



Marine Mammal Stock Assessments

Accounting for Climate Change

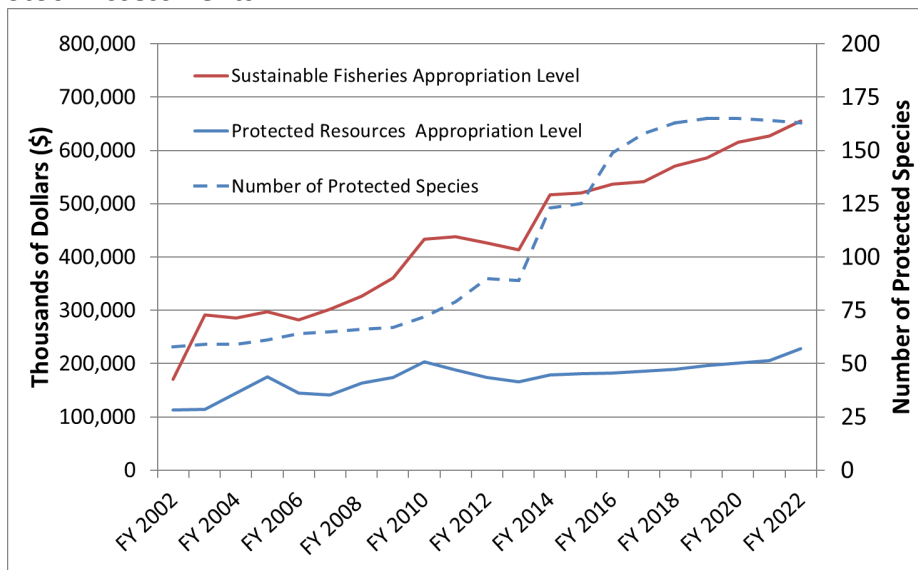


Background

Section 117 of the Marine Mammal Protection Act of 1972 (MMPA) directs NMFS and FWS to prepare annual Stock Assessment Reports (SARs) for all marine mammals in U.S. waters. The SARs are to contain information on each stock’s geographic range (and seasonal variations in range), abundance, trends in abundance, productivity rate, Potential Biological Removal level, and levels and sources of direct human-caused injury and mortality. When human-caused mortality and serious injury exceeds a stock’s potential biological removal level, the SARs should identify other factors that may be impeding the stock’s recovery, such as effects on habitat or prey

The MMPA stock assessment mandate has been successful at describing what is known regarding the status of most U.S. marine mammal stocks. It has also been successful at advancing methods for identifying unique stocks and assessing their geographic range and abundance. However, funding levels for marine mammal stock assessments have not kept pace with current information needs.

Figure 1. Congressional Appropriations for NMFS Offices that Conduct Stock Assessments



Funding Facts

- NMFS funding to collect marine mammal stock assessment data comes from a line item that includes salmon, sea turtles, coral, and other Protected Species.
- Since 2005, the NMFS budget for Protected Species has increased by 30%, not accounting for inflation. NMFS funding for Sustainable Fisheries, in comparison, has increased by 120% (see Fig. 1).
- Meanwhile the number of Protected Species has nearly tripled, from 61 in 2005 to 163 in 2022.
- In fiscal year (FY) 2021, \$24.5M was spent by all federal agencies on marine mammal research with stock assessment and population dynamics.
- A minimum population abundance estimate is lacking for 77 of the 252 identified marine mammal stocks (31%), based on the most recent SARs.

Climate Change Affects All Elements of Stock Assessments

The MMPA stock assessment process was primarily designed to address direct human-caused mortality and serious injury of marine mammals, such as incidental take by fisheries. It does not explicitly take account of indirect threats such as climate change. Yet climate change has the potential to alter every element of SARs. For example:

- **GEOGRAPHIC RANGE**—Climate-induced changes in marine mammal habitat and prey can cause changes in the geographic range of marine mammal stocks over time. Range boundaries may shift and, in some cases, cause intermingling of previously segregated stocks of the same species.
- **ABUNDANCE and TREND**—Climate factors may lead to increases or decreases in marine mammal stock abundance. Alternatively, “apparent” changes in abundance may result if surveys are not adapted to account for changes in a species’ historical range.
- **DIRECT HUMAN-CAUSED MORTALITY**—Spatial and seasonal distributions of both marine mammals and human activities are changing, and will continue to change, in response to changing climate conditions. This can result in unanticipated increases or decreases in lethal or sub-lethal interactions.

What We Need

We need to detect and quantify climate change effects on marine mammals and their habitats. For example, if a stock maintains constant abundance but its distribution shifts to include areas beyond where surveys typically occur, this may appear as a population decline, resulting in a reduced estimate of the Potential Biological Removal level. This could lead to greater regulation of human activities, such as commercial fishing. Adjustments to population survey and study designs could yield great benefits in detecting range shifts and thereby distinguishing changes in abundance versus distribution. Expanded application of new technologies, such as uncrewed systems which can range beyond typical survey bounds, has great potential to detect changes in distribution of marine mammals. Research to understand changes in overlap between marine mammals and human activities will enhance our ability to assess threats to marine mammals and develop effective mitigation measures to address threats of greatest concern.

Figure 2. Saildrones—autonomous sailing vessels with customized acoustic technologies— can be used to study whales, fish, and seals in remote parts of the ocean.



So What?

Better data from surveys and stock assessments will result in better marine mammal management. This will improve the management of commercial fisheries and other industries to address threats of greatest concern.