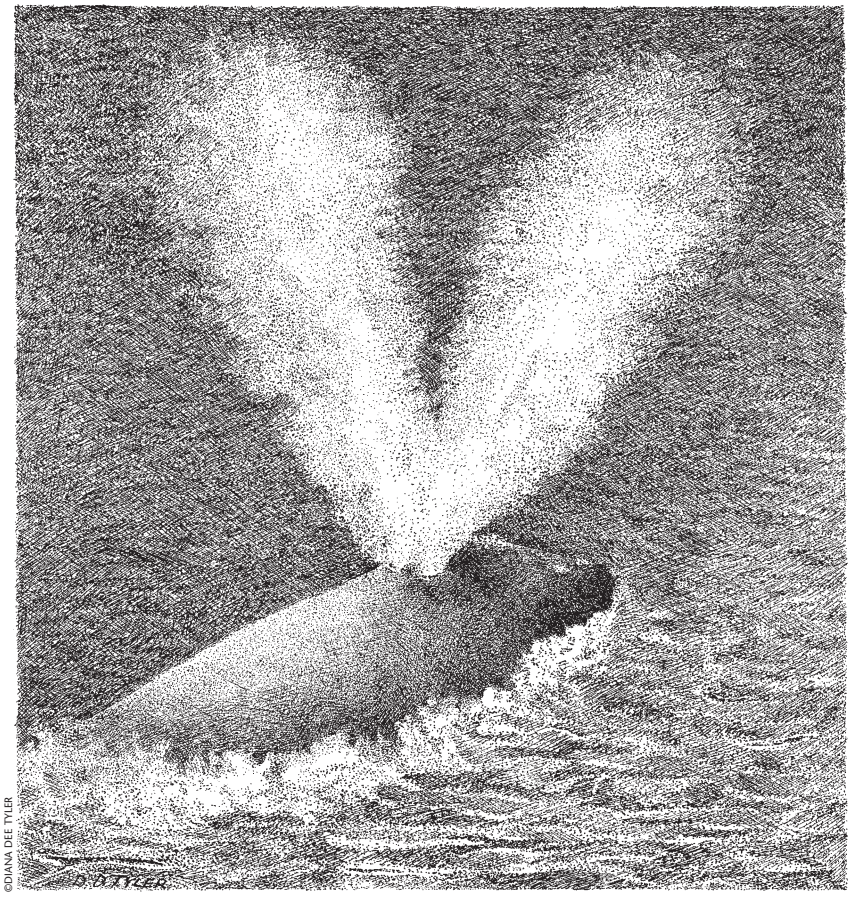
Endangered Right Whales



Under the Shadow of Ships

A Conversation with Amy Knowlton and Moira Brown

Northern right whales have been on the wrong side of human technology for close to 1,000 years. Hunted to the verge of extinction before the Puritans made a beachhead on the Atlantic shore of North America, these 40- to 50-foot black baleen mammals still gently ply coastal waters in search of copepods and other zooplankton.

Though the species hasn't been hunted since a 1935 League of Nations agreement (and was protected by the International Whaling Commission in 1946), it hasn't recovered. It seems that the deliberate harpooning of these surface-loving, oil-rich giants (hence the "right" whale to catch) has been replaced by a more insidious accidental "take" in the form of ship collisions and fishing gear entanglement.

In the fall 1997 *Wild Earth* (vol. 7, no. 3), Robert Stevenson presented an overview of right whale biology and conservation status. Today, biologists continue the effort to clarify the causes and dynamics of right whale endangerment—and to secure protections for them into the future. Two of these research scientists are reaching across international boundaries on behalf of the right whale: an American, Amy Knowlton, with the New England Aquarium in Boston, and a Canadian, Moira ("Moe") Brown, who works jointly for the Center for Coastal Studies in Provincetown, Massachusetts and the Canadian Whale Institute in Bolton, Ontario. *Wild Earth*'s assistant editor, **Joshua Brown,** spoke with them on December 17, 2002.

right whale spout, pen-and-ink by D. D. Tyler

WILD EARTH: I know that right whales are highly endangered, but what does this have to do with shipping lanes?
MOIRA BROWN: Right whales play in the street. In other words, the deepwater basins where mariners in large vessels go as soon as they leave port—for safety of navigation—are near the shore, usually within 10 to 30 miles. This is also where productive oceanographic processes take place—plankton upwellings, which the right whales are seeking. So the basins that are attractive to mariners as shipping lanes are also attractive to right whales, and hence you sometimes get whales and ships colliding. It's a case of accidental overlap.

