FINAL REPORT TO
GEORGIA DEPARTMENT OF NATURAL RESOURCES

NORTHERN EARLY WARNING SYSTEM
NORTH ATLANTIC RIGHT WHALE (*Eubalaena glacialis)*
AERIAL SURVEYS, 2009-2010 SEASON

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Abstract

The endangered North Atlantic right whale (*Eubalaena glacialis*) experiences a high level of anthropogenic mortality, including collisions with vessels and entanglement in fishing gear. In the Southeast United States, the only known calving ground for the species, an Early Warning System of aerial surveys was developed in 1993 to mitigate vessel collisions and document habitat use and reproductive status. The 2009-2010 Northern Early Warning System (NEWS) surveys were conducted by Wildlife Trust from 1 December 2009 to 31 March 2010. The NEWS survey area extended from the northern end of Sapelo Island (31º 32.0N) to mid-Cumberland Island, Georgia (30º 53.0N), eastward approximately 32 nautical miles (nmi). A total of 37 NEWS surveys were conducted, logging 187.0 hours of flight time and averaging 5.0 hours per survey. Overall, 13,714.2 nmi of trackline were flown, with 12,478.3 nmi (91%) flown in a sea state $\leq$ 3. The complete survey area (442.8 nmi of trackline) was flown during 41% of flights (n = 15).

A total of 48 right whale sightings consisting of 114 right whales were documented by the NEWS survey team (average = 2.4 whales per sighting, range: 1-8). Of the 48 sighting events, 10 sightings were mother/calf pairs, 17 were single animals, and 21 sightings were groups of two to eight right whales. Preliminary photo analysis identified 77 individual whales, including six mother/calf pairs. From December 2009 to March 2010, a total of 19 mother/calf pairs were identified in the Southeast US. Eleven of these females were observed within the NEWS survey area, five prior to calving and six post-calving. Of these six mothers, three were first documented with their 2010 calves in the NEWS survey area. Of the 77 individual right whales, the largest demographic group was juveniles of unknown gender (29%), followed by adult males (19%) and mother/calf pairs (16%). Seventy-three of the 77 individual whales were sighted within the boundaries of the NEWS survey area. This represents a 61% decrease in individual whales documented compared to the 2008 – 2009 season (n = 186 whales) and a 34% decrease in the average number of individual right whales in the NEWS area for the previous six survey seasons (n = 110 whales). This reduction in sightings may be due to reduced survey effort caused by inclement weather and the effects of sea-surface temperature on right whale distribution.

The amount of aerial survey effort varied among months, with the lowest effort in December (n = 2,186.3 nmi flown) and the greatest effort occurring in February (n = 3,881.0 nmi flown). However, the number of whales sighted each month did not correspond to survey effort. The greatest number of right whales were sighted in January (n = 42), followed by February (n = 31), December (n = 24), and March (n = 17). Re-sights of individual whales observed in the NEWS area were not as common during the 2009-2010 season as compared to previous seasons. Females with calves were sighted within the NEWS survey area an average of 1.8 times per whale (range: 1-3), versus 2.7 times per whale (range: 1-9) in the 2008-2009 season. Preliminary data indicate that four right whales were sighted solely within the NEWS survey area during the 2009-2010 calving season. Additionally, one injured right whale (EGNO 3745), two whale/vessel co-occurrences and one possible violation of the ship speed restrictions within the Southeast US Seasonal Management Area were documented in the NEWS survey zone.

Introduction

The North Atlantic right whale (*Eubalaena glacialis*) is protected in U.S and territorial waters pursuant to the Marine Mammal Protection Act of 1972, and is classified as an endangered species under the Endangered Species Act of 1973. The only known calving ground for the North Atlantic right whale consists of Atlantic coastal waters in the southeastern United States (SEUS). A portion of the region was designated as Critical Habitat for northern right whales by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) in 1994 and encompasses the waters from Altamaha Sound, Georgia, to Sebastian Inlet, Florida, out to 5-15 nmi from the shoreline (50 CFR 226.203). Minimizing sources of anthropogenic mortality and serious injury is a primary objective of the North Atlantic Right Whale (*Eubalaena glacialis*) Recovery Plan (NMFS, 2005). Vessel collisions are a leading anthropogenic cause of right whale mortality. The SEUS critical habitat includes entrances to four commercial shipping ports (Brunswick, Georgia; Fernandina, Jacksonville and Port Canaveral, Florida), resulting in frequent usage of these waters by large commercial and military vessels. The Early Warning System (EWS) was created in 1994 to alert military and commercial vessels to the presence of right whales, potentially reducing the probability of right whale/vessel collisions. The first EWS survey area encompassed waters from Brunswick, Georgia, to St. Augustine, Florida, out to approximately 20 nmi offshore. Data collected subsequently indicated that right whales regularly utilize waters outside of this area. In 2002, NMFS redesigned the EWS system to include three survey areas (northern, central and southern) encompassing waters from Sapelo Island, Georgia (31º 32.0N), to Crescent Beach, Florida (29º 47.0N), out to approximately 30 nmi offshore. The survey effort described in this report covers the Northern Early Warning System (NEWS) survey zone, from the northern end of Sapelo Island to mid-Cumberland Island, Georgia (30º 53.0N).

The objectives of the 2009-2010 NEWS surveys were to: 1) reduce vessel collisions with right whales, 2) document and provide support for right whale disentanglement, 3) document dead and stranded right whales, 4) monitor the status and trends of abundance and distribution of the western North Atlantic right whale, 5) characterize and monitor right whale habitat and 6) provide aerial support for ongoing right whale biopsy sampling efforts. This report presents the results of the NEWS aerial survey season from 1 December 2009 through 31 March 2010.

Methods

Study Area

NEWS surveys included waters from the northern end of Sapelo Island (31º 32.0N) to mid-Cumberland Island, Georgia (30º 53.0N), eastward approximately 32 nmi offshore. Fourteen east/west tracklines of various lengths (28.8-32.4 nmi) were flown at 3 nmi intervals (Fig. 1). A complete survey consisted of 442.8 nmi of trackline (Table 1), not including miles flown in transit to, from, and between transect lines. On days when the NEWS survey aircraft was unavailable due to scheduled maintenance or pilot absence, a two-plane or one-plane contingency plan was often implemented, during which survey aircraft from the Central Early Warning System (CEWS) and/or the Southern Early Warning System (SEWS) shifted their survey coverage north to include much of the NEWS survey area. On days when the CEWS or SEWS survey aircraft were unavailable, the NEWS survey team flew a two-plane contingency plan, shifting coverage south into the northern section of the CEWS survey area.

Aerial Surveys

Surveys were flown daily, weather permitting, from 1 December 2009 through 31 March 2010. Survey aircraft departed from Malcolm McKinnon airport on St. Simons Island, Georgia, and returned to the same airfield after each flight. All NEWS surveys were conducted in a NOAA DeHaviland Twin Otter aircraft. The survey aircraft was equipped with Global Positioning System (GPS) navigation aids, radar, aviation VHF radio, marine VHF radio, a life raft, PFDs, survival suits, flares, an aircraft ELT, and a satellite telephone. Each observer was equipped with an individually registered GPIRB, FAA approved survival vest, NOMEX flight suit, knife, rescue streamer, and strobe light.

Surveys were flown at an altitude of 1000 ft (303 m) and an average air speed of 100 mph (160 km/hr). Surveys typically began at the western waypoint of the southernmost trackline, however the start point and direction of flight was determined daily based on weather conditions in the survey area and other survey factors. Attempts were made to fly the area surrounding the Brunswick shipping channel during each survey due to increased vessel traffic, including dredge activity. Environmental conditions required for a survey included: ceiling $\geq$ 455m, visibility > 2 nmi, wind speed < 10 knots, and Beaufort sea state $\leq$ 3.

The survey crew consisted of a pilot (PIC) and co-pilot (SIC), two observers, and a data recorder. Observers were positioned on either side of the aircraft at forward bubble windows, and rotated positions every four tracklines to reduce observer fatigue.

Data Collection

The two forward observers reported all sightings to the data recorder. The data recorder logged these sightings into Logger 2000, a software program designed by the International Fund for Animal Welfare (IFAW) for marine survey data entry. The time, location, number, and species of all large whales, leatherback turtles, and manatees were recorded. Logger 2000 also recorded time, position (lat/long), altitude, heading, and aircraft speed at 10 s intervals. In addition, all vessels observed in the survey area were recorded. The type, heading and sighting angles (measured using a digital inclinometer) were recorded for all large vessels ($\geq$100 ft).

When a right whale was observed, a GPS position was recorded along the trackline at the point of observation and another GPS location was obtained directly over the whale(s). The survey plane then circled the whale(s) to obtain digital photographs for photo-identification, a count of the number of whales present and behavioral observations. Once the whale(s) were photo-documented, a final overhead GPS position of the whale(s) was recorded and the survey plane returned to the trackline at the point of observation to continue the survey. Circling for photographic documentation was generally limited to 15 min per sighting.

Sighting distance from the trackline for observed right whales was calculated whenever possible, using the lat/long position on the trackline perpendicular to the position of the whale sighting (lat_1, $long_1$), and the lat/long exact overhead position of the right whale (lat_2, $long_2$). The whale's distance in nmi from the trackline was determined by subtracting the distance between the two latitude positions, as 1 min of latitude = 1 nmi in the study area (Fig. 2).

The NEWS survey team documented any co-occurrences of vessels and rights whales, including the location, number, heading, and behavior of the whales involved in the episode. The location, name, type, length, speed, and heading of each of the vessels involved were also recorded throughout the event. Monitoring of the situation continued until the vessels were no longer in the same vicinity as the right whales. Photographic and video documentation were obtained whenever possible. Attempts were also made to contact the vessels over VHF to alert them to the presence and location of the right whales. All the information collected for each co-occurrence was entered into an Access database and submitted to

NMFS, the Georgia Department of Natural Resources (GDNR) and Florida Fish and Wildlife Research Institute (FWRI).

Suspected violations of the NMFS Final Rule to Implement Speed Restrictions to Reduce the Threat of Ship Collisions With North Atlantic Right Whales (Ship Speed Rule, 50 CFR Part 224) were also documented by the NEWS survey team. If vessels greater than 65 feet were observed traveling faster than 10 knots within the Southeast U.S. Seasonal Management Area (SEUS SMA), the survey team documented the location, name, type, length, estimated speed, and heading of the vessels. Photographic documentation was obtained whenever possible and attempts were made to contact the vessels over VHF to make them aware of the speed restrictions effective in SMAs along the east coast of the U.S. All the information collected during these events was submitted to NMFS and GDNR.

Right whales are individually identified by the patterns of cornified skin primarily located on the top of the head between the tip of the rostrum and the blowhole (Payne *et al.* 1983, Kraus *et al.* 1986). Photographs of right whale callosity patterns and other features, including scars, are used for identification and the cataloging of individual right whales. Right whales observed during the NEWS aerial surveys were photographed and sketched in order to identify individual animals. Photographs were taken with a Canon 50D digital camera with a Canon 100-400 mm image stabilized lens at an altitude of 1000 ft (303m). All photographs obtained during the 2009-2010 NEWS survey season were compared against each other, right whale images from other SEUS aerial survey teams and the New England Aquarium's (NEA) catalog of North Atlantic right whales to determine the probable identity and re-sights of each individual whale encountered. Preliminary photo analysis by the NEWS team and initial verification by NEA has been completed. However, all right whale identifications listed within this report should be considered preliminary and unverified until NEA has analyzed all photographs from the 2009-2010 SEUS calving season. Final comparison and confirmation by NEA is now underway and may be completed in 2011-2012.

