

**Aerial Surveys for Ship Strike Mitigation and Other Field Observations of North Atlantic Right Whales (*Eubalaena glacialis*) off the East Coast of Florida and Georgia
December 2012-March 2013**

Central Early Warning System

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INTRODUCTION

The North Atlantic right whale (*Eubalaena glacialis*) is considered one of the most endangered populations of large whales in the world (Kraus *et al.*, 2005). The species has shown little or no signs of recovery since receiving international protection from commercial whaling in 1935 and federal protection under the Endangered Species Conservation Act in 1970 and, subsequently, the Marine Mammal Protection Act in 1972 and Endangered Species Act in 1973 (Kraus *et al.*, 2005; NMFS, 2005). This lack of recovery is principally attributed to deaths from human related activities, mainly vessel collisions and fishing gear entanglements (Waring *et al.*, 2013). Efforts to protect right whales in the western North Atlantic have increased substantially since the completion of the first recovery plan in 1991; however, the stock is still considered to be extremely low and no mortality or serious injury can be considered insignificant (Waring *et al.*, 2013).

The Southeast U.S. (SEUS) is one of six major habitats identified for North Atlantic right whales (Waring *et al.*, 2013). Based on sighting records, the SEUS wintering population consists mainly of cow-calf pairs and juveniles and, to a lesser extent, adult males and non-calving adult females. The majority of calving is believed to occur off Florida and Georgia between December and March. However, right whales have been sighted in the calving area as early as September and as late as July (Taylor *et al.*, 2010) and there are records of calving occurring in the northeastern U.S. (Patrician *et al.*, 2009). Movements within and between habitats are extensive and right whales have been documented migrating back and forth between the SEUS and northern habitat within a calving season (Waring *et al.*, 2013). In 1994 (59 FR 28805), the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA NMFS) designated the coastal waters of Georgia and Florida as critical habitat for right whales. In addition, NMFS published the Right Whale Minimum Approach Regulation in 1997 (50 CFR 224.103), prohibiting all approaches (vessel, aircraft, or other means) within 500 yards of any right whale (NMFS, 2005).

A Mandatory Ship Reporting System (MSRS) was federally implemented in the SEUS in 1999. The MSRS is endorsed by the International Maritime Organization (IMO) and requires all commercial vessels 300 gross tons or greater to report into a shore-based station when entering the designated right whale reporting area. In return, the vessels are provided with the latest sighting locations (reported by aerial survey teams) and information on how to avoid collisions with whales (NMFS, 2005). In order to reduce the likelihood of vessel collisions with right whales, NMFS, in cooperation with the U.S. Coast Guard (USCG), instituted recommended vessel routes in November 2006 for three major ports in the SEUS: Brunswick, GA; Fernandina, FL; and Jacksonville, FL. Additionally, in October 2008 the Right Whale Ship Strike Reduction Rule (50 CFR Part 224), originally proposed by NMFS in 2006, was finalized and it became effective in December 2008. The rule established a seasonal speed restriction of 10 knots (18.5 km/hr) for vessels 65 ft (19.8 km) in length or greater traveling in designated seasonal management areas (SMA) along the U.S. East Coast. Military, law enforcement, and U.S. government vessels are exempt from speed restrictions in the SMA (50 CFR Part 224). The SEUS-SMA and MSRS are in effect from November 15 – April 15: the timeframe when right whales are typically found in the SEUS.

During the 1993-1994 right whale calving season several agencies and organizations began an extensive aerial survey network known as the Early Warning System (EWS) to reduce ship strikes in the SEUS (NMFS, 2005). The EWS provided valuable right whale sighting information (whale alerts) to the U.S. Army Corps of Engineers (USACE), USCG, U.S. Navy (USN), harbor pilots, port authorities, and other maritime organizations. With the incorporation of the Navy's Fleet Area Control and Surveillance Facility Jacksonville (FACSFACJAX) as the sighting collection and dissemination center for all survey aircraft, whale alerts were processed and transmitted to mariners in near real-time.

The current three-plane EWS survey format was implemented during the 2002-2003 calving season and provides daily monitoring from Sapelo Island, GA (31°32N) to Crescent Beach, FL (29°47N). Under this framework, teams are divided into three survey areas: the northern EWS (NEWS), central EWS (CEWS), and southern EWS (SEWS) (Figure 1). A fourth team surveys South Carolina and northern Georgia (SCGA). The EWS was improved with the dissemination of information to the general public through USCG Broadcast Notices to Mariners (BNTM) and broadcasts over NOAA Weather Radio. Further refinements to the EWS network allowed the aerial survey teams to send whale alerts directly to recipients in geographic regions or “bins”; thus, providing vessel operators with whale sighting information specific to their area of operation in near real-time (Figure 2).

The CEWS survey area includes the portions of the SEUS critical habitat, MSRS, and SMA between 30°50.0N and 30°17.0N, as well as the St. Mary’s River entrance channel and St. Johns River entrance channel. Both of these channels serve a commercial port, a naval base, and a USCG facility. The entrance channels are dredged routinely to maintain required depths. Dredged material is carried offshore to designated ocean dredged material disposal sites (ODMDS). Hopper dredges make frequent trips to the ODMDS during the day and night. These operations are generally carried out during the winter to lessen impacts on sea turtles, but, consequently, overlap with the right whale calving season. The St. Johns River entrance channel provides access to the port of Jacksonville which services many types of large merchant vessels and is one of 15 strategic military cargo ports in the U.S. (Rubin, 2012). According to the Jacksonville Port Authority (JAXPORT), the port’s facilities experienced a record number of vessel calls during FY 2012 (Rubin, 2012).

This report summarizes FWRI’s CEWS aerial survey data and other field observations for the 2012-2013 calving season (subsequently referred to as the 2013 season). During the 2013 calving season, the FWRI provided aerial survey coverage of the CEWS and SEWS survey areas (SEWS aerial survey results are detailed in a separate report). Whale identifications and life history information provided in this report are based on preliminary matches. Funding for the CEWS aerial surveys was provided by the U.S. Army Corps of Engineers, U.S. Coast Guard, and U.S. Navy. Additional support for the CEWS aerial surveys was provided by NMFS, subsequently referred to as NOAA Fisheries in this report.

METHODS

Aerial Surveys

Right whale aerial surveys were conducted daily, weather permitting, from 1 December 2012 to 31 March 2013. The CEWS area consisted of the middle twelve east-west tracklines (lines 13-24) within the overall EWS survey framework (Figure 1). Tracklines were spaced 3.0 NM (5.5 km) apart and extended from Cumberland Island, GA (30°50.0N) to Ponte Vedra, FL (30°17.0N) from 0.5 NM (0.9 km) east of the shoreline to approximately 30 NM (56 km) offshore (080°47.0W). A full survey was defined as 100% coverage of the CEWS predefined tracklines. Contingency plan surveys of varying coverage were flown from Sapelo Island, GA (31°26.0N) to Ponte Vedra, FL (29°59.0N) as needed. These surveys included east-west tracklines 1-30 within the overall EWS survey framework and were implemented to ensure aerial coverage of port entrances when one or more of the EWS teams were unable to survey due to aircraft availability (Table 1). The CEWS and contingency plan survey configurations were consistent with previous EWS surveys carried out since the winter of 2003.

The survey aircraft was a twin engine Cessna 337 operated and maintained by Orion Aviation under provisions of FAA 14 CFR Part 135, NOAA Fisheries SERO PRD requirements, and consistent with NOAA's Aviation Safety Policy. Aircraft typically departed the airport at 0900(L) and returned before sunset. Survey personnel included a pilot-in-command (PIC), pilot-second-in-command (SIC), and two observers. Observers sat in the rear of the aircraft and visually scanned the survey area out to approximately 2.0 NM (3.7 km). Typically, the observer seated on the left recorded survey data and the observer seated on the right conducted photo-documentation through a hinged window during sightings.

Environmental conditions necessary to conduct a survey included visibility greater than 2.0 NM (3.7 km), winds less than approximately 17 knots (31.8 km/hr), and a minimum cloud ceiling of 1200 ft (365.8 m) over the survey area and airport. A sea state value of three or less on the Beaufort scale was targeted and preferred because the detectability of whales has been shown to decrease in sea states greater than three (Hain *et al.*, 1999). Survey team leaders participated in a calibration flight aboard a NOAA operated DeHavilland Twin Otter aircraft to ensure standardized sea state determinations among EWS survey teams.

Whale Sighting Dissemination and Ground Duties

The EWS network facilitated the near real-time transmission of right whale sighting information (whale alerts) via email and text message to aerial survey teams, commercial shipping interests, dredge observers, harbor pilots, local and state agencies, NOAA Fisheries, USACE, USCG, USN, and volunteer networks. The whale alert message was designed to be brief in order to accommodate various types of hardware and the email format was standardized between EWS survey teams. EWS network participants were divided into email distribution lists based on geographic "bins" that represent their area of operation or sighting interests (Figure 2). The CEWS team used satellite phone or marine band VHF radio to relay sighting information to the FWRI ground contact who was then responsible for sending the whale alert via email to the EWS network participants and following up with any reporting errors. Whale sighting location details were kept to a minimum when using marine band VHF radio in order to avoid potential harassment of whales by vessel operators in the surrounding area.

Aerial survey teams attempted to locate and verify sighting reports from non-aerial survey team participants in the EWS network (*e.g.*, dredge observers, USCG, USN) whenever feasible. Sightings

verified by aerial survey teams were disseminated by the confirming survey team. Duplicate sightings of the same whale(s) were not typically disseminated unless more than an hour had passed from the previous sighting or the whale(s) had traveled more than 1.0 NM (1.9 km) from the original sighting location. In an effort to minimize the number of alerts, multiple whale sightings were occasionally combined into one whale alert notification if the whales were observed in close proximity to each other.

CEWS survey sighting information (date, time, and location) was entered into the WHALESSOUTH MSRS and NOAA Fisheries' online EWS sighting database¹. Duplicate whale sightings that were not distributed to EWS participants via email continued to be updated in the MSRS and EWS sighting database. Near real-time sightings remained in the MSRS for 24 hours and could be accessed by vessel captains at any time during that period. Sightings entered into the EWS sighting database were available to the public 24 hours after the initial sighting.

Throughout survey, the FWRI ground contact maintained a near real-time knowledge of the position and maneuvers of the aircraft during survey, disseminated whale sighting information and monitored weather conditions. The ground contact also acted as a liaison between ground crews and the aircraft during special response events (*e.g.*, whales near shipping channels and WVI).

Data Collection and Submission

Aerial Survey Data

The survey crew used a Fujitsu Lifebook T730 tablet PC to collect data electronically while in the aircraft. The tablet PC was small enough to comfortably sit in an observer's lap without obscuring his/her field of vision or presenting a safety hazard. Survey data were recorded at 10 second time intervals in a computer-based data logging program designed by NOAA Fisheries SEFSC. Times, locations, headings, and altitudes from the aircraft GPS were automatically retrieved and stored in a Microsoft Access database. Environmental data and sighting information was entered into the database by the observers. If the GPS or computer malfunctioned, GPS locations, headings, and altitudes were hand-recorded at intervals of five minutes on hard copy datasheets.

Environmental data recorded during survey included: weather (*e.g.*, clear, overcast, haze, fog, etc.), visibility, percent cloud cover, sea state (Beaufort scale), sun penetration, and the severity of the glare from the sun on the water. These data were updated throughout the survey when conditions changed. The survey program was configured to prompt observers to check and verify environmental conditions every seven minutes to ensure data were accurate throughout the survey.

Large vessel information was recorded using an onboard AIS receiver (model AMEC CYPHO 101) and Siitech Web VTS Mate software. During survey, observers used the Siitech software AIS viewer installed on the tablet PC to verify transmission of AIS data from vessels. Vessels clearly identified through their AIS transmissions (*e.g.*, merchant vessels) were not recorded in the survey database. Vessels 65 ft (19.8 m) or larger that were not detected on the AIS viewer were recorded in the survey database. These large vessels were entered when sighted within 2.0 NM (3.7 km) of the trackline. All small vessels (less than 65 ft (19.8 km) in length) within 1.5 NM (2.8 km) of the trackline were also recorded. Number and type of vessels, side of aircraft (*i.e.*, left, right, both), and sighting time and location were entered in the survey database when the vessel was perpendicular to the trackline. Vessel heading was recorded for large vessels only. Exact GPS locations of vessels were not obtained unless the vessel was involved in a whale-vessel interaction (WVI). Commercial fishing gear (*e.g.*, crab buoys) was documented as well.

¹ http://sero.nmfs.noaa.gov/protected_resources/right_whale/seus_sightings/index.html

Species recorded in the survey database included large whales (*e.g.*, right whale and humpback whale), leatherback turtles, and large sharks (*e.g.*, white shark). Leatherback turtles were identifiable out to approximately 1.0 NM (1.9 km) from the trackline depending on sea state and were recorded at the time of sighting (usually perpendicular to the trackline). When whale sightings occurred the survey plane would immediately break from the trackline and fly directly over the whale(s) to obtain an accurate GPS position. Large whale sighting data included: initial and final sighting times and locations, number of whales per sighting, number of calves per sighting, heading of whale(s), observed behaviors, observer reliability (measure of certainty of whale species identification) and confidence (measure of certainty of number of whales observed). In an effort to maintain consistent survey effort, the pilots were asked to not alert the observers to the presence of approaching whales. However, for vessel-strike mitigation purposes, the pilots did inform the observers of whales if they were passed by the survey plane without being sighted by the observers. Sighting verifications, such as these, were not included in the sightings per unit effort (SPUE) analyses because the detection of the whale(s) was not consistent with standard survey protocols. A sighting was defined as any observed whale or group of whales at a given time and location; therefore, an individual whale may be part of more than one sighting per day and/or more than one sighting throughout the calving season.

Photographs were taken with a Canon EOS 7D Digital SLR camera equipped with a Canon 100-400 mm telephoto zoom lens. Digital format allowed for expeditious image review in the aircraft and also allowed FWRI to easily share image files with collaborators. The camera was set on shutter priority mode with a shutter speed of 1/1250 s and minimum ISO of 560 (shutter speed was decreased and ISO increased in low light conditions). Time spent photographing a sighting was directly related to the observers' ability to accurately identify the species of whale and obtain appropriate photo-documentation. Identification of individual whales in the field minimized time spent on scene with a sighting and prevented dissemination of duplicate sighting information. When feasible, additional time was allotted to document and assist with whale-vessel interactions (WVI) and other critical events.

A set of Microsoft Access queries and macros were used to scan the survey data for errors and compliance with the guidelines set by the North Atlantic Right Whale Consortium (NARWC) sightings database manager and NOAA Fisheries. The aircraft flew at a target speed of 100 knots (185 km/h) and 1000 ft (305 m) altitude. In order to take into account aircraft fluctuations an allowable altitude range of 800 ft-1200 ft (244-366 m) was set. Survey effort was defined as the total nautical miles or time flown on trackline (east-west or north-south) while the plane was operating within survey parameters, with the wings-leveled, and in sea state three or less on the Beaufort scale. Short transits between tracklines and periods of circling or transiting outside survey parameters were not considered to be on-effort. The daily survey tables were combined into one database file for final submission to the NARWC. In addition to the electronic survey data collected, hard copy datasheets for each survey day were compiled. Cover datasheets included: the survey crew, flight hours, nautical miles flown, environmental data, and summary of the day's sightings and events. Whale sighting datasheets included: a drawing of the callosity patterns of whale(s) seen, initial and final sighting times and locations, field letters and preliminary whale identifications, observed behaviors, EWS whale alert number, and ancillary photography information (*e.g.*, image frames).

FWRI staff prepared and submitted weekly reports to NOAA Fisheries. These reports included a summary of survey activities conducted and details about right whale sightings documented during the reporting period.

Photo-identification

Individual right whales were mainly identified by the location, shape, and topography of the callosities that occur along their rostrum (Crone and Kraus 1990), as well as scars. Although the callosity patterns of calves are not fully developed until 7-12 months of age, distinctive crenations

along the lower lip (referred to as lip ridges) can be used in the identification of calves (Hamilton and Martin 1999).

FWRI staff reviewed photographs after each survey and made preliminary matches to the online North Atlantic Right Whale Catalog of identified right whales (<http://rwcatalog.neaq.org/Default.aspx>), as well as whales with intermatch and season codes (temporary identification codes assigned to uncataloged whales). Photographs were also examined to look for new injuries, scars, and entanglements. Representative images and preliminary identifications were uploaded to an FTP site where research partners could reference them. New England Aquarium (NEA) personnel preliminarily verified FWRI's matches and assisted with the identification of unmatched whales (mainly juveniles). This allowed for up-to-date tracking of the number of cow-calf pairs and individual whales sighted in the SEUS as well as spatial and temporal movements of aggregations of whales during the calving season.

At the end of the season all photographs and sighting data were submitted to NEA in accordance with the Data and Photographic Submission to the North Atlantic Right Whale Identification Database Version 6, October 2011 protocol (www.narwc.org/pdf/photosubmissionguide.pdf). As the curators of the NARWC identification database, the central repository for archiving and maintaining images and sighting data on right whales, NEA will confirm the final identification of each whale.

Sighting Distance

Sighting or 'radial' distance (Buckland *et al.* 2001) was estimated by recording the aircraft location when the observer first detected a whale sighting (break-track position) and the initial observed location of the whale or group of whales. Geodetic distance between both locations was then calculated. Aircraft heading at the time of detection was used to estimate the sighting angle and perpendicular sighting distance (*i.e.*, the distance from the whale sighting location to the closest point on the survey trackline). Sighting distance was calculated only for on-effort sightings for which less than five minutes elapsed between detection and initial pass over the whale. For the sightings recorded during surveys flown close to shore in a north-south direction (*i.e.*, during transits), sighting distance was only calculated if the sightings occurred east of the trackline. Sighting distance is recorded to estimate probability detection functions.

Sightings per unit Effort

Sightings per unit effort (SPUE) is a basic method of estimating whale density that takes into account differences in effort between survey areas or calving seasons; the observed number of whales is corrected by the amount of survey effort in order to make comparisons. Distance sampling methods were used to determine effective search widths as a function of sea state conditions. Effective search widths were then used to buffer each segment of the survey tracklines and the resulting area surveyed was calculated for each segment. Estimates of the area surveyed were adjusted by removing a blind spot below the plane, which was previously determined to be 186 meters on each side of the plane for surveys flown at 1000 feet. The area surveyed was added up using a grid of 3 x 3 NM cells oriented along the east-west tracklines. The same sampling grid was used to calculate SPUE as the number of whale sightings divided by the area surveyed per cell.

Whale-Vessel Interaction (WVI) Documentation

A WVI form was filled out whenever the survey team: a) observed a vessel within 500 yards (457 m) of a whale or group of whales, b) determined that the heading of a vessel could result in the vessel and whale(s) being approximately 1.0 NM (1.9 km) or less apart, or c) established communication with a vessel to transmit whale sighting location information in an attempt to prevent a

collision or mitigate an interaction. Data reported on the WVI form incorporated information from before, during, and after the incident. Information collected included: whale(s) sighting times and locations, headings, and behaviors; vessel type and description, interaction times and locations, headings, and speed; notes on radio communication between observers and the vessel operator; vessel actions (*e.g.*, changes in heading and/or speed); and the closest distance between whale(s) and the vessel. Photographs and/or video were obtained of the vessel and interaction if possible. WVI forms were completed at the end of survey and forwarded to NOAA Fisheries within 24 hours. At the end of the season, the CEWS survey WVI incidents were submitted to FWRI for inclusion in the WVI database.

RESULTS

Aerial Survey

CEWS Surveys

The CEWS survey team flew 54 out of an available 121 days between 1 December 2012 and 31 March 2013 for a total of 291.0 hours (Table 2). Effort varied both spatially and temporally, but at least a portion of the CEWS area was flown 46% of the available days (Figure 3). Fourteen full CEWS surveys (390 NM/722 km each), thirty-two partial CEWS surveys (average 320 NM/596 km), and eight contingency plan surveys (299-436 NM/554-807 km) were completed for a total of 18,777 NM (34,775 km) of on-effort trackline flown (Figure 4). The CEWS team conducted 14 surveys in December, 12 in January, 14 in February and 14 in March (Figure 5). Contingency surveys were flown during December and mid-February (Figure 6). During contingency survey, a portion of the CEWS area was covered by the CEWS team and a portion was flown by the SEWS or NEWS team. Ninety-three percent of survey effort was completed during favorable sea state conditions of three or less on the Beaufort scale (Figure 7). The majority of partial CEWS surveys resulted from poor weather conditions and associated daylight constraints; however, partial surveys also resulted from military operations and airspace conflicts, as well as communication with the USCG concerning a vessel debris field located during a survey. When partial surveys were conducted, effort was focused, as much as possible, on the shipping lanes in Jacksonville, FL; Fernandina Beach, FL; and Brunswick, GA.

Right Whale Sightings

The CEWS survey team documented 94 sightings totaling 181 whales (Table 3), but this total does not correspond to unique individuals as some whales are resighted throughout the season (see Photo Analysis section below). The first right whale sighting occurred on 4 December 2012 and the last was on 4 March 2013. Of the 94 sightings, 79 were cow-calf pairs, two were cow-calf pairs sighted with other whales, 12 were single adults or juveniles, and one was a group of four whales. Only two groups of whales were involved in surface active group (SAG) behavior, including a calf associated with two other whales in addition to its mother (see Discussion section for more information). Sightings occurred up to 22 NM (41 km) from the shoreline, but the vast majority (98%, $n=92$) of sightings were within approximately 18 NM (33 km) of the shore (Figure 8). Whales were sighted consistently during December, January, February and early March (Figure 9). There were 17 sightings of 33 whales in December, 47 sightings of 90 whales in January, 29 sightings of 56 whales in February, and one sighting of two whales in March (Figure 10). The most sightings and whales per unit nautical mile of effort occurred during the week of 26 January to 1 February 2013 (Figure 11). Whale sightings per unit effort (SPUE) were calculated for the CEWS area (Figure 12).

Whale Alert Dissemination

The FWRI ground contact sent out 91 CEWS whale alerts to EWS network participants.

Photo Analysis

Preliminary photo analysis indicates the CEWS team documented 29 individual adult and juvenile right whales (*i.e.*, excluding calves) including 17 of the 19 females observed with calves in the SEUS. One of these whales was sighted in the SEWS area during a contingency survey. Four whales, including a female with a calf, were unique to the CEWS area (*i.e.*, not seen in other survey areas this calving season). As many as 11 adult and juvenile whales, including nine females with calves, were

sighted during a single survey. The sex and age class of individual whales identified by the CEWS team were: 59% ($n=17$) females with a calf, 7% ($n=2$) adult females (non-calving in 2013), 27% ($n=8$) juveniles, 4% ($n=1$) adult males, and 3% ($n=1$) individuals of unknown age not known to be at least nine years-old (Figure 13). Pregnant female, Catalog #2042, was sighted by the CEWS team prior to giving birth. Behaviors documented during whale sightings are detailed in Table 3 and Appendix 1.

Sighting Distance

Of the 94 CEWS sightings, 61 (65%) were used for sighting distance calculations. The average sighting distance from the survey plane break-track position was 1.2 NM (2.2 km) (range 0.1-4.5 NM/0.2-8.3 km) (Figure 14). Most sightings ($n=48$) occurred between 0.4 NM (0.7 km) and 2.0 NM (3.7 km) from the plane. The average perpendicular distance was 1.1 NM (2.0 km) (range 0.0-3.9 NM/0.0-7.2 km) (Figure 15).