Our job now is to allow ships and whales to coexist—to get them a little further apart, to get ships to slow down in high [whale] use areas, to route ships around the most important whale habitats where there is room to do so.

How did you discover the threat that ships pose to these whales?
AMY KNOWLTON: Our primary project is a field effort to photo-identify all right whales in the North Atlantic. It started in the Bay of Fundy in 1980; I joined the project in 1983 and Moe in 1985. Our basic goal was—and still is—to understand the population status of right whales. But out of this fieldwork has grown an awareness of the ship strike problem and, now, a policy focus to try to reduce whale mortalities.
MB: Right whales were stumbled across almost by accident. There had been sightings in Cape Cod Bay in the 1950s, 60s, and 70s, but the best minds at the time thought that only a few dozen right whales were left, probably not a viable population. Then, in 1980, scientists took a day to fly a survey over where they had seen some right whales. They saw mothers—with calves.
AK: At that point, moving shipping lanes was the farthest thing from our minds. We knew we had a population that was imperiled but we had few clues about why.
MB: It was only after several years of photo identification work that we started to make the connections. As we were developing a catalog, we started to identify scarred animals and dead animals on beaches, with big propeller wounds—from ship strikes.

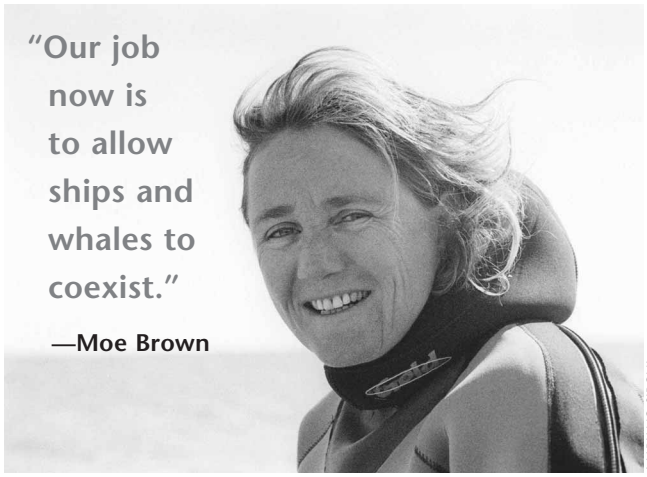
By 1990, a colleague of Amy's at the aquarium had done an analysis of the scarring on all the animals that were well photographed. Many animals had scars from fishing gear, maybe 60%. That, in combination with the carcasses we found on the beaches, led us to believe that ship strikes are likely to be lethal and that gear entanglement was threatening many whales but not as lethally. Today, we think that ship strikes and gear entanglement are likely equal culprits in human-caused right whale mortality.

How do photographs allow you to distinguish individual whales?
AK: Right whales are identifiable by natural markings called callosities, a tissue that erupts on top of their heads—comparable to the areas where humans grow hair. Each animal has a unique pattern that we can photograph from aerial or shipboard platforms. This has allowed us to create the catalog here at the aquarium of all identified right whales.

How many animals have you identified through this photo work?
AK: We presently have 413 North Atlantic right whales identified and the data suggest about 320 of those are still living.

So, what is the worldwide population of right whales?
MB: It's perhaps ten thousand across all species of right whales, but Atlantic right whales [*Eubalaena glacialis*] are a distinct species from North Pacific right whales [*E. japonica*] and from right whales in the Southern Hemisphere [*E. australis*]. In the North Atlantic there are probably 350 right whales. In the North Pacific estimates are sketchy. Amy was at sea for weeks in the Pacific this year and did not see any Pacific right whales. Other field crews saw only a few.

