

**Final**

**Protected Species Monitoring in  
Navy OPAREAs - Small Vessel  
Surveys in the Jacksonville  
Operating Area:  
January 2014 – December 2014**

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Risso's dolphin (*Grampus griseus*). Photographed by Danielle Waples, Duke University, taken under NOAA Scientific Permit No. 14809 (Douglas Nowacek) and NOAA General Authorization Letter of Confirmation 16185 held by Duke University

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## Acronyms and Abbreviations

|                 |  |
|-----------------|--|
| Dtag            | digital acoustic tag                                     |
| F/V             | Fishing Vessel   |
| JAX             | Jacksonville   |
| km              | kilometer(s)   |
| km <sup>2</sup> | square kilometer(s)                                      |
| m               | meter(s)   |
| NOAA            | National Oceanic and Atmospheric Administration          |
| OPAREA          | Operating Area   |
| R/V             | Research Vessel  |
| SERDP           | Strategic Environmental Research and Development Project |
| U.S.            | United States  |
| USWTR           | Undersea Warfare Training Range                          |
| VHF             | Very High Frequency                                      |

# 1. Introduction

This report describes results from a multi-institutional monitoring project intended to provide information on the species composition, population identity, density and baseline behavior of marine mammals and sea turtles present in United States (U.S.) Navy range complexes along the U.S. Atlantic Coast. This program began in 2007, with baseline aerial and vessel surveys and a passive acoustic monitoring program in Onslow Bay, North Carolina and has since expanded to include study areas off Jacksonville, Florida and Cape Hatteras, North Carolina. In Onslow Bay, six years of monitoring yielded a comprehensive picture of the density, distribution and abundance of marine mammals and sea turtles and provided new insights into residency patterns among pelagic delphinids in this region ([Read et al. 2014](#)). Survey effort in the Onslow Bay site concluded in 2013. More than five years of monitoring in the Jacksonville (JAX) Operating Area (OPAREA) have provided similar information on the density and distribution of marine mammals and sea turtles. Off Cape Hatteras, four years of surveys have provided information on the complex patterns of distribution and diversity of the marine mammals and sea turtles in this highly productive area. The present report describes monitoring activities, including photo-identification and biopsy sampling vessel surveys at JAX between January and December 2014. All fieldwork at Cape Hatteras in 2014 was dedicated to the Deep Diver and Satellite Tagging Projects, so the photographic identification work for Hatteras will be reported in [Foley et al. \(2015\)](#). Analysis of the satellite-tagging data is in a report from Cascadia Research Collective ([Baird et al. 2015](#)).

## 2. Jacksonville Vessel Surveys

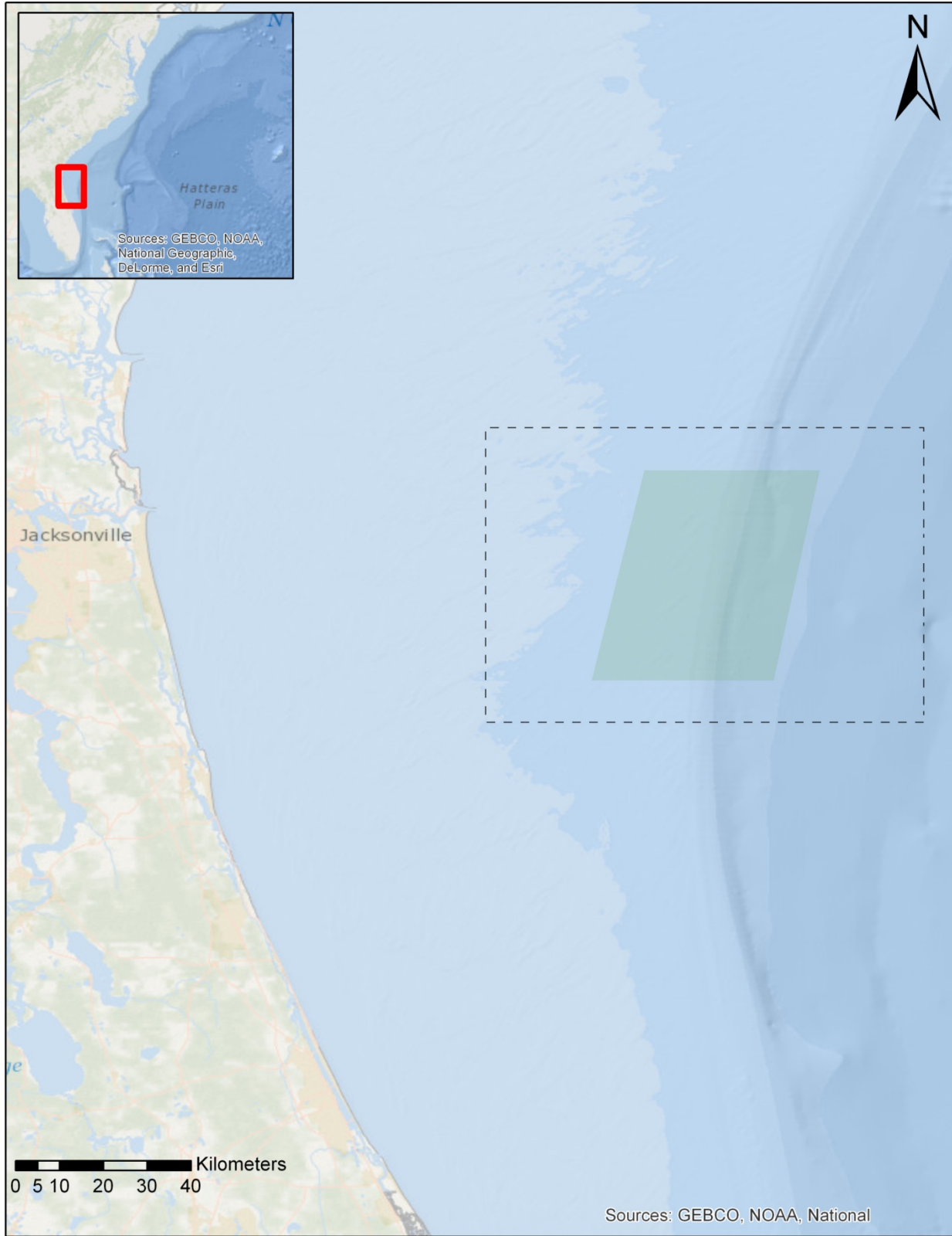
### 2.1 Methods

#### 2.1.1 Study Area

The study area within JAX OPAREA is approximately 5,728 square kilometers (km<sup>2</sup>), surrounding the planned Undersea Warfare Training Range (USWTR), which is approximately 1,700 km<sup>2</sup> in area. The study area straddles the continental shelf break, including some of the Blake Plateau, and includes both shelf and pelagic waters (**Figure 1**).

#### 2.1.2 Data Collection

Our vessel survey effort in JAX during 2014 focused on questions of residency and population structure of odontocete cetaceans. We conducted visual surveys at a speed of approximately 8 to 10 knots from the Research Vessel (R/V) *Richard T. Barber*, a U.S. Coast Guard-approved offshore research vessel outfitted with a bow pulpit, satellite phone, lifeboat and wireless communication system (**Figure 2**). We also surveyed from the R/V *Stellwagen* on one day following the deployment of a High-frequency Acoustic Recording Package. Two observers (one port and one starboard) scanned constantly from straight ahead to 90 degrees abeam either side of the trackline. We closed on all cetacean sightings and recorded the location, species and behavior of every cetacean group. We surveyed turtles in passing mode, but recorded the



1  
2 Figure 1. Map of the Jacksonville study area and the planned USWTR site (shaded box).





1

2 **Figure 2. The R/V *Richard T. Barber*.**

3 location and species of all sea turtles. We recorded environmental conditions (weather, sea  
4 state, depth and sea-surface temperature) at each sighting and whenever survey conditions  
5 changed. We recorded sighting and environmental data on an iPad tablet linked to a geographic  
6 positioning system (GPS) unit.

7 We examined use of the survey area by individual cetaceans using photo-identification and  
8 collected biopsy samples for analysis of population structure. We obtained digital photographs  
9 to confirm species identification at each sighting and to compare identification features with  
10 those used by the aerial survey team. We obtained photographs with Canon or Nikon digital  
11 SLR cameras (equipped with 100 to 400 millimeter zoom lenses) in 24-bit color at a resolution  
12 of 3072 X 2048 pixels and saved in .jpg format. We employed remote biopsy-sampling methods  
13 to collect small skin and blubber samples using a variety of 27- to 68-kilogram pull crossbows,  
14 depending on the species and sampling distance. We obtained biopsy samples with a  
15 specialized 2.5-centimeter stainless biopsy tip attached to a modified bolt, typically fired from the  
16 bow of the survey vessel.

### 17 **2.1.3 Data Analysis**

18 We mapped vessel survey effort and sighting data using *ArcGIS* 10.2. All vessel sighting data  
19 collected from January 2014 through December 2014 will be posted on the data archive OBIS-  
20 SEAMAP (<http://seamap.env.duke.edu/>).

1 **2.1.4 Data Storage**

2 All acoustic, visual survey and photographic data have been archived on digital media, and  
3 backed up on a Duke University network server.

