

**Aerial Survey and Field Observations of
North Atlantic Right Whales (*Eubalaena glacialis*)
off The Florida East Coast**

December 2004 – March 2005
Final Report

Submitted February 2006



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INTRODUCTION

The North Atlantic right whale is one of the most endangered large whales in the world with a population estimate of 300 individuals (NMFS 2005). The North Atlantic right whale is listed as "endangered" under the Endangered Species Act of 1973 (ESA) and as an Appendix I species under the Convention for the International Trade in Endangered Species. Protection is afforded to this species in U.S. and territorial waters under the Marine Mammal Protection Act of 1972 and the ESA (NMFS 2005). While inhabiting Florida waters, protection is offered through the Florida Endangered and Threatened Species Act. In addition, the Southeast U.S. Right Whale Recovery Plan Implementation Team (SEIT) was developed in 1993 as an advisory group to aid efforts to protect, manage, and research right whales in the southeastern U.S. calving area. The Florida Fish and Wildlife Conservation Commission (FWC) has participated as a member of the SEIT since its inception.

The Georgia Bight along the Atlantic coastal waters of Georgia and Florida is the only known calving area of the North Atlantic right whale (Kraus *et al.* 1993). This area was deemed essential to the future survival of the species and designated as the Southeast U.S. (SEUS) Critical Habitat by the National Marine Fisheries Service (NMFS) in 1994. The SEUS Critical Habitat encompasses the waters from 31° 15'N to 30° 15'N from the shoreline out to 15 nm, and the waters between 30° 15'N and 28° 00'N from the shoreline out to five nm (50 CFR Part 226).

The FWC's Fish and Wildlife Research Institute (FWRI) staff has been conducting aerial surveys within the SEUS Critical Habitat with varied coverage and effort since the late 1980's. Later surveys were part of the Early Warning System (EWS) used to detect and report the presence of right whales in Florida waters (Thomas and Ciano 1999; Ciano and Thomas 2001). The 2004-2005 right whale calving season was the thirteenth season during which aerial surveys were conducted by the FWC-FWRI (Brooks *et al.* 1993; Brooks 1994; Brooks 1995; Brooks and Thomas 1996; Thomas and Brooks 1997; Thomas 1998; Thomas and Ciano 1999; Thomas and Ciano 2000; Ciano and Thomas 2001; Smith and Windham-Reid 2002; Windham-Reid and Smith 2003, Windham-Reid and Smith 2004, FWC 2005) as part of this effort. Funding was made available for the 2004-2005 calving season that enabled FWRI to contribute to the EWS surveys on a daily basis (weather dependent) within a dedicated survey area (Figure 1).

These surveys directly contribute to the first objective of the Recovery Plan for the North Atlantic Right Whale (NMFS 2005): "reduce ship collisions with right whales" by disseminating sighting information to all mariners within the calving region via the U.S. Navy, U.S. Coast Guard, harbor pilot associations and port authorities. Ancillary to the EWS, FWRI photo-documents whales and provides support in cases of entangled or injured whales.

Conducting aerial surveys in the SEUS and disseminating whale location information to mariners remains the best available method for reducing the likelihood of vessel/whale collisions. The aim of this report is to present findings from aerial survey and field observations during the 2004-2005 calving season. These surveys were funded primarily by the National Marine Fisheries Service with support from the Florida Fish and Wildlife Conservation Commission.

METHODS

Aerial Surveys

The 2004-2005 FWRI EWS aerial surveys, designated as Florida Warning System (FWS) on the EWS pager system, began December 1, 2004 and were completed on March 31, 2005. The Florida Warning System flights cover the southern portion of the Southeast U.S. critical habitat. Flight effort increased for FWRI from the previous season (2003-2004) because of increased funding and the addition of new survey lines in 2004/2005.

Two main survey configurations, known as the primary and coastal surveys, or combinations of the two were flown during the 2004-2005 calving season (Figure 1). The primary survey comprised 10 east/west lines. The configuration of the primary survey remained the same as that of the previous (2003-2004) season. The FWRI primary team surveyed the southern section of the SEUS critical habitat from Ponte Vedra Beach (30°14'N) to North Crescent Beach (29°47.0) from approximately 0.5 nm east of the shoreline (east/west) out to 080°47'W. Each completed primary survey has a total length of 335.4nm (including transits) with 281.4nm of track lines.

The aerial extent of the coastal survey was augmented from the previous season with the addition of six east/west lines flown off Port Canaveral in conjunction with the

customary north/south coastal tracks. The coastal survey flew two lines parallel to the shoreline at distances approximately one nautical mile and three nautical miles, extending from Crescent Beach (29°47'N) to as far south as Valkaria (27°57'N). The 6 east/west lines off of Port Canaveral started at 0.5 nm from the shoreline and extended out to 80°05'W. North/south track line on the coastal survey is 120nm each way. The 6 track lines off Port Canaveral totaled 159.4nm. Therefore, each completed coastal flight was 399.4 nm from Crescent Beach to Valkaria. The survey waypoints at the eastern and western ends of each track line are listed in Table 1.

The primary survey was scheduled to be flown every good weather day. The coastal survey was flown up to 4 days per week on the best weather days. Survey protocols are outlined in Scott and Gilbert (1982) for the Cetacean and Turtle Assessment Program (CeTAP 1982). Survey personnel included a pilot and a co-pilot. One observer on each side of the aircraft visually scanned out to approximately 2nm. Typically the observer in the left rear seat of the aircraft also recorded the data. Observations of all large whales, environmental conditions, marine debris, and vessel activity (of vessels 300 ft or larger) were recorded in a computer-based data logging program with locations, headings and altitudes being recorded automatically from the platform's Global Positioning System (GPS) every thirty seconds, or recorded by hand and entered into an Excel table when necessary.

Surveys were flown under visual flight rules (VFR) conditions. Environmental conditions necessary to conduct a survey included visibility greater than 2nm, winds less than 17kts, and a minimum ceiling of 366m over the survey area. The aircraft flew at an altitude of 305m with a ground speed of 100kts. The survey platform was a twin engine Cessna 337 equipped with a yoke mounted GPS unit. Additionally, the aircraft was equipped with two aviation very high frequency (VHF) radios and one VHF handheld marine radio, one Mini B emergency position indicator radio beacon (EPIRB), flares, and an inflatable life raft. Each observer onboard wore a Nomex flight suit and a personal flotation device (PFD) equipped with a safety knife, signaling mirror, high-pitch safety whistle, strobe light, streamer, and a GPS-linked emergency position indicator radio beacon (G-EPIRB).

