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Status of North Atlantic right whales: an update

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Status of North Atlantic right whales: an update

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North Atlantic right whales (*Eubalaena glacialis*) continue to decline in number (Pace *in press* 2021). The median total abundance during 2019 calculated from the posterior of a Bayesian, hierarchical state-space model was 368 (credible interval 389-430). Those model results continue to show a diverging sex ratio with an estimate of only 150 (142-156) females in the population during 2019 (Figure 1). As noted in Pace et al. (2017) the last estimate in the time series from this model is slightly biased low in expectation, however the continued downward trend in estimated abundance is well demonstrated. The species appears to have lost all of the nearly 3% per annum growth accrued from 2004 to 2010.

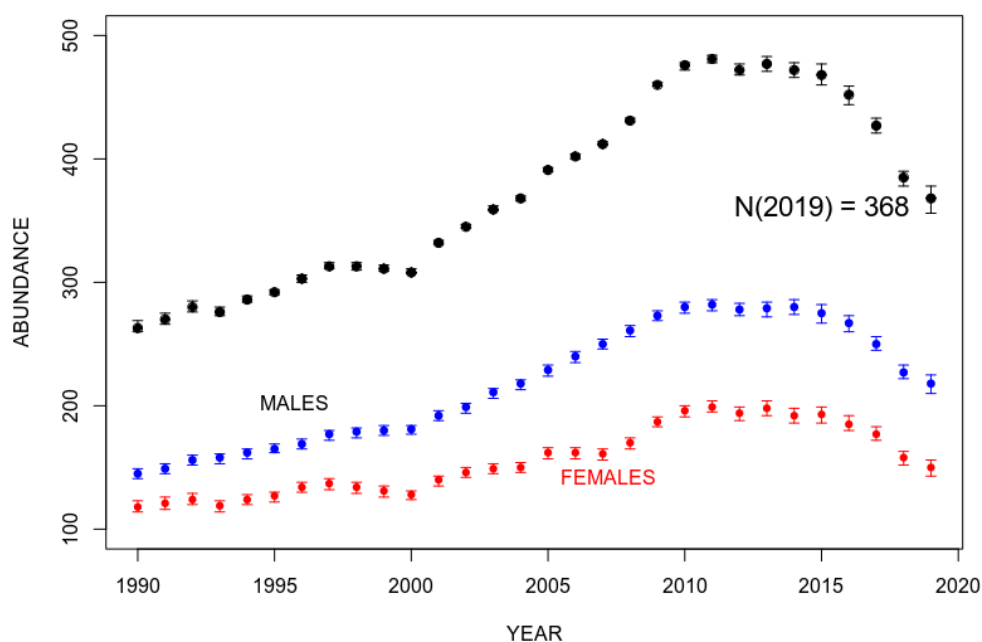


Figure 1. Abundance estimates (medians and 95% credible intervals) from hierarchical state-space models of North Atlantic right whale mark-resight data including separate estimates for the total number of males and females.

Reduced Survival

Since 2010, a well-documented and substantial change occurred in the feeding area-use patterns among North Atlantic right whales (Davis et al. 2017, Davies et al. 2019, Simard et al. 2019). Pace (*in press*) used a revised parameterization of the Pace et al. (2017) abundance model to test the hypothesis that survival rates changed after 2010. The model supported a decline in survival rates during 2011-2019 (Figure 2). The total estimated mortality continues to far exceed the recovered carcasses (Pace et al 2021), and recent increases in these model results strongly support the declared unusual mortality event by the US National Marine Fisheries Service (Figure 3).

