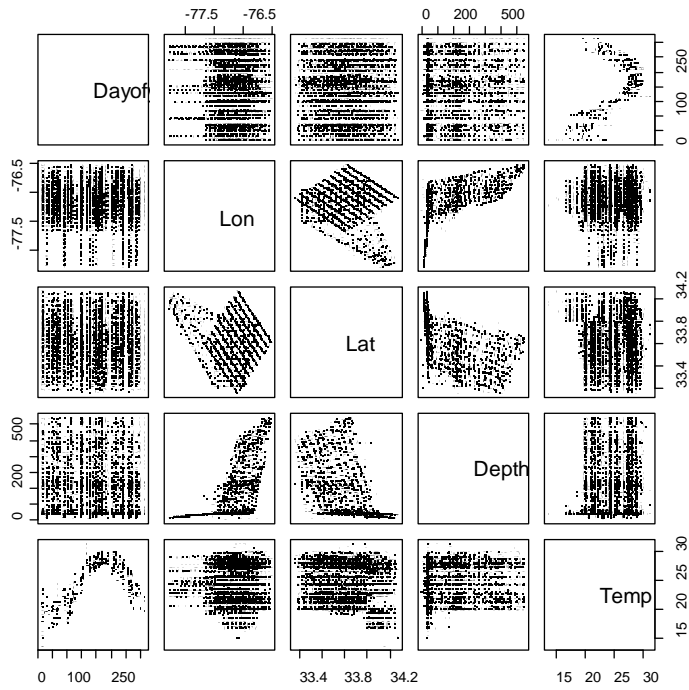


Figure 4. Aerial survey detection functions for a) dolphins (data binned into 150m intervals) and b) whales (binned into 300m intervals).

a)

b)

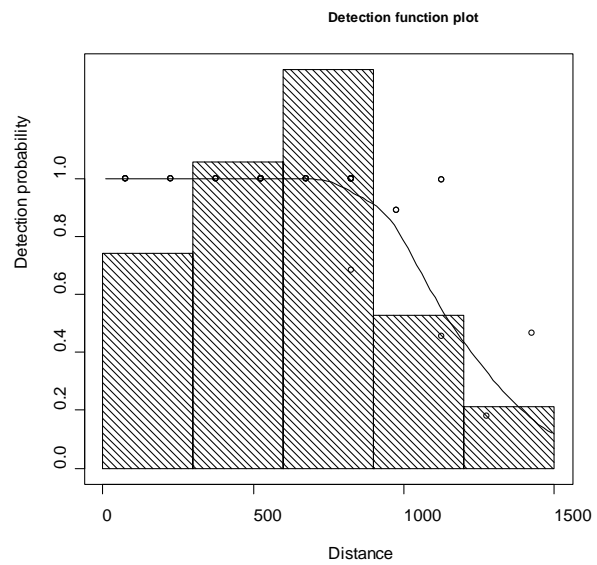
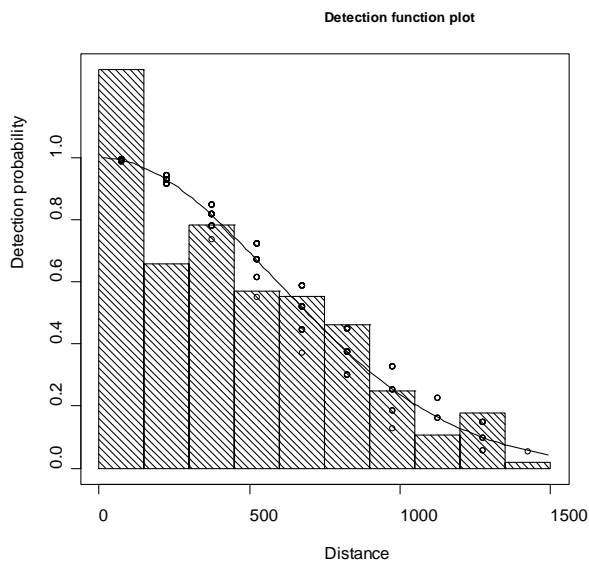


Figure 5. Ship survey detection functions for dolphins (binned into 100m intervals).

