

WORLDWIDE MASS STRANDINGS OF BEAKED WHALES: RETROSPECTIVE REVIEW AND CAUSES

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Mass strandings of beaked whales (three or more) were rare prior to 1960. However, in the early 1960s, the frequency of such strandings markedly increased. We examine worldwide mass strandings of beaked whales and propose reasons for their increase after 1960. We documented 98 beaked whale mass strandings. Eight occurred before 1960 and 90 between 1961 and 2004. In the first eight strandings only three of the 21 currently recognized species of beaked whales were involved. After 1961, another nine species of beaked whales mass stranded. Thirty-nine of the 98 (40%) mass strandings involved Cuvier's beaked whales, *Ziphius cavirostris*. Thirty-two cases involved Gray's beaked whale, *Mesoplodon grayi*. No atypical beaked whale mass strandings or multi-species beaked whale mass stranding were reported before 1961. All mass strandings of Cuvier's beaked whales were either strongly correlated with naval activities off the Bahamas, Canary Islands, Greece or areas where the U.S. naval vessels were deployed off Japan, Puerto Rico, and Italy. There are no known mass strandings of this species in other parts of the world. The start of these mass strandings coincided with the start of wide-scale use of tactical mid-frequency sonar by the US Navy in the early 1960s. The mass strandings of Gray's beaked whales are not associated with mid-frequency sonar but their cause is currently unknown. The US navy is exploring mitigation measures but additional studies on population size are urgently needed. Studies are critical in areas where local resident populations are subject to repeated naval operations in the same areas, as shown by repeated mass strandings, as well as other impacts such as past direct hunting and bycatch. The impacts of deaths likely due to military operations are compounded by the very low reproductive rates in beaked whales and possible disruption of social behavior that could also reduce survival.