

North Atlantic Right Whales at the Crossroads between Health and Extinction

I am on a fishing boat on the Fundy side of Nova Scotia waiting for the chance to see a North Atlantic Right Whale. The wait is exhilarating, the ocean a calming layer of blue rolling beneath my stationary feet. The only sounds are the water gently sloshing against the boat and the cold breaths of the anxious whale watchers beside me. I scan the ocean for the wonderful mixture of textures of the North Atlantic Right Whale, searching the ocean for their smooth rotund bodies, their paired blowholes, and their heads covered in white callosities (National Audubon Society, 2002). My hands become clammy, and I resist the urge to jump in the water, put on a pair of goggles, and search for the right whales myself. They are the quintessential whale: beautiful giants of the ocean feeding on copepods, “filtering their prey through their finely meshed baleen” (National Audubon Society, 2002). Even though I searched the ocean that day, I did not get the chance to see this endangered species in their natural habitat. I might never have the chance, if conservation efforts are not increased as the population is only 300-350 individuals down from the 50,000 strong individuals before whaling (Anderson, 2013; Swink, 2003).

One might ask why an effort should be made to conserve the North Atlantic Right Whale population, given that losing species is a natural part of the evolution of the planet (US Fish and Wildlife Service, 2005). The answer is simple; the overall rate in which we are losing species is larger than is sustainable for our earth’s ecosystems (US Fish and Wildlife Service, 2005). North Atlantic Right Whales are extremely unique in terms of their body structure in comparison with other baleen whales; their large bodies, large heads, white callosities, and lack of a dorsal fin

differentiate them from all other baleen whales in the Eastern United States and Eastern Canada region (National Audubon Society, 2002). The world simply cannot afford to lose such an extraordinary organism that is so breathtaking in its majesty and its grace.

Although it is important to conserve the North Atlantic Right Whale population, it is equally important to conserve all other species, as each plays a vital role in the ecosystem in which they live (US Fish and Wildlife Service, 2005). By disturbing the delicate balance between organisms we are changing the entire functioning of the ecosystem, which brings a myriad of harmful consequences (US Fish and Wildlife Service, 2005). Although it is not completely known what effects a decreasing population of right whales will have on the ecosystem, it has been determined that right whales are important for maintaining the levels of copepods in their habitat as they feed at a “lower trophic level than most rorquals” (Estes et al., 2006). Losing the right whale population would increase the quantity of copepods in the Bay of Fundy and along the coast of Maine, causing potential problems. One such problem is decrease in the increased population of right whale that increases the overall rivalry among species (Estes et al., 2006). In addition, the resurgence of herring and mackerel that eat similar species of copepods in the Gulf of Maine could be a “limiting factor in the right whale population in terms of food competition”, which means that right whales will not have enough food to eat (Estes et al., 2006). We have created unnatural difficulty for right whales through commercial fishing, shipping lanes, and pollution, and we must clean up the mess we have created in our environment. These animals are helpless to the changes we inflict upon them, so it is up to us to help them thrive in our perilous world.

The detrimental effects of our modernization of the ocean on the North Atlantic Right Whales stem from our historic persecution of the species. Whales were slaughtered by ruthless whaling practices or inadvertently killed through our world's fast paced modernization (Anderson, 2013). These "urban whales" live in a toxic and dangerous ocean, where fishing lines pierce their skin and ships kill them with their metal hulls and spinning propellers (Anderson, 2013). The population is in a dire situation and is even more in danger than previously thought (Greene and Pershing, 2004). They are one of the most highly endangered whales on the planet with the rate of whale mortality outpacing the rate of calves being born (Greene and Pershing, 2004; Cornell Lab of Ornithology, 2013). They were the "right" whale to kill for whalers (hence their name); they stayed near the surface, were rich in blubber, and remained buoyant after they were killed (Anderson, 2013). The right whale population dwindled to only 12-24 members, and though conservation efforts have helped marginally to bring the right whale numbers up, the number of individual whales is not enough to sustain a healthy population (Anderson, 2013). Entanglement in fishing nets, ship strikes, and climate variability are the largest challenges preventing North Atlantic Right Whales from reaching population stability (Greene and Pershing, 2004).

