# *U.S. Navy Marine Species Monitoring Program*

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***Please visit the US Navy Marine Species Monitoring Program web portal for additional information on this project – [www.navymarinespeciesmonitoring.us](http://www.navymarinespeciesmonitoring.us)***

*US Navy Marine Species Monitoring Program – Atlantic Technical Review Meeting*
*Virginia Beach, VA* *30-31 March 2015*

# Tagging and Tracking North Atlantic Right Whales in the Southeast U.S.

D.P. Nowacek
S.E. Parks
A.J. Read

2015 Atlantic Marine Species – NAVFAC Technical Review Meeting
30 March 2015

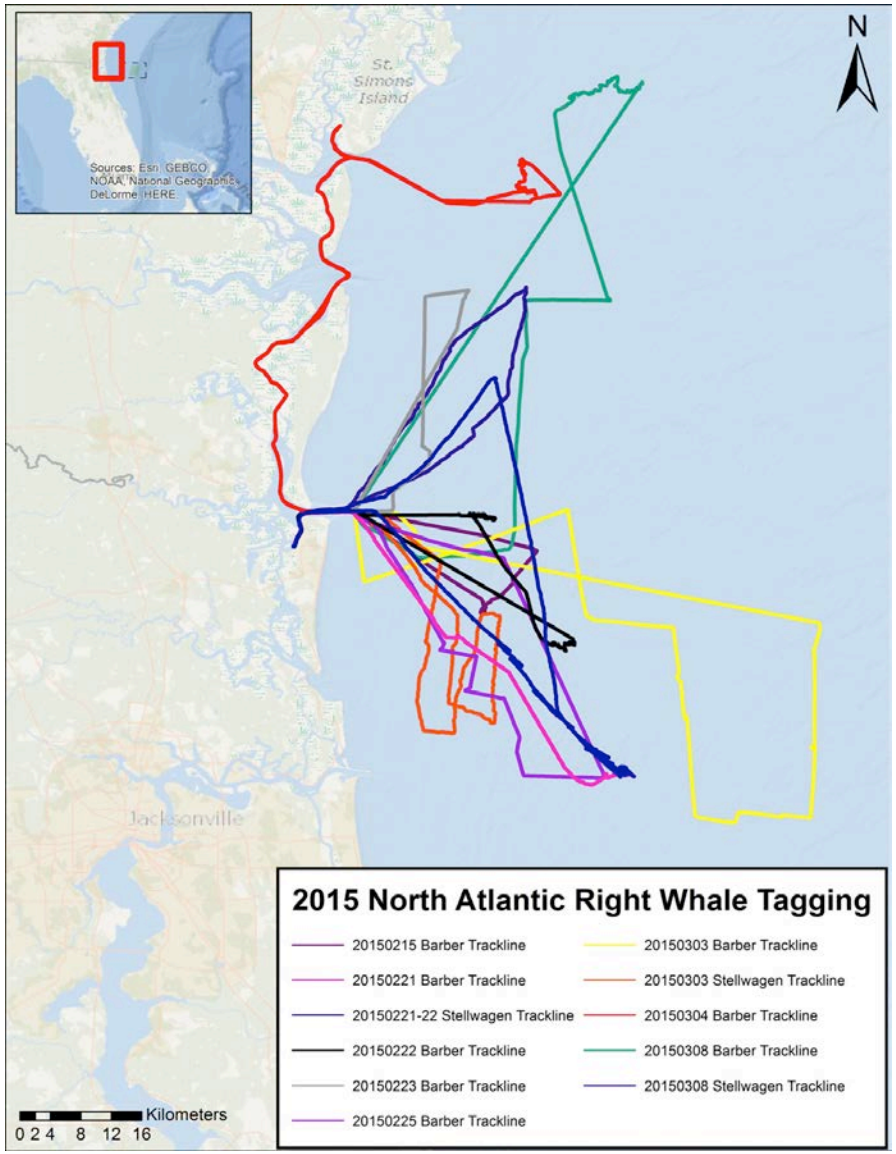
# Goals for 2015

- Tag whales offshore near USWTR range
  - Coordinate with UNCW aerial surveys ✓
- Tag additional nursing females ✓
- Attach tags for 24 hours ✓