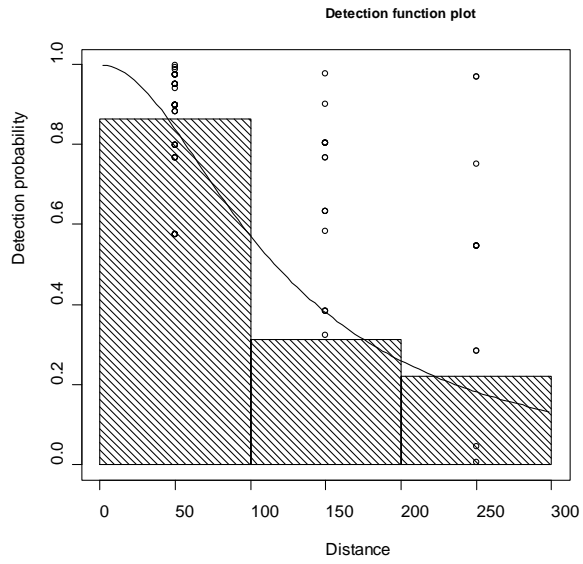


Figure 6. Estimated abundance of bottlenose dolphins: a) inside core USWTR region (black) and immediately outside (red) (error bars are not shown for clarity); b) abundances inside core region with 95% confidence intervals (blue).

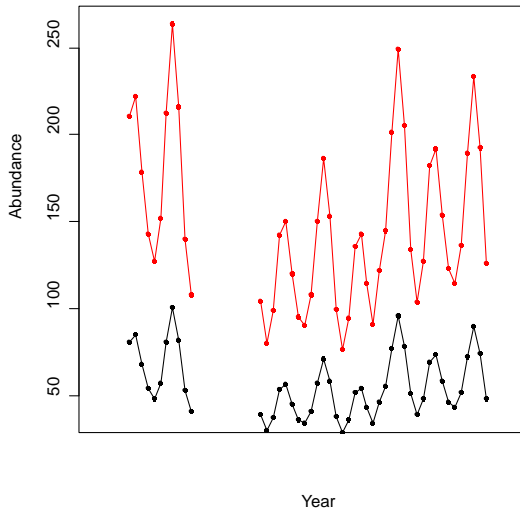


Figure 8. Estimated abundance of spotted dolphins: a) inside core USWTR region (black) and immediately outside (red) (error bars are not shown for clarity); b) abundances inside core region with 95% confidence intervals (blue).

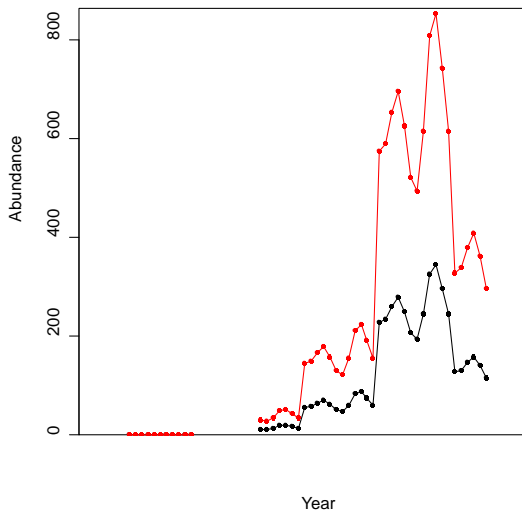
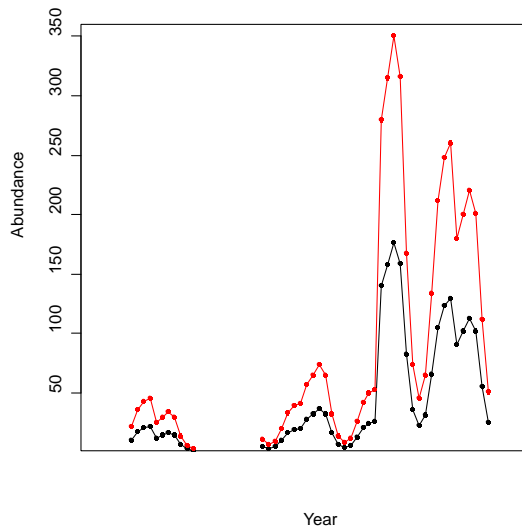


Figure 10. Estimated abundance of loggerhead turtles a. inside (black) and immediately outside (red) the USWTR region (no error bars shown for clarity, b. the inside abundances with 95% confidence intervals (in blue).



