Right Whale Research News

Anderson Cabot Center for Ocean Life
at the New England Aquarium

Volume 31, Number 2
November 2022

In this issue:

Warrior (#3942) lifts her flukes in the Gulf of St. Lawrence in July. The extensive white scarring is from an entanglement.
Photo: Delphine Durette-Morin/NEAQ/CWI.
Taken under SARA Permit.

Summer Fieldwork in the Gulf of St. Lawrence

Fieldwork is known for its unpredictability, but especially in the past few years, we have never been sure how each summer field season is going to play out. Thankfully, crossing the Canadian border is now nearly back to pre-pandemic status, making our travels to Canada for fieldwork much easier to plan than last year. Similar to previous years, two-week cruises were scheduled for July and August in a joint collaboration between our team from the New England Aquarium, and teams from the University of New Brunswick (UNB) and Canadian Whale Institute (CWI) aboard the chartered fishing vessel *Jean-Denis (J.D.) Martin*. As in past years, our objectives for these cruises were photo identification, health assessment, biopsy and fecal sampling, drone imagery, and oceanographic sampling.

Since 2017, in the summer months, right whales have aggregated in large numbers in the Shediac Valley (located in the southern portion of the Gulf of St. Lawrence). However, this year, thanks to sightings collected during Canadian Department of Fisheries and Oceans (DFO) aerial surveys, they appeared to be aggregating farther offshore in the western Bradelle Valley, which is about 30 nm beyond Shediac. Thirty extra nautical miles may not sound like much, but for a vessel that typically travels around 8 knots, this meant it would take 10 to 12 hours to travel out to the whale aggregation instead of the usual six. Not only were the whales farther offshore this year, but they were also difficult to work. Generally speaking, the aggregations were very loose and the whales were spread far apart. We documented a few small surface active groups (SAGs), but for the most part, whales were keeping to themselves and on long dives.

Additionally, both cruises dealt with some challenging weather: we spent much of our 16 days at sea in marginal weather (windy and rough seas). Anecdotally, some fishermen were saying that this was one of the windiest summers they had ever seen. Most of our time was spent in Bradelle Valley documenting 234 right whale sightings of approximately 81 individuals, including three sponsorship whales (see *Sponsored Whale Update*) and four mom/calf pairs: **Silt** (**Catalog #1817**), **Slalom** (**#1245**), **Arpeggio** (**#2753**), and **Dyad** (**#4180**). We also photographed **Meridian** (**#1403**), a recently entangled whale. Given the

Continued on page 2

The approximately five-month-old calf of **Dyad** surfaces in the Gulf of St. Lawrence in July.
Photo: Kelsey Howe/ACCOL/NEAQ/CWI.
Taken under SARA permit.

Summer Fieldwork...

Continued from page 1

late time of day and sea conditions, we were not able to do anything but further document his entanglement and condition, and report his position to rescue teams; unfortunately, he was never relocated. Our UNB colleagues were able to conduct many drone flights and a handful of successful day/night oceanographic sampling stations.

The July cruise had very successful sampling efforts. We collected four fecal samples (which will be further studied for hormones, microbiomes, and plankton content at three different institutions), and biopsy samples from **Warrior** (**#3942**) and **Champagne** (**#3904**) for an ongoing epigenetics study. Perhaps most excitingly, we were able to biopsy sample both **Dyad** and her 2022 calf. This calf was one of only two calves (out of 15) that were not biopsy sampled on the calving grounds this winter, and **Dyad** had never been sampled before! (See *Update on the Calves of 2022*.)

Between the two *J.D. Martin* cruises, two researchers from CWI and two from the Aquarium team conducted small-boat photo-ID and biopsy surveys in the Shediac Valley and the Baie des Chaleurs. Weather is much more restrictive on smaller vessel cruises, but we were able to get out on four occasions, documenting 24 sightings of 17 right whales, including some new whales that had not been seen by the *J.D. Martin* crew in July. Most notably, the small boat crew found **Snow Cone** (**#3560**), a known entangled whale and mom of the year, alone without her 2022 calf. This was her only sighting in the Gulf of St. Lawrence this summer and her first sighting without her calf (see *Mortality and Entanglement Report*).

