

SC/68A/NH/06

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INTERNATIONAL
WHALING COMMISSION

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The North Atlantic right whale is listed as endangered under the U.S. Endangered Species Act and is a depleted stock under the U.S. Marine Mammal Protection Act. Both statutes direct NOAA's National Marine Fisheries Service (NOAA Fisheries) to recover and conserve the North Atlantic right whale. The two primary threats to North Atlantic right whale recovery are entanglement in fishing gear and vessel strikes. NOAA Fisheries has undertaken and continues to take various efforts to address these threats by reducing the risk of entanglements and ship strikes. Below we describe efforts to evaluate the effectiveness of previous measures, assess health, reduce entanglements, and reduce ship strikes.

Evaluating Effectiveness of U.S. Management Efforts

NOAA Fisheries convened an expert working group in Woods Hole, Massachusetts, May 21-23, 2018, to gather input on how NMFS should evaluate the effectiveness of U.S. management measures for reducing ship strikes and entanglements of North Atlantic right whales. The primary purpose of the meeting was to: (1) review available data sets and analyses (for both the U.S. and Canada) on the rates and types of entanglements and vessel strikes with right whales to better understand their potential impact on population dynamics, and (2) identify potential methods/analytical tools (and associated pros/cons) available to address the key questions.

Specific key questions:

- Have there been changes in the effects of human-caused mortality and injury on right whale population dynamics during the last 10 years as a result of U.S. management measures?
- How are threats outside U.S. waters influencing population dynamics?
- What are the best analytical tools (and the data needed to inform such tools) to evaluate potential future management efforts?

The workshop participants discussed the analyses (e.g., spatio-temporal overlap) that have been conducted by both the U.S. and Canada to evaluate the effectiveness of the ship strike reduction measures, including ship speed requirements and changes to shipping routes. The panel members did not identify additional data beyond what is currently available to inform the analyses. Discussion primarily focused on updating the existing analyses, with several identified options for refinements and new analyses.

For evaluating entanglement risk and assessing measures to reduce that risk, the workshop discussions focused on currently available data to evaluate the effectiveness of fishing gear requirements and the limited analyses conducted in both the U.S. and Canada. Panel members noted that the lack of data on fishing effort substantially limits our ability to assess the effectiveness of mitigation measures. Despite the lack of data, the panel members identified several additional analyses that could be conducted to inform effectiveness. The panel members further discussed and provided input on existing analyses and identified future analyses to evaluate effectiveness of ship strike and entanglement mitigation measures. This generated substantial discussion, with multiple ideas identified for both topics. For more information, please see the workshop summary (submitted as a For Info Paper).

Health Assessment Workshop

NOAA Fisheries is convening a workshop June 24-26, 2019 to improve our knowledge of North Atlantic right whale health to advance recovery by better understanding drivers and contributing factors to health trends. The workshop objective is to review existing health assessment protocols and health data collected from right whales (including exploration of new technologies and techniques) to aid in informing future population management (survival and fecundity) and scientific research to support recovery. This expert workshop will be held under the auspices of the Working Group on Marine Mammal Unusual Mortality Events.

Specifically, the workshop will explore current assessment technologies, standardized protocols, data sharing, and how they contribute to health information especially regarding survival and fecundity (strengths and weaknesses; can include information from other mysticete species or small cetaceans). This will include:

- a. Visual Health Assessments, including photographic and in-situ data collection (respiration rate, character, etc.);
- b. Photogrammetry;
- c. Non-invasive sampling (fecal collection, breath collection, sloughed skin, etc.);
- d. Invasive sampling (biopsy collection, tagging, etc.); and
- e. Necropsy collection and data.

Additionally we aim to prioritize and provide recommendations on standardizing and improving current health assessment data, technologies and techniques (including validate/develop new technologies), to provide health information for future population management (survival and fecundity) and research activities.

Lastly, the workshop participants will develop an outline (using the above recommendations) for a longer-term science plan and/or strategic plan for the best means (e.g., approaches, techniques, data types, platforms) to monitor individual health, inform population health, and identify the population consequences of multiple stressors, including the connection between human activities (e.g., entanglement) and health.