**Preliminary analysis of aerial and shipboard surveys of the Jacksonville USWTR  
from June 2009 to June 2010**

*C.G.M. Paxton, and M.L. Burt*

*CREEM, University of St Andrews*

**Abstract**

This report contains an analysis of data from aerial and shipboard surveys of the Jacksonville USWTR, undertaken by Duke University and the University of North Carolina at Wilmington, for the period June 2009 to June 2010. The species for which were sufficient numbers to generate detection functions were bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella frontalis*), leatherback (*Dermochelys coriacea*) and loggerhead turtles (*Caretta caretta*). Detection functions were not fitted to other species owing to a paucity of data. Estimates of abundance were obtained for both the core USWTR region and the outer region. The results from the aerial and shipboard surveys were generally similar. Estimates of abundance of *Tursiops* in the core USWTR region varied from 20 to 90 (maximum CV 40%) depending on season, *Stenella* varied from 20 to 180 (maximum CV 99%) perhaps again depending on season. For sea turtle abundance, *Dermochelys* were strongly seasonal with a peak in the autumn whereas *Caretta* peaked in summer.

## Introduction

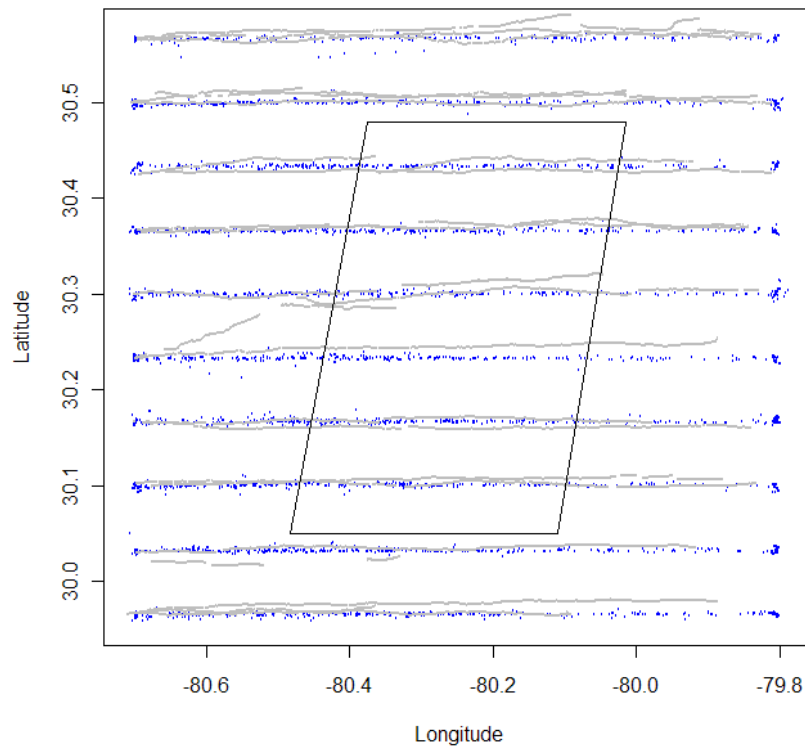
The Jacksonville USWTR aerial and shipboard surveys for 2009 – 2010 were carried out by the University of North Carolina at Wilmington (UNCW) and Duke University. The objective of these surveys is to establish baseline data on the density of marine mammals in the Jacksonville USWTR region. This document describes the analysis of this data set to develop initial quarterly abundance estimates for the region of interest, prior to more detailed analysis using density surface models in the future. Because of the large number of sightings, detection functions were generated from the data alone and not augmented (unlike the Onslow USWTR analyses) with additional data.

