



FINAL REPORT TO  
GEORGIA DEPARTMENT OF NATURAL RESOURCES

NORTHERN EARLY WARNING SYSTEM  
NORTH ATLANTIC RIGHT WHALE (*Eubalaena glacialis*)  
AERIAL SURVEYS, 2005 – 2006 SEASON

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Submitted by:

WILDLIFE TRUST  
AQUATIC CONSERVATION PROGRAM

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## 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. The area designated as the Southeastern United States Critical Habitat (SEUS) by NOAA Fisheries in 1994 encompasses the waters from Altamaha Sound, Georgia to Sebastian Inlet, Florida out to 5-15 nm from the shoreline (50 CFR Part 226). Minimizing sources of human-caused death, injury and disturbance is the first objective of the 1991 northern right whale (*Eubalaena glacialis*) recovery plan as well as the updated draft recovery plan (NMFS 1991, 2004). Within this objective, reducing ships strikes is the first point addressed. Vessel collisions are the greatest threat to right whale survival. The SEUS calving ground includes entrances to four major shipping channels, resulting in frequent usage of these waters by large commercial and military vessels. In hopes of eliminating the risk of collision, the Early Warning System (EWS) was created to alert military and commercial vessels of the presence of right whales in the area. These Early Warning System surveys were initiated in 1994 to cover areas of high whale density along the coastline from Brunswick, Georgia to St. Augustine, Florida. Data collected since that time indicates that right whales regularly utilize waters outside of the initial EWS study area. In 2002, NMFS redesigned the EWS system to include three survey areas that replaced and expanded upon the original single EWS survey area. The redesigned EWS surveys were modified to cover the waters from mid Sapelo Island, GA to the southern end of St. Augustine Beach, FL. The survey effort described in this report covers the area from the northern end of Sapelo Island, GA to mid Cumberland Island, GA, referred to as the Northern Early Warning System (NEWS).

The objectives of the 2005-2006 NEWS surveys were to attempt to implement the actions of the North Atlantic Right Whale Recovery Plan, including the following objectives: “reduce ship collisions with right whales; document and provide support for entangled right whales; document dead and stranded right whales; monitor the status and trends of abundance and distribution of the western North Atlantic right whale; and characterize and monitor right whale habitat.” (GDNR, 2005). This report examines the results of the Wildlife Trust aerial survey efforts while attempting to fulfill these objectives within the Northern Early Warning System survey area for the 2005-2006 calving season.

## Methods

### *Study Area*

The Northern Early Warning System (NEWS) survey season began on December 1, 2005 and concluded on March 31, 2006. The NEWS survey area for the 2005-2006 season extended from the northern end of Sapelo Island, GA to mid Cumberland Island, GA, and out to approximately 32 nautical miles offshore. Fourteen east/west transect lines of varied lengths (28.8 – 32.4 nm) were flown at 3 nm intervals (Figure 1). A complete survey consisted of 442.8 nm of trackline (Table 1), not including miles flown in transit to, from, and between transect lines. Without any whale sightings, a complete survey took approximately five hours to finish.

On certain occasions during the 2005 – 2006 season, the Wildlife Trust survey team was called upon to fly a modified survey area that covered from mid Sapelo Island, GA to north Fernandina Beach, FL. This two-plane contingency survey plan was put into operation when one of the teams covering the three EWS survey areas was unavailable to cover their survey area. On these occasions, the Wildlife Trust survey team would fly 16 east/west transect lines at 3 nm intervals from 31° 26' N down to 30° 41' N, out to 80° 55' W. A complete survey consisted of about 410 nm of trackline. The modified tracklines were created to maintain coverage of the areas surrounding the Brunswick channel and St. Marys channel in the northern sector of the EWS survey system.

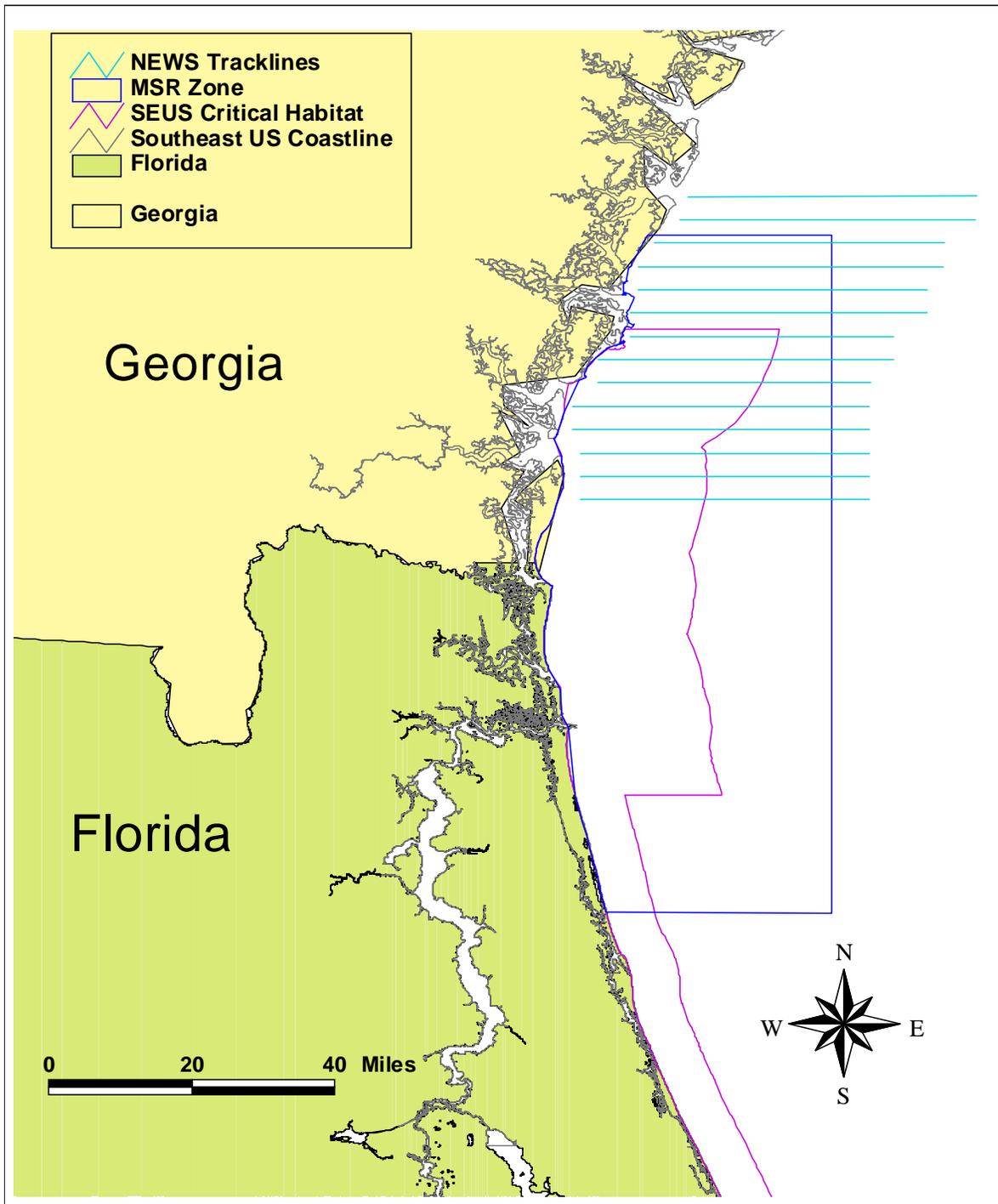


Figure 1: Map of NEWS survey tracklines flown from 01 December 2005 through 31 March 2006, including designated critical habitat and Mandatory Ship Reporting (MSR) zone.

Table 1: Northern early warning system (NEWS) survey transects for the 2005-2006 Season.

Transect Number	Length (NM)	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 NM 442.8**

#### *Aerial Surveys*

Surveys were scheduled to be flown daily from December 1, 2005 through March 31, 2006, weather permitting and under VFR (visual flight rules) conditions. During each normal survey day, the survey aircraft departed from Malcolm McKinnon airport on St. Simons Island, GA and returned to the same airfield. All of the NEWS surveys were conducted in a NOAA owned and operated DeHaviland Twin Otter aircraft. The survey aircraft was equipped with Global Positioning System navigation aids, radar, aviation VHF radio, marine VHF radio, a life raft, PFDs, survival suits, flares, EPIRB, an aircraft ELT and a satellite telephone. Additionally, individually registered GPIRBs, knives, streamers, and strobes were issued to the observers. Flight protocols also included mandatory use of PFDs and Nomex flight suits on all flights. All observers were also required to complete emergency egress training prior to the start of the survey season.

The NEWS surveys were flown at an altitude of 1000 ft (303 m) and at a ground speed of 100 knots. The surveys were typically begun at the western waypoint of the most northern trackline, transect 14, and flown north to south. However, the start point and direction of flight was determined daily based on weather conditions in the survey area and other survey factors. The necessary environmental conditions for a survey flight included a minimum ceiling of 455m, visibility greater than 2 nm, wind speed less than 20 knots, and Beaufort sea state of 6 or less. The survey crew consisted of a pilot and co-pilot, two observers, data recorder and a photographer. The survey team would rotate between the two observer positions and photographer position every four tracklines throughout the duration of the survey. The observers were positioned on either side of the aircraft at the forward bubble windows and all sightings of marine animals were reported to the data recorder. The data recorder did not rotate and used a laptop computer to log all sightings into Logger 2000, a software program designed for marine survey data entry. The time, location, number and species of all marine mammals, sea turtles, sharks and large rays were recorded. In addition, all types of vessels observed in the survey area were recorded. Sighting angles for all large vessels of 100 feet or greater in length were recorded using a digital inclinometer, except for when a large vessel of 300 feet or greater in length was observed within two to three nautical miles of the trackline. In that event, the survey aircraft broke track from the transect and flew directly over the large vessel to obtain an exact overhead GPS location. The large vessel's type, heading and visually estimated length and speed were also recorded at the time the vessel's GPS location was documented.

An exact overhead GPS location was also used to calculate the sighting distance for all large whales seen during the surveys. When a right whale was observed, a GPS position was recorded along the trackline at the point of observation. The survey aircraft then broke track and flew directly over the right whale to obtain an exact GPS location. The aircraft also circled over each right whale encountered to obtain digital photographs and sketches. The circling for photographic documentation was generally limited to 15 minutes for each sighting. After the right whales were fully documented, the aircraft returned to the trackline at the point of departure to continue the survey. However during special events, such as a right whale entanglement or ship strike, the survey area was modified as needed and the time spent obtaining photographs was extended past the 15-minute limit.

#### *Determination of Sighting Distance from the Trackline*

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 nautical miles from the trackline was determined by subtracting the distance between the two latitude positions, as 1 minute of latitude=1 nm in the study area (Figure 2).

The sighting distance from the trackline for large vessels was determined using angles obtained from a digital inclinometer at the time of the vessel's sighting. The angle was obtained when the vessel was directly perpendicular to the point on the trackline where the location was marked. Using the altitude of the aircraft ( $y$ ) and the known angle ( $A$ ) of the object, the distance ( $x$ ) of the vessel from the trackline could be determined from the following equation (Figure 2):

$$x=y(\tan A), \text{ where } y=\text{aircraft altitude in meters}$$

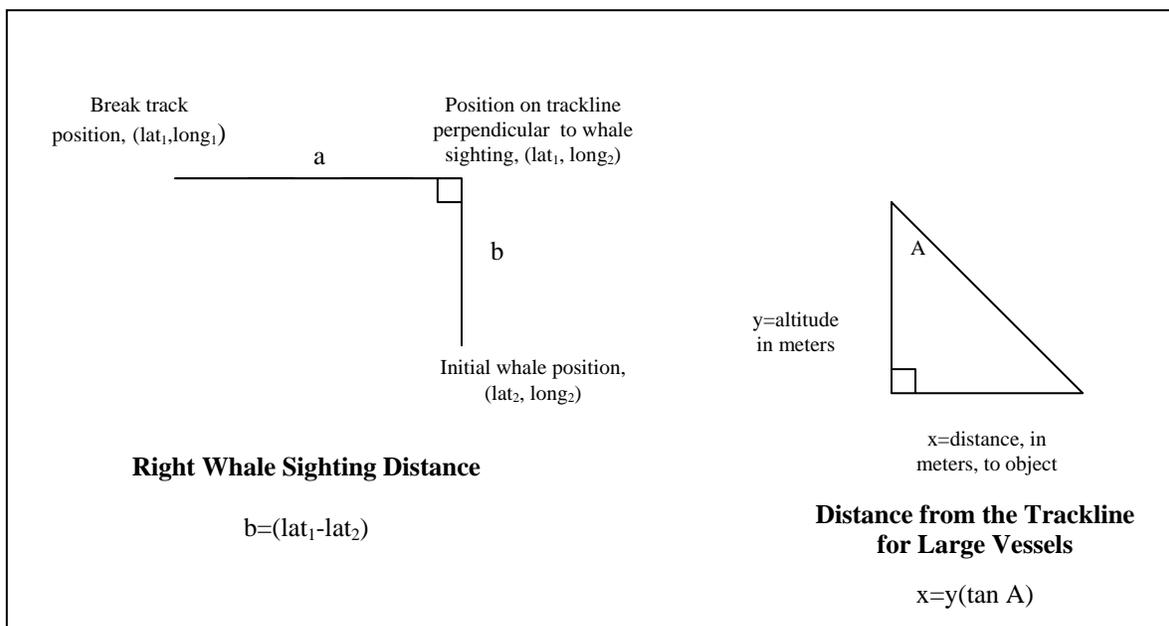


Figure 2: Diagram of methods for determining sighting distances for right whales and large vessels.