Vessel Sightings

A total of 2064 vessel sightings were recorded by the CEWS team. This total does not represent the number of vessels observed by the CEWS team, because vessels identified in AIS (*e.g.*, large merchant) were not recorded in the survey database. The 2064 vessel sightings recorded included: 1529 recreational, 243 commercial fishing, 119 government, 88 sailing, 31 motor yacht, 26 sport-fishing, 11 research, seven personal watercraft, four large merchant, three pilot, two small merchant and one dredge (definitions are included in Appendix 4). The vast majority (88%; $n=214$) of commercial fishing vessel sightings recorded were shrimping vessels. Merchant vessels, pilot boats, and dredge vessels have been removed from analyses in this report, because these vessels were only marked when not visible in AIS or as needed for WVI. The number of vessel sightings recorded decreased from December through February and then increased in March (Figures 16). Most notable were: (1) an increase in recreational vessel sightings recorded in March; (2) a decrease in commercial fishing vessels from December through March; (3) a higher number of government vessel sightings in February; and (4) a higher number of motor yacht sightings in December and March (Figure 17). Vessels were distributed throughout the survey area, with a high number of sightings concentrated within approximately 15 NM (28 km) of the shore and extending farther offshore near the St. Johns River entrance (Figures 18).

Whale-Vessel Interaction (WVI) Documentation

During the 2013 season, the CEWS team documented seven WVI with six groups of whales (Figure 19, Table 4). Two of these interactions occurred in the NEWS area during contingency survey. One large merchant, one pilot boat, one commercial fishing, one law enforcement and three recreational vessels were involved in WVIs. The groups of whales involved consisted of five cow-calf pairs (milling or traveling) and a single juvenile whale (milling). No behavioral reaction to the vessel(s) was observed during these sightings. Four vessels were observed within 500 yd (457 m) of the whale(s) and the closest observed distance between whale(s) and vessel was 50 yd (45.7 m). Three vessels did not respond to VHF radio communication attempts from the CEWS team and communication was not attempted with one vessel. Vessel captains responded positively when communication was established, including changes in vessel course and/or speed to avoid the location of the whale(s).

Other Marine Species

During the 2013 season, the CEWS team documented five humpback whale (*Megaptera novaeangliae*) sightings from 17 December 2012 through 19 March 2013. These sightings occurred from Cumberland Island, GA to Atlantic Beach, FL between 0.5 NM (0.9 km) and 5.6 NM (10.4 km)

offshore (Figure 20). Photographs of the dorsal fin and body scars were used to individualize sightings of whales. Two individual whales were identified by the CEWS team; one of these whales was sighted four times by the CEWS team and also twice by the NEWS team. Harbor pilots and dredge vessels were advised of humpback whale sightings in the vicinity of port entrances and ODMDS. Photographs and sighting data were distributed to aerial survey teams, GDNR, NOAA Fisheries, and the Provincetown Center for Coastal Studies (PCCS) for comparison to the Gulf of Maine Humpback Whale Catalog and North Atlantic Humpback Whale Catalogue.

During the 2013 season, the CEWS team recorded 831 sightings of leatherback turtles (*Dermochelys coriacea*). Approximately 50% ($n=418$) of these sightings were during January. Leatherback turtles were recorded throughout the area surveyed, but the vast majority (99%, $n=825$) occurred greater than 7.0 NM (13.0 km) offshore (Figure 21). Sighting data were distributed to NOAA Fisheries and sea turtle biologists with FWRI and GDNR.

The CEWS team documented 18 large shark sightings during the 2013 season. These sightings consisted of nine white sharks (*Carcharodon carcharias*), four short-fin makos (*Isurus oxyrinchus*), two great hammerheads (*Sphyrna mokarran*), and three unidentified large sharks. Sixteen sharks were observed free-swimming (*i.e.*, not associated with an animal carcass), one white shark was observed feeding on a fish carcass, and one white shark was sighted near a shark research vessel that was actively fishing. Sightings occurred from Cumberland Island, GA to Ponte Vedra, FL approximately 0.7 NM (1.3 km) to 35 NM (65 km) offshore (Figure 22). There were five sightings in December, eight during January, one during February, and four during March. Photographs and sighting data were distributed to NOAA Fisheries and shark biologists with FWRI, GDNR, University of North Florida, and the Massachusetts Division of Marine Fisheries.

Injured Whale Observations

Catalog #3942 – Documentation of new entanglement wounds

On 19 December 2012, the CEWS team sighted Catalog #3942, a four year-old female, with resolving wounds on the fluke, fluke insertion, peduncle, across the rostrum, and behind the blowholes (Figure 23) that are consistent with entanglement wounds as described by Kraus (1990). No gear was present on the whale and #3942 was not known to have been entangled at the time of this sighting; this was the first documentation of the entanglement event.

Catalog #3692 – Vessel wounds

On 7 March 2013, Catalog #3692 was sighted by the SCGA team off Hilton Head, SC with five roughly equidistant, parallel wounds on the dorsal surface of the right fluke (M. White, *pers.comm.*, April 2013). Catalog #3692 was sighted eleven days prior on 24 February 2013 off Nassau Sound in Florida by the CEWS team and, based on photo-documentation, it is not likely the wounds were present during this sighting. The wounds are consistent with vessel injuries observed on Florida manatees (*Trichechus manatus latirostris*) (Wright *et al.*, 1995, Rommel *et al.*, 2007). Catalog #3692, an adult female of unknown age, was observed with her first known calf on 18 February 2013 (prior to injury). The pair has since been sighted by PCCS on 29 April 2013 in Cape Cod Bay (L. Ganley, *pers.comm.*, May 2013) and the wounds appear to be resolving.

2013 Calf of Catalog #1612 – Vessel wounds

The 2013 Calf of Catalog #1612 was sighted on 29 January 2013 by the CEWS team off Mayport, FL with a series (minimum twelve) of roughly equidistant wounds paired with a long linear wound. The wounds were located across a portion of the calf's dorsum and are consistent with vessel injuries observed on Florida manatees (*Trichechus manatus latirostris*) (Wright *et al.*, 1995, Rommel

et. al., 2007). The calf was last sighted without wounds on 21 January 2013 by the CEWS team off Cumberland Island, GA and was sighted on several occasions in the SEUS post-injury; the last sighting was 24 February 2013 by the SCGA team off Tybee Island, GA (M. White, *pers.comm.*, April 2013). The calf's behavior appeared normal during sightings following the injury and the wounds whitened in appearance, suggesting healing.

Stranding Responses

Right Whale Strandings

No right whale carcasses were detected by the CEWS team; however, the carcass of Catalog #4193 (EgNEFL1235) was discovered south of the EWS survey area on 18 December 2012.

DISCUSSION and RECOMMENDATIONS

Since 2004, the CEWS team has conducted an average of 70 surveys per season (SD 10.8, range 51-82); this average is approximately 60% of the available survey days in the calving season. From 2011-2013 the average number of surveys per season has been lower than during 2004-2010 (2004-2010 average 76 surveys per season, SD 4.7, range 69-82; 2011-2013 average 56 surveys per season, SD 5.7, range 51-62). These differences can be principally attributed to variable weather conditions that affect sea state and our efforts in recent years to conduct surveys in a sea state of three or less on the Beaufort scale.

The total number of adult and juvenile whales (*i.e.*, excluding calves) identified in the SEUS decreased to 41 individuals this season. This is the lowest number of individuals documented in the SEUS since at least the 2004 season. There were substantially fewer sightings of juvenile whales and also fewer sightings of non-calving adult females and adult males; almost half of the 41 whales identified in the SEUS were females with calves² ($n=19$) (Figure 13).

During the 2013 season, over 50% of the right whale sightings in the CEWS area were seen between the St. Johns River entrance and St. Mary's River entrance and about half of the sightings in the CEWS area occurred in January. Approximately 85% of the sightings in the CEWS area this season were cow-calf pairs which is significantly higher than the average 40% of sightings from 2004-2012. Cow-calf pairs were present near the beginning of the season (the first was documented on 27 November 2012) and first-detection of the calves seemed to be 6-8 weeks earlier than average; by the end of December, 13 of the total 19 calves had been recorded.

The CEWS team sighted Catalog #1408 and calf on 18 February 2013 approximately 24 NM (44 km) off St. Simons Island, GA. Catalog #1408, an adult female, was observed with her mouth open near the surface of the water (Figure 24). Thermoregulation is one possible explanation for this behavior; however, in this case the behavior documented is consistent with skim feeding which is a behavior that is rarely recorded in the NARWC identification database for the SEUS (P. Hamilton, *pers.comm.*, June 2013). Catalog #1408 was observed swimming with her mouth open (*vs.* resting at the surface) along a convergence of currents where there were planktonic animals visible in the water. Photo-documentation from the sighting combined with additional observations from a GDNR vessel crew lead to the confirmation of skim feeding behavior. While #1408 was feeding, her calf was not visible near the surface of the water, but both mother and calf were near the surface between and after bouts of feeding.

The CEWS team documented two sightings of cow-calf pairs associated with other adult and/or juvenile whale(s). Sightings of cow-calf pairs with other whales are not often documented in the SEUS; prior to the 2013 season less than ten sightings like these have been recorded in the NARWC identification database (P. Hamilton, *pers.comm.*, June 2013). The first of our observations occurred on 26 January 2013 approximately 11 NM (20 km) off Nassau Sound in Florida and included four whales: Catalog #1946, a 24 year-old female; her approximately two month-old calf; Catalog #1402, a 29 year-old male; and intermatch whale CT03SEUS10, a probable juvenile of unknown sex. Catalog #1402 and CT03SEUS10 appeared to approach Catalog #1946 and calf at the start of the observation. The calf, Catalog #1402 and CT03SEUS10 were engaged in SAG behavior; however, the calf's attention appeared focused on CT03SEUS10 (Figure 25a). Catalog #1946 (the mother) did not engage in SAG behavior, but appeared to frequently attempt to position herself next to her calf which consequently brought her near the other two whales (Figure 25b). The interaction lasted at least 12 minutes; when the CEWS team departed the sighting, CT03SEUS10 was still associated with Catalog

² A 20th cow-calf pair sighted in Cape Cod Bay on 12 January 2013 (Asmutis-Silva, 2013) was not sighted in the SEUS during the 2013 calving season .

#1946 and calf, but Catalog #1402 was observed alone just outside the group. The second sighting occurred on 20 February 2013 approximately 13 NM (24 km) off Cumberland Island, GA and involved three whales: Catalog #3513, an eight year-old female; her approximately two month-old calf; and Catalog #3892, a five year-old male. No SAG behavior was observed during this interaction. Catalog #3892 appeared to pursue Catalog #3513 and calf for approximately 20 minutes (Figure 26). During this time, the calf was briefly separated from its mother; however, unlike the observation of Catalog #1946 and calf where the calf spent the majority of its time directly interacting with CT03SEUS10, this calf did not appear to seek an interaction with Catalog #3892 and remained close to its mother.

On 24 January 2011, an unidentified juvenile right whale (known as season code S066) swam into the St. Johns River and initiated a multi-agency response including the CEWS survey team (Jackson *et al.*, 2011). The whale remained in the river for the majority of daylight hours while commercial shipping and military traffic waited outside the river's entrance. The whale eventually exited the river at dusk and was not sighted again in the SEUS during the 2011 season. The first known sighting of this whale since the river incursion event occurred nearly two years later on 19 December 2012 when the CEWS team documented S066 approximately 1.0 NM (1.9 km) off Ponte Vedra Beach, FL (18 NM (33 km) south of the St. Johns River entrance). This sighting and a subsequent sighting of the whale by the SEWS team on 1 January 2013 lead to the photo-identification match of this previously unidentified whale to the 2010 Calf of Catalog #1145, a three year-old female (P. Hamilton, *pers.comm.*, June 2013). This match confirms the whale that swam into the St. Johns River was a one year-old individual. The whale's skin and body condition appeared good, suggesting it is in good health.

Aerial surveys are an efficient tool to monitor the right whale population and support management actions. Although limited by weather and available daylight, the EWS surveys, throughout many seasons, have raised awareness of right whales in the SEUS. Moreover, the consistent and comprehensive data gathered during these surveys can be used to assess protective measures, make informed management decisions, and identify emerging issues and future cumulative impacts to right whales in the calving area. Continued evaluation of SEUS aerial survey design and methods is needed so that field teams are better prepared for contingencies and can systematically respond to seasonal changes in environmental conditions and whale distribution, as well as mitigate for extended periods of in-season inclement weather conditions that are not suitable for survey.

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Cover photographs: Catalog #1968 taken by Marjorie Foster on 21 February 2013 (left), Catalog #2042 and calf taken by Kate Pagan 26 January 2013 (top right), Catalog #2753 and calf taken by Amy Willoughby 12 January 2013 (bottom right). All photographs taken by FWRI staff under NOAA Fisheries permit #15488.

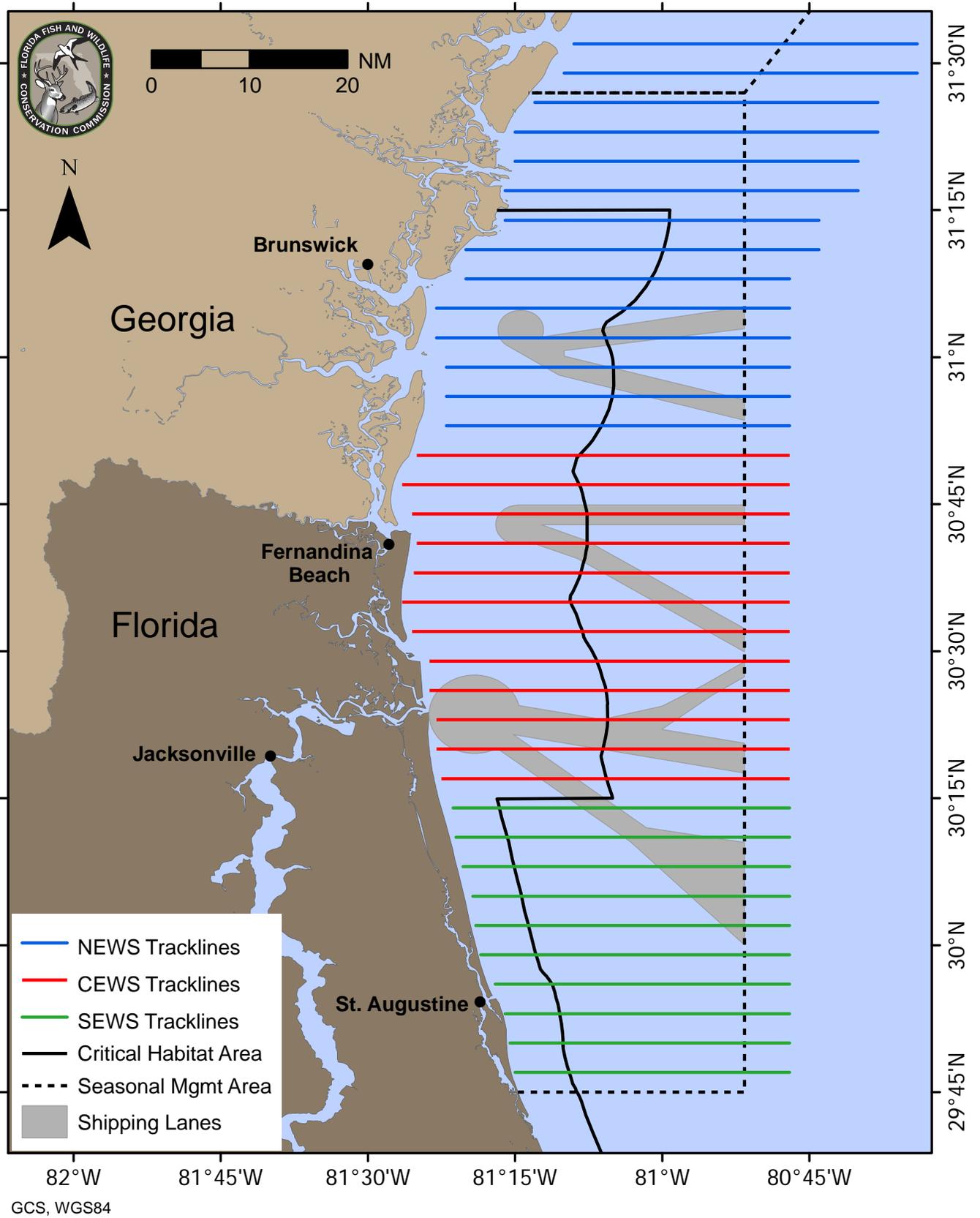


Figure 1. Early warning system (EWS) survey tracklines

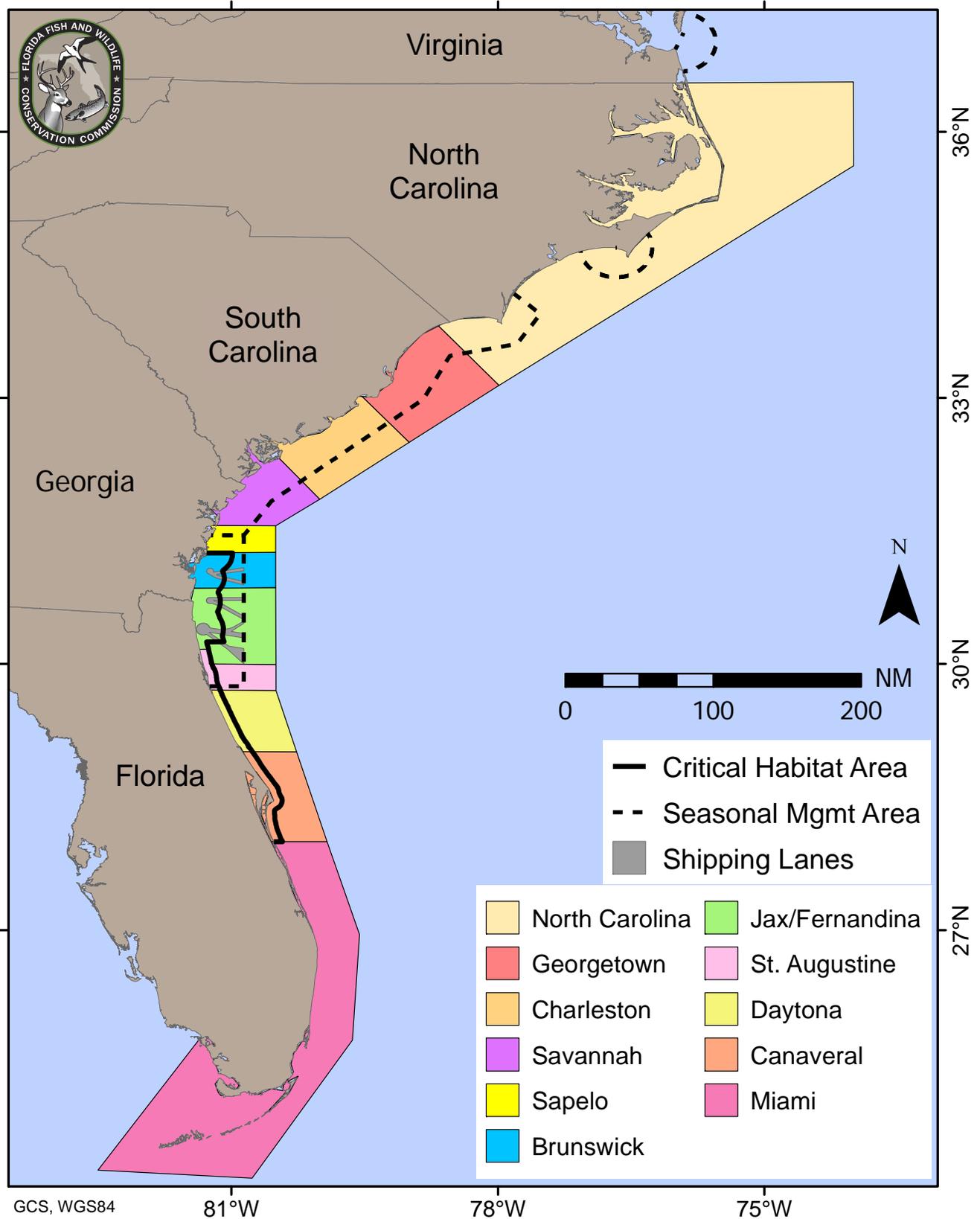


Figure 2. Early warning system (EWS) whale alert geographic “bins”

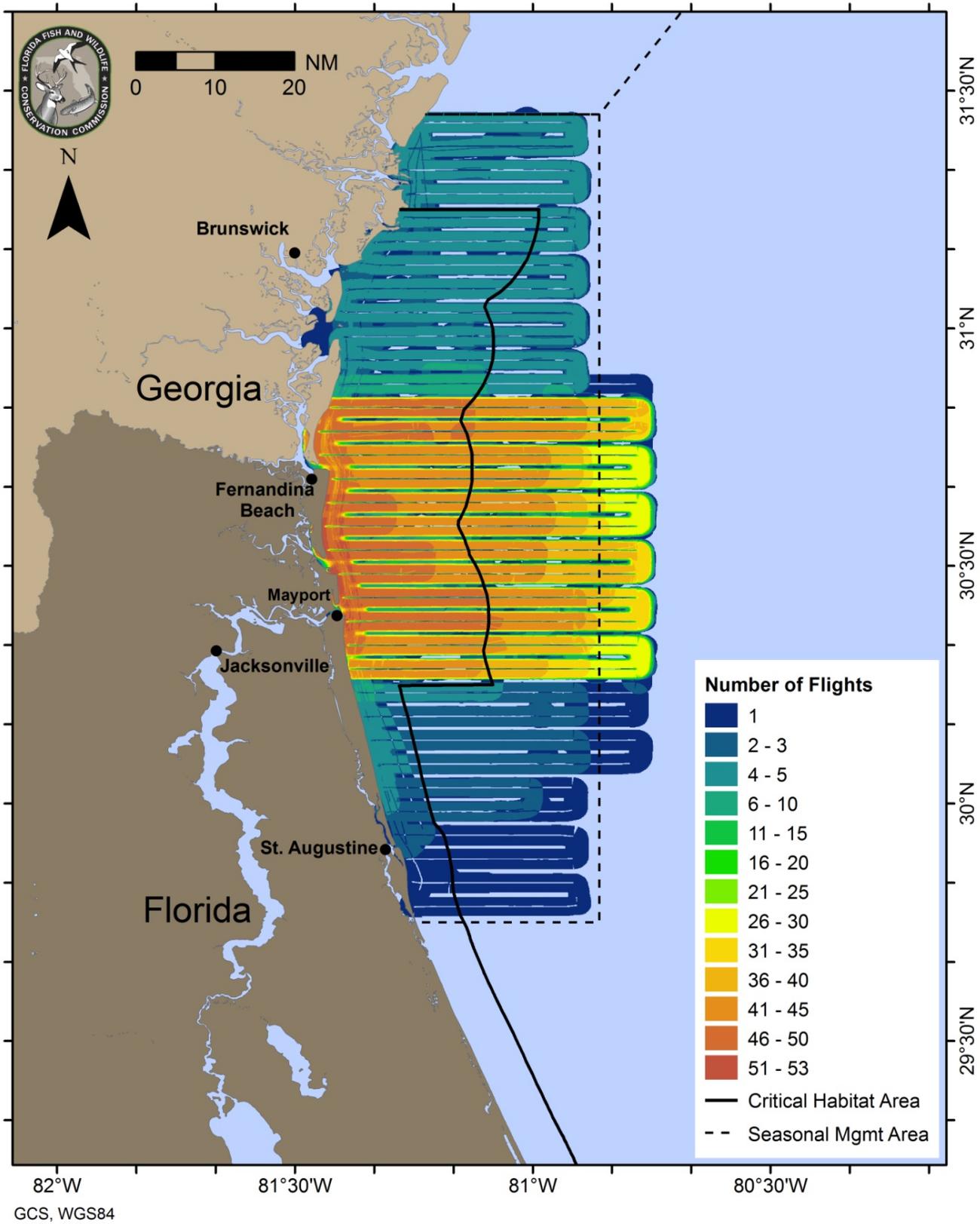


Figure 3. Total on- and off-effort survey conducted by the CEWS team December 2012 through March 2013