## Survey methods

### *Region of interest and survey area*

The Jacksonville USWTR core region of interest (hereafter “inner” region) is shown in Figure 1 with an outer survey zone (hereafter “outer”) as well. The aerial of the core region is 1717 km<sup>2</sup> and the area of the outer region is 4024 km<sup>2</sup>. Abundance estimates were obtained for both the core USWTR region and the outer region separately.

Figure 1. Survey effort (aerial – blue, ship – grey) for the Jacksonville USWTR and its environs. USWTR core region is lined in black



### *Survey effort*

The realised aerial survey effort consisted of 6,047 km in the inner region and 20,118 km of effort in the outer region (Figure 1). The realised ship effort was 1,243 km in the outer area and 528 km in the inner area. Data was grouped where possible into quarters to provide a first hint as to seasonal fluctuations in abundance (although as only one year is under consideration any fluctuations by season may not reflect actual seasonal changes).



## Statistical methods

### Overview

A conventional distance analysis was undertaken (Buckland et al. 1991). Detection probabilities were estimated by fitting to the distribution of perpendicular distances and the resultant detection probabilities and encounter rates were then used to infer density and abundance. Taxonomic groups (in this case dolphins and turtles) were amalgamated into visually similar species groups to estimate robust detection functions. Only seven whales were seen (all on the aerial survey), so density could not be estimated for these species. The abundance of specific species was then estimated using the detection probabilities from the generic functions. Where possible abundance estimates were made for the inner and outer regions and for each season, but for some species this was not possible owing to the paucity of data.

### Estimation of detection probabilities

In conventional line transect sampling, the probability of detection depends only on the perpendicular distance of the sighting to the transect and at zero perpendicular distance this is assumed to be one (denoted by  $g(0)=1$ ). Either a hazard-rate ( $1-\exp(-y/\sigma)^b$ ) or half-normal form ( $\exp(-y^2/2\sigma^2)$ ) was used for the detection function ( $\sigma$  is the scale parameter) (Buckland et al. 2001). The effects of covariates, other than perpendicular distance, were incorporated into the detection function model by setting the scale parameter in the model to be an exponential function of the covariates (Marques 2001). Thus, the probability of detection becomes a multivariate function,  $g(y,\mathbf{v})$ , representing the probability of detection at perpendicular distance  $y$  and covariates  $\mathbf{v}$  ( $\mathbf{v} = v_1, \dots, v_Q$  where  $Q$  is the number of covariates). The scale term,  $\sigma$ , has the form:

$$\sigma_k = \exp\left(\beta_0 + \sum_{q=1}^Q (\beta_q v_{kq})\right)$$

and  $\beta_0$  and  $\beta_q$  ( $q=1, \dots, Q$ ) are parameters to be estimated. With this formulation, it is assumed that the covariates may affect the rate at which detection probability decreases as a function of distance, but not the shape of the detection function. A backward, stepwise selection procedure was used (starting from the previous best models) to decide whether to include *Sea State* in the model, with a minimum Akaike's Information Criterion (AIC) inclusion criterion. All model selection was performed in the program *Distance* (v6.0; Thomas et al. 2002).

## Results

### Aerial survey sightings

Only dolphins ( $n = 97$ ) and turtles ( $n = 617$ ) had sufficient realized numbers to allow formal estimation of detection probabilities.

