



Northeast Fisheries Science Center Reference Document 18-01

# North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) 2016 Results Summary

by Christin Khan, Allison Henry, Peter Duley, Jennifer Gatzke,  
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**U.S. DEPARTMENT OF COMMERCE**  
National Oceanic and Atmospheric Administration  
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Woods Hole, Massachusetts

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## Northeast Fisheries Science Center Reference Documents

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## **ABSTRACT**

This annual report details the 2016 results of the North Atlantic Right Whale Sighting Survey (NARWSS) and the Right Whale Sighting Advisory System (RWSAS), both NOAA Fisheries programs conducted at the Northeast Fisheries Science Center. NARWSS locates and records the seasonal distribution of North Atlantic right whales (*Eubalaena glacialis*) off the northeastern coast of the United States by conducting aerial surveys from New Jersey to Canada. Images of individual whales are collected for mark-recapture models to monitor the population. The RWSAS was designed to reduce collisions between ships and the endangered North Atlantic right whale by alerting mariners to the presence of the right whales. Right whale sighting reports are obtained from a variety of sources including the United States Coast Guard, aerial surveys, shipboard surveys, whale watch vessels, and other sources (commercial ships, fishing vessels, and the general public).

## **NORTH ATLANTIC RIGHT WHALE SIGHTING SURVEY (NARWSS)**

The North Atlantic Right Whale Sighting Survey (NARWSS) is a NOAA Fisheries program which conducts aerial surveys to locate and record the seasonal distribution of North Atlantic right whales (*Eubalaena glacialis*) off the northeastern coast of the United States. Images of individual whales are also collected for mark-recapture models to monitor the population. Annual reports from past surveys are available for the NARWSS program dating back to 2002 (Cole et al. 2007a, 2007b; Gatzke et al. 2017, 2013; Khan et al. 2016, 2014, 2012, 2011, 2010, 2009; Niemeyer et al. 2007a, 2007b, 2008; Rone et al 2007a, 2007b).

NARWSS flights conducted in 2016 followed systematic tracklines with randomized starting locations within 13 primary survey blocks: Cashes Ledge, Downeast Maine, Franklin Basin, Georges Basin, Great South Channel, Howell Swell, Jeffreys Ledge, Jordan Basin, Martha's Vineyard and Nantucket, Rhode Island Sound, Roseway Basin, Southern Georges Shelf Break, and Stellwagen Bank (Figure 1). During 2016, NARWSS flew 189.5 hours over 44 surveys (Table 1), including 2 directed flights around acoustic detections and 2 directed flights near aggregations seen on a previous aerial survey. NARWSS detected 271 right whales (including possible duplicate sightings of the same individual), with 242 right whales sighted within survey blocks and 29 right whales sighted during transit to or from survey areas. Table 1 summarizes survey effort and right whale sightings by month. Figure 2(a-b) displays the locations of right whales and survey effort by season. In 2016, NARWSS did not conduct aerial surveys in February or from July-December. A comparison of NARWSS flights, flight hours, and right whale sightings from 2002 through 2016 is included (Figure 3, Table 2). Internal and external requests for NARWSS survey data are summarized in Table 3.

## **RIGHT WHALE SIGHTING ADVISORY SYSTEM (RWSAS)**

The Right Whale Sighting Advisory System (RWSAS) is a NOAA Fisheries program which was designed to reduce collisions between ships and the endangered North Atlantic right whale by alerting mariners to their presence in near real-time. These right whale sighting reports are obtained from a variety of sources including the United States Coast Guard, aerial surveys, shipboard surveys, whale watch vessels, and other sources (commercial ships, fishing vessels, and the general public). Logging acoustic detections into the RWSAS was discontinued in 2009 in favor of a publicly available automated [acoustic detection website maintained by the Cornell Lab of Ornithology](#), which provides the information in near real-time. Right whale sightings can be reported from Virginia to Maine by calling the NOAA hotline 866-755-6622. In order to increase public awareness about the presence of right whales and the need to report sightings to the NOAA, right whale signs have been distributed throughout this region at boat ramps and marinas (Figure 4).

In 2009, the Right Whale Sighting Advisory System was reengineered to support new regulations to reduce the probability of lethal injury to right whales from collisions with ships (50 CFR Part 224). The regulations established speed restrictions of 10 knots or less for all vessels of length 65 feet (19.8 m) or greater within Seasonal Management Areas (SMAs). The SMAs encompass areas of high risk for whale-vessel collision along the US Atlantic seaboard where right whale sightings predictably and consistently occur each year. Go to the [NOAA ship strike website](#) to learn more.

If at least 3 right whales are sighted with a density of at least 0.04 right whales per square nautical mile outside of SMAs, a Dynamic Management Area (DMA) is established for 15 days (Clapham and Pace 2001) and mariners are requested to either avoid the area or travel through it at 10 knots or less. Unlike SMAs, compliance is voluntary for DMAs. The size of the DMA depends on the number of right whales sighted in the area. Mariners are notified of DMAs via email, an [interactive Google Map website](#), [the Whale Alert app](#), Broadcast Notice to Mariners, and the Mandatory Ship Reporting System.