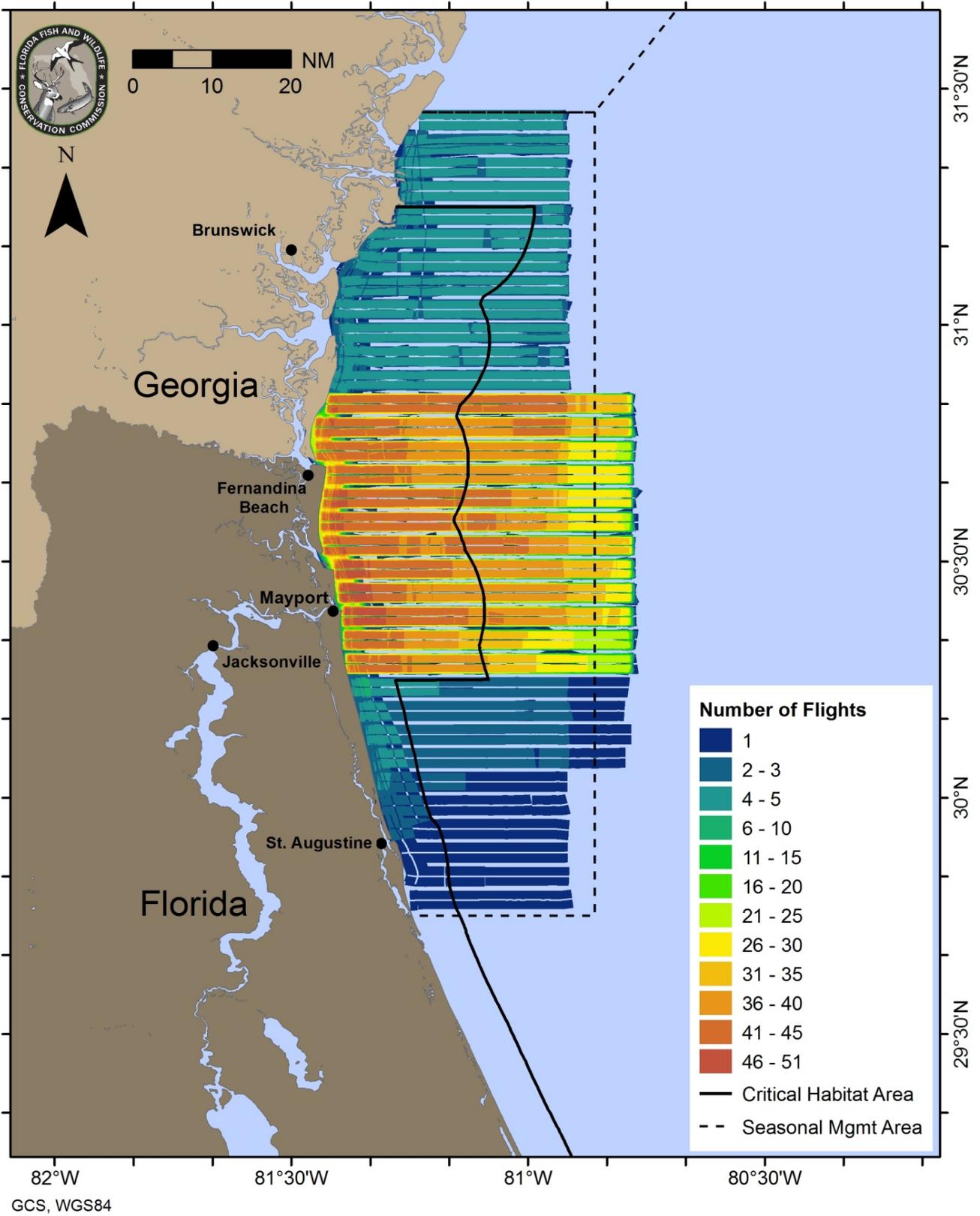


Figure 4. Total on-effort survey conducted by the CEWS team December 2012 through March 2013

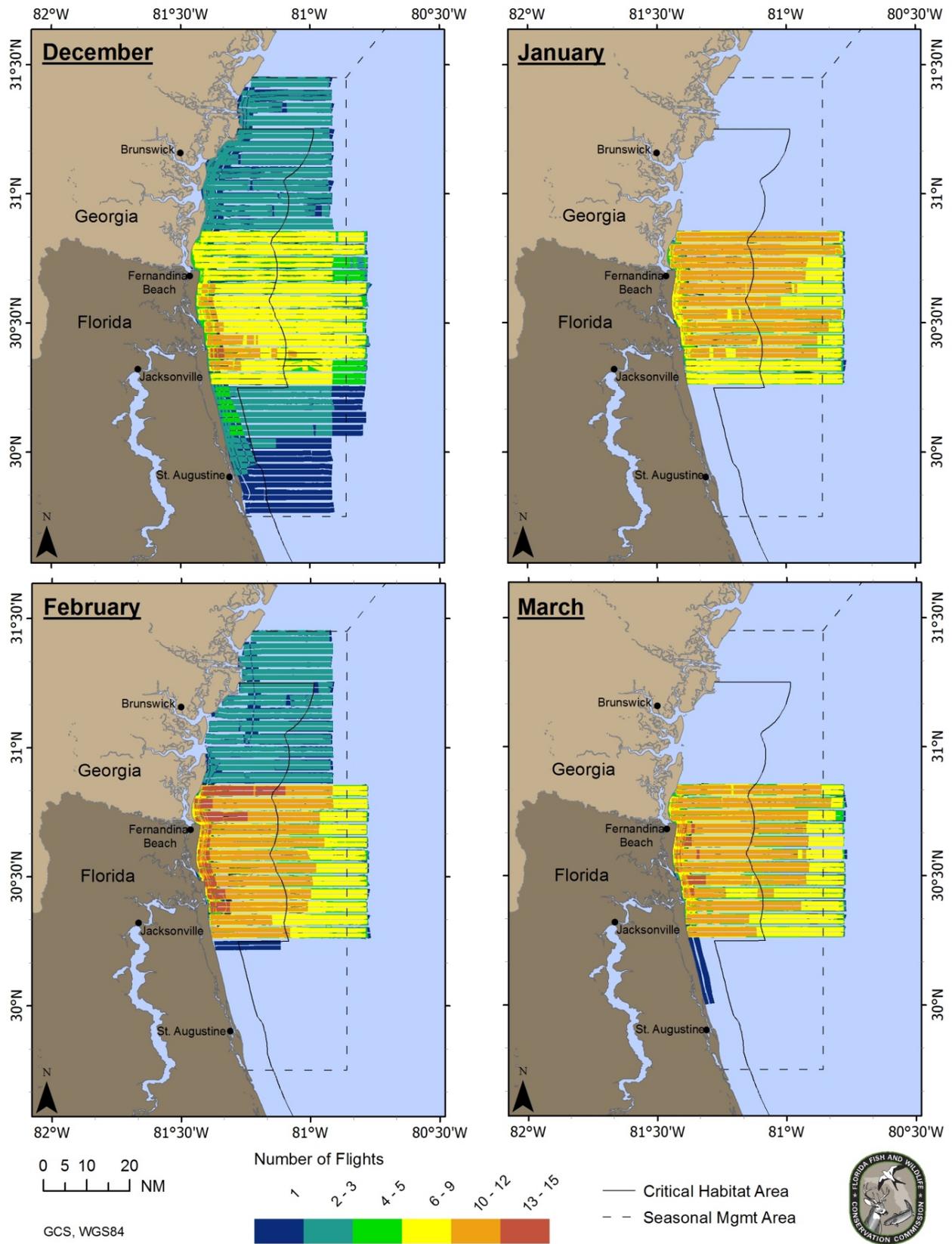


Figure 5. Monthly on-effort survey conducted by the CEWS team December 2012 through March 2013

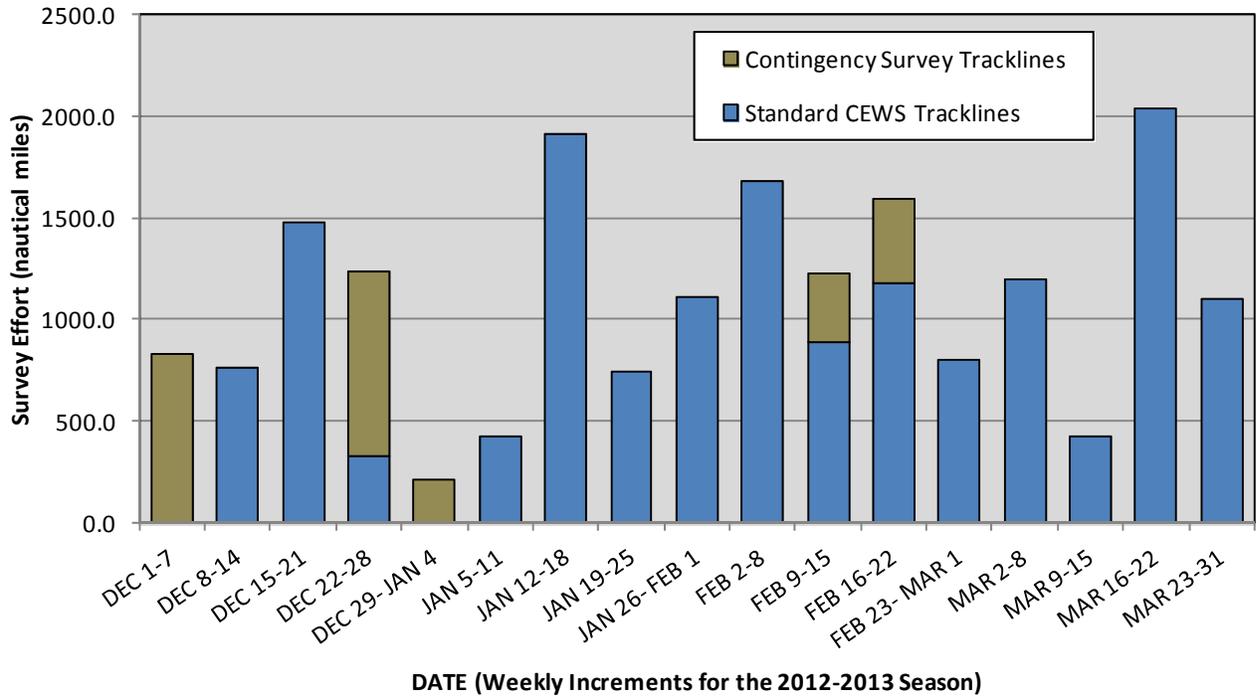


Figure 6. Weekly survey effort conducted by the CEWS team December 2012 through March 2013

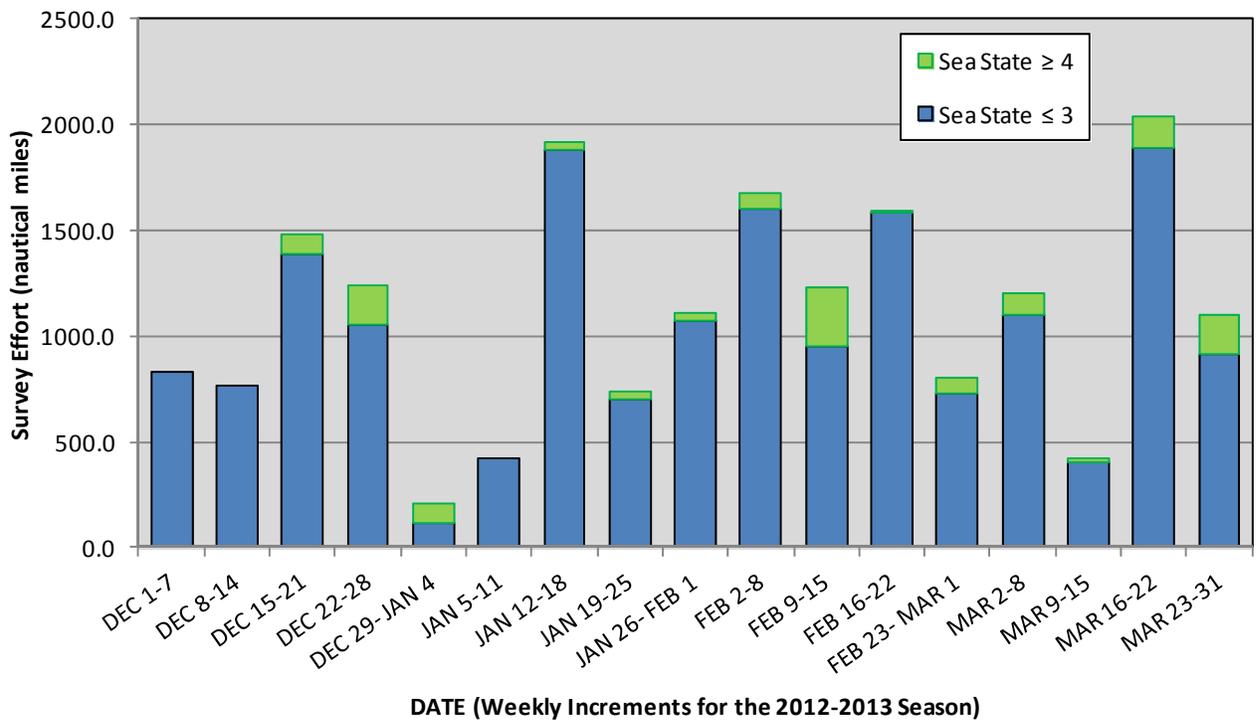


Figure 7. Weekly survey effort conducted by the CEWS team above and at or below sea state three December 2012 through March 2013

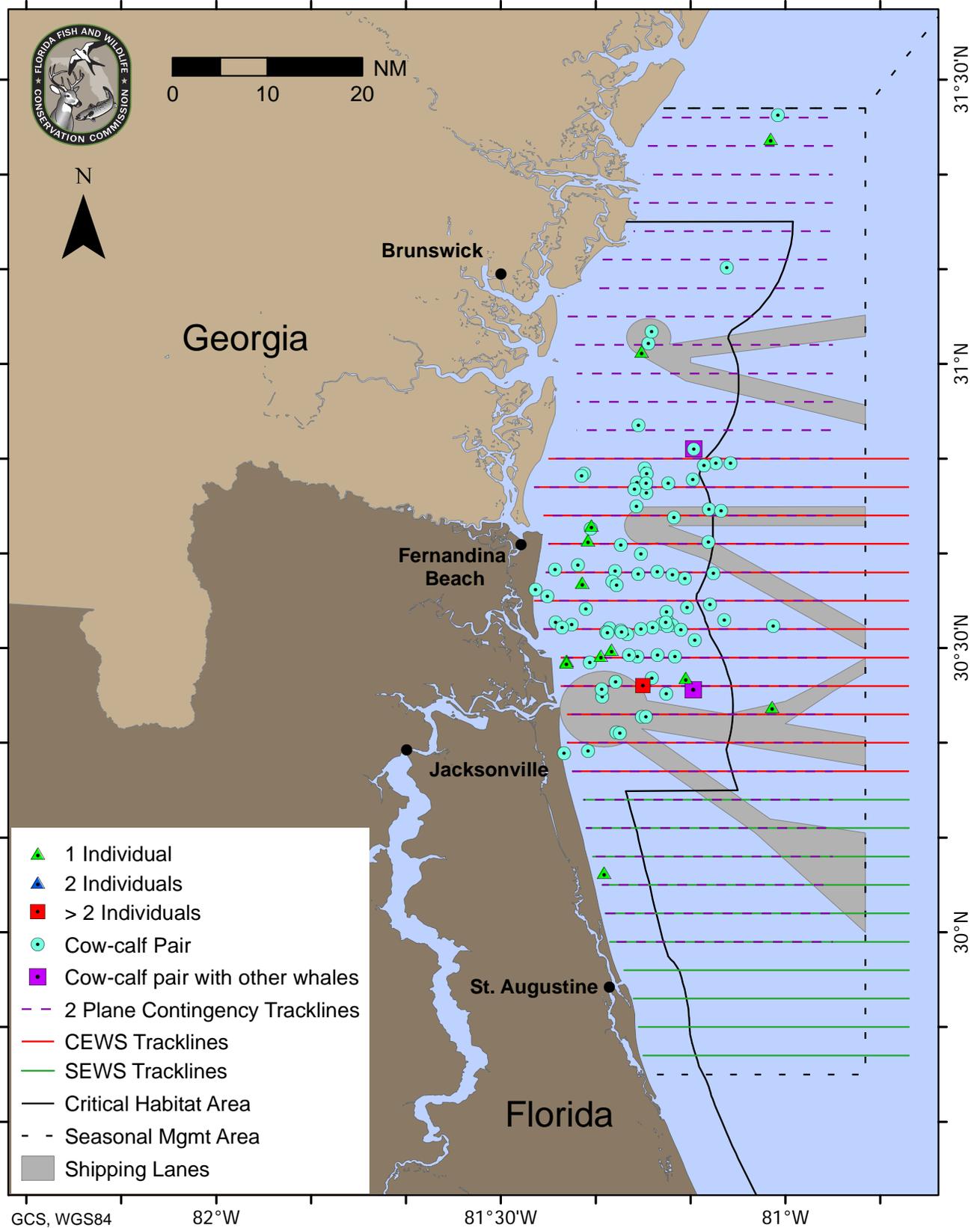


Figure 8. Right whale sightings by the CEWS team
December 2012 through March 2013

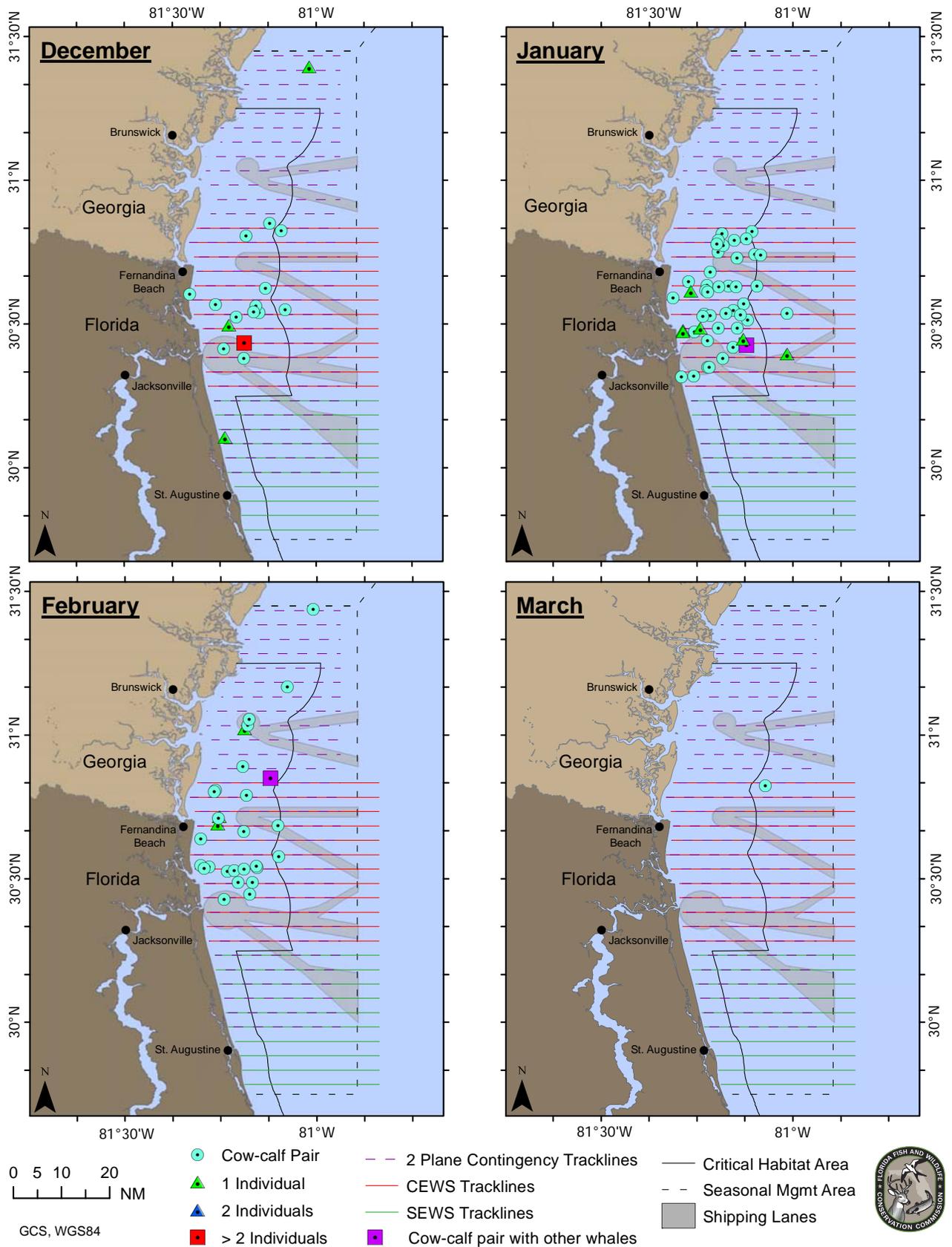


Figure 9. Monthly right whale sightings by the CEWS team
December 2012 through March 2013

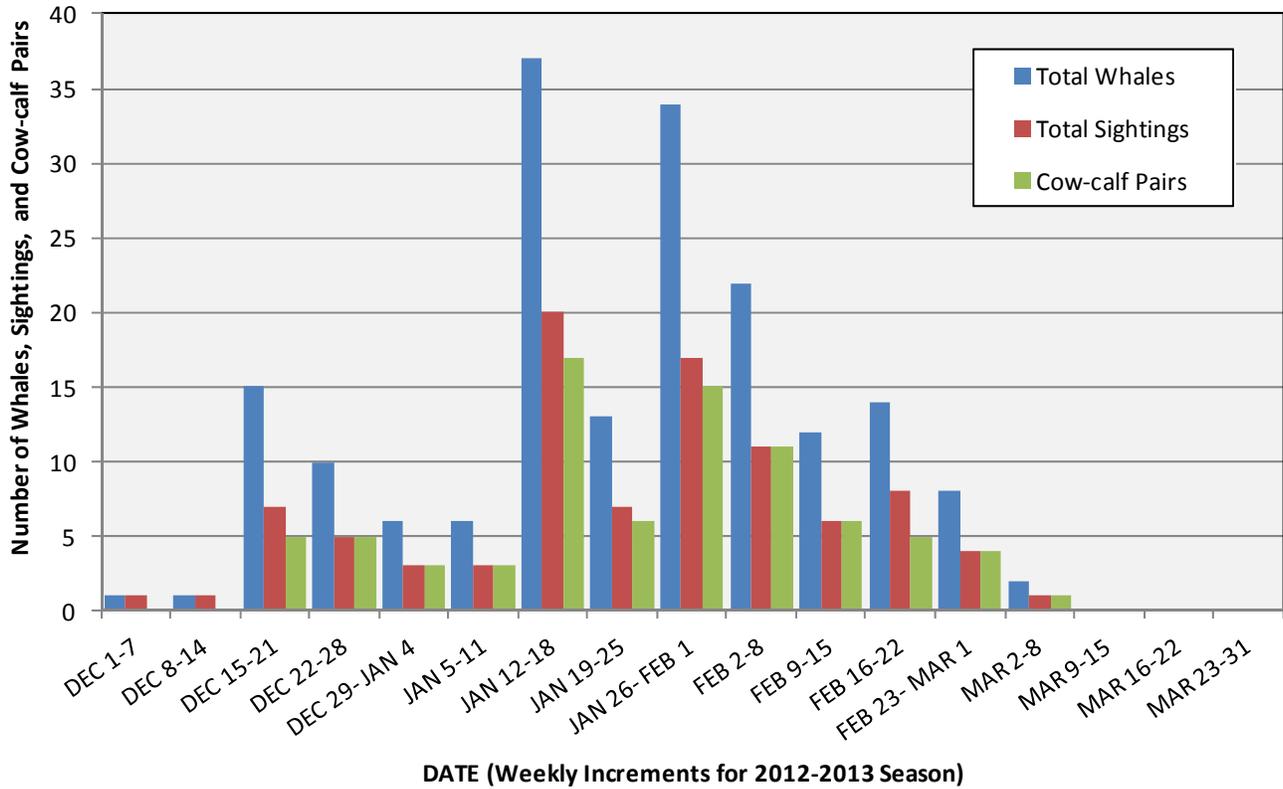


Figure 10. Weekly right whale sightings, right whales and cow-calf pairs by the CEWS team December 2012 through March 2013