### Shipboard survey sightings

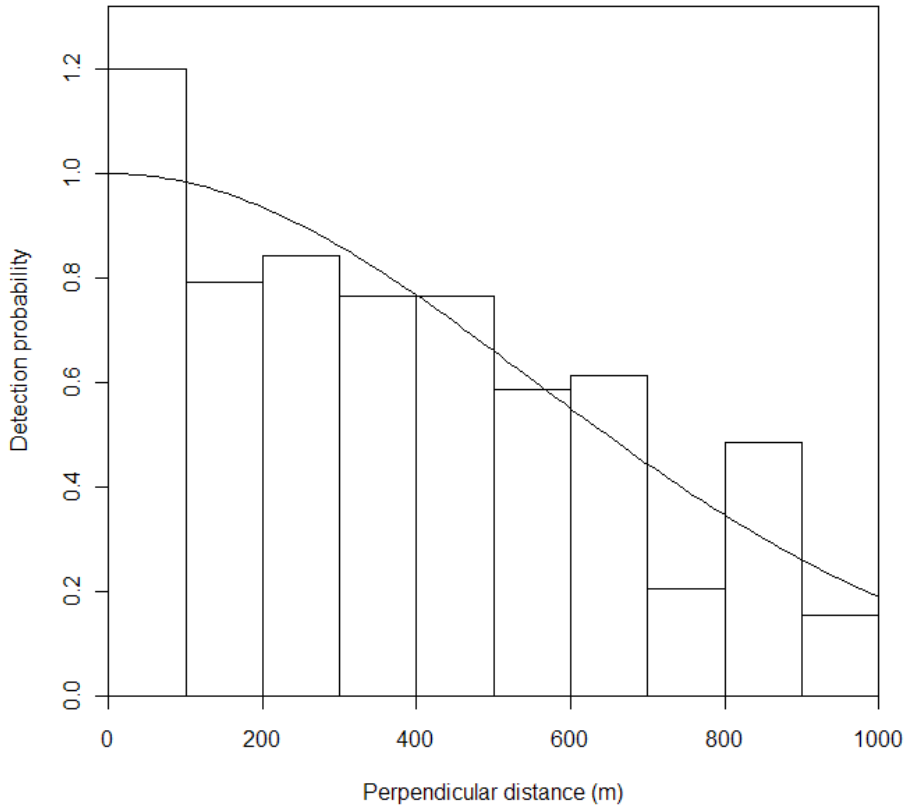
Again only turtles ( $n = 48$ ) and dolphins ( $n = 47$ ) had sufficient realized numbers to have formal estimation of detection probabilities.

### Aerial survey detection functions

Estimates of perpendicular distance were obtained either by reference to direct estimates of distance by observers, trigonometry from the declination angle of the plane to the observed animals or by trigonometry from the position of the plane at first observation of the animals and subsequent location directly above the animals. Sightings data were fitted in *Distance* v6 (Thomas et al. 2009). Dolphin

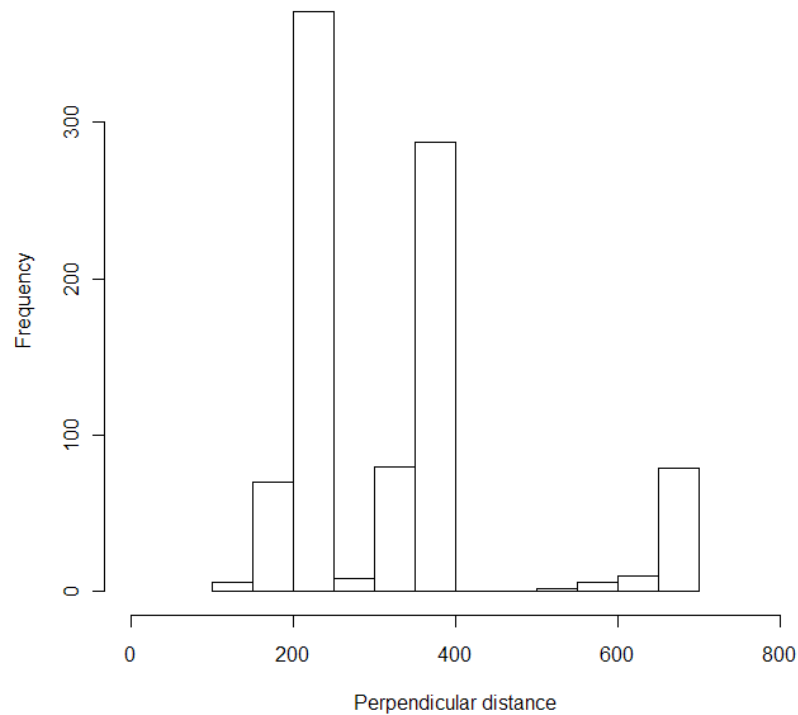
sightings were right truncated at 1.0 km and the best fit detection function was a half normal function (Figure 2). Strangely the inclusion of *Sea State* did not produce a better model

Figure 2. Histogram of perpendicular distances in dolphin sightings. Solid line is the detection function.