4 **2.2 Results**

5 **2.2.1 Vessel Survey Effort**

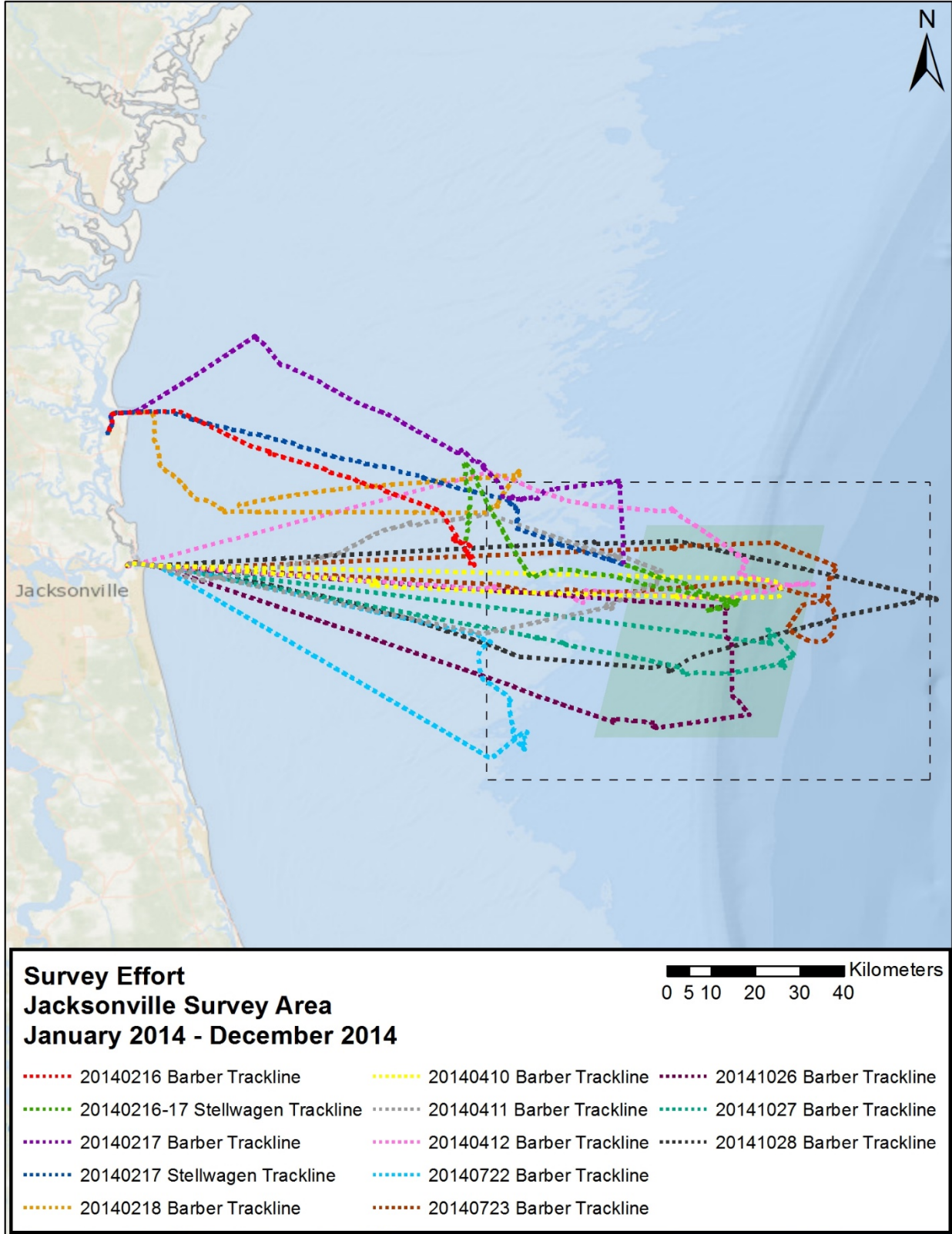
6 We conducted vessel surveys on eleven days in 2014, totaling 1227.4 kilometers (km), or 66.75  
7 hours, of survey effort (**Table 1**). These surveys were conducted in Beaufort Sea States (BSS) 1  
8 to 4 and covered the entirety of the USWTR site and surrounding survey area, including shelf  
9 and pelagic waters (**Figure 3**).

10 **Table 1. Dates, distance, and durations surveyed during vessel surveys in the Jacksonville survey**  
11 **area, January 2014 – December 2014.**

| Date      | Sea State | km Surveyed | Survey Time (hr:min) | At-Sea Time | Platform               |
|-----------|-----------|-------------|----------------------|-------------|------------------------|
| 16-Feb-14 | 3         | 20.2        | 2:03                 | 9:16        | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 2-3       | 68.5        | 4:46                 | 10:33       | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 1-2       | 76.4        | 6:00                 | 19:12       | R/V <i>Stellwagen</i>  |
| 18-Feb-14 | 1-2       | 20.4        | 1:27                 | 9:41        | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 1-4       | 147.0       | 6:09                 | 9:02        | R/V <i>R.T. Barber</i> |
| 11-Apr-14 | 2-3       | 85.4        | 6:16                 | 10:18       | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 1-4       | 149.0       | 7:52                 | 11:17       | R/V <i>R.T. Barber</i> |
| 22-Jul-14 | 2-3       | 48.5        | 4:28                 | 8:23        | R/V <i>R.T. Barber</i> |
| 23-Jul-14 | 1-3       | 157.0       | 7:28                 | 11:40       | R/V <i>R.T. Barber</i> |
| 26-Oct-14 | 3-4       | 128.0       | 6:44                 | 10:08       | R/V <i>R.T. Barber</i> |
| 27-Oct-14 | 2-4       | 138.0       | 7:31                 | 11:04       | R/V <i>R.T. Barber</i> |
| 28-Oct-14 | 1-3       | 189.0       | 6:01                 | 8:56        | R/V <i>R.T. Barber</i> |

12 **2.2.2 Marine Mammal and Sea Turtle Sightings**

13 We recorded forty-five cetacean sightings of four species during these vessel surveys. As in  
14 previous years, bottlenose (*Tursiops truncatus*;  $n=18$ ) and Atlantic spotted dolphins (*Stenella*  
15 *frontalis*;  $n=20$ ) dominated the fauna, with single sightings of Risso’s dolphins (*Grampus*  
16 *griseus*) and a solitary North Atlantic right whale (*Eubalaena glacialis*). In addition, we observed  
17 one mixed group of bottlenose and Atlantic spotted dolphins and recorded four sightings of  
18 unidentified delphinids (**Tables 2 and 3**). We encountered thirty-four sea turtles in the survey  
19 area during 2014. As in the past, the loggerhead sea turtle (*Caretta caretta*;  $n=31$ ) was by far  
20 the most frequently recorded species, with a small number of sightings of leatherback sea  
21 turtles (*Dermochelys coriacea*;  $n=3$ ) (**Tables 4 and 5**).



1  
 2 **Figure 3. Survey effort during vessel surveys in the Jacksonville survey area, January 2014–**  
 3 **December 2014.**

1 Table 2. Cetacean sightings from vessel surveys in the Jacksonville survey area, January 2014–December 2014.

| Date      | Time  | Latitude | Longitude | Species             | Common Name                | Group Size | Biopsy Samples | Photo-id images | Vessel                 |
|-----------|-------|----------|-----------|---------------------|----------------------------|------------|----------------|-----------------|------------------------|
| 16-Feb-14 | 14:37 | 30.44466 | -80.75313 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 20         | 2              | 50              | R/V <i>R.T. Barber</i> |
| 16-Feb-14 | 15:16 | 30.39872 | -80.72787 | <i>E. glacialis</i> | North Atlantic right whale | 1          | 0              | 162             | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 10:13 | 30.39004 | -80.38781 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 1          | 0              | 0               | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 10:55 | 30.41154 | -80.42320 |                     | Unidentified delphinid     | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 10:59 | 30.41192 | -80.45386 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 8          | 0              | 17              | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 11:52 | 30.43914 | -80.55057 | <i>T. truncatus</i> | Bottlenose dolphin         | 2          | 0              | 26              | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 12:05 | 30.55824 | -80.43169 | <i>T. truncatus</i> | Bottlenose dolphin         | 5          | 0              | 8               | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 12:53 | 30.48790 | -80.63983 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 2          | 0              | 0               | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 12:56 | 30.53406 | -80.62853 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 2          | 2              | 47              | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 13:15 | 30.51912 | -80.63821 | <i>T. truncatus</i> | Bottlenose dolphin         | 1          | 0              | 8               | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 13:28 | 30.52501 | -80.65245 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 6          | 0              | 63              | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 13:34 | 30.53696 | -80.64797 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 15         | 0              | 15              | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 14:28 | 30.59847 | -80.70844 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 15         | 0              | 37              | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 14:44 | 30.60539 | -80.71405 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 20         | 2              | 39              | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 15:10 | 30.62744 | -80.74295 |                     | Unidentified delphinid     | 2          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 15:25 | 30.62791 | -80.75786 | <i>T. truncatus</i> | Bottlenose dolphin         | 4          | 1              | 26              | R/V <i>R.T. Barber</i> |
| 18-Feb-14 | 14:08 | 30.51981 | -80.68025 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 7          | 0              | 12              | R/V <i>R.T. Barber</i> |
| 18-Feb-14 | 14:58 | 30.58921 | -80.63347 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 3          | 1              | 18              | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 10:30 | 30.36684 | -80.92588 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 10         | 1              | 64              | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 11:36 | 30.35622 | -80.89972 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 13:04 | 30.33800 | -80.31202 | <i>T. truncatus</i> | Bottlenose dolphin         | 4          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 13:33 | 30.33570 | -80.30245 |                     | Unidentified delphinid     | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 11-Apr-14 | 9:23  | 30.48539 | -80.85377 | <i>S. frontalis</i> | Atlantic spotted dolphin   | 2          | 1              | 10              | R/V <i>R.T. Barber</i> |
| 11-Apr-14 | 12:00 | 30.41516 | -80.43341 | <i>T. truncatus</i> | Bottlenose dolphin         | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 11-Apr-14 | 13:12 | 30.38906 | -80.34832 | <i>T. truncatus</i> | Bottlenose dolphin         | 8          | 1              | 48              | R/V <i>R.T. Barber</i> |
| 11-Apr-14 | 14:31 | 30.35760 | -80.36282 | <i>T. truncatus</i> | Bottlenose dolphin         | 2          | 0              | 4               | R/V <i>R.T. Barber</i> |