The most common source of reports in 2016 was aerial surveys (409 reports - 54%; Table 5; Figure 6). In Canada, most sighting reports were from dedicated right whale shipboard surveys (Table 5; Figure 5a). Most sightings were in the Northeast (New York to Maine), where the number of reports per month ranged from 0 in November to 238 in April (Table 5; Figure 5b). In the Mid-Atlantic (New Jersey through Virginia), most reports were from other sources (commercial ships, fishing vessels, and the general public) (Table 5; Figure 5c). There were 8 DMAs (including extensions) in 2016 triggered by validated right whale sightings, none of which were triggered by NARWSS (Table 4).

## **ACKNOWLEDGEMENTS**

We would like to extend our gratitude to NARWSS aerial observer Karen Vale, NOAA Aircraft Operations Center, the NOAA Twin Otter pilots, and the United States Coast Guard Air Station Cape Cod.

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**Table 1. Summary of NOAA North Atlantic Right Whale Sighting Survey (NARWSS) flights conducted in 2016 by month including the survey block, number of flights, flight hours, and right whale (*Eubalaena glacialis*) sightings. Gray font indicates months with no flights in regular survey blocks.**

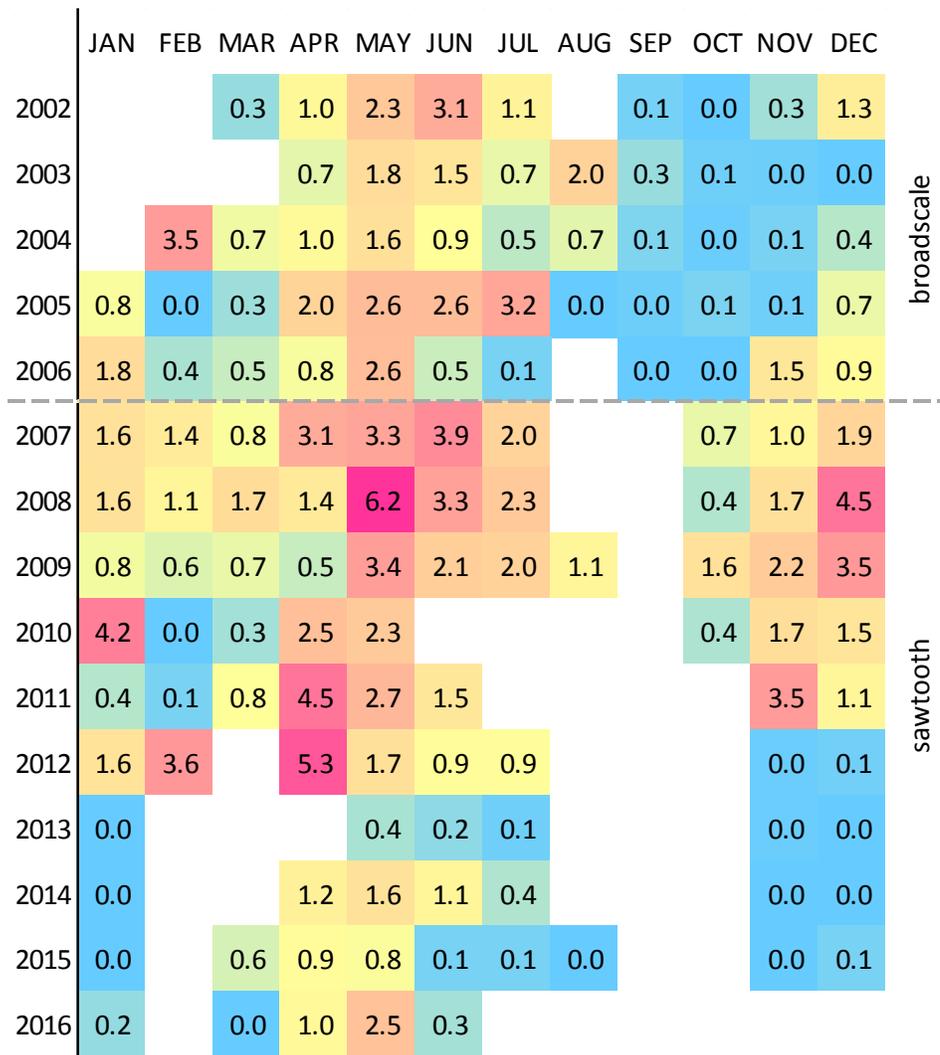
**Total Number of Flights in Each Survey Block**

<b>Month</b>	<b>Cashes Ledge</b>	<b>Downeast Maine</b>	<b>Franklin Basin</b>	<b>Georges Basin</b>	<b>Great South Channel</b>	<b>Howell Swell</b>	<b>Jeffreys Ledge</b>	<b>Jordan Basin</b>	<b>Vineyard + Nantucket</b>	<b>Rhode Island Sound</b>	<b>Roseway Basin</b>	<b>S Georges Shelf Break</b>	<b>Stellwagen</b>	<b>Flights</b>	<b>Flight Hours<sup>1</sup></b>	<b>Right Whales<sup>2</sup></b>
January								1		1				2	8.1	2
February																
March							1		1					2	9.9	0
April	1				3					2		1	5	12	54.7	54
May			1		10	4	1							16	69.1	170
June		1	1	1	5	1	1			1	1			12	47.7	16
July																
August																
September																
October																
November																
December																
<b>Flights</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>18</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>44</b>		
<b>Flight Hours<sup>1</sup></b>	<b>5.7</b>	<b>4.9</b>	<b>10.0</b>	<b>5.2</b>	<b>69.8</b>	<b>18.7</b>	<b>13.7</b>	<b>4.6</b>	<b>5.1</b>	<b>12.7</b>	<b>6.2</b>	<b>5.2</b>	<b>27.7</b>		<b>189.5</b>	
<b>Right Whales<sup>2</sup></b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>131</b>	<b>56</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>49</b>			<b>242</b>