#### *Notification of Right Whale Sighting Information*

Upon completing data collection for each right whale sighting, the survey aircraft would immediately attempt to contact the Fleet Area Control and Surveillance Facility (FACSFACJAX) at Naval Air Station Jacksonville. This was normally accomplished via satellite phone. If this method was unsuccessful, the information was either relayed via another survey aircraft or telephoned in immediately after the survey.

aircraft was on the ground. The right whale sighting information reported to the FACSFACJAX dispatcher included date, time, latitude and longitude, direction of movement, age class and number of right whales sighted. FACSFACJAX would then follow up the sighting by contacting all military ships and aircraft in the southeastern United States (SEUS) almost instantaneously with the right whale sighting information. In addition, the facility would notify all other military and non-military interests via an alphanumeric pager system and email (Taylor and Brooks, 2002). These interests included all aerial survey teams, ship channel pilots, USCG NAVTEX, and state agencies. This near real-time notification of right whale sightings to various entities was put in place to help eliminate the possibility of right whale deaths due to ship strike. It also allows aerial survey teams to investigate and verify sightings reported from other sources such as the Coast Guard, military ships, dredges and other aircraft.

#### *Documentation of Whale/Vessel Interactions*

Due to the significant impact of ship collisions and other anthropogenic activities on the North Atlantic right whale (NMFS 1991, 2004), the Wildlife Trust survey team documented any incident in which a vessel was observed heading directly towards or approaching within a close proximity to right whales. The survey team would suspend the normal survey to document 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. Observations of the incident were documented until the vessels were no longer in the same vicinity as the right whales. Photographic and video documentation were taken whenever possible. Also, attempts were made to contact the vessels over VHF to make them aware of the presence and location of the right whales. All the information collected for each whale/vessel interaction was entered into an Access database and then submitted as detailed report forms to the National Oceanographic and Atmospheric Association (NOAA), the Georgia Department of Natural Resources (GDNR) and the Florida Wildlife Research Institute (FWRI). Appendix 1 contains examples of the whale/ship interaction report forms utilized during the 2005-2006 season.

#### *Photographic Identification*

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 these 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 using these unique patterns and features.

During a right whale sighting, the left-side observer recorded whale behaviors and sketched the callosity patterns and body scarring of the whales being observed. The right-side observer would shift to the left side of the plane and assist in observing the whales' behaviors. The crewmember in the photographer position would remove the window next to the left rear seat. The survey aircraft would circle at an altitude of 1000 ft (303m) while animals were photographed through the open side window. Photographs were taken of whales using a Canon D60 or 10D digital camera with a 100-400 mm or fixed 300 mm lens. In addition, a photographic technique developed by Peter Duley and Tim Cole of the NOAA Northeast Fisheries Science Center was utilized during certain surveys throughout the 2005-2006 NEWS survey season. The technique consisted of a belly mounted Canon Mark II 1Ds digital camera connected to a laptop. The system was used to photograph right whales while flying directly over the animals at 700 feet (212m) and allowed for real time viewing of images. Before the belly mounted camera system was utilized during a right whale sighting, primary identification photographs were always obtained from the side window. This was done because the belly mounted camera system was intended for use as a possible technique to measure the body size of right whales and not as an individual identification technique.

All the photographs obtained during the 2005-2006 NEWS survey season were compared against each other and against the New England Aquarium's catalog of North Atlantic right whales in order to determine the probable identity and resights of each individual whale encountered. This preliminary photo analysis by the Wildlife Trust team and initial identification verification by the New England Aquarium (NEA) has been completed. However, all right whale identifications listed within this report should be considered unverified until NEA has analyzed all photographs from the 2005-2006 southeast calving season. This final comparison and confirmation process by NEA is now underway and will most likely be completed sometime in 2007. Thus, all identification results within this report should be viewed as preliminary and subject to change.

## Results

### *Surveys*

A total of 59 NEWS surveys were flown during the 121 available survey days of the 2005-2006 North Atlantic right whale calving season (Table 2). Three of the surveys (December 3 – 5, 2005) were flown following the modified two-plane contingency survey plan. The other 56 surveys were flown following the normal NEWS 14 trackline survey pattern (Table 1). A total of 275.3 hours of hobbs time was logged for the NEWS surveys, averaging 4.7 hours of hobbs time per survey. Overall, 20,035.7 nautical miles of trackline were flown, with 10,155.5 nm (51%) of this total flown in a sea state of 3 or less. The complete survey area (442.8 nautical miles of trackline) was covered during 26 of the NEWS surveys. On 33 of the NEWS flights, the survey area was partially covered due to factors such as inclement weather, special events or limited available project flight hours (Table 3). During six of these 33 partial surveys, over 90% of the total nautical miles for a complete survey were covered. Days with no survey effort in the NEWS survey area were mostly due to unacceptable weather conditions. Other factors contributing to no fly days were pilot duty issues, such as required rest for survey pilots after six days of flying, and aircraft related reasons, such as required 100-hour plane maintenance (Table 3).

Table 2: NEWS Right Whale Surveys Conducted from 01 December 2005 through 31 March 2006.

Date	Survey Name	Complete Surveys	Partial Surveys	Survey Hobbs Time	Total trackline nmiles flown	Trackline nmiles flown in Beaufort SS < 3	Number of Whales Seen
03-Dec-05	NEWS20051203		1	3.1	86.2	86.2	1
04-Dec-05	NEWS20051204		1	3.4	210.8	35.7	0
05-Dec-05	NEWS20051205		1	2.7	199.3	2.5	0
10-Dec-05	NEWS20051210	1		5.4	442.8	197.7	0
16-Dec-05	NEWS20051216		1	3.0	230.8	74.8	0
17-Dec-05	NEWS20051217		1	0.9	23.7	0.0	0
20-Dec-05	NEWS20051220		1	3.5	255.2	24.9	0
21-Dec-05	NEWS20051221		1	3.5	197.6	6.8	2
22-Dec-05	NEWS20051222		1	1.4	72.4	0.0	0
23-Dec-05	NEWS20051223	1		5.3	442.8	171.7	0
24-Dec-05	NEWS20051224	1		5.6	442.8	442.8	3
27-Dec-05	NEWS20051227		1	5.3	377.0	19.0	2
28-Dec-05	NEWS20051228		1	5.0	401.2	0.0	1
30-Dec-05	NEWS20051230	1		5.7	442.8	178.7	7
31-Dec-05	NEWS20051231	1		5.2	442.8	68.2	0

Date	Survey Name	Complete Surveys	Partial Surveys	Survey Hobbs Time	Total trackline nmiles flown	Trackline nmiles flown in Beaufort SS < 3	Number of Whales Seen
04-Jan-06	NEWS20060104	1		5.7	442.8	442.8	2
05-Jan-06	NEWS20060105	1		5.4	442.8	88.0	0
07-Jan-06	NEWS20060107		1	3.0	197.6	0.0	0
10-Jan-06	NEWS20060110	1		5.5	442.8	52.1	2
11-Jan-06	NEWS20060111	1		5.3	442.8	442.8	0
12-Jan-06	NEWS20060112		1	4.6	314.1	314.1	2
13-Jan-06	NEWS20060113		1	2.7	194.2	184.7	0
16-Jan-06	NEWS20060116		1	6.0	290.9	60.1	4
17-Jan-06	NEWS20060117	1		5.9	442.8	322.7	5
19-Jan-06	NEWS20060119	1		6.2	442.8	144.0	11
20-Jan-06	NEWS20060120		1	6.1	411.3	160.4	14
21-Jan-06	NEWS20060121		1	5.3	386.1	386.1	7
24-Jan-06	NEWS20060124	1		5.8	442.8	336.5	6
26-Jan-06	NEWS20060126		1	1.5	75.4	0.0	0
28-Jan-06	NEWS20060128	1		5.1	442.8	71.2	0
29-Jan-06	NEWS20060129		1	2.3	122.7	9.9	2
01-Feb-06	NEWS20060201	1		5.5	442.8	442.8	2
02-Feb-06	NEWS20060202		1	3.5	255.0	0.0	2
03-Feb-06	NEWS20060203		1	4.9	402.5	220.9	0
06-Feb-06	NEWS20060206	1		5.2	442.8	442.8	1
08-Feb-06	NEWS20060208		1	7.0	423.9	42.2	13
09-Feb-06	NEWS20060209		1	2.4	189.1	189.1	0
10-Feb-06	NEWS20060210	1		6.7	442.8	312.7	17
22-Feb-06	NEWS20060222		1	3.7	261.3	84.8	0
27-Feb-06	NEWS20060227	1		7.6	442.8	290.0	26
28-Feb-06	NEWS20060228		1	6.9	400.5	35.1	13
01-Mar-06	NEWS20060301	1		6.2	442.8	160.7	11
02-Mar-06	NEWS20060302		1	5.1	414.7	14.5	0
03-Mar-06	NEWS20060303	1		7.2	442.8	325.2	8
06-Mar-06	NEWS20060306	1		5.5	442.8	66.3	2
08-Mar-06	NEWS20060308	1		5.8	442.8	427.9	5
09-Mar-06	NEWS20060309	1		5.8	442.8	0.0	2
11-Mar-06	NEWS20060311	1		6.1	442.8	385.7	4
12-Mar-06	NEWS20060312	1		5.8	442.8	423.9	0
13-Mar-06	NEWS20060313	1		5.5	442.8	18.6	0
16-Mar-06	NEWS20060316	1		5.7	442.8	429.0	1
17-Mar-06	NEWS20060317		1	3.5	250.2	83.1	0
19-Mar-06	NEWS20060319		1	3.1	250.2	0.0	0
20-Mar-06	NEWS20060320		1	3.4	250.2	173.9	0
27-Mar-06	NEWS20060327		1	3.2	250.2	174.0	0

Date	Survey Name	Complete Surveys	Partial Surveys	Survey Hobbs Time	Total trackline nmiles flown	Trackline nmiles flown in Beaufort SS < 3	Number of Whales Seen
28-Mar-06	NEWS20060328		1	3.2	250.2	250.2	0
29-Mar-06	NEWS20060329		1	4.0	314.1	273.5	0
30-Mar-06	NEWS20060330		1	4.0	314.1	314.1	0
31-Mar-06	NEWS20060331		1	3.4	250.2	250.2	0
<b>Total</b>	<b>59 Surveys</b>	<b>26</b>	<b>33</b>	<b>275.3</b>	<b>20035.7</b>	<b>10155.5</b>	<b>178</b>

Table 3: Pilot duty and aircraft related reasons for partial or no survey by Wildlife Trust in the NEWS survey area during the 2005 - 2006 calving season.

Date	Fly-able Day	Survey Attempted by WT	Pilot Duty and Aircraft Related Reasons for Partial or No Survey by Wildlife Trust
01-Dec-05	Y	N	NOAA46 Arrived at St. Simons Late in Afternoon
07-Dec-05	N	N	Required Pilot Downtime due to 6 Day Rule
13-Dec-05	Y	N	Late Return of NOAA46 from Disentanglement support off NC
25-Dec-05	N	N	Required Pilot Downtime due to 6 Day Rule
08-Jan-06	Y	N	100 hr. Maintenance on NOAA46
09-Jan-06	Y	N	100 hr. Maintenance on NOAA46
30-Jan-06	N	N	Required Pilot Downtime due to 6 Day Rule
11-Feb-06	N	N	100 hr. Maintenance on NOAA46
12-Feb-06	N	N	100 hr. Maintenance on NOAA46
13-Feb-06	Y	N	100 hr. Maintenance on NOAA46
14-Feb-06	Y	N	100 hr. Maintenance on NOAA46
15-Feb-06	Y	N	100 hr. Maintenance on NOAA46
16-Feb-06	Y	N	100 hr. Maintenance on NOAA46
17-Feb-06	Y	N	100 hr. Maintenance on NOAA46
18-Feb-06	Y	N	100 hr. Maintenance on NOAA46
19-Feb-06	N	N	100 hr. Maintenance on NOAA46
20-Feb-06	N	N	100 hr. Maintenance on NOAA46
05-Mar-06	Y	N	Required Pilot Downtime due to 6 Day Rule
14-Mar-06	N	N	Required Pilot Downtime due to 6 Day Rule
17-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours
19-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours
20-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours
21-Mar-06	N	N	100 hr. Maintenance on NOAA46
22-Mar-06	N	N	100 hr. Maintenance on NOAA46
27-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours
28-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours
29-Mar-06	Y	Partial	Flew Tracklines 1-10 due to Low Number of Available Flight Hours
30-Mar-06	Y	Partial	Flew Tracklines 1-10 due to Low Number of Available Flight Hours
31-Mar-06	Y	Partial	Flew Tracklines 1-8 due to Low Number of Available Flight Hours

Beyond the NEWS surveys conducted during the 2005 – 2006 season, the Wildlife Trust survey team was also involved in three flights that were conducted under special circumstances dealing with an entangled juvenile right whale (Table 4). On December 3, 2005, the Wildlife Trust survey team located an entangled right whale off of Little St. Simons Island, GA. The whale was found to be entangled in line that wrapped around the right pectoral fin, crossed over the back, wrapped around the left pectoral fin and included 500 feet of trailing line with a set of three buoys. The Wildlife Trust survey team spent 2.1 hours on December 3 acting as aerial support while most of the trailing line and buoys were removed and a telemetry buoy was attached to the entangled whale. On December 11 and 12, 2005, the Wildlife Trust team acted as aerial support in an additional disentanglement attempt on the entangled juvenile right whale. The survey team flew up to North Carolina to help locate, track and document the entangled whale off Cape Lookout and Cape Hatteras, NC. Unfortunately, the disentanglement attempts were not successful and the whale has yet to be identified. These three special circumstance flights involved a total of 18.3 hours of flight hobbs time (Table 4).