How long are you out at sea each year and what data do you collect?
AK: We have several seasons throughout the year. The winter field season began in December and goes through March in the



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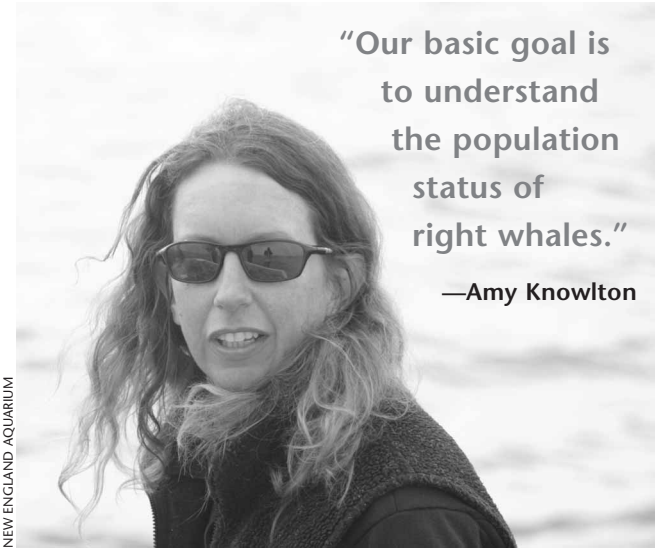

NEW ENGLAND AQUARIUM

calving grounds down south. The New England Aquarium also runs a field season in the Bay of Fundy from July through September. We have a 30-foot power vessel and take a crew of six to eight people out from 6 a.m. sometimes until 8 p.m. We don't sleep out on the boat, but we do go out every day the weather is suitable: winds less than 15 knots and no fog.

Our daily routine is to start a survey track through an area that we know is highly used; as we come across whales we stop and photograph them. We try to get both sides of the head to get all the markings—and any scars on the body and tail to look for entanglement interactions. Sometimes we collect skin biopsies for our genetics database. We try to only sample whales we know we haven't sampled before, like new calves of the year. Additionally, we have a couple of other collaborative projects collecting fecal samples for hormone studies.

All along, an important goal in this fieldwork has been to define where the whales are most concentrated on a seasonal and regional basis. This detailed data has proven to be crucial to Moe's efforts to have shipping lanes moved in the Bay of Fundy.

Moe, this sounds like the making of conservation success story.

MB: Yes, in the Bay of Fundy we have been able to find a solution that separates ships and whales. The lanes have been shifted, as mandated by the International Maritime Organization. The plan was just adopted December 5th at the IMO meeting of the Marine Safety Committee; it's going to be implemented in July 2003.

Does the International Maritime Organization set and determine shipping lanes?

MB: Well, not exactly. The coastal state—in this case Canada—submits a proposed set of shipping lanes and the International Maritime Organization reviews, approves, and adopts their proposal. The IMO is not concerned about animal rights *per se*. They are concerned about the safe navigation of ships.

AK: The fact that the shipping lanes were moved in the Bay of Fundy is unprecedented: the IMO has never before managed ship traffic to protect a moving, migratory species. They have done it to protect a coral reef, or a sensitive bird atoll, but not the seasonal habitat of whales.

What were the key steps in getting the shipping lanes moved?

MB: This habitat area in Canada is different from the ones in the United States. First of all, there are well-defined shipping lanes and there was room to move them. This action doesn't remove the *possibility* of a ship strike, but by shifting these lanes away from the high concentration areas we're going to reduce the probability of a ship strike by 80% in this area.

Until December 2002, Canada didn't have an endangered species act, and it took nine years to get this new law. We have been operating through this whole period without any legislation that would force the industry to make changes. So it was a case of persuasion: taking the photographic data and showing it to people. A couple of key analyses showed that the densest concentrations of whales were right in the middle of shipping lanes, especially the outbound lane. By presenting this data over and over again we began to hear mariners, the captains of ships, saying, "We should move the lanes." It seems simple but it took a long time.

I give Canada a lot of credit. The regulatory agencies could have told us to go away a long time ago. We had no legislative leg to stand on. We just appealed to their sense of what was reasonable; it's a reasonable conservation measure for an extremely endangered whale. I was particularly encouraged that many folks in the shipping and fishing business were able to look at this measure and say, "This is going to cause us some pain, but we are willing to do it for right whales."