Distribution of Right Whale Sighting Information

Following completion of data collection for each right whale sighting event (consisting of a single whale or multiple whales), sighting information was relayed from the survey aircraft to a designated ground contact via satellite phone. The ground contact then distributed the sighting information to various maritime, military, management, and scientific interests in the SEUS via an email distribution list, as part of a system for near real-time dissemination of right whale sightings developed to minimize the probability of right whale death or injury due to collisions with vessels (Taylor and Brooks 2002). The email included distance and direction of the sighting from the closest channel sea buoy, source of the sighting, date, time, lat/long, direction of movement, age class, and number of right whales sighted. Right whale sighting data were distributed to right whale aerial survey teams, harbor pilots, U.S. Coast Guard (USCG) NAVTEX, state agencies, and the Fleet Area Control and Surveillance Facility (FACSFACJAX) at Naval Air Station Jacksonville, among others. FACSFACJAX disseminated right whale sighting information to military ships and aircraft operating throughout the SEUS, and the USCG used NAVTEX to notify large commercial vessels throughout the SEUS. Right whale reports also allowed aerial survey teams to investigate and verify sightings obtained from other sources such as the USCG, other military ships, recreational vessels, dredges, and aircraft. If a right whale sighting was within 5 nmi of the Brunswick channel, the Brunswick harbor pilots were contacted directly by the ground contact with the sighting information. Sightings were also entered into the Mandatory Ship Reporting (MSR) system.

Results

Aerial Surveys

A total of 37 NEWS surveys were conducted from 1 December 2009 to 31 March 2010 (Table 2), totaling 187.0 hours of survey effort. Overall, 13,714.2 nmi of trackline were flown, with 91% flown in a sea state ≤ 3. The complete NEWS survey area (442.8 nmi of trackline) was covered during 41% of flights (n = 15). Incomplete surveys occurred when required survey weather/sea conditions were not met (n = 19) or during two-plane contingency surveys (n = 3). Non-survey days resulted from poor weather conditions (n = 62), aircraft maintenance (n = 16) and pilot unavailability (n = 6; Table 3). On nine days that the NEWS survey team could not fly the NEWS area (8 December 2009, 25-29 January, 24-25 March and 31 March 2010), NEA flew two-plane contingency flights in the NEWS zone resulting in 17 right whale sightings consisting of 40 right whales (Table 4).

Survey effort varied within and among surveys (Fig. 3, 4) due to variability in weather (e.g. sea state, fog, low ceiling) and survey logistics (e.g. 2-plane contingency plans and shipping channel surveys). Spatially, total survey effort was greatest in the western half of the NEWS survey area (80º 55.0W westward). Some areas near shore were flown during 100% of surveys (n = 37), while some eastern portions of the survey area were only flown during 57% of surveys (n = 21). Survey effort varied among months (Fig. 4; Table 5), with the lowest effort occurring in December (n = 2,186.3 nmi flown) due to poor weather conditions and required pilot training. Survey effort was comparable during January, February and March (Fig. 4; Table 5), with the greatest effort occurring in February (n = 3,881.0 nmi flown). As with the overall effort, monthly survey effort was biased spatially toward the western portions of the survey area (Fig. 4).

A total of 48 right whale sightings consisting of 114 right whales (average = 2.4 whales per sighting, range: 1-8) were documented by the NEWS survey team during the 2009-2010 calving season (Appendix 1). The first sighting was on 4 December 2009 and the last sighting was on 30 March 2010. Three of the 48 sightings (n = 10 whales) were documented in the CEWS survey area while the NEWS team was flying two-plane contingency flights. Overall, 10 of the 48 sightings were mother/calf pairs, 17 were single animals, and 21 sightings were groups of two to eight right whales (Fig. 5).

Preliminary photo analysis of all sightings by WT and preliminary verification by NEA has resulted in the identification of six mother/calf pairs and an additional 65 individual adult/juvenile whales, for a total of 77 individual right whales (Appendix 1). Preliminary whale EGNO numbers (EGNO = North Atlantic Right Whale Catalog Number) have been included in Appendix 1. The numbers and codes listed in the EGNO column also include intermatch or season codes (i.e. CT02BOF2007, BK01SEUS09 and S050) provided by NEA or FWRI to assist in the preliminary matching of unknown whales until they are assigned EGNOs. Initial comparisons of whales sighted in the different SEUS survey areas (South Carolina/northern Georgia, NEWS, CEWS and SEWS) indicate that four whales (EGNOs 2140, 2940, 3308 and S050) may have only been sighted in the NEWS survey area during the 2009-2010 season. Results may change as further photo analysis is completed.

Basic demographic information for preliminarily identified right whales is provided in Figure 6. Of the 19 mother/calf pairs documented in the SEUS during the 2009-2010 calving season, six were documented within the NEWS survey area. Of these, three mothers were first documented with their calves in the NEWS survey area and five pregnant females were only documented in the area prior to calving. Of the 77 individual right whales sighted during the season, the largest demographic group was juveniles of unknown gender (29%), followed by adult males (19%) and mother/calf pairs (16%). When classified solely by age, 48% of the individual whales were juveniles, 37% were adults, 8% were calves and 6% were of unknown age.

Of the 77 individual whales documented, 73 were sighted within the boundaries of the NEWS survey area. This represents a 61% decrease in individuals documented compared to the 2008 – 2009 season (n = 186 whales) and a 34% decrease in the average number of individual right whales in the NEWS area for the previous six survey seasons (n = 110 whales, Fig. 7; Table 6). The 13,329.2 nmi of trackline flown within the NEWS area during the 2009-2010 season also represents an 11% decrease in trackline nmi flown compared to the 2008-2009 season (n = 14,976.7 nmi) and a 30% decrease compared to the previous six survey seasons (average = 19,076.9 nmi/season; Fig. 7; Table 6).

The greatest percentage of right whale sightings during the 2009-2010 NEWS season occurred in January (37%), followed by February (27%), December (21%), and March (15%) (Fig. 4, 8). The same pattern holds true for the number of right whales sighted (January: n = 42; February: n = 31; December: n = 24; March: n = 17). Overall, 60% of the 48 right whale sightings documented during the 2009-2010 NEWS season were located outside of the currently delineated right whale critical habitat and 24% of these sightings included mother/calf pairs (Fig. 8). Approximately 29% (n = 13) of the right whale sightings were located within one nautical mile of the Brunswick channel recommended shipping routes.

Females with 2010 calves were sighted within the NEWS survey area an average of 1.8 times per whale (range: 1-3). EGNOs 1317, 2140, 2645, 3260, 3308, 3523, 1241 and her 2010 calf were sighted most frequently (n = 3). The 2009 calf of 1515, a yearling, was seen 61 days apart (22 December 2009 to 21 February 2010), the longest "residency" documented by the NEWS team in the 2009-2010 season. Re-sight frequency for presumed sexually mature males (10 years or older, Kraus *et al.* 2007) and juveniles in the NEWS survey area was 1.5 and 1.4 sightings per whale, respectively.

Average right whale sighting distance from the survey transect line during the 2009-2010 season was 0.77 nmi (SD = 0.55). Sighting distances ranged from 0.0 nmi to 2.54 nmi, with 97% of the sightings occurring between 0.0 nmi and 1.8 nmi (Fig. 9).

Whale/Vessel Co-occurrences

The WT survey team observed two co-occurrences of right whales and vessels during the 2009-2010 NEWS surveys (Appendix 2). Immediately following the two observed events, the required whale/vessel interaction forms were completed and forwarded to the proper authorities within GDNR and NMFS. The first incident occurred on 19 January 2010 when the NEWS survey team observed a stationary recreational vessel located between a group of six right whales and a single whale. The vessel was estimated to be about 0.4 nmi from the single whale and about 0.6 nmi from the group of six whales. After the survey plane flew northeast to document another single whale in the area, the recreational vessel followed and stopped within 100 yards of the last known location for the single whale the plane was circling. The survey team attempted to contact the vessel, but did not receive a reply from the vessel. After twelve minutes, the recreational vessel was observed heading to the west away from the observed whale groups.

On 21 February 2010, the WT team was flying a two-plane contingency survey just north of the Fernandina channel. The team observed two right whales and two stationary recreational vessels 200-300 yards to the east of the whales. When the survey plane broke track and flew towards the whales, the vessels started to slowly move away from the whales to the east. The survey team attempted to contact the vessels, but did not receive a reply from either vessel. When the WT team was finished photographing the whales and started to resume their survey, the recreational vessels were stationary about 0.23 nmi northeast of the whales and did not appear to be pursuing the whales.

Ship Speed Rule Observation

The NEWS survey team documented a suspected violation of the NMFS Ship Speed Rule within the SEUS SMA on 11 January 2010. The survey team observed a vessel estimated to be 75 feet long

transiting very quickly to the north off the coast of Georgia. The vessel was photographed and two overhead locations were obtained via GPS to estimate the speed of the vessel. The photographs indicated that the vessel's name was "Diamond Diva" from Newport Beach, California. The vessel was contacted and informed of the vessel speed restrictions within the SEUS SMA. By the end of the communication between the survey plane and the vessel, the team was unable to determine if there was a change in the vessel's speed due to the distance of the vessel from the survey plane. Following the flight, the two overhead locations were used to calculate that the vessel's speed was 17-20 knots. The "Diamond Diva" was located in the USCG vessel database and found to be a 74.7 ft Lazzara yacht. A report describing the incident was completed and forwarded to the proper authorities within GDNR and NMFS (Appendix 3).

Entangled Right Whales

No entangled right whales or other large whales were sighted by the NEWS survey team during the 2009-2010 survey season. However, three previously entangled right whales were sighted within the NEWS survey area (Appendix 1). EGNO 3260 was entangled in 2007, EGNO 3333 was documented entangled in the SEUS during the 2007-2008 season and EGNO 3714 was first seen entangled on 7 February 2009 in the NEWS survey area. All of these whales were sighted gear-free during the 2009-2010 season.

Dead or Injured Right Whales

No dead right whales or other large whales were sighted during the 2009-2010 NEWS survey season. One whale with newly documented injuries was seen within the NEWS survey area. On 15 December 2009, EGNO 3745 was photographed with two sets of 7-8 prop scars on the left side of its body. The scars did not appear to be fresh, but were the first occasion this whale had been documented with prop scars since its last confirmed sighting on 26 February 2009 off the coast of Georgia (Amy Knowlton, New England Aquarium, pers. comm.).

Marine Animal Sightings

All sightings of large whales, leatherback turtles and manatees were recorded while conducting the NEWS surveys. During the 2009-2010 surveys, 15 leatherback turtles (Table 7) and zero manatees were sighted. One humpback whale was sighted on 20 February 2010 at 31º 00.6 N, 81º 08.1W.

Discussion and Recommendations

Seventy-three individual right whales, based on preliminary analysis, were documented in the NEWS survey zone during the 2009-2010 season. This represents a 61% decrease compared to the 2008 – 2009 season and a 34% decrease in the average number of individual right whales in the NEWS area for the previous six survey seasons. Survey effort (based on nmi of trackline flown) decreased by 11% compared to the 2008-2009 season and 30% compared to the previous six survey seasons, mostly due to unacceptable weather conditions. There has been a steady decrease in survey effort within the NEWS area since 2004, however despite the decrease in survey effort, the 2009-2010 season represents the first time since the NEWS surveys were established that the number of right whales sighted in the NEWS area substantially decreased compared to the previous season (Fig. 7; Table 6). A reduction in the number of right whales sighted was not documented in all SEUS EWS survey areas. In total, approximately 230 individual right whales were sighted in the SEUS from November 2009 to April 2010, mostly within the CEWS and SEWS survey areas (Zani and Jackson 2010). This is a slight increase from the approximately 220 individual right whales sighted in the SEUS during the 2008-2009

season (Monica Zani, New England Aquarium, pers. comm.). The reduction in survey effort in the NEWS area may partially explain the reduced number of right whales sighted in that survey zone. However, since it is known that sea-surface temperature can affect right whale distribution (Keller *et al.* 2006), it is also possible that the cold water temperatures off the coast of Georgia during the 2009-2010 season caused many right whales to migrate further south to the warmer waters off the coast of Florida. The average water temperature recorded at the National Data Buoy Center's (NDBC) Gray's Reef buoy (located between NEWS tracklines 11 and 12 at 31º 24.9 N, 80º 52.9W) was 12.6°C during the 2009-2010 season (NDBC, 2010). This is the coldest average water temperature recorded at Gray's Reef in the past seven right whale calving seasons (Fig. 7). Also, the 12.6°C average water temperature falls at the low end of the standard deviation for the mean sea surface temperature of right whale sightings in the EWS survey area (mean = 14.0° ± 2.0° C) (Keller *et al.* 2006). Regardless of the cause of this distributional shift to the south, the change in right whale distribution emphasizes the importance of continued management and research efforts in the SEUS to document habitat use and mitigate potential effects of human activities. The effects of weather on the frequency of the surveys and the distribution of the whales suggests a need for frequent review of the best methods for providing adequate coverage of the region to ensure that valuable information on the changing movements of right whales is documented.