# 2015 effort

| Date | Sea State | Survey Time (hrs:min) | At Sea Time | Platform |
|---|---|---|---|---|
| 16/Feb/15 | 3 | 3:08 | 3:46 | R/V *R.T. Barber* |
| 21/Feb/15 | 2 | 6:45 | 8:47 | R/V *R.T. Barber* |
| 21/Feb/15 | 2 | 14:42 | 16:55 | R/V *Stellwagen* |
| 22/Feb/15 | 2-4 | 7:32 | 9:14 | R/V *R.T. Barber* |
| 23/Feb/15 | 2-3 | 2:28 | 4:12 | R/V *R.T. Barber* |
| 25/Feb/15 | 2-3 | 6:11 | 7:11 | R/V *R.T. Barber* |
| 3/Mar/15 | 0-2 | 6:19 | 9:04 | R/V *R.T. Barber* |
| 3/Mar/15 | 0-2 | 8:13 | 9:48 | R/V *Stellwagen* |
| 4/Mar/15 | 4 | 3:58 | 8:45 | R/V *R.T. Barber* |
| 8/Mar/15 | 2-3 | 8:32 | 10:36 | R/V *R.T. Barber* |
| 8/Mar/15 | 2 | 5:33 | 7:43 | R/V *Stellwagen* |

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# Eg3292
# 21-22 Feb

# Tagging operations – 2015

- 2015 batting average .250 (1 for 4)
  - (Slugging percentage 1.000!)

Burleigh Grimes – Ol' Stubblebeard (.251)

- Career BA for the Southeast…
  - .667!!!

Ty Cobb – The Georgia Peach (.366)

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# Dive statistics

| Date | Tag ID | Dive record duration | Demographic | Number of dives per hour of tag data | Dive duration (s) | Mean Time at Surface between dives | Mean maximum Dive Depth |
|---|---|---|---|---|---|---|---|
| 24-Jan-06 | Eg06_024a | 1:54:40 | Juvenile male | 13.60 | 158.64 | 55.05 | 7.13 |
| 24-Jan-06 | Eg06_024b | 0:36:42 | Unknown | 21.25 | 70.57 | 62.46 | 7.39 |
| 24-Jan-06 | Eg06_024e | 0:54:06 | Juvenile female | 6.65 | 226.97 | 71.43 | 14.74 |
| 28-Jan-06 | Eg06_028a | 18:30:00 | Adult female | 10.77 | 201.08 | 137.02 | 8.49 |
| 9-Feb-14 | Eg14_040a | 1:33:27 | Nursing female | 8.99 | 213.65 | 143.04 | 9.51 |
| 10-Feb-14 | Eg14_041a | 5:30:01 | Nursing female | 15.82 | 49.06 | 157.70 | 5.07 |
| 16-Feb-14 | Eg14_047a | 3:36:00 | Juvenile male | 11.67 | 166.21 | 120.80 | 10.68 |
| 18-Feb-14 | Eg14_049a | 11:36:27 | Nursing female | 11.98 | 140.09 | 154.35 | 6.02 |
| 25-Feb-14 | Eg14_056a | 5:34:18 | Nursing female | 13.10 | 129.72 | 138.26 | 5.49 |
| 21-Feb-15 | Eg15_052a | 23:20 | Nursing female | | | | |

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# Acoustic data from tags

| Date | Tag ID | Acoustic record duration | Demographic | Right whale calls detected (all SNR including calls from other whales | Estimated calls per hour of tag recording |
|---|---|---|---|---|---|
| 21-Jan-06 | Eg06_021a | 1:21:07 | Juvenile male | 51 | 37.8 |
| 24-Jan-06 | Eg06_024a | 1:54:40 | Juvenile male | 267 | 140.5 |
| 24-Jan-06 | Eg06_024b | 0:36:42 | Unknown | 18 | 30 |
| 24-Jan-06 | Eg06_024c | 0:23:36 | Unknown | 102 | 266.1 |
| 24-Jan-06 | Eg06_024e | 0:54:06 | Juvenile female | 98 | 108.9 |
| 28-Jan-06 | Eg06_028a | 18:30:00 | Adult female | 8 | 0.43 |
| 9-Feb-14 | Eg14_040a | 1:33:27 | Nursing female | 36 | 24 |
| 10-Feb-14 | Eg14_041a | 5:30:01 | Nursing female | 108 | 19.6 |
| 16-Feb-14 | Eg14_047a | 3:36:00 | Juvenile male | 0 | 0 |
| 18-Feb-14 | Eg14_049a | 11:36:27 | Nursing female | 7 | 0.6 |
| 25-Feb-14 | Eg14_056a | 5:34:18 | Nursing female | 8 | 1.4 |
| **21-22 Feb-15** | **Eg15_52a** | **23:20** | **Nursing female** | **?** | **?** |