| Date      | Time  | Latitude | Longitude | Species                                      | Common Name                                    | Group Size | Biopsy Samples | Photo-id images | Vessel                 |
|-----------|-------|----------|-----------|--|--|------------|----------------|-----------------|------------------------|
| 11-Apr-14 | 15:16 | 30.31820 | -80.45048 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 11:02 | 30.50936 | -80.31813 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 6          | 0              | 99              | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 12:09 | 30.42142 | -80.19247 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 2          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 12:25 | 30.41208 | -80.17484 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 14         | 2              | 88              | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 15:56 | 30.34785 | -80.49716 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 8          | 2              | 48              | R/V <i>R.T. Barber</i> |
| 12-Apr-14 | 17:07 | 30.35009 | -80.68401 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 10         | 1              | 14              | R/V <i>R.T. Barber</i> |
| 22-Jul-14 | 9:08  | 30.25446 | -80.71205 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 10         | 2              | 65              | R/V <i>R.T. Barber</i> |
| 22-Jul-14 | 11:35 | 30.02617 | -80.62378 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 7          | 2              | 82              | R/V <i>R.T. Barber</i> |
| 22-Jul-14 | 13:17 | 30.01306 | -80.68470 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 23-Jul-14 | 14:06 | 30.37497 | -80.00475 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 8          | 1              | 41              | R/V <i>R.T. Barber</i> |
| 23-Jul-14 | 15:41 | 30.43792 | -80.31643 | <i>S. frontalis</i> /<br><i>T. truncatus</i> | Atlantic spotted<br>dolphin/Bottlenose dolphin | 7/1        | 2/0            | 34              | R/V <i>R.T. Barber</i> |
| 23-Jul-14 | 16:06 | 30.43296 | -80.31927 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 6          | 1              | 36              | R/V <i>R.T. Barber</i> |
| 26-Oct-14 | 10:08 | 30.08503 | -80.43895 | Unidentified delphinid                       |  | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 26-Oct-14 | 10:50 | 30.07984 | -80.35952 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 7          | 1              | 52              | R/V <i>R.T. Barber</i> |
| 27-Oct-14 | 9:53  | 30.24309 | -80.55016 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 1          | 0              | 0               | R/V <i>R.T. Barber</i> |
| 27-Oct-14 | 11:10 | 30.19154 | -80.30636 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 6          | 2              | 46              | R/V <i>R.T. Barber</i> |
| 27-Oct-14 | 14:09 | 30.27239 | -80.13063 | <i>G. griseus</i>                            | Risso's dolphin                                | 50         | 2              | 312             | R/V <i>R.T. Barber</i> |
| 28-Oct-14 | 11:18 | 30.19475 | -80.33376 | <i>S. frontalis</i>                          | Atlantic spotted dolphin                       | 18         | 2              | 108             | R/V <i>R.T. Barber</i> |
| 28-Oct-14 | 15:30 | 30.44248 | -80.48398 | <i>T. truncatus</i>                          | Bottlenose dolphin                             | 1          | 1              | 9               | R/V <i>R.T. Barber</i> |

1 **Table 3. Numbers of cetacean sightings and mean group sizes ( $\pm 1$  sd) for each species observed**  
 2 **during Year 1 (July 2009–December 2010), Year 2 (January 2011–December 2011), Year 3 (January**  
 3 **2012–December 2012), Year 4 (January 2013–December 2013) and Year 5 (January 2014–**  
 4 **December 2014) of vessel surveys in the Jacksonville survey area.**

| Species                           | Sightings |           |           |           |           | Mean Group Size |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------------|
|                                   | Year 1    | Year 2    | Year 3    | Year 4    | Year 5    |                 |
| <i>Eubalaena glacialis</i>        | 0         | 0         | 0         | 0         | 1         | 1.0 $\pm$ 0.0   |
| <i>Globicephala macrorhynchus</i> | 3         | 0         | 0         | 0         | 0         | 33.3 $\pm$ 17.6 |
| <i>Grampus griseus</i>            | 2         | 0         | 0         | 1         | 1         | 25.8 $\pm$ 20.3 |
| <i>Stenella frontalis</i>         | 35        | 6         | 14        | 9         | 20        | 9.2 $\pm$ 9.3   |
| <i>Tursiops truncatus</i>         | 19        | 6         | 23        | 15        | 18        | 4.7 $\pm$ 4.3   |
| <i>Tursiops/Stenella</i> mix      | 0         | 0         | 0         | 0         | 1         | 1.0 $\pm$ 0.0   |
| Unidentified delphinid            | 13        | 0         | 4         | 3         | 4         | 1.9 $\pm$ 1.2   |
| <b>Total:</b>                     | <b>72</b> | <b>12</b> | <b>41</b> | <b>28</b> | <b>45</b> |                 |

5

6 **Table 4. Sea turtle sightings from vessel surveys in the Jacksonville survey area, January 2014–**  
 7 **December 2014.**

| Date      | Time  | Latitude | Longitude | Species            | Common Name            | Group Size | Vessel                 |
|-----------|-------|----------|-----------|--------------------|------------------------|------------|------------------------|
| 16-Feb-14 | 15:04 | 30.45279 | -80.76539 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 10:06 | 30.38628 | -80.37582 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 11:34 | 30.42813 | -80.50864 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 11:34 | 30.49525 | -80.42668 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 12:02 | 30.55158 | -80.43069 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 12:35 | 30.56153 | -80.50137 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 17-Feb-14 | 14:53 | 30.57825 | -80.82901 | <i>D. coriacea</i> | Leatherback sea turtle | 1          | R/V <i>Stellwagen</i>  |
| 17-Feb-14 | 14:55 | 30.57974 | -80.83192 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>Stellwagen</i>  |
| 18-Feb-14 | 14:36 | 30.55281 | -80.66112 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 18-Feb-14 | 14:45 | 30.57005 | -80.64920 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 18-Feb-14 | 15:00 | 30.58921 | -80.63347 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 18-Feb-14 | 15:19 | 30.57986 | -80.66923 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |
| 10-Apr-14 | 11:51 | 30.35622 | -80.89972 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V <i>R.T. Barber</i> |

| Date      | Time  | Latitude | Longitude | Species            | Common Name            | Group Size | Vessel          |
|-----------|-------|----------|-----------|--------------------|------------------------|------------|-----------------|
| 10-Apr-14 | 12:16 | 30.34512 | -80.66417 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 10-Apr-14 | 12:32 | 30.34269 | -80.56587 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 10-Apr-14 | 15:50 | 30.37663 | -80.37338 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 10-Apr-14 | 16:27 | 30.38098 | -80.55154 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 10-Apr-14 | 16:33 | 30.38334 | -80.65455 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 11-Apr-14 | 11:34 | 30.43251 | -80.48992 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 11-Apr-14 | 12:16 | 30.41693 | -80.43791 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 11-Apr-14 | 14:57 | 30.33981 | -80.40869 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 11-Apr-14 | 15:59 | 30.29230 | -80.55827 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 12-Apr-14 | 9:57  | 30.58366 | -80.68408 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 12-Apr-14 | 10:11 | 30.55948 | -80.61666 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 12-Apr-14 | 10:15 | 30.55103 | -80.59926 | <i>C. caretta</i>  | Loggerhead sea turtle  | 2          | R/V R.T. Barber |
| 12-Apr-14 | 10:38 | 30.51901 | -80.46347 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 12-Apr-14 | 14:58 | 30.34154 | -80.18513 | <i>D. coriacea</i> | Leatherback sea turtle | 1          | R/V R.T. Barber |
| 22-Jul-14 | 11:03 | 30.07974 | -80.64928 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 22-Jul-14 | 11:29 | 30.03578 | -80.63097 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 23-Jul-14 | 16:28 | 30.43368 | -80.34068 | <i>D. coriacea</i> | Leatherback sea turtle | 1          | R/V R.T. Barber |
| 26-Oct-14 | 15:45 | 30.33623 | -80.52188 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 27-Oct-14 | 10:23 | 30.22306 | -80.46049 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 28-Oct-14 | 12:27 | 30.23729 | -80.19298 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |
| 28-Oct-14 | 14:49 | 30.42881 | -80.22463 | <i>C. caretta</i>  | Loggerhead sea turtle  | 1          | R/V R.T. Barber |

1 Table 5. Numbers of sea turtle sightings and mean group sizes ( $\pm 1$  sd) for each species observed  
2 during Year 1 (July 2009–December 2010), Year 2 (January–December 2011), Year 3 (January

1 2012–December 2012), Year 4 (January 2013–December 2013) and Year 5 (January 2014–  
2 December 2014) of vessel surveys in the Jacksonville survey area.

| Species                     | Sightings |           |           |           |           | Mean Group Size |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------------|
|                             | Year 1    | Year 2    | Year 3    | Year 4    | Year 5    |                 |
| <i>Caretta caretta</i>      | 52        | 20        | 41        | 33        | 31        | 1.1±0.2         |
| <i>Dermochelys coriacea</i> | 8         | 3         | 4         | 1         | 3         | 1.0±0.0         |
| <i>Lepidochelys kempii</i>  | 1         | 0         | 1         | 0         | 0         | 1.0±0.0         |
| Unidentified sea turtle     | 8         | 3         | 3         | 1         | 0         | 1.0±0.0         |
| <b>Total:</b>               | <b>69</b> | <b>26</b> | <b>49</b> | <b>35</b> | <b>34</b> |                 |