<sup>1</sup> Flight Hours - includes transit, survey, and circling to photograph whales; does not include flights that were aborted because of bad weather

<sup>2</sup> Right Whales - includes duplicate individuals; does not include whales seen on transit

**Table 2. Comparison of the total number of right whale (*Eubalaena glacialis*) sightings per flight hour by month and year from the NOAA North Atlantic Right Whale Sighting Survey (NARWSS) flights. Numbers indicate the number of right whales seen per flight hour in a given month and year with heat map ranging from blue (no right whale sightings) to hot pink (maximum 6.2 right whales per flight hour in May of 2008).**



**Table 3. Summary of data requests made in 2016 for North Atlantic Right Whale Sighting Survey (NARWSS) and Right Whale Sighting Advisory System (RWSAS) data.**

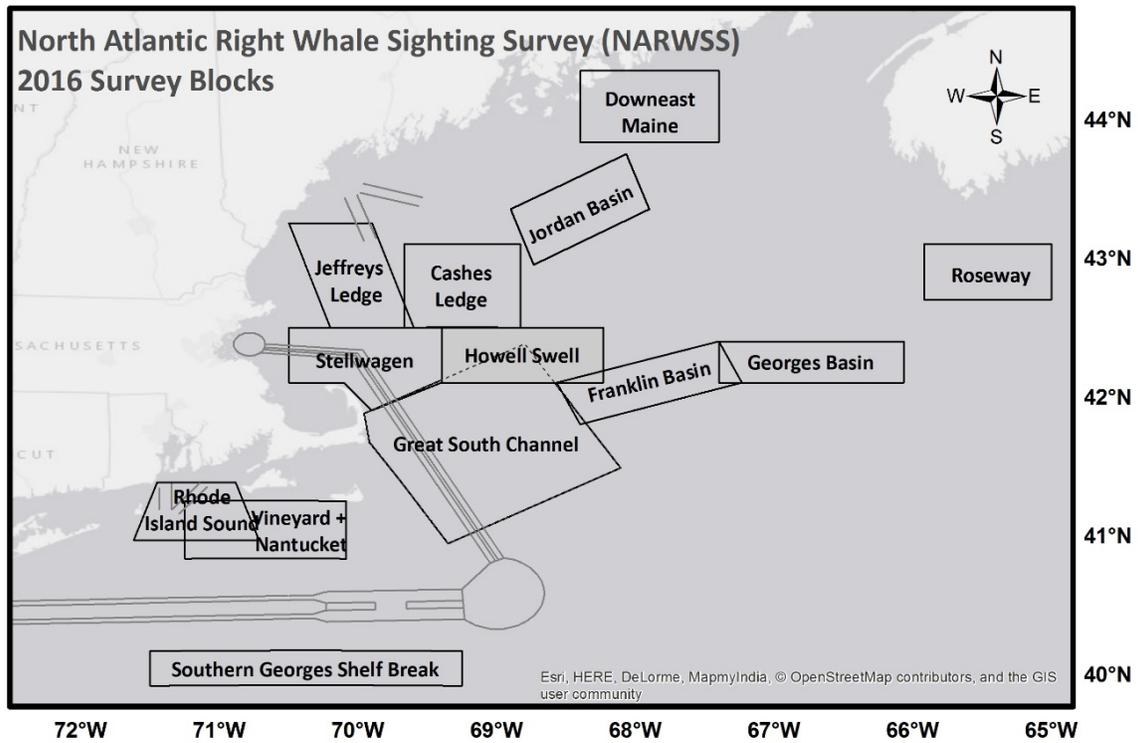
Organization	Database	Data Request Description
The University of Western Ontario, Canada	NARWSS	PhD project on deep learning using photos from Kaggle competition
Université de La Rochelle, France	NARWSS	Sightings of deep diving cetaceans
Woods Hole Oceanographic Institution	NARWSS	Comparing aerial survey data with acoustic buoy and glider data
Duke University	NARWSS	Cetacean habitat modeling work
United States Coast Guard	NARWSS	Comparing aerials with acoustics buoy near Martha's Vineyard

**Table 4. Summary of Dynamic Management Areas (DMA) in 2016, triggered by a confirmed report to the Right Whale Sighting Advisory System (RWSAS) of 3 or more right whales (*Eubalaena glacialis*) in close proximity to each other outside of any active Seasonal Management Areas (SMA).**