The perpendicular distance distribution of turtle detections did not conform to the usual assumption of monotonically declining detection probability with increasing distance (Figure 3). In the latter case the odd distribution of the distances caused the decision to be made to treat the data as a strip transect from 150 to 350 m.

Figure 3. Histogram of perpendicular distances in turtle aerial sightings.

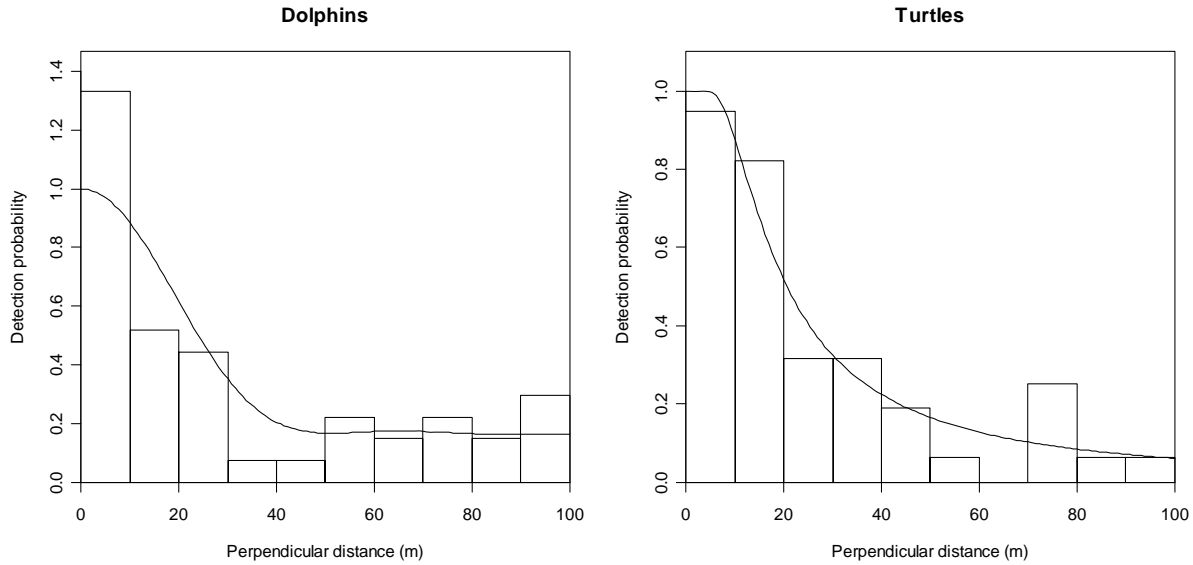


The reasons for the unusual distribution are not known and worthy of further investigation but it may have been caused in part by rounding of distances.

#### *Ship survey detection functions*

Sightings were combined to determine shipboard detection functions for each species group. The dolphin detection function is half-normal and truncation was at 100 m. No covariates were found to be important and there was no evidence for a size bias in detection. Turtles also had right truncation at 100 m but were fitted with a hazard rate function (Figure 4). No covariates were found to be important and there was no evidence for a size bias in detection.

Figure 4 Shipboard detection functions



*Estimation of density – individual species*

In the case of the aerial survey *Tursiops*, *Stenella*, *Dermochelys* and *Caretta* had sufficient numbers to generate estimates of abundance. Encounter rates and other critical statistics are given in Table 1. In the case of the shipboard survey *Tursiops*, *Stenella* and *Caretta* had sufficient numbers to generate estimates of abundance. Encounter rates and other critical statistics are given in Table 2.

Table 1. Line transect density ( $D$ ) estimates for the aerial survey. Coefficients of variation are in parentheses.  $esw$  - effective strip width;  $s$  - mean pod size;  $n/L$  - encounter rate, animals per nautical mile.