Why can't right whales hear ships and get out of the way?

AK: It's a good question to which we don't have an answer yet. We know they hear some boat noise, but we have also seen instances where a whale is asleep at the surface and a

large ship goes by that you might assume would wake it up, but it doesn't. So there is something mysterious going on there. If a whale doesn't wake up it's a problem—or if it wakes up and swims in front of a ship it's even worse.

MB: To give you a sense of what these big vessels are like, if one is cruising along at 15 knots, it would take three miles to stop. We have to treat the whales as a navigational hazard, with boats planning way ahead of time. A 1,000-foot-long ship coming out of Saint John, New Brunswick cannot slalom around right whales.

What actually happens to the whales when they get hit?

AK: Sometimes the blunt trauma is enough to knock them unconscious and they drown. There was one female whose death was witnessed in the Bay of Fundy; she must have been bled out internally because she went into huge death throes, thrashing around and then just rolled over on her side, dead. We have seen carcasses with a series of propeller cuts that killed the animal instantly. There was another animal in Cape Cod who had been struck probably 10 days prior to the time she died; it appeared she died of septicemia, an infection.

There is a lot of effort to document every right whale death. If we find a carcass, the National Marine Fisheries Service has mandated that it gets towed ashore. The aquarium has a contract through the fisheries service to respond to all right whale mortalities. We'll do the necropsy, and sometimes we'll see no external evidence of the strike. But as we flense down to the bone through the muscle, we'll see evidence of bruising and broken bones.

MB: The best you can hope for is that a whale struck by a ship has its spine broken and dies instantly. I think a lot of these animals suffer.

Where are the most important habitats for right whales?

AK: Three areas in U.S. waters are designated critical habitats under the Endangered Species Act. First is a stretch from Georgia Bight down to midcoast Florida; this is the only known calving grounds for northern right whales. The whales also migrate north along the coast to get into Cape Cod Bay and the Great South Channel—the other two ESA designated habitats. Also, in the mid-Atlantic migratory corridor, we see a high number of ship strikes; this is an area that needs protection, too.

MB: In Canadian waters the two most important habitats are the Bay of Fundy and Roseway Basin, an area south of Nova Scotia.

AK: We do have right whales in Cape Cod Bay in the winter. But even if you tally all the whales there and in the southeast U.S. in the winter, we are still missing better than 60% of the whales in the wintertime. We do not know where they go.

Earlier, you used the metaphor of a street to describe shipping lanes. On land, roads cause habitat fragmentation. How comparable are shipping lanes to roads?

MB: Unlike paved roads, shipping lanes present no physical boundary. But, like roads, shipping lanes do have different levels of traffic density. Compare Interstate 89 up through Vermont versus I-95 through Connecticut. The shipping lanes in the Bay of Fundy are more like I-89: 1,000 ships a year, 2,000 transits, four to five ships a day. That's nowhere near the concentration of the very busy shipping areas like you find down in Florida.

Although there are no physical boundaries created by shipping lanes, we have been trying to learn if there are acoustic boundaries. There has been some interesting work done with other species. For example, bowhead whales have to migrate past oil rigs and icebreakers and deal with all kinds of in-the-water noise. These studies seem to show that—if the bowheads are heading for their feeding grounds—the animals swim right through the disturbed areas. This could be resulting in hearing loss for the animals. Right whales also do not appear to be displaced—at least based on 20 years of study, a relatively short period of time in terms of whale years—from a habitat because of human-generated noise.

AK: I agree there hasn't been displacement—the whales aren't responding to the noise at all. This makes it *more* difficult to find a solution. The reality is that these animals are probably exposed to noise from ships constantly.

MB: If your computer is on right now, you probably don't hear it. But when you turn it off, you realize how much noise it makes. There's a similar ecological concern when dealing with habitat disturbance. A colleague at Cornell has made the analogy that for whales swimming off the coast of California, it's like being at a rock concert 24 hours a day. We don't know how that affects reproduction, day-to-day activities, communication. It does seem clear that one of the biggest steps the shipping industry could take over the next few decades for all marine life is to make quieter ships.