ID	DMA Name	# Whales	North	South	West	East	Start Date	End Date
789	16nm S Martha's Vineyard MA	10	41.43	40.72	-71.08	-70.15	21-Feb-17	7-Mar-17
809	16nm S Martha's Vineyard MA	14	41.43	40.72	-71.08	-70.15	6-Mar-17	20-Mar-17
829	22nm SW Nantucket MA	4	41.24	40.56	-70.78	-69.87	22-Mar-17	5-Apr-17
849	12nm ENE Boston MA	3	42.68	42.05	-71.22	-70.30	27-Mar-17	8-Apr-17
869	19nm SSW Nantucket MA	7	41.32	40.58	-70.85	-69.87	11-Apr-17	24-Apr-17
889	19nm SSW Nantucket MA	20	41.32	40.58	-70.85	-69.87	21-Apr-17	5-May-17
909	15nm SE Block Island RI	8	41.40	40.63	-71.78	-70.78	5-May-17	19-May-17
929	80nm E New York NY	8	40.54	39.85	-72.77	-71.82	17-May-17	31-May-17

**Table 5. The total number of right whale (*Eubalaena glacialis*) sighting reports to the Right Whale Sighting Advisory System (RWSAS) in 2016 by reporting source and month within Canadian waters, the Northeast region (New York to Maine), and the Mid-Atlantic region (New Jersey through Virginia). The category "Other" includes reports made by the general public, commercial ships, and fishing vessels. Unconfirmed reports were excluded.**

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
<b>Canada</b>	Aerial Survey						1							1	1%
	Shipboard Survey							16	79	60				155	80%
	Whale Watch					1		1	6	1	2			11	6%
	Coast Guard														
	Other						2	10	9	5				26	13%
	<b>Canada totals</b>						<b>1</b>	<b>3</b>	<b>27</b>	<b>94</b>	<b>66</b>	<b>2</b>		<b>193</b>	<b>100%</b>
<b>Northeast</b>	Aerial Survey	6	22	131	190	51	6			2				408	73%
	Shipboard Survey	1		43	13	2				1				60	11%
	Whale Watch				16	7	1		4	4	1		1	34	6%
	Coast Guard			5	2	1	1							9	2%
	Other		3	4	17	7	1	1	2	2	2		4	43	8%
	<b>Northeast totals</b>	<b>7</b>	<b>25</b>	<b>183</b>	<b>238</b>	<b>68</b>	<b>9</b>	<b>1</b>	<b>6</b>	<b>9</b>	<b>3</b>		<b>5</b>	<b>554</b>	<b>100%</b>
<b>Mid-Atlantic</b>	Aerial Survey														
	Shipboard Survey														
	Whale Watch					1								1	7%
	Coast Guard											1		1	7%
	Other	3	2	1	2			1	1				2	12	86%
<b>Mid-Atlantic totals</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>		<b>1</b>	<b>1</b>				<b>1</b>	<b>2</b>	<b>14</b>	<b>100%</b>



**Figure 1. NOAA North Atlantic Right Whale Sighting Survey (NARWSS) blocks flown in 2016. Shipping lanes are denoted in gray.**

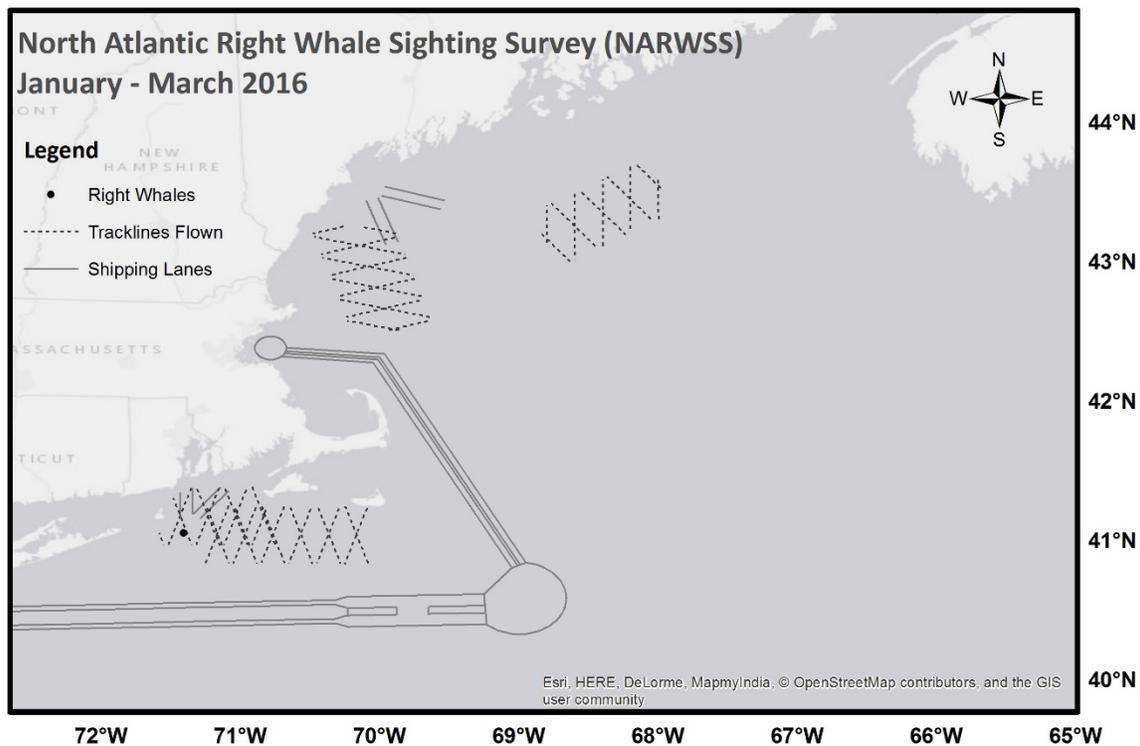


Figure 2a. NOAA North Atlantic Right Whale Sighting Survey (NARWSS) tracklines flown and right whale (*Eubalaena glacialis*) sightings in January and March of 2016. No surveys were flown in February of 2016.