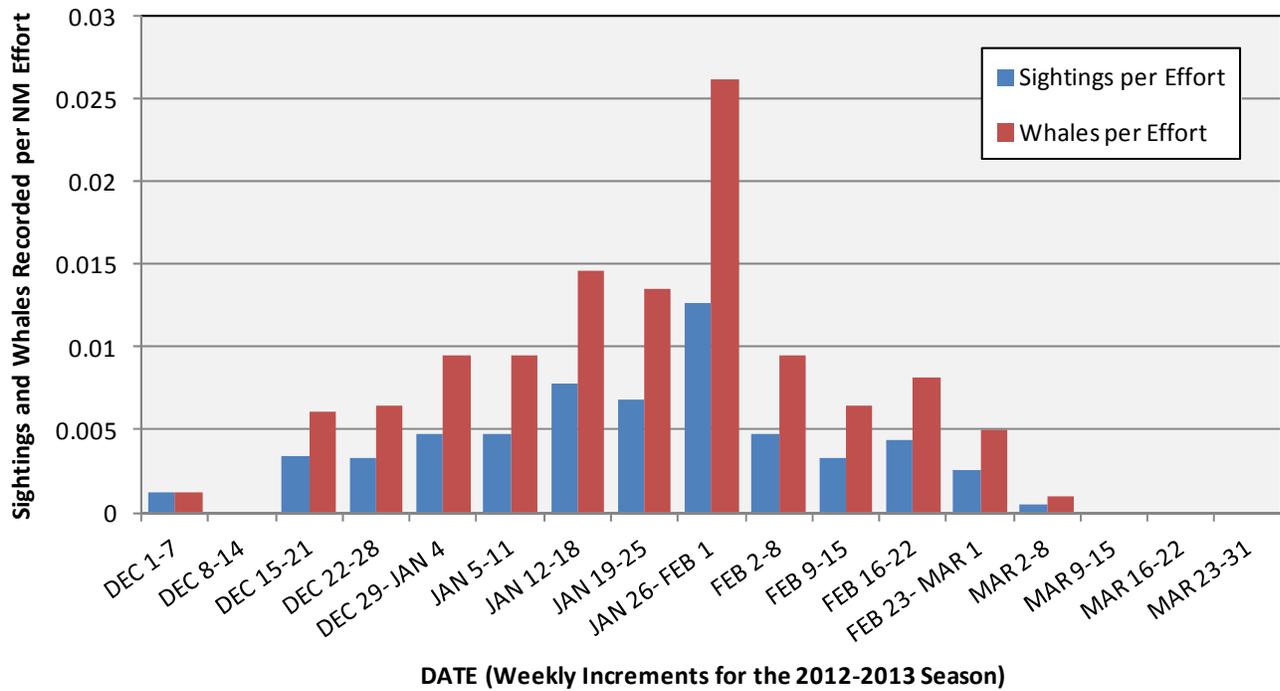


Figure 11. Weekly right whale sightings and whales per NM of on-effort trackline flow by the CEWS team December 2012 through March 2013

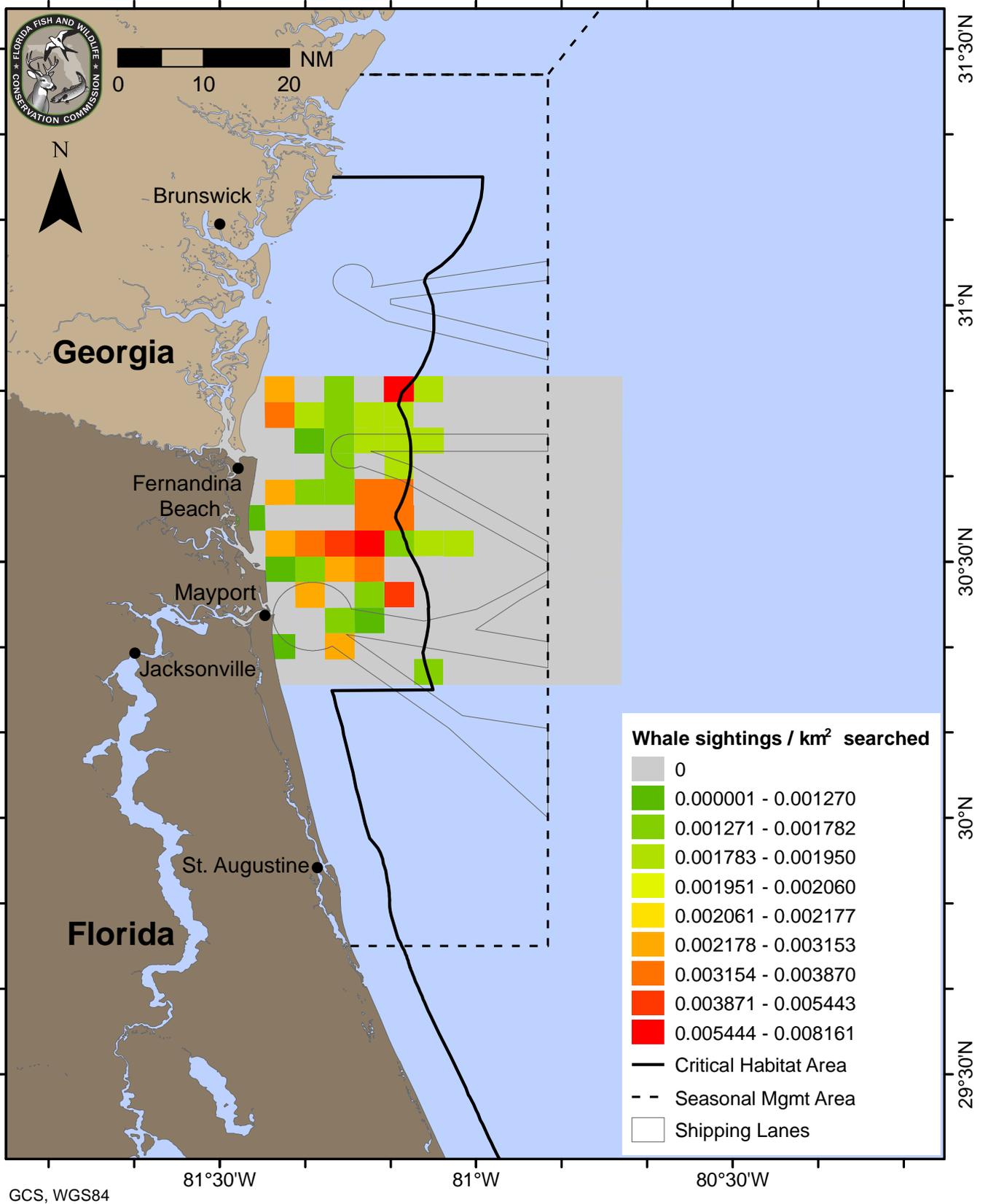


Figure 12. On-effort sightings per unit effort (SPUE) in the CEWS area December 2012-March 2013. SPUE is displayed as the number of whales sighted per km² of area surveyed in 3 x 3 NM grid cells.

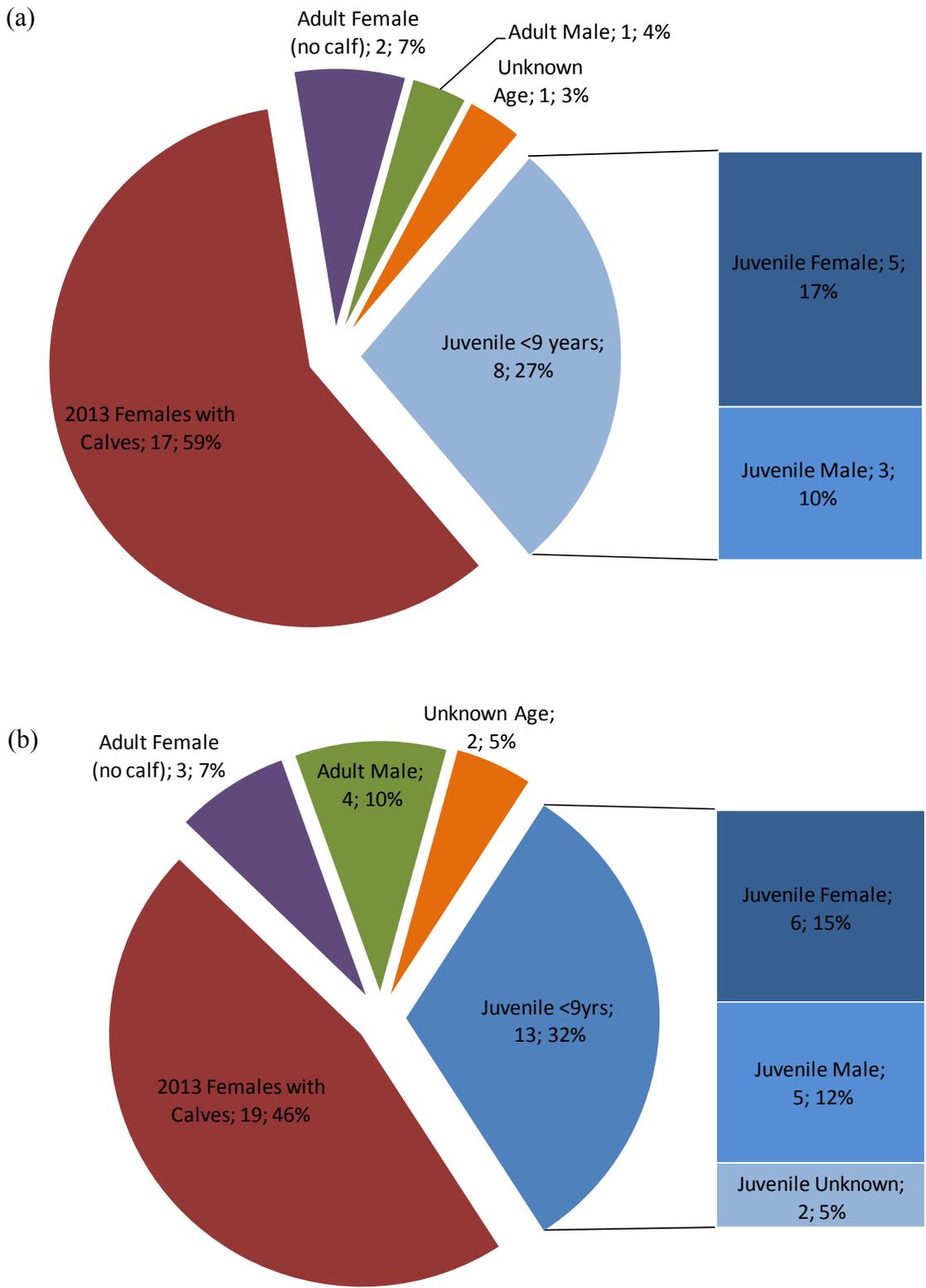


Figure 13. Age and sex class of individual whales

(a) Total individual whales ($n=29$) sighted by the CEWS team, December 2012- March 2013

(b) Total individual whales ($n=41$) sighted in the SEUS from December 2012 through March 2013 provided for reference

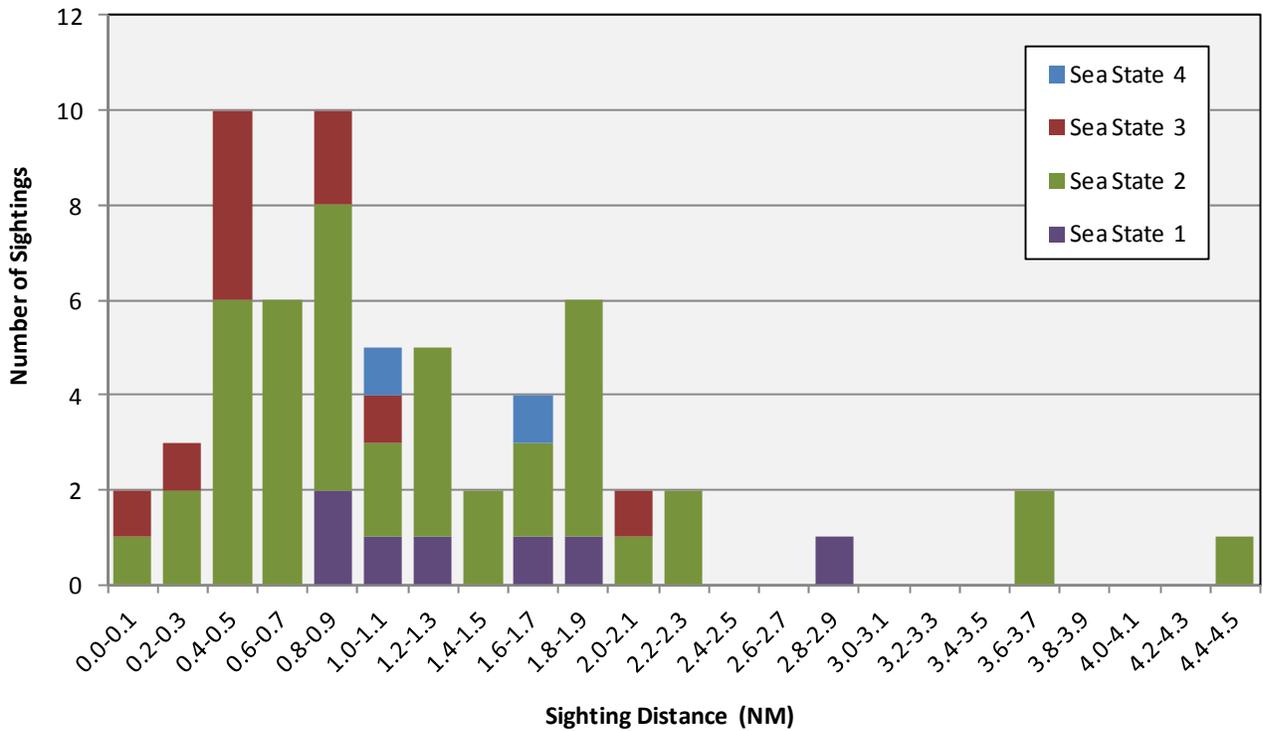


Figure 14. Sighting distance for on-effort right whale sightings by the CEWS team Sightings from December 2012 through March 2013 displayed by sea state (Beaufort scale)

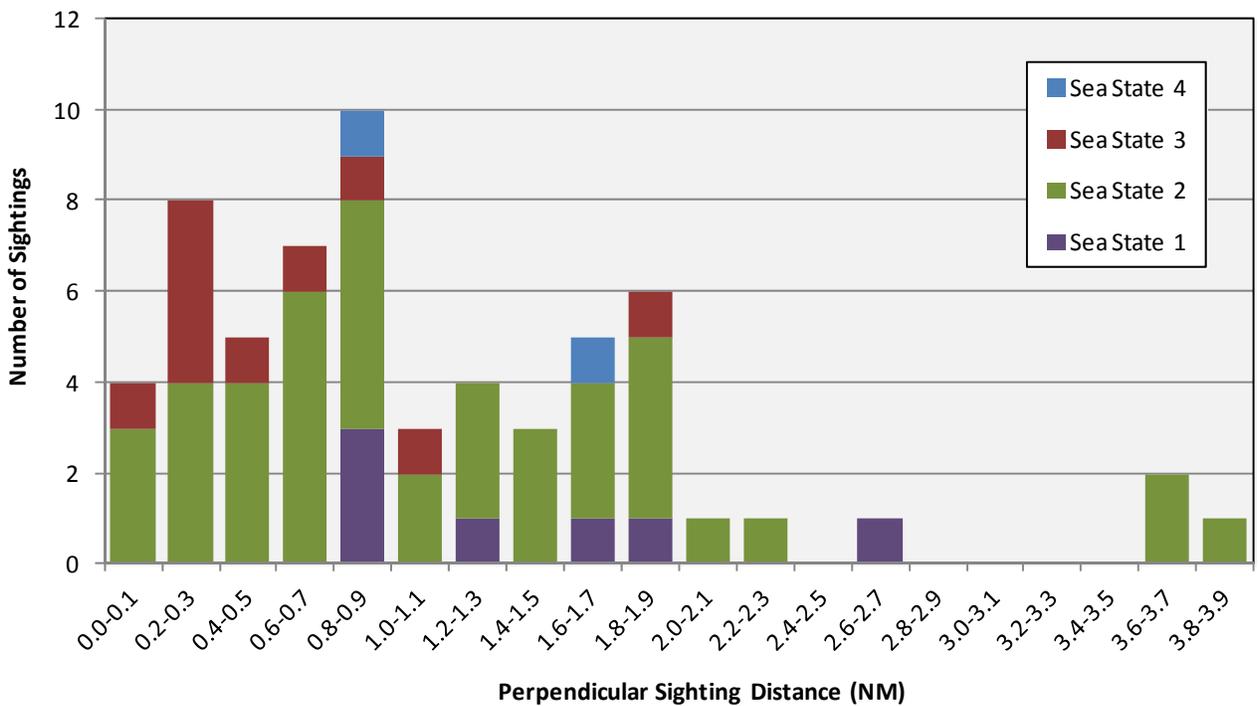


Figure 15. Perpendicular sighting distance for on-effort sightings by the CEWS team Sightings from December 2012 through March 2013 displayed by sea state (Beaufort scale)

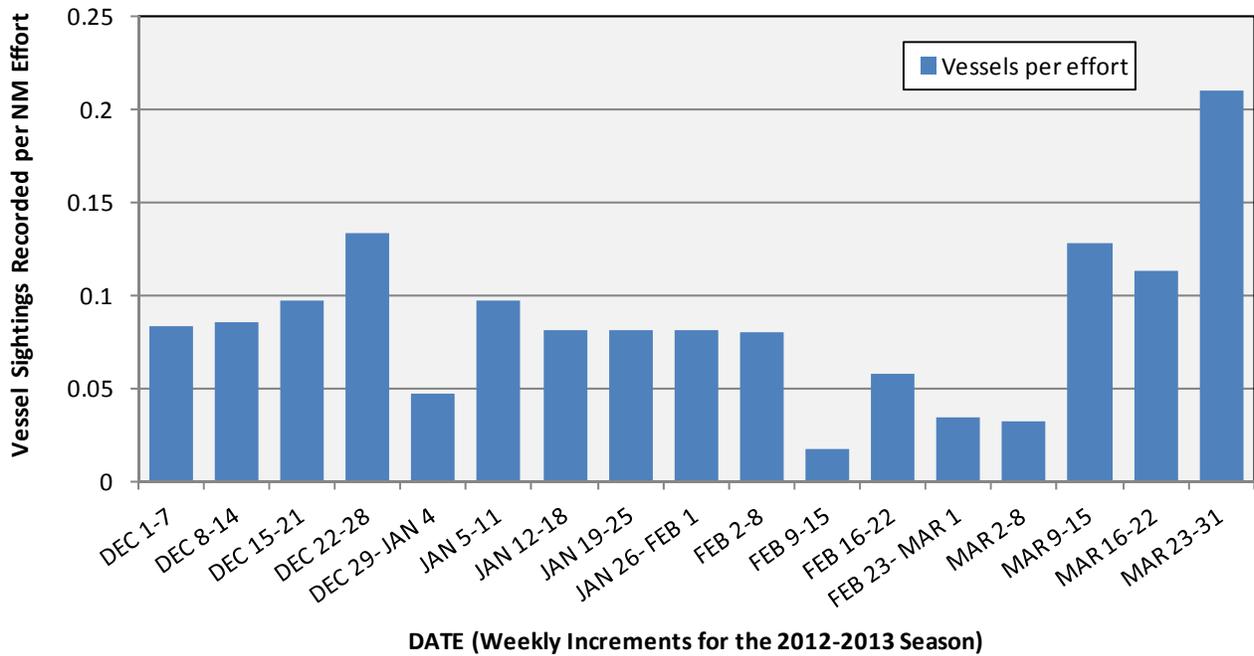


Figure 16. Weekly on-effort vessel sightings per NM of trackline flown by the CEWS team
Sightings include government and small vessels recorded from December 2012 through March 2013

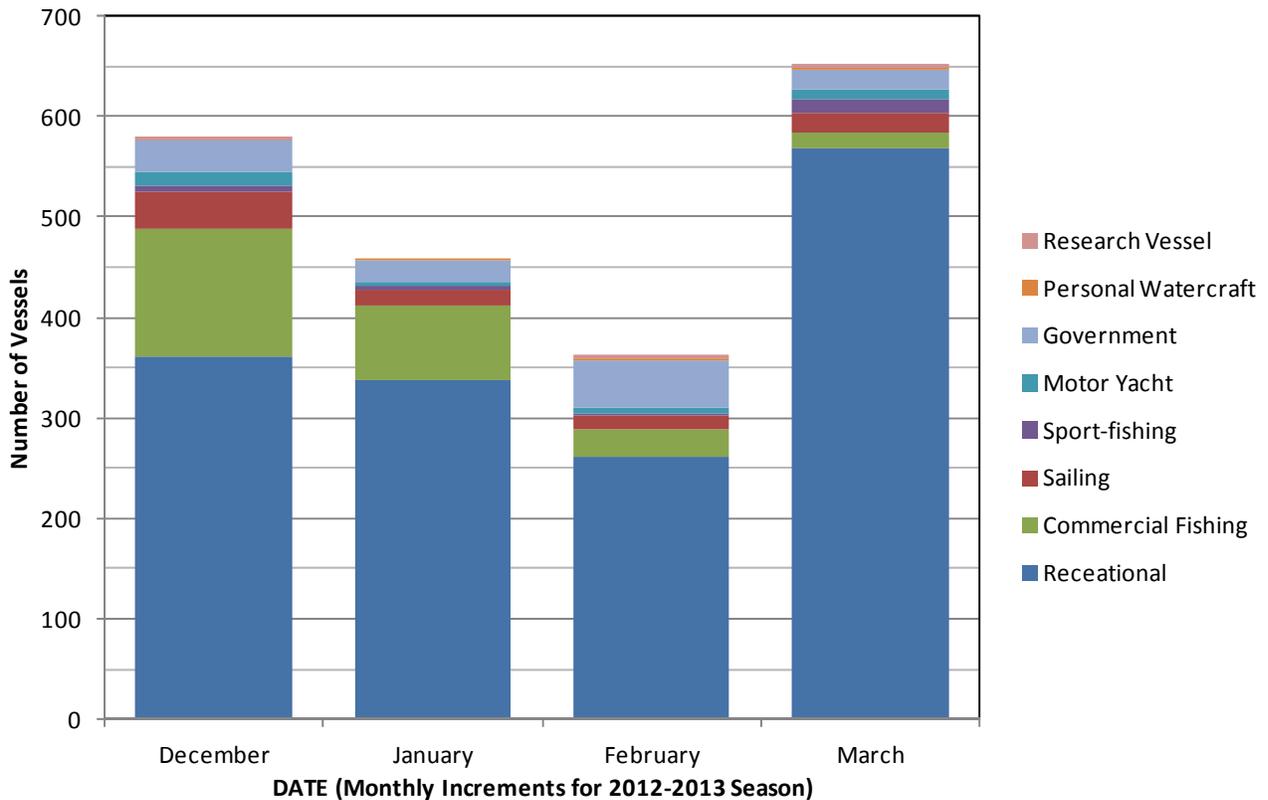


Figure 17. Monthly total of government and small vessel sightings by the CEWS team
Sightings displayed by defined vessel category (Appendix 4), December 2012-March 2013

