



FINAL REPORT TO  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

Contract No. WC133F-06-CN-0251

**Documenting Spatial and Temporal Distribution  
of North Atlantic Right Whales off South Carolina and Northern Georgia  
2007 – 2008**

July 29, 2008

Submitted by:

WILDLIFE TRUST  
AQUATIC CONSERVATION PROGRAM

1601 3<sup>rd</sup> Street South, Suite F  
St. Petersburg, Florida 33701

Prepared by:  
Rachel Sayre and Cynthia R. Taylor

## **TABLE OF CONTENTS**

Abstract.....	Page 3
Introduction.....	Page 4
Methods.....	Page 5
Results.....	Page 9
Aerial Surveys.....	Page 9
Sighting Distances for Right Whales.....	Page 9
Sighting Distances for Large Vessels.....	Page 9
Whale/Ship Interactions.....	Page 13
Dead/Entangled Right Whales.....	Page 13
Humpback Whales.....	Page 14
Right Whale Sightings and Identifications.....	Page 14
Discussion and Recommendations.....	Page 23

## **LIST OF FIGURES AND TABLES**

Table 1. South Carolina-Georgia survey transects for the 2007-2008 right whale calving season.....	Page 6
Table 2. Survey effort for SCGA surveys conducted during the 2007-2008 season.....	Page 10
Table 3. Survey effort totals for SCGA surveys conducted during the 2007-2008 season.....	Page 11
Table 4. Right whale sightings from SCGA surveys conducted during the 2007-2008 season.....	Page 15
Table 5. Demographics of individual right whales seen during SCGA 2007-2008 surveys.....	Page 17
Figure 1. Map of South Carolina-Georgia survey tracklines flown from 15 November 2008 through 15 April 2008.....	Page 7
Figure 2. Survey effort for SCGA surveys conducted during the 2007-2008 season .....	Page 12
Figure 3. Right Whale sighting distances during the 2007-2008 survey season .....	Page 13
Figure 4. Right whale sightings by group type during the 2007-2008 SCGA right whale aerial surveys.....	Page 20
Figure 5. Sightings of interest during the SCGA 0708 survey season.....	Page 21
Figure 6. Right whale sightings by month during the 2007-2008 SCGA right whale aerial surveys.....	Page 22
Figure 7. Number of sightings and right whales by month during the 2007-2008 SCGA right whale aerial surveys.....	Page 23

## Abstract

The North Atlantic right whale, *Eubalaena glacialis*, is listed as a federally-protected endangered species under the Endangered Species Act, in addition to being protected by the Marine Mammal Protection Act. The winter calving grounds off the coasts of Georgia and Florida have been designated as critical habitat. The region just north of the critical habitat, including northern Georgia and South Carolina (SCGA), has long been considered an important migratory route. However, recent survey effort and photo-identification data has suggested that some individuals utilize this area not only as a migratory route, but as a winter residency area as well. The purpose of this aerial survey effort is to collect data on the distribution and use patterns of right whales off the coasts of northern Georgia and South Carolina to assist in determining appropriate management actions in the region. A total of 53 surveys were flown from 15 November 2007 to 15 April 2008 and extended from North Myrtle Beach, South Carolina to St. Catherine's Island, Georgia. Preliminarily, 37 right whale sightings consisting of 85 right whales were documented (including resights of 13 individuals, five individuals sighted three times, and one that was not identifiable). Sightings consisted of three cow/calf pairs, 12 single whales, and 21 groups of two or more adult/juvenile right whales. Preliminary photo analysis has resulted in the identification of the three cow/calf pairs and 32 of the individual adult/juvenile whales. The individuals documented include 15 males, 22 females, and 24 individuals of unknown sex. Of the 22 females seen, 11 gave birth to new calves this season, although only three were seen with their calves within the study area. The remaining eight females were seen while pregnant prior to giving birth further south. Preliminary sightings of note include eight individuals that were unique to the study area and not sighted by other survey teams to the south. Unique sightings include a calving female that was only sighted within the SCGA study area; a group of 13 whales seen approximately 14nm from shore that included two males over 21 years of age and one male over the age of 11; and a group of nine whales approximately 18nm from shore that included four males over the age of 22 and three males over the age of 12. The number of sightings as well as the number of whales seen was greatest in December, resulting in 34% of all sightings and 41% of all whales seen during the 2007/2008 season.

## Introduction

The North Atlantic right whale, *Eubalaena glacialis*, is listed as a federally-protected endangered species under the Endangered Species Act, in addition to being protected by the Marine Mammal Protection Act. Despite recent increases in calving, modeling exercises still indicate a decline in the population (Kraus et al. 2005). A slow reproductive rate is further hindered by human-related mortality, the largest known threat to the species, including vessel collisions and entanglement in fishing gear (NMFS, 2005). It is essential that mitigation measures are enacted quickly and efficiently to minimize human-related mortality, particularly in the calving grounds of the Southeast United States (SEUS).

Right whales are slow moving, especially when accompanied by a calf, and are often not easily seen while at the water's surface due to the lack of a dorsal fin. These factors make them vulnerable to ship strikes, especially in areas of increased vessel traffic. The winter calving grounds off Georgia and northern Florida have been designated as critical habitat for right whales in the SEUS. An Early Warning System (EWS) was created to provide right whale location information to military and commercial vessels transiting the critical habitat area. The region just north of the critical habitat, including northern Georgia and South Carolina, has long been considered an important migratory route. However, recent survey effort and photo-identification data has suggested that some individuals utilize this area not only as a migratory route, but as a winter residency and calving area as well. Resource managers are interested in learning more about the extent and the importance of this southern mid-Atlantic region to the reproducing population. In addition, continuing mortality from ship strikes and gear entanglement in the Mid-Atlantic region is of concern to researchers and managers. More information is needed to determine the best strategies for managing human activities within the region. The purpose of this aerial survey effort is to contribute information to answer these important management questions.

Aerial survey coverage along the entire coasts of Georgia and South Carolina is enabling a better understanding of the residency areas utilized by calving females and other demographic segments of the population. Conservationists, researchers, and managers have considered that the current management boundaries in the mid-Atlantic and SEUS regions may not accurately represent the areas in need of management measures to protect the species. Through this continuing multi-year study we hope to provide managers with a better understanding of right whale distribution and use in the study area to assist with time-critical management decisions.

This study will also serve as an aid to the research being conducted by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries Service) to test the feasibility of using passive acoustic monitoring (PAM) devices to detect the presence of right whales in the Southeast/Mid-Atlantic areas. Data from visual sightings by the aerial survey team will be compared to acoustic detection data collected by these PAM devices to help determine presence/absence of right whales in the region based on vocalizations.

## Methods

### *Study Area*

The South Carolina/northern Georgia (SCGA) survey season began on 15 November 2007 and concluded on 15 April 2008. The SCGA survey area for the 2007-2008 season extended from North Myrtle Beach, South Carolina (SC) to the southern end of St. Catherine's Island, Georgia (GA). The survey area was divided into three sections: northern, middle and southern. The northern area extended from North Myrtle Beach, (SC) to Cape Romain, SC and consisted of 16 southeast/northwest transects of varied lengths (35.1 - 35.3 nautical miles) which were flown at approximately 4 nautical mile (nm) intervals. The middle area extended from Cape Romain, SC to Fripp Island, SC and consisted of 16 southeast/northwest transect lines of varied lengths (35.3 - 35.4 nm) which were also flown at approximately 4 nm intervals. The southern section extended from Hilton Head Island, SC to St. Catherine's Island, GA and consisted of 14 east/west transect lines of varied lengths (11.7 – 29.0 nm) which were flown at 3 nm intervals (Figure 1). The northern and middle transect lines were flown in a southeast/northwest direction as opposed to the east/west orientation of the southern section in order to cover a larger bathymetric range, to provide visual data to substantiate the acoustic data collected by passive detection devices located in the area, and to be consistent with previous survey efforts in the area. A complete northern, middle, and southern survey consisted of 563.4, 565.2, and 323.5 nm of trackline, respectively (Table 1). These totals do not include miles flown in transit to, from, and between transect lines. The survey aircraft departed from Mt. Pleasant Regional Airport (formerly known as East Cooper Airport) in Mt. Pleasant, SC. After completing half of the survey lines for the day, the plane would land to refuel and to provide a rest period to avoid observer fatigue. When flying in the northern section, the plane would refuel at Georgetown Airport in Georgetown, SC. In the middle section, the plane would refuel at Mt. Pleasant Regional Airport in Mt. Pleasant, SC or at Charleston Executive Airport in Johns Island, SC. In the southern section, the plane would refuel at Hilton Head Airport in Hilton Head, SC or at Frogmore Airport in Beaufort, SC. The plane returned to Mt. Pleasant Regional Airport at the end of each normal survey day. Without whale sightings, a complete northern, middle, and southern survey took approximately 8.1, 7.7, and 6.3 hobbs hours, respectively (including transit times to and from the airports).

### *Aerial Surveys*

Surveys were scheduled to be flown from 15 November 2007 through 15 April 2008, weather permitting, under visual flight rules (VFR) conditions. Surveys were conducted in a Cessna 337 Skymaster aircraft owned and operated by Orion Aviation. The aircraft was equipped with a Global Positioning System (GPS), an Automatic Identification System (AIS), navigation aids, radar, aviation very high frequency (VHF) radios, marine VHF radios, a life raft, Global Position Indicating Radio Beacon (GPIRB)-equipped personal flotation devices (PFDs), survival suits, flares, Emergency Position Indicating Radio Beach (EPIRB), and a satellite telephone. Flight protocols included mandatory usage of PFDs and Nomex flight suits. All observers were also required to complete emergency egress training prior to the start of the survey season. All aerial surveys were conducted in adherence to NOAA Fisheries Service' Southeast Region Minimum Aircraft and Crew Provisions for Right Whale Aerial Surveys.