Reducing Entanglements in Fishing Gear

Atlantic Large Whale Take Reduction Team

The U.S. Marine Mammal Protection Act (MMPA) specifies that NOAA Fisheries develop and implement Take Reduction Plans to prevent the depletion and assist in the recovery of certain marine mammal stocks that are killed or seriously injured in commercial fisheries. NOAA Fisheries convenes Take Reduction Teams, composed of stakeholders, that make recommendations for reducing mortalities and serious injuries to acceptable levels. The Teams design each Plan to reduce mortality and serious injury within a specific timeframe through a combination of voluntary and regulatory measures implemented by NOAA Fisheries.

The Atlantic Large Whale Take Reduction Team, and the associated Plan, addresses North Atlantic right, humpback, and fin whales incidentally killed or seriously injured in trap/pot and gillnet fisheries along the U.S. East Coast. Although it's been in existence since 1997, the Atlantic Large Whale Take Reduction Plan has not consistently reduced mortalities and serious injuries below each stock's potential biological removal level.

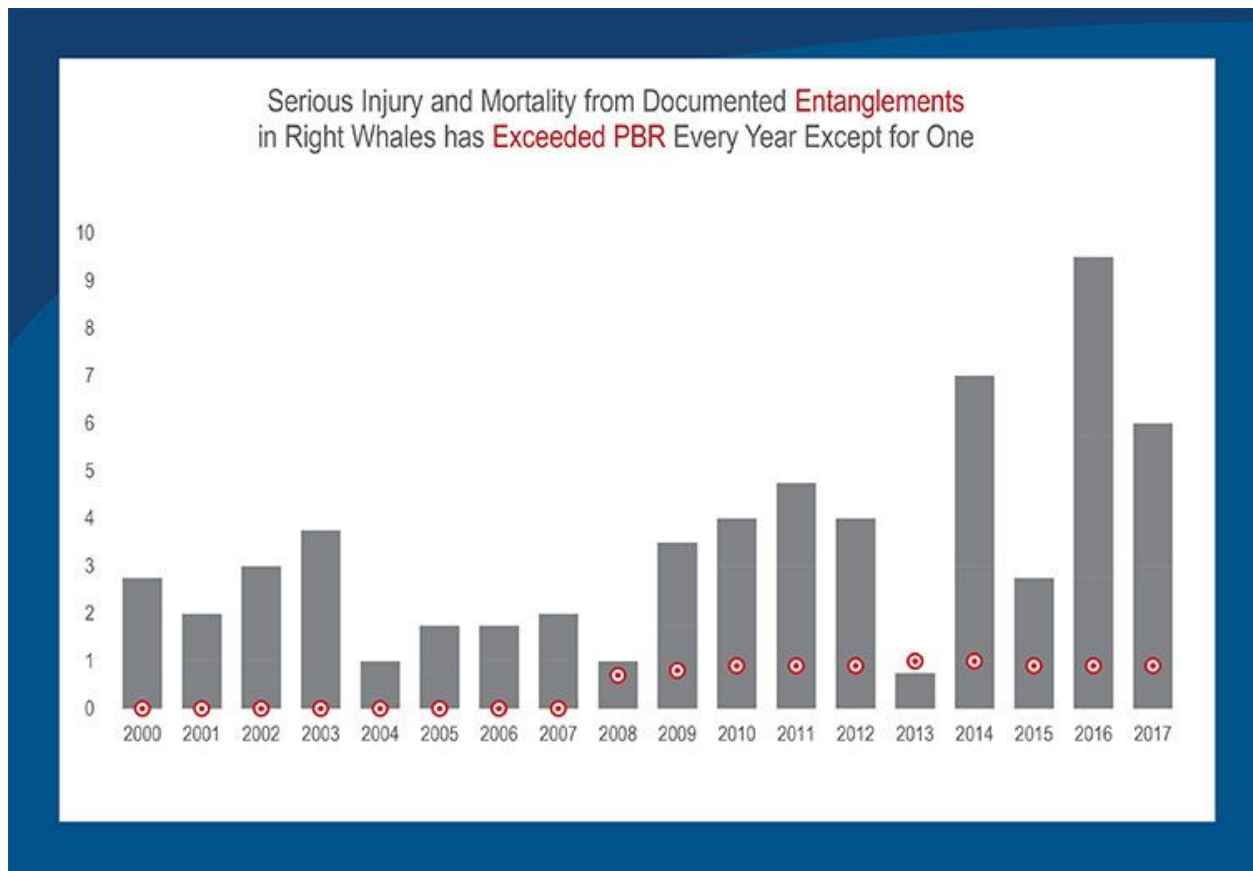


Figure 1. Serious injuries and mortalities from documented right whale entanglements compared to the stock's potential biological removal (PBR) level .

Given the recently observed decline in North Atlantic right whales, NOAA Fisheries reconvened the Team in both October 2018 and April 2019 to develop consensus recommendations to further reduce entanglement risk in trap/pot fisheries. The Team is composed of approximately 60 fishermen, scientists, conservationists, and state and federal officials. After intense discussions throughout recent meeting, the Team reached near unanimous consensus on a package of measures that would achieve an estimated 60% reduction in mortality and serious injury in each of the three U.S. lobster fishery management areas. Two general risk reduction approaches emerged as the Team's preferred options: line reduction and gear modification.

The measures in the recommendations package include reductions in vertical buoy lines as well as gear modifications to reduce the strength at which lines will break. Reduced breaking strength lines (1,700-lb equivalent) would allow entangled whales to more easily break free of gear. Additionally, most Team members supported expanding gear marking to create larger and more frequent marks on U.S. trap/pot fishery buoy lines throughout U.S. East Coast waters. This expansion should improve the ability of large whale scientists and managers to better determine the source of gear seen on or retrieved from endangered large whales.