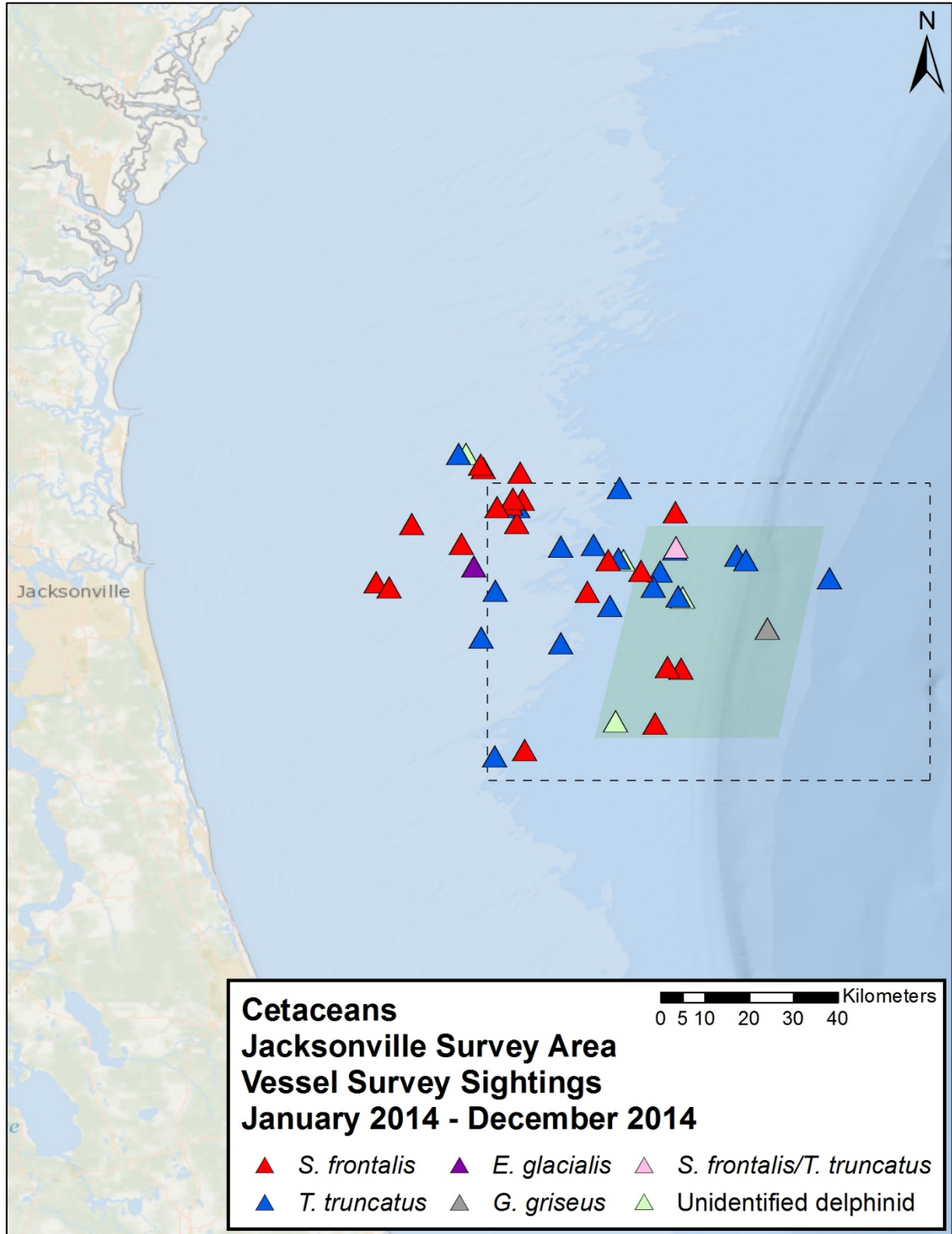
3

4 The North Atlantic right whale (EGNO 4057) observed 16 February 2014 was initially spotted  
5 entangled in hundreds of meters of heavy rope. The R/V *Barber* attached a digital acoustic tag  
6 (DTag) to the animal and the R/V *Stellwagen* tracked it for several hours, until the tag came off,  
7 at which time the R/V *Stellwagen* proceeded offshore. A telemetry buoy was placed on the  
8 whale by officials from Florida Fish and Wildlife Conservation Commission (FWC) after the  
9 DTag was shed, and on 17 February 2014, responders from the Georgia Department of Natural  
10 Resources and FWC were able to shorten the trailing end of line by over 91 meters.

### 11 2.2.3 Distributions and Habitat Associations of Cetaceans and Sea Turtles

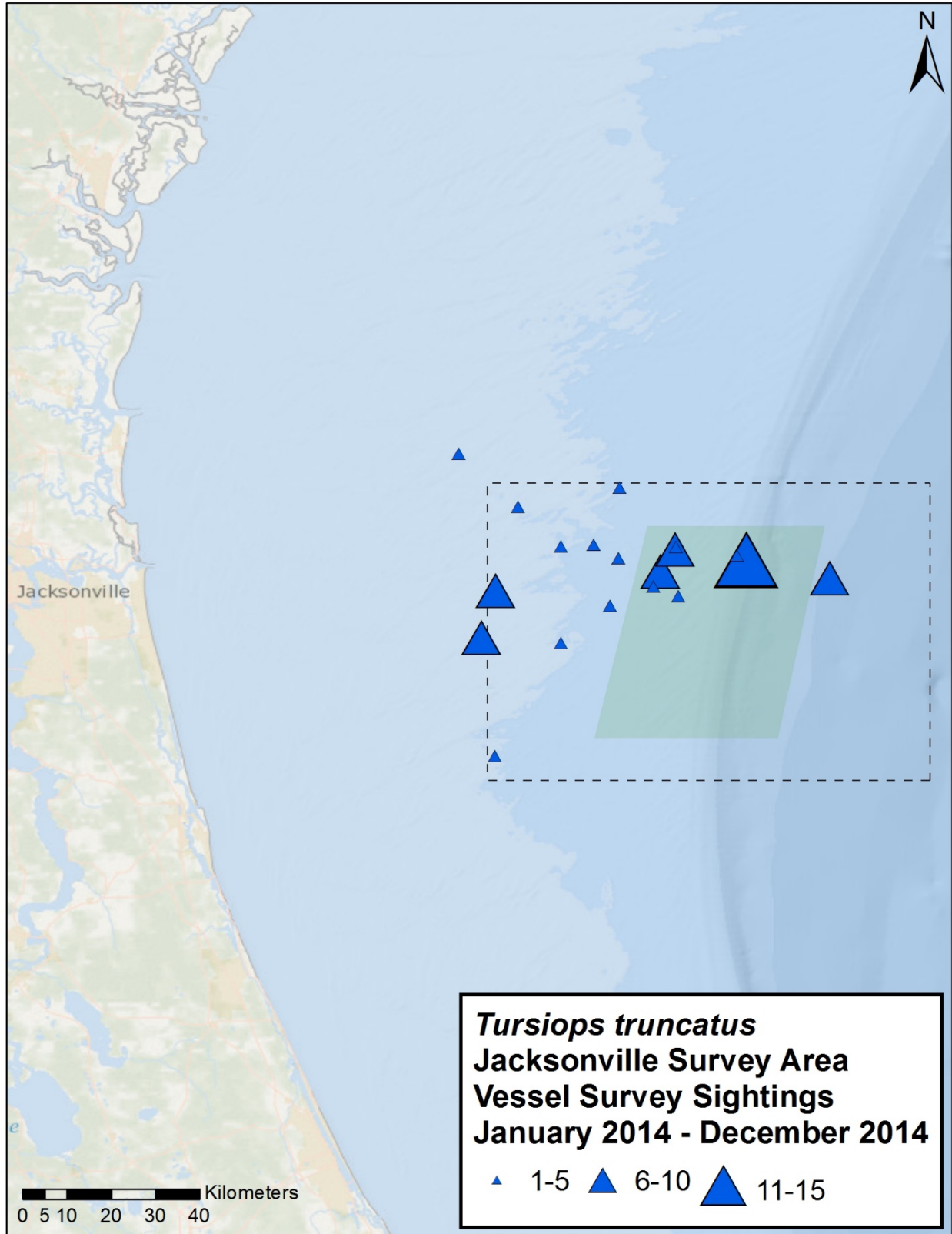
12 The distribution of marine mammals and sea turtles in the Jacksonville survey area is presented  
13 in **Figures 4** through **10**. Similar to our observations in previous years, bottlenose dolphins were  
14 encountered throughout the survey area, including deeper pelagic waters (**Figure 5**), whereas  
15 Atlantic spotted dolphins were restricted to the relatively shallow, shelf waters (**Figure 6**). All  
16 sea turtles were observed over the continental shelf (**Figure 10**).