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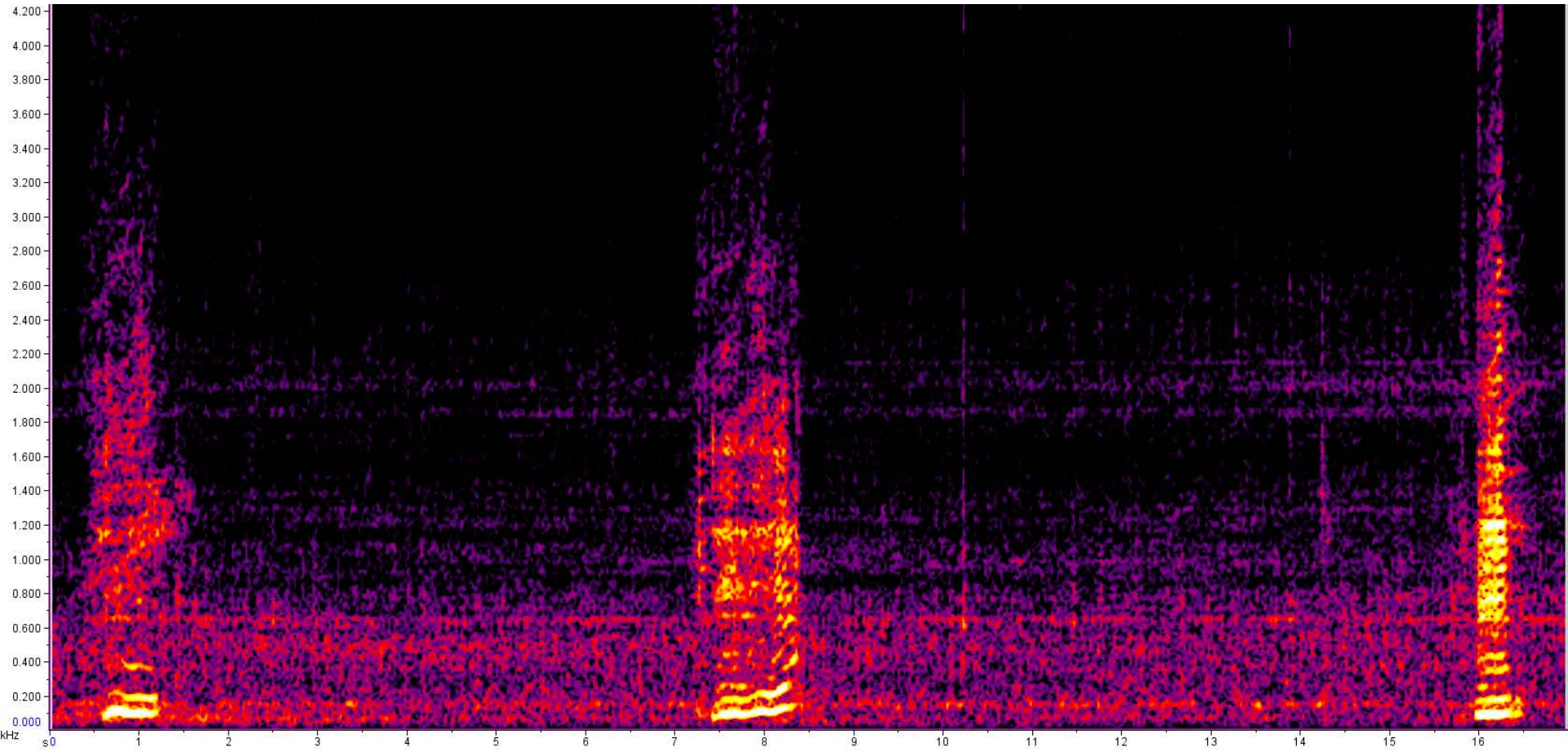