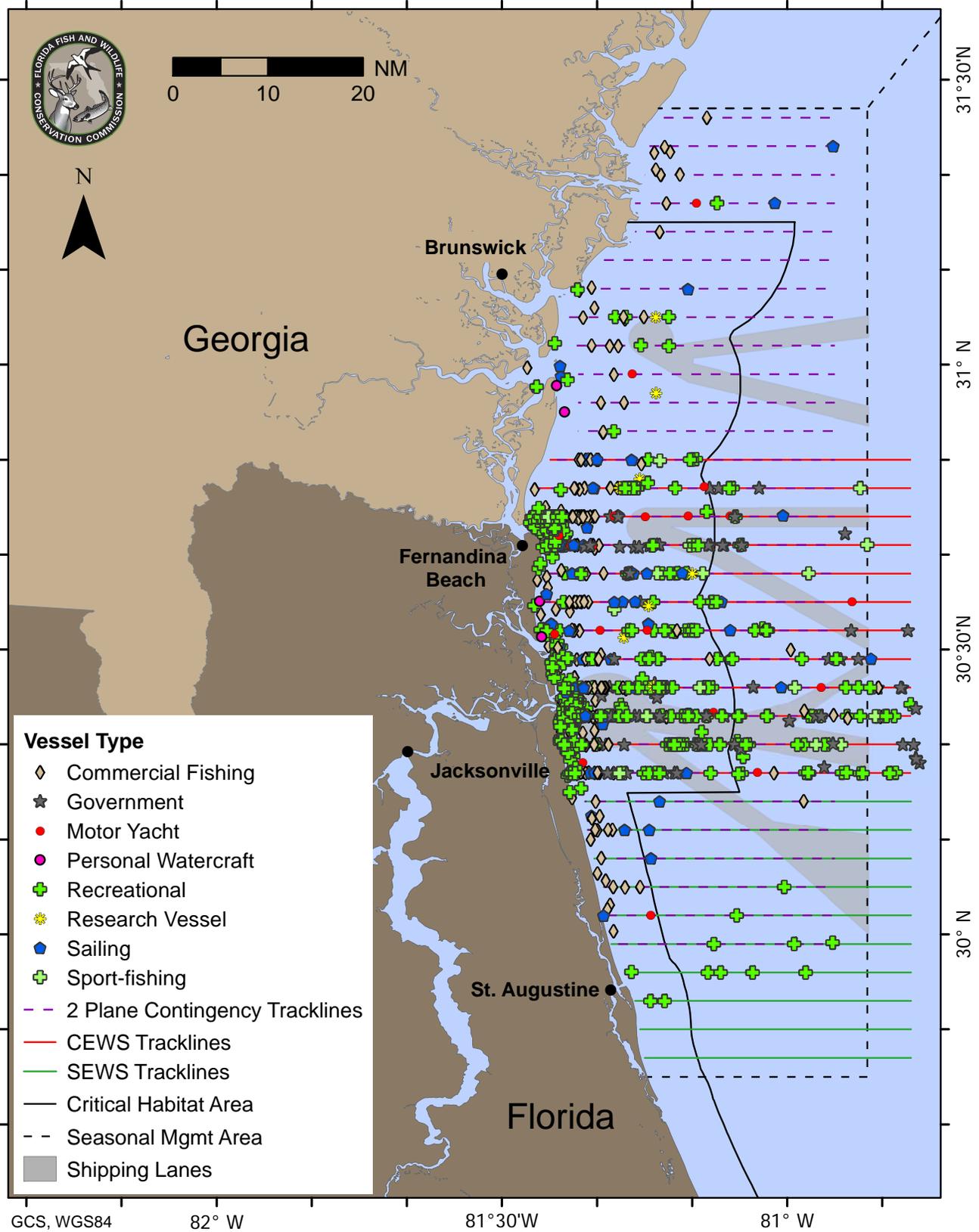


Figure 18. Vessel sightings by the CEWS team
December 2012 through March 2013

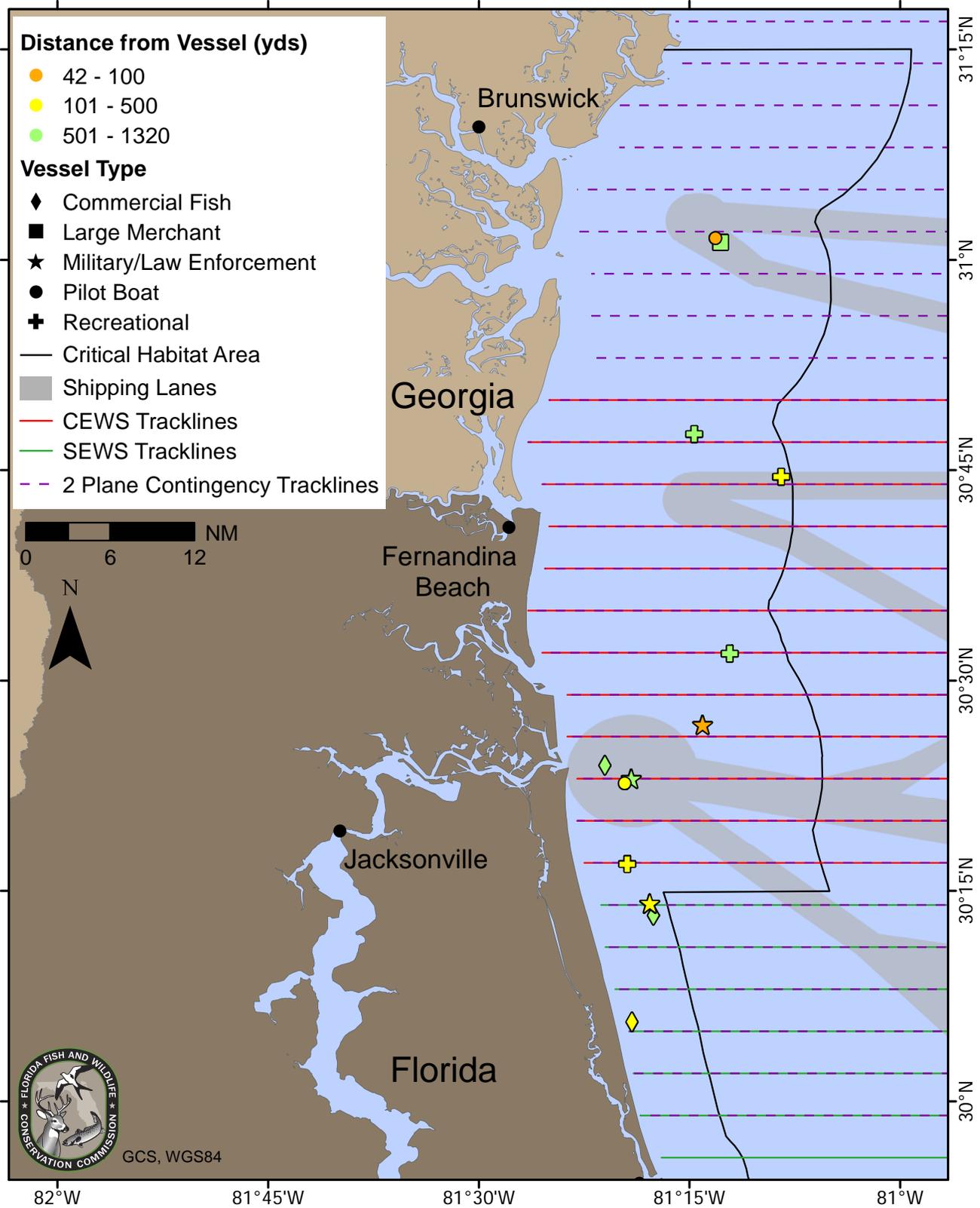


Figure 19. Whale-vessel interactions (WVI) documented by the CEWS and SEWS teams December 2012 through March 2013

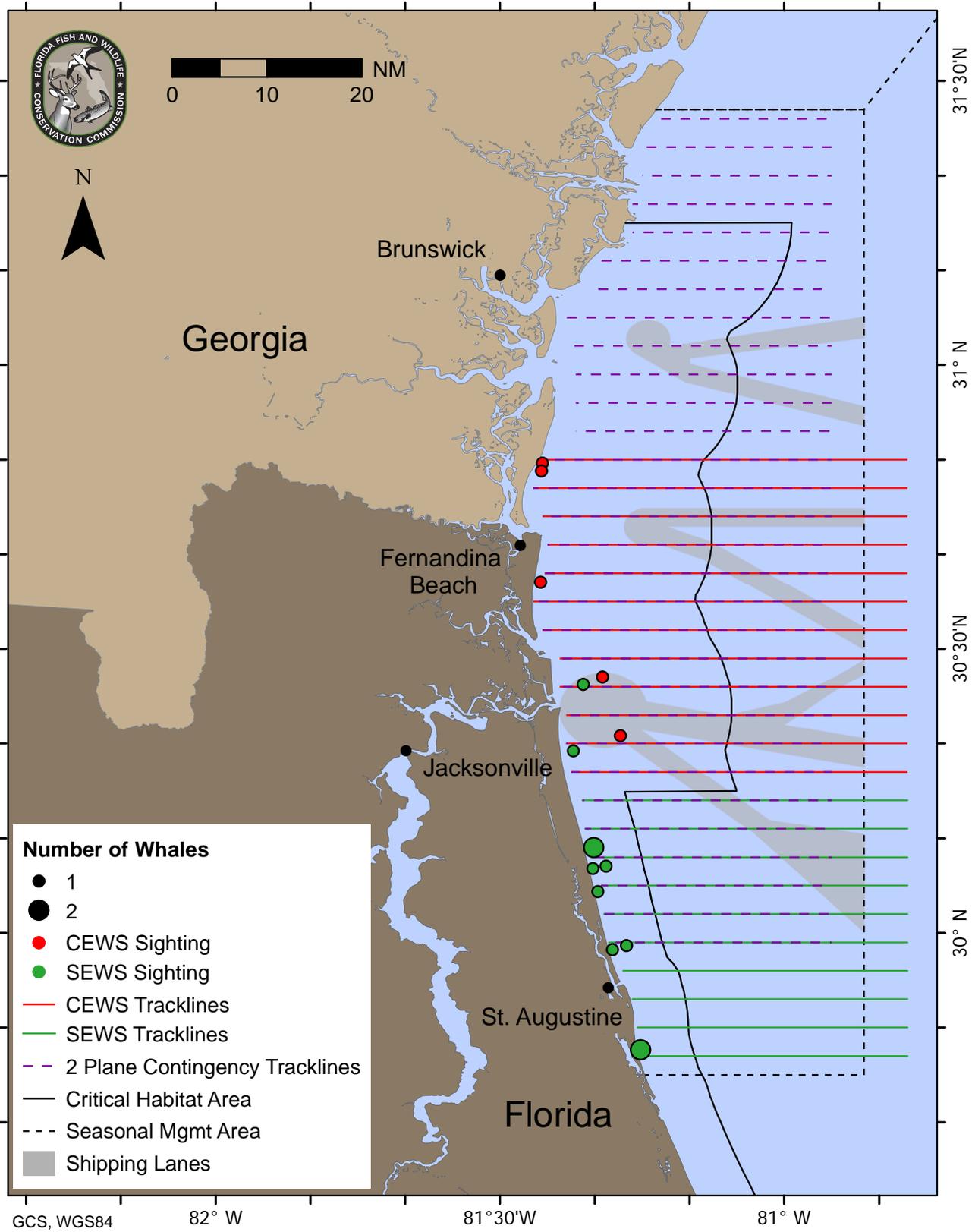


Figure 20. Humpback whale sightings by the CEWS and SEWS teams December 2012 through March 2013

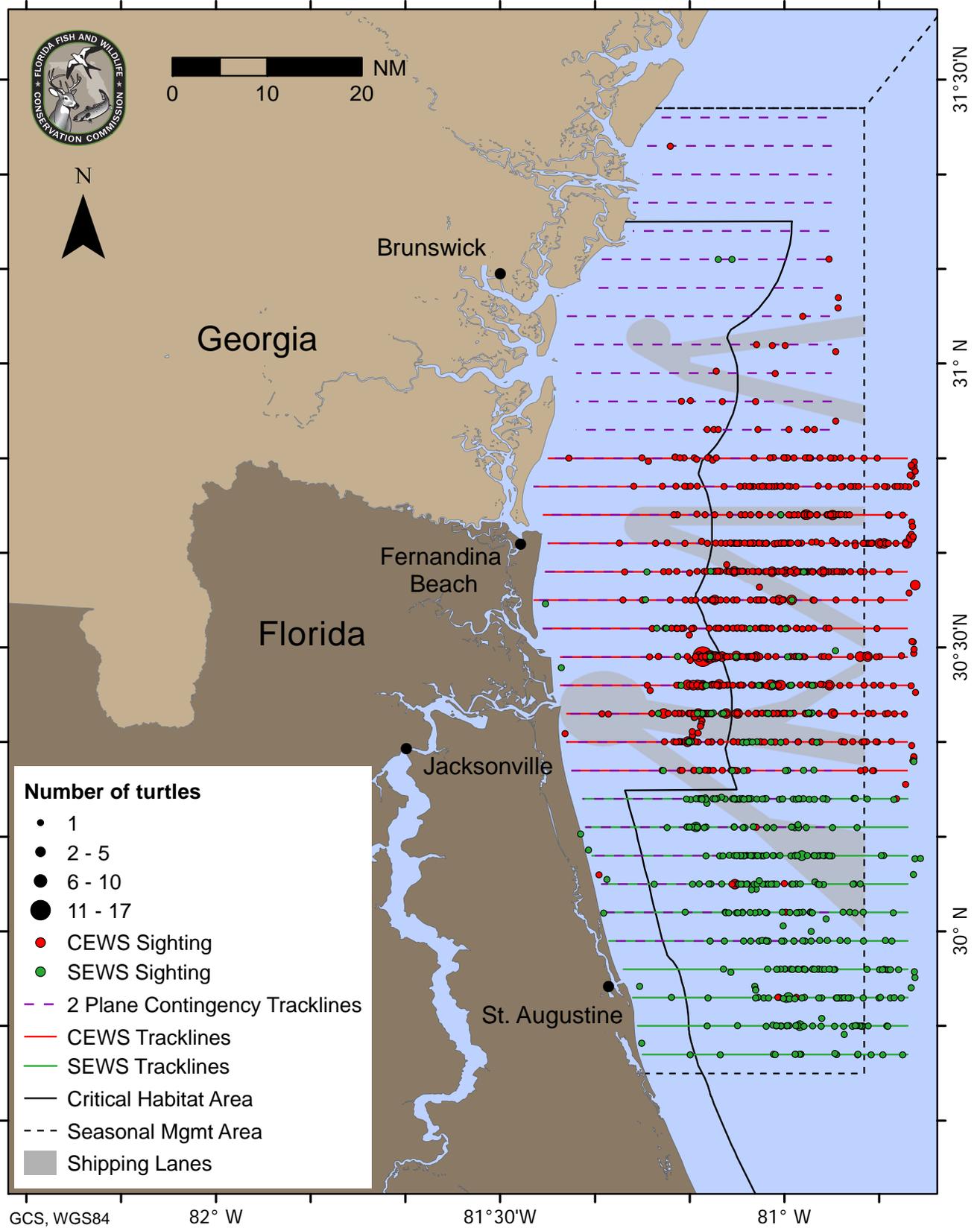


Figure 21. Leatherback turtle sightings by the CEWS and SEWS teams December 2012 through March 2013

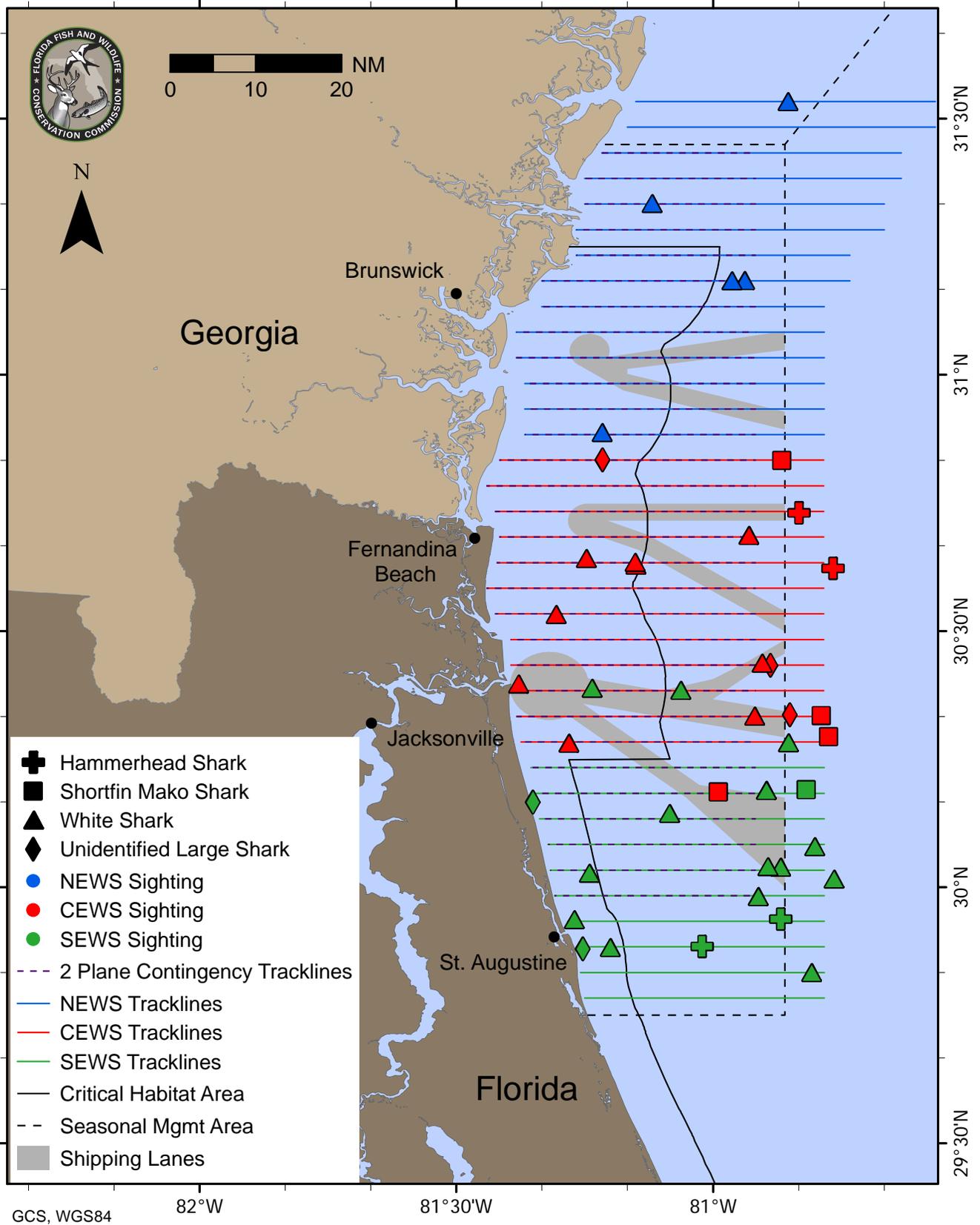


Figure 22. Large shark sightings by the CEWS, NEWS, and SEWS teams December 2012 through March 2013

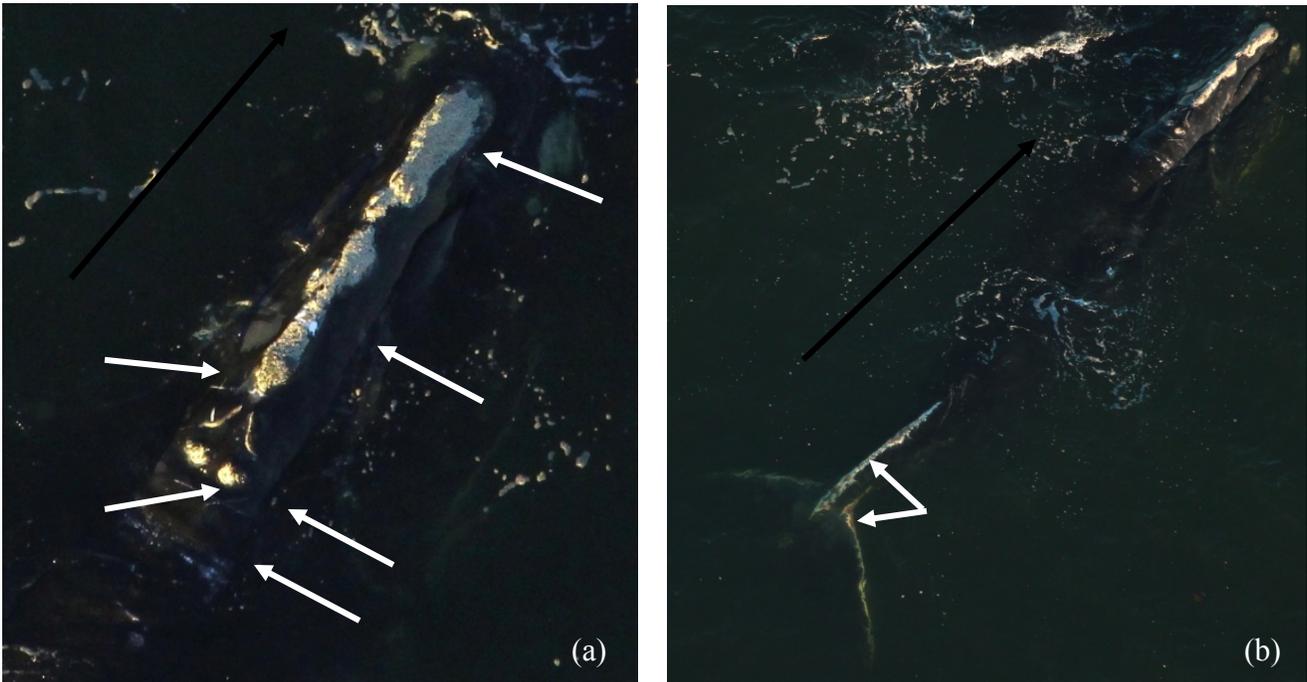


Figure 23. Photographs of Catalog #3942 with entanglement wounds. The white arrows point to entanglement wounds/scars across (a) the rostrum and behind the blowholes and (b) on the peduncle and along the leading edge of the fluke. The black arrows indicate the whale's direction of movement.

Photographs taken 29 December 2012 by Orla O'Brien, FWRI, NOAA Fisheries Permit #15488



Figure 24. Photograph of Catalog #1408 skim feeding along a convergence line of currents. The black arrow indicates the whale's direction of movement. Note small pieces of debris floating on the surface of the water in the bottom of the frame.