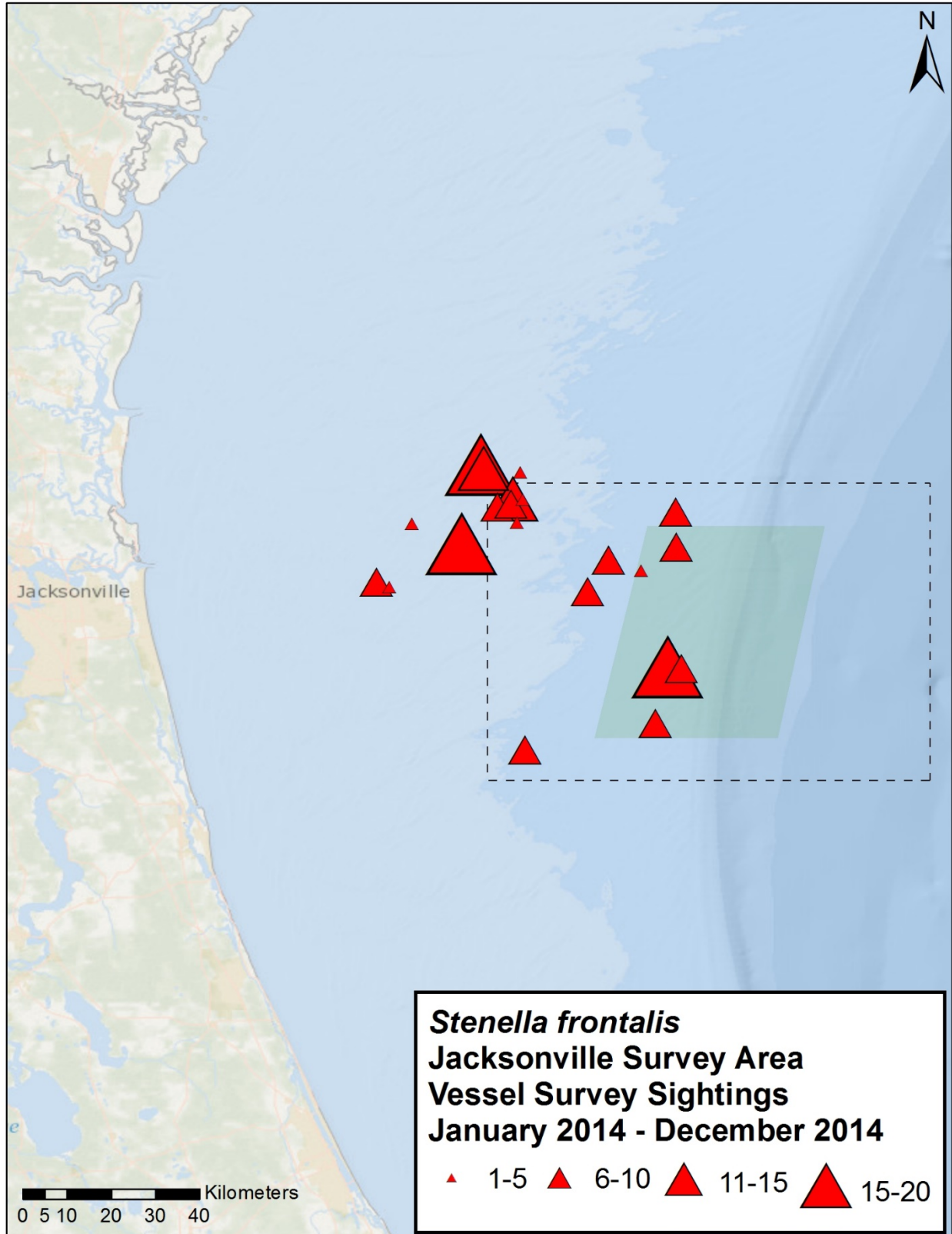
1

2 Figure 4. Distribution of all cetacean sightings made during vessel surveys in the Jacksonville  
3 survey area, January 2014–December 2014.



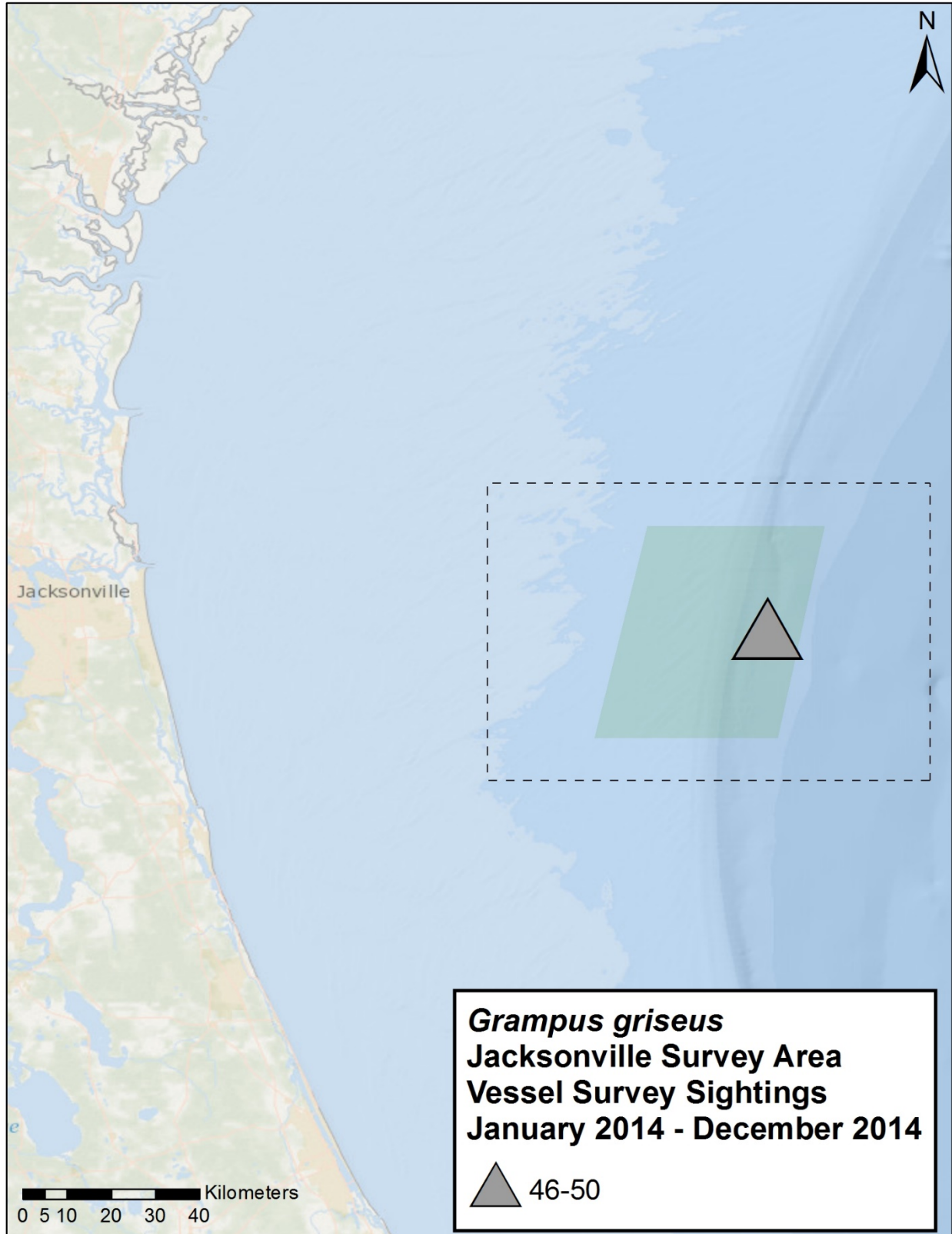
1

2 Figure 5. Distribution of bottlenose dolphin sightings indicating group size made during vessel  
3 surveys in the Jacksonville survey area, January 2014–December 2014.



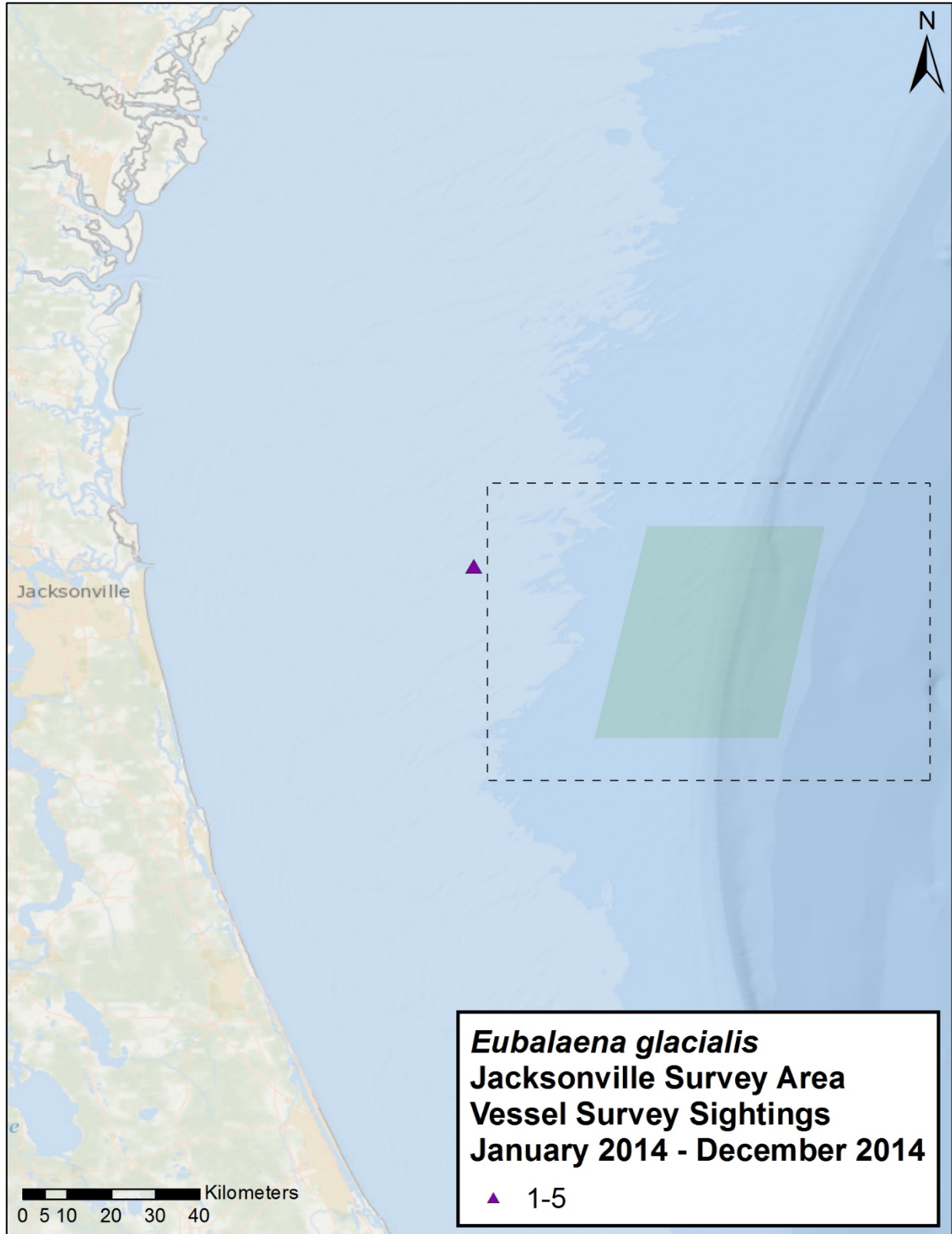
1

2 Figure 6. Distribution of Atlantic spotted dolphin sightings indicating group size made during  
3 vessel surveys in the Jacksonville survey area, January 2014–December 2014.



