



Right Whale Distribution: Has It Changed Over Time?

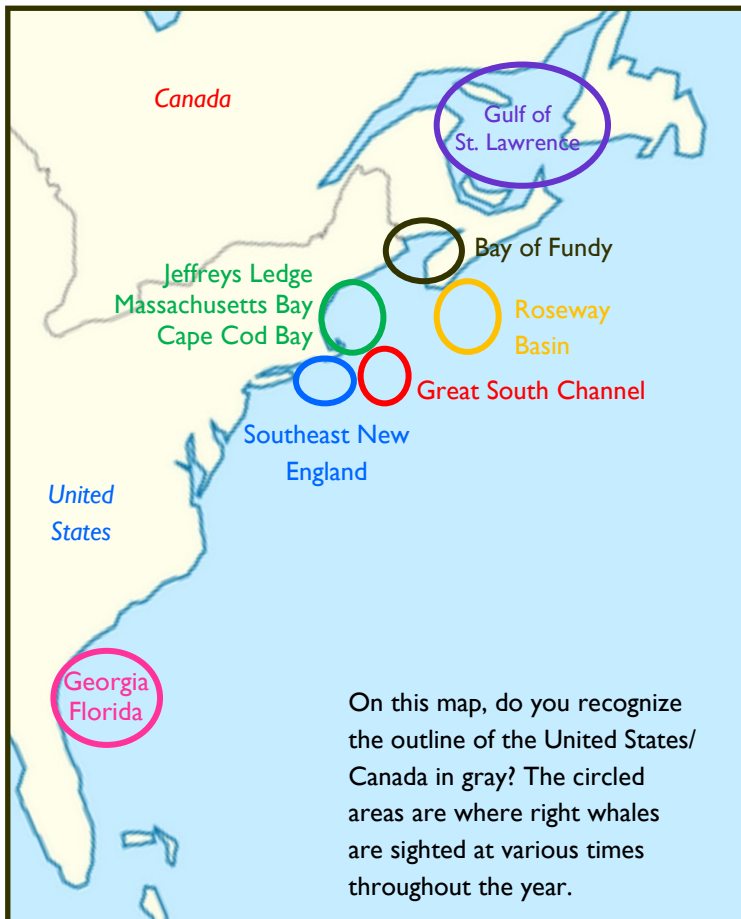
Are whales consistently seen in the same place year after year? To answer that question, we have to study whales for decades. In the case of the North Atlantic right whale, we have studied them for 50 years and are just beginning to understand their movements.



Photo by Judith Scott

Scientists have observed that in fact something has changed. We know that 2010 was a significant year. When scientists talk about right whale distribution, they often refer to “before 2010” and “after 2010”.

That is what we are going to explore in this lesson. Hopefully, you have mapped the movements of a few of these animals by seasons in previous lessons. We have looked at Bocce, Calvin, Mayport, Manta, Peace, Thorny, Halo and Ruffian. We are going to do the same thing with the same data, but this time we are going to color code by year. When scientists have a data set, there are different ways to analyze that data to glean different information. Let’s see what we learn looking at the data a different way.



Put on Your Thinking Cap:

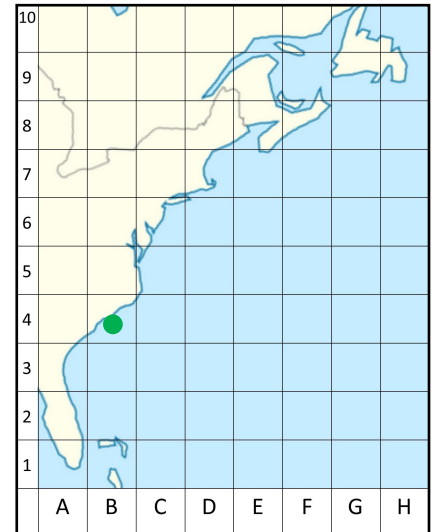
Why would cause a group of animals to shift locations?