Table 1. South Carolina-Georgia survey transects for the 2007-2008 right whale calving season

Track Line	Latitude West	Longitude West	Latitude East	Longitude East
1	31.58	-81.13	31.58	-80.57
2	31.63	-81.12	31.63	-80.57
3	31.68	-81.12	31.68	-80.57
4	31.73	-81.10	31.73	-80.57
5	31.78	-81.05	31.78	-80.50
6	31.83	-81.00	31.83	-80.50
7	31.88	-80.95	31.88	-80.43
8	31.93	-80.90	31.93	-80.43
9	31.98	-80.85	31.98	-80.43
10	32.03	-80.80	32.03	-80.43
11	32.08	-80.75	32.08	-80.37
12	32.13	-80.70	32.13	-80.37
13	32.18	-80.65	32.18	-80.37
14	32.23	-80.60	32.23	-80.37
15	32.34	-80.45	31.89	-80.00
16	32.41	-80.42	31.96	-79.97
17	32.49	-80.39	32.04	-79.94
18	32.50	-80.30	32.05	-79.85
19	32.54	-80.23	32.09	-79.78
20	32.57	-80.16	32.12	-79.71
21	32.60	-80.08	32.15	-79.63
22	32.62	-79.99	32.17	-79.54
23	32.66	-79.93	32.21	-79.48
24	32.71	-79.88	32.26	-79.43
25	32.76	-79.82	32.31	-79.37
26	32.80	-79.75	32.35	-79.30
27	32.85	-79.70	32.40	-79.25
28	32.89	-79.63	32.44	-79.18
29	32.97	-79.61	32.52	-79.16
30	33.02	-79.56	32.57	-79.11
31	33.01	-79.44	32.56	-78.99
32	33.02	-79.35	32.57	-78.90
33	33.10	-79.32	32.65	-78.87
34	33.13	-79.25	32.68	-78.80
35	33.18	-79.19	32.73	-78.74
36	33.27	-79.18	32.82	-78.73
37	33.35	-79.15	32.90	-78.70
38	33.43	-79.12	32.98	-78.67
39	33.49	-79.08	33.04	-78.63
40	33.54	-79.02	33.09	-78.57
41	33.60	-78.98	33.15	-78.53
42	33.65	-78.92	33.20	-78.47
43	33.70	-78.87	33.25	-78.42
44	33.75	-78.81	33.30	-78.36
45	33.79	-78.74	33.34	-78.29
46	33.82	-78.67	33.37	-78.22

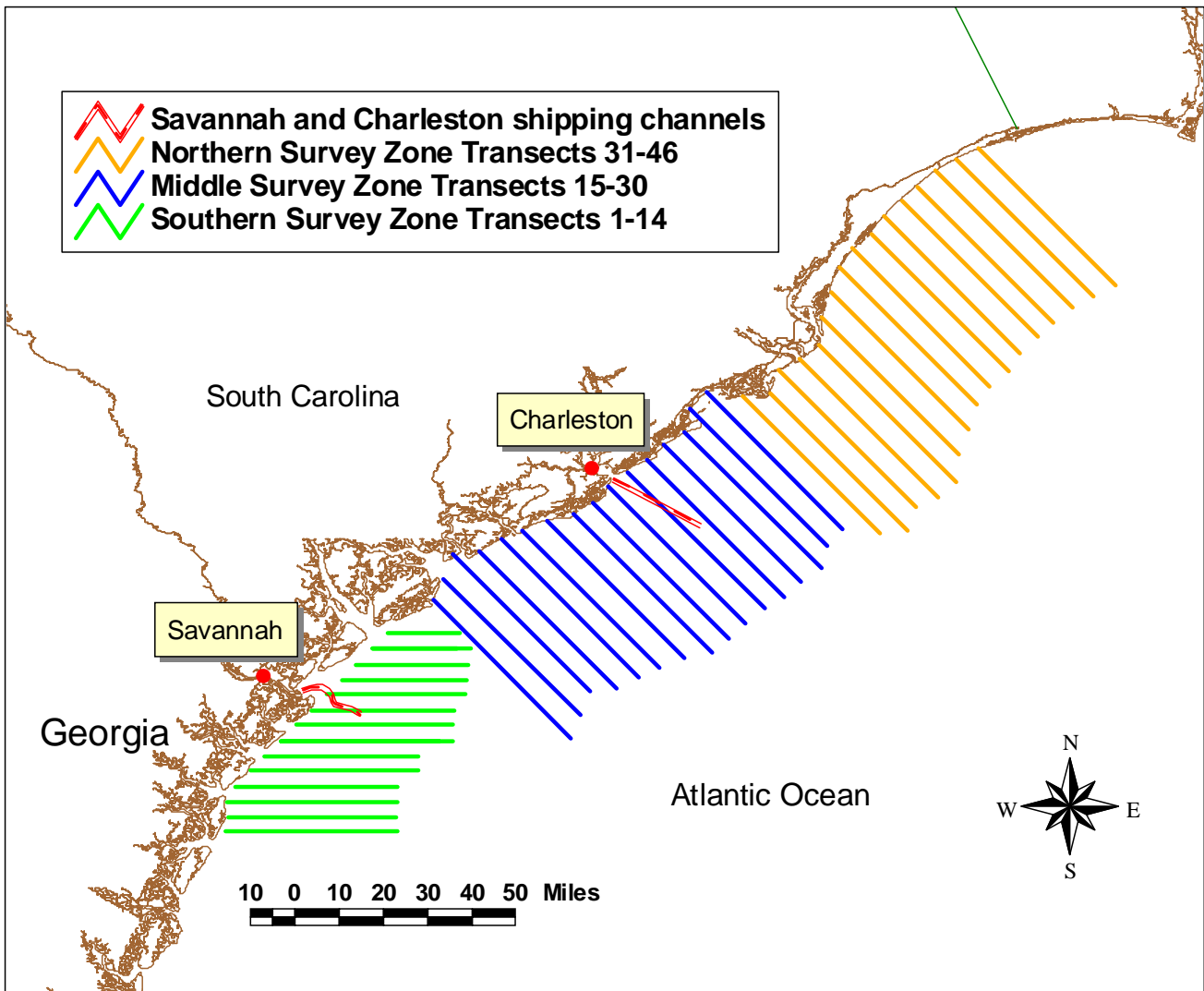


Figure 1. Map of SCGA transect lines flown from 15 November 2007 through 15 April 2008.

Surveys were flown at an altitude of 303 m and at a ground speed of 100 knots. The surveys were typically flown south to north with the western waypoint of the southernmost trackline as the start point. However, the section flown, the start point and direction of flight was determined daily, based on weather conditions throughout the survey area and other survey factors. Spreading survey effort equally amongst the survey areas was also a factor. Conditions necessary for survey flight included a minimum ceiling of 455 m, visibility greater than 2 nm, wind speed less than 17 knots, and Beaufort sea state of 4 or less. The survey crew consisted of a pilot, co-pilot and two observers. The observers were positioned on either side of the aircraft behind the pilot and co-pilot seats. All events, sightings, and changes in environmental conditions were recorded on a laptop computer using Logger 2000, a software program designed for marine data entry. To minimize time spent looking away from the window, when an event occurred the left observer recorded the time and position of the event on the computer while the right observer recorded the time and event information into a handheld digital voice recorder. Time, location, number and species of all large whales were recorded. In addition, all types of large vessels (over 33 m in length) observed in the survey area were recorded from 15 November 2007 to 16

January 2008. Sighting angles for the vessels were recorded using a digital inclinometer. After 16 January 2008, an AIS receiver was installed in the plane which relayed information on all vessels in the vicinity including name, position, speed, length, and course. Sighting distance for all large whales was calculated from overhead GPS locations. 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 a GPS location. The aircraft also circled over each right whale encountered to obtain photographs. The circling for photographic documentation was generally limited to 15 minutes for each sighting, with a maximum of 30 minutes during special circumstances. After right whales were documented the aircraft returned to the trackline at the point of departure to continue the survey.

*Determination of Sighting Distance from the Trackline*

Sighting distance from the trackline for observed right whales was calculated whenever possible, using the latitude and longitude position (lat/long) on the trackline perpendicular to the position of the whale sighting (lat1,long1), and the lat/long of the exact overhead position of the right whale (lat2,long2). The whale’s distance in nautical miles from the trackline was determined by the equation<sup>1</sup>:

$$= \text{ACOS}(\text{COS}(\text{RAD}(90-a)) * \text{COS}(\text{RAD}(90-b)) + \text{SIN}(\text{RAD}(90-a)) * \text{SIN}(\text{RAD}(90-b)) * \text{COS}(\text{RAD}(c-d))) * 3440.065$$

$$a = \text{lat } 1, b = \text{lat } 2, c = \text{long } 1, d = \text{long } 2$$

The sighting distance from the trackline of large vessels was determined using angles obtained from a digital inclinometer at the time of the vessel’s sighting and the equation:

$$= (a/3.281) * (\text{TAN} (\text{RADIANS} (b)))$$

$$a = \text{altitude}, b = \text{angle}$$

*Notification of Right Whale Sighting Information*

Upon completing data collection for each right whale sighting, the aircraft occupants would immediately use the aircraft satellite phone to call a designated ground contact to report the right whale sighting. The ground contact would then relay the sighting information via email to distribution lists which included harbor pilots, USCG, Navy, and any other interested parties. The information sent included date, time, latitude, longitude, number of adults and calves, direction of movement, and distance in nm from the closest sea buoy. In addition, the information was sent to all other military and non-military interests via an alphanumeric pager system (Taylor and Brooks 2002) including all aerial survey teams, ship channel pilots, USCG NAVTEX, and state agencies. The communication system supported real-time notification of right whale presence to ships in order to minimize the probability of right whale death or injury due to ship strike. It also facilitated verification of sighting reports by aerial survey teams from other sources such as military ships and aircraft.