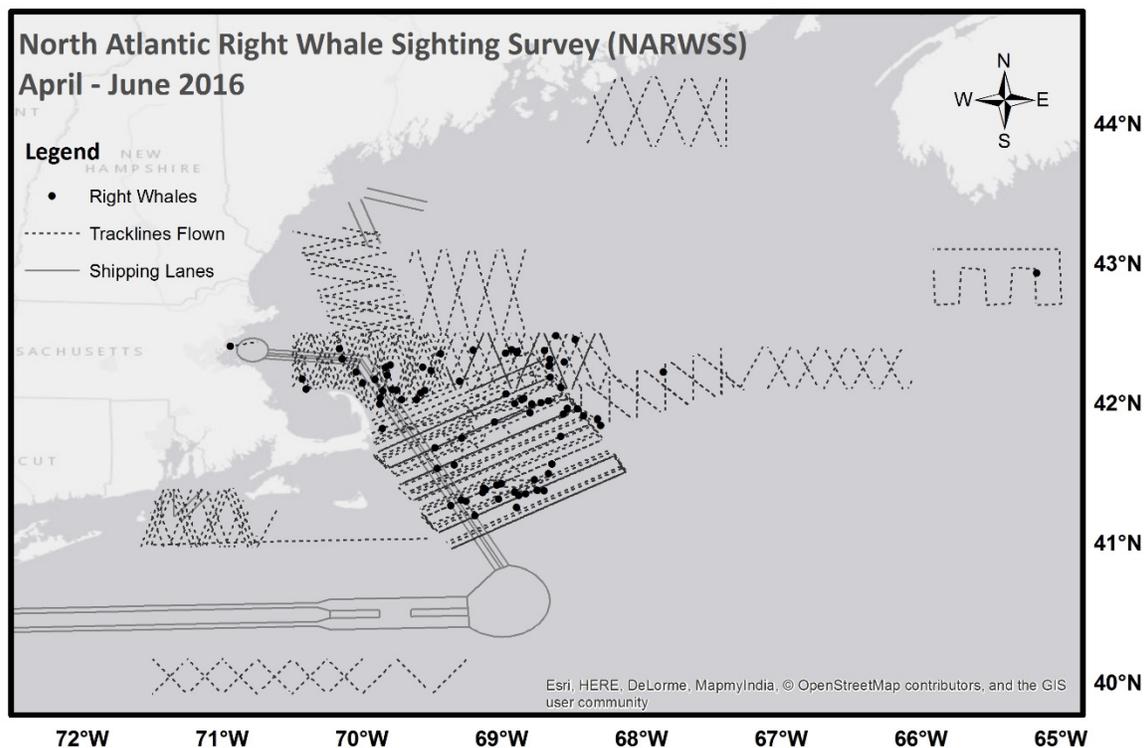
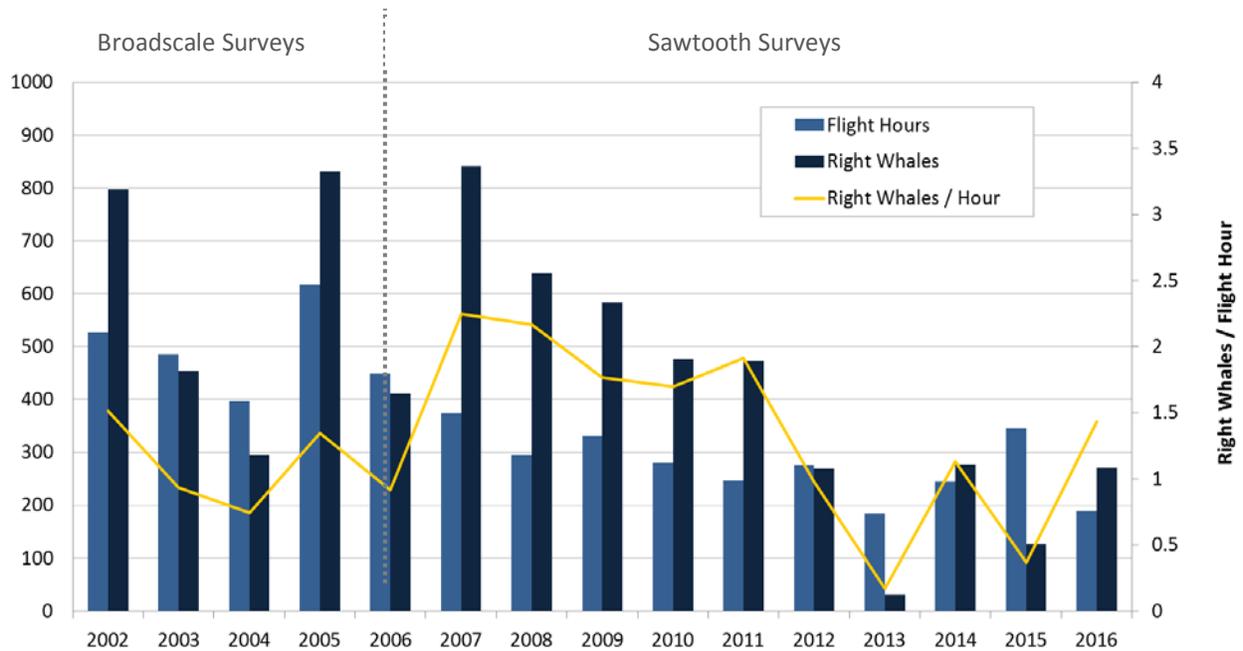


