Virtual Population Analysis of North Atlantic Right Whales revisited

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Abstract

North Atlantic right whales are the most critically endangered population of large baleen whales in existence. Although this species was once abundant along the Atlantic coast of North America, whaling depressed the population to extremely low numbers by the end of the commercial whaling era. Despite a moratorium on commercial whaling since 1986, and protection of North Atlantic right whales by the International Whaling Commission Schedule since 1935, the population has failed to recover and 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.

Several attempts have been made to reconstruct the population back to these states using historical whaling data and genetic analyses. However, there is still a large degree of uncertainty surrounding these estimates. An accurate estimate of the pre and post whaling population size would allow for more reliable measures of population recovery. Specifically, right whale conservation policy is aimed at mitigating vessel strikes and entanglements, therefore an understanding of how these two factors affects population growth and potential recovery is essential for successful management.

Virtual population analysis is a fishery management tool used to reconstruct fish populations by cohort for the purpose of stock assessments It is considered the most efficient and reliable method for fishery stock assessments. To date virtual population analysis (VPA) has only been applied to one other cetacean population: minke whales. While this study yields some important insights into how a VPA for right whales may be created, the models are not exactly analogous because minke whales are being actively hunted. I manipulated the standard VPA model to reconstruct the population of North Atlantic right whales back to the period when commercial whaling for this species ended in 1935 using hypothetical data for the number of individuals alive in each cohort in year 2005 and best estimates for vessel strikes and entanglement deaths. I recently acquired catalogue and necropsy data from the North Atlantic Right Whale Consortium and will proceed to incorporate these data into the model. Eventually the final model will allow for projections about how population would look today if not for ship strikes and entanglements to reveal the impact these events have had on the population's recovery. Additionally, the VPA model can create future population projections and I aim to model the future North Atlantic right whale population under varying degrees of ship strikes and entanglements. This research will perhaps answer questions about the future directions of right whale policy including whether or not the population would significantly improve in the absence of ships strikes and entanglements and if recovery is a real possibility.