*Photographic Identification*

Right whales are 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).

<sup>1</sup>equation source: [http://bluemm.blogspot.com/2007\\_01\\_01\\_archive.html](http://bluemm.blogspot.com/2007_01_01_archive.html)



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 SCGA aerial surveys were photographed in order to identify individual animals. During a right whale sighting, the left observer recorded all sighting information into the voice recorder and entered the sighting positions into the computer. If possible, the observer also sketched the right whale(s) being photographed, including callosity patterns and body scarring, and recorded observed behaviors. The aircraft would circle at an altitude of 1000 ft (303m) over the whale(s) while the right observer photographed the animals through the co-pilot's sliding window or through the right observers' window which could be opened. Photographs were taken using a Canon 20D digital camera with a fixed 300 mm image stabilizing lens. Photographs obtained during the season were compared against all photographs taken during the survey season and the New England Aquarium's (NEA) catalog of North Atlantic right whales in order to determine the probable identity of individual right whales encountered during the 2007-2008 SCGA survey season. Preliminary photo analysis by the SCGA Wildlife Trust team and initial verification by NEA has been completed and all photographs taken during the 2007-2008 season have been forwarded to NEA for final confirmation. The photographic identification-related results presented in this report are preliminary until final verification from NEA is obtained.

## **Results**

### *Aerial Surveys*

A total of 53 SCGA surveys were flown from 15 November 2007 through 15 April 2008 (Tables 2 and 3). A total of 325.7 hobbs hours was logged for the SCGA season, averaging 6.7, 5.3, and 6.6 hours in the northern, middle, and southern section, respectively (including complete and partial surveys). A total of 4683.4, 8875.1, and 4836.5 nm of trackline were flown in the northern, middle, and southern sections, respectively, for a total of 8395.0 nm of trackline flown. The northern survey area was completed four times during the season and partially completed seven times. The middle survey area was completed on four survey days and partially completed on 21 days. The southern survey area was completed 11 times and partially completed six times. The 34 partially completed SCGA flights were largely due to factors such as weather and sea state conditions. See Figure 2 for a graphical representation of survey effort. Days with no survey effort in the SCGA survey area were primarily due to unacceptable weather conditions.

### *Sighting Distances for Right Whales*

Sighting distances were calculated whenever possible, and the average sighting distance for all right whale sightings was 1.03 (SD = 0.69) nm from the trackline (Figure 3).

### *Sighting Distances for Large Vessels*

Sighting angles were obtained for large commercial and military ships between 15 November 2007 through 16 January 2008 whenever possible, and used to calculate distance from the trackline. Average distance from the trackline for large vessels with documented sighting angles was 6.2 nm from the survey plane. After 16 January 2008 all AIS vessel data was saved into a text file using the software Coastal Explorer to be analyzed by GIS modelers at a later date.

Table 2. Survey effort for SCGA surveys conducted during the 2007/2008 season, arranged by amount of area flown (aborted survey, complete survey, partial survey).

Date	Complete Surveys	Partial Surveys	Hobbs Time	Total Trackline Miles Flown	Number of Right Whales Seen	Comments
25-Nov-07	-	-	0.6	-	-	Test/training flight
23-Feb-08	-	-	2.6	-	-	Aborted – sea state
21-Mar-08	-	-	0.8	-	-	mechanical issues - aborted
14-Jan-08	-	-	2.0	-	-	Test/training flight
1-Apr-08	-	-	1.3	-	-	Aborted - thunderstorms
5-Jan-08	M		7.8	565.2	-	complete
11-Mar-08	M		7.6	565.2	-	complete
13-Mar-08	M		8.2	565.2	2	complete
22-Mar-08	M		8.1	565.2	9	complete
2-Feb-08	N		8.1	563.4	-	complete
15-Feb-08	N		7.8	563.4	-	complete
6-Mar-08	N		8.4	563.4	-	complete
14-Apr-08	N		7.9	563.4	2	complete
27-Nov-07	S		6.2	323.5	-	complete
4-Dec-07	S		7.0	323.5	4	2 whales resighted from 12/2/07
20-Dec-07	S		6.8	323.5	5	complete
6-Jan-08	S		7.9	323.5	3	Complete
7-Feb-08	S		7.1	323.5	2	complete
12-Feb-08	S		6.3	323.5	-	complete
29-Feb-08	S		7.5	323.5	4	complete
10-Mar-08	S		8.6	323.5	8	complete
29-Jan-08	S		6.5	343.5	-	complete
27-Mar-08	S		6.6	323.5	2	complete
6-Apr-08	S		6.4	323.5	2	Complete
2-Dec-07		M	7.1	424.0	2	Incomplete - weather/daylight
8-Dec-07		M	6.2	353.0	2	Incomplete - daylight hours
10-Dec-07		M	5.3	282.8	-	Incomplete - daylight
18-Dec-07		M	2.3	139.6	-	Incomplete - sea state
7-Jan-08		M	5.9	424.0	-	incomplete
16-Jan-08		M	2.8	126.1	-	incomplete
22-Jan-08		M	4.0	231.2	-	Incomplete – sea state
24-Jan-08		M	3.9	231.0	-	Incomplete – sea state
27-Jan-08		M	3.6	282.4	-	Late start - high winds
8-Feb-08		M	6.0	424.0	-	late start - high winds

Date	Complete Surveys	Partial Surveys	Hobbs Time	Total Trackline Miles Flown	Number of Right Whales Seen	Comments
14-Feb-08		M	4.6	282.4	2	late start - high winds
20-Feb-08		M	7.2	459.0	1	Incomplete - daylight
21-Feb-08		M	3.6	194.2	-	Incomplete - sea state
25-Feb-08		M	4.8	353.4	-	Incomplete - fog
28-Feb-08		M	5.2	353.0	2	late start - high winds
1-Mar-08		M	3.2	183.9	-	Incomplete – sea state
3-Mar-08		M	4.7	378.5	-	Incomplete – high winds
26-Mar-08		M	6.7	522.7	-	cut lines 23-26 - sea state
2-Apr-08		M	3.6	282.4	-	Incomplete - weather
9-Apr-08		M	7.0	533.0	-	cut lines 21-24 - sea state
10-Apr-08		M	3.2	153.8	-	Incomplete – low clouds.
11-Dec-07		N	5.6	340.5	3	Incomplete - GPS error
19-Dec-07		N	7.8	547.0	-	cut 2 lines - high seas
10-Jan-08		N	7.6	493.2	-	Cut last 2 lines -daylight
23-Jan-08		N	6.2	411.1	-	cut last 4 lines
2-Mar-08		N	3.9	136.4	-	Incomplete – sea state
28-Mar-08		N	4.6	114.0	-	Incomplete – sea state
11-Apr-08		N	6.3	387.6	-	Late start - fog
14-Dec-07		S	7.8	271.4	13	Incomplete - daylight
31-Jan-08		S	4.0	121.0	-	incomplete
3-Feb-08		S	5.7	211.9	-	Incomplete - fog
11-Feb-08		S	7.0	298.6	2	cut lines 3 and 4 early
16-Feb-08		S	5.2	242.6	1	ended survey early
24-Feb-08		S	5.0	112.5	14	Incomplete - low ceiling

Table 3. Survey effort totals for SCGA surveys conducted during the 2007/2008 season

Survey Area	Complete Surveys	Partial Surveys	Hobbs Time	Total Trackline Miles Flown	Number of Right Whales Seen
North	4	7	76.8	4683.4	5
Middle	4	21	137.3	8875.1	20
South	11	6	111.6	4836.5	60
Totals	19	34	325.7	18395.0	85