Despite the decrease in the overall number of whales sighted in the NEWS area, the average number of whales documented during a sighting event was the same as the previous two seasons (n = 2.4). However, the 2009-2010 surveys did reflect a change in the demographics of the sightings. Only 32% (n = 6) of the 19 available mother/calf pairs in the SEUS were sighted in the NEWS area during the 2009-2010 season, as compared to 72% (n = 28) of the 39 available mother/calf pairs during the 2008-2009 season, however this change was not significant ($t = .18$, $df = 46$, $P = .86$). Overall, 48% of the 2009-2010 NEWS individual whales were juveniles, 37% were adults (including 19% adult males), 8% were calves and 6% were of unknown age. This large percentage of juveniles and adult males indicates that the SEUS calving ground is not solely important to pregnant females, but is an area utilized by many different demographic groups. Since right whales move between the various EWS survey areas, a more complete picture of right whale demographics and behavior could be obtained if the data from all the SEUS survey teams were compiled and analyzed. This comprehensive analysis would give a better representation of right whale movements and residency patterns throughout the region and would be a practical tool for managers and researchers.

Two whale/vessel co-occurrences involving recreational vessels were observed by the NEWS survey team during the 2009-2010 season. These incidents, along with the documentation of a right whale with extensive prop scars and the observation of a 75 ft vessel traveling at greater than ten knots within the SEUS SMA, point towards the continued need for public education about right whales and the monitoring of high-risk areas within the SEUS calving grounds.

Portions of the east coast of the United States are without consistent survey effort, limiting spatial and temporal distribution data and ultimately protection available for the right whale. However, limitations of these aerial survey efforts must also be addressed, including high costs, the inability to fly in inclement weather and darkness, safety issues, observer bias, observer fatigue, etc. If the goal is to provide maximum protection for right whales, we must investigate new technologies and management techniques that may provide a more reliable means for detecting and protecting right whales throughout their range. Without moving forward on these fronts it is unlikely that we will ever reach a potential biological removal level of zero for North Atlantic right whales, as calculated in Marine Mammal Protection Act stock assessment reports (Waring *et al.* 2009).

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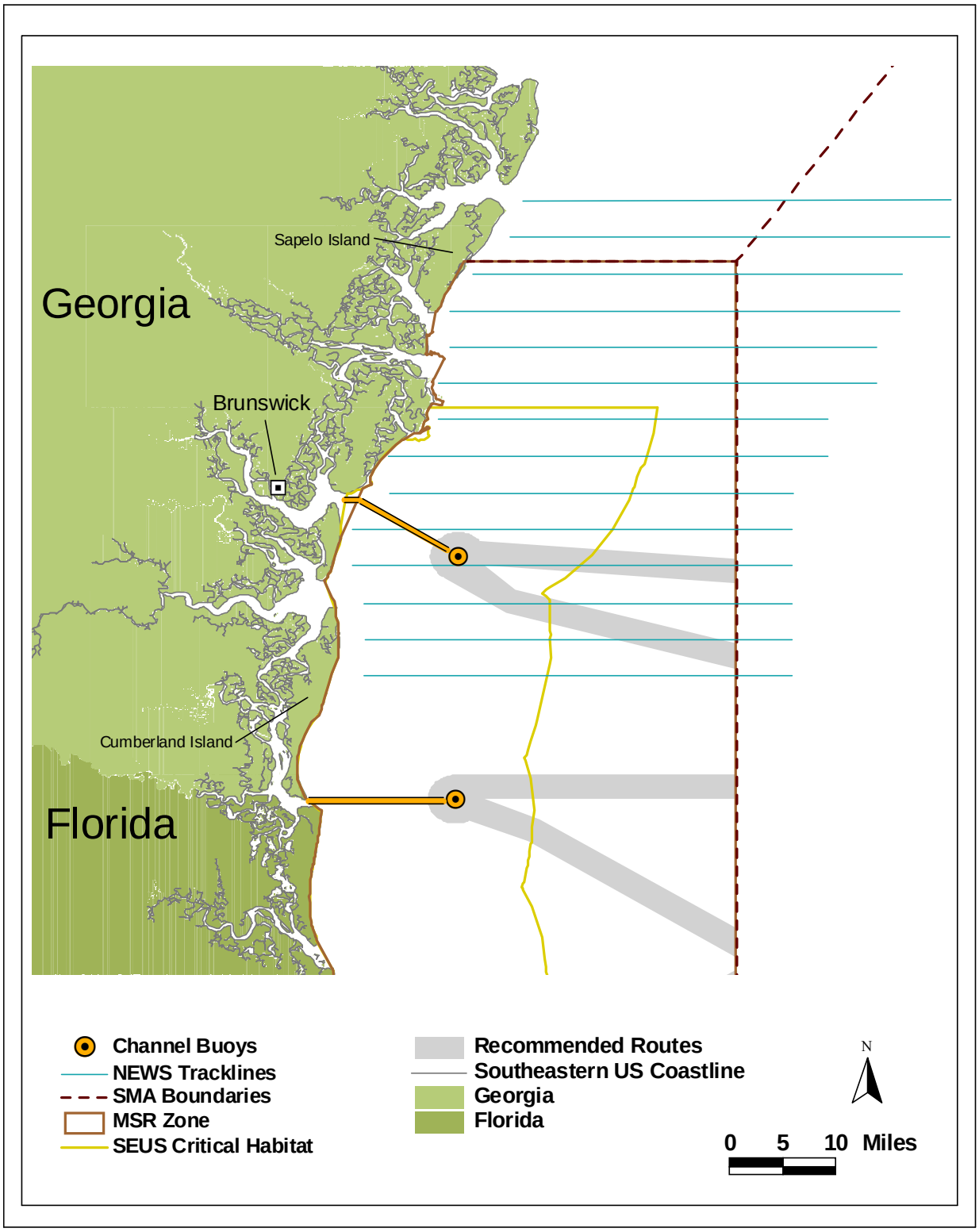

Figure 1. NEWS 2009-2010 survey tracklines.

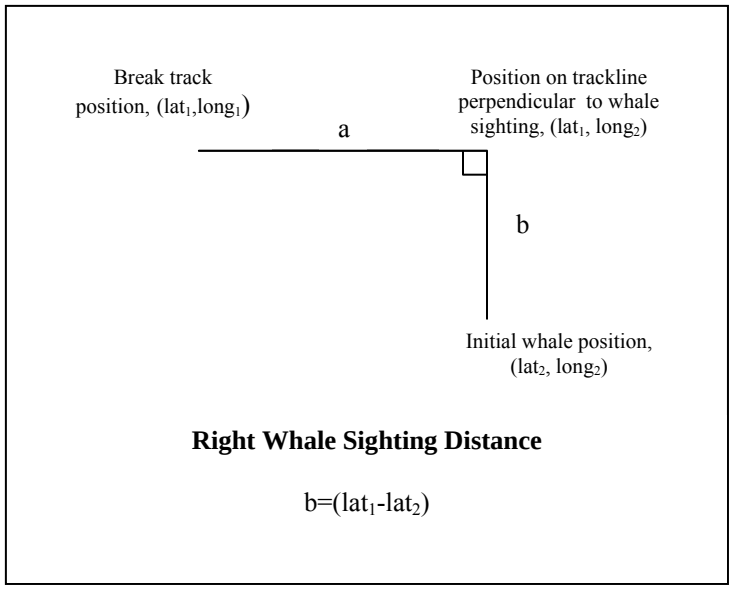

Figure 2. Diagram of method for determining sighting distances for right whales.

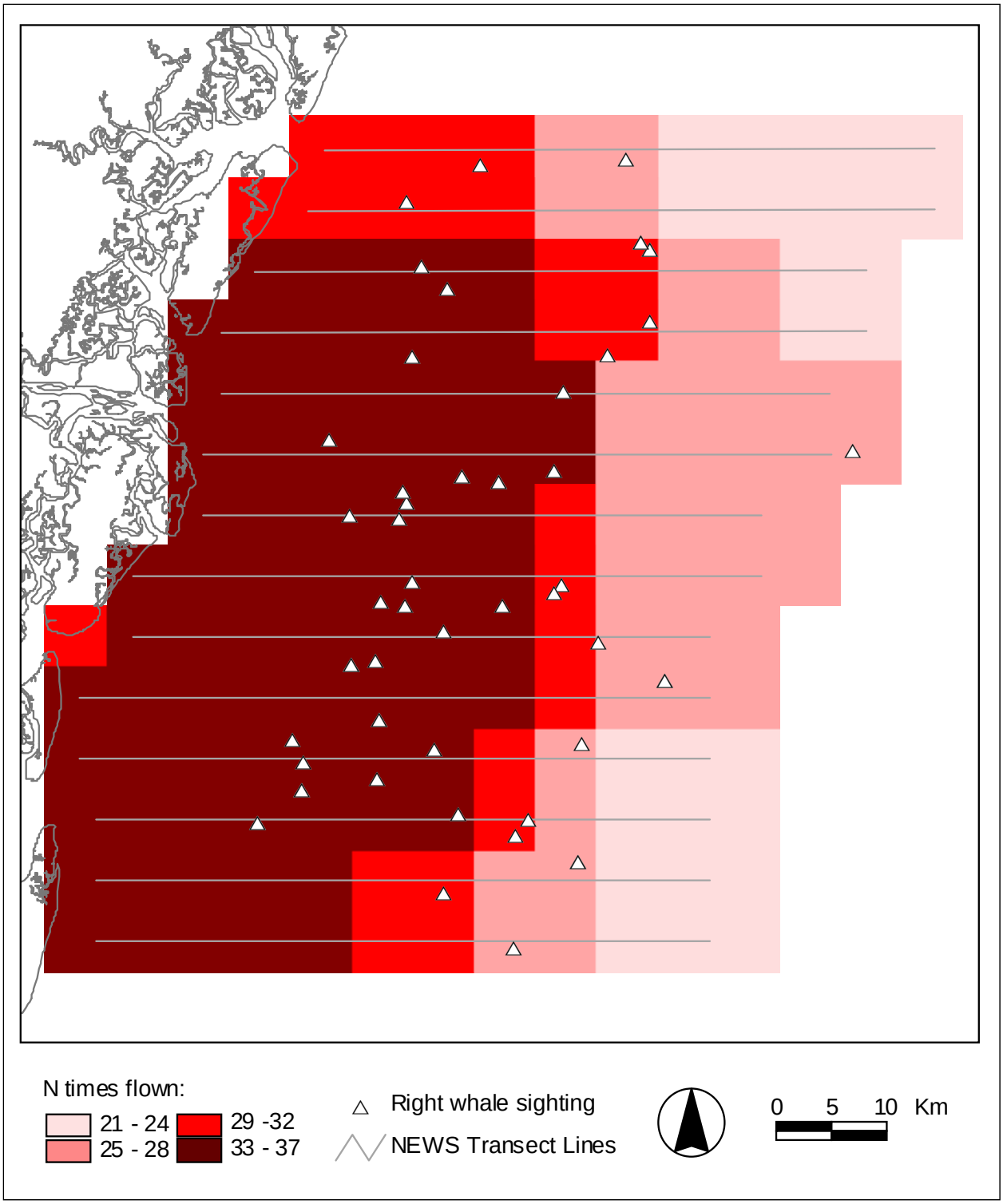

Figure 3. Spatial distribution of survey effort, 1 December 2009 to 31 March 2010.