Table 4: Wildlife Trust special circumstance flights during the 2005-2006 aerial survey season.

Date	Flight Name	Flight Hobbs Time	Description of Flight	Number of Whales Seen
03-Dec-05	ENTG20051203	2.1	Disentanglement Aerial Support off GA	1 (Entgled)
11-Dec-05	ENTG20051211	5.5	Transit to NC and Attempt to Locate Entangled Whale	0
12-Dec-05	NEWS20051212	10.7	Disentanglement Aerial Support off NC & Transit to GA	1 (Entgled)
	<b>Total</b>	<b>18.3</b>		

On eleven days in which the Wildlife Trust survey team could not fly the NEWS survey area due to aircraft related reasons or special circumstance flights, the NEA or FWRI aerial survey teams flew portions of the NEWS survey area. The FWRI team surveyed the southern section of the NEWS area on December 1, 2005. The NEA team covered most of the NEWS survey area while flying the northern portion of the two-plane contingency on December 12 - 13, 2005, January 8 – 9, 2006 and February 13 – 18, 2006. During February 13 – 18, 2006, NEA sighted the only right whales observed by either team. In total, the NEA team documented 29 sighting events consisting of 68 whales (including six mother/calf pairs) in the NEWS survey area over these six days (Table 5).

#### *Right Whale Sightings and Identifications*

The Wildlife Trust survey team documented a total of 178 right whales during 75 sighting events while conducting the NEWS surveys (Appendix 2). Thirty-one mother/calf pairs, 15 single animals, 12 pairs of two right whales, eight groups of three right whales and nine groups of five or more right whales were observed during these sightings (Figure 3). These totals do not include any sightings by other aerial survey teams in the NEWS area, nor do they include one additional whale sighting by the Wildlife Trust survey team off of North Carolina. This sighting of an entangled juvenile right whale off of Cape Hatteras, North Carolina at 35° 16.840 N and 75° 00.016 W on December 12, 2005 was the only sighting by the Wildlife Trust team outside of the NEWS survey area (Table 4). If this sighting is included in the overall totals, the Wildlife Trust survey team observed 179 whales during 76 sighting events.

Four of the 179 observed whales were not photographically documented due to elusive behavior by the animals. Preliminary photo analysis of all other sightings by the Wildlife Trust team and initial verification by NEA has resulted in the identification of 14 individual mother/calf pairs seen by the Wildlife Trust survey team during the 2005-2006 calving season. An additional 64 individual adult/juvenile whales were observed during the NEWS surveys. Any preliminary identifications (EGNOs) of these 92 total individual whales have been included in the “EGNO” column of Appendix 2. Forty-seven of the 64 individual adult/juvenile whales observed during the 2005 – 2006 season do not

have a preliminary identification at this time. Initial photo analysis indicates that a large percentage of these unidentified individuals are juvenile whales that have yet to be officially added to the North Atlantic Right Whale Catalog. The numbers and codes listed in the “EGNO” column of Appendix 2 include EGNO numbers for known whales and intermatch codes (i.e. SE06CT01). These intermatch codes were provided by NEA to assist in the preliminary matching of juvenile whales until they are assigned EGNOs. However, all right whale identifications listed within this report should be considered unverified until NEA has analyzed all photographs from the 2005-2006 southeast calving season. All of the images and data for the NEWS surveys have been forwarded to NEA for this final confirmation process that will most likely be completed sometime in 2007. Thus, all identification results within this report should be viewed as preliminary and subject to change.

Table 5: NEA right whale sightings in the NEWS survey area during the 2005-2006 season.

Sighting Event	Month	Day	Year	Time	DecLat	DecLong	Number of Whales Sighted	Time Report	NRW Number
1	02	13	2006	1303	31.03973	-81.1258	3	1350	NRW06245
2	02	13	2006	1339	31.02178	-81.1134	2	1350	NRW06245
3	02	14	2006	0916	31.01165	-81.3798	3	0928	NRW06246
4	02	14	2006	1134	31.01072	-81.3614	3	1142	NRW06251
5	02	14	2006	1141	31.0056	-81.3279	2	1213	NRW06252
6	02	14	2006	1430	30.84685	-81.1022	2	1444	NRW06254
7	02	14	2006	1440	30.85472	-81.0358	2 (Mom/Calf)	1458	NRW06255
8	02	14	2006	1448	30.87103	-81.0515	3	1458	NRW06256
9	02	15	2006	1315	30.92498	-81.1418	2	1330	NRW06263
10	02	15	2006	1352	31.05685	-81.215	4	1436	NRW06265
11	02	15	2006	1411	31.0645	-81.253	1	1436	NRW06266
12	02	15	2006	1420	31.06582	-81.2491	2	1436	NRW06266
13	02	15	2006	1440	31.0712	-81.2079	1	1455	NRW06267
14	02	16	2006	1309	31.0795	-81.2963	4	1355	NRW06275
15	02	16	2006	1324	31.08142	-81.2474	3	1355	NRW06276
16	02	16	2006	1426	31.09505	-81.258	1	1450	NRW06277
17	02	16	2006	1447	31.08248	-81.1936	2	1450	NRW06278
18	02	16	2006	1455	31.08225	-81.1999	2	1507	NRW06278
19	02	16	2006	1506	31.07199	-81.2118	1	1530	NRW06279
20	02	16	2006	1533	31.10093	-81.186	1	1538	NRW06279
21	02	16	2006	1704	31.45297	-81.1082	2 (Mom/Calf)	1720	NRW06280
22	02	17	2006	1119	30.94693	-81.2756	4	1134	NRW06284
23	02	17	2006	1132	30.9466	-81.1464	2 (Mom/Calf)	1141	NRW06285
24	02	17	2006	1138	30.94402	-81.1587	2 (Mom/Calf)	1155	NRW06286
25	02	17	2006	1322	30.93733	-81.147	2 (Mom/Calf)	1400	NRW06291
26	02	17	2006	1344	30.9048	-81.2609	4	1400	NRW06291
27	02	18	2006	1027	30.86897	-81.2347	5	1047	NRW06302
28	02	18	2006	1146	31.02572	-81.2594	1	1157	NRW06305
29	02	18	2006	1218	31.0594	-81.0276	2 (Mom/Calf)	1222	NRW06309

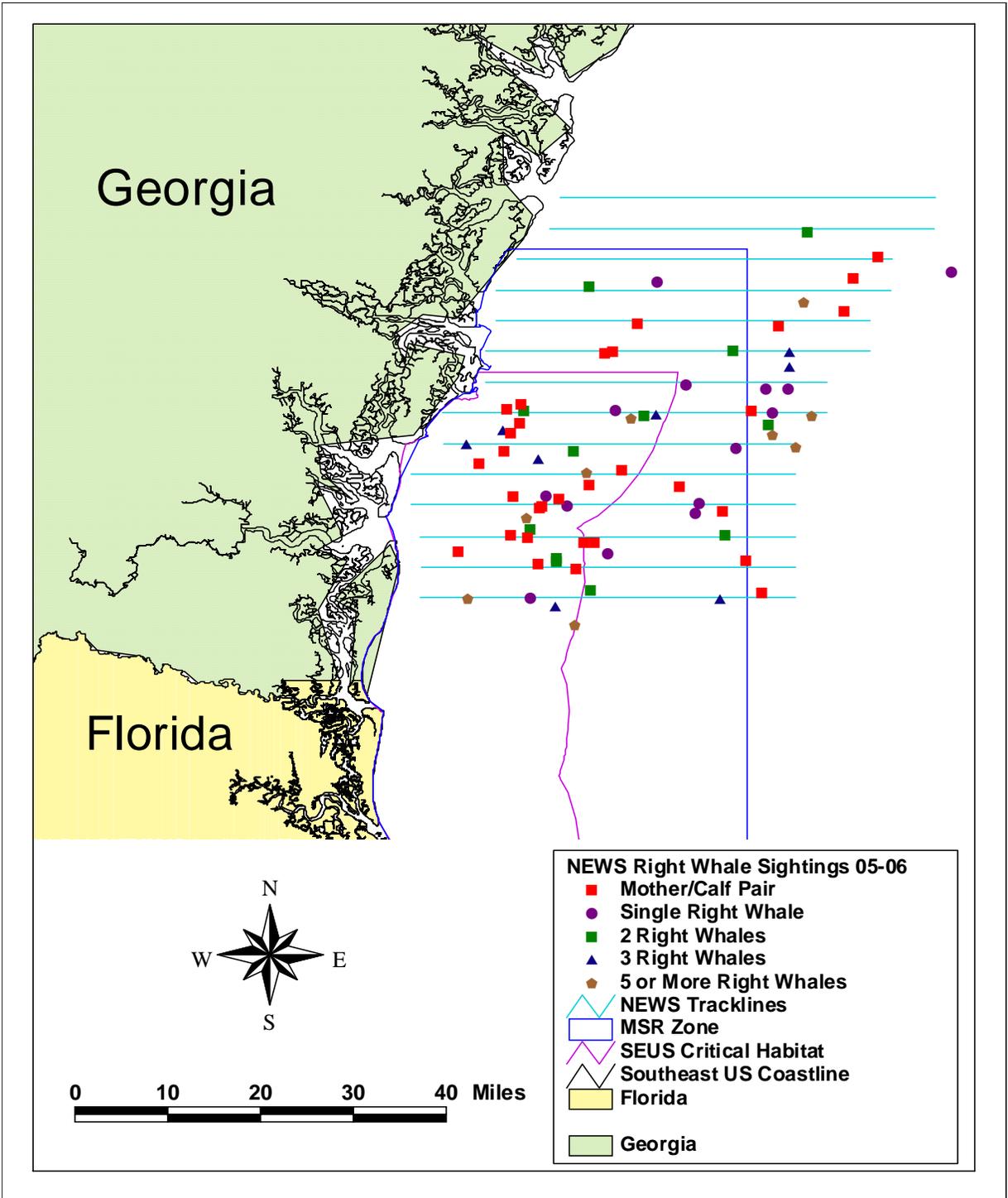


Figure 3: Right whale sightings documented during the 2005-2006 NEWS right whale aerial surveys.

Of the 92 total individual whales observed in the NEWS area during the 2005-2006 season, 31 animals have been initially identified and assigned their EGNO number from the North Atlantic Right Whale Catalog. Basic demographic information for these individuals is provided below (Table 6). In total, 19 mother/calf pairs were identified throughout the SEUS during the season. Sixteen of these mothers were observed within the NEWS survey area, but only 14 of them were seen with their calves. The Wildlife Trust team observed EGNO 1802 alone on February 1, 2006 after she had lost her calf to possible entanglement. EGNO 1817 was also seen in the NEWS area, but before giving birth to her calf.

Table 6: Demographic information for identified right whales sighted in the NEWS survey area during the 2005-2006 season. (Provided by NEA)

EGNO	Sex	Age	Mother in 05-06 season	Last Calving	Number of Calves (including 05-06 season)	Comments
1151	F	Unknown	Yes	2003	5	Seen in NEWS area before and after calving
1248	F	Unknown	Yes	2002	N/A	Seen in NEWS area before and after calving
1281	F	Unknown	Yes	2004	6	Believed to have lost 2004 calf
1408	F	22	No	2005	3	Seen with yearling in every NEWS sighting
1408's yearling	N/A	1	No	N/A	0	Seen with mother in every NEWS sighting
1503	F	21	Yes	2003	3	Mother and calf seen only once in NEWS area
1603	M	20	No	N/A	N/A	Seen only once in NEWS survey area
1611	F	20	Yes	2001	2	
1706	M	19	No	N/A	N/A	Seen only once in NEWS survey area
1712	M	19	No	N/A	N/A	Seen only once in NEWS survey area
1802	F	18	Yes	2003	2	Seen in NEWS area only once and after calf died from possible entanglement
1817	F	Unknown	Yes	2003	3	Seen in NEWS area only before calving
1946	F	17	Yes	2003	3	
1950	F	Unknown	Yes	2003	3	Mother and calf seen only once in NEWS area
1968	F	17	No	N/A	N/A	
2029	F	16	Yes	2003	2	Seen in NEWS area before and after calving
2048	M	16	No	N/A	N/A	
2123	F	15	Yes	2003	2	Mom & calf seen only on one day in NEWS area
2320	F	Unknown	Yes	N/A	1	First time mother seen in NEWS area before and after calving, unknown if still entangled
2420	F	Unknown	Yes	2002	3	Mother and calf seen only once in NEWS area
2602	M	10	No	N/A	N/A	Seen only once in NEWS survey area
2608	M	10	No	N/A	N/A	Seen only once in NEWS survey area
2660	F	10	Yes	N/A	1	First time mother in 2005-2006 season
2709	M	9	No	N/A	N/A	Seen only once in NEWS survey area
2710	F	9	Yes	N/A	1	First time mother in 2005-2006 season
2791	F	Unknown	Yes	N/A	1	First time mother in 2005-2006 season
2810	M	8	No	N/A	N/A	
3103	F	5	No	N/A	N/A	Seen only once in NEWS survey area
3301	U	3	No	N/A	N/A	
3346	M	3	No	N/A	N/A	"Kingfisher", entangled since 2004
3442	U	2	No	N/A	N/A	Seen only once in NEWS survey area

Ten of the nineteen 2005-2006 mothers last gave birth in 2003, resulting in an overall calving interval of 3.07 for the season. This calving interval is slightly less than the previous season's overall calving interval of 3.65 years (Monica Zani, NEA, personal communication).