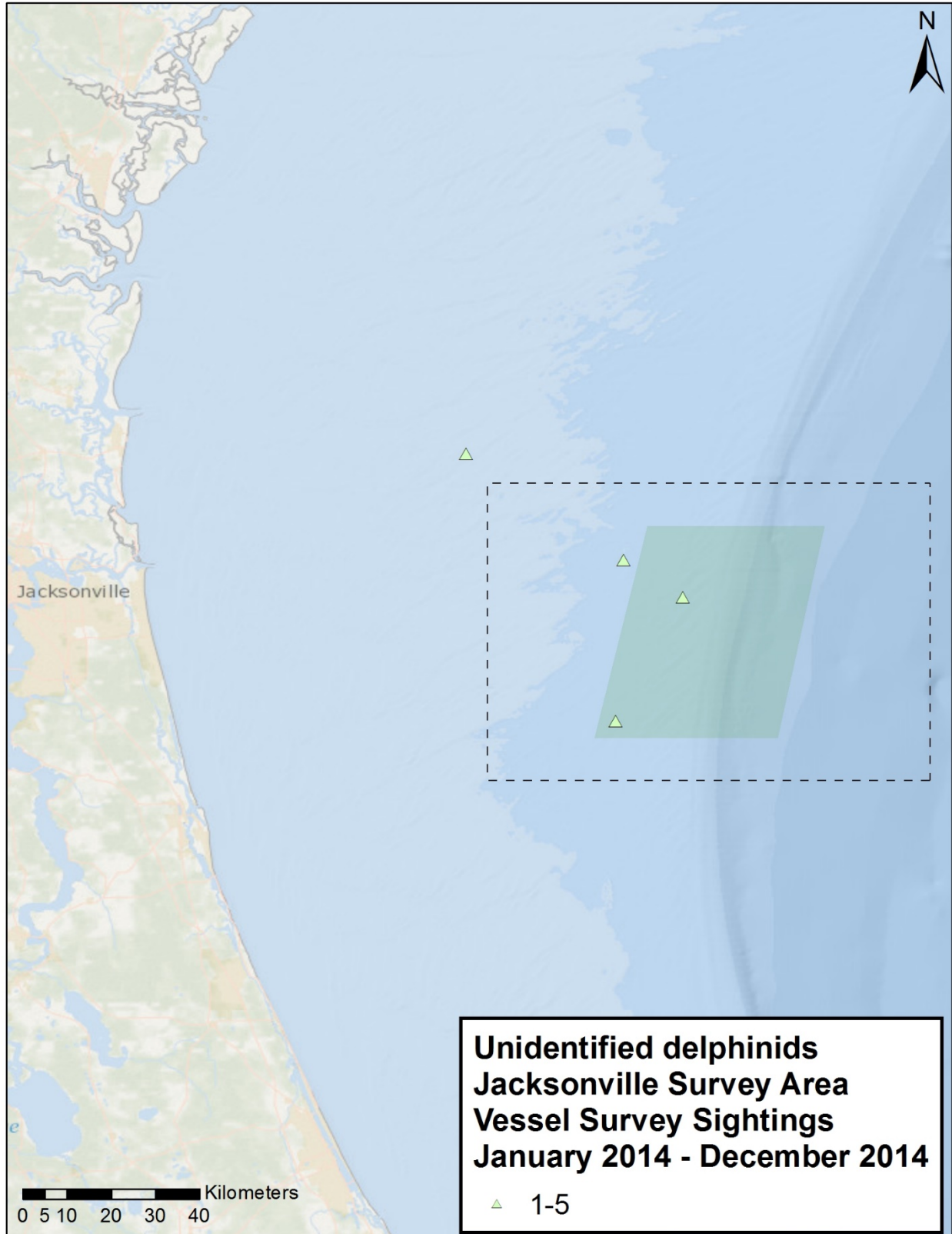
1

2 Figure 7. Distribution of Risso's dolphin sightings indicating group size made during vessel  
3 surveys in the Jacksonville survey area, January 2014–December 2014.



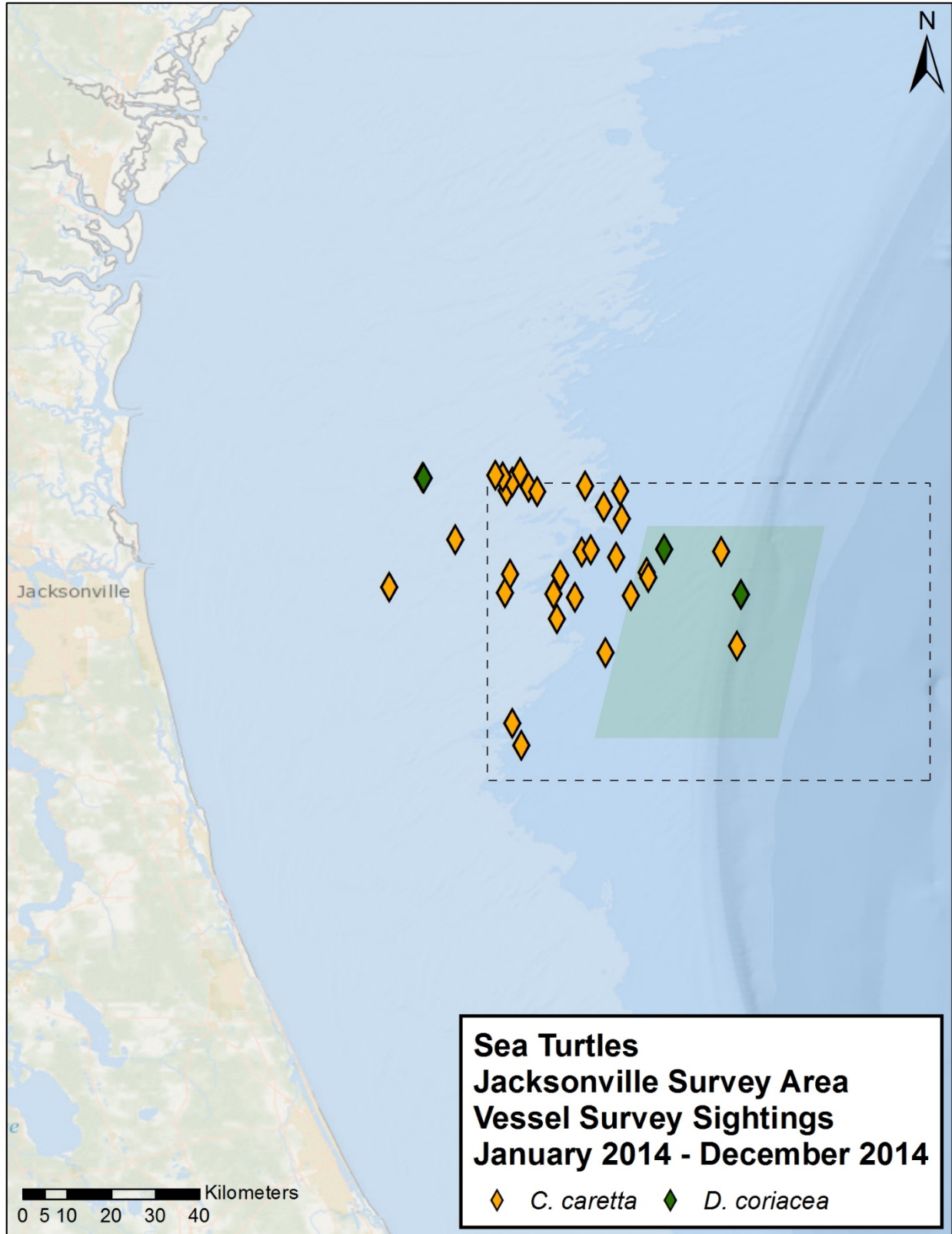
1

2 Figure 8. Distribution of North Atlantic right whale sightings indicating group size made during  
3 vessel surveys in the Jacksonville survey area, January 2014–December 2014.



1

2 Figure 9. Distribution of unidentified delphinid sightings indicating group size made during vessel  
3 surveys in the Jacksonville survey area, January 2014–December 2014



1

2 Figure 10. Distribution of sea turtle sightings indicating group size made during vessel surveys in  
3 the Jacksonville survey area, January 2014–December 2014.