Photo-identification

Individual right whales can be identified by the callosity patterns located on the top of the head between the tip of the rostrum and the blowhole (Payne *et al.* 1983; Kraus *et al.* 1986). Secondly, scars provide useful information for individual recognition. FWRI aerial survey teams contributed to the identification of individual whales by photo-documentation of whales. Photographs along with sighting data were provided to the New England Aquarium for inclusion in the North Atlantic right whale photo-identification catalogue – the central repository for archiving and maintaining images and data on individual whales. Photo-identification data are important for documenting population parameters, such as reproduction and survival, as well as distribution and movements.

During the 2004-2005 season, primary survey photographs were taken with a Canon EOS D20 Digital SLR camera equipped with a Canon Image Stabilizer Ultrasonic 100-400mm (f/4.5-5.6) lens. Photographs were taken with a Canon EOS D60 Digital SLR camera equipped with a Canon Image Stabilizer Ultrasonic fixed 300mm (f/4.0)-lens for the coastal surveys. The use of a digital format camera allowed for expeditious image review in the aircraft and for rapid whale identification utilizing image-downloading programs. This process allowed researchers to efficiently and rapidly document the individuals encountered and easily share image files with other survey teams during the calving season.

Both survey teams had SLR cameras for backup in case of failure by digital cameras. The primary survey team had a Canon EOS Digital Rebel SLR camera as a back up camera. A Canon EOS3 SLR camera using ASA Kodak Gold print film was reserved, though never utilized, as a back up camera for the coastal survey. Both back up cameras were equipped with Canon Image Stabilizer Ultrasonic fixed 300mm (f/4.0)-lenses.

The right side observer photographed the animals through the opened right front or rear window of the plane. High priority was given to getting a photograph of the whale(s) head-on, whenever feasible, to capture a full set of callosities. Body shots are also included to capture scar patterns and other information that could contribute to individual identification.

“Close Call” Documentation

All Early Warning System cooperators were required to record information on whales observed in close proximity to vessels. Information recorded included date, location, time, vessel type, headings, and any reactions of whales or vessels. These reports, known as “close call” reports, were forwarded to FWRI where they were entered into a database and mapped.

Biopsy Sample Collection

FWRI staff conducted cruises to collect biopsy samples from right whales as part of a multi-agency effort for right whale genetic and health analyses (under Permit No. 633-1483-03). Ideally, biopsy samples should contain both skin and blubber. Skin samples provide information on kinship, mating system, individual gender and identification, stock identity, and genetic variability within the population. Blubber samples offer insight into contaminant levels and potentially feeding ecology and nutritional condition. Biopsy cruises were coordinated with the aerial teams, who relayed the identity and location of targeted whales to the biopsy team. Samples were collected using a crossbow and biopsy darts. Samples were then packaged and sent to the New England Aquarium where they are grouped with samples from other researchers and forwarded to Trent University for analysis.

RESULTS

Aerial Surveys

The FWRI aerial survey team conducted 79 aerial surveys in the primary (southern EWS) survey area from December 1, 2004 to March 31, 2005 and 31 aerial surveys in the coastal survey area from January 1, 2005 to March 31, 2005 excluding February 1, 2005 through February 18, 2005 when the aircraft was grounded for engine repairs. Survey dates and the ranges flown on each survey are listed in Table 2.

Eleven primary and eight coastal survey flights were shortened for weather-related reasons, including low cloud ceiling, high winds, fog, haze, thunderstorms, or heavy rain. In addition, three primary surveys were shortened because of equipment problems, including engine and landing gear problems. Two primary surveys were not completed because of flight restrictions associated with security for the Superbowl in

Jacksonville. Another primary survey was shortened because the team was diverted to assist with an entangled whale. One coastal flight was redirected to GA to assist with location of a dead whale and another coastal survey was shortened because of a rocket launch. The primary survey was completed on 58 days and partially flown on 21 days, for a total flight time of 340.8 hours. The coastal survey was flown completely on 17 days and partially on an additional 14 days, for a total flight time of 142 hours.

The FWRI primary survey team sighted its first right whale of the season on December 8, 2004 and its last whale on March 19, 2005. The coastal survey sighted its first whale on January 12, 2005 and its last whale on March 19, 2005. FWRI also verified a sighting of a mom/calf pair, with the aide of FWC-LE, on April 19, 2005. This pair had not been previously documented during this calving season. The primary survey team sighted 119 groups of right whales comprising 433 sightings. The coastal survey team sighted 37 groups of right whales comprising 79 sightings. Including the ancillary flight on April 19, 2005, a total of 157 groups of right whales comprising 514 sightings were observed for the entire season. Right whales were sighted on 42 different days during the primary survey and 13 days during the coastal survey. A breakdown of the dates, locations, and whales sighted is listed in Table 3.

Photo-identification

FWRI observers compared photographs taken during the aerial surveys with the Catalog of Identified Right Whales from the Western North Atlantic. At the completion of the season photographs were submitted to the New England Aquarium for final analysis. Preliminary results from the New England Aquarium showed that there were 28 mom/calf pairs, 41 other identified individuals (not mom/calf pairs), and at least 12 unidentified individuals sighted in the SEUS during the 2004-05 season. Of the 41 identified non-mom/calf individuals, 18 were male, 13 were female, and 10 were of unknown sex. Many of the 12 unidentified individuals were thought by the New England Aquarium to be yearlings or juveniles. At the time of this report, a total of 109 individual whales, including 28 calves, were known to have been sighted in the SEUS during the 2004-05 season (Table 4).

“Close Call” Documentation

FWRI received 27 “close call” reports during the 2004-2005 season (Table 5). Ten reports noted an apparent behavioral/directional change by the whale. In eight of ten reports, the whale(s) dove as the vessel approached at distances ranging from under 20 m to greater than 500 m. In several cases, observers noted that dives corresponding to an approaching vessel lasted longer than earlier dives or dives after the boat had passed. At least one diving response involved a mother and calf, and two cases involved SAGs. Two of the ten reports involved evasive behaviors; both involved SAGs. In one case, the vessel followed the SAG. In only two close-call incidents were pec and/or fluke slapping, and breaching exhibited; one incident involved a shrimp boat and the other involved a tug and barge. In the close-call with the shrimp boat, the mother began pec/fluke slapping and breaching when she became separated from her calf, although her behavior continued after her calf returned but ended when the vessel changed direction away from the whales. In the other instance, the whale pec slapped and breached when an approaching tug/barge was at a distance between 500 and 2000 m. In a similar incident involving a tug/barge at the same approximate distance, a right whale exhibited no obvious response to the approach. The furthest distance at which a whale exhibited a change in behavior that appeared to be in response to an approaching vessel was greater than 2000 m. In many instances (17), however, neither large nor small vessels induced any visible change in whale behavior, even when approaching the whales closely (as within 20 m).