Beyond the identified mothers, three identified females and nine identified males were documented during the surveys (Table 6). It is of interest to note that six of the nine males were only documented within the NEWS survey area on one occasion. It is not known whether this lack of resights for known males is indicative of a low residency period for these animals in the NEWS area. As more whales from the season are identified and their sex and resight patterns are analyzed, the possible significance of this observation can be further studied.

#### *Entangled Right Whales*

One possibly entangled right whale and two definitively entangled right whales were observed during the 2005-2006 NEWS surveys. The first entangled whale was the juvenile right whale found by the NEWS survey team off of Little St. Simons Island, GA on December 3, 2005 (as described earlier in this report). The whale was originally found with line wrapped around both pectoral fins and about 500 feet of trailing line with a set of three buoys coming off the left side of its' body. On December 3, the Wildlife Trust team served as aerial support as the trailing line was shortened and a telemetry buoy was attached to the entangled whale. The animal was then tracked south to Florida and then north to North Carolina over the next week. During the time the entangled whale was off the coast of Florida, the trailing line with the telemetry buoy had been shortened to about 75 feet during a disentanglement attempt by Provincetown Center for Coastal Studies (PCCS), GDNR and FWRI. The Wildlife Trust team relocated the whale off of North Carolina on December 12, 2005 as part of a final disentanglement attempt. Unfortunately, during this disentanglement attempt, the line towing the telemetry buoy parted and the whale was not relocated. The location of the whale is still unknown and the animal is believed to be trailing about 20 feet of line along with the line still wrapped around each pectoral fin. The identity of the whale remains unknown.

The second entangled whale observed by the Wildlife Trust survey team was identified as "Kingfisher" (EGNO 3346). This male juvenile right whale was first seen entangled off of Florida on March 17, 2004. During 2004, Kingfisher was the subject of multiple disentanglement attempts and was seen again in the southeast on January 11, 2005. Kingfisher was sighted multiple times in the NEWS survey area during the 2005-2006 season. He was observed on December 24, 2005, January 20, 2006 and February 8 and 10, 2006 (Appendix 2). During these sightings, it could be seen that the whale appeared to have shed most of its' original March 2004 entanglement but still had line wrapped tightly around its' right pectoral fin. The remaining entanglement did not appear to inhibit the activity of the whale. In the majority of its' 2005-2006 sightings, the whale was very actively involved in surface active groups (SAG) with multiple other whales.

The possibly entangled whale seen in the NEWS survey area was EGNO 2320, "Piper". EGNO 2320 was listed as an active entanglement case by the Provincetown Center for Coastal Studies (PCCS) at the time of her sightings during the 2005-2006 season. EGNO 2320 was first observed entangled on 4 August 2002 off Long Island, Nova Scotia. Through multiple sightings, the whale was found to have line running extensively through its' baleen and wrapping once over its' head. In April 2005, images of the whale appeared to indicate that the wrap around the whale's head was no longer present. The NEWS survey team sighted Piper alone on December 27, 2005 off of Jekyll Island and then with her first calf on March 8, 2006 (Appendix 2). All the images of the whale taken by the NEWS survey team on December 27 and March 8 indicated that the whale was externally gear free. However, it could not be determined at that time whether the whale still had line running through its' baleen. On April 14, 2006, PCCS obtained images of Piper off the coast of Massachusetts that confirmed the whale was gear free.

At the time of their sightings, digital images of all the entangled right whales were sent to NEA and PCCS for assessment of each whale's condition. Also, information pertaining to each sighting was passed on to the proper authorities within GDNR and NOAA.

#### *Temporal and Spatial Movements of Right Whales*

Figure 4 illustrates the NEWS right whale sightings classified by survey month. The December and March right whale sightings were spread throughout the NEWS survey area. The January sightings occurred mostly in the southern section of the NEWS tracklines. The February sightings appear to have occurred most often in the central section of the survey area. However, the Wildlife Trust survey team did not fly the NEWS area for ten days during the middle of February 2006 (February 11-20). During this time, the NEA survey team covered the area. The NEA sightings for this period (Table 5) are not included in Figure 4, and many of these sightings occurred in the southern half of the survey. Thus, the Wildlife Trust February sightings mapped out in Figure 4 do not represent a complete pattern for all right whale sightings during this month.

It is interesting to note that every survey month had a substantial number of sightings occurring outside of the designated critical habitat and the Mandatory Ship Reporting (MSR) Zone. Overall, 48% of all the right whale sightings documented during the 2005-2006 NEWS surveys were located outside of the currently designated right whale critical habitat. The other 52 % of the observed right whales were seen in the southwestern quarter of the NEWS survey area (western half of the bottom seven tracklines, Figures 3 and 4). This portion of the survey is notable due to the fact that the Brunswick shipping channel cuts diagonally to the southeast through the middle of this area. Thus, a considerable number of the right whales seen during the 2005-2006 NEWS surveys were found in close proximity to the area of greatest concern for ship traffic within the survey area.

Many of the whales observed in the NEWS area were resighted on multiple occasions by the Wildlife Trust team. Six adults/juveniles and a mother were sighted three times within the NEWS area. Two adult/juvenile right whales and four mother/calf pairs were observed on four occasions, and the entangled right whale, Kingfisher, was sighted five times. The greatest number of resights occurred with EGNO 1151 and her calf. This mother alone and then with her calf were sighted six times from January 21, 2006 through March 3, 2006 for a residency period in the SEUS of at least one and a half months. Figure 5 depicts the sightings of EGNO 1151 alone and also with her calf off the Georgia coastline. EGNO 1151 was observed without her calf on January 21 and February 1. She was then sighted with her calf on February 8 and 10 and March 1 and 3. Following along the trend for the overall NEWS sightings, four of the six sightings of EGNO 1151 occurred outside of the critical habitat, and one of the sightings was on the very edge of the Mandatory Ship Reporting (MSR) Zone.

It should also be noted that the final right whale sighting for the Wildlife Trust survey team was March 16, 2006. Previous to that date, the last right whales sighted in the NEWS area were observed on March 11, 2006 (Appendix 2). This represents a much earlier decrease in the number of sightings within the NEWS area than the previous two seasons. During the 2003-2004 season, right whales were sighted regularly through March 30, 2004. In the 2004-2005 season, sightings were consistent until March 24, 2005 with the final sightings occurring on March 29, 2005. It is possible that the low number of whales seen during the latter part of the 2005-2006 season could be related to environmental factors. However, it is also possible the decreased whale observations could be a remnant of the survey effort following the March 16, 2006 sighting. Due to limited available flight hours, a majority of the surveys after March 16 only covered the southern eight tracklines of the NEWS survey area. Also, the survey area was not flown from March 21 to March 26, 2006 due to maintenance and weather (Table 3). Since right whales are typically heading north during this period of their migration, it is possible that right whale sightings were missed when the northern six tracklines of the survey area were not covered or the entire survey area was not flown during the last two weeks of the survey season.

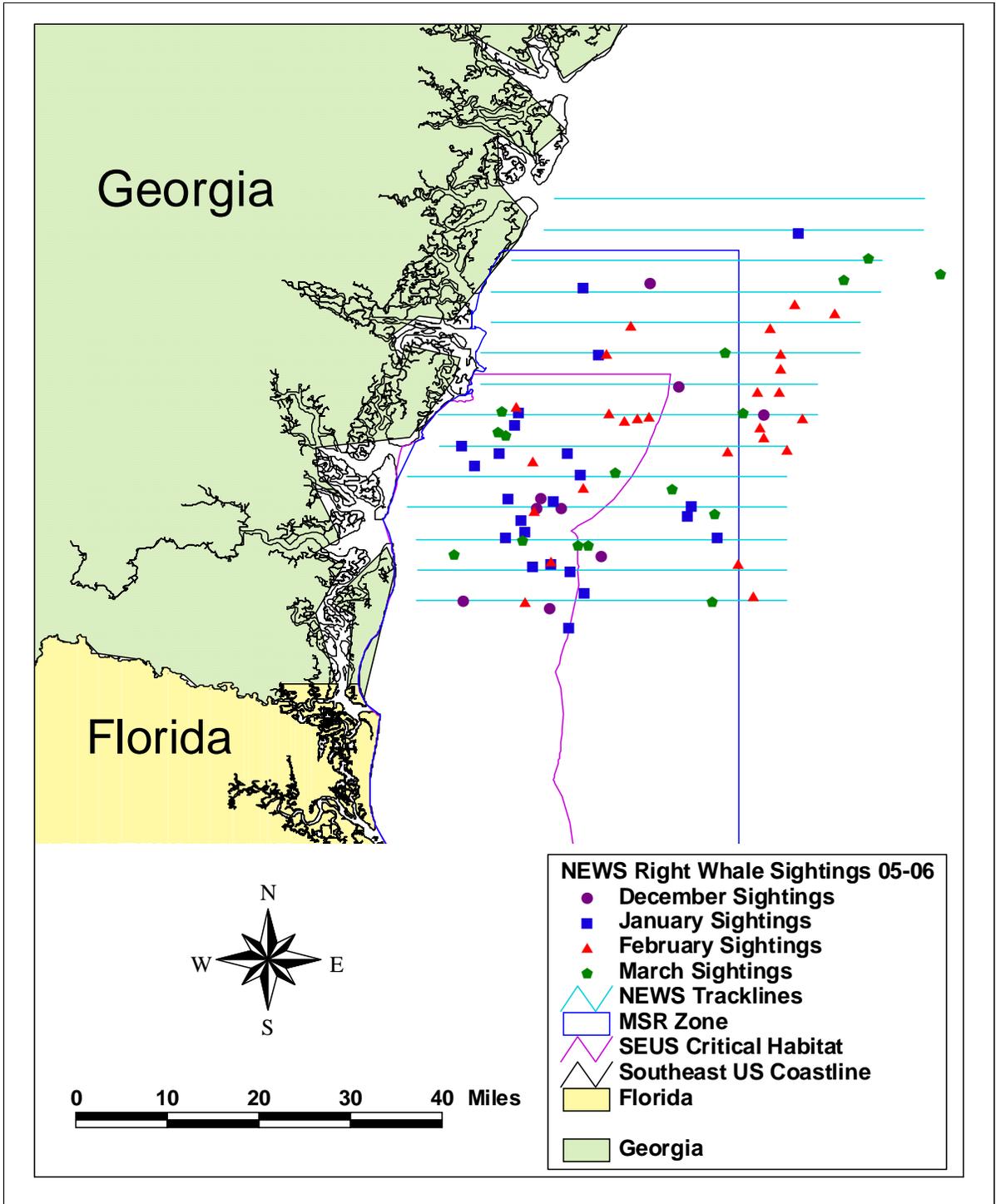


Figure 4: Northern Early Warning System 2005-2006 right whale sightings classified by month.