1 **2.2.4 Biopsy Sampling**

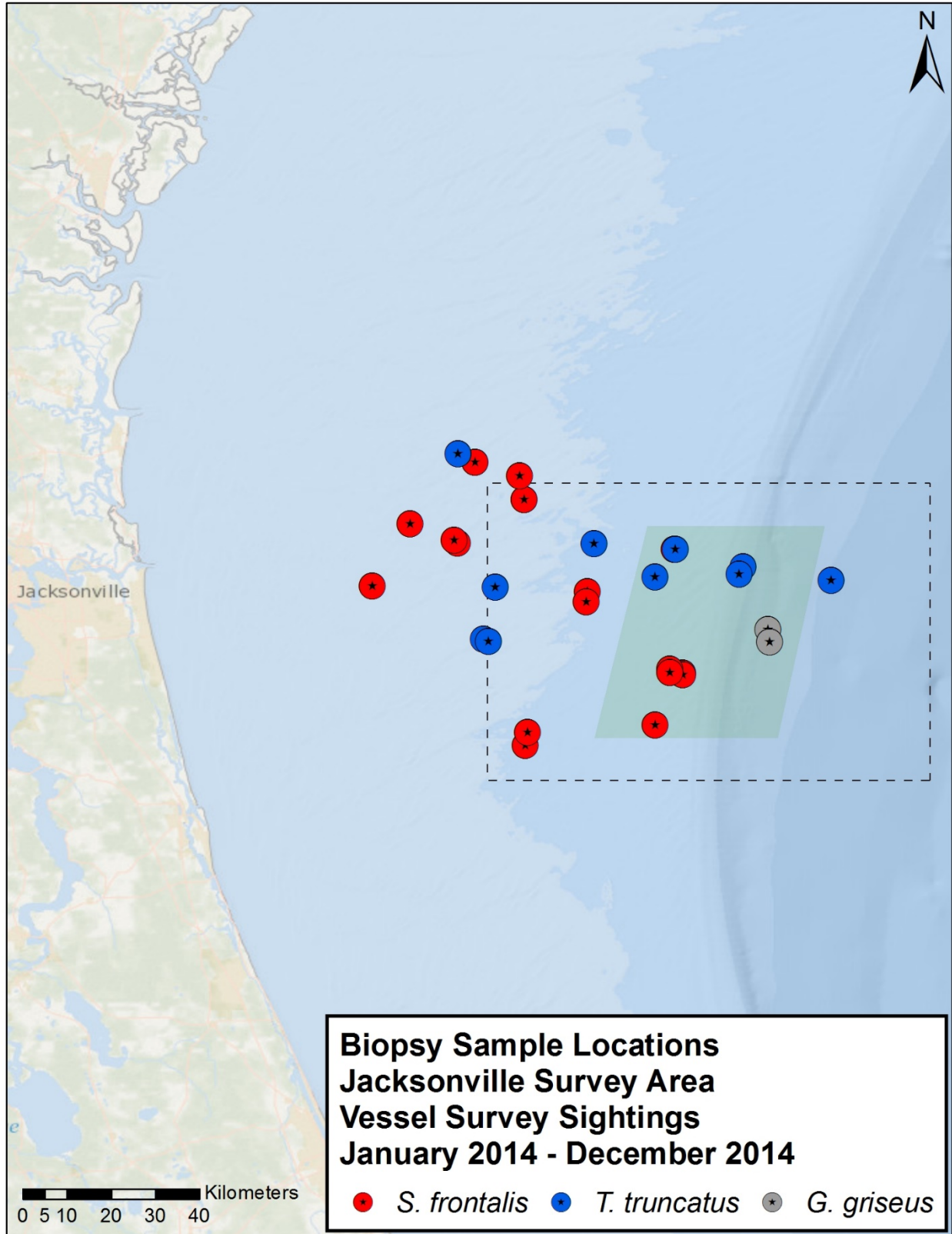
2 We collected 31 biopsy samples in the Jacksonville survey area during 2014 from Atlantic  
3 spotted dolphins ( $n = 19$ ), bottlenose dolphins ( $n = 10$ ) and Risso’s dolphins ( $n = 2$ ) (**Table 6**  
4 and **Figure 11**). Skin samples will be analyzed for sex determination. Voucher specimens of  
5 these samples are archived with the National Marine Fisheries Service’s Southeast Fisheries  
6 Science Center in Lafayette, Louisiana.

7 **Table 6. Biopsy samples collected in the Jacksonville survey area, January 2014–December 2014.**

| Date      | Time  | Latitude | Longitude | Species             | Sample #  |
|-----------|-------|----------|-----------|---------------------|-----------|
| 16-Feb-14 | 14:46 | 30.44654 | -80.76097 | <i>S. frontalis</i> | ZTS_14_01 |
| 16-Feb-14 | 14:59 | 30.45201 | -80.76713 | <i>S. frontalis</i> | ZTS_14_02 |
| 17-Feb-14 | 13:17 | 30.53476 | -80.62554 | <i>S. frontalis</i> | ZTS_14_03 |
| 17-Feb-14 | 13:17 | 30.53476 | -80.62554 | <i>S. frontalis</i> | ZTS_14_04 |
| 17-Feb-14 | 14:52 | 30.61051 | -80.72516 | <i>S. frontalis</i> | ZTS_14_05 |
| 17-Feb-14 | 14:52 | 30.61051 | -80.72516 | <i>S. frontalis</i> | ZTS_14_06 |
| 17-Feb-14 | 15:30 | 30.62691 | -80.76006 | <i>T. truncatus</i> | ZTS_14_07 |
| 18-Feb-14 | 15:09 | 30.58223 | -80.63459 | <i>S. frontalis</i> | ZTS_14_08 |
| 10-Apr-14 | 11:25 | 30.35937 | -80.93349 | <i>S. frontalis</i> | RJM_14_01 |
| 11-Apr-14 | 9:27  | 30.48467 | -80.85674 | <i>S. frontalis</i> | ZTS_14_13 |
| 11-Apr-14 | 13:54 | 30.37738 | -80.35910 | <i>T. truncatus</i> | ZTS_14_09 |
| 12-Apr-14 | 12:55 | 30.39841 | -80.18007 | <i>T. truncatus</i> | RJM_14_02 |
| 12-Apr-14 | 13:16 | 30.38292 | -80.18761 | <i>T. truncatus</i> | RJM_14_03 |
| 12-Apr-14 | 16:00 | 30.34785 | -80.49716 | <i>S. frontalis</i> | ZTS_14_10 |
| 12-Apr-14 | 16:36 | 30.32655 | -80.49910 | <i>S. frontalis</i> | ZTS_14_11 |
| 12-Apr-14 | 17:37 | 30.35679 | -80.68403 | <i>T. truncatus</i> | ZTS_14_12 |
| 22-Jul-14 | 9:18  | 30.25047 | -80.70766 | <i>T. truncatus</i> | ZTS_14_19 |
| 22-Jul-14 | 9:31  | 30.24610 | -80.69749 | <i>T. truncatus</i> | ZTS_14_20 |
| 22-Jul-14 | 11:51 | 30.03559 | -80.62347 | <i>S. frontalis</i> | ZTS_14_21 |
| 22-Jul-14 | 12:27 | 30.06204 | -80.61854 | <i>S. frontalis</i> | ZTS_14_22 |
| 23-Jul-14 | 14:21 | 30.37076 | -80.00085 | <i>T. truncatus</i> | ZTS_14_23 |
| 23-Jul-14 | 15:50 | 30.43299 | -80.31967 | <i>S. frontalis</i> | ZTS_14_24 |
| 23-Jul-14 | 16:20 | 30.43387 | -80.31759 | <i>T. truncatus</i> | ZTS_14_25 |
| 26-Oct-14 | 11:00 | 30.07673 | -80.35933 | <i>S. frontalis</i> | ZTS_14_29 |
| 27-Oct-14 | 11:21 | 30.18258 | -80.30241 | <i>S. frontalis</i> | ZTS_14_30 |
| 27-Oct-14 | 11:29 | 30.17864 | -80.30235 | <i>S. frontalis</i> | ZTS_14_31 |
| 27-Oct-14 | 14:16 | 30.27022 | -80.13001 | <i>G. griseus</i>   | ZTS_14_32 |
| 27-Oct-14 | 15:03 | 30.24501 | -80.12642 | <i>G. griseus</i>   | ZTS_14_33 |
| 28-Oct-14 | 11:31 | 30.18974 | -80.32982 | <i>S. frontalis</i> | ZTS_14_34 |
| 28-Oct-14 | 11:57 | 30.18293 | -80.32886 | <i>S. frontalis</i> | ZTS_14_35 |
| 28-Oct-14 | 15:36 | 30.44508 | -80.48248 | <i>T. truncatus</i> | ZTS_14_36 |

8





1

2 Figure 11. Locations of biopsy samples collected in the Jacksonville survey area, January 2014–  
3 December 2014.

1 **2.2.5 Photographic Effort**

2 We obtained 1,688 digital images for species confirmation and individual identification during  
3 2014. Photo-identification analysis is now complete for all images taken through December  
4 2014; this past year we added 77 newly identified dolphins to existing catalogs (**Table 7**). Photo-  
5 identification catalogues for bottlenose and Atlantic spotted dolphins in JAX currently consist of  
6 80 and 111 individuals, respectively. We have re-sighted two individual spotted dolphins within  
7 the JAX study area (**Figure 11**). Sfr 3-001 was observed first on 10 October 2010 and again on  
8 19 March 2011; Sfr 8-005 was photographed during surveys on two consecutive days: 18 March  
9 2011 and 19 March 2011 (**Table 8**). In addition, we re-sighted two bottlenose dolphins together  
10 on 25 January 2012 and 18 July 2013 (**Table 8** and **Figure 12**). The Risso’s dolphin catalog  
11 consists of 22 individuals, but we have not identified any re-sightings through 2014.

12 **Table 7. Summary of photographs taken of animals in the Jacksonville survey area, January 2014–**  
13 **December 2014, with photo-identification catalog sizes and total number of matches.**

| Species                 | Common Name              | Images | Catalog Size | Matches |
|-------------------------|--------------------------|--------|--------------|---------|
|                         |                          | 2014   |              |         |
| <i>G. macrorhynchus</i> | Short-finned pilot whale | n/a    | 12           | 0       |
| <i>G. griseus</i>       | Risso's dolphin          | 312    | 22           | 0       |
| <i>S. frontalis</i>     | Atlantic spotted dolphin | 807    | 111          | 2       |
| <i>T. truncatus</i>     | Bottlenose dolphin       | 373    | 80           | 2       |