Activity Directions:

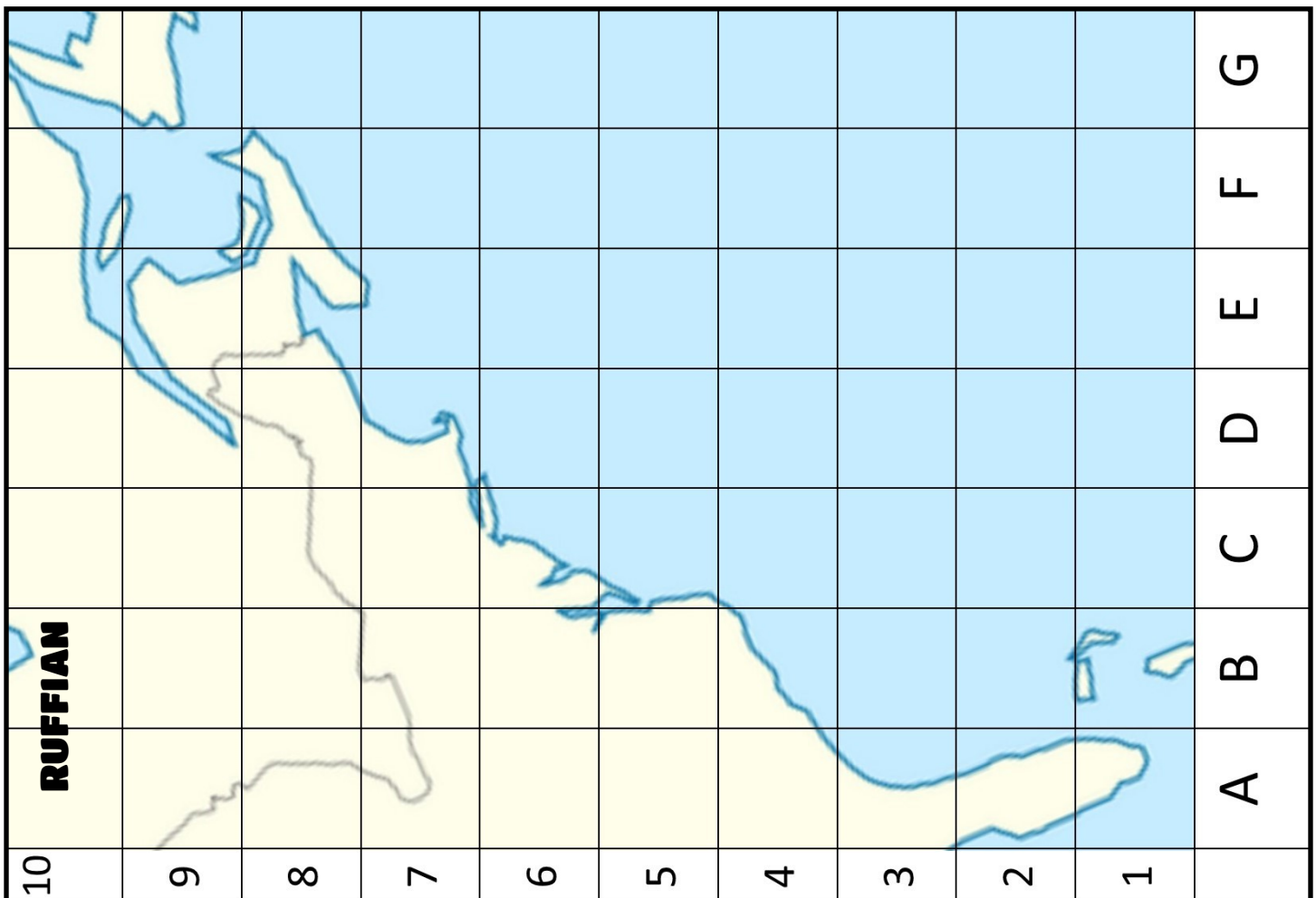
1. Print out the pages of the whales that you want to graph. (These are found on the next 6 pages).
2. For each data point, place a colored dot in the corresponding location of the graph. For example, the first row of Halo's data is

12 (Green)	2004	South Carolina	B4
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 That means that in December of 2004, Halo was sighted off South Carolina. Place a green dot in block B4. (It should be relatively small). Continue until all the locations are represented on the map. Make sure you use the different colors to represent the different years the animals was sighted:
 - Green is sightings before 2010
 - Orange is 2010—2014 sightings
 - Purple is 2015-2018 sightings
3. Because three of the whales (Calvin, Manta and Thorny) have been sighted for so many years, we have graphed those for you.
4. When you are finished, answer the questions after the maps!