The type of boat may impact whether whale(s) respond to an oncoming vessel. The whales did not respond to any approaching kayak (5 instances). Whales responded only 3 of 13 times when a recreation boat approached, and in two of these three, the boat approach was extremely close (< 20 m) when the whale reacted. In only 2 of 8 approaches by sport fishers did whales respond. In both instances the boats were close prior to whale reaction (< 20 and <100 m), however, sport fishers approached closely on several other occasions without evoking any response from the whales. The whales seemed to show greater inclination to respond to shrimp boats (3 of 7 times) and tug and barge (1 of 2), even when they were not particularly close to the whales. Whales responded to the only approach by a yacht. Although sizes of boats were not always recorded, larger boats seemed to evoke responses more often and at greater distances than

smaller boats, although data would need to be collected to greater detail to verify these results.

Biopsy Sample Collection

FWRI staff conducted five right whale biopsy cruises during the 2004-2005 season (Table 6). Three of the cruises targeted mom/calf pairs and two targeted surface active groups (SAG). The cruises resulted in the collection of 2 biopsy samples; one sample from the calf of EG# 1140 and the other from entangled whale EG# 3210. A biopsy sample was also obtained from EG# 3314 "Yellowfin" for the purpose of health assessment during disentanglement efforts.

Other Events

Several unusual right whale occurrences were documented during the 2004-2005 season and are detailed here in chronological order.

- Three entangled right whales were sighted in the calving grounds this season. FWC staff working in collaboration with other agencies and organizations including NOAA Fisheries, the Georgia Department of Natural Resources, and the Center for Coastal Studies, participated in the successful disentanglement of one of the entangled whales, named "Yellowfin" for the U.S. Coast Guard cutter crew that provided essential assistance. The right whale team also provided photo-documentation of the other two entangled whales for use in disentanglement action plans. "Kingfisher," an entangled right whale spotted off Florida last season, was sighted again and appeared to be in relatively good condition, although still entangled.
- Staff assisted with the landing and necropsy of the carcass of a 14-year-old pregnant right whale found off of Georgia on January 15, 2005. Her death was preliminarily attributed to an infection from ship strike wounds incurred as a calf in 1991 in the SEUS calving ground. Having survived the ship strike in 1991, the female whale had been named "Lucky," only

later to succumb to complications believed to be brought on from these once healed wounds that were compromised as her body expanded with her first reported pregnancy.

- On February 8, 2005 EG# 2645 was sighted with a calf by the FWRI primary survey team. However, the same mom was sighted again without her calf on February 12, 2005 by the primary survey team. A dead calf was never sighted or stranded, but the calf was apparently lost.
- On April 19, 2005 a mom/calf pair was reported off Jacksonville Beach. With FWC-LE support, observer Katie Jackson went to verify the sighting in an FWC Cessna 172. The mom/calf pair was located at 30°20.65N and 81°22.77W and they were heading north. The mom was later identified as EG# 3010 and its calf was the 28th calf of the season.

SUMMARY and RECOMMENDATIONS

FWRI survey teams for the 2004-2005 season saw a greater number of groups and number of whales than the 2003-2004 season. The number of groups for 2004-2005 was a little over twice that of the previous season, while the total whale sightings was greater than 4 times that of the previous season. This indicates that average group size was likely increased over the previous season. The number of recognizable individuals (both identified and unidentified in the photo-identification catalog) that were seen last season totaled approximately 29 (unverified figures) whereas the current season included approximately 41 individuals. There were a greater number of calves this season (28) over the previous season (16 calves in 2003-2004) as well. If this figure is verified, that would indicate that individuals were re-sighted a greater number of times in the 2004-2005 season.

The series of unusual events which occurred during the season and the collaborative approach to responding to them highlight and reinforce the value of a response network. Three of the events took place outside of the EWS survey region and one of these events occurred after the survey season ended when most of the observers had left the area. In these cases, the established network in the state of Florida including

FWC-LE and FWRI allowed for rapid response, alerts, documentation, and resolution of these events. The relationship between stranding response teams and right whale conservation programs should be supported and strengthened. Right whale-specific training and equipment for network responders in areas such as necropsy, live stranding response, disentanglement, and photography should be implemented.

The FWRI aerial team continued to observe instances of harassment by small vessels. Again this season, small recreational vessels were observed altering the behavior of a cow/calf pair within the critical habitat. With the steady growth along Florida's east coast and the increase in the number of boat registrations, it is likely that whale/vessel interactions will continue to be a management concern.

With the increased number of aerial surveys, safety guidelines for aerial surveys should be continually reviewed and modified to reflect upgraded research methods due to changing technology. The evaluation of safety protocols should include assessments of the durability and longevity of safety equipment. This assessment would allow for the development of replacement cycles for worn or obsolete equipment. Regular exchange between management and experienced right whale aerial biologists participating in the monitoring effort will help to facilitate and fine-tune these processes.

ACKNOWLEDGEMENTS

The National Marine Fisheries Service and the Florida Fish and Wildlife Conservation Commission funded this work. Special thanks go to: the staff members of the U.S. Navy FACSFAC Jacksonville office, without whom the EWS pager system would not be functional, the staff of the U.S. Coast Guard District 7 NAVTEX office, the staff of the U.S. Coast Guard Group Mayport, the Florida and Georgia Port Authorities and Harbor Pilot Associations; Georgia Department of Natural Resources, the Wildlife Trust aerial team, the New England Aquarium staff, the Marine Resources Council, and Orion Aviation, including Ed Coffman, Billy Foster and Andy Gamache. FWRI's René Baumstark, Elsa Haubold, Chérie Keller, Katie Jackson, Julie Mikolajczyk, Tom Pitchford, Jamison Smith, Leslie Ward, and Alicia Windham-Reid contributed to this report. Special gratitude is expressed to the FWRI survey team members: Kat Frisch Allison Griffin, Katie Jackson, Dianna Schulte, Alicia Windham-Reid, and Tracy Wurth.

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Figure 1.