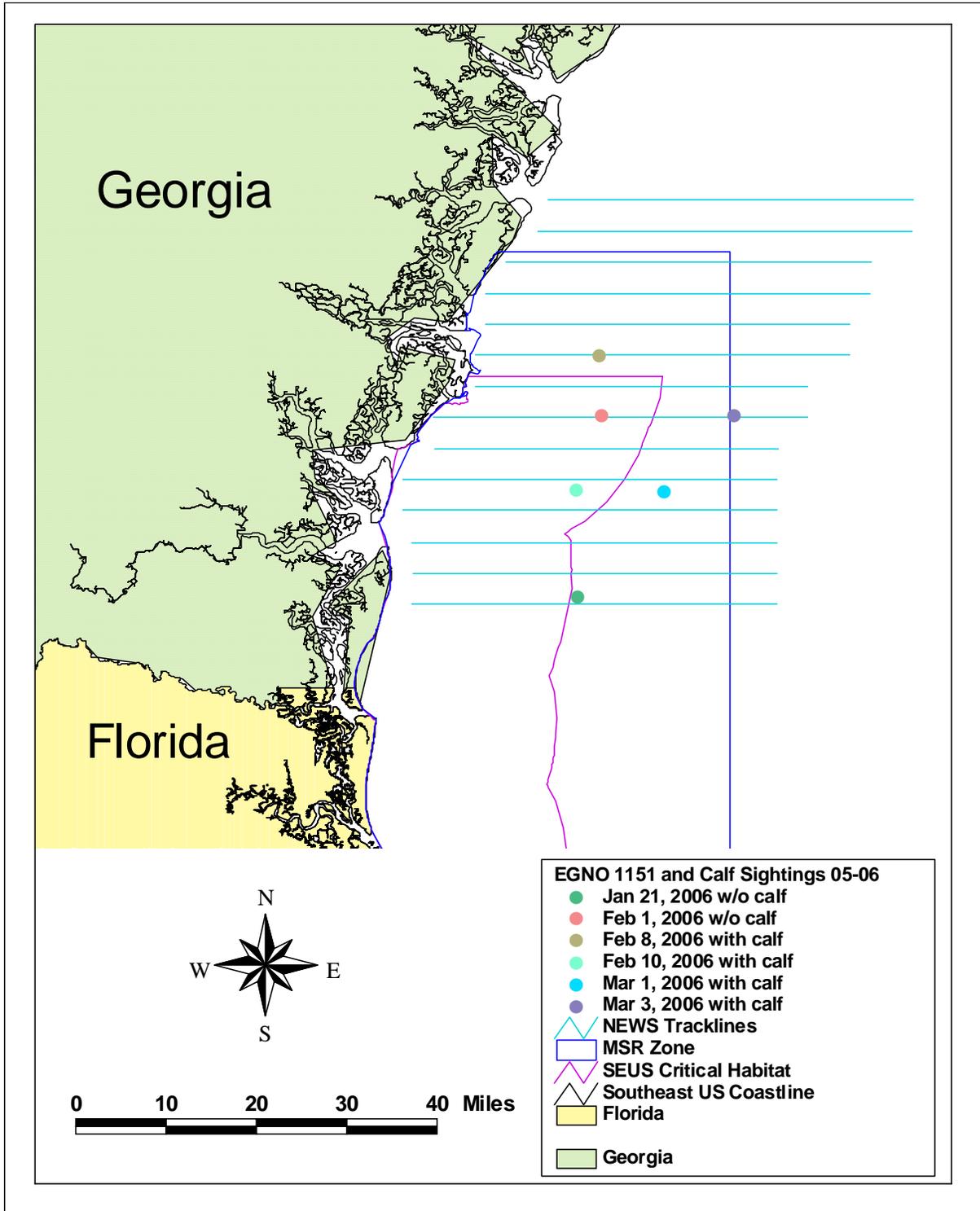


Figure 5: EGNO 1151 and calf NEWS sightings between 21 January 2006 and 3 March 2006.

### *Sighting Distances for Right Whales*

Sighting distances for right whale sightings were calculated whenever possible, and the average sighting distance was 0.53 nm (SD=0.58). The sighting distances ranged from 0.0 nm to 2.60 nm, with 96% of the sightings occurring from 0.0 nm to 1.6 nm (Figure 6).

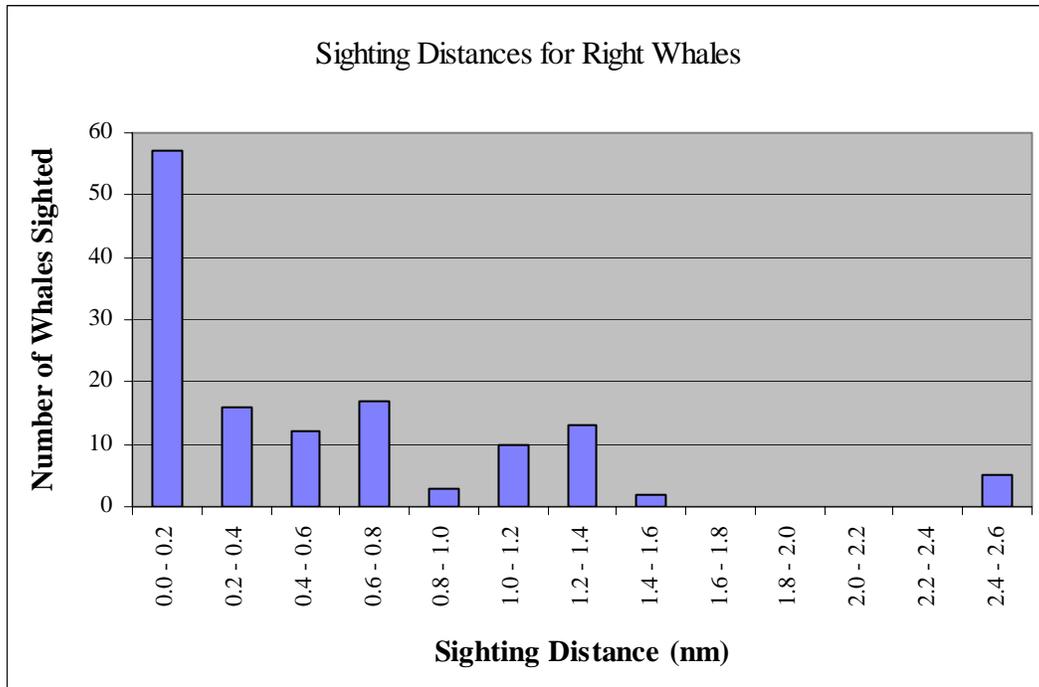


Figure 6: Right Whale Sighting Distances for the 2005-2006 NEWS aerial survey season.

### *Sighting Distances for Large Vessels*

During the 2005-2006 NEWS surveys, sighting angles were recorded for all large vessels (100 feet or greater in length) whenever an exact overhead GPS location for the vessel was not obtained. These sighting angles were used to calculate distance from the trackline for any vessel without an exact GPS location. Average calculated distance from the trackline for the large vessels was 2,992.27 m (SD=2,397.41). See Appendix 3 for all sightings of large ships with a calculated sighting distance. See Appendix 4 for all sightings of large vessels with an exact overhead GPS location.

### *Marine Animal Sightings*

Beyond right whale and vessel sightings, all sightings of other marine mammals, sea turtles, sharks, and large rays were recorded while conducting the NEWS surveys. Date, time, latitude/longitude position, species and number, aircraft heading and altitude, and environmental conditions such as overall weather trend, Beaufort sea state, glare, and visibility were also entered into the data logger program with all sightings. Table 7 summarizes the marine animal sightings for all the NEWS surveys flown during the 2005-2006 season.

Table 7: Summary of other marine animal sightings during the 2005-2006 NEWS right whale surveys.

Survey Date	ASDO	BASH	BODO	HSHH	HUWH	LETU	LOTU	MANA	MARA	RITU	UNDO	UNLW	UNSH	UNST	UNTU
03-Dec-05	0	0	44	0	0	0	13	0	0	0	23	0	0	0	8
04-Dec-05	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
05-Dec-05	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0
10-Dec-05	0	0	19	0	0	2	13	0	0	0	0	0	0	0	2
16-Dec-05	0	0	45	0	0	0	10	0	0	0	0	0	0	0	1
17-Dec-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-Dec-05	0	0	16	0	0	1	0	0	0	0	3	0	0	0	0
21-Dec-05	0	0	10	0	0	0	1	0	0	0	0	0	0	0	0
22-Dec-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23-Dec-05	0	0	51	0	0	0	45	0	0	1	3	0	0	0	0
24-Dec-05	0	5	112	0	0	0	71	0	0	0	49	0	0	0	5
27-Dec-05	0	0	81	0	0	0	1	0	0	0	37	0	2	0	0
28-Dec-05	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0
30-Dec-05	0	2	156	0	0	0	11	0	0	0	36	0	0	0	2
31-Dec-05	0	0	63	0	0	0	5	0	0	0	2	0	1	0	2
04-Jan-06	0	12	185	0	0	0	35	0	0	0	26	0	1	0	6
05-Jan-06	0	3	20	0	0	1	3	0	0	0	2	0	1	0	2
07-Jan-06	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
10-Jan-06	0	3	96	0	0	0	4	0	0	0	2	0	1	0	1
11-Jan-06	0	2	107	0	0	0	11	0	0	1	3	0	1	0	2
12-Jan-06	0	9	223	0	0	0	66	0	0	0	13	0	0	0	1
13-Jan-06	0	2	127	0	0	0	13	0	0	0	6	0	0	0	0
16-Jan-06	0	1	28	0	0	0	5	0	0	0	0	0	1	0	0
17-Jan-06	0	4	203	0	0	0	5	0	0	0	3	0	0	0	0
19-Jan-06	0	6	89	0	0	0	1	0	0	0	1	0	2	0	1
20-Jan-06	0	4	134	0	0	0	7	0	0	0	0	0	1	0	2
21-Jan-06	0	5	97	0	0	0	23	0	0	0	0	0	1	0	1
24-Jan-06	0	1	56	0	0	0	14	0	0	0	3	0	0	0	1
26-Jan-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-Jan-06	0	2	71	0	0	0	7	0	0	0	0	0	1	0	0
29-Jan-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01-Feb-06	0	2	302	0	0	0	37	0	0	0	6	0	2	0	0
02-Feb-06	0	1	13	0	0	0	2	0	0	0	0	0	0	0	0
03-Feb-06	0	3	70	0	0	0	15	0	0	0	3	0	1	0	0
06-Feb-06	0	8	329	0	0	1	14	0	0	0	59	0	2	0	6
08-Feb-06	0	0	21	0	0	0	1	0	0	0	0	0	0	100	0
09-Feb-06	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
10-Feb-06	0	3	57	0	0	0	16	0	0	17	11	0	0	0	3
22-Feb-06	0	0	14	0	0	0	1	0	0	0	32	0	0	0	0
27-Feb-06	0	2	156	0	0	0	30	0	0	26	2	0	1	0	9

Survey Date	ASDO	BASH	BODO	HSHH	HUWH	LETU	LOTU	MANA	MARA	RITU	UNDO	UNLW	UNSH	UNST	UNTU
28-Feb-06	0	0	15	0	0	0	2	0	0	0	0	0	0	0	1
01-Mar-06	0	0	54	0	0	1	3	0	0	0	0	0	0	0	0
02-Mar-06	0	0	15	0	0	0	2	0	0	0	2	0	0	0	0
03-Mar-06	0	2	121	0	0	0	38	0	0	0	2	0	0	0	16
06-Mar-06	0	0	8	0	0	0	4	0	0	0	0	0	1	0	0
08-Mar-06	0	0	69	0	0	0	69	0	1	0	14	0	0	0	9
09-Mar-06	0	0	1	0	0	0	7	0	0	0	0	0	0	0	0
11-Mar-06	0	1	79	0	0	0	69	0	0	0	7	0	0	0	4
12-Mar-06	0	1	202	0	0	0	158	0	0	0	3	0	0	0	10
13-Mar-06	0	1	122	0	0	0	57	0	0	1	3	0	0	0	10
16-Mar-06	0	1	100	0	0	0	84	0	0	0	66	0	0	0	17
17-Mar-06	0	0	43	0	0	0	18	0	0	0	50	0	0	0	0
19-Mar-06	0	0	5	0	0	0	1	0	0	0	0	0	0	0	0
20-Mar-06	0	0	83	0	0	0	50	0	0	1	0	0	0	60	3
27-Mar-06	0	1	90	0	0	0	33	0	0	2	2	0	1	0	4
28-Mar-06	0	0	125	0	0	0	107	0	0	1	7	0	2	0	20
29-Mar-06	0	0	79	0	0	0	83	0	0	2	0	0	0	0	6
30-Mar-06	0	0	56	0	0	0	92	0	0	0	34	0	0	0	6
31-Mar-06	0	0	106	0	0	0	121	0	0	0	3	0	0	0	5
<b>Totals</b>	<b>0</b>	<b>85</b>	<b>4186</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>1440</b>	<b>0</b>	<b>1</b>	<b>26</b>	<b>493</b>	<b>0</b>	<b>22</b>	<b>160</b>	<b>149</b>

ASDO=atlantic spotted dolphin; BASH = basking shark; BODO=bottlenose dolphin; HSHH=hammerhead shark; HUWH=humpback whale; LETU=leatherback turtle; LOTU=loggerhead turtle; MANA=manatee; MARA=manta ray; RITU=ridley turtle; UNDO=unidentified dolphin; UNLW=unidentified large whale; UNSH = unidentified shark; UNST=unidentified Stenella, UNTU=unidentified turtle

#### *Whale/Vessel Interactions*

The Wildlife Trust survey team observed one whale/vessel interaction (“close call”) during the 2005-2006 season (Appendix 1). On February 8, 2006, the Wildlife Trust survey was observing a mother and calf pair (1151 and calf) off of Little St. Simons Island, GA. The mother and calf were swimming to the northwest at about two to three knots when an estimated 40-foot small motor yacht was observed heading directly towards the mother and calf. The vessel was first observed about three nautical miles to the south of the mother and calf’s initial position. As the vessel approached, the survey plane attempted to contact the yacht multiple times. The vessel never responded to the hail. The vessel did not change direction and was observed traveling at high speed (20-30 knots) 1.2 miles to the east of the final position of the mother and calf. This was the closest observed distance between the vessel and the whales. The vessel was last observed continuing to travel north at high speed. The only observed changes in behavior by the mother and calf during the presence of the vessel were a two minute longer downtime and a change in heading to the west. Overall, the mother and calf’s activity did not appear to change significantly during the whale/vessel interaction. All required whale/vessel interaction forms were completed for the described event and forwarded to the proper authorities within NOAA, GDNR and FWRI.

### Discussion and Recommendations

The right whale calving ground is extremely important to the reproducing population of the North Atlantic right whale and is vital to military and commercial shipping interests. The EWS system attempts to provide protection for right whales from ship collisions within this region. During the 2005-2006 survey season, the substantial number of whales observed near the Brunswick channel and the deaths of two calves from ship strike and entanglement near the Jacksonville channel point toward the continued need for the EWS system. Also, the significant number of right whales being observed in Georgia waters outside of the designated critical habitat and the Mandatory Ship Reporting (MSR) Zone point to the need for expansion of the current boundaries of the critical habitat.