Overall, we had a successful summer field season, even though the weather and whales tried to throw several curveballs our way. Generally speaking, a small aggregation did form in the southern Shediac Valley in August, but not in the numbers we would have expected to see based on previous years. Where will the right whales settle in next year? We will just have to wait and see. For more details and photos, **check out our blog**! *—Amy Warren and Kelsey Howe*

Update on the Calves of 2022

As I wrote in the spring newsletter, we never know the final count of calves until the end of the year (see *News from the Calving Grounds* in *RWRN May 2022*). By the end of the calving season in late March, we still held out hope that we would discover a few more calves up north to add to our total of 15 already discovered. We had particularly high hopes for **Koala** (**Catalog #3940**) who our **Wildlife and Ocean Health** team discovered was pregnant last summer after analyzing the hormones in a fecal sample from her. **Koala** was not seen on the calving ground at all, but she was seen in June and July in the Gulf of St. Lawrence by the Department of Fisheries and Ocean Canada and our team aboard the *J.D. Martin* (see *Summer Field Work…*). Although a **paper** we recently published reported that calves can be weaned as early as six months, such cases are very rare and it is more likely that **Koala** either miscarried or her calf died sometime after birth. So, the calf count remains at 15.

We know that at least 12 of those calves successfully migrated to the feeding grounds off New England. One of the missing three is **Half Note's** (**#1301**) calf, who was observed in declining health on the calving ground and who likely died, as we suspected it would (see *The Unusual Case of Half Note* in ***RWRN May 2014***). The two other calves that were not seen up north are **#3220's** and **Braces'** (**#3320**). It is no surprise that the former was not seen—**#3220** is an enigmatic whale who has only been seen every ten years or so and only on the calving ground. And, although **Braces** is seen frequently around Cape Cod, she and her only other calf, born in 2009, were not seen outside of the calving ground. Where these two mothers take their calves to feed is one of many intriguing right whale mysteries.

In addition to Half Note's calf, we also have concern for the calf of **Snow Cone** (**#3560**). The pair were last seen together in April in Cape Cod Bay by the Center for Coastal Studies, while **Snow Cone** was still entangled in fishing ropes. Since then, **Snow Cone** was seen alone in July in the Gulf of St. Lawrence and again in late September south of Nantucket, unfortunately entangled in new fishing gear (see *Mortality and Entanglement Report*). Again, calves can be weaned early, but the fact that **Snow Cone's** health was severely compromised by the earlier entanglement is cause for additional concern for her calf.

While some mysteries will be difficult to crack, such as where **#3220** goes during her decade-long absences from survey areas, we did collect some information this summer that may help shed light on another mystery. Before **Dyad (#4180)** gave birth to her first calf three years ago, we didn't know her sex and we knew nothing about her history. She was first seen in 2010 in Cape Cod Bay as a juvenile. This summer, we were able to collect a genetic sample from her which may give us some clues. There were three calves born between 2007 and 2009 that were genetically sampled, but never photo-identified (they weren't seen up north as calves after their callosities had developed; see *How to Identify the Next Generation* in ***RWRN May 2016***). If the sample from **Dyad** matches one of these, we will learn her age and who her mother and other relatives are. We may even learn who her father is.

As this newsletter goes to print, we look towards the upcoming calving season which is about to begin. The cycle continues as this species does what they can to survive. *—Philip Hamilton*

Southern New England Aerial Surveys 2022

The New England Aquarium has been conducting aerial surveys south of Martha's Vineyard and Nantucket since 2011 to collect information on marine megafauna in areas sited for wind energy development.* Our team has documented North Atlantic right whales in this area in every year surveyed. Right whale abundance in southern New England has been increasing since 2017, and the year-round usage by a portion of the species makes this area a unique habitat.

So far in 2022, we have identified 29 individual right whales, with nine sighted on more than one survey. Throughout the winter and early spring, our aerial surveys supported the Aquarium's first season of vessel surveys in Southern New England (see *New Survey Area...* in *RWRN May 2022*). We typically see adult right whales during this time, so it was exciting to see two yearlings (**2021 Calf of 2413** and **2021 Calf of 3593**) this year.

We had no right whale sightings during May and June. However, in mid-July, right whales returned to the survey area, including several individuals with consistent summer sighting histories in the Nantucket Shoals area. On multiple surveys, we saw groups of three or more right whales which extended a Dynamic Management Area (DMA) for voluntary vessel speed restrictions in the Shoals. Many whales were feeding subsurface including adult females such as **Cassiopeia** (**Catalog #4041**) and **Portato** (**#3802**). We're hopeful that the females in this group will reproduce in the coming years, especially as increased protection measures are implemented (see *Efforts to Protect Right Whales*).

In September, we sighted **Snow Cone** (**#3560**) 15 miles south of Nantucket in extremely poor health and with a new entanglement in addition to entangling gear from a previous incident (see *Mortality and Entanglement Report*). Disentanglement efforts are still pending, and we believe her case magnifies the urgent need for dramatic changes to fixed gear fisheries, including accelerating the transition to ropeless gear.