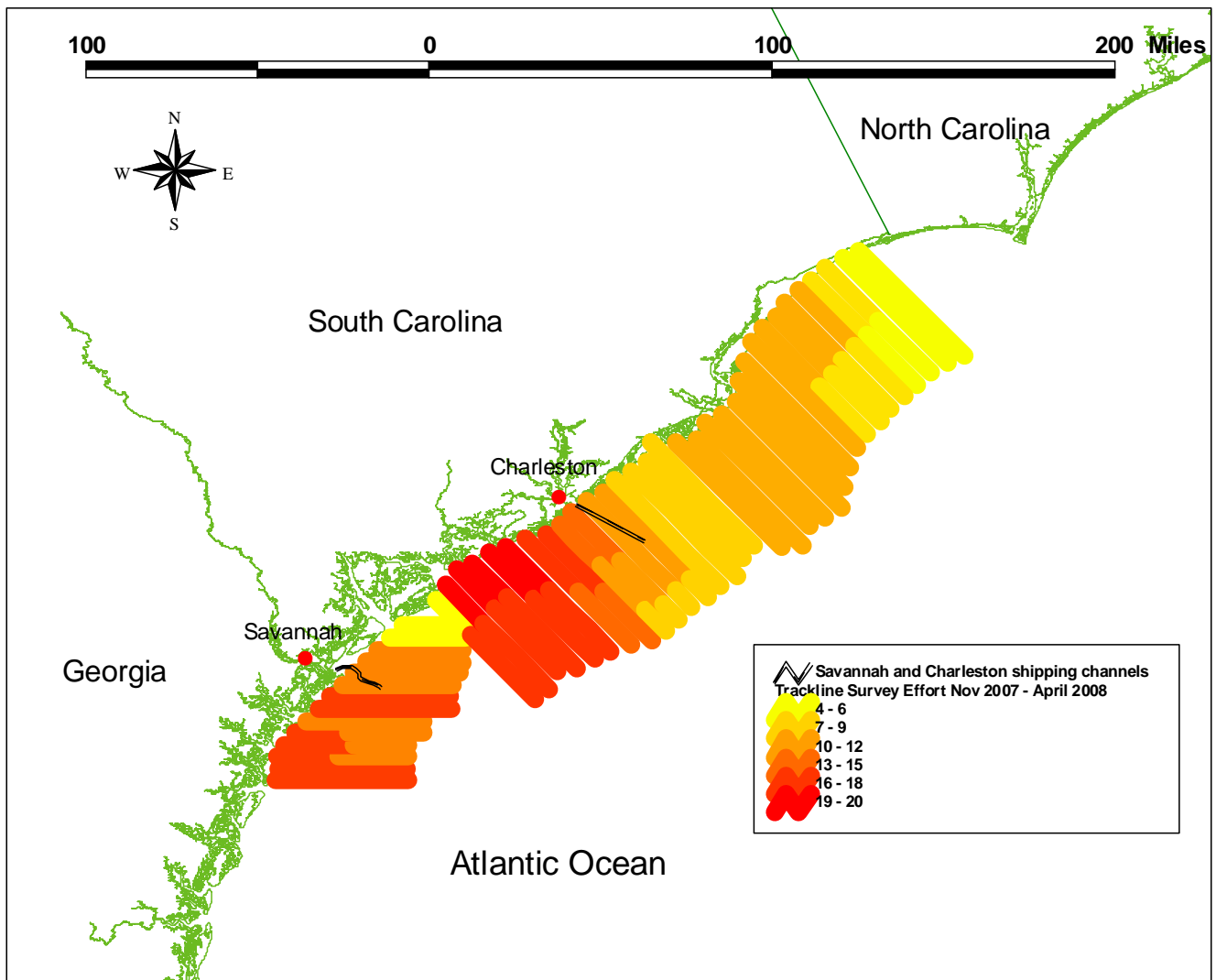


Figure 2. Survey effort for SCGA surveys conducted during the 2007/2008 season. Areas with higher (15 surveys) effort are depicted in red; areas with lower (6 surveys) effort are depicted in yellow.

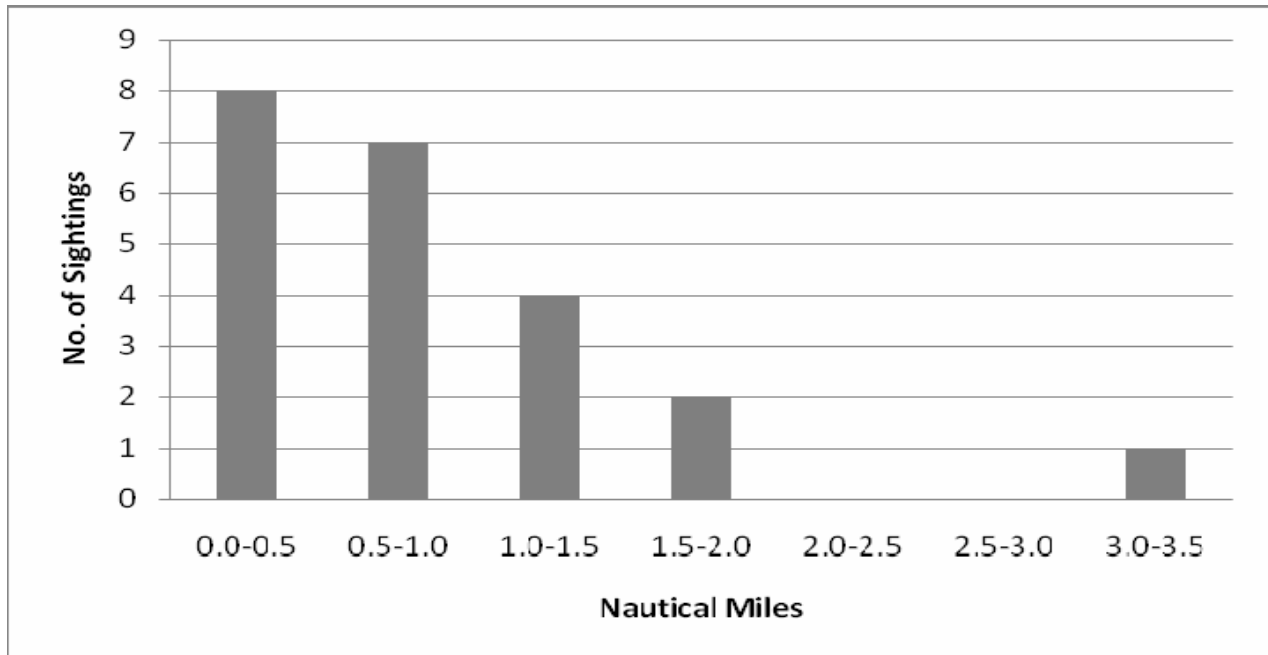


Figure 3. Right Whale sighting distances during the 2007/2008 survey season

#### *Whale/Ship Interactions*

There were two “close-call” whale/ship interactions observed within the SCGA study area during the 2007-2008 season. On 14 December 2007, a small recreational sailing vessel was transiting an area roughly 1.5 nm west of one adult right whale at a medium speed. A position of the vessel was taken at 1638 hrs at 32.02756N/-80.6165W. The whale, CT05SEUS08, was at 32.03278N/-80.60088W at 1619. The team circled over both the whale and the vessel and hailed the vessel on Marine channel 16 multiple times. The vessel never responded. The closest the vessel came to the whale was 0.22 nm to the north. The team took a final position of the whale at 1642 at 32.02382N -80.62670W.

On 3 March 2008, a small recreational fishing vessel, Nauti Hooker, was transiting an area roughly 1.3 nm southwest of a mom/calf right whale pair at a fast speed. The mom/calf pair, EGNO1632 and calf, were at 31.94678N/-80.74528W at 1009. A position of the vessel was taken at 1014 hrs at 31.92532N/-80.75500W. The team circled over both the whale and the vessel and hailed the vessel on Marine channel 16. The co-pilot told the vessel that there were two right whales in the area. The vessel reduced its speed and started to move slowly to the whales. The co-pilot then hailed the vessel again to request that they remain 500 yards from the whales. The vessel stopped moving towards the whales and stayed at least 500 yards from the mom/calf pair. The team took a final position on the whales at 1030 at 31.93733N/-80.74757W.

#### *Dead/Entangled Right Whales*

One flight involving an entangled whale occurred on 28 February 2008 when EGNO 3346, also known as “Kingfisher”, was sighted with one other whale at 1325 at 31.702317N/-79.44842W. “Kingfisher” has been documented as entangled since 17 March 2004 and is currently under the status of “monitor”. This animal was identified in the field, and the photographs from the sighting were sent to the disentanglement team at the Provincetown Center for Coastal Studies in

Provincetown, MA on 17 March following completion of the survey. There were no dead right whales observed within the SCGA study area during the 2007-2008 season.

### *Humpback Whales*

There were no humpback whales observed within the SCGA study area during the 2007-2008 season.

### *Right Whale Sightings and Identifications*

Thirty-seven right whale sightings were documented during the SCGA surveys, consisting of 85 right whales. A sighting is defined as the documentation of right whales in one location during an aerial survey, regardless of the size of the group. For example, one sighting may consist of one individual right whale or a group of multiple right whales in the same vicinity. The total number of whales seen includes resights of 13 individuals, five individuals sighted three times, and one that was not identifiable resulting in a total of 61 different individuals. Three cow/calf pairs, 12 single whales, and 21 groups of two or more adult/juvenile right whales were documented (Figure 4). Preliminary photoanalysis by the SCGA Wildlife Trust team and verification by NEA has resulted in the identification of the three cow/calf pairs and 32 of the individual adult/juvenile whales which accounts for 36 of the 61 animals sighted during the season (Tables 4 and 5). The numbers and codes listed in the “EGNO” column of Table 4 include EGNO numbers for known whales and intermatch codes (i.e. CT05SEUS08). These intermatch codes were created to assist in the preliminary matching of juvenile whales until they are assigned EGNOs. Whales with “poss” next to their EGNO indicate preliminary photo-identification that has not yet been verified by NEA. Twenty-five individual whales have not been positively identified at the time of this report. All right whale identification information included in this report is preliminary and should not be considered final until NEA completes the confirmation process.

The 61 individual right whales documented include 15 males, 22 females, and 24 individuals of unknown sex (Table 5). Of the 22 females seen, 11 gave birth to calves during the 2007-2008 season, although only three were seen with their calves within the study area. The remaining eight females were seen in the SCGA survey area while pregnant prior to giving birth further south. Of the 11 2007-2008 mothers seen in the SCGA survey area, three last gave birth in 2004, five last gave birth in 2005, one last gave birth in 2006, two were first time mothers, and one animal is of unknown age and it is not known how many calves she has produced. The female right whale who last gave birth in 2006, EGNO 1802, is presumed to have lost her calf that same year.

Table 4. Right Whale sightings from SCGA surveys conducted during the 2007/2008 season (“poss” indicated photo-identification that has not yet been verified by NEA).