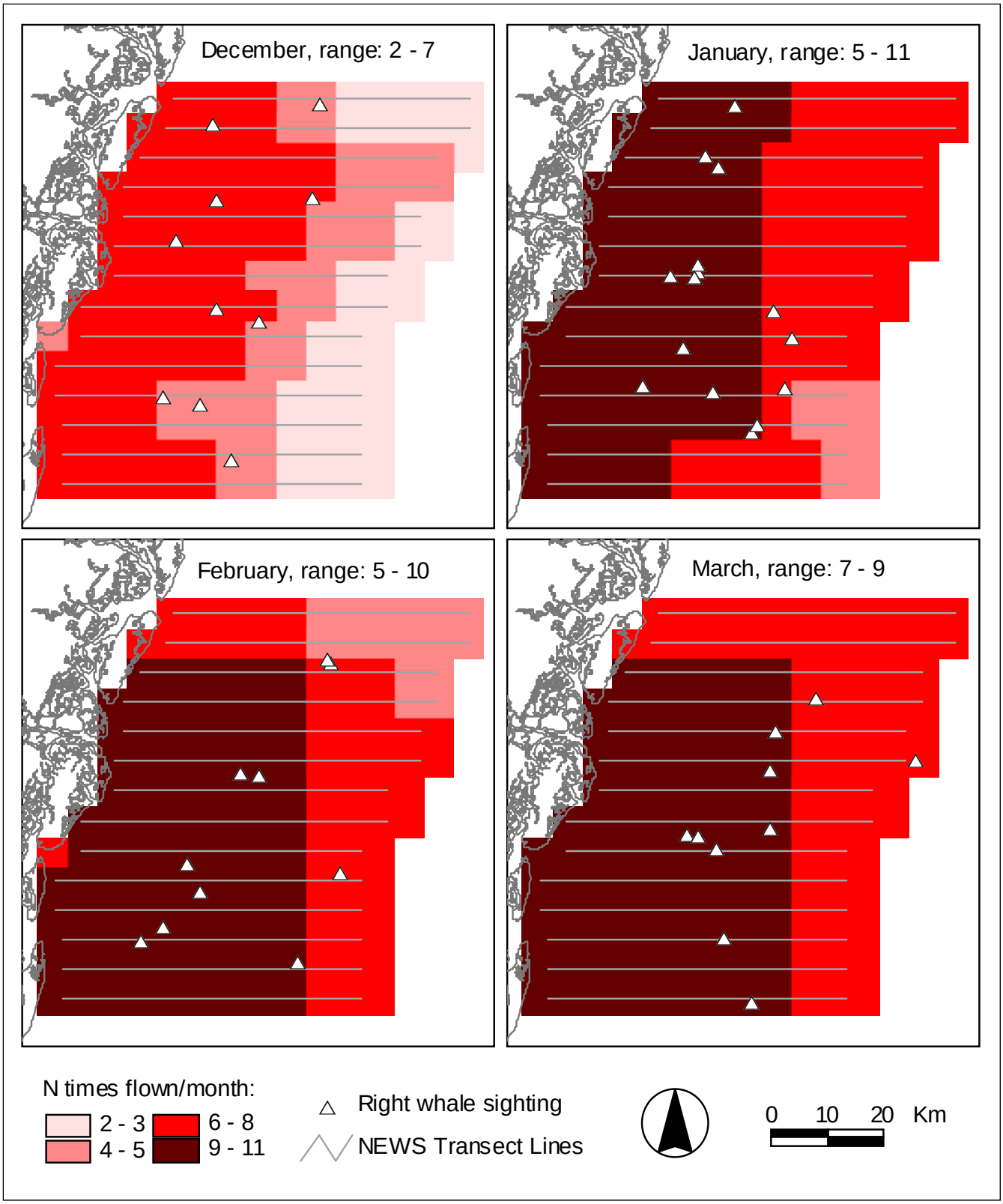

Figure 4. Spatial distribution of survey effort by month, December 2009 to March 2010.

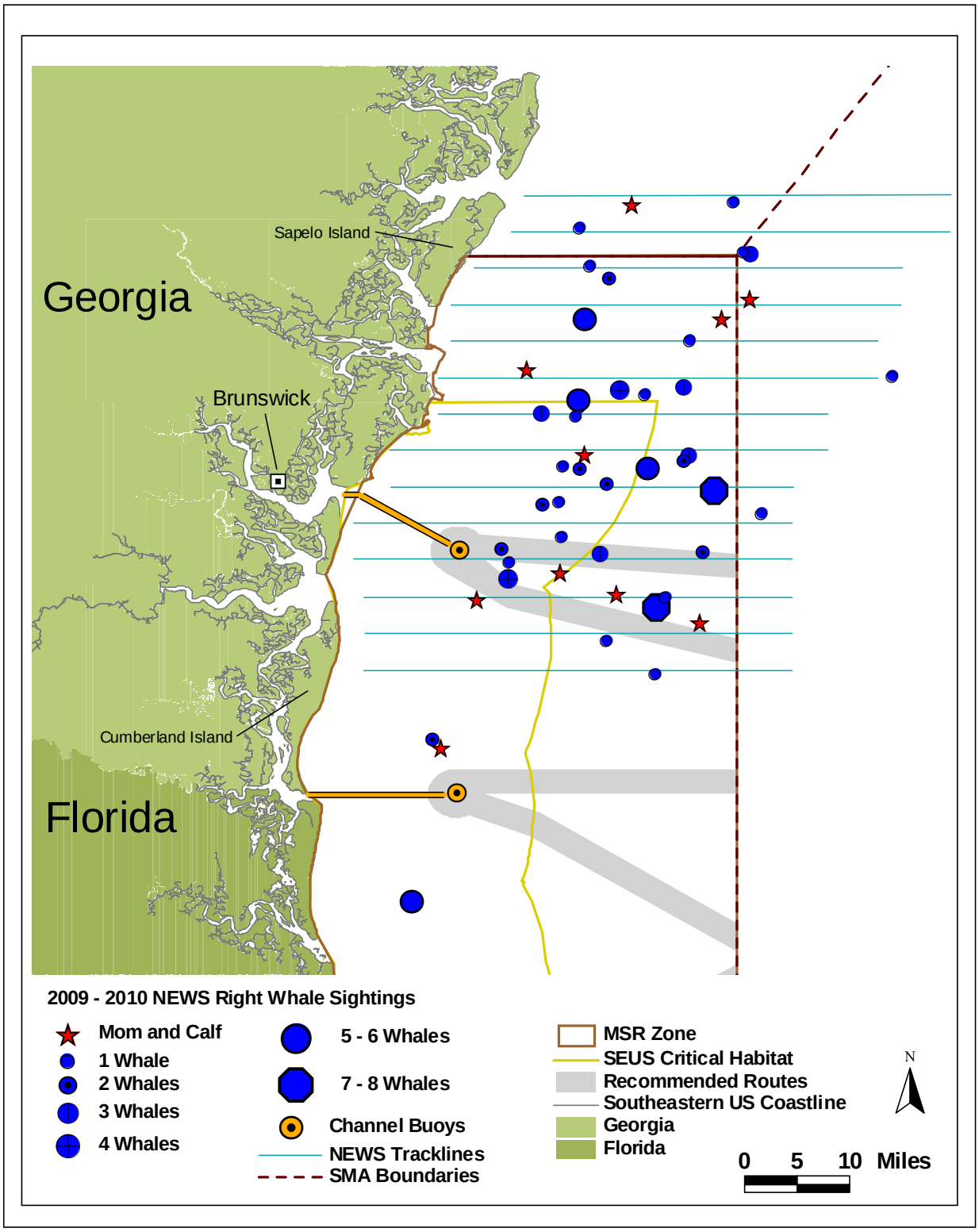

Figure 5. NEWS 2009-2010 right whale sightings

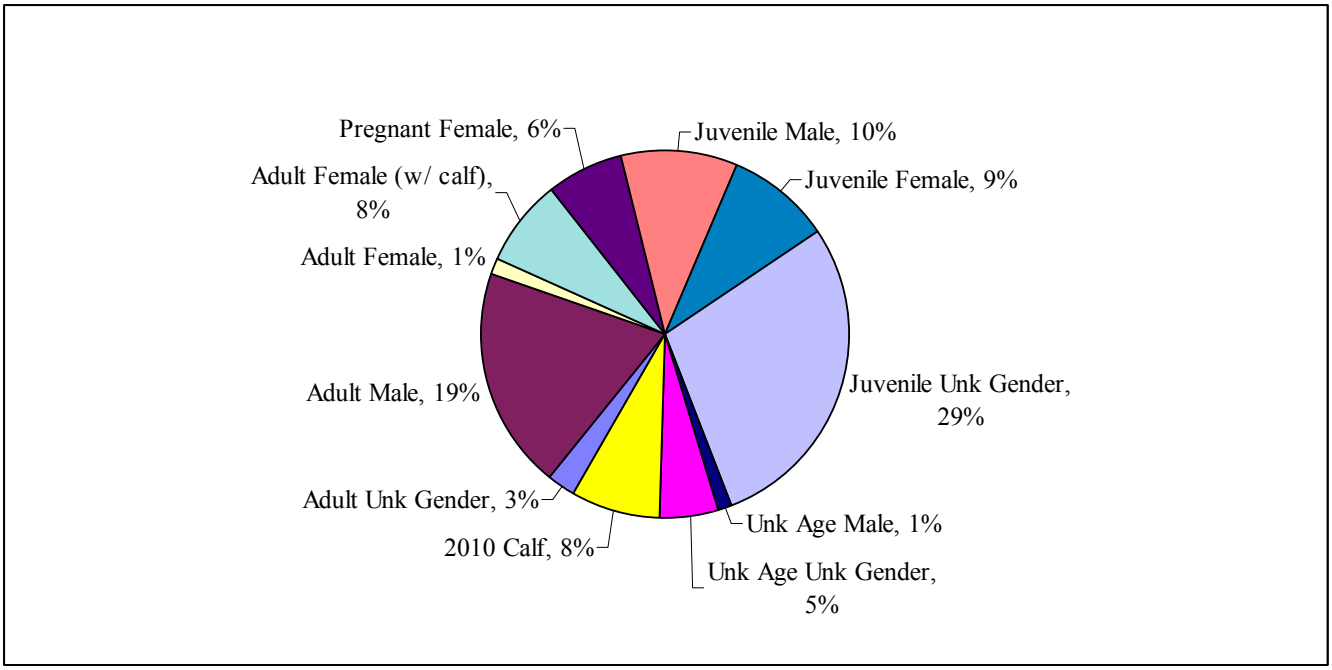

Figure 6. NEWS 2009-2010 right whale demographic summary.

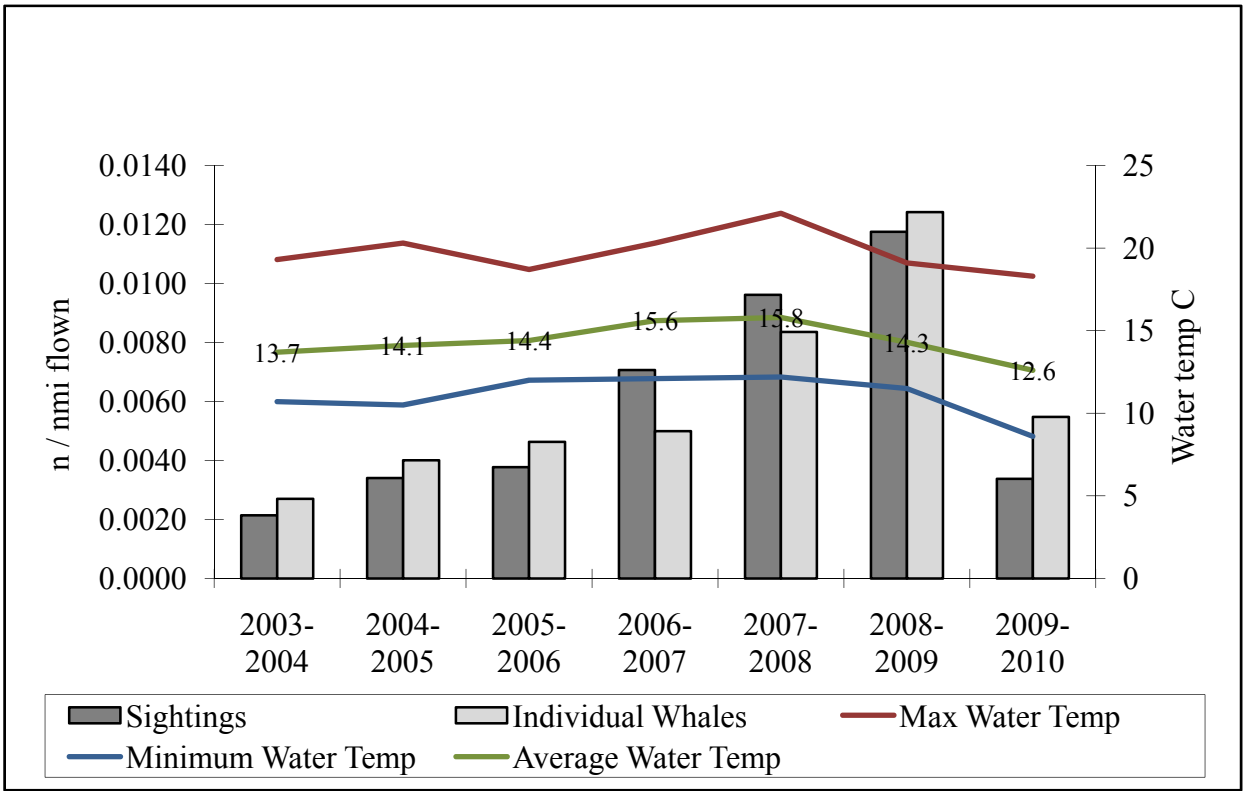

Figure 7. 2003-2010 Right whale sightings/individuals vs. water temperatures at Gray's Reef buoy.

