



PHOTOGRAPHS COURTESY OF ANDERSON CABOT CENTER FOR OCEAN LIFE AT THE NEW ENGLAND AQUARIUM

Doing Right

AMY KNOWLTON HAS SPENT THE LAST THREE DECADES TRYING TO SAVE THE NORTH ATLANTIC RIGHT WHALE FROM EXTINCTION. SHE BELIEVES THERE'S STILL HOPE.

by Right Whales

BY PAULA MACKAY

AMY KNOWLTON IS THE JANE GOODALL OF RIGHT WHALES. She knows every right whale in the North Atlantic by given name and has made a successful career combining science and advocacy on behalf of the wild creatures she loves—70-ton marine mammals who almost disappeared during the brutal era of whaling. Knowlton is quick to point out that her accomplishments have been possible only because of teamwork and the “unique and impressive” dedication of the right whale research community as a whole. A little humility goes a long way in our troubled world.

Knowlton is a senior scientist with the New England Aquarium’s Anderson Cabot Center for Ocean Life. She and I first met in the summer of 1991 when I was an intern based at the Aquarium’s right whale research station in Lubec, Maine—a small fishing village on the Bay of Fundy. At 31 years old, Knowlton had already established herself as an expert in her field under the leadership of Scott Kraus, presently vice president and chief scientist at the Anderson Cabot Center. In 1980, Kraus and colleagues had unexpectedly encountered numerous North Atlantic right whales (*Eubalaena glacialis*) in the Bay, disproving the widely held assumption that this once-abundant species was nearly extinct. Kraus initiated a landmark photographic catalog of right whales that has described 736 individuals to date, many of them now deceased.

Photographing a right whale from the bow of a small boat exceeds every notion one might have about being close to such an outlandish animal. Imagine the air infused with a foul-smelling vapor—a fishy blast of moisture emitted from the blowhole as the whale clears the way to breathe. It’s massive blackish



body merges with the shadowy sea boiling up around it, filling the frame with a confusing froth of “whalishness” and water. The physical form that finally does take shape looks nothing like the rectangular sperm whale popularized by *Moby Dick*, the right whale’s rotund body more akin to a blimp than a boxcar. But it’s the strange, gigantic head that truly boggles the brain.

Comprising a quarter of the body length, the right whale’s head is blemished with coarse patches of skin called callosities, whose unique raised pattern, like fingerprints, holds the key to distinguishing individuals. The callosities are inhabited

by thousands of shrimp-like crustaceans (called cyamids or whale lice) in earth tones of cream, tan and orange—a spiky relief map brought to life on a whale.

Historically, these diminutive hitchhikers almost lost their hosts to greed. North Atlantic right whales were the first victims of commercial whaling, beginning with the Basques in the 11th century—who sold their oil, baleen and other parts on the European market. Once the whales were gone from the eastern North Atlantic, the Basque whalers moved west. Yankee whalers took over where the Basques left off, and by the late 1800s right whales

were so rare they were hardly worth pursuing. Knowlton and other scientists estimate that at their low point only a few dozen right whales persisted off the east coast of North America. They may have numbered 10,000 or more before Columbus set sail.

A Species on the Brink of Extinction

THE NORTH ATLANTIC right whale remains one of the most threatened marine mammals on Earth, despite the International Whaling Commission’s 1935 ban on hunting them and later protections

whaling is behind them?

According to Knowlton, the answer is partially rooted in the same reason whalers favored right whales in the first place: They are relatively slow swimmers who travel close to shore (they also float when they’re dead, which further enhanced their appeal as targets). North Atlantic right whales migrate along the nearshore continental shelf, an area that today accommodates some of the busiest shipping lanes in the world. Back in the early 1990s, Knowlton could see that right whales were on a collision course with the shipping industry; ship strikes had killed dozens of right whales since 1970 and injured many more. So she decided to pursue a graduate degree in marine policy.

Knowlton’s master’s thesis probed the shipping/right whale conflict and produced a suite of recommendations aimed at reducing ship strikes. Thanks to her efforts and those of many others, the National Marine Fisheries Service ultimately enacted speed restrictions and shipping lane changes along the US East Coast. Meanwhile, one of Knowlton’s Canadian colleagues, Moira Brown, was instrumental in compelling Transport Canada to implement whale-friendly changes in Canadian waters. Knowlton says these measures have reduced the number of right whale vessel strikes considerably,

though she cautions that “we need to remain vigilant as right whales shift their distribution patterns.”