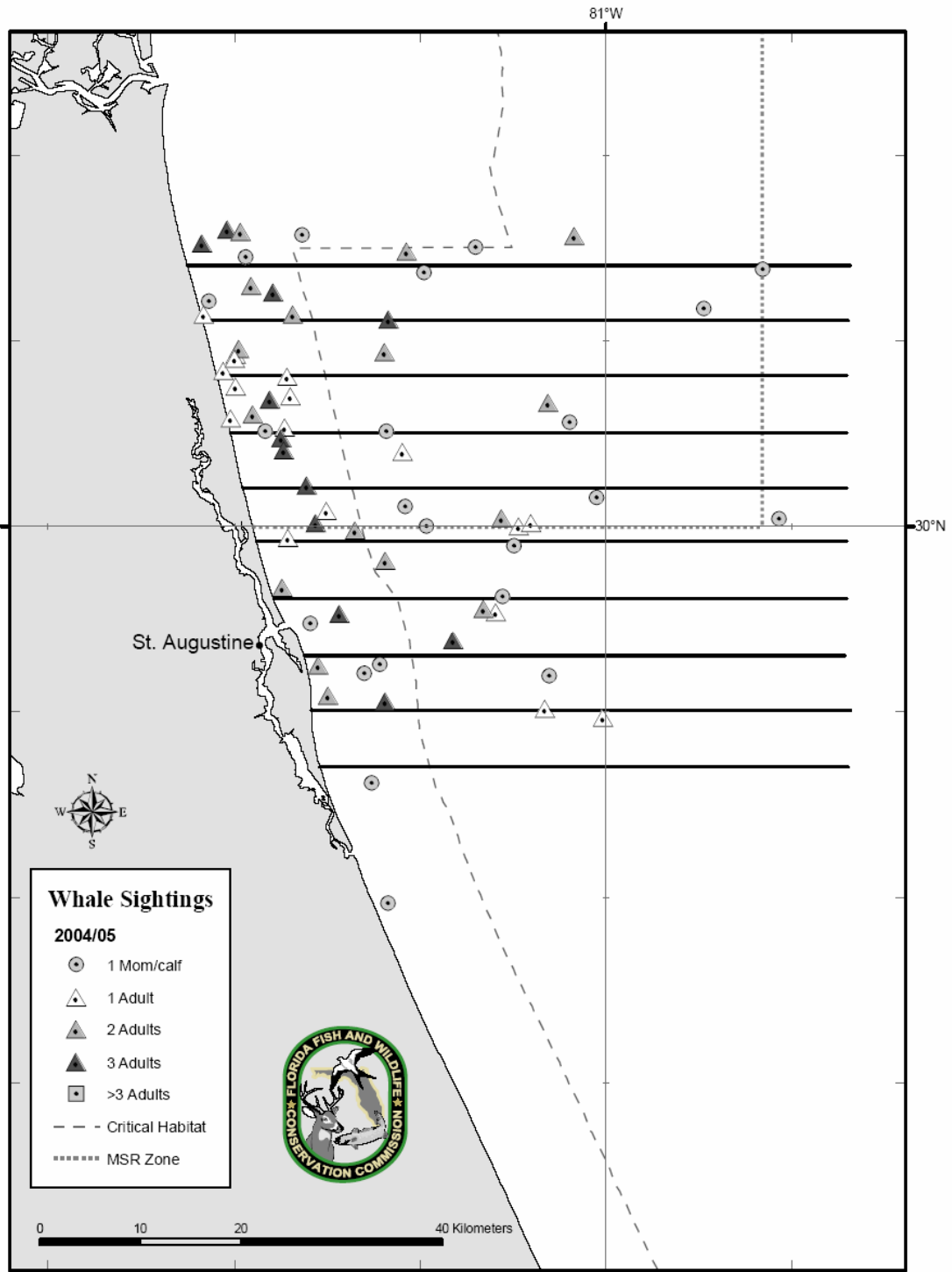


Figure 1. (continued)

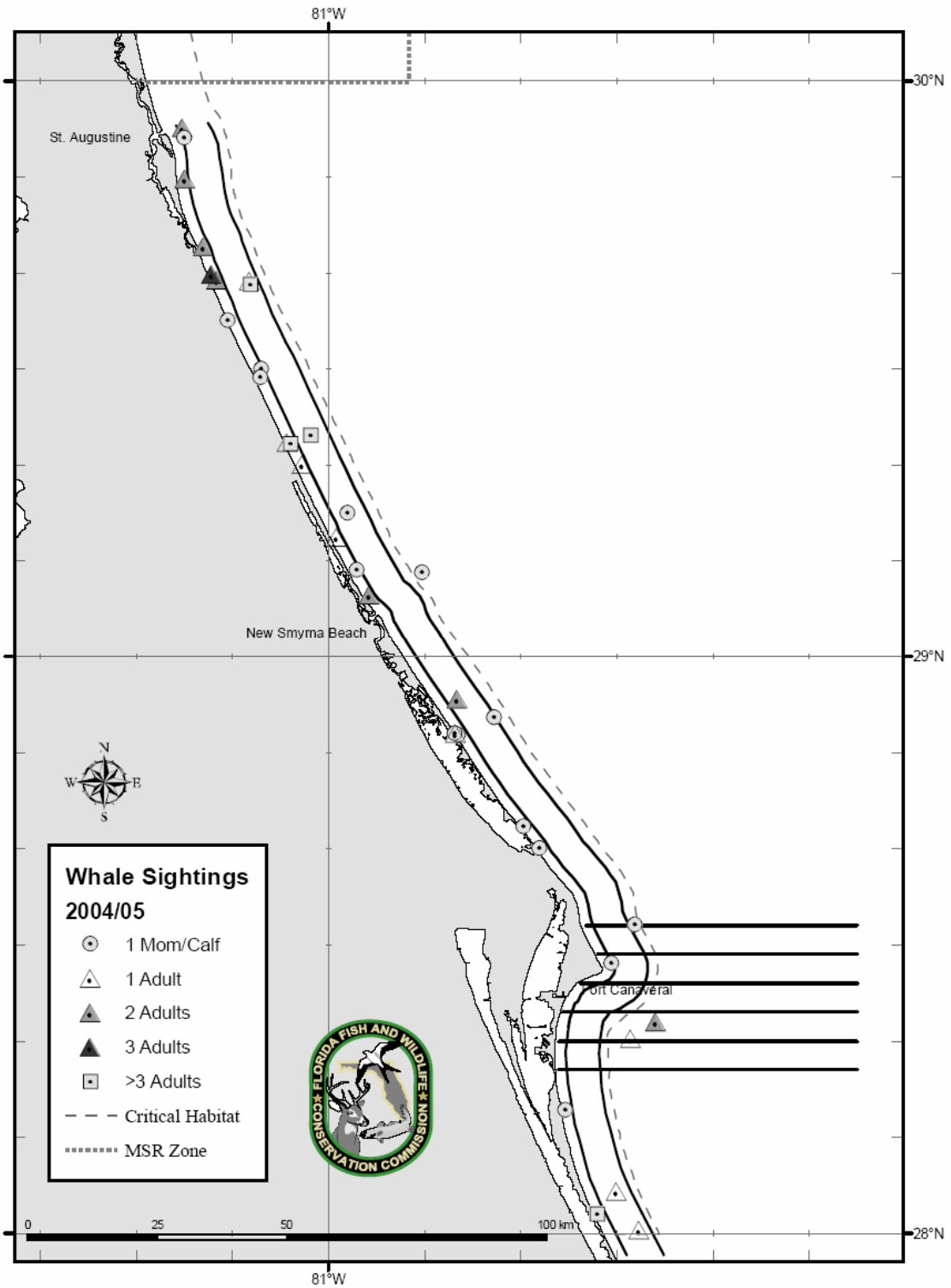


Table 1. Survey waypoints.