Sighting #	Whale #	Month	Day	Year	Time (L)	Survey Name	Declat	Declong	RIWH Letter	NEAq EGNO	NRW Number
1	2	12	2	2007	14:47	SCRW20071202	32.6974	-79.65410	B	2042	SCGA001
1	1	12	2	2007	14:47	SCRW20071202	32.6974	-79.65410	A	3103	SCGA001
2	3	12	4	2007	9:58	SCRW20071204	32.11343	-80.493	A	1802	SCGA002
2	4	12	4	2007	9:58	SCRW20071204	32.11343	-80.493	B	3130	SCGA002
3	5	12	4	2007	14:21	SCRW20071204	31.87737	-80.7466	C	2042	SCGA003
3	6	12	4	2007	14:21	SCRW20071204	31.87737	-80.7466	D	3103	SCGA003
4	7	12	8	2007	11:48	SCRW20071208	32.72365	-79.5525	A	1812	SCGA004
4	8	12	8	2007	11:48	SCRW20071208	32.72365	-79.5525	B	3513	SCGA004
5	9	12	11	2007	12:15	SCRW20071211	33.03493	-79.12825	A	1308	SCGA005
6	10	12	11	2007	15:31	SCRW20071211	33.2731	-78.76920	B	1701	SCGA006
6	11	12	11	2007	15:31	SCRW20071211	33.2731	-78.76920	C	2007 calf of 1701	SCGA006
7	12	12	14	2007	9:48	SCRW20071214	32.47547	-79.9792	A	2040	SCGA007
7	13	12	14	2007	9:48	SCRW20071214	32.47547	-79.9792	B	2790	SCGA007
8	15	12	14	2007	10:18	SCRW20071214	32.35277	-80.2747	D	1245	SCGA008
8	14	12	14	2007	10:18	SCRW20071214	32.35277	-80.2747	C	1812	SCGA008
8	16	12	14	2007	10:18	SCRW20071214	32.35277	-80.2747	E	CT03SEUS08	SCGA008
9	17	12	14	2007	10:40	SCRW20071214	32.31792	-80.3134	F	3292	SCGA009
10	18	12	14	2007	11:23	SCRW20071214	31.72137	-81.012	G	1308	SCGA010
11	21	12	14	2007	13:35	SCRW20071214	31.84358	-80.8564	J	3123	SCGA011
11	19	12	14	2007	13:35	SCRW20071214	31.84358	-80.8564	H	3314	SCGA011
11	20	12	14	2007	13:35	SCRW20071214	31.84358	-80.8564	I	3513	SCGA011
12	22	12	14	2007	14:09	SCRW20071214	31.8685	-80.8028	K	3130	SCGA012
12	23	12	14	2007	14:09	SCRW20071214	31.8685	-80.8028	L	3293	SCGA012
13	24	12	14	2007	16:19	SCRW20071214	32.03278	-80.6088	M	CT05SEUS08	SCGA013
14	25	12	20	2007	10:46	SCRW20071220	31.73455	-80.9358	A	1308	SCGA014
14	26	12	20	2007	10:46	SCRW20071220	31.73455	-80.9358	B	3123	SCGA014
14	27	12	20	2007	10:46	SCRW20071220	31.73455	-80.9358	C	3293	SCGA014
15	29	12	20	2007	15:19	SCRW20071220	32.69542	-79.8024	E	3405	SCGA015
15	28	12	20	2007	15:19	SCRW20071220	32.69542	-79.8024	D	3550	SCGA015
16	30	01	06	2008	14:16	SCRW20080106	31.80444	-80.833	A	1245	SCGA016
16	32	01	06	2008	14:16	SCRW20080106	31.80444	-80.833	C	1812	SCGA016

Sighting #	Whale #	Month	Day	Year	Time (L)	Survey Name	DecLat	DecLong	RIWH Letter	NEAq EGNO	NRW Number
16	31	01	06	2008	14:16	SCRW20080106	31.80444	-80.833	B	3230	SCGA016
17	33	02	07	2008	11:35	SCRW20080207	31.83853	-80.8570	A	2007 calf of 2645	SCGA017
18	34	02	07	2008	12:22	SCRW20080207	31.8688	-80.66842	B	1632	SCGA018
19	35	02	11	2008	14:37	SCRW20080211	32.11248	-80.524	A	2006 calf of 1503	SCGA019
19	36	02	11	2008	14:37	SCRW20080211	32.11248	-80.524	B	CT19SEUS08	SCGA019
20	37	02	14	2008	13:05	SCRW20080214	32.98752	-79.09542	A	3260	SCGA020
20	38	02	14	2008	13:05	SCRW20080214	32.98752	-79.09542	B	3302	SCGA020
21	39	02	16	2008	8:54	SCRW20080216	31.86837	-80.70116	A	BK08SEUS08	SCGA021
22	40	02	20	2008	10:00	SCRW20080220	32.82318	-79.37393	A	3308	SCGA022
23	41	02	24	2008	12:55	SCRW20080224	31.63858	-80.63360	A	CT10SEUS08	SCGA023
24	45	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	E	1320	SCGA024
24	52	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	L	poss 1712	SCGA024
24	50	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	J	poss 2705	SCGA024
24	42	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	B	poss 3323	SCGA024
24	43	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	C	2006 CALF OF 1611	SCGA024
24	51	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	K	BK13SEUS08	SCGA024
24	44	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	D	BK27	SCGA024
24	53	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	M	CT02BOF2004	SCGA024
24	48	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	H	CT05SEUS08	SCGA024
24	47	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	G	CT12SEUS08	SCGA024
24	46	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	F	CT35SEUS08	SCGA024
24	49	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	I	CT36SEUS08	SCGA024
24	54	02	24	2008	14:31	SCRW20080224	31.82607	-80.62755	N	no ID photo	SCGA024
25	56	02	28	2008	13:25	SCRW20080828	32.70232	-79.4484	B	3346	SCGA025
25	55	02	28	2008	13:25	SCRW20080828	32.70232	-79.4484	A	CT24SEUS08	SCGA025
26	57	02	29	2008	10:16	SCRW20080229	31.61873	-80.94820	A	2007 CALF OF 2614	SCGA026
27	60	02	29	2008	11:15	SCRW20080229	31.65915	-80.7595	D	poss 3420	SCGA027
27	58	02	29	2008	11:15	SCRW20080229	31.65915	-80.7595	B	poss 3308	SCGA027
27	59	02	29	2008	11:15	SCRW20080229	31.65915	-80.7595	C	CT35SEUS08	SCGA027
28	61	03	10	2008	10:30	SCRW20080310	31.93733	-80.74757	A	2330	SCGA028
28	62	03	10	2008	10:30	SCRW20080310	31.93733	-80.74757	B	2330's calf	SCGA028
29	63	03	10	2008	14:47	SCRW20080310	31.8545	-80.76983	C	2330	SCGA029
29	64	03	10	2008	14:47	SCRW20080310	31.8545	-80.76983	D	2330's calf	SCGA029
30	65	03	10	2008	15:15	SCRW20080310	31.8265	-80.77033	E	3157	SCGA030
30	66	03	10	2008	15:15	SCRW20080310	31.8265	-80.77033	F	BK01PCCS2003	SCGA030



Sighting #	Whale #	Month	Day	Year	Time (L)	Survey Name	DecLat	DecLong	RIWH Letter	NEAq EGNO	NRW Number
31	67	03	10	2008	16:21	SCRW20080310	31.99917	-80.48200	G	3130	SCGA031
31	68	03	10	2008	16:21	SCRW20080310	31.99917	-80.48200	H	3130's calf	SCGA031
32	69	03	13	2008	9:42	SCRW20080313	32.39482	-80.23763	A	SE07BK16	SCGA032
33	70	03	13	2008	11:37	SCRW20080313	32.41933	-80.19814	B	SE07BK16	SCGA033
34	74	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	D	poss 1019	SCGA034
34	77	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	G	poss 1150	SCGA034
34	71	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	A	poss 1156	SCGA034
34	73	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	C	poss 1616	SCGA034
34	79	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	I	poss 2142	SCGA034
34	78	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	H	poss 2615	SCGA034
34	76	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	F	poss 2630	SCGA034
34	75	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	E	poss 3110	SCGA034
34	72	03	22	2008	9:52	SCRW20080322	32.48467	-79.39745	B	BK33	SCGA034
35	80	03	27	2008	14:33	SCRW20080327	32.11358	-80.50275	A	3157	SCGA035
35	81	03	27	2008	14:33	SCRW20080327	32.11358	-80.50275	B	BK01PCCS2003	SCGA035
36	82	04	06	2008	14:45	SCRW20080406	32.0724	-80.47738	A	1632	SCGA036
36	83	04	06	2008	14:45	SCRW20080406	32.0724	-80.47738	B	1632's calf	SCGA036
37	85	4	14	2008	15:30	SCRW20080414	33.13143	-79.11828	B	3157	SCGA037
37	84	4	14	2008	15:30	SCRW20080414	33.13143	-79.11828	A	BK01PCCS2003	SCGA037

Table 5. Demographics of individual right whales seen during the SCGA 2007-2008 surveys. Asterisk (\*) indicates right whales that are preliminarily unique to the SCGA survey area. "Poss" indicates an ID that has not yet been confirmed by the New England Aquarium. "U" is an abbreviation for "unknown". Individuals in bold are 2007/2008 mothers