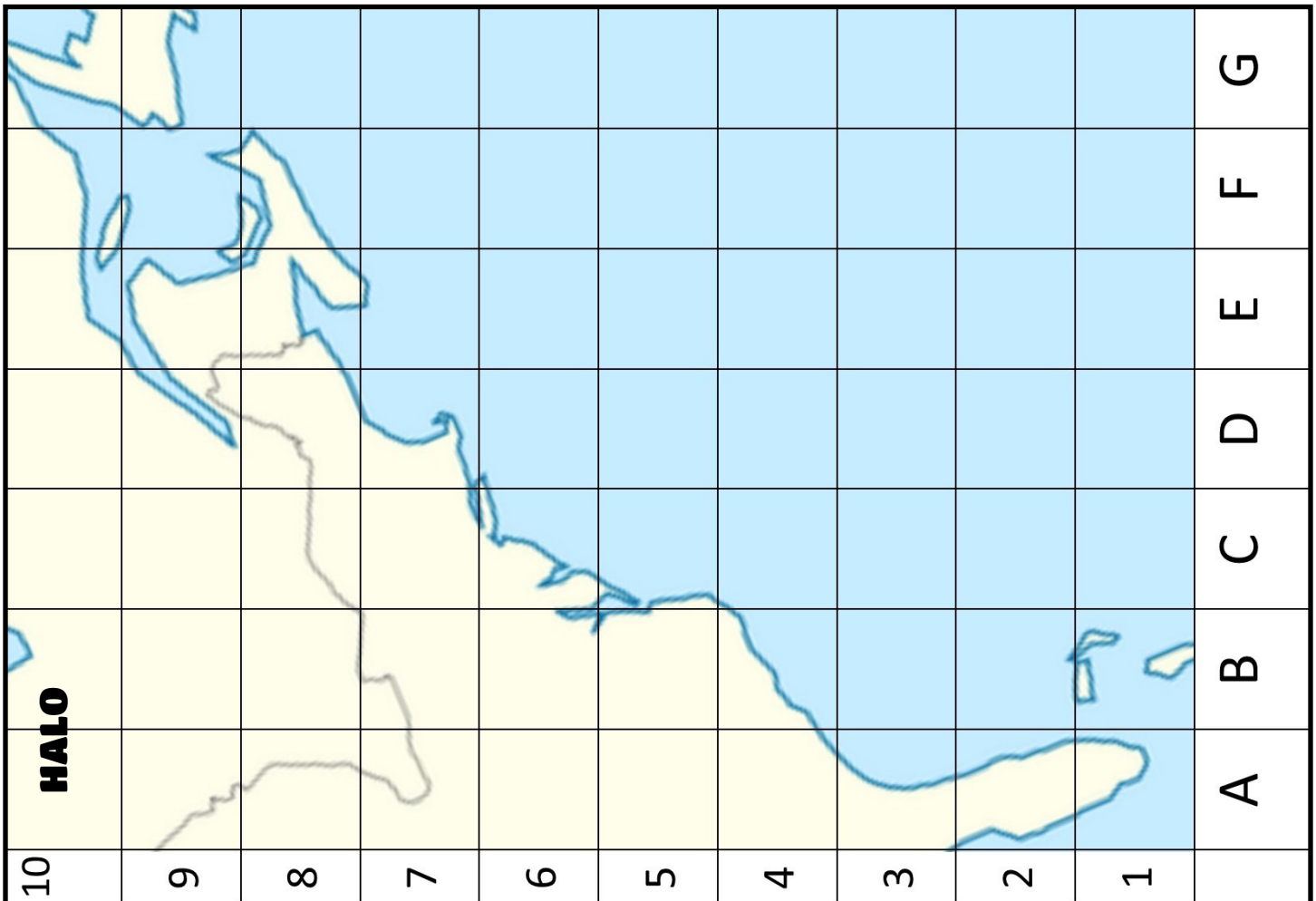


Sighting data for Ruffian is on the next page



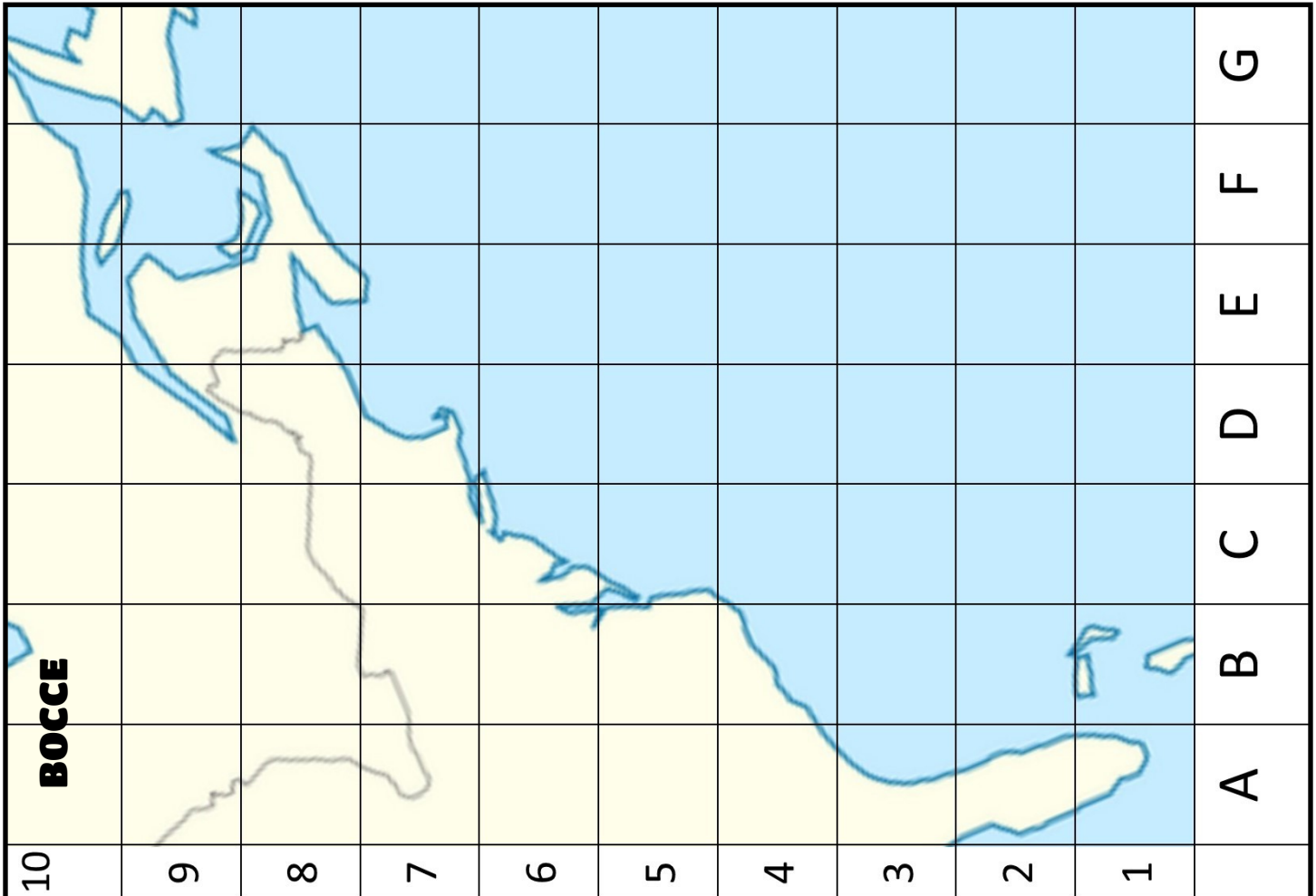
Sighting Month	Sighting Year	Area	Graph Location
1 (Green)	2004	Florida	A3
1 (Green)	2005	Florida	A3
10 (Green)	2005	Bay of Fundy	E8
12 (Green)	2005	Florida	A3
3 (Green)	2005	South Carolina	B4
6 (Green)	2005	Great South Channel	E6
4 (Green)	2006	Massachusetts Bay	D7
9 (Green)	2006	Roseway Basin	F7
12 (Green)	2007	Gulf of Maine	E7
2 (Green)	2007	Georgia	A3
4 (Green)	2007	Cape Cod Bay	D7
6 (Green)	2007	Great South Channel	E6
8 (Green)	2007	Bay of Fundy	E8
1 (Green)	2008	Florida	A3
12 (Green)	2008	Georgia	A3
3 (Green)	2008	Cape Cod Bay	D7
5 (Green)	2008	Great South Channel	E6
12 (Green)	2009	Florida	A3
3 (Green)	2009	Cape Cod Bay	D7
5 (Green)	2009	Gulf of Maine	E7
7 (Green)	2009	Great South Channel	E6
8 (Green)	2009	Bay of Fundy	E8
12 (Orange)	2010	Gulf of Maine	E7
4 (Orange)	2010	Southern New England	D6
1 (Orange)	2011	Florida	A3
1 (Orange)	2011	South Carolina	B4