Primary Survey

Line	Latitude	Longitude
1	30° 14.0	From 0.5 nm out to 80°47.0
2	30° 11.0	From 0.5 nm out to 80°47.0
3	30° 08.0	From 0.5 nm out to 80°47.0
4	30° 05.0	From 0.5 nm out to 80°47.0
5	30° 02.0	From 0.5 nm out to 80°47.0
6	29° 59.0	From 0.5 nm out to 80°47.0
7	29° 56.0	From 0.5 nm out to 80°47.0
8	29° 53.0	From 0.5 nm out to 80°47.0
9	29° 50.0	From 0.5 nm out to 80°47.0
10	29° 47.0	From 0.5 nm out to 80°47.0

Coastal Survey

Line	Latitude	Longitude
1	28° 32.0	From 0.5 nm out to 80°05.0
2	28° 29.0	From 0.5 nm out to 80°05.0
3	28° 26.0	From 0.5 nm out to 80°05.0
4	28° 23.0	From 0.5 nm out to 80°05.0
5	28° 20.0	From 0.5 nm out to 80°05.0
6	28° 17.0	From 0.5 nm out to 80°05.0

Table 2. List of 2004-2005 survey dates and ranges flown.

Primary Surveys					
Date	Survey Type	Miles	Comments	Full	Part
12/1/2004	8 E/W lines	224.2			1
12/2/2004	10 E/W lines	281.4		1	
12/3/2004	10 E/W lines	281.4		1	
12/4/2004	?			1	
12/5/2004	10 E/W lines	281.4		1	
12/6/2004	10 E/W lines	281.4		1	
12/7/2004	10 E/W lines	281.4	Late take off due to weather	1	
12/8/2004	10 E/W lines	281.4		1	
12/9/2004	10 E/W lines	281.4		1	
12/12/2004	10 E/W lines	281.4	Late take off due to weather	1	
12/17/2004	10 E/W lines	281.4		1	
12/18/2004	10 E/W lines	281.4		1	
12/19/2004			High Beaufort	1	
12/21/2004			Covered 4 NEAq lines while they responded to entanglement	1	
12/22/2004	10 E/W lines	281.4		1	
12/24/2004	6 E/W lines	177.8	Reduced altitude to 800-900ft due to low ceiling offshore		1
12/27/2004	10 E/W lines	281.4		1	
12/28/2004	10 E/W lines	281.4		1	
12/29/2004	10 E/W lines	281.4		1	
12/30/2004	?			1	
12/31/2004	?			1	
1/1/2005	10 E/W lines	281.4	Close call with 3 shrimp boats	1	
1/2/2005	10 E/W lines	281.4		1	
1/3/2005	10 E/W lines	281.4	Close call with shrimp boat	1	
1/4/2005	10 E/W lines	281.4	Delayed takeoff due to GPS problems	1	
1/5/2005	10 E/W lines	281.4		1	
1/6/2005	10 E/W lines	281.4		1	
1/7/2005	10 E/W lines	281.4		1	
1/8/2005	10 E/W lines	281.4		1	
1/9/2005	10 E/W lines	281.4		1	

Table 2. continued

Date	Survey Type	Miles	Comments	Full	Part
1/10/2005	3.5 E/W lines	103.6	Foggy and hazy		1
1/11/2005	10 E/W lines	281.4		1	
1/12/2005	10 E/W lines	281.4		1	
1/13/2005	6	117.8nmi	Ended survey due to high winds		1
1/19/2005	10 E/W lines	281.4		1	
1/20/2005	10 E/W lines	281.4	Delayed take off due to winds	1	
1/21/2005	10 E/W lines	281.4	Delayed takeoff due to high winds	1	
1/24/2005	10 E/W lines	281.4		1	
1/25/2005	10 E/W lines	281.4		1	
1/26/2005	10 E/W lines	281.4		1	
1/27/2005	?	204.8nmi	partial survey due to weather		1
1/30/2005	<1 E/W line	16.5nmi	partial survey due to weather		1
1/31/2005	0 E/W lines	0.0	Survey aborted after take off due to engine problems		1
2/1/2005	0 E/W lines	0.0	Survey aborted after take off due to engine problems		
2/6/2005	8.5 E/W lines	234.7	Survey ended early due to time constraint (closed air for superbowl)		1
2/7/2005	8 aberrant E/W lines	294.6nmi	lines modified due to Superbowl cruise ship traffic.		1
2/8/2005	10 E/W lines	281.4		1	
2/9/2005	8 E/W lines and Coastal	320.9nmi	covered coastal survey to Melbourne		1
2/12/2005	10 E/W lines	281.4nmi?	Some computer problems	1	
2/13/2005	10 E/W lines	281.4		1	
2/14/2005	?	?			1
2/15/2005	8 E/W lines	228.9nmi			1
2/16/2005	4 E/W lines	120.6?	Delayed take off due to engine problems		1
2/17/2005	<1 E/W line	14.8	survey aborted due to landing gear problems		1
2/18/2005	2 E/W lines	70.5?	Ended survey due to high winds		1
2/19/2005	2+ E/W lines	71.5?	Stood by entangled whale waiting for FWC boat		1
2/20/2005	10 E/W lines	281.4		1	
2/21/2005	10 E/W lines	281.4	2 close call events	1	
2/22/2005	10 E/W lines	281.4		1	
2/23/2005	6 E/W lines cut short	95.5nmi	Partial survey due to weather; 2 close calls		1
2/24/2005	<10 E/W lines	268.4?	Partial survey due to weather		1
2/28/2005	6 E/W lines	177.8	Partial survey due to weather		1
3/2/2005	10 E/W lines	281.4	Late take off due to weather	1	