# Mom's call

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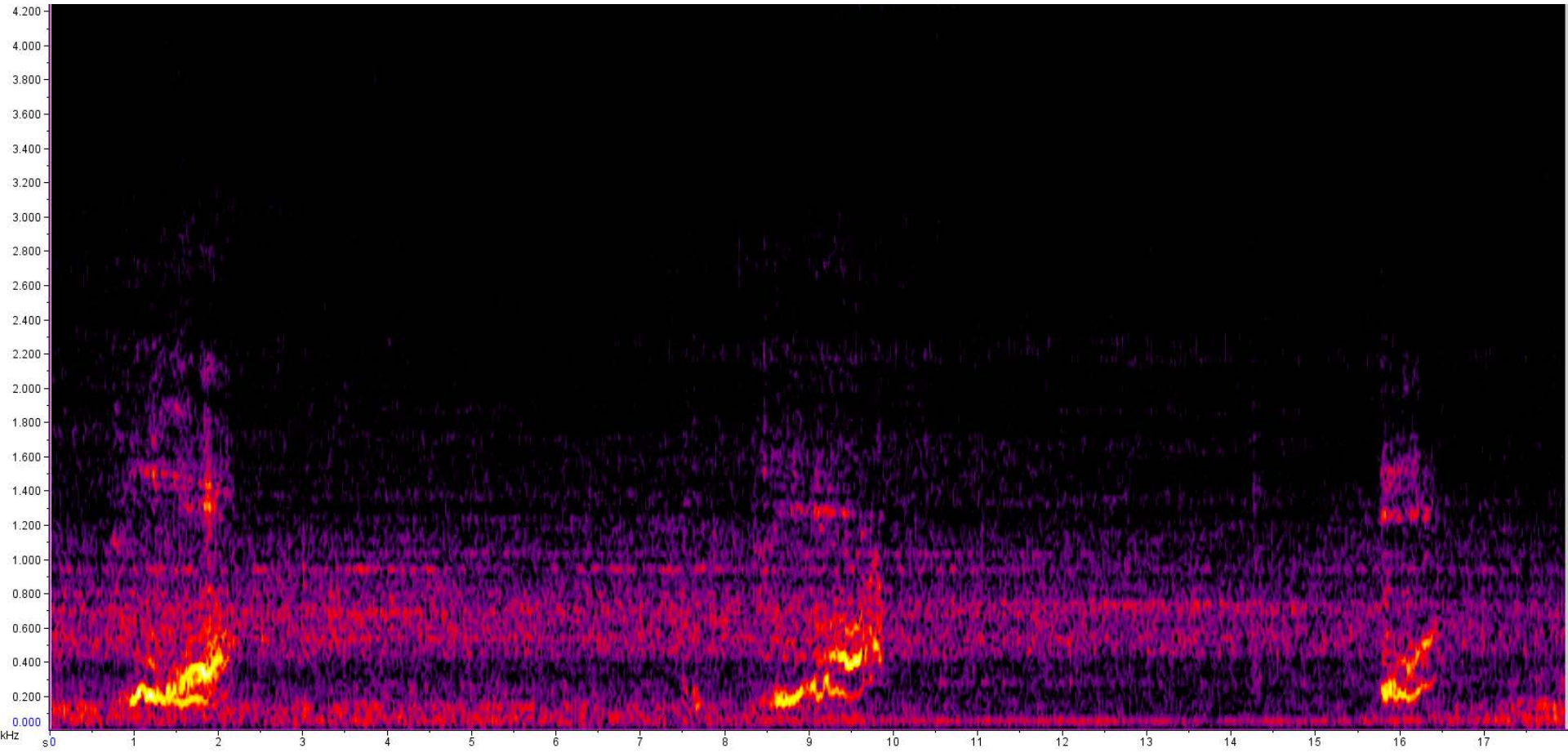