Wind energy construction is likely to begin in summer 2023. It is critical to continue to monitor the presence and habitat use patterns of right whales and other species in this area as it becomes further industrialized. *—Sharon Hsu*

Surveys funded by Massachusetts Clean Energy Center, NOAA, and a private foundation; surveys conducted under NOAA/NMFS Research Permit 25739.

*For previous articles about our surveys in the wind energy area, see ***RWRN Nov. 2021***, ***Dec. 2020***, ***May 2013***, ***Dec. 2012***, ***Dec. 2011***

Bay of Fundy Update

Due to the continued lack of right whales in the Bay of Fundy, our research team has focused our efforts on areas with higher concentrations, but there were still several groups monitoring the bay throughout the summer. In addition to whale watch vessels, Canadian Department of Fisheries and Oceans conducted occasional aerial surveys of the area. Two boat-based teams were also conducting research in the Bay of Fundy: a joint effort by University of New Brunswick and Dalhousie University, and the Grand Manan Whale and Seabird Research Station. Between the various efforts, there were five right whale sightings in the bay during the summer and our team identified three of the whales: **Catalog #4143**, **Babushka** (**#3890**), and **Tripelago** (**#2614**) with her calf of the year! **Babushka** was seen in the Gulf of St. Lawrence earlier this summer, but, to our knowledge, neither **#4143** nor **Tripelago** (and calf) have been seen since the spring!

Seamount (**#4457**), **#4605** and **#4312** in a low-energy surface active group just a few miles southwest of Martha's Vineyard. Photo: Sharon Hsu/ACCOL/NEAQ. NOAA Permit #25739.

Sponsored Whale Update

Thank you so much for sponsoring a right whale and supporting our program. We have new sightings to report for all seven whales in this issue!

Gemini (**#1150**) was photographed subsurface feeding on April 30 and May 5, 2022, by the Center for Coastal Studies (CCS) aerial survey team in Massachusetts Bay.

Manta (**#1507**) was seen once this spring on March 7, 2022, by the Northeast Fisheries Science Center (NEFSC) aerial survey team in Massachusetts Bay. He was then seen multiple times in the Gulf of St. Lawrence between July 5 and August 15, 2022, by Canadian Department of Fisheries and Oceans (DFO) aerial survey teams and our own Aquarium team aboard the *J.D. Martin* (see *Summer Fieldwork in the Gulf of St. Lawrence*).

Aphrodite (**#1701**) was documented between April 13 and May 6, 2022, by multiple teams and the public on Jeffreys Ledge to the east of Gloucester, MA, then in Massachusetts Bay, and later off the New Hampshire coast. Less than a month later on May 26, the DFO aerial survey team spotted her in the Gulf of St. Lawrence, where she was seen several times throughout the summer by various organizations, including the Aquarium team. It is great to see her around and across multiple habitats!