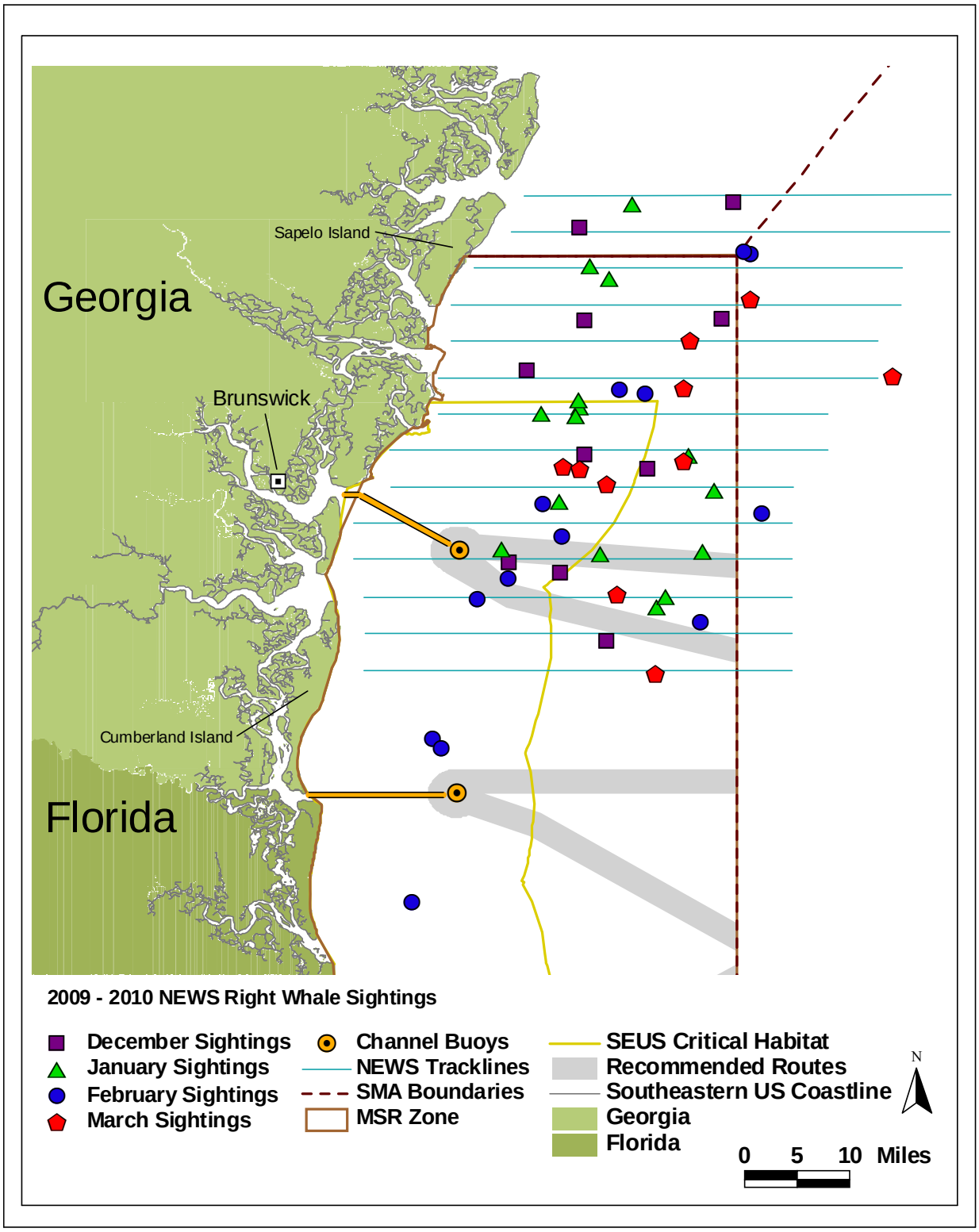

Figure 8. NEWS 2009-2010 right whale sightings classified by month.

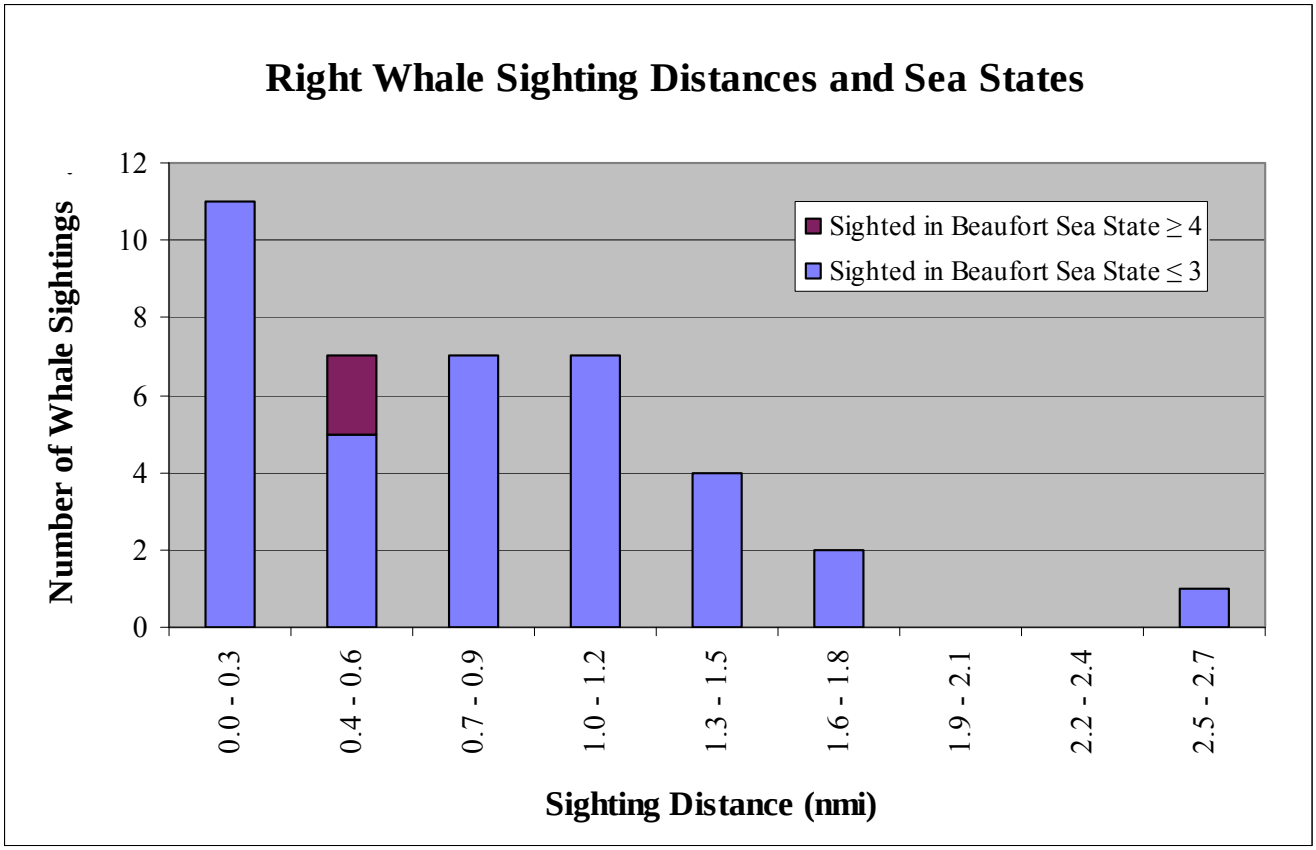

Figure 9. NEWS 2009-2010 right whale sighting distances and sea states.

Table 1. NEWS trackline waypoints.

Transect Number	Length (nmi)	Western Waypoint		Eastern Waypoint	
1	31.5	30° 53 N	81° 22 W	30° 53 N	80° 47 W
2	31.5	30° 56 N	81° 22 W	30° 56 N	80° 47 W
3	31.5	30° 59 N	81° 22 W	30° 59 N	80° 47 W
4	32.4	31° 02 N	81° 23 W	31° 02 N	80° 47 W
5	32.4	31° 05 N	81° 23 W	31° 05 N	80° 47 W
6	29.7	31° 08 N	81° 20 W	31° 08 N	80° 47 W
7	32.4	31° 11 N	81° 20 W	31° 11 N	80° 44 W
8	28.8	31° 14 N	81° 16 W	31° 14 N	80° 44 W
9	32.4	31° 17 N	81° 16 W	31° 17 N	80° 40 W
10	31.5	31° 20 N	81° 15 W	31° 20 N	80° 40 W
11	33.3	31° 23 N	81° 15 W	31° 23 N	80° 38 W
12	31.5	31° 26 N	81° 13 W	31° 26 N	80° 38 W
13	32.4	31° 29 N	81° 10 W	31° 29 N	80° 34 W
14	31.5	31° 32 N	81° 09 W	31° 32 N	80° 34 W

Total nmi 442.8

Table 2. NEWS right whale surveys, 1 December 2009 through 31 March 2010.

Date	Survey Name	Complete Surveys	Partial Surveys	Survey Hobbs Time	Total trackline nmi flown	Trackline nmi flown in Beaufort SS ≤ 3	Number of Whales Seen	Contingency Plan
04-Dec-09	NEWS20091204		1	3.8	243.7	243.7	1	
15-Dec-09	NEWS20091215	1		5.4	442.8	442.8	6	
21-Dec-09	NEWS20091221		1	3.6	231.5	137.0	0	
22-Dec-09	NEWS20091222		1	6.1	377.2	361.3	5	
23-Dec-09	NEWS20091223		1	3.8	259.1	201.2	2	
27-Dec-09	NEWS20091227		1	4.6	311.4	280.7	7	
31-Dec-09	NEWS20091231		1	4.6	320.7	292.2	3	
03-Jan-10	NEWS20100103		1	5.0	327.7	312.9	6	
04-Jan-10	NEWS20100104		1	5.1	378.9	367.3	3	
07-Jan-10	NEWS20100107		1	5.0	414.5	392.1	0	
11-Jan-10	NEWS20100111		1	3.6	220.8	193.9	0	
12-Jan-10	NEWS20100112		1	3.2	163.9	143.1	1	
14-Jan-10	NEWS20100114	1		5.7	442.8	396.3	2	
15-Jan-10	NEWS20100115		1	4.9	392.3	312.6	0	
18-Jan-10	NEWS20100118		1	5.3	382.4	374.2	3	
19-Jan-10	NEWS20100119	1		6.3	442.8	366.5	8	
20-Jan-10	NEWS20100120	1		6.1	442.8	442.8	12	
22-Jan-10	NEWS20100122		1	2.7	158.2	136.3	7	
08-Feb-10	NEWS20100208		1	3.7	266.8	158.0	0	
09-Feb-10	NEWS20100209		1	4.1	300.0	300.0	2	

Date	Survey Name	Complete Surveys	Partial Surveys	Survey Hobbs Time	Total trackline nmi flown	Trackline nmi flown in Beaufort SS ≤ 3	Number of Whales Seen	Contingency Plan
11-Feb-10	NEWS20100211		1	4.5	378.9	364.3	0	
14-Feb-10	NEWS20100214	1		5.8	442.8	310.4	5	
19-Feb-10	NEWS20100219	1		6.1	442.8	408.0	4	
20-Feb-10	NEWS20100220		1	5.1	367.9	367.9	6	2 Plane
21-Feb-10	NEWS20100221		1	6.4	423.5	423.5	11	2 Plane
23-Feb-10	NEWS20100223	1		5.3	442.8	442.8	0	
24-Feb-10	NEWS20100224	1		5.2	442.8	442.8	0	
27-Feb-10	NEWS20100227		1	4.9	372.7	339.3	3	
07-Mar-10	NEWS20100307	1		5.7	442.8	387.2	1	
08-Mar-10	NEWS20100308	1		5.7	442.8	442.8	3	
09-Mar-10	NEWS20100309	1		5.8	442.8	442.8	2	
10-Mar-10	NEWS20100310		1	6.8	367.9	324.8	9	2 Plane
19-Mar-10	NEWS20100319	1		5.7	442.8	411.7	0	
20-Mar-10	NEWS20100320	1		5.7	442.8	442.8	0	
28-Mar-10	NEWS20100328	1		5.2	442.8	395.2	0	
29-Mar-10	NEWS20100329	1		5.6	442.8	428.1	0	
30-Mar-10	NEWS20100330		1	4.9	412.3	249.0	2	
Total	**37 Surveys**	**15**	**22**	**187.0**	**13714.2**	**12478.3**	**114**	

Table 3. NEWS 2009-2010 non-weather related causes for no-fly days.