North Atlantic Right Whales live in a range along the coast of the United States and Canada from their warm, subtropical calving grounds of the Southeastern United States where they are found in the winter to the cold sub-polar regions of eastern Canada where they stay during the summer (National Audubon Society, 2002). North Atlantic Right Whales live close to shore, and their main habitat is in a shipping lane of profound economic importance to both the Eastern United States and Eastern Canada (Greene and Pershing, 2004). As a result, fishing gear

entanglements and ship strikes are major causes of mortality in the population (Baumgartner and Wenzel, 2011). North Atlantic North Atlantic Right Whales do not have “a natural aversion to ships” and, as such, do not swim away when ships are heard in the distance making them susceptible to ship strikes (Cornell Lab of Ornithology, 2013). Similarly North Atlantic Right Whales are easily caught in fishing lines because their forward vision is limited and their style of skimming the water for prey and filtering through their baleen allows lines to be easily caught in their baleen (Murison, 2002). In addition, North Atlantic Right Whales roll when they are entangled, trapping them further as the line wraps around more of their bodies (Murison, 2002). North Atlantic Right Whales are caught in particular in “American lobster, northeast multispecies, monkfish, and spiny dogfish fisheries” traps (Leutwiler, 2011). “Ship strikes are more immediately lethal to North Atlantic Right Whales but entanglements result in long term deterioration of an animal and may be responsible for higher levels of mortality than previously thought” (Knowlton and Kraus, 2001). Fifty six percent of the entanglements for North Atlantic Right Whales involved buoy lines (Johnston et al., 2005). In general, any line that rises into the water column poses a considerable threat to North Atlantic Right Whales (Johnston et al., 2005). As such, conservation efforts have to balance the needs of the whales with the needs of the shipping companies and the commercial fishing industry, an increasingly difficult feat.

A high female mortality rate from entanglement in fishing lines and collisions with ships was deemed to have been the major factor decreasing the efficacy of conservation efforts; however, research has identified climate variability as another prominent threat (Greene and Pershing, 2004). The effects of climate variability have a large impact on the reproductive rates of female North Atlantic Right Whales and, subsequently, have a considerable effect on

population growth. Northern North Atlantic Right Whales now only have a calf once every 5+ years, which, coupled with increasing mortality, is disastrous for the future of the species (Estes et al., 2006). The calving rate for North Atlantic Right Whales is 1/3 of what it needs to be and half of the reproductive rate of the healthy population of Southern Right Whales (Moore, 2004; Estes et al., 2006). Climate variability has caused significant drops in right whale reproductive rates which are more substantial than spikes in reproductive rates that might occur (Greene and Pershing, 2004). North Atlantic Right Whales typically eat a species of copepods called *Calanus finmarchius*, which thrive in slightly higher ocean temperatures. When the climate fluctuates, whales are unable to find enough food and recover slowly from any changes in temperature (Greene and Pershing, 2004). In periods where there was a relatively high abundance of *Calanus*, right whale reproductive rates were stable, as reproductive rates are linked to a right whales' ability to feed (Greene and Pershing, 2004). North Atlantic Right Whales need an appropriate copepod density in order to feed properly, which might not exist in increasing variable climates (Estes et al., 2006; Greene and Pershing, 2004). Today the climate is increasingly variable due to rising greenhouse gas emissions which could be detrimental to right whale recovery (Greene and Pershing 2004). In this case, saving 2-3 females per year will not be enough to sustain the health of the population (Greene and Pershing, 2004).