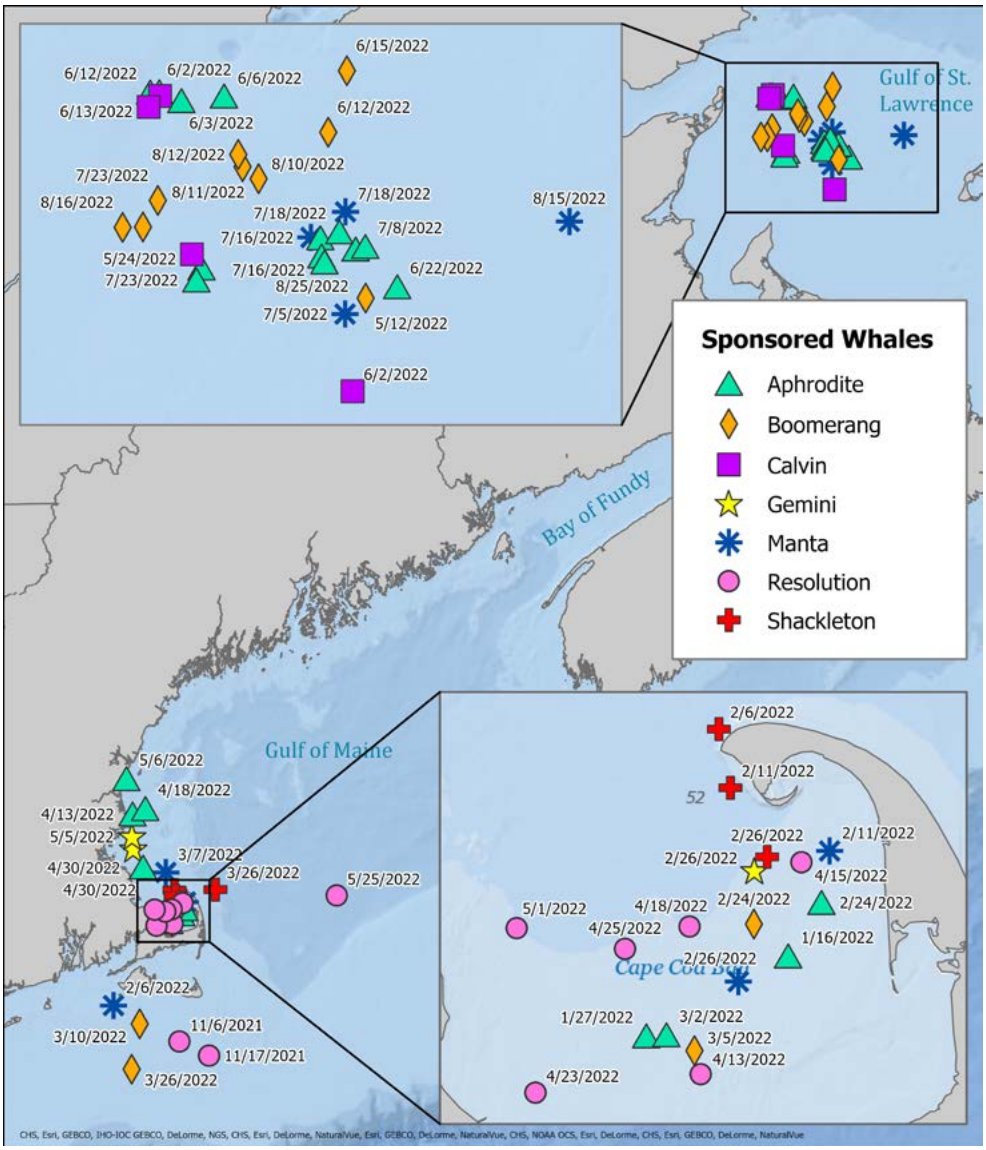
Calvin (**#2223**) was photographed a few times in the Gulf of St. Lawrence in May and June by the DFO aerial team. (For more about her see *Celebrating Calvin's 30th Birthday*).

Shackleton (**#2440**) was seen traveling east of Cape Cod on March 26, 2022, by the CCS aerial team.

Boomerang (**#2503**) was skim feeding in Cape Cod Bay on March 5, 2022, and then documented in a surface-active group south of Martha's Vineyard by the NEFSC aerial team on March 10. She was spotted one more time in southern New England in March before making her way north, where she was photographed many times between May and August in the Gulf of St. Lawrence by DFO and the Aquarium team.

Resolution (**#3532**) was seen feeding several times in Cape Cod Bay in April and May by the CCS aerial team and then on May 25, 2022, in the Great South Channel, east of Cape Cod.

Please check out the map to see where all the sponsorship whales have been spotted in the past year!



Sponsored whale sightings September 2021 through August 2022. Map: Kelsey Howe/ACCOL/NEAQ

Aphrodite in the Gulf of St. Lawrence in July 2022. Photo: Amy Warren/ACCOL/NEAQ/CWI. Taken under SARA permit.

Celebrating Calvin's 30th Birthday

On Saturday, August 6, 2022, about 70 people of all ages gathered on the Town Common in the beautiful coastal town of Castine, Maine, to celebrate the 30th birthday of **Calvin** (**Catalog #2223**)! For those who don't know about **Calvin**, she is the 1992 calf of **Delilah** (**#1223**) and she was orphaned at about 9 months old when her mother was killed by a vessel strike. **Calvin** was named for the spunky little character in the *Calvin and Hobbes* comic, before her sex was known. She was chosen to be the mascot for the **CALVIN Project** and the Calvineers, a group of 7th and 8th graders at the Adams School in Castine. **Calvin** is also one of our sponsorship whales—see *Sponsored Whale Update* for her recent sightings!

The birthday event included fun educational stations facilitated by alumni and current members of the Calvineers, a cake (decorated with a large copepod!), music by the Planet Pan Steel Drum Band, a life-sized inflatable version of Calvin, and an impassioned presentation by the Calvineers' teacher and long-time Right Whale team volunteer, Bill McWeeny. Also in attendance were New England Aquarium Right Whale team members Amy Knowlton, Kara Mahoney Robinson, and Jane Harrison, as well as a few friends who were members of the Team back in 1983 and helped to pioneer the Aquarium's Right Whale Program. Some of the day's activities included making right whale puppets, dressing up as a right whale, and trying on a blubber "mitt" to feel how right whales stay warm in cold water. Community members had the chance to interact with the amazing Calvineers, who explained the issues facing right whales, and also hear from their parents who have not only supported these students but have learned about right whales alongside them. Many parents said that being a Calvineer has given their child a bigger world perspective and that some alumni have been inspired to continue studying science beyond middle school.