AK: All ship traffic in the Bay of Fundy was closed for several days after the September 11th disasters. The teams that went out to make recordings said it was eerily quiet, and the right whale sounds were amazing.

MB: I was out on the boats those days. We had a hydrophone in the water and we were hearing echoes from right whale calls in the 100-hertz range, which are normally all blanked out. If these are usually blanked out from ship noise, the whales must have a more difficult time discerning calls at a lower frequency—this must be a form of habitat disturbance.

Amy, what needs to happen to improve protections for right whales in U.S. waters?

AK: In the southeast U.S. there is a different set of problems than we face in the Bay of Fundy, where we have been able to move the shipping lanes around the whale aggregations. In the Southeast there is nowhere else for these ships to go; they have to come into port and pass right through the high-use areas—and there is a lot more traffic into these ports.

Bruce Russell and I co-authored a series of recommendations that are now being reviewed by an internal National Marine Fisheries Service working group ["Recommended Measures to Reduce Ship Strikes of North Atlantic Right Whales" available at www.nero.nmfs.gov/whaletrp/]. The thorniest recommendation—that a lot of people in industry and the government have issue with—is about speed.

Anywhere from 10–13 knots is considered a suitable speed reduction to provide better protection for right whales. But that is not based on a lot of hard science. There is an anecdotal paper I co-authored with a colleague on ship strikes from around the world of all large whale species. We had 54 incidents where the vessel speed and size was known. We learned that under 13 knots most of the incidents were not fatal or even very serious. But once ships, especially the bigger vessels, got over 13 knots we started seeing more lethal impacts.

A big question is: how do right whales respond to an incoming ship? If they do respond—and I believe that the whales do respond, at some point—then going 10 knots will give the whales a better chance to get out of the way than if the ship is going 22 knots. There is a perception among mariners that reduced speed would help the whales—but they don't want to admit that, because that would have huge implications for their industry.

What are these implications? Why is it so hard for the mariners to slow down a little bit?

AK: It's mostly about time. Time is so critical for these large ships; if they lose three hours, they might not get from one port to the next before the tide becomes too low to get into that port. Then they lose a whole tidal cycle and a lot of money.

Amy, your report suggests that the verdict is still out on new technologies, sonar, etc., to give ships more warning of whales. Is there promise there?

AK: The industry keeps hoping for a technological fix, so that they don't have to change the way they do business. They ask, "Why can't you radio tag each whale so we always know where every animal is? We'd gladly go around them if we knew where they were." But it is just not a feasible option. Not only is it too expensive, but also the right whales treat the tags like a splinter and the tag is out of there in a couple of months. Routing and speed have been identified as the only two presently viable solutions.

What are the keys to your success as conservationists?

MB: We've been out there collecting the data, we've gotten seasick, we've spent hours pouring over photographs, matching animals, entering the data. (Amy even fell out of the sky one year in a survey airplane and had to sit in the water waiting for someone to pick her up.) We started out as volunteer interns, and we became lifers. We are into this right whale project for the rest of our working lives—and probably beyond because we won't be able to afford to retire! That brings a deeper understanding about these animals and passion about the issues.

When you imagine a best-case scenario—in terms of management protocols and the status of the whales, in the real world—say 20 years out, what do you see?

AK: If in the U.S. we could implement all the recommendations in that report, I feel like right whales might have a chance. If we could also strengthen regulations about fishing gear entanglements the animals would have a fighting chance. But it is going to require a real change in how mariners use the ocean. In the past they haven't had to consider an issue like this. It's a change in how they practice their living. We can succeed if we can get them to understand that nobody wants to put them out of business; we just want to change things enough that ships and whales can coexist.

MB: We've got a lot of work to do; it is going to take another 10 or 20 years to protect the other critical habitats. It's a long-term investment in a long-lived species.

AK: But time is of the essence as well. There is population modeling that shows that, if we don't reduce the human-caused mortality, northern right whales might go extinct in 200 years. We're reaching that fine line where there might be no hope for these animals. We need public support for these whales. ☾