

North Atlantic right whales have gotten smaller since the 1980s

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A North Atlantic right whale feeding in Cape Cod Bay. Right whales feed on dense patches of copepods in the Gulf of Maine every summer. Changing ocean conditions that affect prey availability could also be playing a role in the decreasing body lengths of North Atlantic right whales. Credit: Michael Moore and Carolyn Miller (WHOI), authorized by NMFS research permit #21371.

Whales are largely protected from direct catch, but many populations' numbers still remain far below what they once were. A study published in the journal *Current Biology* on June 3 suggests that, in addition to smaller population sizes, those whales that survive are struggling. As evidence, they find that right whales living in the North Atlantic today are significantly shorter than those born 30 to 40 years ago.

"On average, a whale born today is expected to reach a total length about a meter shorter than a whale born in 1980," said Joshua Stewart of the National Oceanic and Atmospheric Administration (NOAA) in La Jolla, CA. That represents an average decline in length of about 7%. "But that's just the average—there are also some extreme cases where young [whales](#) are several meters shorter than expected.

"Major impacts on life history like this have been documented in heavily exploited commercial species, especially fishes, but to our knowledge this is the first time these kinds of impacts are being recorded in a large mammal," he added.

In the new study, Stewart and his colleagues from NOAA, the New England Aquarium, Oregon State University, and Woods Hole Oceanographic Institution wanted to document the challenges faced by [right whales](#) as indicated by changes in their life history characteristics, including size. Using aerial photogrammetry measurements collected from crewed aircraft and remotely operated drones over a 20-year period, they looked for any changes in the body lengths of right whales.



A North Atlantic right whale in Cape Cod Bay. Severe scarring around the fluke indicates a significant previous entanglement. Credit: Michael Moore and Carolyn Miller (WHOI), authorized by NMFS research permit #21371.

"We were able to build on our previous work that used conventional aircraft in the early 2000s by adopting new drone technology to extend the time series in recent years," said John Durban at Oregon State University (formerly with NOAA). "In both cases, we were able to measure whales by flying a camera high above them, essentially giving them a health check without them knowing we were there."

The whales were an ideal case study because they've been monitored consistently since the 1980s, with individual-level information on age and size and detailed records of attached-gear entanglements. This

intensive monitoring made it possible to begin to evaluate the effects that severe and prolonged entanglements may have on the long-term fitness of individuals, as well as the potential effects of other stressors such as vessel noise, ship strikes, and shifting prey availability.

"Fishing gear entanglements in this population are unfortunately fairly common, and entanglements resulting in attached gear and severe injuries have been generally increasing over the past several decades," Stewart said. "Previous studies have shown that the increased drag from entangling gear requires right whales to spend a lot of extra energy just to go about their normal activities, and that is energy they might otherwise spend on growth or reproduction. In some cases, entanglements can be lethal, but it turns out that even sub-lethal entanglements can have lasting impacts on right whales."

Their data show that these serious entanglements in fishing gear are one stressor associated with shorter whales. They suggest that the stunted growth may lead to reduced reproductive success and a greater likelihood of life-threatening gear entanglements. The findings in right whales may have implications for other species of large whales around the world.



A North Atlantic right whale in Cape Cod Bay. The callosity patterns on each whale's head are unique and allow for identification, along with tracking of impacts such as entanglements and vessel strikes, reproductive histories, and ages of individual whales. Credit: John Durban (NOAA) and Holly Fearnbach (SR3), authorized by NMFS research permit #17355.

"The smaller you are, the less energetic reserves you have, and the harder it might be to survive a serious entanglement or sustained food shortage," Stewart explained. "So it's possible that these [life history](#) changes could translate into population viability impacts. But this really makes me wonder about how large whales worldwide are being impacted by entanglements. This is by no means a problem unique to right whales—entanglements are a major threat for whales, marine mammals, and other marine species worldwide.

"Because North Atlantic right whales have this incredibly detailed dataset with known ages, sizes, entanglement histories, and so forth, we could directly examine how these impacts are affecting growth rates," Stewart continued. "My guess is that many other species are being similarly affected, but we just don't have the ability to detect it in less well-studied populations."

Based on the findings, the researchers call for stronger management actions to reduce the impacts of fishing gear and vessel operations.

"Implementing proven solutions such as reduced vessel speeds, lower breaking strength ropes, and ropeless fishing gear more broadly throughout their range are critical and urgent steps needed to stave off the extinction of this species," said study co-author Amy Knowlton, New England Aquarium, Boston.

In future studies, the researchers plan to explore whether shorter female whales do indeed have fewer offspring. They'll also continue to use photogrammetry monitoring of the whale's growth and body condition to document any further changes over time. The hope is that those data can detect problems as well as any benefits of management actions in order to facilitate effective whale conservation.

More information: *Current Biology*, Stewart et al.: "Decreasing body lengths in North Atlantic right whales" [www.cell.com/current-biology/full-0960-9822\(21\)00614-X](http://www.cell.com/current-biology/full-0960-9822(21)00614-X) , DOI: [10.1016/j.cub.2021.04.067](https://doi.org/10.1016/j.cub.2021.04.067)

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