All in all, the gathering was a great way to celebrate **Calvin's** birthday and learn about North Atlantic right whales! *—Kara Mahoney Robinson*

Birthday event attendees pose for a photo with a life-sized inflatable version of Calvin.

The mission of the CALVIN Project and the Calvineers is "Endangered Species Recovery Through Education." The Calvineers not only research right whales and their challenges but also educate their community about what they learn and share their passion for conservation. They have brought their hopeful spirit to annual North Atlantic Right Whale Consortium meetings and all the way to the Marine Mammal Biennial Conference in Barcelona, Spain! (For more about the Calvineers see *The CALVIN Project…* in *RWRN May 2008*).

Efforts to Protect Right Whales

There are multiple efforts underway in both the US and Canada to reduce risk of entanglements and vessel strikes to right whales. On the entanglement front, NOAA Fisheries implemented some protection measures by regulation in May 2022 with the aim of reducing entanglement risk in US waters by 60 percent. These measures included a combination of seasonal closures, trawling up of lobster pots to reduce endlines, and integration of 1,700-pound breaking strength ropes, or weak points, into endlines.

But, as a result of lawsuits from environmental NGOs, NOAA is now required to expedite efforts to reach 90 percent risk reduction in a shorter timeframe than the 10 years initially proposed for the next phase of measures. The Atlantic Large Whale Take Reduction Team (which includes an Aquarium scientist), is working with various stakeholders, including fishing industry members, to provide NOAA with a suite of recommendations that they can consider to achieve this level of risk reduction.

NOAA also recently released a "Roadmap to Ropeless," indicating they are committed to continued development and implementation of ropeless gear (i.e. using technology to keep rope at the seafloor until released by an acoustic device that brings it to the surface). In Canada, there has been a focus on continued testing of ropeless gear in the Gulf of St. Lawrence snow crab fishery. Also, Canada has committed to transitioning all their fisheries to weak ropes by January 2023. Between both countries' efforts, we hope to see the elimination of entanglement mortality and serious injuries to right whales in the coming years. We will continue to closely monitor the species to determine if the frequency and severity of entanglements drops.

On the vessel strike front, NOAA Fisheries recently published an amendment to their vessel strike reduction rule by proposing a suite of changes to the present regulations. The two main amendments include expansion of the spatial and temporal boundaries of current speed restriction areas and inclusion of smaller vessels (down to 35 feet) that would be required to abide by mandatory speed restrictions. These amendments, if enacted, will provide greater protection to right whales in US waters. In Canada, both static and dynamic vessel speed restrictions continue to be enacted in the Gulf of St. Lawrence from April to November to reduce risk when right whales are present.

Overall, we are encouraged by the changes that are being considered by the US and Canadian governments. But these changes must be implemented in a timely manner to bring right whales back from the edge of extinction. *—Amy Knowlton*

Seafood Watch Advises Avoiding Lobster

The Monterey Bay Aquarium recently released their updated Seafood Watch recommendations to the public. Seafood Watch conducts assessments of various fisheries around the world to evaluate their environmental performance. Because of the continued levels of entanglements of North Atlantic right whales along the East Coast, Seafood Watch gave a red rating to **US and Canadian lobster fisheries**. The red rating cautions consumers to avoid eating lobsters caught with typical roped lobster gear in East Coast fisheries. As measures to protect right whales from entanglements are put in place by US and Canadian governments, this red listing may shift to a less strong warning.

Mortality and Entanglement Report

In each newsletter, we report on new entanglements and mortalities that we have observed in North Atlantic right whales since the last issue. Although this number is always concerning, we know that it drastically underrepresents what the species is actually experiencing. A recent study determined that for every carcass observed there may be three times that number of undocumented deaths. This species is in decline, and until entanglements and vessel strikes are dramatically reduced, North Atlantic right whales will continue to inch closer to extinction. By sharing these stories, we are keeping you, our readers, apprised of these deadly anthropogenic events.

Mortalities

There have been no new documented mortality events since the last newsletter in May.