Species	Block	$esw$ (m)	$s$	$n$	$n/L$	$D$ (% CV) (no/ km <sup>2</sup> )	Abundance
<i>Tursiops</i>	Inner Spring			6	0.006	0.0529 (40)	90
	Outer Spring			47	0.015	0.1400 (31)	560
	Inner Summer			12	0.012	0.1057 (99)	180
	Outer Summer	640.75 (5.7)	11.7 (8.1)	47	0.012	0.1049 (32)	420
	Inner Autumn			2	0.002	0.0135 (69)	20
	Outer Autumn			9	0.002	0.0185 (38)	70
	Inner Winter			11	0.004	0.0380 (32)	70
	Outer Winter			36	0.004	0.0384 (24)	160
<i>Stenella</i>	Inner Spring			12	0.012	0.106 (26)	180
	Outer Spring			22	0.007	0.066 (24)	260
	Inner Summer			1	0.001	0.009 (98)	20
	Outer Summer	640.75 (5.7)	11.7 (8.1)	11	0.003	0.025 (32)	100
	Inner Autumn			5	0.004	0.034 (54)	60
	Outer Autumn			24	0.005	0.049 (22)	200
	Inner Winter			4	0.002	0.014 (42)	20
	Outer Winter			18	0.002	0.019 (29)	80
<i>Caretta</i>	Inner Spring			14	0.014	0.040 (31)	70
	Outer Spring			47	0.015	0.046 (14)	180
	Inner Summer			30	0.029	0.086 (30)	150
	Outer Summer	200	1.2 (1.8)	165	0.040	0.120 (15)	480
	Inner Autumn			17	0.013	0.037 (28)	60
	Outer Autumn			84	0.019	0.056 (15)	230
	Inner Winter			28	0.011	0.032 (28)	50
	Outer Winter			91	0.011	0.032 (13)	130
<i>Dermochelys</i>	Inner Spring			0	0	0	0
	Outer Spring			0	0	0	0
	Inner Summer			0	0	0	0
	Outer Summer			0	0	0	0
	Inner Autumn	200	1.2 (1.8)	8	0.006	0.018 (30)	30
	Outer Autumn			14	0.003	0.009 (38)	40
	Inner Winter			0	0	0	0
	Outer Winter			3	<0.001	0.001	0

Table 2. Line transect density ( $D$ ) estimates for the ship survey. Coefficients of variation are in parentheses..  $esw$  - effective strip width;  $s$  - mean pod size;  $n/L$  - encounter rate, animals per km.

Species	Block	$esw$ (m)	$s$	$n$	$n/L$	$D$ (% CV) (no/ km <sup>2</sup> )	Abundance
<i>Tursiops</i>	Inner	34.83	4.2	3	0.006	0.34 (40)	580
	Outer	(19.8)	(14.6)	8	0.006	0.39 (70)	1560
<i>Stenella</i>	Inner	34.83	4.2	6	0.011	0.68 (52)	1170
	Outer	(19.8)	(14.6)	17	0.014	0.85(50)	3300
<i>Caretta</i>	Inner	33.50	1.0	7	0.027	0.22 (52)	370
	Outer	(19.8)	(14.6)	34	0.031	0.45(50)	1830

## Discussion

Numbers were generally comparable across surveys, although the encounter rate for *Stenella* was on average higher than sea from the planes, presumably because of the greater availability to be detected. There was no evidence of any seasonal changes in the abundance of *T. truncatus* or *S. frontalis*.

*C. caretta* numbers seem to peak in summer whereas *D. coriacea* primarily appears in the autumn, although some were seen in the outer region in winter.

### Recommendations for the future

Assuming the USWTR survey work is ongoing, issues of potential interest in the future work might include:

1. Improving detection function and density estimates by supplementing existing detections with those from future surveys.
2. Investigation of the strange pattern of reported distances for turtles
3. Investigation of reliable methods for estimating  $g(0)$  without double-observer survey. Options include cue-based methods and use of appropriate availability correction methods based on data on availability patterns for each species.
4. Further elucidation of the environmental drivers of cetacean density in the area of interest, perhaps by the use of additional variables.
5. Records of water clarity may be useful in the generation of detection functions of turtles.

## References

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., Borchers, D.L. and Thomas, L. 2001. *Introduction to distance sampling: estimating abundance of biological populations*. Oxford University Press, London. 432pp.