# Calf's call

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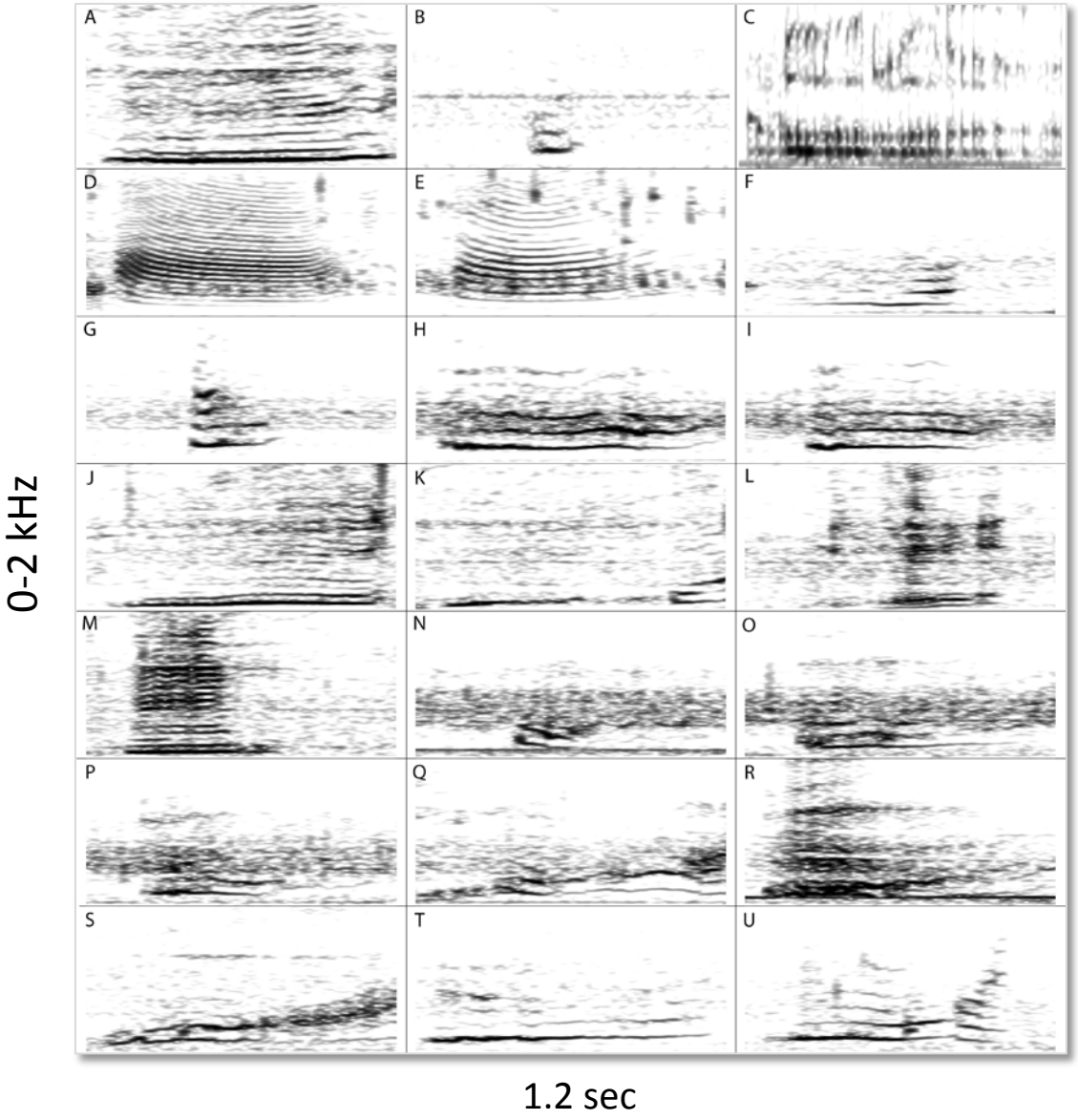
# Mom-calf counter calling

- Neonates maintain close proximity to mother
- Within weeks to months, calves begin to separate
  - Maintenance of vocal contact is critical



Spectrograms of high SNR calls showing the call types found in the acoustic tag records. (A) upcall, (B) grunt, (C) growl, (D-M) variable tonal calls, (N-U) variable tonal calls presumed to be from a calf.

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# Availability of whales 2007-2015

| Calving Season | Number of aerial survey whale sighting events | Number of whales sighted (includes duplicates) | Number of calves | Number of individual whales sighted |
|---|---|---|---|---|
| 2007 | 419 | 918 | 23 | 112 |
| 2008 | 617 | 1410 | 23 | 153 |
| 2009 | 848 | 1853 | 39 | 198 |
| 2010 | 523 | 1240 | 19 | 216 |
| 2011 | 265 | 610 | 22 | 142 |
| 2012 | 130 | 339 | 7 | 68 |
| 2013 | 184 | 355 | 20 | 41 |
| 2014 | 141 | 275 | 11 | 42 |
| 2015 | 75 | 149 | 17 | 30 |

Thanks to K. Jackson and FFWCC!