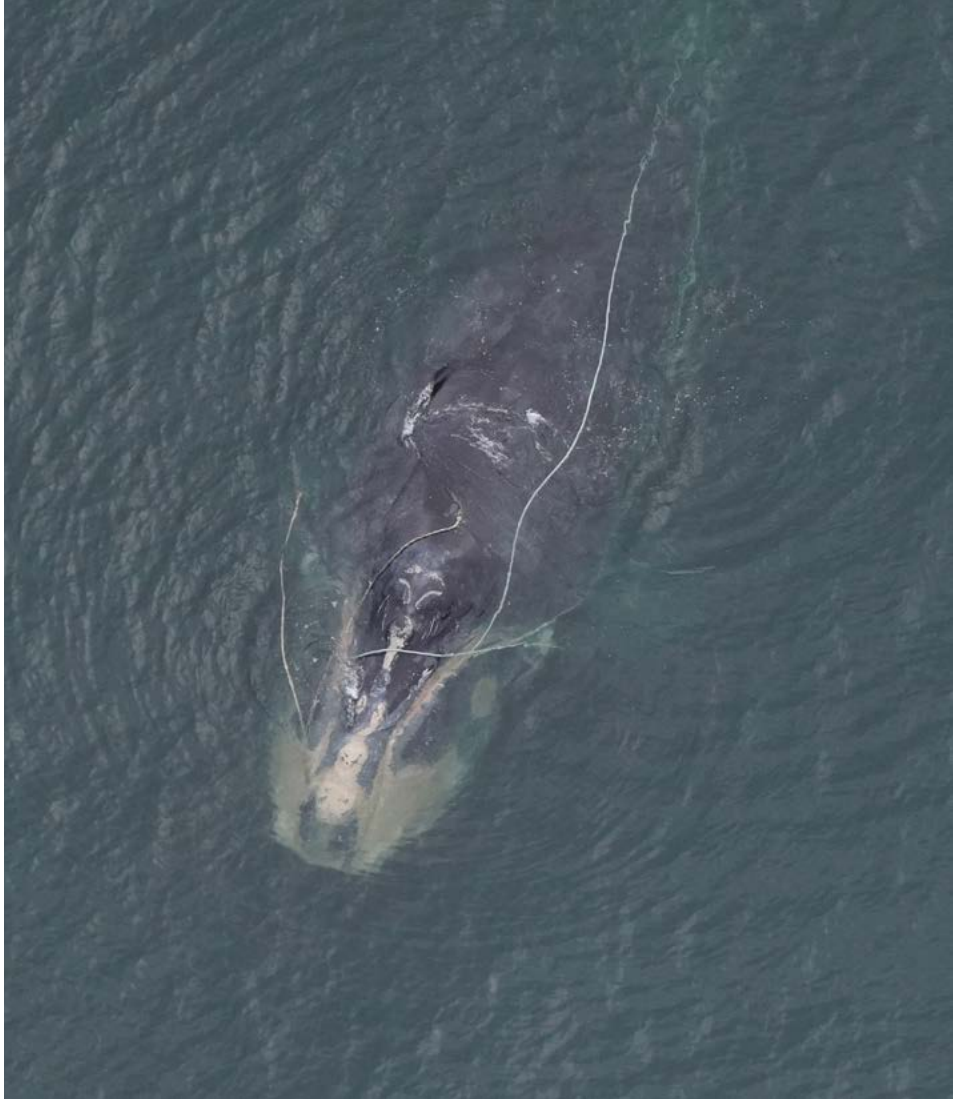
Entanglements

Since the last newsletter, there have been five new documented entanglement cases. Unfortunately, because of their distance from shore and time of day, none of these whales were able to be disentangled.

Sundog (**#3823**, 14-year-old female): On May 19, aerial survey teams from the Canadian Department of Fisheries and Oceans (DFO) and Northeast Fisheries Science Center (NEFSC) sighted **Sundog** during a survey in the Gulf of St. Lawrence. She had line through her mouth and was trailing a bullet buoy and polyball, as well as some weight attached to the other end of the line. Sadly, this is her sixth documented entanglement, and she has not been seen since May.

Meridian (**#1403**, 38-year-old male): On June 30, an aerial team from DFO sighted **Meridian** about 50 nautical miles east of Miscou Island in the Gulf of St. Lawrence. Line could be seen trailing behind his body, but it was unclear whether the line was through the mouth or around the flippers. He was last seen on July 7 by the joint research team from the Canadian Whale Institute, the University of New Brunswick, and the Aquarium during their cruise in the Gulf of St. Lawrence. **Meridian** has had five previous documented entanglement events.

2021 Calf of #3720 (yearling, female): Sighted by a DFO aerial team on August 20 swimming with a wrap of line around the peduncle and about 200 feet of trailing line. She had been seen gear-free in the Great South Channel in May of this year.