Date	Fly-able Day	Survey Attempted by WT	Non-weather Related Reasons for Partial or No Survey by Wildlife Trust Survey Team	NEWS Area Covered by One or Two Plane Contingency
06-Dec-09	N	N	NOAA Corp Pilot Safety Training	N
07-Dec-09	N	N	NOAA Corp Pilot Safety Training	N
08-Dec-09	Y	N	NOAA Corp Pilot Safety Training	Y
09-Dec-09	N	N	NOAA Corp Pilot Safety Training	N
10-Dec-09	N	N	NOAA Corp Pilot Safety Training	N
23-Jan-10	N	N	100 hr. Maintenance on NOAA46	N
24-Jan-10	N	N	100 hr. Maintenance on NOAA46	N
25-Jan-10	Y	N	100 hr. Maintenance on NOAA46	Y
26-Jan-10	N	N	100 hr. Maintenance on NOAA46	Y
27-Jan-10	Y	N	100 hr. Maintenance on NOAA46	Y
28-Jan-10	Y	N	100 hr. Maintenance on NOAA46	Y
29-Jan-10	Y	N	100 hr. Maintenance on NOAA46	Y
30-Jan-10	N	N	100 hr. Maintenance on NOAA46	N
31-Jan-10	N	N	100 hr. Maintenance on NOAA46	N

Date	Fly-able Day	Survey Attempted by WT	Non-weather Related Reasons for Partial or No Survey by Wildlife Trust Survey Team	NEWS Area Covered by One or Two Plane Contingency
01-Feb-10	N	N	100 hr. Maintenance on NOAA46	N
02-Feb-10	N	N	100 hr. Maintenance on NOAA46	N
21-Mar-10	N	N	100 hr. Maintenance on NOAA46	N
22-Mar-10	N	N	100 hr. Maintenance on NOAA46	N
23-Mar-10	N	N	100 hr. Maintenance on NOAA46	N
24-Mar-10	Y	N	100 hr. Maintenance on NOAA46	Y
25-Mar-10	Y	N	100 hr. Maintenance on NOAA46	Y
31-Mar-10	Y	N	Pilot Unavailable to Fly	Y

Table 4. 2009-2010 NEA right whale sightings in the NEWS survey area.

Sighting Event	Month	Day	Year	Time (Local)	Latitude	Longitude	Number of Whales Sighted	Time of Report	Sighting Identifier	Sighting Source
1	12	08	2009	1205	31.13667	-81.27333	1	1216	CEWS001	NEA
2	01	25	2010	1032	31.27167	-80.94500	3	1043	CEWS056	NEA
3	01	28	2010	1219	31.01000	-80.96000	1	1229	CEWS065	NEA
4	01	28	2010	1518	31.27333	-80.86667	9	1550	CEWS066	NEA
5	01	28	2010	1532	31.26000	-80.87833	1	1555	CEWS067	NEA
6	01	28	2010	1555	31.20667	-80.89000	3	1608	CEWS068	NEA
7	01	28	2010	1718	30.87500	-81.36500	2	1725	CEWS069	NEA
8	01	29	2010	1131	31.04000	-81.06500	2	1154	CEWS070	NEA
9	01	29	2010	1141	31.04333	-81.07500	1	1157	CEWS071	NEA
10	01	29	2010	1236	31.05833	-81.24833	2	1238	CEWS072	NEA
11	01	29	2010	1554	31.29500	-80.90833	3	1610	CEWS073	NEA
12	01	29	2010	1627	31.34667	-80.87167	3	1646	CEWS074	NEA
13	01	29	2010	1630	31.31667	-80.87333	1	1649	CEWS075	NEA
14	03	24	2010	1146	30.88167	-80.98500	2 (Mom/Calf)	1159	CEWS149	NEA
15	03	24	2010	1504	31.28833	-81.16500	2 (Mom/Calf)	1513	CEWS150	NEA
16	03	25	2010	1149	31.04667	-81.24000	2 (Mom/Calf)	1159	CEWS152	NEA
17	03	25	2010	1352	31.14000	-81.10500	2 (Mom/Calf)	1404	CEWS153	NEA

Table 5. NEWS 2009-2010 survey effort per month.

Survey Month	Number of NEWS Surveys	NEWS Survey Hobbs Time	Total trackline nmi flown	Trackline nmi flown in Beaufort SS ≤ 3	Number of Whales Seen
December 2009	7	31.9	2186.3	1958.9	24
January 2010	11	52.9	3767.1	3438.0	42
February 2010	10	51.1	3881.0	3557.0	31
March 2010	9	51.1	3879.8	3524.4	17
Total	**37**	**187.0**	**13714.2**	**12478.3**	**114**

Table 6. NEWS right whale survey data from December 2003 to March 2010.

NEWS Survey Season	Number of NEWS Surveys	Complete NEWS Surveys	Partial NEWS Surveys	Total Survey Hobbs Time	Total Trackline nmi Flown	Trackline nmi Flown in Beaufort SS ≤ 3	Number of Right Whale Sighting Events	Number of Right Whales Sighted	Number of Individual Right Whales	Number of Individual Mother/ Calf Pairs
2003-2004	61	31	30	279.4	21499.9	10369.8	46	83	58	13
2004-2005	67	28	39	323.0	23220.9	12089.1	79	185	93	16
2005-2006	59	26	33	273.5	19879.4	10144.8	75	178	92	14
2006-2007	55	22	33	258.1	17415.6	10243.8	123	271	87	14
2007-2008	46	28	18	261.0	17469.0	13653.5	168	414	146	17
2008-2009	44	22	20	248.1	14976.7	11871.6	176	434	186	28
2009-2010	37	15	22	181.5	13329.2	12122.8	45	104	73	6

Table 7. NEWS 2009-2010 leatherback turtle sightings.

Survey Date	Time (GMT)	Latitude	Longitude	Number of Leatherback Turtles Sighted
14-Jan-10	165557	31.23028	-80.72315	1
18-Jan-10	200900	31.32577	-80.64816	1
29-Mar-10	190456	31.38317	-80.64995	1
29-Mar-10	190526	31.38327	-80.63236	1
29-Mar-10	190545	31.38570	-80.62158	1
29-Mar-10	190556	31.38997	-80.62034	1
29-Mar-10	190656	31.41672	-80.61678	1
29-Mar-10	190826	31.43320	-80.65166	1
29-Mar-10	194446	31.48315	-80.56728	1
29-Mar-10	194546	31.50263	-80.55544	1
29-Mar-10	194626	31.52065	-80.55418	1
29-Mar-10	203046	30.88505	-80.89111	1
29-Mar-10	203227	30.88375	-80.83055	1
30-Mar-10	194540	31.28315	-80.46150	1
30-Mar-10	195210	31.33417	-80.72004	1

Appendix 1. NEWS 2009-2010 right whale sightings.

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NEWS Number	Comments	Sighting Distance (nmi)
1	12	04	2009	1052	NEWS20091204	31.52423	-80.86425	A	1701	1116	NEWS001		0.57
2	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	A	3314	1605	NEWS002		1.26
3	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	B	2008 Calf of 2790	1605	NEWS002		1.26
4	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	C	3745	1605	NEWS002		1.26
5	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	D	3623	1605	NEWS002		1.26
6	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	E	2008 Calf of 3130	1605	NEWS002		1.26
7	12	15	2009	1523	NEWS20091215	31.36265	-81.06900	F	2008 Calf of 1243	1605	NEWS002		1.26
8	12	22	2009	0947	NEWS20091222	31.01691	-81.10181	A	1701	1010	NEWS003	w/ Calf	1.04
9	12	22	2009	0947	NEWS20091222	31.01691	-81.10181	B	2010 Calf of 1701	1010	NEWS003	Calf	1.04
10	12	22	2009	1045	NEWS20091222	31.17837	-81.06902	C	1241	1112	NEWS004	w/ Calf	0.27
11	12	22	2009	1045	NEWS20091222	31.17837	-81.06902	D	2010 Calf of 1241	1112	NEWS004	Calf	0.27
12	12	22	2009	1258	NEWS20091222	31.48915	-81.07463	E	2009 Calf of 1515	1317	NEWS005	Yearling	0.33
13	12	23	2009	1034	NEWS20091223	31.29453	-81.14697	A	1950	1103	NEWS006	w/ Calf	0.65
14	12	23	2009	1034	NEWS20091223	31.29453	-81.14697	B	2010 Calf of 1950	1103	NEWS006	Calf	0.65
15	12	27	2009	0918	NEWS20091227	30.92368	-81.03773	A	2009 Calf of 3440	0940	NEWS007	Yearling	0.57
16	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	B	2614	1116	NEWS008		1.50
17	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	C	2007 Calf of 3360	1116	NEWS008		1.50
18	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	D	3790	1116	NEWS008		1.50
19	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	E	2008 Calf of 3293	1116	NEWS008		1.50
20	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	F	2009 Calf of 3317	1116	NEWS008	Yearling	1.50
21	12	27	2009	1046	NEWS20091227	31.15873	-80.98313	G	3317	1116	NEWS008	w/ Yearling	1.50
22	12	31	2009	1337	NEWS20091231	31.03063	-81.17198	A	2009 Calf of 1281	1404	NEWS009	Yearling	0.17
23	12	31	2009	1543	NEWS20091231	31.36398	-80.88122	B	1241	1608	NEWS010	w/ Calf	1.09
24	12	31	2009	1543	NEWS20091231	31.36398	-80.88122	C	2010 Calf of 1241	1608	NEWS010	Calf	1.09
25	01	03	2010	1238	NEWS20100103	31.43640	-81.06035	A	2009 Calf of 2145	1305	NEWS011	Yearling	0.21
26	01	03	2010	1528	NEWS20100103	31.04782	-81.18295	B	BK01SEUS09	1549	NEWS012		0.88
27	01	03	2010	1528	NEWS20100103	31.04782	-81.18295	C	2645	1549	NEWS012		0.88
28	01	03	2010	1538	NEWS20100103	31.04095	-81.04780	D	3620	1611	NEWS013		0.42
29	01	03	2010	1538	NEWS20100103	31.04095	-81.04780	E	3308	1611	NEWS013		0.42
30	01	03	2010	1538	NEWS20100103	31.04095	-81.04780	F	3523	1611	NEWS013		0.42
31	01	04	2010	1521	NEWS20100104	31.23355	-81.12780	A	3620	1601	NEWS014		0.10
32	01	04	2010	1521	NEWS20100104	31.23355	-81.12780	B	3308	1601	NEWS014		0.10
33	01	04	2010	1521	NEWS20100104	31.23355	-81.12780	C	3523	1601	NEWS014		0.10
34	01	12	2010	1310	NEWS20100112	31.11318	-81.10412	A	2642	1348	NEWS015		N/A
35	01	14	2010	1329	NEWS20100114	31.41827	-81.03527	A	2645	1351	NEWS016		0.94
36	01	14	2010	1329	NEWS20100114	31.41827	-81.03527	B	3421	1351	NEWS016		0.94
37	01	18	2010	1328	NEWS20100118	31.17587	-80.92592	A	2048	1403	NEWS017		2.54
38	01	18	2010	1328	NEWS20100118	31.17587	-80.92592	B	3260	1403	NEWS017	Prev. Entgled	2.54
39	01	18	2010	1328	NEWS20100118	31.17587	-80.92592	C	2140	1403	NEWS017		2.54
40	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	A	3560	1422	NEWS018		0.76