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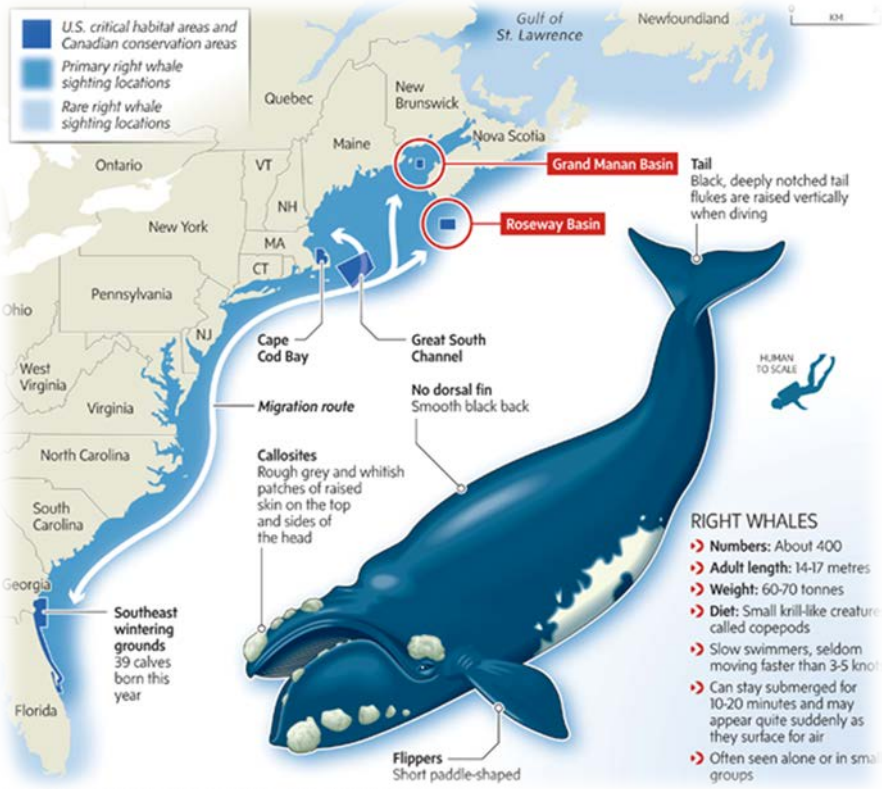
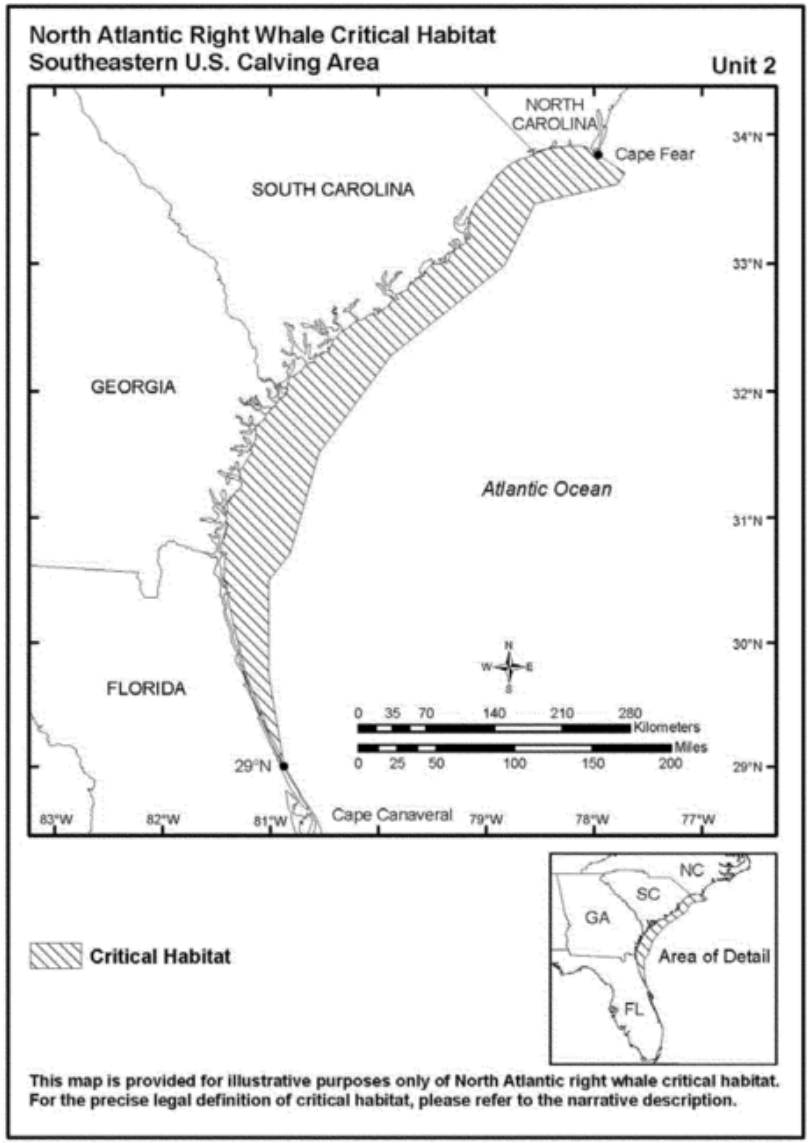
# Lessons learned other results

