

Survival and fecundity rates of entangled humpback whales

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Case studies show that individual humpback whales can survive severe injuries and that females with such injuries can go on to reproduce. However, the likelihood that a given type or level of injury will have a positive outcome is harder to determine. Animals without outwardly severe injuries can die after exposure to human activities, and mitigation efforts like disentanglement do not ensure animal survival.

In the Gulf of Maine, a well-established reporting network exists to detect and respond to entangled humpbacks. There has also been annually intensive photo-identification research on the free-ranging population since the 1970s. Provided that an entangled individual is sufficiently documented, there is a possibility of re-sighting should it survive. In such cases, mark-recapture statistical analyses can provide a framework for comparing apparent survival among individuals. They can also provide a means of estimating and comparing other vital rates, such as reproductive rates. Here, multi-state statistical models (Arnason, 1972, 1973; Hestbeck et al., 1991; Brownie et al., 1993; Schwarz et al., 1993; Lebreton and Pradel, 2002) were used to study the survival and fecundity of entangled Gulf of Maine humpback whales.

Apparent survival was estimated among 865 Gulf of Maine humpback whales seen at least once between 1997 and 2006. Individuals were classified as either juveniles or adults and could occupy one of three entanglement states in a given year: 1) never reported entangled, 2) entangled in that year or 3) entangled in any previous year. When an individual was entangled in a given year and also had a previous history, priority was given to the current case. This model structure allowed juveniles to be assessed separately from adults and for immediate survival impacts to be differentiated from chronic effects. Other factors considered were the initial assessment of the disentanglement team, the disentanglement action (if any) and the final “serious injury” determination.

In a second multi-state statistical analysis, annual calving probabilities were estimated for 203 mature Gulf of Maine females, including those reported to have been entangled. Each year that a mature female was documented, she was placed into one of four states depending on her calving status (accompanied by a calf or not) and her documented entanglement history. This model structure allowed us to compare annual calving probabilities among females with and without an entanglement history.

Preliminary results of these analyses and potential sources of bias will be discussed.