Table 2. continued

Date	Survey Type	Miles	Comments	Full	Part
3/3/2005	10 E/W lines	281.4		1	
3/4/2005	10 E/W lines	281.4		1	
3/5/2005	10 E/W lines	281.4		1	
3/6/2005	10 E/W lines	281.4		1	
3/7/2005	10 E/W lines	281.4		1	
3/9/2005	10 E/W lines	281.4		1	
3/10/2005	10 E/W lines	281.4	Late take off due to weather	1	
3/11/2005	6 E/W lines	177.8nmi	Partial survey due to landing gear problems		1
3/13/2005	8 E/W lines	230.9	Late take off due to weather		1
3/14/2005	10 E/W lines	281.4		1	
3/19/2005	10 E/W lines	281.4		1	
3/20/2005	10 E/W lines	281.4		1	
3/21/2005	10 E/W lines	281.4		1	
3/24/2005	10 E/W lines and coastal	319.4nmi	Covered part of coastal to Flagler	1	
3/27/2005	10 E/W lines	281.4		1	
3/29/2005	6 E/W lines	177.8	Late take off due to weather		1
3/30/2005	10 E/W lines	281.4		1	
3/31/2005	10 E/W lines	281.4		1	

Table 2. continued

Coastal Surveys					
Date	Survey Type	Miles	Comments	Full	Parital
1/2/2005	Coastal + 4 E/W lines	345.4			1
1/3/2005	Coastal + 6 E/W lines	399.4		1	
1/5/2005	Coastal + 6 E/W lines	399.4		1	
1/7/2005	Coastal + 0 E/W lines	187.3	Late take off due to weather		1
1/11/2005	Coastal + 6 E/W lines	399.4	Late take off due to weather	1	
1/12/2005	Coastal + ?	160.1	Flew Georgia Area for WT		1
1/19/2005	Coastal + 6 E/W lines	399.4		1	
1/20/2005	Coastal + 4 E/W lines	345.4?	Late take off due to weather		1
1/21/2005	Coastal + 6 E/W lines	399.4		1	
1/25/2005	Coastal + 6 E/W lines	399.4		1	
1/26/2005	Coastal + 6 E/W lines	399.4		1	
1/27/2005	Coastal + 6 E/W lines	333.7?	Late take off due to weather; all lines cut short		1
1/31/2005	Coastal + ?	411.4	Late take off due to weather; 4 southern lines flown, 2 northern lines cut; northern 2 lines completed?		1
2/19/2005	Coastal + 6 E/W lines	399.4		1	
2/23/2005	Coastal + 4 E/W lines	287?	Late take off due to low ceiling; cut lines 3 and 4 short; did not attempt lines 5 and 6		1
2/24/2005	Coastal + 2 E/W lines	341.0	Flew entire N/S lines and E/W lines 20 and 23		1
2/28/2005	Partial Coastal + 2 E/W lines	341.0	Late take off due to high winds		1
3/2/2005	Partial Coastal + 2 E/W lines	341.0	Late take off due to high winds		1
3/3/2005	Coastal + 6 E/W lines	399.4		1	
3/4/2005	Coastal + 6 E/W lines	399.4		1	
3/7/2005	Coastal + 6 E/W lines	399.4		1	
3/9/2005	Coastal + 2 E/W lines	342.5?	Did not complete lines 3-6		1
3/10/2005	Partial Coastal + 0 E/W lines	276.2?	Late take off due to high winds		1
3/11/2005	Coastal + 4 E/W lines	435.8?			1
3/14/2005	Coastal + 4 E/W lines	402.7?			1
3/19/2005	Coastal + 6 E/W lines	399.4		1	
3/20/2005	Coastal + 6 E/W lines	399.4		1	
3/21/2005	Coastal + 6 E/W lines	399.4		1	
3/29/2005	Coastal + 6 E/W lines	399.4	Late take off due to high winds	1	
3/30/2005	Coastal + 6 E/W lines	399.4		1	
3/31/2005	Coastal + 6 E/W lines	399.4		1	

Table 3. 2004-2005 right whale sightings

Primary Survey

Time (L)	Day	Month	Year	Latitude	Longitude	Number of whales in sighting	Group type
1352	8	12	2004	29.92283	81.099	1	Adult
1602	22	12	2004	30.029	81.2615	1	Adult
1034	29	12	2004	30.084	81.217	5	Adult
1320	30	12	2004	31.12067	80.979	1	Adult
1301	31	12	2004	30.00733	81.2515	5	Adult
914	1	1	2005	30.0565	81.30283	4	Adult
1139	1	1	2005	30.07284	81.309	6	Adult
1013	2	1	2005	30.02817	81.3195	6	Adult
921	3	1	2005	29.9895	81.28567	1	Adult
952	3	1	2005	29.98267	81.311	6	Adult
1055	3	1	2005	30.23034	80.8595	2	Mom/Calf
1217	3	1	2005	30.06633	81.18233	1	Adult
1237	3	1	2005	30.014	81.25117	1	Adult
1111	4	1	2005	30.00131	81.23306	6	Adult
1212	4	1	2005	30.0086	81.23243	6	Adult
1129	5	1	2005	30.07817	81.19817	6	Adult
1441	5	1	2005	29.82733	81.00317	1	Adult
952	6	1	2005	30.18966	81.28117	2	Adult
1002	6	1	2005	30.17017	81.259	5	Adult
1550	8	1	2005	30.09632	81.33702	1	Adult
1046	19	1	2005	30.007	81.094	2	Adult
1216	20	1	2005	30.05	81.26666	2	Adult
1216	21	1	2005	29.94283	81.12484	2	Mom/Calf
1328	24	1	2005	30.08467	81.19666	2	Mom/Calf
1341	24	1	2005	30.085	81.30517	2	Mom/Calf
1244	25	1	2005	29.9825	81.08217	2	Mom/Calf
1033	27	1	2005	30.19483	80.91183	2	Mom/Calf
1642	27	1	2005	30.08517	80.9575	1	Adult
1110	6	2	2005	29.94097	81.19788	4	Adult
1208	6	2	2005	29.84171	81.19778	3	Adult
1000	7	2	2005	30.24658	81.17899	2	Adult
1017	7	2	2005	30.25442	81.18563	4	Adult
1251	7	2	2005	30.22283	81.16983	4	Adult
1113	8	2	2005	30.09316	81.0325	2	Mom/Calf
1210	8	2	2005	29.96836	81.18538	5	Adult
1240	8	2	2005	29.99368	81.20006	4	Adult
1417	8	2	2005	29.96892	81.19791	5	Adult
1442	8	2	2005	29.93684	81.09222	2	Mom/Calf
1411	9	2	2005	29.84711	81.24976	2	Adult
1438	9	2	2005	29.6609	81.1949	2	Mom/Calf
1542	9	2	2005	28.64848	80.58582	2	Mom/Calf
1617	9	2	2005	28.12211	80.57151	2	Mom/Calf
1630	9	2	2005	27.9794	80.48952	7	Adult

Table 3. continued.