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NEWS Number	Comments	Sighting Distance (nmi)
41	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	B	3308	1422	NEWS018		0.76
42	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	C	3648	1422	NEWS018		0.76
43	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	D	3790	1422	NEWS018		0.76
44	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	E	3333	1422	NEWS018	Prev. Entgled	0.76
45	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	F	3541	1422	NEWS018		0.76
46	01	19	2010	1307	NEWS20100119	30.97033	-80.97008	#1	3111	1422	NEWS018		0.76
47	01	19	2010	1336	NEWS20100119	30.98313	-80.95858	G	3317	1423	NEWS019		N/A
48	01	20	2010	1103	NEWS20100120	31.51990	-81.00277	A	1241	1125	NEWS020	w/ Calf	N/A
49	01	20	2010	1103	NEWS20100120	31.51990	-81.00277	B	2010 Calf of 1241	1125	NEWS020	Calf	N/A
50	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	C	3680	1342	NEWS021		0.19
51	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	D	3523	1342	NEWS021		0.19
52	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	E	3333	1342	NEWS021	Prev. Entgled	0.19
53	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	F	3550	1342	NEWS021		0.19
54	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	G	3646	1342	NEWS021		0.19
55	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	H	3648	1342	NEWS021		0.19
56	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	I	3560	1342	NEWS021		0.19
57	01	20	2010	1317	NEWS20100120	31.12915	-80.89125	#1	2140	1342	NEWS021		0.19
58	01	20	2010	1414	NEWS20100120	31.04545	-80.90695	J	3745	1453	NEWS022		0.63
59	01	20	2010	1414	NEWS20100120	31.04545	-80.90695	K	3430	1453	NEWS022		0.63
60	01	22	2010	1644	NEWS20100122	31.24278	-81.07453	A	3360	1644	NEWS023		0.52
61	01	22	2010	1649	NEWS20100122	31.25232	-81.07677	B	3503	1709	NEWS024		N/A
62	01	22	2010	1649	NEWS20100122	31.25232	-81.07677	C	2140	1709	NEWS024		N/A
63	01	22	2010	1649	NEWS20100122	31.25232	-81.07677	D	3423	1709	NEWS024		N/A
64	01	22	2010	1649	NEWS20100122	31.25232	-81.07677	E	3550	1709	NEWS024		N/A
65	01	22	2010	1649	NEWS20100122	31.25232	-81.07677	#1	3680	1709	NEWS024		N/A
66	01	22	2010	1712	NEWS20100122	31.23058	-81.08087	F	3360	1712	NEWS025		N/A
67	02	09	2010	1106	NEWS20100209	31.11073	-81.12572	A	3260	1134	NEWS026	Prev. Entgled	1.35
68	02	09	2010	1106	NEWS20100209	31.11073	-81.12572	B	1150	1134	NEWS026		1.35
69	02	14	2010	1133	NEWS20100214	31.06557	-81.10035	A	2645	1149	NEWS027		1.16
70	02	14	2010	1351	NEWS20100214	31.45083	-80.84210	B	2008 Calf of 1245	1437	NEWS028		1.12
71	02	14	2010	1351	NEWS20100214	31.45083	-80.84210	C	3681	1437	NEWS028		1.12
72	02	14	2010	1351	NEWS20100214	31.45083	-80.84210	D	2008 Calf of 1408	1437	NEWS028		1.12
73	02	14	2010	1415	NEWS20100214	31.45590	-80.85050	E	2008 Calf of 1243	1444	NEWS029		N/A
74	02	19	2010	1059	NEWS20100219	31.26510	-81.02012	A	2608	1130	NEWS030		1.07
75	02	19	2010	1059	NEWS20100219	31.26510	-81.02012	B	1960	1130	NEWS030		1.07
76	02	19	2010	1059	NEWS20100219	31.26510	-81.02012	C	1320	1130	NEWS030		1.07
77	02	19	2010	1059	NEWS20100219	31.26510	-81.02012	#1	1317	1130	NEWS030		1.07
78	02	20	2010	1113	NEWS20100220	31.00745	-81.17386	A	3190	1205	NEWS031		1.59
79	02	20	2010	1113	NEWS20100220	31.00745	-81.17386	B	1317	1205	NEWS031		1.59
80	02	20	2010	1113	NEWS20100220	31.00745	-81.17386	C	2608	1205	NEWS031		1.59
81	02	20	2010	1113	NEWS20100220	31.00745	-81.17386	D	3411	1205	NEWS031		1.59

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NEWS Number	Comments	Sighting Distance (nmi)
82	02	20	2010	1156	NEWS20100220	30.98055	-81.21508	E	3180	1212	NEWS032	w/ Calf	0.15
83	02	20	2010	1156	NEWS20100220	30.98055	-81.21508	F	2010 Calf of 3180	1212	NEWS032	Calf	0.15
84	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	A	2009 Calf of 1515	1010	NEWS033	Yearling; Sighted in CEWS Survey Area	1.13
85	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	B	2201	1010	NEWS033	Sighted in CEWS Survey Area	1.13
86	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	C	1317	1010	NEWS033	Sighted in CEWS Survey Area	1.13
87	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	D	1320	1010	NEWS033	Sighted in CEWS Survey Area	1.13
88	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	E	1960	1010	NEWS033	Sighted in CEWS Survey Area	1.13
89	02	21	2010	0933	NEWS20100221	30.56583	-81.30430	F	3714	1010	NEWS033	Prev. Entgled, Sighted in CEWS Survey Area	1.13
90	02	21	2010	1102	NEWS20100221	30.78829	-81.27758	G	2330	1230	NEWS034	Sighted in CEWS Survey Area	0.18
91	02	21	2010	1102	NEWS20100221	30.78829	-81.27758	H	2271	1230	NEWS034	Sighted in CEWS Survey Area	0.18
92	02	21	2010	1120	NEWS20100221	30.77693	-81.26433	I	3180	1257	NEWS035	w/ Calf, Sighted in CEWS Survey Area	N/A
93	02	21	2010	1120	NEWS20100221	30.77693	-81.26433	J	2010 Calf of 3180	1257	NEWS035	Calf, Sighted in CEWS Survey Area	N/A
94	02	21	2010	1357	NEWS20100221	31.26052	-80.98593	K	3260	1430	NEWS036	Prev. Entgled	1.60
95	02	27	2010	0937	NEWS20100227	30.94816	-80.91081	A	1145	1002	NEWS037	w/ Calf	0.95
96	02	27	2010	0937	NEWS20100227	30.94816	-80.91081	B	2010 Calf of 1145	1002	NEWS037	Calf	0.95
97	02	27	2010	1054	NEWS20100227	31.09713	-80.82702	C	2009 Calf of 1151	1118	NEWS038	Yearling	0.73
98	03	07	2010	1227	NEWS20100307	31.28483	-80.64777	A	2008 Calf of 1802	1256	NEWS039		N/A
99	03	08	2010	0928	NEWS20100308	30.87842	-80.97105	A	3725	0949	NEWS040		0.37
100	03	08	2010	1013	NEWS20100308	30.98748	-81.02512	B	2605	1027	NEWS041	w/ Calf	0.00
101	03	08	2010	1013	NEWS20100308	30.98748	-81.02512	C	2010 Calf of 2605	1027	NEWS041	Calf	0.00
102	03	09	2010	1129	NEWS20100309	31.16967	-80.93380	A	1981	1147	NEWS042		0.88
103	03	09	2010	1129	NEWS20100309	31.16967	-80.93380	B	2940	1147	NEWS042		0.88
104	03	10	2010	0954	NEWS20100310	31.33457	-80.92410	A	2009 Calf of 1608	1046	NEWS043	Yearling	0.02
105	03	10	2010	1004	NEWS20100310	31.26968	-80.93388	B	CT02BOF2007	1049	NEWS044		0.84
106	03	10	2010	1004	NEWS20100310	31.26968	-80.93388	C	3460	1049	NEWS044		0.84
107	03	10	2010	1004	NEWS20100310	31.26968	-80.93388	D	2209	1049	NEWS044		0.84
108	03	10	2010	1129	NEWS20100310	31.16250	-81.09793	E	S050	1226	NEWS045		N/A
109	03	10	2010	1132	NEWS20100310	31.15933	-81.07540	F	2920	1228	NEWS046		1.52
110	03	10	2010	1132	NEWS20100310	31.15933	-81.07540	G	3680	1228	NEWS046		1.52
111	03	10	2010	1145	NEWS20100310	31.13748	-81.03903	H	1327	1232	NEWS047		0.21
112	03	10	2010	1145	NEWS20100310	31.13748	-81.03903	I	1131	1232	NEWS047		0.21
113	03	30	2010	1620	NEWS20100330	31.39090	-80.84173	A	2605	1646	NEWS048	w/ Calf	0.45
114	03	30	2010	1620	NEWS20100330	31.39090	-80.84173	B	2010 Calf of 2605	1646	NEWS048	Calf	0.45

Appendix 2. NEWS 2009-2010 whale/vessel co-occurrence report forms.

Whale/Vessel Interaction Report Form

Date 1 /19/2010 **Unique Report #** 1612

Survey Agency or Organization: WLT **Contact** Patricia Naessig 507-581-1147

Survey Area NEWS

Observer's Last Name(s) Naessig, Brower and Grassia

Are there photos? No **Location/name of photo files**

Is there video? No **Location/name of video files**

Whale Information (Initial)

Time of initial whale sighting (local, 24 hour) 1307 **Total number of whales** 8 **Number of calves** 0

Whale IDs 3560, 3308, 3648, S016, 3333, 3541, 3111 and 3317

Whale's initial activity (select the one that best fits; use description for additional activities)

Select: Milling

Description of whale activity A group of six whales was sighted milling with a single whale a mile to the east and another single whale a mile to the northeast of the six whales. The single whale to the east was swimming to the southeast. The single whale to the northeast was swimming to the northeast. The initial whale location below is for the group of six whales. The initial locations for the other two single whales were 30.97518N -80.97957W and 30.98313N -80.95859W.

Heading of Whale/Whale group Various

Whale's initial latitude 30.97033 **Whale's initial longitude** -80.97009 **(NAD 83 datum assumed)**

Whale Information (Post Interaction)

Time whale was observed at the last location (local, 24 hour) 1357

Whale's last latitude 30.99073 **Whale's last longitude** -80.94625 **(NAD 83 datum assumed)**

Did the whale change course? No **Did the whale's activity change?** No

New heading of Whale/Whale group Various

Description of activity/direction change:

The last location listed above is for the single whale swimming to the northeast. The group of six whales and the other single whale were last sighted at 1332(L) and 30.9717N -80.9774W. None of the whales appeared to change behavior or react to the presence of the recreational vessel during the time that the Wildlife Trust survey team was observing the whales.

Additional Information

At 1307(L), the recreational vessel was initially sighted between the group of six whales and the single whale to the east. The vessel was about 0.6 miles east of the group of six whales and about 0.4 miles to the west of the single whale. The vessel was stationary and the people aboard appeared to be fishing. During the time that the survey plane was circling and documenting the group of six whales and the single whale to the east, the recreational vessel remained stationary. The survey plane left the six whales and single whale at 1332(L). The survey plane then flew to the northeast and started circling and documenting the single whale swimming to the northeast at 1336(L). Shortly after the plane started circling again, the recreational vessel quickly picked up speed and headed directly to the last known location of the single whale to the northeast. At 1340(L), the vessel was stopped within about 100 yards of the last location the whale was observed at the surface. After a couple minutes, the people aboard the vessel appeared to start fishing again. At 1350(L), the survey team sighted the single whale about 600 yards to the northeast of the recreational vessel. At 1352(L), the survey team observed the recreational vessel slowly heading to the west. The survey team last observed the recreational vessel at 1358(L) still slowly heading to the west. At this time, the vessel was about 1.5 miles southwest of the last known location of the single whale swimming northeast and about 0.7 miles north of the last known location for the group of six whales.