NOAA Fisheries will now use these recommendations to develop a regulation to require the reduction in buoy lines and use of weak rope.

Reducing Vessel Strikes

The U.S. employs a suite of measures aimed at reducing vessel interactions with North Atlantic right whales. The primary actions include the following:

1.) All vessels 65 feet (19.8 meters) or longer must travel at 10 knots or less in designated Seasonal Management Areas (SMAs) along the U.S. east coast at certain times of the year. The purpose of this regulation is to reduce the likelihood of deaths and serious injuries to these endangered whales that result from collisions with ships.

2.) If groups of 3 or more right whales are spotted outside an active SMA NOAA Fisheries will establish a voluntary 15-day Dynamic Management Area (DMA) and request vessels (> 65 feet in length) transiting the DMA to reduce their speed to 10 knots or avoid the area. This measure is intended to provide additional protection for aggregations of right whales that occur outside of active SMAs.

3.) In 2007 and 2009, the shipping lanes approaching Boston Harbor were moved to protect seasonal aggregations of whales foraging in Stellwagen Bank National Marine Sanctuary. This permanent change was intended to provide a long-term reduction in vessel strike risk in the Boston approaches.

4.) In 2009 NOAA established, with endorsement by the International Maritime Organization, an Area to be Avoided in the Great South Channel Area off of Massachusetts. This voluntary management area encompasses ~1,000 nm² and is in effect when right whale occurrence and density in the area is highest.

4.) The state of Massachusetts enacted a new rule this year requiring vessels smaller than 65 feet (19.8m) in length to reduce their speed to 10 knots during the months of March and

April when transiting Cape Cod Bay. This state regulation overlaps with a federal SMA in Cape Cod Bay for vessels greater than 65 feet (19.8m) in length and was designed to provide a comprehensive reduction in vessel collisions in an area known for exceptionally large seasonal aggregations of North Atlantic right whales.

5.) Mariners are alerted in near real time to the presence of North Atlantic right whales through several programs including the Mandatory Ship Reporting System, Notices to Mariners and emails to interested parties. These efforts are intended to provide mariners with the most up to date information on the location of North Atlantic right whales in an effort to further reduce vessel collisions.