Photographs taken 18 February 2013 by Kelsey Howe, FWRI, NOAA Fisheries Permit #15488

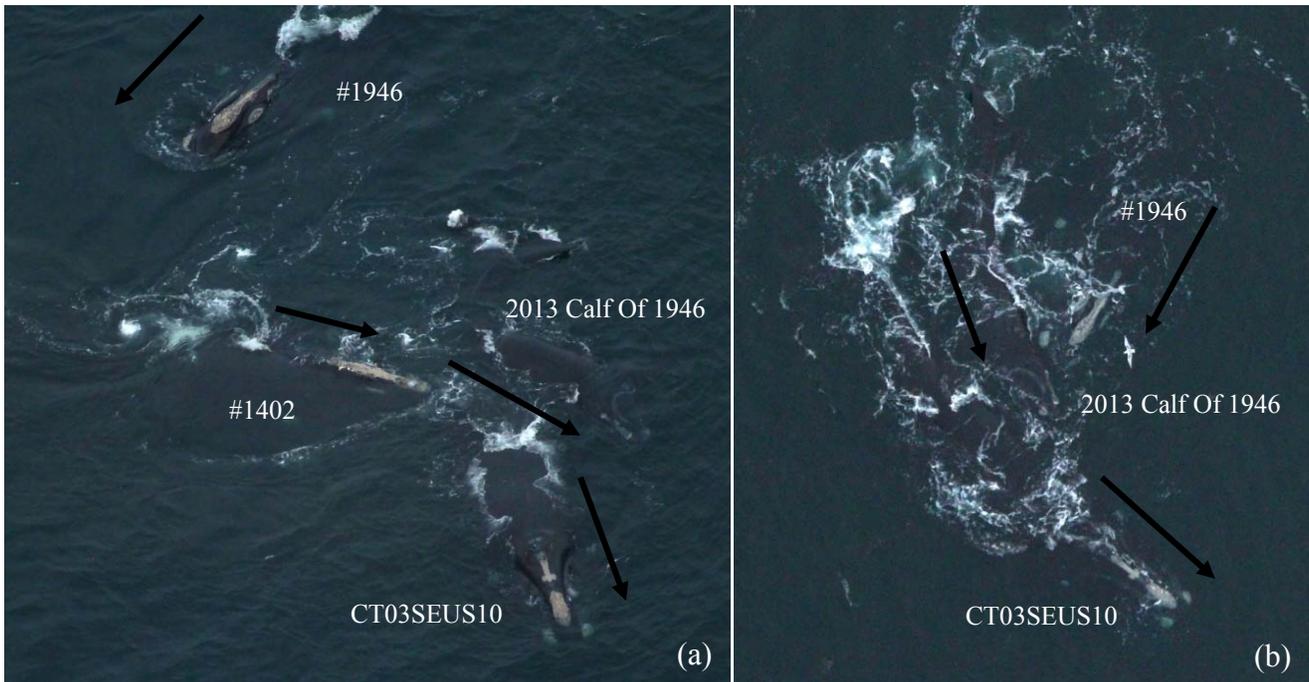


Figure 25. Photographs Catalog #1946 and calf sighted with other whales. Catalog #1946, the 2013 Calf of Catalog #1946, Intermatch CT03SEUS10 and Catalog #1402 have been labeled with ID in white. The black arrows indicate the whales' direction of movement. Note (a) SAG behavior of calf, CT03SEUS10 and #1402 with #1946 on periphery and (b) calf's pursuit of CT03SEUS10 while #1946 attempts to position herself near the calf. Photographs taken 26 January 2013 by Kate Pagan, FWRI, NOAA Fisheries Permit #15488

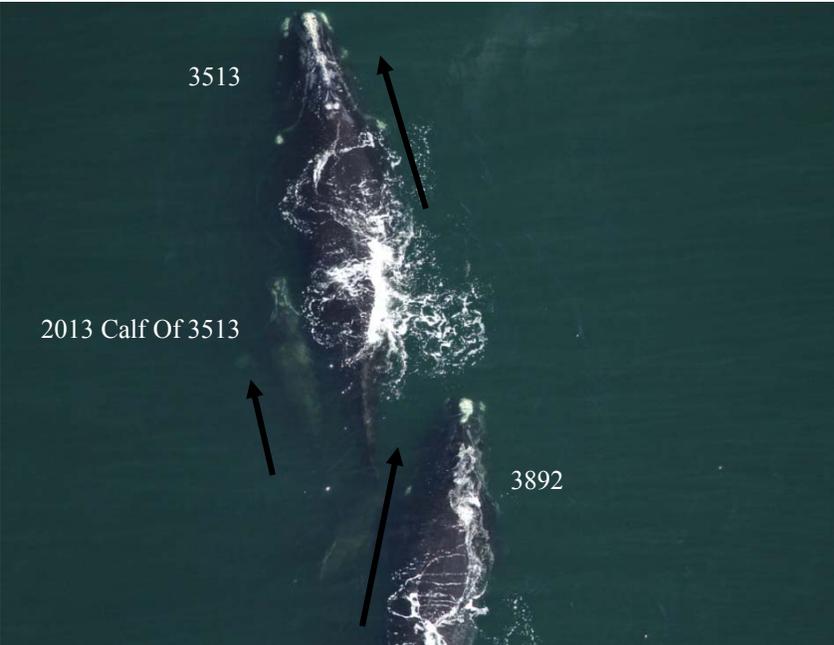


Figure 26. Photograph of Catalog #3513 and calf with a juvenile whale. Catalog #3513, the 2013 Calf of Catalog #3513 and Catalog #3892 have been labeled with ID in white and the black arrows indicate the whales' direction of movement. Note Catalog #3892's pursuit of the cow-calf pair. Photographs taken 20 February 2013 by Orla O'Brien, FWRI, NOAA Fisheries Permit #1548

Table 1. Early warning system (EWS) survey tracklines

Survey Area	EWS Trackline Number	Trackline Latitude	Eastern End Point Longitude	Standard Nautical Mileage	2-Plane Tracklines	Trackline Latitude	2-Plane Eastern Longitude	2-Plane Nautical Mileage	1-Plane Tracklines	Trackline Latitude	1-Plane Eastern Longitude	1-Plane Nautical Mileage
NEWS	a	31° 32.0	80° 34.0	29.9								
NEWS	b	31° 29.0	80° 34.0	30.8								
NEWS	1	31° 26.0	80° 38.0	30.0	1	31° 26.0	80° 55.0	15.4				
NEWS	2	31° 23.0	80° 38.0	31.7	2	31° 23.0	80° 55.0	17.1				
NEWS	3	31° 20.0	80° 40.0	30.0	3	31° 20.0	80° 55.0	17.1				
NEWS	4	31° 17.0	80° 40.0	30.8	4	31° 17.0	80° 55.0	18.0				
NEWS	5	31° 14.0	80° 44.0	27.5	5	31° 14.0	80° 55.0	18.0	5	31° 14.0	81° 00.0	13.7
NEWS	6	31° 11.0	80° 44.0	30.9	6	31° 11.0	80° 55.0	21.4	6	31° 11.0	81° 00.0	17.1
NEWS	7	31° 08.0	80° 47.0	28.3	7	31° 08.0	80° 55.0	21.4	7	31° 08.0	81° 00.0	17.1
NEWS	8	31° 05.0	80° 47.0	30.9	8	31° 05.0	80° 55.0	24.0	8	31° 05.0	81° 00.0	19.7
NEWS	9	31° 02.0	80° 47.0	30.9	9	31° 02.0	80° 55.0	24.0	9	31° 02.0	81° 00.0	19.7
NEWS	10	30° 59.0	80° 47.0	30.1	10	30° 59.0	80° 55.0	23.2	10	30° 59.0	81° 00.0	18.9
NEWS	11	30° 56.0	80° 47.0	30.1	11	30° 56.0	80° 55.0	23.2	11	30° 56.0	81° 00.0	18.9
NEWS	12	30° 53.0	80° 47.0	30.2	12	30° 53.0	80° 55.0	23.2	12	30° 53.0	81° 00.0	18.9
CEWS	13	30° 50.0	80° 47.0	32.8	13	30° 50.0	80° 55.0	25.8	13	30° 50.0	81° 00.0	21.5
CEWS	14	30° 47.0	80° 47.0	34.1	14	30° 47.0	80° 55.0	27.1	14	30° 47.0	81° 00.0	22.8
CEWS	15	30° 44.0	80° 47.0	33.2	15	30° 44.0	80° 55.0	26.3	15	30° 44.0	81° 00.0	22.0
CEWS	16	30° 41.0	80° 47.0	32.8	16	30° 41.0	80° 55.0	25.9	16	30° 41.0	81° 00.0	21.6
CEWS	17	30° 38.0	80° 47.0	33.1	17	30° 38.0	80° 55.0	26.1	17	30° 38.0	81° 00.0	21.8
CEWS	18	30° 35.0	80° 47.0	34.1	18	30° 35.0	80° 55.0	27.2	18	30° 35.0	81° 00.0	22.9
CEWS	19	30° 32.0	80° 47.0	33.3	19	30° 32.0	80° 55.0	26.3	19	30° 32.0	81° 00.0	22.0
CEWS	20	30° 29.0	80° 47.0	31.7	20	30° 29.0	80° 55.0	24.8	20	30° 29.0	81° 00.0	20.5
CEWS	21	30° 26.0	80° 47.0	31.7	21	30° 26.0	80° 55.0	24.8	21	30° 26.0	81° 00.0	20.5
CEWS	22	30° 23.0	80° 47.0	31.1	22	30° 23.0	80° 55.0	24.2	22	30° 23.0	81° 00.0	19.9
CEWS	23	30° 20.0	80° 47.0	31.2	23	30° 20.0	80° 55.0	24.2	23	30° 20.0	81° 00.0	19.9
CEWS	24	30° 17.0	80° 47.0	30.8	24	30° 17.0	80° 55.0	23.8	24	30° 17.0	81° 00.0	19.5
SEWS	25	30° 14.0	80° 47.0	29.7	25	30° 14.0	80° 55.0	22.8	25	30° 14.0	81° 00.0	18.5
SEWS	26	30° 11.0	80° 47.0	29.5	26	30° 11.0	80° 55.0	22.5	26	30° 11.0	81° 00.0	18.2
SEWS	27	30° 08.0	80° 47.0	28.9	27	30° 08.0	80° 55.0	21.9				
SEWS	28	30° 05.0	80° 47.0	28.1	28	30° 05.0	80° 55.0	21.1				
SEWS	29	30° 02.0	80° 47.0	27.8	29	30° 02.0	80° 55.0	20.8				
SEWS	30	29° 59.0	80° 47.0	27.4	30	29° 59.0	80° 55.0	20.4				
SEWS	31	29° 56.0	80° 47.0	26.1								
SEWS	32	29° 53.0	80° 47.0	25.2								
SEWS	33	29° 50.0	80° 47.0	24.8								
SEWS	34	29° 47.0	80° 47.0	24.4								

Table 2. CEWS survey team activities, December 2012-March 2013

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
1-Dec-12		X													No fly - high winds and rain
2-Dec-12		X													No fly - high winds and rain
3-Dec-12		X													No fly - low ceiling. Standby until 1300(L) due to low ceiling.
4-Dec-12				X	1-16	1	1	0		6.4	575.73	411.18	411.18		Northern portion of 2-plane contingency. Lines 3126N-3041N flown S to N. Standby due to fog.
5-Dec-12				X	1-16	0	0	0		6.1	535.07	421.99	421.99		Northern portion of 2-plane contingency. Lines 3126N-3041N flown S to N. Standby due to fog and mechanical issue.
6-Dec-12		X													No fly - high winds
7-Dec-12		X													No fly - high winds, low ceiling
8-Dec-12		X													No fly - low ceiling and fog
9-Dec-12			X		19-24	0	0	0		2.8	194.84	161.61	161.61		Lines 3032N-3017N flown S to N. Small areas of fog throughout the survey area resulted in several short periods of off watch. Standby due to fog and rain.
10-Dec-12			X		17-24	1	1	0		4.3	357.76	258.11	258.11		Lines 3038N-3017N flown S to N. Off effort for short periods of time on lines 3026N-3017N due to offshore fog. Standby due to fog.
11-Dec-12			X		13-22	0	0	0		4.3	390.78	347.58	347.58		Lines 3050N-3023N flown N to S. Short period of off effort due to fog in the middle of line 3047N and at the end of line 3044N. Transit north on track. Standby due to fog.
12-Dec-12		X													No fly - high wind and rain
13-Dec-12		X													No fly - high wind and rain
14-Dec-12		X													No fly - high wind and sea state
15-Dec-12		X													No fly - high winds, rain, and low ceiling/fog. Standby until 1300(L) due to low ceiling.

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
16-Dec-12			X		13-24	1	2	1		6.6	548.86	401.98	401.98		Lines 3050N-3017N flown S to N. Responded to sighting report in St.Johns channel directly after takeoff. Off effort for portion of circling sighting due to low fog. Line 3029N cut just before the end of the line due to low ceiling. Standby due to fog.
17-Dec-12	X				13-24	2	4	2	1	6.1	585.83	416.41	416.41		Lines 3050N-3017N flown N to S. Transit north on track.
18-Dec-12		X													No fly - high winds
19-Dec-12			X		13-14, 17-28	4	9	2		7.7	664.13	465.51	465.51	Yes	Lines 3038N-3005N flown S to N and lines 3050N-3047N flown N to S. Transit north on track. Transited above survey speed (off watch) to sighting verification near St. Johns channel.
20-Dec-12			X		13-18, 21-24	0	0	0		3.0	276.08	194.73	107.79		Lines 3026N-3017N flown S to N and lines 3050N-3035N flown N to S. Cut lines 3026N-3017N and 3044N-3035N offshore between 08055W and 08118W due to high sea state.
21-Dec-12		X													No fly - high winds
22-Dec-12		X													No fly - high winds
23-Dec-12				X	17-34	1	2	1		6.5	590.45	434.52	434.52		Southern portion of 2-plane contingency. Lines 3038N-2947N flown N to S. Transit north on track.
24-Dec-12				X	17-30	0	0	0		3.6	326.79	235.26	83.39		Southern portion of 2-plane contingency. Lines 3038N -2959N flown N to S. Cut lines 3032N-2959N offshore due to high sea state.
25-Dec-12				X	17-24	0	0	0	1	3.5	329.14	234.19	200.62		Modified 2-plane contingency. Lines 3038N-3017N flown S to N. Lines 3038N-3029N cut offshore between 08108W-08059W due to high sea state. Responded to whale report nearshore Fernandina then transited along the coast on track to St. Augustine Inlet (3035N-2954N) and back to Jacksonville (2956N-3016N). Ended survey due to high sea state. Standby due to coordination with the NEWS team and fog to the north.
26-Dec-12		X													No fly - high winds and rain

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
27-Dec-12		X													No fly - high winds
28-Dec-12			X		13-22	4	8	4		6.3	579.83	331.58	331.58	Yes	Lines 3050N-3023N flown N to S
29-Dec-12		X													No fly - high winds
30-Dec-12		X													No fly - high winds
31-Dec-12				X	5-12, 18, 22- 23	3	6	3		5.5	497.46	211.81	115.81		One-plane contingency. Lines 3114N-3111N flown N to S. Transit north on track. Landed at McKinnon to standby due to high sea state. Lines 3108N-3053N flown N to S. Cut lines 3102N-3053N offshore at approx. 08109W due to high sea state. Transited south to verify sighting report off Fernandina. Flew inshore portion of line 3035N (worked a sighting) and then transited south to verify a sighting report in Jax channel. Then lines 3023N-3020N flown N to S.
1-Jan-13		X													No fly - high winds and fog
2-Jan-13		X													No fly - high winds and rain
3-Jan-13		X													No fly - high wind and rain
4-Jan-13		X													No fly - high winds
5-Jan-13		X													No fly - high winds
6-Jan-13		X													No fly - high winds and rain
7-Jan-13		X													No fly - high winds
8-Jan-13		X													No fly - high winds and rain
9-Jan-13			X			0	0	0		0.4	0.00	0.00	0.00		After takeoff, encountered low dense fog at shoreline. Attempted to fly east on 3017N trackline but fog worsened and ceiling lowered. Aborted survey and returned to airport. No 'on effort' survey due to low visibility. Standby until 1230(L) due to fog.
10-Jan-13		X													No fly - low ceiling/fog and high winds
11-Jan-13	X				13-24	3	6	3		6.5	612.27	421.52	421.52		Lines 3050N-3017N flown S to N. Transit south on track. Delayed takeoff due to fog.
12-Jan-13	X				13-24	5	10	5		6.7	624.46	387.80	387.80		Lines 3050N-3017N flown S to N. Transit south above survey speed (off effort) due to time constraints. Delayed takeoff/standby due to fog.

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
13-Jan-13	X				13-24	3	6	3		6.8	633.01	418.01	418.01	Yes	Lines 3050N-3017N flown S to N. Transit south on track. Delayed takeoff due to fog.
14-Jan-13	X				13-24	4	7	3		7.2	669.61	412.46	384.72		Lines 3050N-3017N flown N to S. Transit north on track. Responded to sighting report off Amelia Island. Delayed takeoff due to fog.
15-Jan-13			X		13-22	3	6	3		6.0	534.28	325.83	325.83		Lines 3050N-3017N flown. Lines 3050N-3035N flown S to N and lines 3032N-3023N flown N to S. Survey configuration altered due to restricted airspace in Area AA. Sighting verification on line 3032N.
16-Jan-13			X		13-24	5	8	3	1	8.1	627.02	371.10	363.02		Flew lines 3050N-3017N. Lines 3050N-3035N flown S to N and lines 3032N-3017N flown N to S. Cut lines 3038N-3035N at approx. 08052W due to high sea state and lines 3044N-3041N at 08055W due to restricted airspace in Area AA. After completing survey, transited N off watch (above survey speed) to verify a sighting report off Cumberland Island. Unable to locate whales. Transited back to airport off watch (above survey speed).
17-Jan-13		X													No fly - pilot rest and high winds
18-Jan-13		X													No fly - high winds
19-Jan-13		X													No fly - high winds
20-Jan-13		X													No fly - high winds
21-Jan-13			X		13-22	5	9	4		6.2	577.35	348.11	341.91		Lines 3050N-3023N flown N to S. Verified sighting report off Nassau Sound after completing line 3047N. Broke from line 3041N to document a second sighting report off Cumberland Island. Cut lines 3038N-3035N at 08100W due to high sea state. Transit north on track.
22-Jan-13		X													No fly - high winds
23-Jan-13		X													No fly - high winds. Standby until 1130(L) due to increasing winds.
24-Jan-13		X													No fly - high winds

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
25-Jan-13	X				13-24	2	4	2		5.7	534.56	391.64	356.73		Lines 3050N-3017N flown S to N. Transit south above survey speed (off watch). Standby due to high winds.
26-Jan-13			X		13-21	9	20	9		6.6	616.77	300.28	285.83		Lines 3050N-3026N flown N to S. Line 3026N cut at 08011W after sighting #9 and line 3023N not flown due to time constraints. Transit north on track. Transit to airport at the end of the day above survey speed (off effort). Standby due to high winds.
27-Jan-13		X													No fly - high winds
28-Jan-13	X				13-24	3	5	2		6.2	579.64	419.75	395.50		Lines 3050N-3017N flown S to N. Transit south on track. Standby due to high winds.
29-Jan-13			X		13-24	5	9	4		6.7	551.60	389.55	389.55		Lines 3050N-3017N flown S to N. Lines 3053N-3043N cut at 08055W due to restricted airspace in Area AA. After survey verified two public sighting reports off Jacksonville. Off effort for last two sightings due to increased speed and time constraints. Transit south on track. Standby mid-day due to low ceiling in northern portion of survey area. Delayed takeoff due to fog.
30-Jan-13		X													No fly - high winds
31-Jan-13		X													No fly - high winds
1-Feb-13		X													No fly - high winds
2-Feb-13			X		13-24	1	2	1	1	4.2	395.23	288.96	288.96		Lines 3050N-3017N flown N to S. Lines 3050N-3047N cut at 08055W and lines 3044N-3017N cut at 08100W due to time constraints. Transit north on track. Standby due to high winds.
3-Feb-13		X													No fly - high winds
4-Feb-13	X				13-24	3	6	3		6.9	632.63	416.47	416.47		Lines 3050N-3017N flown N to S. Transit north on track. After line 3023N flew north to verify report of whales near the St. Mary's channel.

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
5-Feb-13	X				13-24	2	4	2		6.5	579.03	417.17	417.17	Yes	Lines 3050N-3017N flown N to During survey, boxed area around St. Mary's River entrance due to increased sightings in the vicinity. Transit north on track.
6-Feb-13	X				13-24	4	8	4		6.5	604.50	395.70	394.54		Lines 3050N-3035N flown S to N and lines 3032N-3017N flown N to S. Survey configuration altered due to restricted airspace in Area AA. Delayed takeoff due to aircraft maintenance.
7-Feb-13		X													No fly - high wind and rain
8-Feb-13			X		13-24	1	2	1		2.6	242.02	160.82	87.13		Lines 3050N-3017N flown. Lines 3020N-3017N flown S to N and lines 3050N-3023N from N to S; all lines cut offshore due to high sea state. Transit north on track. Standby due to high winds.
9-Feb-13		X													No fly - high winds
10-Feb-13		X													No fly - high winds
11-Feb-13			X		12-25	3	6	3		6.4	596.03	397.51	181.68		Lines 3053N-3014N flown. Lines 3053N-3032N flown S to N. Lines 3029N-3014N flown N to S. Cut all lines offshore due to high sea state. Started on line 3032N in order to verify sighting report in ODMS area. Additional lines flown instead of transiting offshore due to high sea state. Standby due to high winds.
12-Feb-13			X		19-24	1	2	1		3.4	296.03	193.01	182.10		Lines 3032N-3017N flown N to S. Fog bank persisted over the northern portion of survey area all day. Off effort for portion of attempted transit north to 3050N due to fog. Standby due to low ceiling.
13-Feb-13		X													No fly - high winds and rain
14-Feb-13			X		13-22	0	0	0		4.1	387.09	294.76	267.35		Lines 3050N-3023N flown N to S. Lines 3044N-3035N cut at approx. 08056W due to restricted airspace in Area AA. Standby due to rain and low ceilings.

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
15-Feb-13				X	1-14	2	4	2		7.4	563.02	344.34	320.74	Yes	Northern portion of 2-plane contingency. Lines 3126N-3047N flown S to N. Prior to survey, boxed area around St. Andrews Sound for cow-calf pair sighted in the entrance of the sound on 2/14 and remained there all day, no whales found. During transit south, flew past WVI location in Brunswick channel to obtain an updated position on cow-calf pair. Transit north on track.
16-Feb-13		X													No fly - high winds
17-Feb-13		X													No fly - high winds
18-Feb-13				X	1-16	4	7	3		7.1	662.34	416.86	416.86		Northern portion of 2-plane contingency. Lines 3126N-3041N flown S to N. Transit south on track.
19-Feb-13		X													No fly - high winds
20-Feb-13			X		13-24	2	5	2		5.3	508.39	342.65	342.65		Lines 3050N-3017N flown N to S. Cut all lines at 08055W due to time constraints. Transit north on track. Standby due to high winds.
21-Feb-13	X				13-24	2	2	0		6.2	539.92	413.38	413.38		Lines 3050N-3017N flown N to S. Broke from 3041N line to obtain an updated location of sighting in the Fernandina channel. Transit north on track. Standby after refuel due to computer login issue.
22-Feb-13	X				13-24	0	0	0		5.0	466.85	420.99	411.23		Lines 3050N-3017N flown S to N. Transit south on track.
23-Feb-13		X													No fly - high winds and rain
24-Feb-13			X		13-24	4	8	4		7.0	589.23	389.33	389.33		Lines 3050N-3017N flown N to S. Transit north on track. Lines 3020N-3017N cut at approx. 08100W due to the discovery of vessel debris. Reported vessel debris field to USCG and circled to provide requested information. Standby due to low ceiling.
25-Feb-13		X													No fly - high winds and rain
26-Feb-13		X													No fly - high winds and rain

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
27-Feb-13			X		13-24	0	0	0		4.8	466.86	409.73	339.42		Lines 3050N-3017N flown S to N. Lines 3020N-3017N cut offshore at approx. 08054W due to high sea state. Transit south on track. Delayed takeoff due to high winds.
28-Feb-13		X													No fly - high winds
1-Mar-13		X													No fly - high winds
2-Mar-13		X													No fly - high winds
3-Mar-13		X													No fly - high winds
4-Mar-13			X		13-24	1	2	1		4.9	458.38	336.55	336.55		Lines 3050N-3017N flown N to S. Lines 3044N-3017N cut at 08055W due to time constraints. Transit north on track. Standby due to high winds and sea state.
5-Mar-13			X		13-24	0	0	0		3.2	246.99	121.64	59.47		Lines 3050N-3017N flown S to N. Cut lines 3050N-3023N between 08126W and 08112W due to high sea state. Wind increased rapidly inshore by mid-day.
6-Mar-13		X													No fly - high winds
7-Mar-13			X		13-24	0	0	0		5.2	492.54	425.41	422.11		Lines 3050N-3017N flown N to S. Lines 3044N-3035N cut at 08055W due to restricted airspace in Area AA. Takeoff from St. Augustine airport due to repair to CEWS aircraft and high winds in SEWS area. Transit north and south on track. Standby due to high winds.
8-Mar-13			X		13-22	0	0	0		3.9	356.38	318.70	279.48		Lines 3050N-3023N flown N to S. Lines 3050N-3047N cut at 08109W due to high sea state. Transit north on track.
9-Mar-13		X													No fly - high winds
10-Mar-13		X													No fly - high winds
11-Mar-13		X													No fly - high winds
12-Mar-13		X													No fly - high winds
13-Mar-13		X													No fly - high winds
14-Mar-13		X													No fly - high winds
15-Mar-13	X				13-24	0	0	0		5.1	482.08	421.21	405.90		Lines 3050N-3017N flown S to N. Transit south on track. Delayed takeoff due to DST and additional standby due to high sea state.