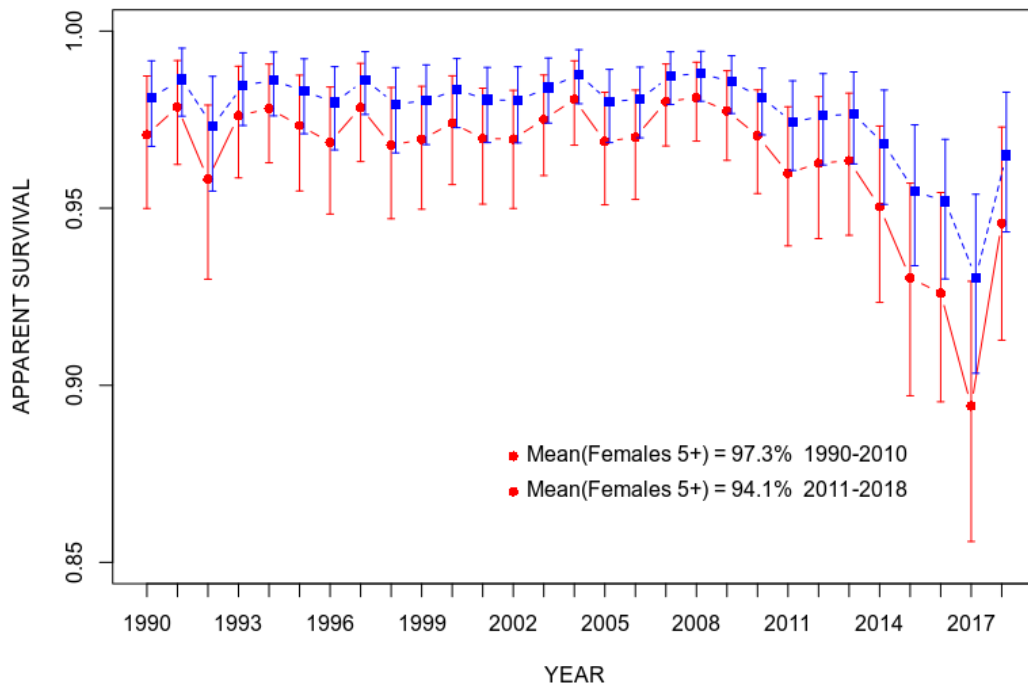


Figure 2. Estimated survival rates (medians and 95% credible intervals) from hierarchical state-space models of North Atlantic right whale mark-resight data parameterized to estimate abundance but with an added to test the hypothesis of a change in mean survival during 2011–2019. Upper line (blue) is for adult (5+ males) and the lower line, point estimates and credible intervals are for adult (5+) females. Different periodic mean estimates for adult females are displayed in text.

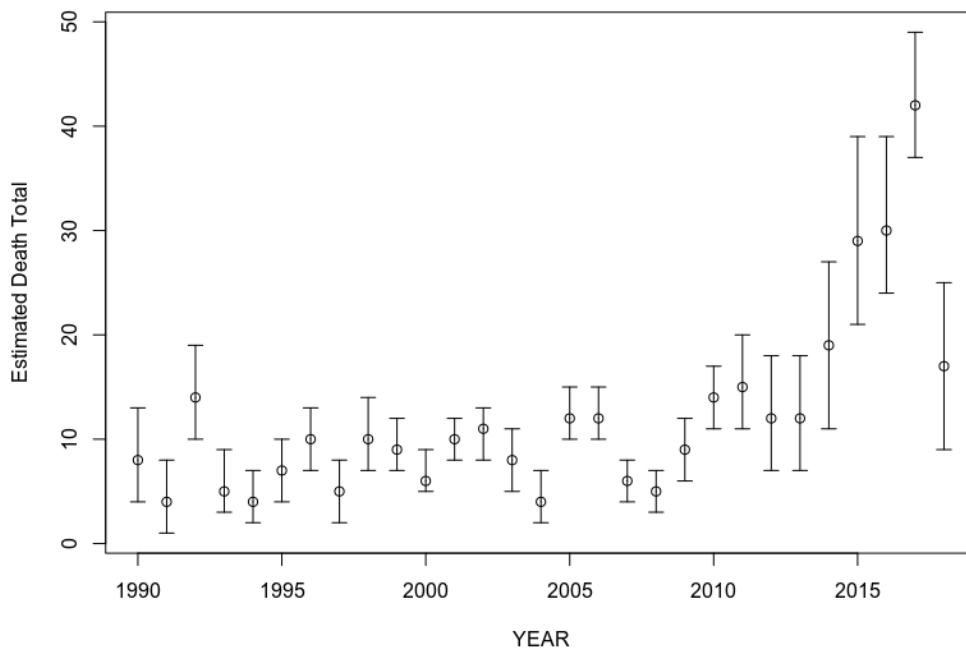


Figure 3. Estimated total number of dead North Atlantic right whales (medians and 95% credible intervals) derived from a hierarchical state-space models of mark-resight data evaluated for 2011–2019.

Cryptic Mortality

Results from the hierarchical state-space model, combined with available datasets on animal health, serious injuries and mortalities, indicate that observed carcasses accounted for only 36% of all estimated deaths during 1990-2017 (Pace et al. 2021). The disparity between observed causes of serious injury in right whales, and causes of mortality determined through necropsies of dead whales, indicate that the cause of death of examined carcasses may not accurately be representative of all mortalities. There is strong evidence that mortality varied over time. Carcass detection rates varied with effort, and observed carcass counts were poor predictors of the estimated annual numbers of mortalities.

Serious Injury & Mortality

Serious injury and mortality rates related to anthropogenic causes increased 19% in 2014-2018 compared to 2013-2017 (Henry et al. 2021). A total of 31 mortalities were observed from 2014-2018, with entanglements accounting for 11 and vessel strikes accounting for 6 of the mortalities. Since June 2020, four mortalities have been observed in US waters, including two calves that experienced vessel interactions¹. A recent modeling study found that vessels of all sizes, including those under 20m in length, can cause serious injury or mortality to right whales (Kelley et al. 2021).

Proven Females and Reproduction

For the 8 calving seasons 2014-2021, the substantial calving ground survey effort detected 73 females birthing 81 calves (average of 10.1 calves/yr). During that time, 14 of the 73 females produced 2 calves with the rest having only 1. Of those 73 females, 51 have been seen since 1 Jan 2019, at least 4 are known dead and another has been missing since being seen with a severe entanglement injury. To date (early April 2021), 17 live calves were produced in the winter 2021 season.

Regional Mark-Recapture Studies

A study examining opportunistic and dedicated mark-recapture aerial survey data collected from 2015-2019 in the Gulf of St. Lawrence identified over 180 individuals in that region, including at least 12 female-calf pairs and 15 pregnant females (Crowe et al. 2020; *in review*). Approximately 95% of the individuals sighted in 2019 had been sighted in earlier years in the study, indicating a high rate of inter-annual return. Based on Jolly-Seber models, approximately 140 animals were estimated to have used the area in 2019, and capture rates indicated residency of several months. Similar mark-recapture studies are being conducted by colleagues in New England waters, as well as in the calving region along the Georgia and Florida coast.

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