The dire situation of North Atlantic North Atlantic Right Whales is disheartening, and one might not have much hope for the future. But I believe conservation efforts will reverse the population trend of the North Atlantic Right Whale if members of coastal communities, activists, and members of the commercial industry can work together to determine solutions for the problems plaguing North Atlantic Right Whales. Currently, "The Right Whale Buoy Project," a

project of the Woods Hole Oceanographic Institution (WHOI, 2009) and Cornell University, is an example of effective communication between right whale advocates and the company Excelerate Energy (WHOI, 2009). Excelerate Energy wished to build a deep-water port off the coast of Boston to make liquefied gas. This proposed port was to be situated right in the heart of right whale habitat, adding even more ships into a congested shipping lane (WHOI, 2009). The Right Whale Buoy project was formed as a solution to the problem and has proven effective in reducing ship strikes with North Atlantic Right Whales (WHOI, 2009). WHOI and Cornell University have created a buoy with an underwater microphone that can detect North Atlantic Right Whales and communicate their location within the shipping lane (WHOI, 2009). In addition, this technology is now being applied around the world to prevent ship strikes with whales by combining buoy technology with AIS (air-traffic control for boats to prevent collisions with other ships) so that more boats are made aware of the presence of North Atlantic Right Whales and other endangered whales in busy commercial waters (WHOI, 2009). A new iPad/iPhone app called Whale Alert uses the buoy technology to provide more ships with real time information about right whales (NOAA, 2012).

Current regulations like The Whale Ship Strike Reduction Rule, a rule that calls for “ships to slow to speeds of 10 knots or less in Seasonal Management Areas where North Atlantic Right Whales are likely to be present”, provide hope that the United States government can work with biologists to improve conservation efforts (NOAA Fisheries Service, 2009). Fines from \$16,400-\$49,500 have been introduced to discourage boats from breaking the Whale Ship Strike Reduction Rule (Leutwiler, 2010). Other measures such as the shift of a shipping lane about four nautical miles east of the original shipping lane in the Bay of Fundy reduced the amount of ship

strikes with whales in this crucial right whale habitat (Swink, 2003). It was not an easy feat to move the shipping lane as it is an international shipping lane and required cooperation from the Canadian and U.S. governments as well as many commercial oil and fishing companies (Swink, 2003). Effective communication between biologists, activists, and commercial organizations as well as the government is imperative for the long-term survival of the species.

Research currently being conducted by Mark Baumgartner and Fred Wenzel is revealing how North Atlantic Right Whales interact with the water column and determining exactly what conditions are favorable to the growth of the thin layers of copepods that the whales prefer to eat (2011). This will provide information that can be used to prevent entanglements, by determining how the whales feed and the fishing traps that would come in the least contact with the whales (Baumgartner and Wenzel, 2011). The use of sinking or neutrally buoyant groundlines could reduce the risk of entanglement, and Baumgartner and Wenzel's research can tell conservationists whether right whales feed near groundlines and determine the effectiveness of using sinking or neutrally buoyant groundlines as the type of fishing gear that poses the least harm to right whales (2011). Standardized color coding fishing gear can more accurately determine the types of fishing gear that provide the most risk to whales (Johnston et al., 2005). Current technologies are vastly improving our ability to locate and catalogue North Atlantic Right Whales so the issues affecting the population can be better understood (Cornell Lab of Ornithology, 2013). The work of the many researchers and lawyers working to save the North Atlantic Right Whales through policy and new technologies gives me hope for the future of North Atlantic Right Whales.

Someday I hope I will get the chance to see a right whale. I know that if the many advocates working for North Atlantic Right Whales are listened to, I will finally get to live that dream of mine. If all members of the community can work together and implement solutions that might be economically and commercially difficult at first, but will provide extreme conservation benefits in the long run, it will allow us to all rest in peace knowing that our efforts have saved a majestic species of cultural and natural importance (Moore, 2004).

When I think of North Atlantic Right Whales, I see a species who has continued to survive despite the odds stacked against them, a species that, in the 1980s, surprised scientists by surviving--likening their appearance in the Bay of Fundy to finding a “brontosaurus in the backyard” (Kraus and Rolland, 2010). When the whalers were finished with them, the population was only 12-24 individuals (Anderson, 2013). Even today the population is still surviving. This provides hope that these majestic wonders of the natural world will become healthy again only with our help.

*You are the right whale to kill,
but somehow you don't feel that way.
You are not a statistic.
You can navigate through the boats,
jostle your tail out of fishing nets.
You can survive.
You will survive.
And we will be there to help you.
You feel beautiful frolicking in the ocean
feeling the sun beating yellow
on your dark black skin.*

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