NOAA Fisheries is currently undertaking a review of the vessel speed rule, which will include assessments of biological effectiveness, compliance, economic impacts, and navigational safety impacts of the rule. The report will be made available for public comment.

U.S. Recovery Plan Implementation Teams

The U.S. Endangered Species Act (ESA) authorizes NOAA Fisheries to appoint recovery teams to assist with the development and implementation of recovery plans. NOAA Fisheries has convened two implementation teams (Northeast and Southeast) to assist with the North Atlantic Right Whale Recovery Plan. Both teams assist NOAA Fisheries on issues related to the status and conservation of right whales. The objectives are:

- Coordinate and effect recovery plan implementation in Southeast U.S. while making efficient use of available resources via recommendations to NOAA Fisheries.
- Involve stakeholders in implementation of the recovery plan.
- Promote creative solutions.
- Monitor effectiveness of recovery plan implementation and adapt accordingly.
- Identify and prioritize information needs that can be best addressed through enhanced partnerships.

Issues related to right whale interactions with commercial fisheries are addressed under the Atlantic Large Whale Take Reduction Team process.

Recently, in the Southeast U.S., the SEIT developed a 5-year action plan. The plan includes those recovery tasks that we should focus on for the next 5 years and can be implemented by NOAA Fisheries and our partners. Recently, the SEIT and other partners have provided many years of Southeast U.S. right whale aerial survey data to Duke University so the data could be included in a habitat-based cetacean density model for the U.S. Atlantic. These models are used by U.S. federal agencies evaluating the effects of proposed projects (e.g., oil and gas exploration, wind energy, etc.) on marine mammals.

In the Northeast U.S., the NEIT was newly reconvened in 2018 and has made important progress to identify recovery tasks that we should focus on for the next 5 years and can be implemented by NOAA Fisheries and our partners. Priorities considered included those previously identified (e.g., Recovery Plan, Five-Year Review, SEIT) in order to consider these

other important efforts. The NEIT's next steps will include a deep-dive into identified priorities and associated implementation discussions.

The NEIT and SEIT combine to form a U.S. Right Whale Implementation Team to coordinate on coastwide issues. NMFS plans on convening the full U.S. Implementation Team in 2019. Both teams work independently on regional issues, but will coordinate on issues to address coast wide specific issues, such as the Population Evaluation Tool (PET) Subgroup.

The objective of the PET Subgroup is to develop a population viability analysis or other assessment tool that will allow the agency to characterize the North Atlantic right whale extinction risk, taking into account current and future threats, and will allow inquiry into how much improvement to present-day mortality and reproduction schedules is needed to improve population trajectories. This analysis will be useful to help identify benchmarks based on population status, which would inform management as well as any gaps in research. The PET Subgroup plans to develop a population evaluation tool that will include estimates of extinction probability under status quo conditions and other potential scenarios by spring of 2020.

Partnerships are critical to right whale recovery and the implementation teams help further these partnerships. For example, important transboundary collaborations occur through the recovery teams with Canada's Department of Fisheries and Oceans involvement in the NEIT (and therefore coastwide team) and PET Subgroup.

Transboundary Collaboration on North Atlantic Right Whale Recovery

In response to the increase in observed right whale mortalities in both U.S. and Canadian waters in 2017, NOAA Fisheries, Fisheries and Oceans Canada (DFO), and Transport Canada (TC) established a U.S./Canada Bilateral Right Whale Working Group. The Working Group was created to share lessons learned and to explore future collaborations on both right whale research and management.

The Working Group has subsequently met several times to review past management practices to prevent both entanglements and ship strikes and also to coordinate the development of future measures. The Working Group has aligned scientific research across borders, including the sharing of methods and data on aerial surveys and passive acoustic monitoring. The Working Group has also shared data and methods on the analysis of recovered entangling gear to attribute to specific fisheries and cooperated on best practices for at-sea disentanglement of right whales.