Identification code (EGNO/Intermatch)	Date Sighted	Birth Year	Calf of	Sex	First Seen	Last Seen	# calves produced (inc. 0708)	Last Known Calving
poss 1019 "Radiator"	22-Mar-08	U	U	M	1980	2006	-	-
poss 1150 "Gemini"	22-Mar-08	U	U	M	1970	2007	-	-
poss 1156 "Slalom"	22-Mar-08	U	U	M	1981	2006	-	-
<b>1245 (MOM)</b>	<b>14-Dec-07</b>	<b>1982</b>	<b>1140</b>	<b>F</b>	<b>1982</b>	<b>2005</b>	<b>4</b>	<b>2005</b>
<b>1245 (MOM)</b>	<b>6-Jan-08</b>	<b>1982</b>	<b>1140</b>	<b>F</b>	<b>1982</b>	<b>2005</b>	<b>4</b>	<b>2005</b>
<b>1308 (MOM)</b>	<b>11-Dec-07</b>	<b>1983</b>	<b>1012</b>	<b>F</b>	<b>1983</b>	<b>2005</b>	<b>3</b>	<b>2005</b>
<b>1308 (MOM)</b>	<b>14-Dec-07</b>	<b>1983</b>	<b>1012</b>	<b>F</b>	<b>1983</b>	<b>2005</b>	<b>3</b>	<b>2005</b>
<b>1308 (MOM)</b>	<b>20-Dec-07</b>	<b>1983</b>	<b>1012</b>	<b>F</b>	<b>1983</b>	<b>2005</b>	<b>3</b>	<b>2005</b>

	Identification code (EGNO/Intermatch)	Date Sighted	Birth Year	Calf of	Sex	First Seen	Last Seen	# calves produced (inc. 0708)	Last Known Calving
	1320 "Mohawk"	24-Feb-08	U	U	M	1974	2006	-	-
	1503's calf from 2006	11-Feb-08	2006	1503	U	2006			
	1611's calf from 2006	24-Feb-08	2006	1611	U	2006			
	poss 1616	22-Mar-08	U	U	M	1986	2006		
	<b>1632 (MOM) "Catspaw"</b>	<b>7-Feb-08</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1986</b>	<b>2005</b>	<b>≥2</b>	<b>2004</b>
	<b>1632 (MOM) "Catspaw"</b>	<b>6-Apr-08</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1986</b>	<b>2005</b>	<b>≥2</b>	<b>2004</b>
*	1632's calf from 2008	6-Apr-08	2008	1632	U	2008			
	1701 "Aphrodite"	11-Dec-07	1987	1219	F	1987	2007	4	2007
	1701's calf from 2007	11-Dec-07	2007	1701	U	2007			
	poss 1712	24-Feb-08	1987	1619	M	1987	2006		
	<b>1802 (MOM)</b>	<b>4-Dec-07</b>	<b>1988</b>	<b>1014</b>	<b>F</b>	<b>1988</b>	<b>2006</b>	<b>3</b>	<b>2006 (lost calf)</b>
	<b>1812 (MOM)</b>	<b>8-Dec-07</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1988</b>	<b>2006</b>	<b>4</b>	<b>2004</b>
	<b>1812 (MOM)</b>	<b>14-Dec-07</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1988</b>	<b>2006</b>	<b>4</b>	<b>2004</b>
	<b>1812 (MOM)</b>	<b>6-Jan-08</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1988</b>	<b>2006</b>	<b>4</b>	<b>2004</b>
	<b>2040 (MOM)</b>	<b>14-Dec-07</b>	<b>1990</b>	<b>1140</b>	<b>F</b>	<b>1990</b>	<b>2005</b>	<b>3</b>	<b>2005</b>
	2042	2-Dec-07	1990	1142	F	1990	2005	0	-
	2042	4-Dec-07	1990	1142	F	1990	2005	0	-
	poss 2142 "Rhino"	22-Mar-08	1991	1243	M	1991	2006	-	-
	<b>2330 (MOM)</b>	<b>10-Mar-08</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1993</b>	<b>2005</b>	<b>2</b>	<b>2004</b>
	<b>2330 (MOM)</b>	<b>10-Mar-08</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1993</b>	<b>2005</b>	<b>2</b>	<b>2004</b>
	2330's calf from 2008	10-Mar-08	2008	2330	U	2008			
	2330's calf from 2008	10-Mar-08	2008	2330	U	2008			
	2614's calf form 2007	29-Feb-08	2007	2614	U	2007			
	poss 2615	22-Mar-08	1996	1815	M	1996	2005	-	-
*	poss 2630 "Alien"	22-Mar-08	U	U	M	1996	2005	-	-
	2645's calf from 2007	7-Feb-08	2007	2645	U	2007			
*	poss 2705 "Silver"	24-Feb-08	1997	1405	M	1997	2006	-	-
	<b>2790 (MOM)</b>	<b>14-Dec-07</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>1997</b>	<b>2005</b>	<b>2</b>	<b>2005</b>
	poss 3060	22-Mar-08	U	U	U	2000	U	U	U
	3103	2-Dec-07	2001	1703	F	2000	2006	0	-
	3103	4-Dec-07	2001	1703	F	2000	2006	0	-
	poss 3110	22-Mar-08	2001	1710	M	2000	2005	-	-
	3123	14-Dec-07	2001	1123	F	2001	2006	0	-
	3123	20-Dec-07	2001	1123	F	2001	2006	0	-
	<b>3130 (MOM)</b>	<b>4-Dec-07</b>	<b>2001</b>	<b>2240</b>	<b>F</b>	<b>2001</b>	<b>2005</b>	<b>1</b>	<b>new mom</b>
	<b>3130 (MOM)</b>	<b>14-Dec-07</b>	<b>2001</b>	<b>2240</b>	<b>F</b>	<b>2001</b>	<b>2005</b>	<b>1</b>	<b>new mom</b>
	<b>3130 (MOM)</b>	<b>10-Mar-08</b>	<b>2001</b>	<b>2240</b>	<b>F</b>	<b>2001</b>	<b>2005</b>	<b>1</b>	<b>2008</b>
	3130's calf from 2008	10-Mar-08	2008	3130	U	2008			

	Identification code (EGNO/Intermatch)	Date Sighted	Birth Year	Calf of	Sex	First Seen	Last Seen	# calves produced (inc. 0708)	Last Known Calving
	3157	10-Mar-08	2001	1157	F	2000	2006	0	-
	3157	27-Mar-08	2001	1157	F	2000	2006	0	-
	3157	14-Apr-08	2001	1157	F	2000	2006	0	-
	3230	6-Jan-08	2002	2040	F	2002	2006	0	-
	3260	14-Feb-08	U	U	F	2002	2007	U	U
	<b>3292 (MOM)</b>	<b>14-Dec-07</b>	<b>2002</b>	<b>1310</b>	<b>F</b>	<b>2002</b>	<b>2006</b>	<b>1</b>	<b>new mom</b>
	<b>3293 (MOM)</b>	<b>14-Dec-07</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>2002</b>	<b>2008</b>	<b>≥1</b>	<b>Unknown</b>
	<b>3293 (MOM)</b>	<b>20-Dec-07</b>	<b>U</b>	<b>U</b>	<b>F</b>	<b>2002</b>	<b>2008</b>	<b>≥1</b>	<b>Unknown</b>
*	3302	14-Feb-08	2003	1802	M	2003	2006	-	-
	3308	20-Feb-08	2003	1608	M	2003	2006	-	-
*	3308	29-Feb-08	2003	1608	M	2003	2006	-	-
	3314 "Yellowfin"	14-Dec-07	2003	2114	F	2002	2007	0	-
	poss 3323	24-Feb-08	2003	2123	M	2002	2006	-	-
	3346 "Kingfisher"	28-Feb-08	2003	1946	M	2003	2007	-	-
	poss 3380	24-Feb-08	U	U	U	2003	2007	U	U
	3405 "Fuse"	20-Dec-07	2004	1705	F	2003	2007	0	-
	poss 3420	29-Feb-08	2004	2460	F	2004	2007	0	-
	3513	8-Dec-07	2005	2413	F	2005	2006	0	-
	3513	14-Dec-07	2005	2413	F	2005	2006	0	-
	3550	20-Dec-07	2005	1145	U	2005	2007	U	U
	BK01PCCS2003	10-Mar-08	U	U	U	U	U	U	U
	BK01PCCS2003	27-Mar-08	U	U	U	U	U	U	U
	BK01PCCS2003	14-Apr-08	U	U	U	U	U	U	U
*	BK08SEUS08	16-Feb-08	U	U	U	U	U	U	U
	BK13SEUS08	24-Feb-08	U	U	U	U	U	U	U
	SE07BK16	13-Mar-08	U	U	U	U	U	U	U
	SE07BK16	13-Mar-08	U	U	U	U	U	U	U
	CT02BOF2004	24-Feb-08	U	U	U	U	U	U	U
	CT03SEUS08	14-Dec-07	U	U	U	U	U	U	U
	CT05SEUS08	14-Dec-07	U	U	U	U	U	U	U
	CT05SEUS08	20-Dec-07	U	U	U	U	U	U	U
	CT10SEUS08	24-Feb-08	U	U	U	U	U	U	U
	CT12SEUS08	24-Feb-08	U	U	U	U	U	U	U
	CT19SEUS08	11-Feb-08	U	U	U	U	U	U	U
	CT24SEUS08	28-Feb-08	U	U	U	U	U	U	U
*	CT35SEUS08	24-Feb-08	U	U	U	U	U	U	U
*	CT35SEUS08	29-Feb-08	U	U	U	U	U	U	U
*	CT36SEUS08	24-Feb-08	U	U	U	U	U	U	U