- Number of whales in the Southeast has declined in recent years
- Still a critical area for calving…






# Right whale critical habitat

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# Lessons learned other results

- Number of whales in the Southeast has declined in recent years
- Still a critical area for calving females
- Coordination with offshore aerial survey was effective
- Energetic analyses
  - Eg4057, entangled whale tagged in 2014
  - Fluid dynamics modeling to obtain explicit energetic costs of locomotion (collaboration with L. Howle)
- Data from all tags being used in Mother-Calf project @ Syracuse and NOAA



# Classification of right whale signals

**CLASSIFICATION OF WHALE VOCALIZATIONS USING THE WEYL TRANSFORM**

*Yin Xian*, Andrew Thom*
*Douglas Nowacek*, Jianj*

* Department of Electrical and Comput
Duke University, USA
{yin.xian, qiang.qiu, loren.nolte, d
{thompson, jia

**Fig. 2**: Examples of humpback whale sig

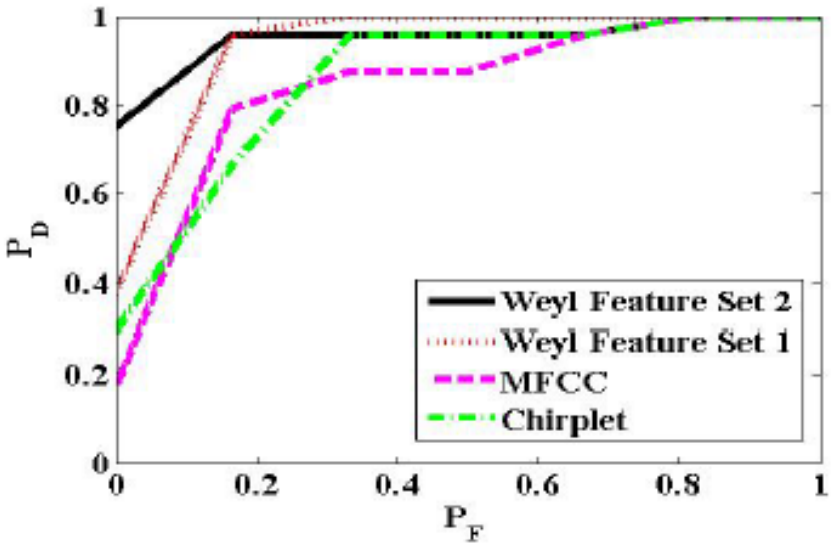


**Fig. 4**: The ROC of classifying whales using signal representation methods

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# Onwards…

- Run tag recorded signals thru propagation models of JAX area to investigate potential detection ranges
- Analyze time spent below the surface
  - Important for sound propagation to/from USWTR
- Vocal activity and age of calf, i.e., more cue rate information
- 2015-16 tagging during good weather and whale windows
- Collaborate with NOAA-led efforts on satellite tagging project, i.e., possibility of double-tagging
- Incorporate glues and microtecture to increase suction cup attachment times (NOPP)
- Gliders and/or tagging for right whales in the US mid and south Atlantic regions
- Response of right whales to sounds (other than alarms!)

# Acknowledgements


- Duke, Syracuse, and Stellwagen crews
  - Swaim, Foley, Waples, Capt'n Wilson, Cusano, Loer
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- UNCW
  - Pabst, McLellan and gang
- HDR
- NAVFAC