Sighting Month	Sighting Year	Area	Graph Location
3 (Orange)	2011	Cape Cod Bay	D7
2 (Orange)	2012	South Carolina	B4
5 (Orange)	2012	Great South Channel	E6
6 (Orange)	2012	Gulf of Maine	E7
6 (Orange)	2012	Roseway Basin	F7
11 (Orange)	2013	Gulf of St. Lawrence	F9
1 (Orange)	2014	Florida	A3
4 (Orange)	2014	Southern New England	D6
4 (Orange)	2014	Cape Cod Bay	D7
4 (Orange)	2014	Great South Channel	E6
7 (Orange)	2014	George's Bank	E7
1 (Purple)	2015	Florida	A3
4 (Purple)	2015	Cape Cod Bay	D7
3 (Purple)	2016	Cape Cod Bay	D7
4 (Purple)	2016	Great South Channel	E6
7 (Purple)	2016	Gulf of St. Lawrence	F9
1 (Purple)	2017	Georgia	A3
2 (Purple)	2017	Cape Cod Bay	D7
5 (Purple)	2017	Great South Channel	E6
7 (Purple)	2017	Gulf of St. Lawrence	F9
12 (Purple)	2018	Cape Cod Bay	D7
2 (Purple)	2018	Cape Cod Bay	D7
3 (Purple)	2018	Southern New England	D6
4 (Purple)	2018	Great South Channel	E6
6 (Purple)	2018	Gulf of St. Lawrence	F9

