Forming Practical Policy Solutions to the North Atlantic Right Whale Crisis

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Abstract

North Atlantic right whales are the most critically endangered population of large baleen whales in existence; extinction is predicted in less than 200 years. Today the two biggest threats to North Atlantic right whales are anthropogenic: entanglements in commercial fishing gear and strikes by large vessels. U.S. and Canadian policy focus on mitigating these two threats to protect the species and promote recovery of the population. A comprehensive understanding of North Atlantic right whale recovery dynamics includes a reliable model of the population, an understanding of where entanglements are strikes are likely to occur, and solutions for reducing the probabilities of such event to allow for population recovery.

Virtual Population Analysis (VPA) is a traditional fishery model which considers "catch" per year within each stage class to calculate the population backward and forward in time. For whales catch is replaced with entanglement and strike deaths. By manipulating these two factors in the model we can see how the population may look today if not for these two factors and how the population might look in the future under varying degrees of strike and entanglement pressures. Implementing another method, Population Viability Analysis (PVA), I propose to identify the stage classes most critical for conservation and population recovery and the biological and anthropogenic factors to which various stage classes are most sensitive. For example, PVA may reveal that the limiting factor to population recovery is vessel strike related mortality of reproductively mature female North Atlantic right whales.

Understanding where these sensitive stage classes occur in relative to areas of high strike and entanglement risk is critical in developing successful conservation policy. My research group has employed number-density estimates of geographic distributions of North Atlantic right whales and vessels along the east coast of North America, and calculated relative probabilities of vessel and whale encounters in three critical right whale habitats to determine the portion of each habitat with highest relative probability of an encounter. For one of the three habitat regions, the Great South Channel (GSC), we also provide two quantitative habitual vessel traffic pattern shift scenarios (A and B) that achieve substantial reductions in the probability of a vessel and whale encounter. We suggest that option A is preferable as it achieves a greater overall encounter probability reduction (36%) and is shorter than B (it is only 13% longer than the existing habitual traffic pattern). The methods employed in assessing encounter probabilities and the pattern-shifting of vessel-traffic can be applied to any geographic region for which vessel and whale data are available to support successful conservation of North Atlantic right whales and other endangered and threatened species.

Employing a similar method as described for vessel strikes, I propose to obtain locations of fishing gear which pose the greatest threat to North Atlantic right whales (fixed bottom gear) from vessel trip reports maintained by NMFS to quantitatively predict where entanglements are

likely to occur based on North Atlantic right whale distribution data and fishing gear locations. Spatial locations of fixed gear were presented at the 2006 Right Whale Consortium Meeting; however, to date they have not been analyzed quantitatively to determine the density of gear in specific locations and in relation to North Atlantic right whale distribution. Calculating the relative probabilities of gear and whales within regions will allow for similar proposed policy solutions to vessel strike mitigation in terms of potential seasonal (or annual) gear-relocation by identifying geographic areas with the highest risk of gear encounters for North Atlantic right whales. Further, a synthesis of these two pieces (strike and entanglement probabilities) will reveal the most dangerous areas for North Atlantic right whales in terms of combined threat of entanglement and strikes. Finally, tying together population modeling, strike probabilities, and entanglement probabilities will demonstrate how reducing strike and entanglement probabilities (and thus reducing the number of strikes and entanglements per year) may re-shape the VPA model to allow for recovery.