Time (L)	Day	Month	Year	Latitude	Longitude	Number of whales in sighting	Group type
1110	12	2	2005	30.19427	81.34368	4	Adult
1135	12	2	2005	30.18998	81.36085	1	Adult
1149	12	2	2005	30.20358	81.33376	5	Adult
1215	12	2	2005	30.2098	81.29883	3	Adult
1350	12	2	2005	30.08866	81.2884	1	Adult
1624	12	2	2005	29.86449	81.05059	2	Mom/Calf
1710	12	2	2005	29.78614	81.11803	4	Adult
935	13	2	2005	30.25326	81.36842	16	Adult
1036	13	2	2005	30.26624	81.33933	3	Adult
1119	13	2	2005	30.26022	81.02865	2	Adult
1233	13	2	2005	30.23484	81.01958	6	Adult
1424	13	2	2005	30.02525	81.00829	2	Mom/Calf
1447	13	2	2005	30.00637	80.84447	2	Mom/Calf
1559	13	2	2005	29.58735	81.09721	7	Adult
925	14	2	2005	30.21199	81.30211	9	Adult
1024	14	2	2005	30.26789	81.3484	7	Adult
1045	14	2	2005	30.26396	81.32791	2	Adult
1116	14	2	2005	30.25356	81.36255	3	Adult
1211	14	2	2005	30.21722	81.31126	9	Adult
1347	14	2	2005	30.08598	81.05811	4	Adult
1358	14	2	2005	30.11042	81.05187	2	Adult
1628	14	2	2005	29.92603	81.11013	2	Adult
1245	15	2	2005	29.90752	81.24352	4	Adult
1315	15	2	2005	30.1392	81.34331	1	Adult
1333	15	2	2005	30.17234	81.33883	13	Adult
1631	15	2	2005	29.99581	81.22524	2	Adult
1650	15	2	2005	29.9213	81.23903	3	Adult
1130	16	2	2005	30.01934	81.24593	8	Adult
1158	16	2	2005	30.00265	81.26054	3	Adult
1409	16	2	2005	30.11038	81.31158	8	Adult
1434	16	2	2005	30.12519	81.33207	1	Adult
1600	16	2	2005	30.0624	81.25902	4	Adult
1634	16	2	2005	30.02581	81.24564	7	Adult
1640	16	2	2005	30.07923	81.29131	3	Adult
1702	16	2	2005	30.01279	81.24362	8	Adult
1316	17	2	2005	30.06067	81.32426	5	Adult
1403	17	2	2005	30.07376	81.30087	4	Adult
1453	17	2	2005	30.06771	81.28909	3	Adult
1517	17	2	2005	30.02471	81.24666	6	Adult
1555	17	2	2005	30.2274	81.16324	2	Mom/Calf
1119	18	2	2005	30.00986	81.31079	7	Adult
1004	19	2	2005	30.1	81.31666	2	Adult
1047	19	2	2005	30.25	81.11666	2	Mom/Calf
1135	19	2	2005	30.18517	81.1955	3	Adult
1335	19	2	2005	30.11666	81.28333	1	Adult
1356	19	2	2005	30.15	81.25	5	Adult

Table 3. continued.

Time (L)	Day	Month	Year	Latitude	Longitude	Number of whales in sighting	Group type
929	20	2	2005	30.1265	81.30617	12	Adult
1054	20	2	2005	30.15367	81.33266	1	Adult
1110	20	2	2005	30.20117	81.356	2	Mom/Calf
1118	20	2	2005	30.26083	81.27217	2	Mom/Calf
1245	20	2	2005	30.10383	81.29084	7	Adult
1307	20	2	2005	30.11333	81.30183	3	Adult
1513	20	2	2005	29.874	81.25833	2	Adult
850	21	2	2005	30.0365	81.26833	3	Adult
929	21	2	2005	30.15933	81.32917	2	Adult
1244	21	2	2005	29.87133	81.12749	4	Adult
1300	21	2	2005	29.89734	81.13734	3	Adult
1520	22	2	2005	30.15	81.23333	8	Adult
1601	22	2	2005	30.13417	81.28583	1	Adult
1640	22	2	2005	30.15	81.33333	1	Adult
1550	23	2	2005	29.87033	80.995	10	Adult
1629	23	2	2005	29.8355	81.05517	1	Adult
1652	23	2	2005	29.87533	81.20267	2	Mom/Calf
1339	28	2	2005	30.15617	81.1985	2	Adult
1436	28	2	2005	29.999	81.08683	10	Adult
1454	28	2	2005	30.00633	81.0785	1	Adult
1454	28	2	2005	30.00266	81.06716	1	Adult
1511	2	3	2005	30.06167	80.95367	6	Adult
931	3	3	2005	30.24133	81.3225	2	Mom/Calf
1031	3	3	2005	30.143	81.161	2	Mom/Calf
1303	4	3	2005	29.7685	81.21	2	Mom/Calf
1105	5	3	2005	30.01733	81.17966	2	Mom/Calf
1245	6	3	2005	29.86666	81.21666	2	Mom/Calf
1426	7	3	2005	30.21533	81.3185	2	Adult
1609	7	3	2005	29.945	81.29084	2	Adult
1411	19	3	2005	29.91217	81.265	2	Mom/Calf
						433	Total Whales

Table 3. continued.

Coastal Survey							
Time (L)	Day	Month	Year	Latitude	Longitude	Number of whales in sighting	Group type
1030	12	01	2005	30.873	81.103	1	Adult/DE AD
1241	12	01	2005	30.865	81.28	2	Adult
1518	12	01	2005	31.168	81.05	2	Adult
0955	19	01	2005	29.15056	80.95167	2	Mom/Calf
0945	25	01	2005	29.50000	81.11667	2	Mom/Calf
1411	25	01	2005	28.53444	80.46861	2	Mom/Calf
1054	26	01	2005	28.86278	80.77528	2	Mom/Calf
1208	27	01	2005	28.66667	80.63333	2	Mom/Calf
1336	27	01	2005	28.36667	80.43333	2	Adult
1112	31	01	2005	28.03333	80.53333	4	Adult
0955	19	02	2005	29.65378	81.19507	2	Adult
1013	19	02	2005	29.66442	81.20360	3	Adult
1024	19	02	2005	29.58393	81.17501	2	Mom/Calf
1051	19	02	2005	29.20784	80.98745	1	Adult
1100	19	02	2005	29.10734	80.93104	2	Adult
1151	19	02	2005	28.21288	80.58865	2	Mom/Calf
1229	19	02	2005	28.07301	80.50172	1	Adult
1505	19	02	2005	28.33774	80.47677	1	Adult
1639	19	02	2005	28.92510	80.77782	2	Adult
1729	19	02	2005	29.71267	81.21774	2	Adult
1124	23	02	2005	29.37259	81.07352	1	Adult
1134	23	02	2005	29.37037	81.06564	6	Adult
1226	23	02	2005	28.86621	80.78029	3	Mom/Calf /Adult
1256	23	02	2005	28.46785	80.50893	2	Mom/calf
1631	23	02	2005	29.38573	81.03098	5	Adult
1347	24	02	2005	29.33477	81.04716	1	Adult
1422	24	02	2005	28.70491	80.66151	2	Mom/Calf
1628	24	02	2005	28.89342	80.71194	2	Mom/Calf
1646	24	02	2005	29.14634	80.83704	2	Mom/Calf
1727	24	02	2005	29.65285	81.13885	1	Adult
1734	24	02	2005	29.64741	81.13548	4	Adult
1330	28	02	2005	29.48583	81.11750	2	Mom/Calf
1701	02	03	2005	29.25000	80.96694	2	Mom/Calf
0920	03	03	2005	29.91892	81.25459	2	Adult
0955	03	03	2005	29.83051	81.24991	2	Adult
1057	19	03	2005	28.00500	80.46302	1	Adult
1548	19	03	2005	29.90081	81.25090	2	Mom/Calf
						79	Total Whales