The Race to Eliminate Threats

THESE DAYS, Knowlton is focused on whale entanglements in fishing gear as the most immediate threat to the North Atlantic population. She and her associates regularly come across right whales with deadly rope looped through their mouths or wrapped around their tails, and 85% of the animals they photograph bear scars from such entanglements. Knowlton says the composition of ropes used in gillnet fishing and trap-based fisheries has evolved from natural fibers to polypropylene to a progressively stronger and longer-lasting co-polymer plastic blend. Stronger ropes mean less gear is lost to the sea, but they also show little forgiveness to right whales who happen to be in the wrong place at the wrong time and who tend to thrash and roll when they become ensnared.

LEFT: THE WHALES’ ROUGH SKIN PATCHES, AKA CALLOSITIES, ENABLE RESEARCHERS TO ID INDIVIDUALS. BELOW: AMY KNOWLTON.



In August 2017, I returned to Lubec to reconnect with the right whale crew. Knowlton had just returned from Canada's Gulf of St. Lawrence where she had been leading an expedition to search for right whales feeding in the area—several of whom had been found dead over the previous weeks from vessel strikes or entanglements. Tragically, July's death toll had also included the survey team's original captain, a fisherman named Joe Howlett, who was struck and killed by a right whale's tail while disentangling the whale from snow crab gear. Those who knew him said Howlett lost his life doing what he felt morally obliged to do, and the entangled whale swam away free as a result of his heroic efforts. But sadness ran deep among the right whale and local fishing communities.

Knowlton reports that an unprecedented 20 North Atlantic right whales succumbed mainly to human-related causes between April 2017 and November 2018, with 12 found in the Gulf of St. Lawrence and 8 in US waters. In an alarming one-two punch, the right whale research community failed to document a single right whale calf on calving grounds off the coasts of Georgia and Florida during the winter of 2017–18, another first in the history of the project. Scientists at Woods Hole Oceanographic Institute have predicted that North Atlantic right whales could become functionally extinct by 2040 if these trends continue.

On the hopeful side, in 2018 Canadian officials imposed new boat speed restrictions and fishery closures in the Gulf of St. Lawrence in an effort to curb encounters with right whales. There were no known mortalities in the Gulf during the summer of 2018, though researchers did document four entanglements that were known or likely to have occurred in Gulf waters. And during the 2018-19 birthing season, six new calves have been sighted.

Driven by Hope

IF THERE IS INDEED HOPE for the North Atlantic right whale, it is due in no small part to Amy's innovative work, which is helping to bring about a change in how humans coexist with whales. At the end of our interview (extracted below) in

Lubec last summer, Amy's heartfelt words brought tears to my eyes—not because she is giving up but because the opposite is true. Amy is bearing witness to an animal most people will never see and whose future may well depend on the tenacity of hope.

PAULA MACKAY: When I first worked with you in Lubec 27 years ago, there were only 300-plus right whales in the North Atlantic. Why does their risk of extinction continue to grow even though they've gained some ground in terms of numbers? **AMY KNOWLTON:** Their numbers began to rise notably in the first decade of the 2000s. We saw a max of 39 calves in one year, in 2009. But since then, calf counts have dropped again. They should be going up—ideally, exponentially. Coupled with this is a dramatic increase in the number of severe entanglements.

Entanglements are resulting in severe injuries that right whales can't survive. We started seeing the trend in the early 2000s, and since 2010 it's just shot through the roof. And now we're seeing sublethal impacts on whales if they do, in fact, survive the initial event. Their reproductive output is compromised, and entanglements are impacting reproductive females more than the other demographic groups.

PM: So the entanglement problem has gotten substantially worse in recent years? **AK:** Entanglements have unquestionably climbed, possibly coinciding with climate change-driven redistributions of right whales. Here in the Bay of Fundy, they're not showing up like they used to—not consistently anyway. If their food is aggregating in other parts of the ocean where we don't happen to be surveying, it could be bringing them into areas with a lot of [fishing] gear or heavy gear.