Snow Cone swimming south of Nantucket in September. The line over her head, emerging from her mouth and along her left side is a new entanglement, acquired since her sighting in July. The tan patches on her head and lower jaw are orange cyamids, an indicator of poor health.
Photo: Sharon Hsu/ACCOL/NEAQ. NOAA Research Permit #25739

Catalog #4501 (7-year-old male). On August 24, the DFO aerial team was searching for the entangled **2021 Calf of #3720** when they spotted **#4501** east of Shippagan, NB. He was acting agitated, suggesting that he had just become entangled, and two passes of line were visible across his body, though an attachment point could not be seen due to sea conditions. At the end of the sighting, the lines could no longer be seen on the visible portions of the whale, and it is unclear whether he shed the gear. He was seen earlier in the Gulf of St. Lawrence without attached gear.

Snow Cone (**#3560**, 17-year-old female): First seen entangled in March 2021, she was sighted off the coast of Georgia on December 2, 2021, with her second documented calf. The pair were sighted in April 2022 off of Cape Cod, and a disentanglement effort was made by the Center for Coastal Studies response team; however, because **Snow Cone** has a complicated wrap of line embedded in her rostrum, efforts were unsuccessful. On July 22, she was seen by the Aquarium team in the Gulf of St. Lawrence; she remained entangled, and unfortunately, her calf was not present (see *Update on the Calves of 2022*). Her most recent sighting was south of Nantucket on September 21. The Aquarium aerial survey team documented **Snow Cone** with her head still entangled but also carrying additional line and likely heavy gear that was not present at her sighting in July. Sadly, but predictably, her health condition has deteriorated significantly, and her prognosis is bleak.

Despite tremendous efforts in both the US and Canada to reduce the risk of entanglement for right whales, the fact that five new entanglements with attached gear were documented since May 2022 indicates that more needs to be done to address this chronic threat to this critically endangered species. *—Kate McPherson*

Recent Peer-Reviewed Team Papers

Highlighting our expertise and productivity, below is a list of recent peer-reviewed publications on which members of the Aquarium's Anderson Cabot Center for Ocean Life are either lead authors or co-authors, noted in bold. This work is made possible due to grants and contracts we apply for, and through direct donations to our program. Thank you all for your support!

Bishop, et al. (co-author **P. Hamilton**) 2022. Maternal lineage and habitat use patterns explain variation in the fecundity of a critically endangered baleen whale. *Frontiers in Marine Science*. **https://www.frontiersin.org/articles/10.3389/fmars.2022.880910/full**

"This paper explores the relationship between family lineages and reproductive success and found that the female calves of 'successful' mothers tend to have more calves than those born to less successful mothers; the females that are now consistently feeding in the Gulf of St. Lawrence are more likely to reproduce than those that feed elsewhere." —Philip Hamilton

P. Corkeron, et al. (co-author **S. Kraus**) 2022. Balaenoptera ricei is also the Gulf of Mexico whale. *Marine Mammal Science*. **https://doi.org/10.1111/mms.12928**

"The names we give animals matters. In this short piece, we argue that the appropriate name for the world's most endangered whale is the 'Gulf of Mexico whale' not 'Rice's whale.' Naming it for the place where it is found should give those people living near its range more understanding that it's their whale to protect." —Peter Corkeron

B. Hodge et al. (co-authors **D. Pendleton**, **L. Ganley**, **O. O'Brien**, **S. Kraus**, **J. Redfern**) 2022. Identifying predictors of species diversity to guide designation of marine protected areas. *Conservation Science and Practice*. **https://conbio.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/csp2.12665**

"The Northeast Canyons and Seamounts Marine National Monument was designated to protect an area of high marine mammal diversity. However, previous to this paper, no comparisons had been made between diversity in the Monument and other areas. We found that the Monument protects a diverse and unique marine mammal community, with some of the highest diversity indicators on the US East Coast." —Laura Ganley

Khan, et al. (co-author **P. Hamilton**) 2022. Artificial Intelligence for Right Whale Photo Identification: From Data Science Competition to Worldwide Collaboration. *Mammalian Biology*. **https://doi.org/10.1007/s42991-022-00253-3**

"Leveraging right whale data from around the world, we describe the development of a sophisticated, collaborative web-based platform hosted by Wild Me that allows biologists with no machine learning expertise to use a semi-automated photo identification system to match both North Atlantic and southern right whales." —Philip Hamilton

A. Knowlton, et al. (co-authors **P. Hamilton**, **S. Kraus**, **H. Pettis**, **R. Rolland**) 2022. Fishing gear entanglement threatens recovery of critically endangered North Atlantic right whales. *Conservation Science and Practice*. **https://doi.org/10.1111/csp2.12736**

"This paper looks at the impact of entanglement on right whale health. When injury severity from entanglement is greater, health declines, which affects reproduction and survival. These impacts are more pronounced in females. Unless entanglement threats are adequately addressed, this species could go extinct." —Amy Knowlton