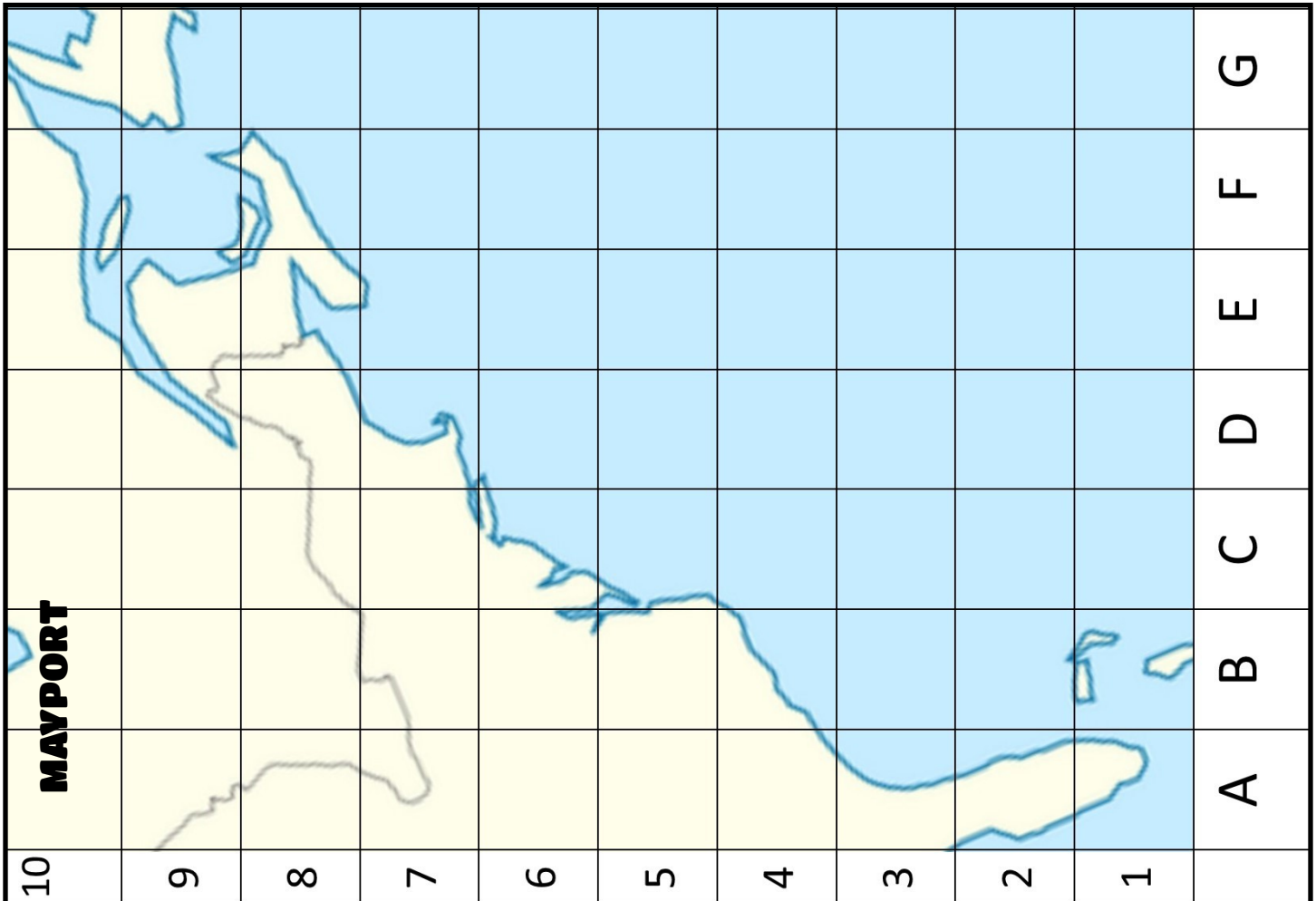


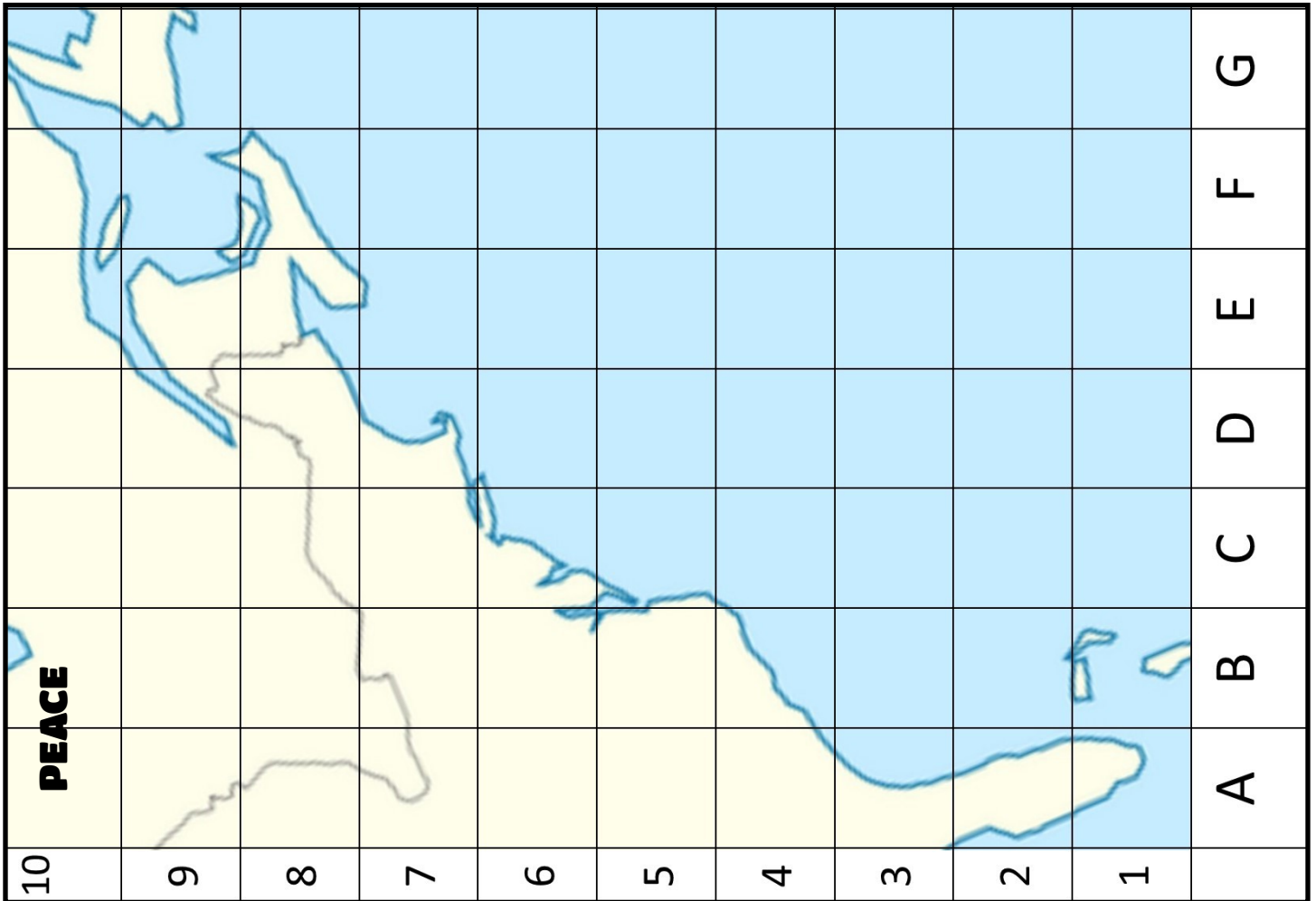
Sighting Month	Sighting Year	HALO Sighting Area	Graph Location
12 (Green)	2004	South Carolina	B4
1 (Green)	2005	Georgia	A3
5 (Green)	2006	Cape Cod Bay	D7
2 (Green)	2007	Florida	A3
3 (Green)	2007	Cape Cod Bay	D7
4 (Green)	2007	Great South Channel	E6
8 (Green)	2007	Bay of Fundy	E8
2 (Green)	2008	Florida	A3
4 (Green)	2008	Cape Cod Bay	D7
1 (Green)	2009	Florida	A3
3 (Green)	2009	Cape Cod Bay	D7
1 (Orange)	2010	Florida	A3
12 (Orange)	2010	Gulf of Maine	E7
4 (Orange)	2010	Southern New England	D6
5 (Orange)	2010	Great South Channel	E6
1 (Orange)	2011	Florida	A3
4 (Orange)	2011	Southern New England	D6
5 (Orange)	2012	Roseway Basin	F7
3 (Orange)	2013	Cape Cod Bay	D7
4 (Orange)	2013	Great South Channel	E6
1 (Orange)	2014	Florida	A3
6 (Orange)	2014	Gulf of St. Lawrence	F9
4 (Purple)	2016	Cape Cod Bay	D7
5 (Purple)	2016	Great South Channel	E6
5 (Purple)	2017	Southern New England	D6
7 (Purple)	2017	Gulf of St. Lawrence	F9