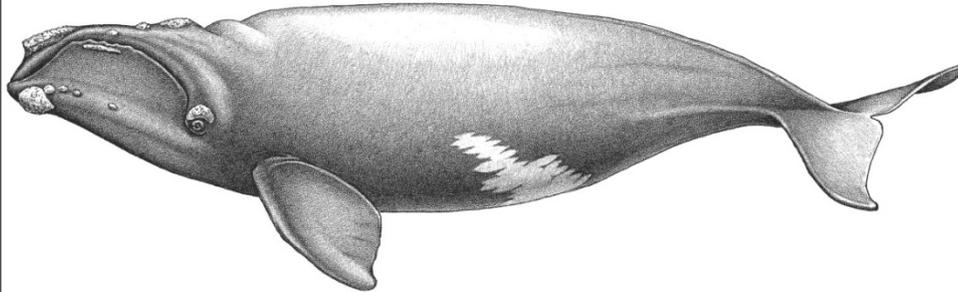
Figure 2b. NOAA North Atlantic Right Whale Sighting Survey (NARWSS) tracklines flown and right whale (*Eubalaena glacialis*) sightings from April through June 2016.



**Figure 3. Comparison of North Atlantic Right Whale Sighting Survey (NARWSS) hours flown and right whale (*Eubalaena glacialis*) sightings from 2002 through 2016 with the number of right whales seen per flight hour overlaid. The number of flights includes randomized systematic, directed, and exploratory surveys. The number of flight hours includes time on transit, on survey, and circling to photograph whales. The number of whales includes duplicate individuals but not whales seen on transit. The number of right whales sighted per flight hour increased in 2007 when the sawtooth survey design replaced broadscale systematic surveys that covered the entire Gulf of Maine (Cole et al 2007a). From 2002 - 2005 there were periods when 2 survey aircraft were used concurrently.**



# Help North Atlantic Right Whales!



## What You Can Do:

### Keep Watch

Endangered right whales visit our waters year-round; sometimes swimming close to shore. They can be difficult to spot. **STAY ALERT** and **LOOK OUT** for whales!

### Slow Down

If you see a right whale, **SLOW DOWN** to 10 knots. Vessels 65 feet or greater in length must travel 10 knots or less in Seasonal Management Areas: [www.greateratlantic.fisheries.noaa.gov/shipstrike](http://www.greateratlantic.fisheries.noaa.gov/shipstrike).

### Move Away

**STAY AT LEAST 500 YARDS AWAY** from right whales—it's the law. Be cautious when transiting areas where whales are present.

### Report

**REPORT** right whale sightings and any whales or sea turtles in distress to NOAA Fisheries Greater Atlantic Marine Animal Reporting Hotline 866-755-6622 or to the U.S. Coast Guard on VHF 16.