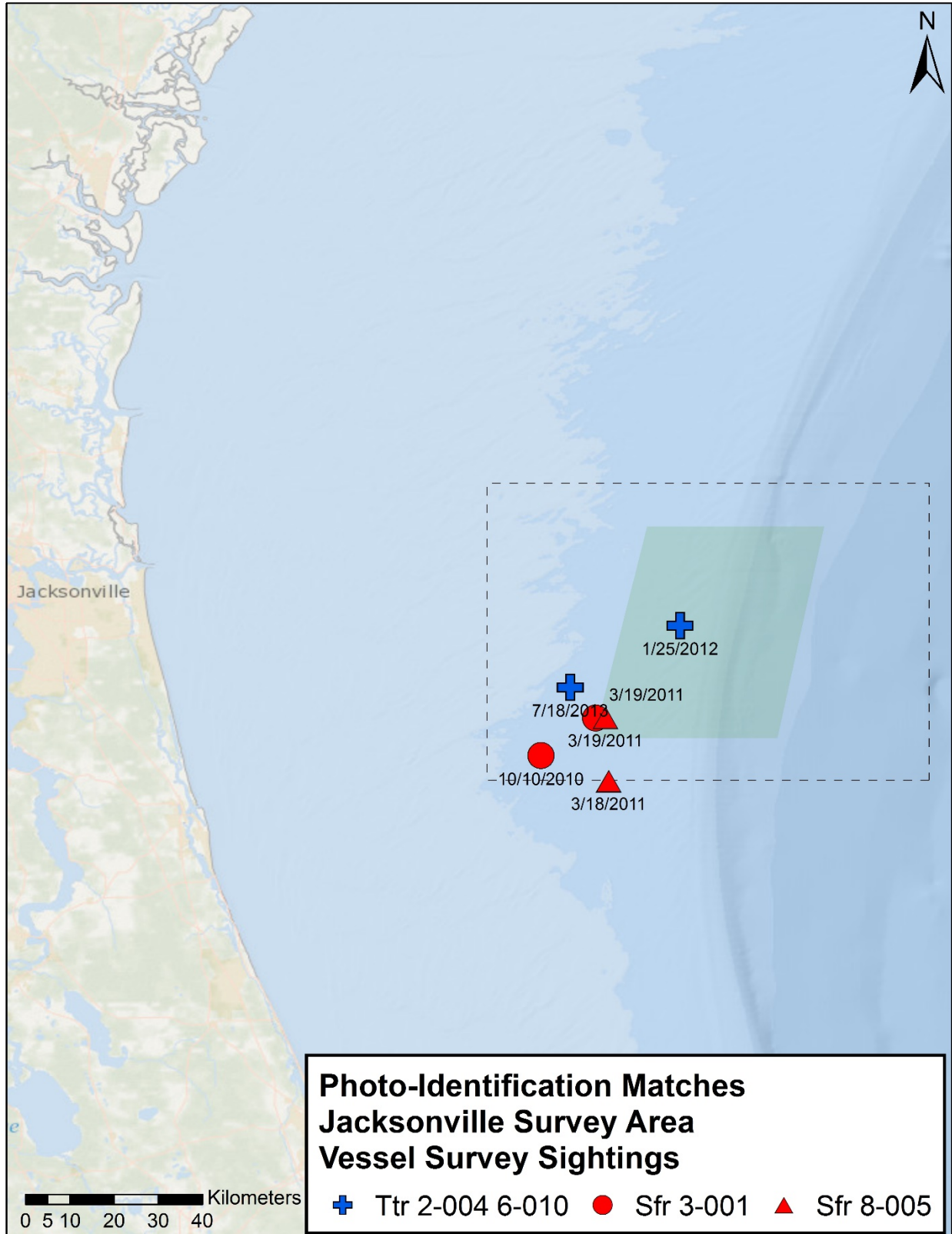
14 **Table 8. Photo-identification matches of bottlenose dolphins and Atlantic spotted dolphins**  
15 **observed in the Jacksonville survey area.**

| ID                     | Jacksonville, FL |      |                |      |      |      |
|------------------------|------------------|------|----------------|------|------|------|
|                        | 2009             | 2010 | 2011           | 2012 | 2013 | 2014 |
| Ttr 2-004 <sup>^</sup> |                  |      |                | X    | X    |      |
| Ttr 6-010 <sup>^</sup> |                  |      |                | X    | X    |      |
| Sfr 3-001              |                  | X    | X              |      |      |      |
| Sfr 8-005              |                  |      | X <sup>m</sup> |      |      |      |

<sup>^</sup>Observed together in multiple sightings

<sup>m</sup>Re-sighted within same month

16 The North Atlantic right whale observed on 16 February 2014 was identified as EGNO 4057, a  
17 male born in 2010 (North Atlantic Right Whale Catalog, New England Aquarium, Boston,  
18 <http://rwcatalog.neaq.org/>). After being partially disentangled on 17 February 2014, the  
19 individual was re-sighted on 12 April 2014 in Cape Cod Bay by the Center for Coastal Studies’  
20 aerial team. While line is still present in the mouth of the animal, the entanglement has been  
21 assessed as not life threatening.



1

2 Figure 12. Locations of matched dolphins within the Jacksonville survey area.

## 2.3 Summary Tables

Total survey effort conducted since the beginning of the monitoring program in the Jacksonville survey area is reported in **Table 9**. The annual numbers of sightings and mean group size by species for both cetaceans and sea turtles are presented in **Tables 10** and **11**, respectively. The number of biopsy samples collected to date is reported in **Table 12**. **Table 13** summarizes the catalog sizes and matches by species to date and images taken during the reporting period in the Jacksonville survey area.

**Table 9. Duration and distance surveyed during Year 1 (July 2009–December 2010), Year 2 (January 2011–December 2011), Year 3 (January 2012–December 2012), Year 4 (January 2013–December 2013) and Year 5 (January 2014–December 2014) in the Jacksonville survey area.**

|                     | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---------------------|--------|--------|--------|--------|--------|-------|
| <b>Survey Hours</b> | 127.1  | 20.9   | 58.6   | 58.7   | 66.8   | 329.7 |
| <b>km Surveyed</b>  | 2073.5 | 345.7  | 937.4  | 1021.7 | 1227.4 | 5672  |

**Table 10. Numbers of cetacean sightings and mean group sizes ( $\pm 1$  sd) for each species observed during Year 1 (July 2009–December 2010), Year 2 (January 2011–December 2011), Year 3 (January 2012–December 2012), Year 4 (January 2013–December 2013) and Year 5 (January 2014–December 2014) of vessel surveys in the Jacksonville survey area.**

| Species                           | Sightings |           |           |           |           | Mean Group Size |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------------|
|                                   | Year 1    | Year 2    | Year 3    | Year 4    | Year 5    |                 |
| <i>Eubalaena glacialis</i>        | 0         | 0         | 0         | 0         | 1         | 1.0 $\pm$ 0.0   |
| <i>Globicephala macrorhynchus</i> | 3         | 0         | 0         | 0         | 0         | 33.3 $\pm$ 17.6 |
| <i>Grampus griseus</i>            | 2         | 0         | 0         | 1         | 1         | 25.8 $\pm$ 20.3 |
| <i>Stenella frontalis</i>         | 35        | 6         | 14        | 9         | 20        | 9.2 $\pm$ 9.3   |
| <i>Tursiops truncatus</i>         | 19        | 6         | 23        | 15        | 18        | 4.7 $\pm$ 4.3   |
| <i>Tursiops/Stenella</i> mix      | 0         | 0         | 0         | 0         | 1         | 1.0 $\pm$ 0.0   |
| Unidentified delphinid            | 13        | 0         | 4         | 3         | 4         | 1.9 $\pm$ 1.2   |
| <b>Total:</b>                     | <b>72</b> | <b>12</b> | <b>41</b> | <b>28</b> | <b>45</b> |                 |

**Table 11. Numbers of sea turtle sightings and mean group sizes ( $\pm 1$  sd) for each species observed during vessel surveys in the Jacksonville survey area, January 2009–December 2014.**

| Species                     | Sightings |           |           |           |           | Mean Group Size |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------------|
|                             | Year 1    | Year 2    | Year 3    | Year 4    | Year 5    |                 |
| <i>Caretta caretta</i>      | 52        | 20        | 41        | 33        | 31        | 1.1 $\pm$ 0.2   |
| <i>Dermochelys coriacea</i> | 8         | 3         | 4         | 1         | 3         | 1.0 $\pm$ 0.0   |
| <i>Lepidochelys kempii</i>  | 1         | 0         | 1         | 0         | 0         | 1.0 $\pm$ 0.0   |
| Unidentified sea turtle     | 8         | 3         | 3         | 1         | 0         | 1.0 $\pm$ 0.0   |
| <b>Total:</b>               | <b>69</b> | <b>26</b> | <b>49</b> | <b>35</b> | <b>34</b> |                 |

1 **Table 12. Biopsy samples collected to date in the Jacksonville survey area.**

| Species             | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Total |
|---------------------|--------|--------|--------|--------|--------|-------|
| <i>G. griseus</i>   | 0      | 0      | 0      | 1      | 2      | 3     |
| <i>S. frontalis</i> | 0      | 0      | 19     | 6      | 19     | 44    |
| <i>T. truncatus</i> | 0      | 0      | 12     | 5      | 10     | 27    |

2 **Table 13. Summary of images collected during all vessel surveys in the Jacksonville survey area,**  
3 **January 2009–December 2014, with photo-identification catalog sizes and matches to date.**

| Species                 | Year 1       |         | Year 2       |         | Year 3       |         | Year 4       |         | Year 5       |         |
|-------------------------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|
|                         | Catalog Size | Matches | Catalog Size | Matches | Catalog Size | Matches | Catalog Size | Matches | Catalog Size | Matches |
| <i>G. macrorhynchus</i> | 0            | 0       | 0            | 0       | 0            | 0       | 12           | 0       | 12           | 0       |
| <i>G. griseus</i>       | 1            | 0       | 1            | 0       | 1            | 0       | 7            | 0       | 22           | 0       |
| <i>S. frontalis</i>     | 0            | 0       | 41           | 0       | 60           | 2       | 77           | 2       | 111          | 2       |
| <i>T. truncatus</i>     | 0            | 0       | 21           | 0       | 41           | 0       | 52           | 2       | 80           | 2       |

4 **3. Acknowledgements**

5 We thank Joel Bell (Naval Facilities Engineering Command Atlantic) for his continued support  
6 and guidance. We are indebted to Keith Mullin and Kathy Foley, who allowed us to work under  
7 their biopsy permits (14450). We thank Danielle Waples, Bethany Roberts, and Ryan McAlarney  
8 for assistance in the field. We are also grateful to Alex Loer, the captain of the R/V *Stellwagen*,  
9 for his expertise and assistance. Surveys were conducted under NOAA Scientific Permit 16473  
10 held by the University of North Carolina Wilmington and NOAA General Authorization 808-1798-  
11 01, 808-1798-02, and 16185 held by Duke University.

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3   Read, A.J., S. Barco, J. Bell, D.L. Borchers, M.L. Burt, E.W. Cummings, J. Dunn, M. Fougères,  
4   L. Hazen, L.E. Williams-Hodge, A-M Laura, R.J. McAlarney, P. Nilsson, D.A. Pabst,  
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