1 (Purple)	2018	Georgia	A3
12 (Purple)	2018	Southern New England	D6
2 (Purple)	2018	Cape Cod Bay	D7
7 (Purple)	2018	Gulf of St. Lawrence	F9

Sighting Month	Sighting Year	Bocce Sighting Area	Graph Location
2 (Green)	2008	Florida	A3
2 (Green)	2009	Florida	A3
5 (Green)	2009	Great South Channel	E6
1 (Orange)	2010	Florida	A3
3 (Orange)	2010	Cape Cod Bay	D7
1 (Orange)	2011	Florida	A3
4 (Orange)	2011	Cape Cod Bay	D7
8 (Orange)	2011	Bay of Fundy	E8
1 (Orange)	2012	Cape Cod Bay	D7
1 (Orange)	2013	Florida	A3
11 (Orange)	2013	Gulf of St. Lawrence	F9
3 (Orange)	2013	Cape Cod Bay	D7
1 (Orange)	2014	Florida	A3
3 (Orange)	2014	Cape Cod Bay	D7
2 (Purple)	2015	Cape Cod Bay	D7
6 (Purple)	2015	Gulf of St. Lawrence	F9
1 (Purple)	2016	Florida	A3
4 (Purple)	2016	Cape Cod Bay	D7
5 (Purple)	2016	Great South Channel	E6
8 (Purple)	2016	Gulf of St. Lawrence	F9
3 (Purple)	2017	Cape Cod Bay	D7
5 (Purple)	2017	Great South Channel	E6
6 (Purple)	2017	Gulf of St. Lawrence	F9
3 (Purple)	2018	Cape Cod Bay	D7
7 (Purple)	2018	Gulf of St. Lawrence	F9