The Gulf of St. Lawrence is a case in point. The 2017 aggregation of right whales coincided with a major snow crab fishery. It was only because there were a lot of people looking that the entanglements were documented. I think this is happening throughout their range. Wherever there is gear and there are whales, there's going to be a problem.

We had a female up on the eastern side

RESEARCHERS PHOTOGRAPH WHALES TO TRACK INDIVIDUALS AND DOCUMENT SCARRING FROM ENTANGLEMENTS OR SHIP STRIKES.

of Nova Scotia with 30 wraps of heavy line around her tail. She probably didn't ever make it to the surface. It's tragic what is happening out there. I just hope this whole situation—the tragedy of losing Joe and the tragedy of all these carcasses and severe injuries from entanglements—starts to wake everyone up to the problems at hand. It's not just the Gulf of St. Lawrence. It's not just Canada's problem. Everybody who operates on the ocean throughout their range has to be a part of the solution.

PM: Are you concerned about a possible synergy between known threats to right whales and climate change?

AK: Yes. It's perhaps going to become less predictable where the whales might be. If they're getting exposed to gear wherever they are, the ultimate goal is to make every gear set—whatever it is, wherever it is—safe so the whales can exist amongst fishing gear. And with shipping, too, I think vessel operators need to be cognizant of where whales exist and take precautions to reduce their potential impact.

PM: You're trying to develop and promote ropes that will break when whales become entangled in fishing gear. How do fishermen respond to this idea?

AK: I think there's a willingness to think about it and some are trying to adjust, but others are nervous they could lose more gear. I understand where they're coming from, but if we don't change the ropes—either go to all ropeless fishing or reduced-breaking-strength ropes—we'll never tackle this problem. My goal is to work with the fishing industry to determine what strength they really need to haul in their gear and to come up with ways to reconfigure gear to reduce tension when hauling.

The Massachusetts South Shore Lobster Fishermen's Association took it upon themselves to review the right whale science and read our [2016] paper on rope strength after being forced to close



their fishing area for a few months each season. They worked with a rope manufacturer to develop hollow braided sleeves with a reduced breaking strength, and integrated these sleeves into every 40 feet of rope in hopes of being allowed back into the closed area. They're testing them for their operational efficiency right now. This rope isn't going to prevent whale entanglements from happening, but if it prevents them from becoming complex and life-threatening, I think we'll be moving in a good direction.

PM: Traditionally, scientists are encouraged to remain "objective" and just put the facts out there. Have you found it difficult to balance your role as a scientist with your advocacy work?

AK: I guess for me it was difficult not being an advocate. Early on I said to myself, "These whales are dealing with all sorts of crap and who's providing them a voice?" The science is vital, but if we don't do anything with it, if we don't find solutions to the problems right whales are facing, then we're not really doing what I feel

obligated to be doing.

PM: Can you describe one of your most moving experiences in the presence of right whales?

AK: Back in 1992, a right whale named Delilah was killed by a ship. I remember talking to a reporter and, to my surprise, I broke down in tears because I was so distressed over this poor whale.

PM: You let it in.

AK: I let it in. But maybe that's not really the kind of moment you're looking for. I love seeing the mothers and babies interact. Sometimes the babies get curious and come look at us and hang out with us. That's an incredible thing to behold.

PM: How do you remain hopeful in the face of so much loss and adversity?

AK: I've seen that humans can be really willing to come to the table—and that's when you can educate people with the science and about changes they can make that won't be so draconian. We saw this happen with the shipping industry. There was a lot of back and forth; it wasn't easy to get them to embrace speed restrictions.

But they came around to recognizing that this change wouldn't kill the industry and that it might help, and it has helped. I think the industry is proud of that fact, as it should be. I hope we can come to that same place with the fishing industry—that together we can find a way forward.

PM: When you do eventually retire, probably at age 100, what do you hope will be your greatest legacy?

AK: I hope my greatest legacy will have been helping to create an ocean, both in the Atlantic and maybe throughout the world, that is safer for whales. We're operating in a realm that is really not our home. It's the whales' home. If we can come to realize that and respect that, and make sure everything we do out there is with the intention of keeping whales out of harm's way, we will have achieved more than I ever thought was possible. **WH**

Learn more about North Atlantic right whale conservation efforts at andersoncabotcenterforoceanlife.org and scroll through their catalog of 736 whales at rwcatalog.neaq.org.