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
16-Mar-13			X		13-24	0	0	0		4.7	460.24	415.69	392.05		Lines 3050N-3017N flown S to N. Lines 3050N-3047N cut at approx. 08050W due to high sea state. Transit south on track. Delayed takeoff due to DST.
17-Mar-13			X		13-24	0	0	0		5.0	454.79	395.48	377.55		Lines 3050N-3017N flown S to N. Cut lines 3038N-3035N at 08053W and lines 3044N-3041N at 08052W due to increased sea state. Transit south partially on track.
18-Mar-13			X		13-24	0	0	0		5.0	436.52	392.72	392.72		Lines 3050N-3017N flown S to N. Cut lines 3044N-3035N at 08055W due to restricted airspace in Area AA. Transit north on track. Delayed takeoff due to DST and low ceiling.
19-Mar-13			X		13-24	0	0	0	1	5.4	519.72	417.50	310.09		Lines 3050N-3041N flown N to S. Cut inshore portion of lines 3047N-3044N at approx. 08108W due to high sea state. Flew entire 3041N line then back-tracked to survey inshore portion of 3047N-3044N to see if sea state had improved. Switched survey direction due to sea state. Lines 3026N-3017N flown S to N. Cut lines 3026N-3023N at approx. 08055W due to high sea state. After refueling, lines 3038N-3029N flown N to S. Transit north on track. Standby due to rain and visibility concerns.
20-Mar-13		X													No fly - high winds and rain
21-Mar-13		X													No fly - high winds
22-Mar-13			X		13-24	0	0	0		4.8	469.83	416.23	416.23		Lines 3050N-3017N flown N to S. Cut lines 3026N-3023N at approx. 8050W due to pilot error. Transit north on track. Delayed takeoff due to DST and additional standby due to high winds.
23-Mar-13		X													No fly - rain, thunderstorms, and low ceiling associated with stalled front
24-Mar-13		X													No fly - wind, rain, thunderstorms, and low ceiling associated with approaching cold front
25-Mar-13		X													No fly - high winds
26-Mar-13		X													No fly - high winds

Date	Full	None	Partial	One/ Two Plane	EWS Lines	Number of RIWH Sightings	Number of RIWH Whales	RIWH M/C Pair	Number of HUWH Whales	Flight Hours	Total Nautical Miles	Trackline Nautical Miles	On Effort Nautical Miles	WVI	Comments (LAT/LONG format degrees, minutes)
27-Mar-13		X													No fly - high winds
28-Mar-13			X		13-24	0	0	0		4.5	393.05	324.21	271.13		Lines 3050N-3017N flown. Lines 3032N-3017N flown S to N and lines 3050N-3035N from N to S. Cut lines 3032N-3017N between 08101W and 08106W due to high sea state. Transit north on track. Standby in morning due to high winds and sea state. Standby at airport from 1330-1530(L) due to high winds and sea state.
29-Mar-13	X				13-24	0	0	0		5.5	516.15	424.51	424.51		Lines 3050N-3017N flown S to N. Transit south on track. Delayed takeoff due to DST.
30-Mar-13			X		13-24	0	0	0		4.6	416.21	353.00	222.75		Lines 3050N-3017N flown. Lines 3032N-3017N flown S to N and lines 3050N-3035N flown N to S. Lines 3032N-3029N cut at 08112W due to high sea state. Standby midday due to high sea state. Delayed takeoff due to DST.
31-Mar-13		X													No fly - high winds

Table 3. CEWS survey team right whale sightings, December 2012-March 2013

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
12/4/2012	16:02:49	31.39613	-81.02724	A	2042	F	23	LIN TR	CEWS001	Alert delayed due to email distribution list server error
12/10/2012	12:30:35	30.49729	-81.30657	A	3503	F	8	LIN TR	CEWS002	Alert delayed due to email distribution list server error
12/16/2012	10:29:53	30.41479	-81.32190	A	1204	F	>31	W/CALF	CEWS003	
12/16/2012	10:29:53	30.41479	-81.32190	B	2013CalfOf1204	Unk	Calf	CALF W/MOM	CEWS003	
12/17/2012	11:21:21	30.62313	-81.17657	A	2753	F	16	W/CALF, BOD CNT, WH CHN, WH BEL, BRCH	CEWS004	
12/17/2012	11:21:21	30.62313	-81.17657	B	2013CalfOf2753	Unk	Calf	CALF W/MOM, BOD CNT, WH CHN	CEWS004	
12/17/2012	12:21:56	30.52379	-81.27774	C	2330	F	>20	W/CALF, BOD CNT, BLK BEL, BLK CHN, ROLL, HD TLT	CEWS005	
12/17/2012	12:21:56	30.52379	-81.27774	D	2013CalfOf2330	Unk	Calf	CALF W/MOM, BOD CNT	CEWS005	
12/19/2012	10:13:27	30.54063	-81.19840	A	2753	F	16	W/CALF, BOD CNT	CEWS006	
12/19/2012	10:13:27	30.54063	-81.19840	B	2013CalfOf2753	Unk	Calf	CALF W/MOM, BOD CNT	CEWS006	
12/19/2012	13:53:49	30.10496	-81.31974	C	2010CalfOf1145	F	3	BODO, HD TLT	CEWS007	Alert delayed due to email distribution list server error
12/19/2012	15:30:39	30.82613	-81.12190	D	2042	F	23	W/CALF, BOD CNT, ROLL, WH BEL, WH CHN	CEWS008	
12/19/2012	15:30:39	30.82613	-81.12190	E	2013CalfOf2042	Unk	Calf	CALF W/MOM, BOD CNT, WH BEL, WH CHN	CEWS008	
12/19/2012	16:35:06	30.43429	-81.25007	F	3545	M	8	SAG, BUBLS	CEWS009	Paged as 3 adults
12/19/2012	16:35:06	30.43429	-81.25007	G	3966	M	4	SAG	CEWS009	
12/19/2012	16:35:06	30.43429	-81.25007	H	3942	F	4	SAG, BUBLS, WH CHN	CEWS009	
12/19/2012	16:35:06	30.43429	-81.25007	1	3512	F	8		CEWS009	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
12/23/2012	10:27:54	30.54929	-81.10740	A	2042	F	23	W/CALF, NURS	CEWS010	
12/23/2012	10:27:54	30.54929	-81.10740	B	2013Calfof2042	Unk	Calf	CALF W/MOM, WH CHN, NURS	CEWS010	
12/28/2012	9:48:40	30.84996	-81.16107	A	2330	F	>20	W/CALF, BOD CNT, HD TLT	CEWS011	
12/28/2012	9:48:40	30.84996	-81.16107	B	2013Calfof2330	Unk	Calf	CALF W/MOM, BOD CNT, ROLL	CEWS011	
12/28/2012	10:36:49	30.80746	-81.24340	C	3513	F	8	W/CALF, NURS, BODO	CEWS012	
12/28/2012	10:36:49	30.80746	-81.24340	D	2013Calfof3513	Unk	Calf	CALF W/MOM, NURS, BODO	CEWS012	
12/28/2012	12:45:24	30.56396	-81.20857	E	2042	F	23	W/CALF, BOD CNT, NURS	CEWS013	
12/28/2012	12:45:24	30.56396	-81.20857	F	2013Calfof2042	Unk	Calf	CALF W/MOM, BOD CNT, WH BEL, WH CHN, NURS, HD LFT	CEWS013	
12/28/2012	14:00:52	30.54246	-81.21690	G	2042	F	23	W/CALF, WH CHN	CEWS014	
12/28/2012	14:00:52	30.54246	-81.21690	H	2013Calfof2042	Unk	Calf	CALF W/MOM	CEWS014	
12/31/2012	14:29:41	30.60329	-81.43907	A	3540	F	8	W/CALF, BODO	CEWS015	
12/31/2012	14:29:41	30.60329	-81.43907	B	2013Calfof3540	Unk	Calf	CALF W/MOM, BODO	CEWS015	
12/31/2012	14:58:47	30.56863	-81.35040	C	2912	F	14	W/CALF, HD TLT, NURS	CEWS016	
12/31/2012	14:58:47	30.56863	-81.35040	D	2013Calfof2912	Unk	Calf	CALF W/MOM, ROLL, NURS	CEWS016	
12/31/2012	15:53:22	30.37929	-81.25190	E	2320	F	>20	W/CALF	CEWS017	
12/31/2012	15:53:22	30.37929	-81.25190	F	2013Calfof2320	Unk	Calf	CALF W/MOM	CEWS017	
1/11/2013	12:25:49	30.53929	-81.02174	A	1315	F	30	W/CALF, BLK BEL	CEWS018	
1/11/2013	12:25:49	30.53929	-81.02174	B	2013Calfof1315	Unk	Calf	CALF W/MOM, ROLL, BLK CHN, MOPN	CEWS018	
1/11/2013	14:30:40	30.63229	-81.12624	C	2413	F	19	W/CALF, BOD CNT	CEWS019	
1/11/2013	14:30:40	30.63229	-81.12624	D	2013Calfof2413	Unk	Calf	CALF W/MOM, BOD CNT, ROLL, FEM, BLK BEL	CEWS019	
1/11/2013	14:55:38	30.61696	-81.30374	E	2753	F	16	W/CALF, BOD CNT, HD TLT	CEWS020	
1/11/2013	14:55:38	30.61696	-81.30374	F	2013Calfof2753	Unk	Calf	CALF W/MOM, BOD CNT	CEWS020	
1/12/2013	12:16:27	30.35029	-81.29107	A	2042	F	23	W/CALF, NURS	CEWS021	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
1/12/2013	12:16:27	30.35029	-81.29107	B	2013CalfOf2042	Unk	Calf	CALF W/MOM, ROLL, WH CHN, WH BEL, NURS	CEWS021	
1/12/2013	12:54:06	30.35113	-81.29724	C	2042	F	23	W/CALF	-	Re-sighting of sighting 1. No last pass, not re-paged.
1/12/2013	12:54:06	30.35113	-81.29724	D	2013CalfOf2042	Unk	Calf	CALF W/MOM	-	
1/12/2013	14:12:39	30.51463	-81.15907	E	2753	F	16	W/CALF, WH CHN, LOG, BOD CNT	CEWS022	
1/12/2013	14:12:39	30.51463	-81.15907	F	2013CalfOf2753	Unk	Calf	CALF W/MOM, BOD CNT	CEWS022	
1/12/2013	14:41:20	30.59079	-81.41757	G	2912	F	14	HD TLT, W/CALF, BOD CNT	CEWS023	
1/12/2013	14:41:20	30.59079	-81.41757	H	2013CalfOf2912	Unk	Calf	CALF W/MOM, BOD CNT	CEWS023	
1/12/2013	16:25:55	30.74979	-81.26140	I	2413	F	19	W/CALF, NURS, BODO	CEWS024	
1/12/2013	16:25:55	30.74979	-81.26140	J	2013CalfOf2413	Unk	Calf	CALF W/MOM, NURS, BODO	CEWS024	
1/13/2013	13:22:24	30.61096	-81.29674	A	2320	F	>20	W/CALF, BOD CNT, BEL UP, BLK CHN, BLK BEL, HD TLT, ROLL	CEWS025	
1/13/2013	13:22:24	30.61096	-81.29674	B	2013CalfOf2320	Unk	Calf	CALF W/MOM, BOD CNT, ROLL, BLK CHN, MALE, BLK BEL, CHN BRCH	CEWS025	
1/13/2013	13:43:44	30.64663	-81.36424	C	1315	F	30	W/CALF, BOD CNT	CEWS026	
1/13/2013	13:43:44	30.64663	-81.36424	D	2013CalfOf1315	Unk	Calf	CALF W/MOM, BOD CNT	CEWS026	
1/13/2013	15:27:41	30.74446	-81.13424	E	2912	F	14	W/CALF, BOD CNT, ROLL	CEWS027	
1/13/2013	15:27:41	30.74446	-81.13424	F	2013CalfOf2912	Unk	Calf	CALF W/MOM, BOD CNT, BLK BEL, ROLL, BLK CHN, HD LFT	CEWS027	
1/14/2013	11:35:11	30.63396	-81.22524	A	2330	F	>20	W/CALF, BOD CNT	CEWS028	
1/14/2013	11:35:11	30.63396	-81.22524	B	2013CalfOf2330	Unk	Calf	CALF W/MOM, BOD CNT	CEWS028	
1/14/2013	12:49:12	30.53496	-81.30907	C	2413	F	19	W/CALF, BOD CNT, NURS, HD TLT	CEWS029	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
1/14/2013	12:49:12	30.53496	-81.30907	D	2013CalfOf2413	Unk	Calf	CALF W/MOM, BOD CNT, NURS, BLK BEL, ROLL	CEWS029	
1/14/2013	13:53:22	30.47496	-81.34324	E	2320	F	>20	W/CALF, BOD CNT, NURS	CEWS030	
1/14/2013	13:53:22	30.47496	-81.34324	F	2013CalfOf2320	Unk	Calf	CALF W/MOM, BLK BEL, BLK CHN, MALE, BOD CNT, ROLL, BRCH, NURS	CEWS030	
1/14/2013	14:59:25	30.61546	-81.35807	G	3780	F	>6	HD LFT	CEWS031	
1/15/2013	12:18:50	30.52796	-81.31440	A	1315	F	30	W/CALF, HD TLT, BOD CNT	CEWS032	
1/15/2013	12:18:50	30.52796	-81.31440	B	2013CalfOf1315	Unk	Calf	CALF W/MOM, BOD CNT, FLIP	CEWS032	
1/15/2013	13:26:12	30.53113	-81.28857	C	1315	F	30	W/CALF	CEWS033	
1/15/2013	13:26:12	30.53113	-81.28857	D	2013CalfOf1315	Unk	Calf	CALF W/MOM	CEWS033	
1/15/2013	14:37:31	30.41996	-81.20907	E	2413	F	19	W/CALF, BOD CNT	CEWS034	
1/15/2013	14:37:31	30.41996	-81.20907	F	2013CalfOf2413	Unk	Calf	CALF W/MOM, BOD CNT, CHN BRCH, BRCH	CEWS034	
1/16/2013	9:42:00	30.57113	-81.17240	A	1315	F	30	W/CALF, BOD CNT?	CEWS035	
1/16/2013	9:42:00	30.57113	-81.17240	B	2013CalfOf1315	Unk	Calf	CALF W/MOM, BOD CNT?	CEWS035	
1/16/2013	11:07:16	30.73029	-81.19574	C	1946	F	24	W/CALF, NURS	CEWS036	
1/16/2013	11:07:16	30.73029	-81.19574	D	2013CalfOf1946	Unk	Calf	CALF W/MOM, NURS	CEWS036	
1/16/2013	14:01:43	30.54829	-81.20757	E	1315	F	30	W/CALF	CEWS037	
1/16/2013	14:01:43	30.54829	-81.20757	F	2013CalfOf1315	Unk	Calf	CALF W/MOM	CEWS037	
1/16/2013	14:50:09	30.47846	-81.38540	G	1968	F	24	MOPN, BODO	CEWS038	
1/16/2013	15:12:03	30.47496	-81.38574	H	3405	F	9	HD TLT, BODO	CEWS038	
1/21/2013	10:02:36	30.77296	-81.24390	A	1612	F	>27	W/CALF, BOD CNT, NURS	CEWS039	
1/21/2013	10:02:36	30.77296	-81.24390	B	2013CalfOf1612	Unk	Calf	CALF W/MOM, BOD CNT, BLK CHN, NURS, BLK BEL, FEM, ROLL	CEWS039	
1/21/2013	10:49:51	30.48646	-81.32540	C	1968	F	24		CEWS040	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
1/21/2013	11:56:26	30.77913	-81.26507	D	3294	F	>11	W/CALF, HD TLT, ROLL	CEWS041	
1/21/2013	11:56:26	30.77913	-81.26507	E	2013CalfOf3294	Unk	Calf	CALF W/MOM	CEWS041	
1/21/2013	12:08:28	30.79129	-81.26057	F	1612	F	>27	W/CALF	CEWS042	Paged first pass, re-sighting of CEWS039
1/21/2013	12:08:28	30.79129	-81.26057	G	2013CalfOf1612	Unk	Calf	CALF W/MOM	CEWS042	
1/21/2013	13:41:24	30.53696	-81.23324	H	2753	F	16	W/CALF, HD TLT, BOD CNT	CEWS043	
1/21/2013	13:41:24	30.53696	-81.23324	I	2013CalfOf2753	Unk	Calf	CALF W/MOM, BOD CNT, ROLL, WH BEL, WH CHN, BRCH	CEWS043	
1/25/2013	15:40:49	30.63596	-81.29924	A	2320	F	>20	W/CALF, BOD CNT	CEWS044	
1/25/2013	15:40:49	30.63596	-81.29924	B	2013CalfOf2320	Unk	Calf	CALF W/MOM, BOD CNT	CEWS044	
1/25/2013	16:07:14	30.68113	-81.28874	C	3513	F	8	W/CALF	CEWS045	
1/25/2013	16:07:14	30.68113	-81.28874	D	2013CalfOf3513	Unk	Calf	CALF W/MOM	CEWS045	
1/26/2013	12:08:21	30.82213	-81.14290	A	1408	F	29	W/CALF, BOD CNT, WH CHN, WH BEL	CEWS046	
1/26/2013	12:08:21	30.82213	-81.14290	B	2013CalfOf1408	Unk	Calf	CALF W/MOM, BOD CNT	CEWS046	
1/26/2013	12:34:00	30.79663	-81.16257	C	2042	F	23	W/CALF, BOD CNT, FLIP, ROLL, FEM, BEL UP, WH CHN, WH BEL	CEWS047	
1/26/2013	12:34:00	30.79663	-81.16257	D	2013CalfOf2042	Unk	Calf	CALF W/MOM, ROLL, BOD CNT, MALE, WH BEL, FLIP, HD LFT, WH CHN	CEWS047	
1/26/2013	13:19:51	30.81563	-81.24707	E	1632	F	>27	W/CALF	CEWS048	
1/26/2013	13:19:51	30.81563	-81.24707	F	2013CalfOf1632	Unk	Calf	CALF W/MOM, WH CHN, WH BEL, ROLL	CEWS048	
1/26/2013	13:58:47	30.74113	-81.11290	G	3513	F	8	W/CALF, NURS	CEWS049	
1/26/2013	13:58:47	30.74113	-81.11290	H	2013CalfOf3513	Unk	Calf	CALF W/MOM, NURS	CEWS049	
1/26/2013	15:11:01	30.63013	-81.25857	I	2912	F	14	W/CALF	CEWS050	
1/26/2013	15:11:01	30.63013	-81.25857	J	2013CalfOf2912	Unk	Calf	CALF W/MOM	CEWS050	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
1/26/2013	15:29:31	30.62979	-81.19824	K	2320	F	>20	W/CALF	CEWS051	
1/26/2013	15:29:31	30.62979	-81.19824	L	2013CalfOf2320	Unk	Calf	CALF W/MOM	CEWS051	
1/26/2013	16:25:56	30.53246	-81.18340	M	2413	F	19	W/CALF, LOG	CEWS052	
1/26/2013	16:25:56	30.53246	-81.18340	N	2013CalfOf2413	Unk	Calf	CALF W/MOM	CEWS052	
1/26/2013	17:02:25	30.48579	-81.19390	O	2753	F	16	W/CALF, LOG	CEWS053	
1/26/2013	17:02:25	30.48579	-81.19390	P	2013CalfOf2753	Unk	Calf	CALF W/MOM, LOG	CEWS053	
1/26/2013	17:29:27	30.42663	-81.16190	Q	1946	F	24	W/CALF, BOD CNT, HD TLT	CEWS054	
1/26/2013	17:29:27	30.42663	-81.16190	R	2013CalfOf1946	Unk	Calf	CALF W/MOM, BOD CNT, CALF W/OTHERS, SAG, FLIP	CEWS054	
1/26/2013	17:29:27	30.42663	-81.16190	S	1402	M	29	SAG	CEWS054	
1/26/2013	17:29:27	30.42663	-81.16190	T	CT03SEUS10	Unk	Unk	SAG	CEWS054	
1/28/2013	11:41:49	30.44813	-81.17640	A	1402	M	29	LIN TR	CEWS055	
1/28/2013	12:25:32	30.44146	-81.29807	B	2320	F	>20	W/CALF, BOD CNT	CEWS056	
1/28/2013	12:25:32	30.44146	-81.29807	C	2013CalfOf2320	Unk	Calf	CALF W/MOM, BOD CNT, ROLL	CEWS056	
1/28/2013	12:48:02	30.48496	-81.26007	D	3540	F	8	W/CALF, NURS	CEWS057	
1/28/2013	12:48:02	30.48496	-81.26007	E	2013CalfOf3540	Unk	Calf	CALF W/MOM, NURS	CEWS057	
1/29/2013	15:03:22	30.79079	-81.20574	A	2330	F	>20	W/CALF, BOD CNT, BODO	CEWS058	
1/29/2013	15:03:22	30.79079	-81.20574	B	2013CalfOf2330	Unk	Calf	CALF W/MOM, BOD CNT, BODO	CEWS058	
1/29/2013	16:24:52	30.38013	-81.24507	C	1612	F	>27	W/CALF	CEWS059	
1/29/2013	16:24:52	30.38013	-81.24507	D	2013CalfOf1612	Unk	Calf	CALF W/MOM	CEWS059	
1/29/2013	17:11:00	30.39646	-81.02440	E	UNPH	Unk	Unk		CEWS060	Paged first pass, unable to relocate
1/29/2013	17:39:50	30.31946	-81.34640	F	1315	F	30	W/CALF	CEWS062	Paged first pass after landing due to time constraints
1/29/2013	17:39:50	30.31946	-81.34640	G	2013CalfOf1315	Unk	Calf	CALF W/MOM	CEWS062	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
1/29/2013	17:45:12	30.31513	-81.38824	H	3540	F	8	W/CALF	CEWS061	Paged first pass after landing due to time constraints
1/29/2013	17:45:12	30.31513	-81.38824	I	2013CalfOf3540	Unk	Calf	CALF W/MOM	CEWS061	
2/2/2013	15:35:10	30.53863	-81.20757	A	2753	F	16	W/CALF, BOD CNT	CEWS063	
2/2/2013	15:35:10	30.53863	-81.20757	B	2013CalfOf2753	Unk	Calf	CALF W/MOM, BOD CNT, WH CHN	CEWS063	
2/4/2013	10:58:18	30.66613	-81.25390	A	2330	F	>20	W/CALF, BOD CNT, HD TLT	CEWS064	
2/4/2013	10:58:18	30.66613	-81.25390	B	2013CalfOf2330	Unk	Calf	CALF W/MOM, BOD CNT	CEWS064	
2/4/2013	11:57:54	30.57746	-81.13274	C	1315	F	30	W/CALF, BOD CNT, BLK CHN, ROLL, BEL UP, FEM, BLK BEL, FLIP	CEWS065	
2/4/2013	11:57:54	30.57746	-81.13274	D	2013CalfOf1315	Unk	Calf	CALF W/MOM, BOD CNT, ROLL	CEWS065	
2/4/2013	14:50:32	30.71029	-81.34190	E	2320	F	>20	W/CALF, BOD CNT, BLK CHN, ROLL, BEL UP, FEM, BLK BEL, FLIP	CEWS066	
2/4/2013	14:50:32	30.71029	-81.34190	F	2013CalfOf2320	Unk	Calf	CALF W/MOM, BOD CNT, DFCN?	CEWS066	
2/5/2013	12:23:31	30.54479	-81.21040	A	1315	F	30	W/CALF, ROLL, BLK CHN, NURS	CEWS067	
2/5/2013	12:23:31	30.54479	-81.21040	B	2013CalfOf1315	Unk	Calf	CALF W/MOM, BUBLS, NURS	CEWS067	
2/5/2013	14:01:32	30.44763	-81.23424	C	1632	F	>27	W/CALF, BOD CNT	CEWS068	
2/5/2013	14:01:32	30.44763	-81.23424	D	2013CalfOf1632	Unk	Calf	CALF W/MOM, BOD CNT, WH BEL, WH CHN, ROLL	CEWS068	
2/6/2013	11:32:00	30.80779	-81.35340	A	2413	F	19	W/CALF, BOD CNT	CEWS069	
2/6/2013	11:32:00	30.80779	-81.35340	B	2013CalfOf2413	Unk	Calf	CALF W/MOM, ROLL, BOD CNT, BLK BEL	CEWS069	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
2/6/2013	12:31:15	30.80279	-81.35790	C	2413	F	19	W/CALF	-	Re-sighting of sighting 1, not re-paged
2/6/2013	12:31:15	30.80279	-81.35790	D	2013CalfOf2413	Unk	Calf	CALF W/MOM	-	
2/6/2013	13:28:58	30.54129	-81.37524	E	2320	F	>20	W/CALF, BOD CNT	CEWS070	
2/6/2013	13:28:58	30.54129	-81.37524	F	2013CalfOf2320	Unk	Calf	CALF W/MOM, BOD CNT	CEWS070	
2/6/2013	14:00:13	30.52713	-81.31257	G	1315	F	30	W/CALF	CEWS071	
2/6/2013	14:00:13	30.52713	-81.31257	H	2013CalfOf1315	Unk	Calf	CALF W/MOM	CEWS071	
2/8/2013	14:33:57	30.63879	-81.40424	A	2753	F	16	W/CALF	CEWS072	
2/8/2013	14:33:57	30.63879	-81.40424	B	2013CalfOf2753	Unk	Calf	CALF W/MOM	CEWS072	
2/11/2013	10:19:51	30.52813	-81.28757	A	2042	F	23	W/CALF	CEWS073	
2/11/2013	10:19:51	30.52813	-81.28757	B	2013CalfOf2042	Unk	Calf	CALF W/MOM	CEWS073	
2/11/2013	10:46:26	30.53313	-81.25324	C	1315	F	30	W/CALF, BOD CNT, BLK CHN, HD LFT	CEWS074	
2/11/2013	10:46:26	30.53313	-81.25324	D	2013CalfOf1315	Unk	Calf	CALF W/MOM, BOD CNT, ROLL, BLK BEL, FEM	CEWS074	
2/11/2013	12:52:38	30.79063	-81.24457	E	2320	F	>20	W/CALF, NURS	CEWS075	
2/11/2013	12:52:38	30.79063	-81.24457	F	2013CalfOf2320	Unk	Calf	CALF W/MOM, NURS	CEWS075	
2/12/2013	12:41:47	30.48863	-81.22474	A	3515	F	8	W/CALF, NURS	CEWS076	
2/12/2013	12:41:47	30.48863	-81.22474	B	2013CalfOf3515	Unk	Calf	CALF W/MOM, NURS, WH CHN	CEWS076	
2/15/2013	12:48:52	31.03563	-81.24040	A	3294	F	>11	W/CALF, BOD CNT (?), HD TLT, AGG VSL?	CEWS077	Paged first pass at 1308(L); Sent updated location (last pass) to Brunswick Bin only at 1327(L)
2/15/2013	12:48:52	31.03563	-81.24040	B	2013CalfOf3294	Unk	Calf	CALF W/MOM, BOD CNT (?), AGG VSL?	CEWS077	
2/15/2013	16:19:00	31.05663	-81.23490	C	3294	F	>11	W/CALF, HD TLT	CEWS078	Paged first pass
2/15/2013	16:19:00	31.05663	-81.23490	D	2013CalfOf3294	Unk	Calf	CALF W/MOM	CEWS078	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
2/18/2013	10:38:58	30.89213	-81.25774	A	3515	F	8	W/CALF	CEWS079	
2/18/2013	10:38:58	30.89213	-81.25774	B	2013CalfOf3515	Unk	Calf	CALF W/MOM	CEWS079	
2/18/2013	11:55:18	31.02213	-81.25390	C	1968	F	24	LIN TR	CEWS080	
2/18/2013	13:52:40	31.16896	-81.10290	D	1408	F	29	W/CALF, SKM FD, FEED, WH CHN	CEWS081	
2/18/2013	13:52:40	31.16896	-81.10290	E	2013CalfOf1408	Unk	Calf	CALF W/MOM	CEWS081	
2/18/2013	15:20:00	31.43829	-81.01357	F	1632	F	>27	W/CALF, BOD CNT	CEWS082	
2/18/2013	15:20:00	31.43829	-81.01357	G	2013CalfOf1632	Unk	Calf	CALF W/MOM, BOD CNT, WH BEL, FEM, BEL UP, WH CHN, ROLL	CEWS082	
2/20/2013	13:28:57	30.85046	-81.16090	A	3513	F	8	W/CALF	CEWS083	
2/20/2013	13:28:57	30.85046	-81.16090	B	2013CalfOf3513	Unk	Calf	CALF W/MOM, CALF W/OTHER	CEWS083	
2/20/2013	13:28:57	30.85046	-81.16090	C	3892	M	5		CEWS083	
2/20/2013	16:25:35	30.42829	-81.32290	D	3692	F	>7	W/CALF, BOD CNT, HD TLT	CEWS084	
2/20/2013	16:25:35	30.42829	-81.32290	E	2013CalfOf3692	Unk	Calf	CALF W/MOM, BOD CNT	CEWS084	
2/21/2013	10:17:05	30.71613	-81.34174	A	1968	F	24	MUD	CEWS085	
2/21/2013	11:28:28	30.68979	-81.34774	B	1968	F	24	MUD	CEWS086	Updated location on sighting 1, paged first pass
2/24/2013	11:17:57	30.54579	-81.40340	A	1632	F	>27	W/CALF, BODO, BOD CNT, HD TLT	CEWS087	
2/24/2013	11:17:57	30.54579	-81.40340	B	2013CalfOf1632	Unk	Calf	CALF W/MOM, BODO, WH CHN, BOD CNT, WH BEL, FEM, ROLL, FLIP	CEWS087	
2/24/2013	13:07:05	30.68613	-81.13507	C	3294	F	>11	W/CALF, BOD CNT, HD TLT, ROLL	CEWS088	
2/24/2013	13:07:05	30.68613	-81.13507	D	2013CalfOf3294	Unk	Calf	CALF W/MOM, BOD CNT, LBTL	CEWS088	