Sighting Month	Sighting Year	Mayport Sighting Area	Graph Location
12 (Green)	2009	Florida	A3
1 (Orange)	2010	Florida	A3
3 (Orange)	2010	South Carolina	B4
4 (Orange)	2010	Cape Cod Bay	D7
1 (Orange)	2011	Florida	A3
12 (Orange)	2012	Florida	A3
1 (Orange)	2013	Florida	A3
1 (Orange)	2014	Florida	A3
4 (Orange)	2014	Cape Cod Bay	D7
4 (Orange)	2014	Cape Cod Bay	D7
4 (Orange)	2014	Great South Channel	E6
5 (Orange)	2014	Great South Channel	E6
1 (Purple)	2016	Florida	A3
5 (Purple)	2016	Great South Channel	E6
7 (Purple)	2016	Gulf of St. Lawrence	F9
4 (Purple)	2017	Southern New England	D6
7 (Purple)	2017	Gulf of St. Lawrence	F9





Sighting Month	Sighting Year	Peace Sighting Area	Graph Location
4 (Green)	1970	Cape Cod Bay	D7
8 (Green)	1982	Roseway Basin	F7
5 (Green)	1984	Great South Channel	E6
5 (Green)	1985	Great South Channel	E6
8 (Green)	1986	Roseway Basin	F7
3 (Green)	1987	Cape Cod Bay	D7
9 (Green)	1987	Roseway Basin	F7
9 (Green)	1988	Roseway Basin	F7
8 (Green)	1989	Roseway Basin	F7
9 (Green)	1992	Roseway Basin	F7
12 (Green)	2002	Gulf of Maine	E7
3 (Green)	2003	Great South Channel	E6
7 (Green)	2003	Gulf of Maine	E7
9 (Green)	2004	Roseway Basin	F7
2 (Green)	2006	Gulf of Maine	E7
4 (Green)	2006	Cape Cod Bay	D7
9 (Green)	2006	Roseway Basin	F7
1 (Green)	2007	Gulf of Maine	E7
12 (Green)	2007	Gulf of Maine	E7
4 (Green)	2007	Cape Cod Bay	D7
10 (Green)	2008	East Scotian Shelf	F8
4 (Green)	2008	Cape Cod Bay	D7
9 (Green)	2009	Roseway Basin	F7
2 (Orange)	2011	Georgia	A3
4 (Orange)	2013	Cape Cod Bay	D7
1 (Orange)	2014	Georgia	A3
8 (Purple)	2015	Gulf of St. Lawrence	F9
8 (Purple)	2016	Bay of Fundy	E8
2 (Purple)	2017	Southern New England	D6
4 (Purple)	2017	Great South Channel	E6



Extend the Learning

What Did You Observe?

Where Do These Females Go?

Place all four maps in front of you and look at them. What are some interesting observations you can make?

What is different before 2010 (the green) and after 2010 (the orange and purple)?

What areas are fairly consistent with sightings over the years? (In other words, which squares have all 3 colors in them? Is that consistent among most of the other whales?) _____

Where did some of the whales start showing up after 2010. (Which boxes have only orange and purple)

1. _____
2. _____

Do you think that the whales had never been there before? Or did scientists start looking there and found them? _____

Brainstorm some reasons why whales might move to different locations. _____



Extend the Learning (cont.)

What Did You Observe?

If whales are sighted in locations in which they haven't been previously sighted, how might their movements to "new" locations impact them?

Conservation measures are based on our knowledge of where whales are sighted. Starting in 2017, right whales have had an incredible hit to their population. If you are interested in seeing what has happened in the past couple years with right whales, [click here](#). If you have printed this out, search 2017–2020 North Atlantic Right Whale Unusual Mortality Event. This is a NOAA article. Warning: It's depressing! But it's also why we are working so hard trying to help people care about and protect right whales. Take the space below to write your response to the article. You can draw, write words, sentences, whatever you want.

If you have completed this and would like feedback, please send it in to info@yearoftherightwhale.org.

Manta, Calvin and Thorny Maps

ALL data comes from the New England Aquarium Right Whale Catalog and is for educational purposes only.