Whale/Vessel Interaction Report Form

Date 1 /19/2010 **Unique Report #** 1612

Vessel Information

Is this a close approach (500 yard rule?) Yes **Homeport** N/A **State Reg. #** N/A

Vessel 1 **of** 1 **(one sheet for each vessel)** **Time vessel was spotted (24 hour)** 1307

Vessel Length (feet) 20 **Vessel Name** N/A

Vessel Code RECV **Vessel Type:** Recreational

Vessel Description Center console white recreational vessel with outboard motor

Vessel Speed (knots) 0 **Vessel Speed (Qualitative):** None **Vessel Heading** None

Method of determining speed Visual

Inbound/Outbound: N/A **Destination Port** N/A

Origin Port N/A

Description of vessel's initial location relative to whale(s)

At 1307(L), the recreational vessel was stationary between the group of six whales and the single whale to the east. The vessel was about 0.6 miles east of the group of six whales and about 0.4 miles to the west of the single whale.

Vessel's initial latitude 30.98098 **Vessel's initial longitude** -80.97473 **(NAD 83 datum assumed)**

Closest distance between whale and vessel 0.4 **Units:** Miles

Was communication attempted? (Did you try to hail them?): Yes

Was communication achieved? (Did they respond?): No

Did the vessel's heading change?: Yes **New Heading** Northeast

Did the vessel's speed change?: Yes **New Speed (knots)** 20

New Vessel Speed Qualitative: Fast

Description of vessel's last location relative to whale(s)

At 1358(L), the vessel was slowly heading to the west and about 1.5 miles southwest of the last known location of the single whale to the northeast and about 0.7 miles north of the last known location for the group of six whales.

Notes on the communication effort

The pilots on the survey plane attempted to contact the vessel by transmitting on VHF 16: "Recreational vessel at 30° 58 N and 80° 57 W. This is NOAA46 survey plane. Do you copy on 16?" No response was received from the vessel.

Time of vessel's last recorded location (local, 24 hour) 1358

Vessel's last latitude 30.98288 **Vessel's last longitude** -80.97404 **(NAD 83 datum assumed)**

Additional whale information specific to this vessel

At 1307(L), the vessel was stationary and the people aboard appeared to be fishing. While the survey plane was circling the group of six whales and the single whale to the east, the vessel remained stationary. The survey plane left the six whales and single whale at 1332(L). The survey plane then flew to the northeast and started circling the single whale swimming to the northeast at 1336(L). After the plane started circling again, the vessel quickly picked up speed and headed northeast. At 1340(L), the vessel was stopped within about 100 yards of the last know location for the whale swimming northeast. The people aboard the vessel then appeared to start fishing again. At 1350(L), the survey team sighted the single whale about 600 yards to the northeast of the recreational vessel. At 1352(L), the vessel was observed slowly heading to the west.

Whale/Vessel Interaction Report Form

Date 2 /21/2010 **Unique Report #** 823

Survey Agency or Organization: WLT **Contact** Patricia Naessig 507-581-1147

Survey Area CEWS (WTGA flying northern section of 2 plane contingency)

Observer's Last Name(s) Morten, Grassia, Brower

Are there photos? Yes **Location/name of photo files** 2010-02-21-WT-GA

Is there video? No **Location/name of video files**

Whale Information (Initial)

Time of initial whale sighting (local, 24 hour) 1102 **Total number of whales** 2 **Number of calves** 0

Whale IDs EGNO 2330 and EGNO 2271

Whale's initial activity (select the one that best fits; use description for additional activities)

Select: Swimming/Treveling

Description of whale activity WHALES ORIGINALLY SURFACED ABOUT 200-300 YARDS WEST OF TWO FISHING VESSELS. WHALES WERE TRAVELING IN A SW DIRECTION.

Heading of Whale/Whale group SW

Whale's initial latitude 30.78829 **Whale's initial longitude** -81.27758 **(NAD 83 datum assumed)**

Whale Information (Post Interaction)

Time whale was observed at the last location (local, 24 hour) 1114

Whale's last latitude 30.78563 **Whale's last longitude** -81.27963 **(NAD 83 datum assumed)**

Did the whale change course? No **Did the whale's activity change?** No

New heading of Whale/Whale group N/A

Description of activity/direction change:

WHALES APPEARED TO HAVE NO REACTION TO FISHING VESSELS AND CONTINUED TO TRAVEL TO THE SW.

Additional Information

Whale/Vessel Interaction Report Form

Date 2 /21/2010 **Unique Report #** 823

Vessel Information

Is this a close approach (500 yard rule?) No **Homeport** N/A **State Reg. #** N/A

Vessel 1 **of** 2 **(one sheet for each vessel)** **Time vessel was spotted (24 hour)** 1102

Vessel Length (feet) 20 **Vessel Name** N/A

Vessel Code RECV **Vessel Type:** Recreational

Vessel Description Center Consol white recreational fishing vessel, out board engine with a blue canopy, make: sea hunt

Vessel Speed (knots) 0 **Vessel Speed (Qualitative):** Slow **Vessel Heading** None

Method of determining speed Visual Estimate

Inbound/Outbound: N/A **Destination Port** N/A

Origin Port N/A

Description of vessel's initial location relative to whale(s)

Vessels were sighted at the same time as Right Whales. Vessels were orignally 200-300 yards to the East of the two whales. As soon as the plane broke track and headed towards the whales, the vessels began to motor towards the East at 1-2 knots.

Vessel's initial latitude 30.78829 **Vessel's initial longitude** -81.27758 **(NAD 83 datum assumed)**

Closest distance between whale and vessel 0.16 **Units:** Miles

Was communication attempted? (Did you try to hail them?): Yes

Was communication achieved? (Did they respond?): No

Did the vessel's heading change?: Yes **New Heading** East

Did the vessel's speed change?: Yes **New Speed (knots)** 1-2

New Vessel Speed Qualitative: Slow

Description of vessel's last location relative to whale(s)

Once the vessels were about 400 yards to the East of the whales they continued to fish. At the end of the sighting the vessels were .23 miles NE of the whales. The boats were stationary and did not appear to be pursuing the whales.

Notes on the communication effort

Pilots on the survey plane attempted to contact the vessel as it approached the area of the whales by transmitting on VHF 16: "Recreational vessel at 31° 15 N and 81° 05 W. This is NOAA46 survey plane. Do you copy on 16?" The pilots attempted to contact the vessel many times, but no response was ever received. Pilots gave an advisory to remain 500 yards away from the endangered Right Whales.

Time of vessel's last recorded location (local, 24 hour)

Vessel's last latitude **Vessel's last longitude** **(NAD 83 datum assumed)**

Additional whale information specific to this vessel

Whale/Vessel Interaction Report Form

Date 2 /21/2010 **Unique Report #** 823

Vessel Information

Is this a close approach (500 yard rule?) No **Homeport** N/A **State Reg. #** N/A

Vessel 2 **of** 2 **(one sheet for each vessel)** **Time vessel was spotted (24 hour)** 1102

Vessel Length (feet) 20 **Vessel Name** N/A

Vessel Code RECV **Vessel Type:** Recreational

Vessel Description Center console white recreational fishing vessel with outboard motor

Vessel Speed (knots) 0 **Vessel Speed (Qualitative):** None **Vessel Heading** None

Method of determining speed Visual Estimate

Inbound/Outbound: N/A **Destination Port** N/A

Origin Port N/A

Description of vessel's initial location relative to whale(s)

Vessels were sighted at the same time as Right Whales. They were orignally 200-300 yards to the East of the two whales. As soon as we broke track and headed towards the whales the vessels began to motor towards the East at 1-2 knots.

Vessel's initial latitude 30.78829 **Vessel's initial longitude** -81.27758 **(NAD 83 datum assumed)**

Closest distance between whale and vessel 0.16 **Units:** Miles

Was communication attempted? (Did you try to hail them?): Yes

Was communication achieved? (Did they respond?): No

Did the vessel's heading change?: Yes **New Heading** East

Did the vessel's speed change?: Yes **New Speed (knots)** 1-2

New Vessel Speed Qualitative: Slow

Description of vessel's last location relative to whale(s)

Once the vessels were about 400 yards to the East of the whales they continued to fish. At the end of the sighting the vessels were .23 miles NE of the whales. The boats were stationary and did not appear to be pursuing the whales.

Notes on the communication effort

Pilots on the survey plane attempted to contact the vessel as it approached the area of the whales by transmitting on VHF 16: "Recreational vessel at 31° 15 N and 81° 05 W. This is NOAA46 survey plane. Do you copy on 16?" The pilots attempted to contact the vessel many times, but no response was ever received. Pilots gave an advisory to remain 500 yards away from the endangered Right Whales.

Time of vessel's last recorded location (local, 24 hour)

Vessel's last latitude **Vessel's last longitude** **(NAD 83 datum assumed)**

Additional whale information specific to this vessel

February 21, 2010 WTGA Whale/Vessel Interaction Vessel 1

February 21, 2010 WTGA Whale/Vessel Interaction Vessel 2

Appendix 3. NEWS 2009-2010 ship speed rule observation report.

Ship Speed Rule Observation – January 11, 2010

On January 11, 2010, the Wildlife Trust Georgia Right Whale survey team was flying an aerial survey within the NEWS survey area (30° 53N to 31° 32N out to 080° 34W on the eastern boundary). While flying in the southern section of the survey area, the team sighted a yacht traveling quickly to the north. At the first sighing of the vessel, it was 1020 (L), the plane was at 30° 56.0172N 081° 15.4128W (off Cumberland Island, Georgia) and the vessel was about 4-5 miles north of the plane. At that time, the vessel was too far away to be able to tell its size. Later on in the flight, the survey team was much closer to the vessel off Sapelo Island, Georgia and able to estimate the yacht to be about 75 feet in length. Because the vessel was transiting very quickly and appeared to be larger than 65 feet, the survey team photographed the vessel and took two directly overhead locations of the vessel to estimate its speed (Table 1). From the vessel images, it was determined that the vessel's name was "Diamond Diva" (Figure 1). After documenting the vessel, one of the plane's pilots hailed the vessel on VHF channel 16 and the vessel's captain responded right away. When the captain responded, he was asked to switch to VHF channel 10. On VHF channel 10, the pilot asked if the vessel was aware of the ship speed restrictions. The vessel's captain responded that he was unaware of the regulations and the pilot then explained that vessels of 65 feet or greater were required to travel at 10 knots or less in that area from November to April of each year. The captain thanked the pilot for the information and both the survey plane and vessel switched back to channel 16. By the time this communication between the survey plane and the "Diamond Diva" was completed, the survey team did not have a good visual of the vessel to tell if its speed had changed. Also, immediately following the communication between the survey plane and vessel, a Coast Guard alert to mariners discussing the ship speed rules and approach regulations for right whales was broadcast on VHF channel 22. Following the flight, the overhead locations of the observed vessel were used to calculate that the "Diamond Diva" was traveling at 17-20 knots within a Seasonal Management Area. Additionally, information about the vessel was obtained from the United States Coast Guard's (USCG) vessel data base at http://www.st.nmfs.noaa.gov/st1/CoastGuard/index.html. According to the USCG database, the "Diamond Diva" is a 74.7 foot Lazzara Yacht hailing from Newport Beach, California.

Table 1: Sighting Information for Observed Vessel "Diamond Diva"

	Time (L)	Latitude	Longitude
First Overhead Location:	12:33:06	31.52932	-81.00277
Second Overhead Location:	12:38:46	31.5529	-80.98392
Calculated Speed:	17.13 - 20.56 Knots		

Figure 1: Vessel involved in Ship Speed Rule Observation – January 11, 2010.