The number of juvenile right whale sightings in the NEWS survey area appears to have substantially increased in the last four years. This follows the relatively high number of calves born each right whale calving season since 2001. During the 2000-2001 SEUS season, the highest number of recorded right whale births was documented at 31 calves (Heather Pettis, NEA, written communication). Since that time, the number of right whale calves born each season has ranged from 16 to 29. As of May 2006, a total of 19 mother/calf pairs had been identified during the 2005-2006 calving season, with three of the calves lost due to ship strike, entanglement and unknown causes (Monica Zani, NEA, personal communication). The documented calving interval has also ranged around three to four years for the last three seasons, with a calving interval of 3.07 years for the 2005-2006 season. The typical calving interval for North Atlantic right whales had been concluded to range from 3 to 5 years, but the calving intervals had been increasing in the 1990's (Kraus and Hatch, 2001). It will be interesting to note if the general trend of shorter calving intervals, high numbers of births, and corresponding substantial presence of juveniles in the SEUS continues in the coming calving seasons, or if a reverse trend in number of births begins to develop over time possibly affecting the number of whales observed in the SEUS.

The large number of whales currently being documented in the SEUS emphasizes the need to pursue appropriate shipping management measures to reduce the risk of whales being injured or killed by ships. Implementing the Coast Guard recommended vessel routing measures in the SEUS may help to reduce the risk of ship strike from commercial vessels. However, the number of interactions between recreational vessels and right whales during recent years emphasizes the need for greater public education highlighting individual responsibility and appropriate behavior near right whales.

Large areas of the US east coast not previously part of any consistent survey efforts are starting to be covered in developing survey projects, and if we are to protect this species, these efforts must continue. However, the logistical and financial limitations of these aerial survey efforts must also be addressed. If our goal is to provide maximum protection for right whales, we must investigate new technologies 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 by NMFS in the right whale recovery plan.

While we highly recommend identifying other methods of right whale detection and protection, we recognize that in the interim the current survey program is the most effective method we have for protecting right whales from vessel collisions. We recommend continuing Northern Early Warning System surveys from December 1, 2006 through March 31, 2007.

### Acknowledgements

Data was collected and analyzed by the Wildlife Trust aerial survey crew consisting of Patricia Naessig, Christin Khan, Julius Schoen, Kate Sparks and Christina Toms. We would like to thank the NOAA Twin Otter pilots and NOAA AOC for their consistent professionalism and for maintaining a safe and productive working environment. Additionally, we would like to thank the Georgia Department of Natural Resources and NOAA Southeast Region staff for providing support and assistance, which is greatly appreciated. Finally, we thank the FWRI and NEA survey teams for covering the NEWS survey area on occasion, and for their continued collaboration and cooperation.

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Appendix 1. February 8, 2006 whale/ship interaction report forms.

## Whale/Ship Interaction (Close Call) Report Form

Date  Unique Report # 

Observer's Last Name(s)	<input type="text" value="Naessig, George, Toms and Sparks"/>	Contact	<input type="text" value="Patricia Naessig 507-581-1147"/>
Survey Agency or Organization:	<input type="text" value="WLT"/>		
Survey Area	<input type="text" value="Northern Early Warning System"/>		
Are there photos?	<input type="text" value="No"/>	Location/name of photo files	<input type="text"/>
Is there video?	<input type="text" value="No"/>	Location/name of video files	<input type="text"/>

### Whale Information (Initial)

Time of initial whale sighting (local, 24 hour)	<input type="text" value="1147"/>	Total number of whales	<input type="text" value="2"/>	Number of calves	<input type="text" value="1"/>
Whale IDs	<input type="text" value="EGNO 1151 and calf"/>				
Whale's initial activity (select the one that best fits; use description for additional activities)					
Select:	<input type="text" value="Swimming/Traveling"/>				
Description of whale activity	<input type="text" value="Mother and calf were swimming at about 2-3 knots to the northwest. Mother and calf would intermittently dive and stay below the surface for 3-4 minutes."/>				
Heading of Whale/Whale group	<input type="text" value="Northwest"/>				
Whale's initial latitude	<input type="text" value="31° 16.910 N"/>	Whale's initial longitude	<input type="text" value="81° 04.210 W"/>	(NAD 83 datum assumed)	

### Whale Information (Post Interaction)

Time whale was observed at the last location (local, 24 hour)	<input type="text" value="1210"/>				
Whale's last latitude	<input type="text" value="31° 16.890 N"/>	Whale's last longitude	<input type="text" value="81° 05.170 W"/>	(NAD 83 datum assumed)	
Did the whale change course?	<input type="text" value="Yes"/>	Did the whale's activity change?	<input type="text" value="No"/>		
New heading of Whale/Whale group	<input type="text" value="West"/>				
Description of activity/direction change:					
<input type="text" value="Mother and calf dove and were not seen for about six minutes. When the mother and calf were resighted, they were still moderately swimming but to the west instead of the northwest."/>					

Additional Information

## FWC Whale/Ship Interaction (Close Call) Report Form

Date  Unique Report #

### Vessel Information

Is this a close approach (500 yard rule?)  Homeport  State Reg. #

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

Vessel Length (feet)  Vessel Name

Vessel Code  Vessel Type:

Vessel Description

Vessel Speed (knots)  Vessel Speed (Qualitative):

Method of determining speed  Vessel Heading

Inbound/Outbound:  Destination Port

Origin Port

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

Vessel was observed heading north directly towards initial location of mother and calf. Vessel was first observed about 3 miles directly south of mother and calf initial position.

Vessel's initial latitude  Vessel's initial longitude  (NAD 83 datum assumed)

Closest distance between whale and vessel  Units:

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

Was communication achieved? (Did they respond?):

Did the vessel's heading change?:  New Heading

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

New Vessel Speed Qualitative:

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

Vessel was observed traveling at high speed (20-30 knots) 1.2 miles to the east of the final position of the mother and calf.

#### 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.

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

Appendix 2. NEWS right whale sightings from 01 December 2005 through 31 March 2006.

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NRW Number	Comments	Sighting Distance (nm)
1	12	03	2005	1111	NEWS20051203	31.22697	-80.95498	A	UNK 1	1209	NRW06002	Entangled	0.48
2	12	21	2005	1018	NEWS20051221	31.39525	-81.00007	A	1968	1044	NRW06021		N/A
3	12	21	2005	1150	NEWS20051221	31.03153	-81.14098	B	1817	1205	NRW06022		0.13
4	12	24	2005	1335	NEWS20051224	30.87127	-81.15950	A	SE06CT03	1405	NRW06028		0.76
5	12	24	2005	1335	NEWS20051224	30.87127	-81.15950	B	SE06BK01	1405	NRW06028		0.76
6	12	24	2005	1335	NEWS20051224	30.87127	-81.15950	C	3346	1405	NRW06028	Entangled	0.76
7	12	27	2005	1205	NEWS20051227	31.04805	-81.17385	A	2320	1220	NRW06033	Entangled?	0.49
8	12	27	2005	1301	NEWS20051227	30.95363	-81.07917	B	2029	1331	NRW06034		0.41
9	12	28	2005	1132	NEWS20051228	31.18310	-80.82100	A	1817	1154	NRW06038		0.00
10	12	30	2005	1237	NEWS20051230	31.03070	-81.18120	A	2660	1324	NRW06043	w/ Calf	0.28
11	12	30	2005	1237	NEWS20051230	31.03070	-81.18120	B	N/A	1324	NRW06043	Calf	0.28
12	12	30	2005	1402	NEWS20051230	30.88215	-81.29677	C	SE06BK02	1455	NRW06046		0.09
13	12	30	2005	1402	NEWS20051230	30.88215	-81.29677	D	SE06CT02	1455	NRW06046		0.09
14	12	30	2005	1402	NEWS20051230	30.88215	-81.29677	E	SE06CT01	1455	NRW06046		0.09
15	12	30	2005	1402	NEWS20051230	30.88215	-81.29677	F	SE06CT04	1455	NRW06046		0.09
16	12	30	2005	1402	NEWS20051230	30.88215	-81.29677	G	1968	1455	NRW06046		0.09
17	01	04	2006	1158	NEWS20060104	31.12148	-81.23932	A	2710	1220	NRW06058	w/ Calf	1.01
18	01	04	2006	1158	NEWS20060104	31.12148	-81.23932	B	N/A	1220	NRW06058	Calf	1.01
19	01	10	2006	1012	NEWS20060110	31.47527	-80.76527	A	SE06BK06	1102	NRW06090		0.13
20	01	10	2006	1012	NEWS20060110	31.47527	-80.76527	B	SE06CT02	1102	NRW06090		0.13
21	01	12	2006	1340	NEWS20060112	31.01927	-80.94247	A	1248	1417	NRW06104		0.87
22	01	12	2006	1436	NEWS20060112	31.03645	-80.93572	B	1248	1532	NRW06106		N/A
23	01	16	2006	1329	NEWS20060116	31.04850	-81.22433	A	1503	1415	NRW06127	w/ Calf	N/A
24	01	16	2006	1329	NEWS20060116	31.04850	-81.22433	B	N/A	1415	NRW06127	Calf	N/A
25	01	16	2006	1518	NEWS20060116	31.04433	-81.15450	C	1281	1545	NRW06131	w/ Calf	1.12
26	01	16	2006	1518	NEWS20060116	31.04433	-81.15450	D	N/A	1545	NRW06131	Calf	1.12
27	01	17	2006	1124	NEWS20060117	31.08600	-81.11067	A	SE06BK02	1206	NRW06134		0.12
28	01	17	2006	1124	NEWS20060117	31.08600	-81.11067	B	SE06BK09	1206	NRW06134		0.12
29	01	17	2006	1124	NEWS20060117	31.08600	-81.11067	C	UNK 2	1206	NRW06134		0.12
30	01	17	2006	1124	NEWS20060117	31.08600	-81.11067	D	SE06BK05	1206	NRW06134		0.12
31	01	17	2006	1124	NEWS20060117	31.08600	-81.11067	E	SE06CT06	1206	NRW06134		0.12
32	01	19	2006	1109	NEWS20060119	31.38783	-81.10733	A	1408	1134	NRW06140	w/ Yearling	0.25
33	01	19	2006	1109	NEWS20060119	31.38783	-81.10733	B	1408's Yearling	1134	NRW06140	Yearling	0.25
34	01	19	2006	1203	NEWS20060119	31.27950	-81.08200	C	1946	1233	NRW06141	w/ Calf	0.27
35	01	19	2006	1203	NEWS20060119	31.27950	-81.08200	D	N/A	1233	NRW06141	Calf	0.27
36	01	19	2006	1408	NEWS20060119	30.98517	-80.89400	E	No Photos	1434	NRW06142	No Photos	0.08
37	01	19	2006	1408	NEWS20060119	30.98517	-80.89400	F	UNK 3	1434	NRW06142		0.08
38	01	19	2006	1519	NEWS20060119	30.84017	-81.12900	G	UNK 4	1531	NRW06143		2.60
39	01	19	2006	1519	NEWS20060119	30.84017	-81.12900	H	SE06CT06	1531	NRW06143		2.60
40	01	19	2006	1519	NEWS20060119	30.84017	-81.12900	I	SE06BK05	1531	NRW06143		2.60