Lonati, et al. (co-author **P. Corkeron**) 2022. Investigating the thermal physiology of Critically Endangered North Atlantic right whales *Eubalaena glacialis* via aerial infrared thermography. *Endangered Species Research*. **https://doi.org/10.3354/esr01193**

"Filming whales using infrared technology from small, cheap drones offers new insights into their biology, which can be used to better understand how we're impacting whales' health." —Peter Corkeron

L. Ganley, et al. (co-authors, **D. Pendleton**, **J. Redfern**) 2022. Effects of changing temperature phenology on the abundance of a critically endangered baleen whale. *Global Ecology and Conservation*. **https://doi.org/10.1016/j.gecco.2022.e02193**

D. Pendleton, et al. (co-authors **L. Ganley**) 2022. Decadal-scale phenology and seasonal climate drivers of migratory baleen whales in a rapidly warming marine ecosystem. *Global Change Biology*. **https://doi.org/10.1111/gcb.16225**

"These papers explore the impacts of earlier springs on right whale habitat use in Massachusetts waters. Years with earlier springs had higher right whale abundance in Cape Cod Bay, and habitat use peaked later in the season. Changes in the intensity and timing of right whale habitat use are important for policy makers to consider when deciding the appropriate timeframe for trap/pot gear closures and vessel speed restrictions." —Laura Ganley and Dan Pendelton

O. O'Brien, et al. (co-authors **D. Pendleton**, **L. Ganley**, **K. McKenna**, **S. Kraus**, **J. Redfern**) 2022. Repatriation of a historical North Atlantic right whale habitat during an era of rapid climate change. 2022. *Scientific Reports*. **https://www.nature.com/articles/s41598-022-16200-8.pdf**

"This study documents an increase in the number of whales found in southern New England and the length of time they spend there, contributing to our understanding of the recent climate-driven changes in right whale distribution. Understanding changing whale distributions is critical to better mitigating potential effects of increased human use of the ocean." —Orla O'Brien

Reed, et al. (co-author **P. Corkeron)** 2022. Multi-event modeling of true reproductive states of individual female right whales provides new insights into their decline. *Frontiers in Marine Science*. **https://www.frontiersin.org/articles/10.3389/fmars.2022.994481/full**

"By making no assumptions about when whales 'should' mature, this paper throws new light on the status of female right whales. The number of breeding females has declined precipitously since 2010, and now there are as many non-breeding females as there are females that have had calves. This must change if the species is to recover." —Peter Corkeron

Stewart, et. al. (co-authors **P. Hamilton**, **A. Knowlton**) 2022. Larger females have more calves: influence of maternal body length on fecundity in North Atlantic right whales. *Marine Ecology Progress Series*. **https://www.int-res.com/articles/meps_oa/m689p179.pdf**

"There is a clear linkage between body length and reproductive output in this species. Declining body lengths over several decades may be contributing to low birth rates and entanglements are a known cause of these reduced body lengths. Reducing anthropogenic impacts to right whales will be essential for species resilience." —Amy Knowlton

New England Aquarium
Central Wharf
Boston, MA 02110-3399

PRINTED ON RECYCLED PAPER
80/11-22/AG

Holiday Gift Ideas

Give the gift of Endangered Species conservation! North Atlantic right whale-themed gifts and tax-deductible sponsorships and donations are available with proceeds directly supporting our research and conservation work to save this critically endangered whale.

Visit **rightwhaleresearch.bigcartel.com** to learn more!

Editor

Marilyn Marx, mmarx@neaq.org

Contributors

Philip Hamilton
Kelsey Howe
Sharon Hsu
Amy Knowlton
Kara Mahoney Robinson
Kate McPherson
Amy Warren

In this newsletter, all photographs of right whales in U.S. waters were taken under NOAA research permits under the authority of the Marine Mammal Protection Act and the U.S. Endangered Species Act. Right Whale Research News is produced and published by the New England Aquarium. We welcome your comments and suggestions.

Read more about our project at accol.org.

You may access past issues of Right Whale Research News on our website at andersoncabotcenterforoceanlife.org/about-us/newsletters/right-whale-research-news. The archive goes back to 2005, and all but the two most recent issues of RWRN are available. Now when one of the articles in the current issue refers to an earlier piece on the same subject, it's easy to check it out!

Thank you!

We would like to thank all the individuals, organizations, and schools that continue to support our research with annual sponsorships and donations. In these difficult economic times, with federal research budgets shrinking, your support is more critical than ever, and we truly appreciate your generosity. Sponsorship funds are used by our Right Whale Program to support activities that directly contribute to the conservation of North Atlantic right whales.