Table 3. continued.

Other Sightings

Time (L)	Day	Month	Year	Latitude	Longitude	Number of whales in sighting	Group type
1253	19	04	2005	30.34416	81.37950	2	Mom/Calf Sighted after end of Season
						2	Total Whales

Total Whales From All Surveys: 514

Table 4.
2004-2005
Mom/Calf Pairs in SEUS

EG #	EG #
1012	1315
1013	1334
1039	1408
1140	1604
1145	1622
1179	1632
1204	1703
1240	1970
1241	2040
1245	2223
1246	2413
1303	2645
1308	2790
1310	3010

2004-2005
41 Identified Individuals (not mom/calf pairs)

EG #	Sex	EG #	Sex
1056	U	2601	F
1131	M	2602	M
1158	F	2611	F
1207	M	2614	F
1245	F	2630	M
1323	M	2642	F
1327	M	2681	M
1427	M	2753	F
1624	M	2795	U
1706	F	3040	M
1803	M	3160	U
1901	M	3180	F
2010	M	3210	U
2018	M	3301	U
2143	F	3314	M
2145	F	3346	M
2413	U	3351	U
2425	F	1142's Yearling	Y
2427	M	2145's Yearling	Y
2430	F	2614's Yearling	Y
2541	M		

F - female, M - male, U - unknown, Y - yearling

Table 5. "Close Calls" recorded during the 2004/2005 season.

Report number	Date	Reporting Agency	Vessel Type (and size, if indicated)	Distance categories between vessel and whale (in meters)					Whale response?	Description of Response
				<20	21-100	101-500	501-2000	>2000		
1	12/8/04	FWC	21 foot small sport fisher				x		No	
2	12/21/04	GADNR	recreational			x			Yes	Dove for 11 minutes; before and after dive time was 5 minutes
3	12/30/04	GADNR	recreational				x		No	
			recreational				x			
4	12/31/04	FWC	45 foot modified shrimper			x			Yes	Longer dive periods, less surface activity
			40 foot yacht					x		
5	12/31/04	FWC	45 foot shrimp boat				x		Yes	Longer dive periods, less surface activity
6	12/31/04	GADNR	recreational			x			No	
			recreational			x				
7	1/1/05	FWC	50-60 foot shrimp boat			x			No	
			50-60 foot shrimp boat				x			
			50-60 foot shrimp boat				x			
8	1/2/05	GADNR	shrimp boat				x		Yes	Calf separated from mother; mother exhibited pec slapping, fluke slapping, blowing under water; these behaviors continued after calf reassociated; stopped when vessel changed direction
9	1/3/05	FWC	65 foot shrimp boat		x				No	
10	2/13/05	FWC	kayak	x					No	
11	2/13/05	NEA	55-65 foot recreational			x			No	
12	2/13/05	NEA	55-65 foot recreational			x			No	

Table 5. continued.

Report number		Reporting Agency	Vessel Type (and size, if indicated)	Distance categories between vessel and whale (in meters)					Whale response?	Description of Response
				<20	21-100	101-500	501-2000	>2000		
13	2/13/05	FWC	tug and barge				x		No	
14	2/13/05	NEA	kayak	x					No	
			kayak	x						
			kayak	x						
			kayak	x						
15	2/13/05	FWC	sport fisher		x				Yes	Some within large SAG dove after vessel was about 100 feet away; others did not react; SAG did not change course
16	2/13/05	NEA	21-26 foot power boat	x					Yes	SAG dove when vessel approached (10-20 feet); separated before surfacing; vessel continued following, whales repeated evasive behaviors
17	2/19/05	GADNR	recreational			x			No	
			recreational			x				
18	2/19/05	GADNR	recreational	x					Yes	SAG behavior stopped when vessel was within 150 yards; animals moved away from the boat; split into two pairs and continued SAG behavior away from the boat
19	2/19/05	GADNR	recreational		x				No	
20	2/19/05	FWC	sport fisher			x			No	
21	2/19/05	FWC	sport fisher	N/A					Yes	Whales dove; did not resurface until boat had passed
22	2/20/05	FWC	sport fisher	x					No	
23	2/21/05	FWC	recreational				x		No	
24	2/21/05	FWC	sport fisher				x		No	
25	2/24/05	FWC	tug and barge				x		Yes	Whale breached and pec slapped
26	2/23/05	FWC	sport fisher		x				No	
27	2/23/05	FWC	sport fisher			x			No	

Table 6. FWRI biopsy sampling cruises from 2004-2005 season (Permit No. 633-1483-03).

Date	Time(L)	Latitude	Longitude	Eg #	Sample Notes	Behavior Before	Behavior After
2/9/2005	1645-1800	29°39.04	81°12.12	"B" calf of 1140	Skin only, no blubber	Slow swimming, body contact	No apparent reaction to darting, continued slow swimming
2/19/2005	1642-1740	30°08.4	81°17.4	3210	Skin and blubber	SAG behaviors, whale mottled with many cyamids, line/scar on rostrum	No visible reaction to darting, SAG behavior continued
2/16/2005	1351-1541	30°00.72 through 30°01.42	81°15.76 through 81°15.46	UNK	No sample	Large SAG (8 plus animals) split into small subgroups that were milling around.	Some avoidance behavior was noticed.
3/5/2005	1336	30°19.6	81°09.1	UNK	No sample	Fast swimming north and posturing.	Did not stay with whale long.
3/5/2005	1533	30°15.59	81°12.64	1310 and calf	No sample	Surface resting, calf playful behavior	