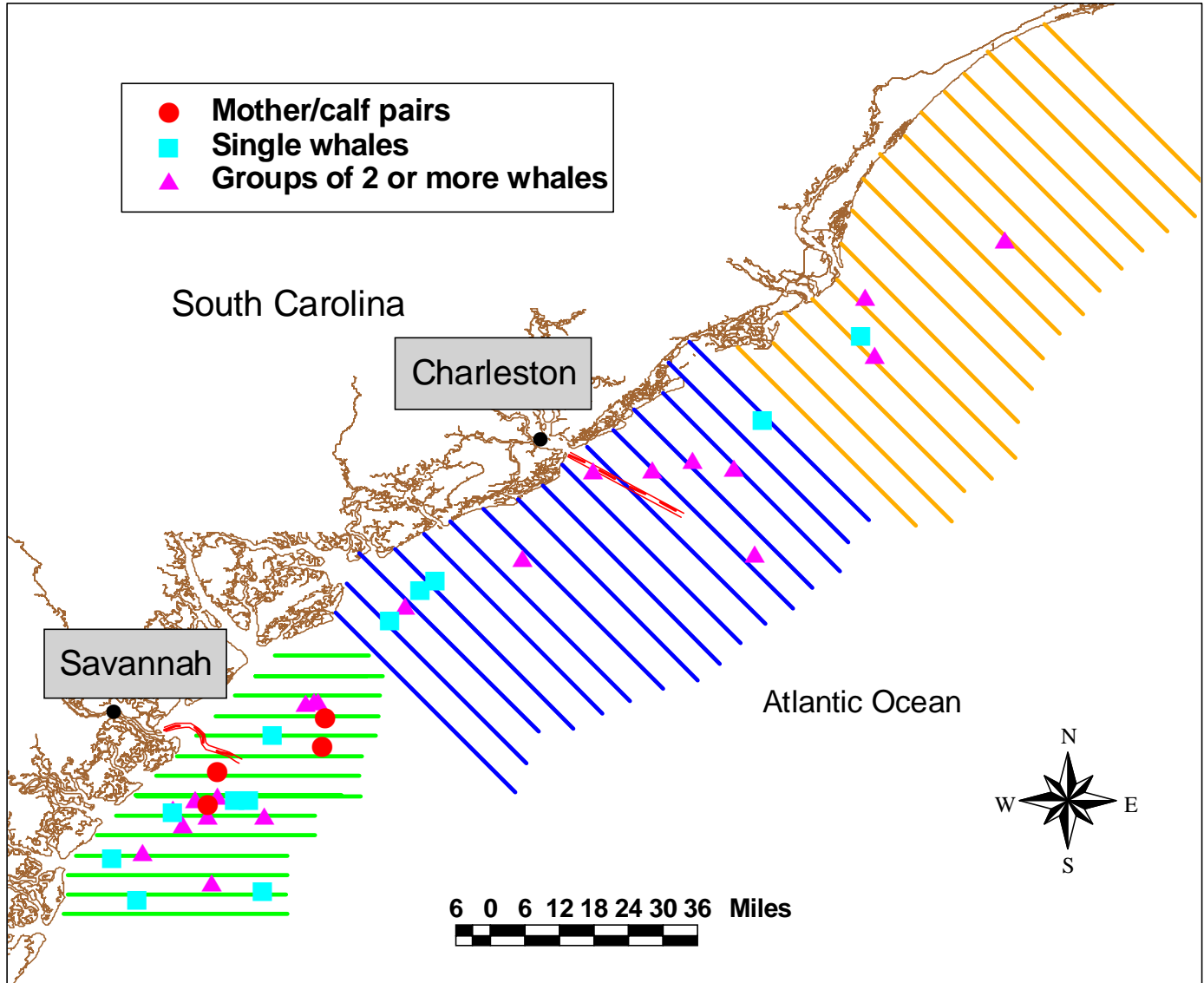


Figure 4. Right whale sightings by group type during the 2007/2008 SCGA right whale aerial surveys.

Sightings of note include eight individuals that were unique to the study area (based on preliminary analysis) and not sighted by other SEUS survey teams: EGNO 1632's calf, poss 2630, poss 2705, EGNO 3302, EGNO 3308, BK08SEUS08, CT35SEUS08, and CT36SEUS08. The sighting of EGNO 1632 and her calf on 06 April 2008 was especially important as this was the first sighting of the new calf this season (Figure 5). EGNO 1632 was first sighted on 07 February 2008 by the SCGA team and was last sighted without a calf on 11 March 2008 by the Northern Early Warning System (NEWS). EGNO 3260 is an animal that was previously

entangled and was thought to be gear free. The sighting on 14 February 2008 confirmed that EGNO 3260 was gear free. Other interesting sightings included two large groups dominated by older males that were seen in February and March (Figure 5). A group of 13 whales was observed on 24 February 2008 approximately 14nm from shore and included two males over 21 years of age and one male over the age of eleven. A group of nine whales was observed on 22 March 2008 approximately 18nm from shore and included four males over the age of 22 and three males over the age of twelve.

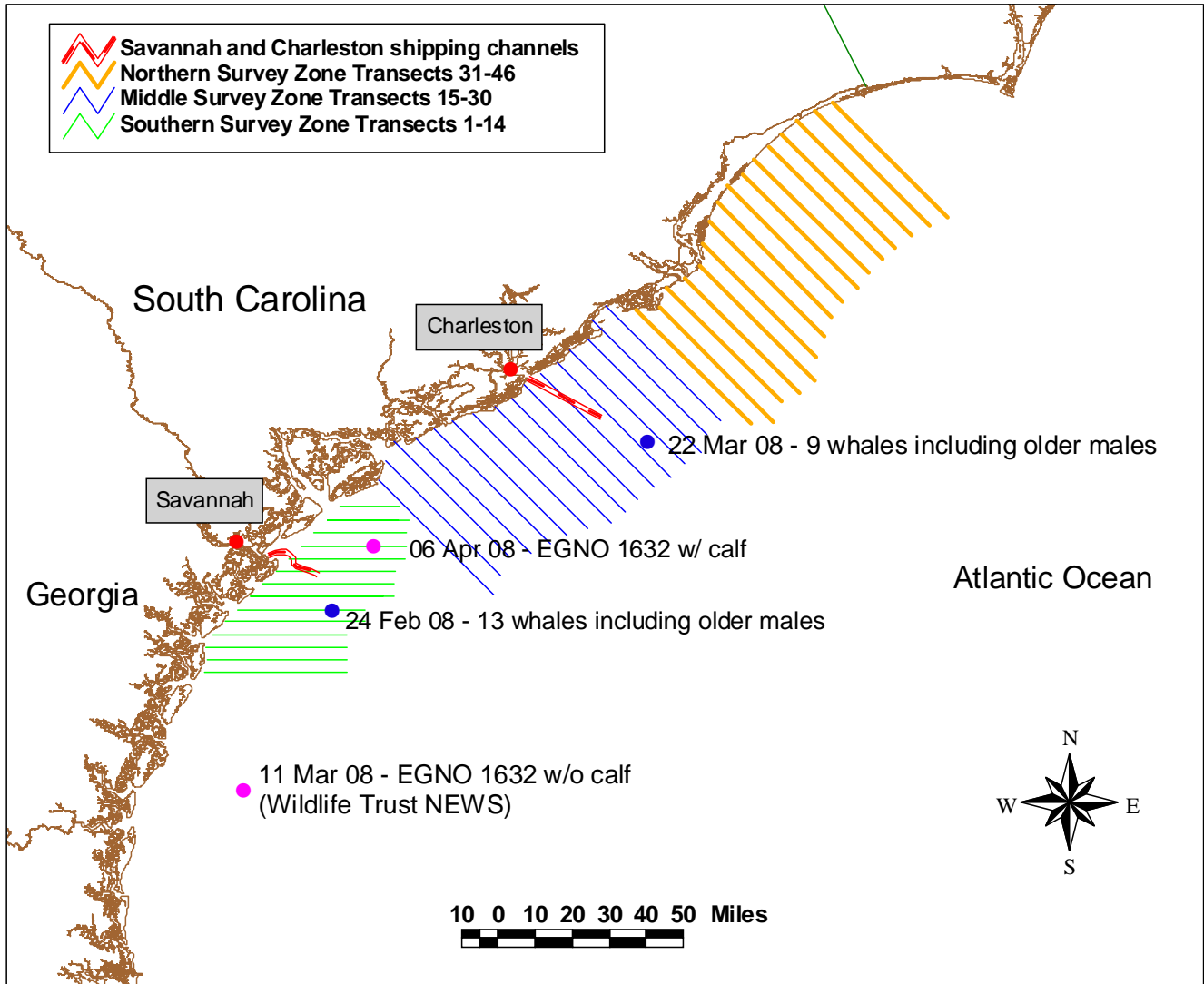


Figure 5. Sightings of interest during the SCGA 0708 survey season.

Geographic locations of the 37 SCGA right whale sightings are depicted by month in Figure 6. During the 2007/2008 season, 37.6% of the right whale sightings occurred in December and January and 57.6% of the whale sightings occurred in February and March (Figures 5 and 6).

This result is similar to the 2006/2007 season but is in contrast to the 2005/2006 and 2004/2005 seasons in which the sightings were less evenly distributed temporally. During the 2006/2007 SCGA surveys 47% of the right whale sightings occurred in December and January and 47% of the whale sightings occurred in February and March. During the 2005/2006 SCGA surveys, 72% of all sightings occurred during February and March. During the 2004/2005 SCGA surveys, 88% of all sightings occurred during December and January. The 2007/2008 season was the first season to have sightings in the month of April which accounts for 4.7% of the right whale sightings. The average number of whales per sighting was greatest in December, with 41% of all whales seen during the season documented in December. February had the next highest amount of whales sighted at 30% of all whales documented (Figure 7).

