

Knowlton, A.R.; Kraus, S.D. 2001. Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the western North Atlantic Ocean. *Journal of Cetacean Research and Management*, Special Issue no. 2, pp. 193-208.

Northern right whales in the western North Atlantic number about 300 animals and have shown little sign of recovery in recent decades. Mortality and serious injury due to human activities, particularly commercial fishing and shipping, are thought to be significant factors limiting their recovery. From 1970-1999, 45 right whale deaths were reliably documented. Sixteen of these fatalities (35.5%) were due to ship collisions, and three (6.7%) were due to entanglement in fishing gear. The remainder were neonates (13; 28.9%) and 'unknown cause' mortalities (13; 28.9%). Criteria for defining serious injuries and mortalities from entanglement or ship strikes were developed and include any animal carrying fishing gear, cuts from entanglement or ship strike deeper than 8 cm, swelling or necrosis, evidence of poor health from such interactions, and, in carcasses, evidence of haematoma, haemorrhaging or broken bones. A total of 56 animals fitting the defined criteria were documented from 1970-1999: 31 (55.4%) from entanglement and 25 (44.6%) from ship strikes. Nineteen were fatal (16 ship strikes, 3 entanglements), 10 were possibly fatal (2 ship strikes, 8 entanglements) and 27 were non-fatal (7 ship strikes, 20 entanglements). The breakdown of potentially serious injuries by age and sex reveals no difference in levels between sexes but shows a 3.3:1 higher level of interaction in juveniles and calves versus adults. The data show that ship strikes are more immediately lethal, but entanglements can result in long term deterioration of an animal and may be responsible for higher levels of mortality than previously thought. Considering that some animals become entangled, drown and never return to the surface, even these levels may be underestimated. Between 1986 and 1999, 84 animals were presumed dead based on a lack of resightings for six years. There were 32 confirmed deaths during this time period suggesting that at least as many unreported deaths occurred as carcasses were reported. Definitive actions need to be taken to reduce the level and severity of anthropogenic injuries and deaths. Actions could include continued disentanglement efforts, gear modifications, seasonal closures for fisheries, mandatory ship reporting, ships' routing measures and speed restrictions for commercial shipping.