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NRW Number	Comments	Sighting Distance (nm)
41	01	19	2006	1519	NEWS20060119	30.84017	-81.12900	J	UNK 5	1531	NRW06143		2.60
42	01	19	2006	1519	NEWS20060119	30.84017	-81.12900	K	UNK 2	1531	NRW06143		2.60
43	01	20	2006	1201	NEWS20060120	31.18633	-81.20800	A	1408	1227	NRW06149	w/ Yearling	0.14
44	01	20	2006	1201	NEWS20060120	31.18633	-81.20800	B	1408's Yearling	1227	NRW06149	Yearling	0.14
45	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	C	SE06BK10	1331	NRW06151		1.23
46	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	D	3442	1331	NRW06151		1.23
47	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	E	UNK 6	1331	NRW06151		1.23
48	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	F	SE06BK11	1331	NRW06151		1.23
49	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	G	UNK 7	1331	NRW06151		1.23
50	01	20	2006	1307	NEWS20060120	31.01367	-81.20500	H	3346	1331	NRW06151	Entangled	1.23
51	01	20	2006	1357	NEWS20060120	30.98433	-81.22917	I	1946	1418	NRW06152	w/ Calf	0.02
52	01	20	2006	1357	NEWS20060120	30.98433	-81.22917	J	N/A	1418	NRW06152	Calf	0.02
53	01	20	2006	1408	NEWS20060120	30.99450	-81.19817	K	SE06BK10	1423	NRW06153		N/A
54	01	20	2006	1408	NEWS20060120	30.99450	-81.19817	L	UNK 6	1423	NRW06153		N/A
55	01	20	2006	1450	NEWS20060120	31.10067	-81.27767	M	1281	1515	NRW06155	w/ Calf	N/A
56	01	20	2006	1450	NEWS20060120	31.10067	-81.27767	N	N/A	1515	NRW06155	Calf	N/A
57	01	21	2006	1113	NEWS20060121	30.89433	-81.10533	A	1151	1124	NRW06161		0.62
58	01	21	2006	1113	NEWS20060121	30.89433	-81.10533	B	1248	1124	NRW06161		0.62
59	01	21	2006	1141	NEWS20060121	30.94183	-81.15850	C	1408	1206	NRW06163	w/ Yearling	0.40
60	01	21	2006	1141	NEWS20060121	30.94183	-81.15850	D	1408's Yearling	1206	NRW06163	Yearling	0.40
61	01	21	2006	1324	NEWS20060121	31.13467	-81.29783	E	SE06BK02	1340	NRW06164		0.03
62	01	21	2006	1324	NEWS20060121	31.13467	-81.29783	F	SE06BK12	1340	NRW06164		0.03
63	01	21	2006	1324	NEWS20060121	31.13467	-81.29783	G	1968	1340	NRW06164		0.03
64	01	24	2006	1016	NEWS20060124	30.93067	-81.12650	A	2123	1053	NRW06179	w/ Calf	0.26
65	01	24	2006	1016	NEWS20060124	30.93067	-81.12650	B	N/A	1053	NRW06179	Calf	0.26
66	01	24	2006	1039	NEWS20060124	31.16650	-81.21483	C	1281	1053	NRW06180	w/ Calf	N/A
67	01	24	2006	1039	NEWS20060124	31.16650	-81.21483	D	N/A	1053	NRW06180	Calf	N/A
68	01	24	2006	1329	NEWS20060124	30.93800	-81.18617	E	2123	1353	NRW06183	w/ Calf	N/A
69	01	24	2006	1329	NEWS20060124	30.93800	-81.18617	F	N/A	1353	NRW06183	Calf	N/A
70	01	29	2006	1135	NEWS20060129	31.12217	-81.13167	A	SE06CT07	1215	NRW06202		N/A
71	01	29	2006	1135	NEWS20060129	31.12217	-81.13167	B	SE06BK11	1215	NRW06202		N/A
72	02	01	2006	1132	NEWS20060201	31.18800	-81.07567	A	1802	1208	NRW06213	w/o Calf	0.26
73	02	01	2006	1144	NEWS20060201	31.18734	-81.06700	B	1151	1208	NRW06214		0.22
74	02	02	2006	1137	NEWS20060202	31.19600	-81.21217	A	1946	1202	NRW06221	w/ Calf	0.77
75	02	02	2006	1137	NEWS20060202	31.19600	-81.21217	B	N/A	1202	NRW06221	Calf	0.77
76	02	06	2006	0932	NEWS20060206	30.88367	-81.19950	A	UNK 8	0944	NRW06227		0.00
77	02	08	2006	1147	NEWS20060208	31.28183	-81.07017	A	1151	1217	NRW06234	w/ Calf	0.00
78	02	08	2006	1147	NEWS20060208	31.28183	-81.07017	B	N/A	1217	NRW06234	Calf	0.00
79	02	08	2006	1245	NEWS20060208	31.17933	-81.02083	C	3346	1408	NRW06235	Entangled	0.20
80	02	08	2006	1245	NEWS20060208	31.17933	-81.02083	D	SE06BK11	1408	NRW06235		0.20
81	02	08	2006	1311	NEWS20060208	31.18083	-81.00367	E	UNK 2	1408	NRW06235		N/A

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NRW Number	Comments	Sighting Distance (nm)
82	02	08	2006	1311	NEWS20060208	31.18083	-81.00367	F	SE06CT04	1408	NRW06235		N/A
83	02	08	2006	1311	NEWS20060208	31.18083	-81.00367	G	SE06BK12	1408	NRW06235		N/A
84	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	H	3301	1408	NRW06235		N/A
85	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	I	SE06BK16	1408	NRW06235		N/A
86	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	J	SE06CT08	1408	NRW06235		N/A
87	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	K	3346	1408	NRW06235	Entangled	N/A
88	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	L	UNK 9	1408	NRW06235		N/A
89	02	08	2006	1328	NEWS20060208	31.17367	-81.04117	M	SE06BK15	1408	NRW06235		N/A
90	02	10	2006	1052	NEWS20060210	31.32833	-81.03200	A	1946	1110	NRW06237	w/ Calf	0.28
91	02	10	2006	1052	NEWS20060210	31.32833	-81.03200	B	N/A	1110	NRW06237	Calf	0.28
92	02	10	2006	1115	NEWS20060210	31.34683	-80.71000	C	1248	1133	NRW06238	w/ Calf	0.83
93	02	10	2006	1115	NEWS20060210	31.34683	-80.71000	D	N/A	1133	NRW06238	Calf	0.83
94	02	10	2006	1209	NEWS20060210	31.16350	-80.82667	E	3301	1251	NRW06240		1.22
95	02	10	2006	1209	NEWS20060210	31.16350	-80.82667	F	SE06BK13	1251	NRW06240		1.22
96	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	G	UNK 10	1251	NRW06240		N/A
97	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	H	SE06BK16	1251	NRW06240		N/A
98	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	I	UNK 9	1251	NRW06240		N/A
99	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	J	3346	1251	NRW06240	Entangled	N/A
100	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	K	SE06BK11	1251	NRW06240		N/A
101	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	L	SE06CT08	1251	NRW06240		N/A
102	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	M	SE06BK15	1251	NRW06240		N/A
103	02	10	2006	1222	NEWS20060210	31.14867	-80.82217	N	UNK 4	1251	NRW06240		N/A
104	02	10	2006	1406	NEWS20060210	31.12450	-80.87767	O	UNK 11	1418	NRW06241		0.48
105	02	10	2006	1425	NEWS20060210	31.06600	-81.10733	P	1151	1435	NRW06242	w/ Calf	1.08
106	02	10	2006	1425	NEWS20060210	31.06600	-81.10733	Q	N/A	1435	NRW06242	Calf	1.08
107	02	27	2006	1042	NEWS20060227	31.36233	-80.77217	A	1706	1100	NRW06334		1.29
108	02	27	2006	1042	NEWS20060227	31.36233	-80.77217	B	UNK 12	1100	NRW06334		1.29
109	02	27	2006	1042	NEWS20060227	31.36233	-80.77217	C	2608	1100	NRW06334		1.29
110	02	27	2006	1042	NEWS20060227	31.36233	-80.77217	D	2048	1100	NRW06334		1.29
111	02	27	2006	1042	NEWS20060227	31.36233	-80.77217	E	3103	1100	NRW06334		1.29
112	02	27	2006	1130	NEWS20060227	31.32250	-80.81017	F	1950	1139	NRW06335	w/ Calf	0.65
113	02	27	2006	1130	NEWS20060227	31.32250	-80.81017	G	N/A	1139	NRW06335	Calf	0.65
114	02	27	2006	1147	NEWS20060227	31.28233	-80.79500	H	No Photos	1224	NRW06337	No Photos	0.09
115	02	27	2006	1147	NEWS20060227	31.28233	-80.79500	I	2709	1224	NRW06337		0.09
116	02	27	2006	1147	NEWS20060227	31.28233	-80.79500	J	UNK 13	1224	NRW06337		0.09
117	02	27	2006	1209	NEWS20060227	31.25833	-80.79567	K	UNK 14	1224	NRW06337		N/A
118	02	27	2006	1209	NEWS20060227	31.25833	-80.79567	L	1712	1224	NRW06337		N/A
119	02	27	2006	1209	NEWS20060227	31.25833	-80.79567	M	SE06CT08	1224	NRW06337		N/A
120	02	27	2006	1248	NEWS20060227	31.22133	-80.83250	N	UNK 8	1317	NRW06338		0.71
121	02	27	2006	1306	NEWS20060227	31.22200	-80.79683	O	UNK 15	1317	NRW06339		0.68
122	02	27	2006	1359	NEWS20060227	31.12700	-80.78450	P	UNK 16	1422	NRW06340		0.19
123	02	27	2006	1359	NEWS20060227	31.12700	-80.78450	Q	UNK 17	1422	NRW06340		0.19

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NRW Number	Comments	Sighting Distance (nm)
124	02	27	2006	1359	NEWS20060227	31.12700	-80.78450	R	UNK 18	1422	NRW06340		0.19
125	02	27	2006	1359	NEWS20060227	31.12700	-80.78450	S	UNK 19	1422	NRW06340		0.19
126	02	27	2006	1359	NEWS20060227	31.12700	-80.78450	T	2810	1422	NRW06340		0.19
127	02	27	2006	1545	NEWS20060227	31.03000	-81.18350	U	2791	1555	NRW06341	w/ Calf	0.02
128	02	27	2006	1545	NEWS20060227	31.03000	-81.18350	V	N/A	1555	NRW06341	Calf	0.02
129	02	27	2006	1639	NEWS20060227	30.94433	-80.86133	W	2660	1650	NRW06343	w/ Calf	0.65
130	02	27	2006	1639	NEWS20060227	30.94433	-80.86133	X	N/A	1650	NRW06343	Calf	0.65
131	02	27	2006	1657	NEWS20060227	30.89033	-80.83700	Y	2420	1712	NRW06344	w/ Calf	0.47
132	02	27	2006	1657	NEWS20060227	30.89033	-80.83700	Z	N/A	1712	NRW06344	Calf	0.47
133	02	28	2006	1002	NEWS20060228	30.94783	-81.15700	A	UNK 20	1030	NRW06347		0.23
134	02	28	2006	1002	NEWS20060228	30.94783	-81.15700	B	UNK 21	1030	NRW06347		0.23
135	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	C	1603	1245	NRW06350		0.07
136	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	D	UNK 18	1245	NRW06350		0.07
137	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	E	UNK 10	1245	NRW06350		0.07
138	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	F	2810	1245	NRW06350		0.07
139	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	G	2048	1245	NRW06350		0.07
140	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	H	2602	1245	NRW06350		0.07
141	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	I	UNK 16	1245	NRW06350		0.07
142	02	28	2006	1224	NEWS20060228	31.17867	-80.76100	J	UNK 19	1245	NRW06350		0.07
143	02	28	2006	1612	NEWS20060228	31.10917	-81.18650	K	UNK 22	1658	NRW06354		N/A
144	02	28	2006	1612	NEWS20060228	31.10917	-81.18650	L	UNK 23	1658	NRW06354		N/A
145	02	28	2006	1612	NEWS20060228	31.10917	-81.18650	M	UNK 24	1658	NRW06354		N/A
146	03	01	2006	1201	NEWS20060301	31.18817	-81.23467	A	1611	1243	NRW06356	w/ Calf	0.18
147	03	01	2006	1201	NEWS20060301	31.18817	-81.23467	B	N/A	1243	NRW06356	Calf	0.18
148	03	01	2006	1208	NEWS20060301	31.15533	-81.24167	C	UNK 22	1243	NRW06357		N/A
149	03	01	2006	1208	NEWS20060301	31.15533	-81.24167	D	UNK 24	1243	NRW06357		N/A
150	03	01	2006	1208	NEWS20060301	31.15533	-81.24167	E	UNK 23	1243	NRW06357		N/A
151	03	01	2006	1215	NEWS20060301	31.15000	-81.23017	F	2791	1243	NRW06357	w/ Calf	N/A
152	03	01	2006	1215	NEWS20060301	31.15000	-81.23017	G	N/A	1243	NRW06357	Calf	N/A
153	03	01	2006	1258	NEWS20060301	31.06450	-80.96617	H	1151	1310	NRW06359	w/ Calf	1.01
154	03	01	2006	1258	NEWS20060301	31.06450	-80.96617	I	N/A	1310	NRW06359	Calf	1.01
155	03	01	2006	1433	NEWS20060301	31.02383	-80.89867	J	2029	1447	NRW06361	w/ Calf	0.57
156	03	01	2006	1433	NEWS20060301	31.02383	-80.89867	K	N/A	1447	NRW06361	Calf	0.57
157	03	03	2006	1107	NEWS20060303	31.43533	-80.65617	A	2710	1129	NRW06379	w/ Calf	0.12
158	03	03	2006	1107	NEWS20060303	31.43533	-80.65617	B	N/A	1129	NRW06379	Calf	0.12
159	03	03	2006	1132	NEWS20060303	31.40183	-80.69583	C	1611	1150	NRW06380	w/ Calf	1.00
160	03	03	2006	1132	NEWS20060303	31.40183	-80.69583	D	N/A	1150	NRW06380	Calf	1.00
161	03	03	2006	1308	NEWS20060303	31.18683	-80.85467	E	1151	1322	NRW06382	w/ Calf	0.16
162	03	03	2006	1308	NEWS20060303	31.18683	-80.85467	F	N/A	1322	NRW06382	Calf	0.16
163	03	03	2006	1543	NEWS20060303	30.97200	-81.09933	G	2029	1556	NRW06384	w/ Calf	0.73
164	03	03	2006	1543	NEWS20060303	30.97200	-81.09933	H	N/A	1556	NRW06384	Calf	0.73
165	03	06	2006	1434	NEWS20060306	31.09050	-81.05650	A	2791	1457	NRW06399	w/ Calf	0.40

Whale Number	Month	Day	Year	Time (Local)	Survey Name	Latitude	Longitude	RIWH Letter	EGNO	Time of Report (Local)	NRW Number	Comments	Sighting Distance (nm)
166	03	06	2006	1434	NEWS20060306	31.09050	-81.05650	B	N/A	1457	NRW06399	Calf	0.40
167	03	08	2006	1341	NEWS20060308	30.98167	-81.20167	A	2320	1400	NRW06402	Entangled?, w/ Calf	0.14
168	03	08	2006	1341	NEWS20060308	30.98167	-81.20167	B	N/A	1400	NRW06402	Calf	0.14
169	03	08	2006	1425	NEWS20060308	30.88200	-80.90383	C	UNK 25	1431	NRW06403		0.12
170	03	08	2006	1425	NEWS20060308	30.88200	-80.90383	D	UNK 26	1431	NRW06403		0.12
171	03	08	2006	1425	NEWS20060308	30.88200	-80.90383	E	SE06BK04	1431	NRW06403		0.12
172	03	09	2006	1020	NEWS20060309	30.97350	-81.11483	A	2791	1045	NRW06406	w/ Calf	0.60
173	03	09	2006	1020	NEWS20060309	30.97350	-81.11483	B	N/A	1045	NRW06406	Calf, No Photos	0.60
174	03	11	2006	1126	NEWS20060311	31.28433	-80.88167	A	UNK 27	1140	NRW06411		0.03
175	03	11	2006	1126	NEWS20060311	31.28433	-80.88167	B	UNK 28	1140	NRW06411		0.03
176	03	11	2006	1355	NEWS20060311	30.95733	-81.31117	C	1281	1402	NRW06412	w/ Calf	1.42
177	03	11	2006	1355	NEWS20060311	30.95733	-81.31117	D	N/A	1402	NRW06412	Calf	1.42
178	03	16	2006	0954	NEWS20060316	31.41100	-80.54167	A	No Photos	1017	NRW06423	No Photos	N/A

Appendix 3. Large vessels with a calculated sighting distance during the 2005-2006 NEWS right whale aerial surveys.