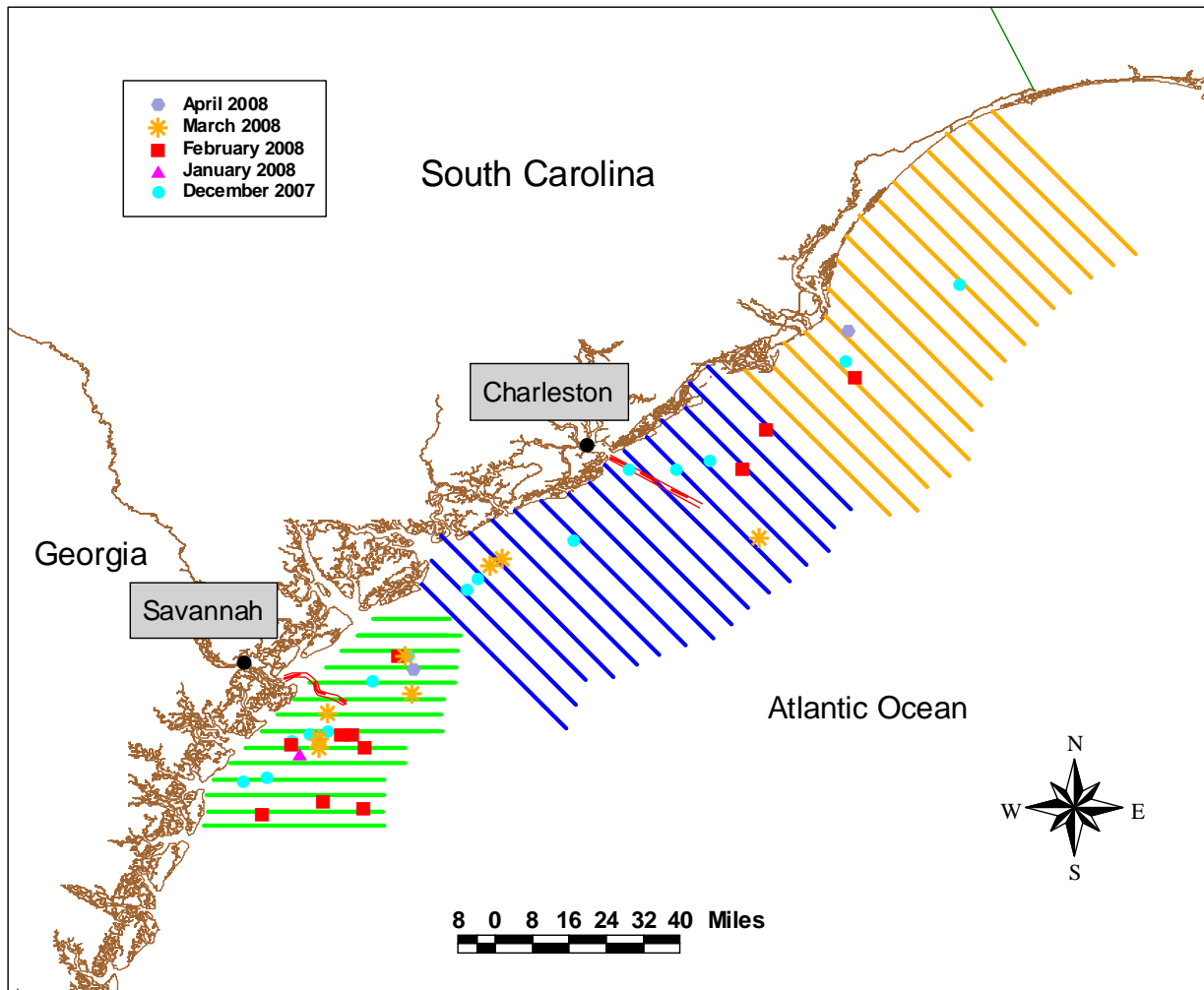


Figure 6. Right whale sightings by month during the 2007/2008 SCGA right whale aerial surveys.

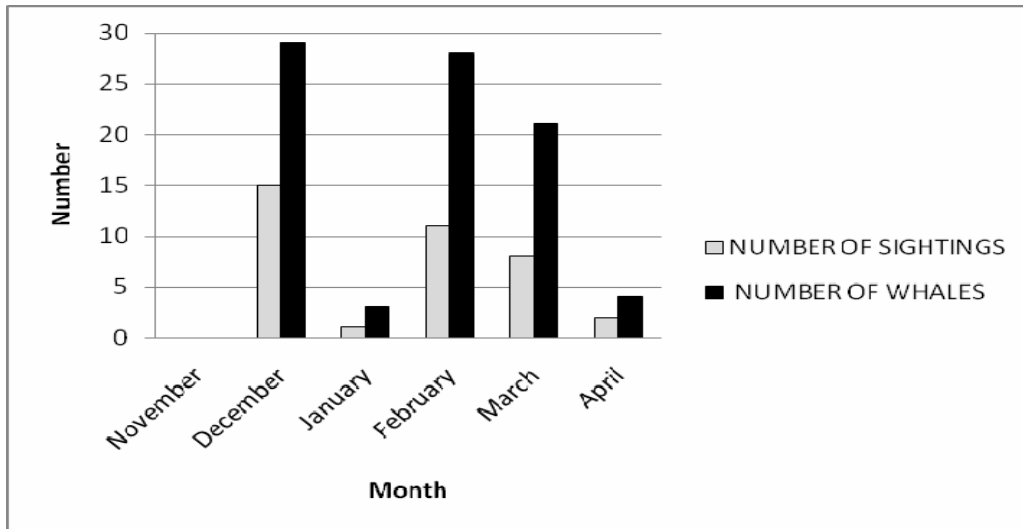


Figure 7. Number of sightings and right whales by month during the 2007/2008 SCGA right whale aerial surveys.

### Discussion and Recommendations

The calving ground off the SEUS is an extremely important area for reproduction in the North Atlantic right whale. In addition, this area is vital to military and commercial interests. Three major shipping routes pass through the designated critical habitat, and provide a constant threat to the slow-moving right whale, particularly females with calves. Three additional shipping routes are located to the north and south of the critical habitat boundary. The Early Warning System and associated aerial surveys, communication system, and other components have likely decreased the risk of ship strikes to whales while in this critical habitat. However, until recently very little had been documented about right whale distribution north of these historical survey areas. The coast of South Carolina had been surveyed sporadically in the late 1990s through early 2000s, and the northern coast of Georgia had been surveyed at various effort levels through the 1990s to 2003. Since 2004, consistent survey effort off South Carolina and northern Georgia throughout the migration and calving season has provided valuable additional sightings and increased warnings to mariners. In comparison to the EWS survey areas, the number of right whales sighted in the SCGA area this season (61) was low. However, survey effort expended in the region was lower due to a greater amount of area to cover, and the numbers were higher than expected in a region that is traditionally not considered a residency area for right whales. A complete sightings per unit of effort (SPUE) analysis throughout the SEUS and mid-Atlantic region would be useful in comparing distribution of right whales during winter months.

The boundary of the current critical habitat was designated in 1994 by NMFS based on the best available scientific data at the time. Fourteen additional years of spatial and temporal distribution data now exist, which will provide a more accurate picture of right whale distribution in the southeast and mid-Atlantic. The data from these surveys will provide valuable information regarding the most appropriate boundaries for critical management designations that will protect features essential to the conservation of the species. Additionally, distribution data in this region

will assist with other management actions that may be implemented in the future, such as ship reporting systems, speed zones, or routing. This study is also serving as an aid to research being conducted by NMFS to test passive acoustic monitoring devices. Our survey data will be available to groundtruth right whale calls collected remotely.

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, and observer fatigue. 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 (NMFS 2007).

### **Acknowledgements**

Funding was provided by the National Oceanic and Atmospheric Administration, Contract No. WC133F06CN0251 and the South Carolina State Port Authority. Research was conducted under permit No. 594-1759-00 issued to the Georgia Department of Natural Resources. We would like to thank our observers, Lauren Beddia and Michelle Schatz, and the Orion Aviation pilots, Frank Dugas and Andrew Haueisen, for their enthusiasm, consistent professionalism and maintaining a safe and productive working environment. Barb Zoodsma, NMFS Southeast Region, provided support and assistance which was greatly appreciated. We thank the Wildlife Trust Northern Early Warning System team, the NEA survey team, and the Florida Fish and Wildlife Conservation Commission survey team for their collaboration and support.

### **References**

- Kraus, S.D., M.W. Brown, H. Caswell, C.W. Clark, M. Fujiwara, P.K. Hamilton, R.D. Kenney, A.R. Knowlton, S. Landry, C.A. Mayo, W.A. McLellan, M.J. Moore, D.P. Nowacek, D.A. Pabst, A.J. Read, R.M. Rolland. 2005. North Atlantic Right Whales in Crisis. *Science* 309(5734):561-562.
- Kraus, S.D. and J.J. Hatch. 2001. Mating Strategies in North Atlantic Right Whales. Pp. 237-244. *Journal of Cetacean Research and Management: Special Issue 2*.
- Kraus, S.D., K.E. Moore, C.A. Price, M.J. Crone, W.A. Watkins, H.E. Winn and J.H. Prescott. 1986. The use of photographs to identify individual North Atlantic right whales (*Eubalaena glacialis*). Pp. 145-151. In: R.L. Brownell, P.B. Best and J.H. Prescott (eds.) *Right Whales: Past and Present Status*, Special Issue 10. International Whaling Commission, Cambridge, England. 289pp.



National Marine Fisheries Service. 2007. Northern Right Whale (*Eubalaena glacialis*): Western Atlantic Stock. Marine Mammal Protection Act Stock Assessment Report.9pp.

Payne, R., O. Brazier, E.M. Dorsey, J.S. Perkins, V.J. Roundtree and A. Titus. 1983. External features in southern right whales (*Eubalaena australis*) and their use in identifying individuals, pp. 371-445. In: R. Payne (ed) Communication and Behavior of Whales. Westview Press, Boulder, CO.

Taylor, C.R. and W.B. Brooks Jr. 2002. Dissemination of northern right whale (*Eubalaena glacialis*) sighting information to the Southeast U.S. maritime community. Marine Technology Society Journal 36(2):58-60.