White Markings On Head



No Dorsal Fin



V-Shaped Blow



All Black, Smooth Tail



Paddle Shaped Flippers

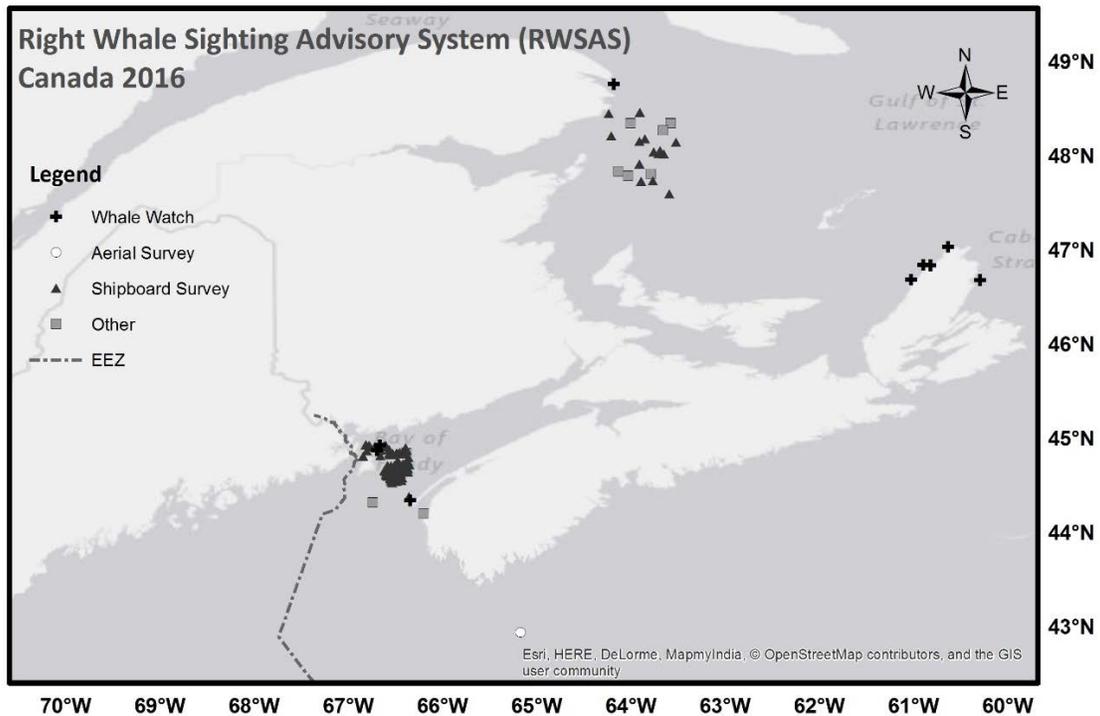
**REPORT RIGHT WHALE SIGHTINGS: 866-755-NOAA (6622)**

Thanks To All Our Partners:

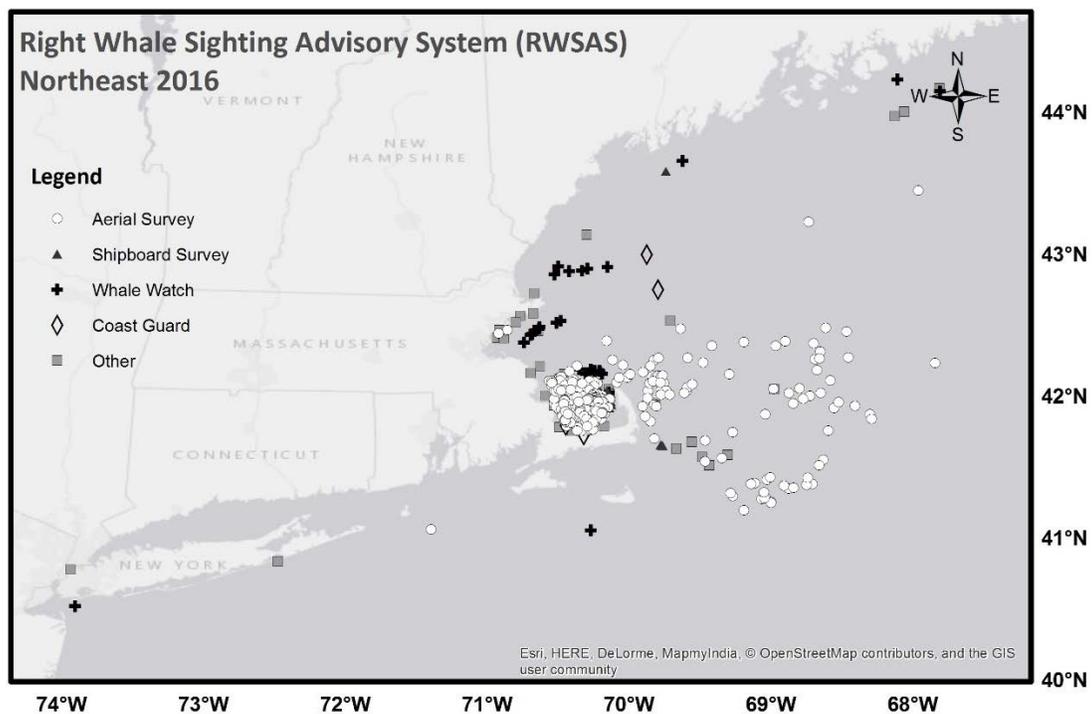


For comments or questions about this sign, contact [rwsign@noaa.gov](mailto:rwsign@noaa.gov)

Figure 4. Right whale signs have been distributed throughout the region at boat ramps and marinas to increase public awareness about the presence of North Atlantic right whales (*Eubalaena glacialis*) and how to report sightings to the Right Whale Sighting Advisory System.



**Figure 5a.** Locations of all right whales (*Eubalaena glacialis*) reported to the Right Whale Sighting Advisory System (RWSAS) within Canadian waters in 2016, shown by reporting source. The category “Other” includes reports made by the general public, commercial ships, and fishing vessels. Unconfirmed reports were excluded.



**Figure 5b.** Locations of all right whales (*Eubalaena glacialis*) reported to the Right Whale Sighting Advisory System (RWSAS) within the Northeast region (New York to Maine) in 2016, shown by reporting source. The category “Other” includes reports made by the general public, commercial ships, and fishing vessels. Unconfirmed reports were excluded.