Date	Time (Z)	Plane Latitude	Plane Longitude	Plane Altitude (ft)	Plane Heading	Vessel Type	Vessel Heading	Angle	Observer	Distance from Track Line (m)	Comments
10-Dec-05	170908	31.13248	-81.30291	1016	87.9	CRSH	06	87	S	5908.70	CASINO BOAT
20-Dec-05	171217	31.01783	-81.37914	1032	355.7	MV-B	15	85	P	3595.19	TUG AND BARGE
24-Dec-05	154703	31.33118	-80.65701	1011	131.6	MV-C	08	69	P	802.73	PRODUCT TANKER
27-Dec-05	174748	30.98423	-81.31615	999	270.6	MV-C	06	88	S	8719.18	CAR CARRIER
31-Dec-05	174749	31.08348	-81.35596	1050	270	CRSH	21	78	S	1505.60	CASINO BOAT
07-Jan-06	170810	30.93388	-81.02378	1013	90.7	MV-C	14	86	P	4415.29	CONTAINER SHIP
10-Jan-06	192322	30.88379	-80.93705	1031	269.8	NV-U	11	87	P	5995.93	NAVY SUBMARINE
21-Jan-06	152931	31.40867	-80.63534	1100	177	MV-B	01	84	P	3189.82	INTEGRATED TUG/BARGE
24-Jan-06	164643	31.42716	-80.63383	1056	147.9	MV-C	09	86	P	4602.71	CONTAINER SHIP
01-Feb-06	143654	30.8835	-81.20733	1015	88.9	MV-B	02	70	P	849.95	TUG AND BARGE
01-Feb-06	174656	31.33383	-80.80849	997	269.8	CRSH	06	85	S	3473.26	CRUISE SHIP
03-Feb-06	144131	30.91083	-80.78333	1067	355	MV-B	09	87	S	6205.29	TUG AND BARGE
08-Feb-06	142306	31.24367	-81.26000	963	12.1	MV-C	14	83	S	2390.43	CAR CARRIER
10-Feb-06	203235	30.93283	-80.94866	997	89.9	NV-U	03	79	S	1563.28	NAVY SUBMARINE
10-Feb-06	203254	30.93283	-80.93800	988	90	NV-L	03	79	S	1549.17	NAVY SUBMARINE TENDER
11-Mar-06	173110	31.13367	-81.31433	1058	69.1	CRSH	21	77	S	1396.74	CASINO BOAT
12-Mar-06	171413	31.13350	-81.31583	975	89.7	MV-C	14	83	S	2420.22	BULK SHIP
12-Mar-06	180743	31.03333	-81.11983	991	89.9	MV-C	06	88	S	8649.35	BREAK BULK CARGO
12-Mar-06	182917	30.98550	-80.75684	960	218.6	MV-C	08	61	P	527.85	BREAK BULK CARGO
12-Mar-06	194045	31.13517	-81.36016	1100	4.5	CRSH	12	84	S	3189.82	CASINO BOAT
16-Mar-06	141734	31.13317	-81.34500	978	52.5	DR-T	14	60	S	516.29	HOPPER DREDGE "ATCHAFALAYA
16-Mar-06	164105	31.28067	-80.65666	983	284	MV-B	00	72	P	922.09	TUG AND CONTAINER BARGE
17-Mar-06	140646	31.12766	-81.38284	950	88.8	MV-C	10	64	S	593.66	BREAK BULK
17-Mar-06	171546	31.12983	-81.37400	950	334.9	CRSH	21	85	S	3309.52	CASINO BOAT
19-Mar-06	162842	31.08367	-81.32484	1030	269.9	DR-W	21	77	P	1359.77	HOPPER DREDGE "ATCHAFALAYA
19-Mar-06	164710	31.03250	-80.96300	1023	91.7	MV-B	02	70	P	856.65	TUG AND BARGE
20-Mar-06	162727	31.08367	-81.32816	1018	270.7	DR-W	21	21	P	119.10	HOPPER DREDGE "ATCHAFALAYA
28-Mar-06	162649	30.93367	-80.89317	1030	90.1	MV-B	01	87	S	5990.12	TUG AND BARGE
28-Mar-06	165649	31.03550	-81.38534	1068	357.5	MV-B	06	85	P	3720.60	INTEGRATED TUG AND BARGE
31-Mar-06	165959	-81.36965	-81.36965	1083	22.7	CRSH	21	77	S	1429.74	CASINO BOAT

Appendix 4. Large vessels with an exact GPS location during the 2005-2006 NEWS right whale aerial surveys.

Date	Time (Z)	Vessel Latitude	Vessel Longitude	Plane Altitude (ft)	Plane Heading	Vessel Type	Vessel Heading	Estimated Length (ft)	Estimated Speed (knots)	Comments
03-Dec-05	170110	31.19720	-80.97620	1190	191.8	MY-L	06	100	18	LARGE MOTOR YACHT
04-Dec-05	152549	31.08565	-81.31625	1100	268.3	MV-C	14	500	12	BULK SHIP
04-Dec-05	153610	31.00812	-81.19521	1069	61.9	MV-C	22	450	AT ANCHOR	BULK SHIP
04-Dec-05	153810	31.02012	-81.22704	1038	296.6	MV-C	22	500	AT ANCHOR	RO-RO BARGE
05-Dec-05	181243	31.04782	-81.24123	956	125	MV-C	06	550	8	CAR CARRIER
05-Dec-05	181403	31.02062	-81.21850	950	130.4	MV-O	22	400	AT ANCHOR	PRODUCT TANKER
05-Dec-05	181433	31.01328	-81.20518	950	99.1	MV-C	22	450	AT ANCHOR	BULK SHIP
05-Dec-05	181523	31.00635	-81.19320	950	288.9	MV-C	22	450	AT ANCHOR	BULK SHIP
10-Dec-05	175339	31.01570	-81.24275	1035	279.8	MV-C	22	400	AT ANCHOR	BULK SHIP
17-Dec-05	142459	31.09711	-81.32935	1099	129.2	MV-C	06	550	10	CAR CARRIER
20-Dec-05	162146	31.03208	-81.27142	1033	348.6	MV-C	22	550	AT ANCHOR	CAR CARRIER
22-Dec-05	170537	31.09695	-81.32535	950	252.7	MV-C	14	600	10	BULK SHIP
23-Dec-05	183100	30.86757	-80.75635	1006	333.8	MV-C	09	700	N/A	BREAK BULK CARGO
24-Dec-05	190805	31.07045	-81.28052	995	66	MV-C	06	550	6	BREAK BULK CARGO
28-Dec-05	184415	31.12217	-81.37230	1021	2	MV-C	06	500	8	CAR CARRIER
30-Dec-05	155044	31.31390	-80.65008	1024	172.6	MY-L	08	100	20	LARGE MOTOR YACHT
04-Jan-06	174508	31.03163	-81.23727	1018	99.3	MV-C	22	550	AT ANCHOR	BREAK BULK CARGO
04-Jan-06	181406	31.00015	-81.21589	965	19.3	MV-C	22	700	AT ANCHOR	BREAK BULK CARGO
05-Jan-06	181919	30.99515	-81.22567	979	207.9	MV-C	22	500	AT ANCHOR	BREAK BULK CARGO
07-Jan-06	173209	31.10772	-81.36821	1005	320.8	MY-L	22	200	AT ANCHOR	LARGE MOTOR YACHT
10-Jan-06	164421	31.25565	-80.68272	992	42.1	MV-B	01	550	15	INTEGRATED TUG/BARGE
11-Jan-06	175158	31.07525	-80.87749	1026	271.8	MV-B	08	550	12	INTEGRATED TUG/BARGE
13-Jan-06	165516	31.02945	-80.93168	950	53.5	MV-C	06	550	12	BREAK BULK CARGO
16-Jan-06	192442	31.10050	-80.90617	977	62.7	MV-C	10	600	15	CAR CARRIER
21-Jan-06	174801	31.09033	-81.34500	984	123.1	MY-L	22	125	AT ANCHOR	LARGE MOTOR YACHT
28-Jan-06	154723	31.12750	-81.39217	1026	320.1	MV-C	14	600	10	CAR CARRIER
29-Jan-06	162601	31.03383	-81.27233	1063	270.1	MV-C	22	500	AT ANCHOR	BREAK BULK CARGO
01-Feb-06	142554	31.0675	-81.33517	955	196.4	MV-C	14	500	10	BREAK BULK CARGO
02-Feb-06	142649	31.09167	-81.34766	1023	225.3	MV-C	14	500	5	CAR CARRIER
02-Feb-06	155048	31.02817	-81.24017	1052	208.2	MV-C	06	600	12	BREAK BULK CARGO
06-Feb-06	151612	31.01983	-81.20834	1026	277	MV-C	22	500	AT ANCHOR	BREAK BULK CARGO
06-Feb-06	161142	31.14000	-80.79267	1100	205.4	MV-C	21	600	STATIONARY	CAR CARRIER
10-Feb-06	174929	31.16633	-80.98683	994	219.6	MV-C	10	550	5	BREAK BULK CARGO
28-Feb-06	154340	31.01467	-81.21000	1034	265.2	MV-C	22	400	AT ANCHOR	BREAK BULK CARGO
01-Mar-06	200410	31.02150	-81.21150	1043	24.6	MV-C	21	400	AT ANCHOR	BREAK BULK CARGO
02-Mar-06	141536	31.10383	-81.34283	1019	209.2	MV-C	14	450	10	CONTAINER SHIP
02-Mar-06	153638	31.01317	-81.21300	1027	148.3	MV-C	22	400	AT ANCHOR	BREAK BULK CARGO
03-Mar-06	190617	31.08383	-81.31767	1004	269.2	CRSH	21	N/A	N/A	CASINO BOAT
06-Mar-06	190625	31.09200	-81.32017	1033	237.4	MV-C	06	500	8	CAR CARRIER
11-Mar-06	180710	31.08333	-81.35500	1003	270.1	DR-W	21	200	STATIONARY	HOPPER DREDGE "ATCHAFALAYA"
12-Mar-06	182514	31.06433	-80.82816	950	196.3	MV-C	10	300	10	BREAK BULK CARGO "EAR BULK"

Date	Time (Z)	Vessel Latitude	Vessel Longitude	Plane Altitude (ft)	Plane Heading	Vessel Type	Vessel Heading	Estimated Length (ft)	Estimated Speed (knots)	Comments
13-Mar-06	142308	31.13667	-81.34966	1086	50.8	DR-T	14	200	10	HOPPER DREDGE "ATCHAFALAYA"
17-Mar-06	145217	31.08450	-81.30583	1065	205.1	MV-C	12	650	10	BREAK BULK
17-Mar-06	145345	31.06516	-81.31551	1073	295.9	DR-T	14	200	15	HOPPER DREDGE "ATCHAFALAYA"
17-Mar-06	152116	31.05233	-80.95650	1100	208.8	MV-O	12	600	15	PRODUCT TANKER
17-Mar-06	162947	30.91467	-81.11983	1023	349.7	MV-C	14	600	15	CAR CARRIER "WALLENUS WILHELMSSEN"
19-Mar-06	162040	31.03850	-81.11733	1043	97.3	MV-C	22	650	AT ANCHOR	CAR CARRIER
19-Mar-06	163842	31.03283	-81.24751	990	16.1	MV-O	22	450	AT ANCHOR	PRODUCT TANKER
27-Mar-06	143518	31.15900	-80.86484	1067	168.2	MV-C	10	500	12	CAR CARRIER "ARC"
29-Mar-06	163349	31.01867	-80.88850	1084	278.7	MV-C	12	600	15	CAR CARRIER "WALLENUS WILHELMSSEN"