Date	Time (L)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	RIWH Field Letter	RIWH Catalog ID # Intermatch Code or Season Code	Sex	Age	Behaviors*	Whale Alert Number	Comments
2/24/2013	14:58:33	30.53679	-81.39207	E	1632	F	>27	W/CALF	CEWS089	Resight of sighting 1; paged first pass location
2/24/2013	14:58:33	30.53679	-81.39207	F	2013CalfOf1632	Unk	Calf	CALF W/MOM	CEWS089	
2/24/2013	15:38:18	30.48729	-81.27424	G	3692	F	>7	W/CALF, BOD CNT	CEWS090	
2/24/2013	15:38:18	30.48729	-81.27424	H	2013CalfOf3692	Unk	Calf	CALF W/MOM, BOD CNT	CEWS090	
3/4/2013	13:42:59	30.82496	-81.09590	A	3515	F	8	W/CALF; BOD CNT	CEWS091	
3/4/2013	13:42:59	30.82496	-81.09590	B	2013CalfOf3515	Unk	Calf	BOD CNT, CALF W/MOM, FEM, WH CHN, WH BEL, ROLL	CEWS091	

Table 4. Whale-vessel interaction events documented by the CEWS survey team, December 2012-March 2013

Date	WVI ID	Survey Area	Whale ID	Initial Whale LAT	Initial Whale LONG	Vessel #	Vessel Type	Est. Initial Vessel Speed (kts)	Closest Distance (yds)	Initial Whale Behavior	Reaction to Vessel	Comms Achieved	Additional Event Details and Communication Notes
12/19/2012	399	CEWS	Catalog #2753 and calf	30.54063	-81.19840	1	Recreational 16ft	0	528	Milling	No	Yes	Vessel was stationary to the south of whales when the plane arrived on scene, but had recently been transiting the area towards the whales. Observers hailed vessel on VHF Ch.16, established communication on a working channel, and thanked the captain for remaining more than 500 yards from the whales. The captain requested to know the heading of the whales and the observers informed him there was no apparent movement. He replied that he intended to anchor and fish and that he would look-out for the whales and depart the area slowly when finished.
12/19/2012	1716	CEWS	2010 Calf of Catalog #1145	30.10496	-81.31974	1	Commercial Fishing/ Shrimp 77ft	3	150	Milling	No	No	Vessel was abeam the whale and heading away when the plane arrived on scene, so no communication was attempted. Vessel was fishing and continued heading away from the whales while the observers were on scene.

Date	WVI ID	Survey Area	Whale ID	Initial Whale LAT	Initial Whale LONG	Vessel #	Vessel Type	Est. Initial Vessel Speed (kts)	Closest Distance (yds)	Initial Whale Behavior	Reaction to Vessel	Comms Achieved	Additional Event Details and Communication Notes
12/28/2012	1693	CEWS	Catalog #3513 and calf	30.80746	-81.24340	1	Recreational 23ft	20	600	Swimming/Traveling	No	Yes	Vessel was initially sighted heading towards the whales from the SW. Observers hailed vessel on VHF Ch.16, established communication on a working channel, and informed the captain of the whales' location and 500 yard rule. The vessel stopped approximately 0.5 NM from the whales. The captain asked if they could approach the whales for photographs and the observers reiterated the 500 yard rule. After slowly motoring around the area for several minutes (presumably photographing and observing the whales) the captain informed the observers they was departing the area and continued offshore.
1/13/2013	1806	CEWS	Catalog #2912 and calf	30.74446	-81.13424	1	Recreational 24ft	25	200	Milling	No	No	Vessel was initially sighted 0.5 NM ENE of the whales. Observers hailed vessel on VHF Ch.16 by vessel description and location and then by name; no response. Vessel passed N of the whales and the captain did not appear to see them; no course or speed change was observed.
2/5/2013	1518	CEWS	Catalog #1632 and calf	30.44763	-81.23424	1	Law Enforcement 25ft	15	100	Milling	No	No	Vessel approached whales from SW to apparently talk to acoustic research vessel with whales. Observers hailed vessel on VHF Ch.16 by vessel description and location twice; no response. After talking with research crew the vessel departed and motored slowly past the whales.

Date	WVI ID	Survey Area	Whale ID	Initial Whale LAT	Initial Whale LONG	Vessel #	Vessel Type	Est. Initial Vessel Speed (kts)	Closest Distance (yds)	Initial Whale Behavior	Reaction to Vessel	Comms Achieved	Additional Event Details and Communication Notes
2/15/2013	1249	NEWS	Catalog #3294 and calf	31.03563	-81.24040	1	Pilot Boat 50ft	25	50	Milling	No	No	Vessel was initially sighted SE of whales heading into port. Observers hailed vessel on VHF Ch.16 by vessel name and location three times; no response. Vessel passed the whales and continued into port. Vessel captain did not appear to see the whales; no course or speed change was observed.
2/15/2013	1249	NEWS	Catalog #3294 and calf	31.03563	-81.24040	2	Large Merchant/ Car Carrier 650ft	8	1320	Milling	No	Yes	Vessel was initially sighted 1.25 NM SE of whales heading into port. Observers hailed vessel on VHF Ch.16 by vessel name several times; no response. Then observers hailed vessel on working channel and were able to establish communication with the pilot. Observers provided the whales' location and remained in communication with the pilot until the vessel had passed the whales. The pilot altered course N and continued into port using the northern portion of the shipping lane vs. the southern portion where the whales were located.

Appendix 1. Behavior codes

Behavior Code	Behavior Name
AGG VSL	Aggressive Approach
APPR	Approacher to SAG
BEL UP	Belly Up
BEL/BEL	Belly to Belly
BLK BEL	Black Belly
BLK CHN	Black Chin
BOD CNT	Body Contact
BODO	Bottlenose Dolphins
BRCH	Breaching
BUBLS	Bubbles
CALF	Calf Alone
CALF W/MOM	Calf of a Mom/Calf Pair
CALF W/OTHER(S)	Calf With Another Whale
CALF W/ UNPH	Calf With Unphotographed Whale(s)
CHN BRCH	Chin Breach
DEAD ON BEACH	Dead on Beach
DFCN	Defecation
DSENTGL	Disentangled
DSENTGL ATT	Disentanglement Attempt
ENTGL	Entangled
FEED	Unspecified Feeding
FEM	Female
FL	Fluking
FLIP	Flipping/ Flipper Slapping
FLTG DEAD	Floating Dead
FRST DEAD	First Sighting of a Dead Whale
FRST ENTGL	First Entangled
FRST SATTG	First Satellite Tagged
HDLFT	Head Lift
HDPSH	Head Push
HD TLT	Head Tilt
INTRO	Intromission
LBTL	Lobtailing
LIN TR	Linear Travel

Behavior Code	Behavior Name
LIVE STRAND	Live stranded
LN GONE	Line Gone
LOG	Logging
MALE	Male
MOPN	Mouth Open
MUD	Mud
NOT FL	Not Fluking
NURS	Probable Nursing
PENIS	Penis observed
POST	Posturing
PRT DSENTGL	Disentangled Partially
RACE	Racing Dive
RAND SUB TRV	Random Subsurface Movement
RETRVD	Carcass Retrieved
ROLL	Rolling
SAG	Surface Active Group
SICK	Sick Whale
SKM FD	Surface or Skim Feeding
SPY	Spyhopping
TL BRCH	Tail Breach
TL SLSH	Tail Slash
UW EXH	Underwater Exhalation
W/CALF	Mom of a Mom/Calf Pair
W/CALF UNPH	Mom with Unphotographed Calf
W/SATTG	Satellite Tagged
W/TELBUEOY	Telemetry Buoy
W/UNPH EG	With Unphotographed Whale
W/YRLG	Mom of Mom/Yearling Pair
WH BEL	White Belly
WH CHN	White Chin
YRLG	Yearling
YRLG W/MOM	Yearling of Mom/Calf Pair

Appendix 2. Acronyms and Abbreviations

AFF	Automatic Flight Following
AIS	Automatic Identification System
ALWDN	Atlantic Large Whale Disentanglement Network
BNTM	Broadcast Notices to Mariners (USCG)
CEWS	Central Early Warning System (aerial survey)
CFR	Code of Federal Regulations
ELT	Emergency Locator Transmitter
EPIRB	Emergency Position Indicator Radio Beacon
EWS	Early Warning System
F	Female (sex)
FAA	Federal Aviation Administration
FACSFACJAX	Fleet Area Control and Surveillance Facility Jacksonville (U.S.)
FL	Florida
FTP	File transfer protocol
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute (part of FWC)
GA	Georgia
GDNR	Georgia Department of Natural Resources
GIS	Geographic Information Systems
GPS	Global Positioning System
GTM NERR	Guana Tolomato Matanzas National Estuarine Research
HUWH	Humpback Whale
ID	Identification
IFR	Instrument Flight Rules
IMO	International Maritime Organization
LAT	Latitude
LONG	Longitude
M	Male (sex)
MRC	Marine Resources Council
MSRS	Mandatory Ship Reporting System
NARWC	North Atlantic Right Whale Consortium
NC	North Carolina
NDBC	National Data Buoy Center
NEA	New England Aquarium

NEFSC	(NOAA NMFS) Northeast Fisheries Science Center
NEWS	Northern Early Warning System (aerial survey)
NMFS	National Marine Fisheries Service (aka NOAA Fisheries Service)
NOAA	National Oceanic and Atmospheric Administration
ODMDS	Ocean dredged material disposal site
PC	Personal computer
PCCS	Provincetown Center for Coastal Studies
PFD	Personal flotation device
PIC	Pilot in Command
RIWH	Right Whale
S2S	Sea To Shore Alliance
SAG	Surface Active Group
SC	South Carolina
SCGA	South Carolina Northern Georgia (aerial survey)
SD	Standard Deviation
SEFSC	NOAA NMFS, Southeast Fisheries Science Center
SERO PRD	(NOAA) Southeast Regional Office Protected Resources Division
SEUS	Southeast United States
SEWS	Southern Early Warning System (aerial survey)
SIC	Second In Command (pilot)
SLR	Single Lens Reflex
SMA	Seasonal Management Area
SPUE	Sightings Per Unit Effort
SST	Sea surface temperature
Unk	Unknown (sex or age class)
UNCW	University of North Carolina Wilmington
UNPH	Unphotographed
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USN	United States Navy
USWTR	Undersea Warfare Training Range
VFR	Visual Flight Rules
VHF	Very High Frequency
WVI	Whale/Vessel Interaction

Appendix 3. Units of measure

ft	feet
hr	hour
km	kilometers
km/hr	Kilometer per hour
knots, kn, kts	knots
m	meter
Mhz	mega hertz
min	minute
mph	miles per hour
NM	nautical miles
s	second
yd	yard

Appendix 4. Definition of terms

Term	Definition
Adult	Whale known to be 9 years of age or older and calving female of any age; a whale of unknown age is classified as adult in their ninth year from initial sighting.
Aggregation	When animals purposely come together in a defined area during a discrete time period
Associated	When whales coordinate their movement within a body length or two. Association categories applicable to whale sightings in SEUS include: mother-calf pair, surface active group (SAG), pairs or groups not engaged in SAG behavior, and singleton (not associated).
Beaufort Scale	An empirical measure that relates wind speed to observed conditions at sea or on land.
Calf	Whale less than one year of age
Callosity	Raised patches of roughened tissue. Occurs on the top of the head, chin, jaw, lips, above the eyes and behind the blowholes. The callosity pattern is black in color, but appears white due to the presence of cyamids.
Confidence	Measure of certainty of number of whales observed
Cow	Calving female, refers to a calving female from 2012 season for the purposes of this report
Critical Habitat	Specific areas within the geographical area occupied by the species that contain physical or biological features essential to conservation and those features may require special management considerations or protection. Also, specific areas outside the geographical area occupied by the species, if the agency determines that the area itself is essential for conservation.
Cyamids	Small white crustaceans of the order Amphipoda that live exclusively on cetaceans. Cyamids, also known as "whale lice" colonize the callosities of right.
Effort	The total nautical miles (NM) or time flown on trackline (east-west or north-south) while the plane was operating within survey parameters, with wings-level, and is sea state three or less on the Beaufort scale. Short transits between tracklines and periods of circling or transiting outside survey parameters were not considered to be "on-effort".
FAA 14 CFR Part 135 and NOAA SERO requirements	In accordance with FAA 14 CFR Part 135 and additional NOAA requirements, the aircraft were equipped with: IFR certification, GPS unit with direct linkage to the tablet PC, Emergency Locator Transmitter (ELT), Automatic Flight Following (AFF) transponder, 2-B:C rating fire extinguishers, primary and secondary VHF radios, marine band radio with linkage to intercom system, DC power for observer tablet PC, back-up GPS with direct linkage to the tablet PC, Automatic Identification System (AIS) receiver, VHF telemetry, satellite phone, and extended over water operations emergency equipment as listed in FAA 14 CFR Part 135.167 including a registered 406 MHz emergency position indicator radio beacon (EPIRB) and an inflatable life raft. Aerial observers were required to wear a Nomex flight suit and an aviation style personal flotation device (PFD) equipped with a safety knife, signaling mirror, high-pitch safety whistle, strobe light, streamer, and a 406 MHz personal EPIRB with built in GPS receiver
Geodetic Distance	The shortest path along the ellipsoid of the earth at sea level between one point and another

Term	Definition
Ground contact	FWRI staff member stationed in an office that maintains a near real-time knowledge of the position and maneuvers of the aircraft during survey, monitored weather conditions, and acts as the communication liaison for the survey team.
Intermatch Code	A code assigned by NEA to a whale that has been matched for more than one sighting but the Catalog number is unknown
Juvenile	Whale 1-8 years of age (except calving females within this range)
Mitigation	A reduction in the extent of exposure to a risk and/or the likelihood or its occurrence
OTHER Sighting	Sighting report from non-aerial survey team participant in the EWS network (e.g., USN, USCG, dredge observers)
Peduncle	Where the fluke (tail) meets the body of the whale
Reliability	Measure of certainty of whale species identification
Rostrum	Curved upper jaw or "snout" of a right whale
Season Code	A temporary code given to a whale within a season when the Catalog number or Intermatch code is unknown to assist in the recognition of individuals in the field .
Sighting	A sighting is defined as any observed whale or group of whales at a given time and location. A sighting may consist of one or many whales. An individual whale may not be counted more than once during a sighting; however, an individual whale may be part of more than one sighting per day and/or more than one sighting throughout the calving season.
Verification	A response or deviation from survey by the survey team to the location of a sighting reported from another source (e.g., USCG, USN, public boater) in order to record, document, and disseminate sighting information. Verification sightings are excluded from effort analyses.
Vessel- Commercial Fishing	Vessel involved in fishing for commercial purposes, can be various sizes. Category includes shrimp vessels and crab vessels. Typically does not transmit AIS data.
Vessel- Cruise Ship	Passenger ship used for pleasure voyages, includes casino boats. Typically transmits AIS data.
Vessel- Government	Vessel involved in government operations. Category includes USACE, USCG, USN, Homeland Security and law enforcement. Typically does not transmit AIS data.
Vessel- Large Merchant	Ship that transports cargo. Category includes car carrier, container ship, tanker, freighter, tug and barge. Typically transmits AIS data.
Vessel - "Large"	Government/military vessels of all sizes, vessels 65 ft (19.8 m) or larger, and any vessel expected to be transmitting AIS data. Information recorded for "large" vessels included: type of vessel, time, location, heading, estimated length, estimated speed, estimated distance from aircraft, and name or hull number if discernible. Recorded within 2 NM (3.7 km) of survey trackline. Information on vessels required to carry an AIS transponder available at: (www.navcen.uscg.gov/?pageName=AISmain.html)
Vessel- Motor Yacht	Vessel with enclosed living area for passengers, often used for socializing or transiting. Many have dinghies or other small vessels onboard. Can be classified as large (>100ft) or small (<100ft). Typically does not transmit AIS data.
Vessel- Personal Watercraft	Any vessel designed to typically carry one or two people. Includes: jet ski, wave runner, kayak, canoe. Typically does not transmit AIS data.

Term	Definition
Vessel- Recreational	Vessel without substantial closed spaces, typically center console, often with outboard engines. Includes parasail operators. Typically does not transmit AIS data.
Vessel- Research	Vessel designed and equipped to carry out research at sea, can be various sizes. Typically transmits AIS data.
Vessel- Sailing	Vessel powered by the wind. Can be classified as large (>50ft) or small(<50ft). Includes windsurfers. Typically does not transmit AIS data.
Vessel - "Small"	Vessel less than 65 ft (19.8 km) in length. Information recorded for "small" vessels included: vessel type, time, location, number of vessels, and side of aircraft (<i>i.e.</i> , left, right, both). Exact GPS locations of vessels and heading, length, speed, and name or registration number of small vessels were not obtained unless the vessel was involved in a whale-vessel interaction (WVI). Recorded within 1.5 NM (1.8 km) of survey trackline.
Vessel- Sport-fishing	Larger recreational vessel with multiple towers, outriggers and inboard engines. Includes charter fishing vessels. Typically does not transmit AIS data.
Volunteer Networks	The Marineland Right Whale Project and Marine Resources Council (MRC) right whale monitoring program organize volunteers who search for right whales from land in Florida, record sighting information and alert other network members who can obtain photo-documentation of sightings. These efforts range from dedicated land surveys to opportunistic sighting reports through MRC's hotline number.
Whale alert	Whale sighting information transmitted from (mainly) aerial survey teams to EWS network participants in near real-time via email and text message. Whale alert includes: distance and bearing to nearest sea buoy, whale alert number (consecutive for each reporting source), date, final sighting time and position, number of whales, number of calves, and heading of whales. Example of whale alert format: Subject: WHALE ALERT 18NM ESE "STJ" (CEWS041) Body: 24JAN2011, 11:57(L), 3015.3N 08059.6W, 1 ADULT, 1 CALF, HDG N
WVI	A situation when the survey team a) observed a vessel within 500 yards (457 m) of a whale or group of whales, b) determined that the heading of a vessel could result in the vessel and whale(s) being approximately 1.0 NM (1.9 km) or less apart, or c) established communication with a vessel to transmit whale sighting location information in an attempt to prevent a collision or mitigate an interaction.
Yearling	One year-old whale