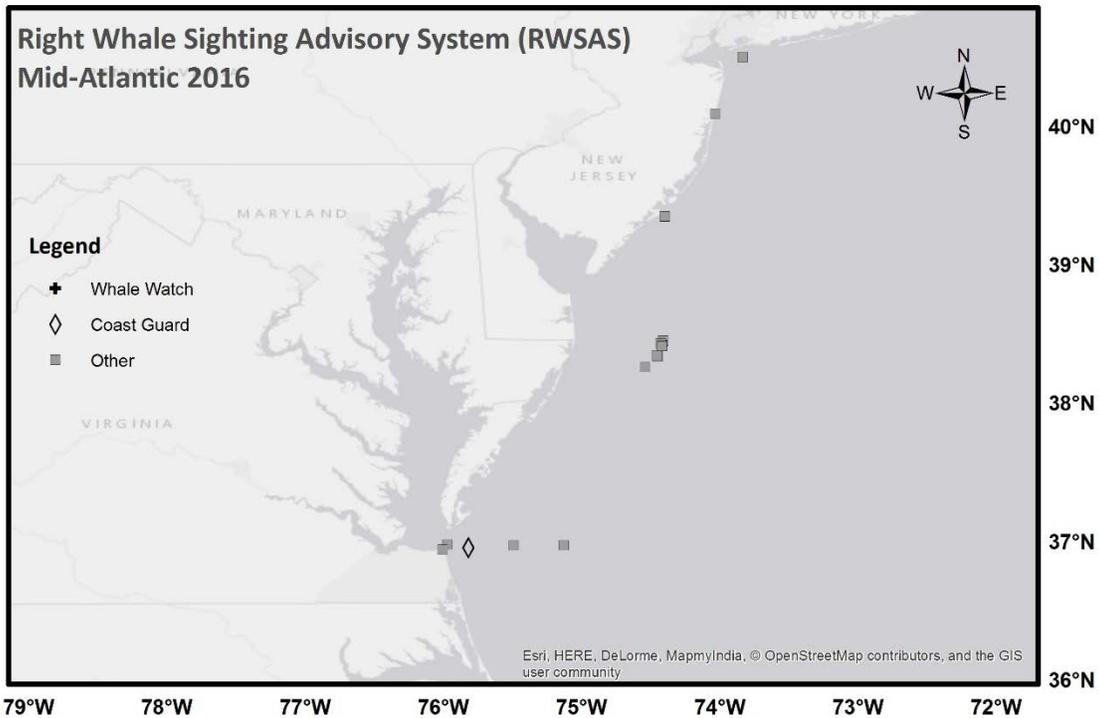
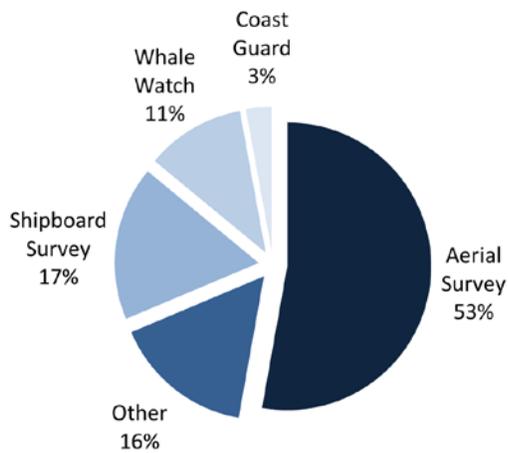


Figure 5c. Locations of all right whale (*Eubalaena glacialis*) sightings reported to the NOAA Right Whale Sighting Advisory System (RWSAS) within the Mid-Atlantic region in 2016, shown by reporting source. The category “Other” includes reports made by the general public, commercial ships, and fishing vessels. Unconfirmed reports were excluded.

(a.) RWSAS 2002-2016 (9123 reports)



(b.) RWSAS 2016 (761 reports)

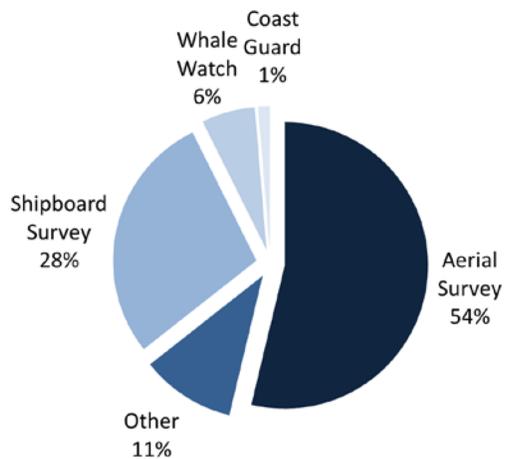


Figure 6. Right Whale Sighting Advisory System (RWSAS) reports by category from (a.) all years (2002-2016) and (b.) 2016.

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The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "conducting ecosystem-based research and assessments of living marine resources, with a focus on the Northeast Shelf, to promote the recovery and long-term sustainability of these resources and to generate social and economic opportunities and benefits from their use." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Currently, there are three such media:

*NOAA Technical Memorandum NMFS-NE* -- This series is issued irregularly. The series typically includes: data reports of long-term field or lab studies of important species or habitats; synthesis reports for important species or habitats; annual reports of overall assessment or monitoring programs; manuals describing program-wide surveying or experimental techniques; literature surveys of important species or habitat topics; proceedings and collected papers of scientific meetings; and indexed and/or annotated bibliographies. All issues receive internal scientific review and most issues receive technical and copy editing.

*Northeast Fisheries Science Center Reference Document* -- This series is issued irregularly. The series typically includes: data reports on field and lab studies; progress reports on experiments, monitoring, and assessments; background papers for, collected abstracts of, and/or summary reports of scientific meetings; and simple bibliographies. Issues receive internal scientific review and most issues receive copy editing.

*Resource Survey Report* (formerly *Fishermen's Report*) -- This information report is a regularly-issued, quick-turnaround report on the distribution and relative abundance of selected living marine resources as derived from each of the NEFSC's periodic research vessel surveys of the Northeast's continental shelf. This report undergoes internal review, but receives no technical or copy editing.

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