

HARBOR PORPOISE (*Phocoena phocoena*): Northern Oregon/Washington Coast Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

In the Pacific, harbor porpoise are found in coastal and inland waters from Point Conception, California to Alaska and across to Kamchatka and Japan (Gaskin 1984). Harbor porpoise appear to have more restricted movements along the western coast of the continental U.S. than along the eastern coast. Regional differences in pollutant residues in harbor porpoise indicate that they do not move extensively between California, Oregon, and Washington (Calambokidis and Barlow 1991). This pattern is a sharp contrast with the eastern coast of the U.S. and Canada, where harbor porpoise are believed to migrate seasonally from as far south as the Carolinas to the Gulf of Maine and Bay of Fundy (Polacheck *et al.* 1995). A phylogeographic analysis of genetic data from northeast Pacific harbor porpoise did not show complete concordance between DNA sequence types and geographic location (Rosel 1992). However, an analysis of molecular variance (AMOVA) of the same data with additional samples found significant genetic differences for four of the six pair-wise comparisons between the four areas investigated: California, Washington, British Columbia, and Alaska (Rosel *et al.* 1995). These results demonstrated that harbor porpoise along the west coast of North America are not panmictic or migratory, and movement is sufficiently restricted that genetic differences have evolved.

Significant genetic differences have been identified for harbor porpoises along the outer U.S. West Coast and in inland waters of Washington (Chivers *et al.* 2002, 2007; Morin *et al.* 2021), leading to the designation of multiple stocks in this region. The most recent study (Morin *et al.* 2021) identified additional genetic differences between porpoises found off central and southern Oregon, and suggested that a new stock boundary was warranted at approximately 43.2°N latitude. Based on these findings, the northern boundary of the Northern California – Southern Oregon stock has been moved south to 43.2°N, and a new central Oregon stock has been designated between 43.2°N and 45°N (Figure 1).

For the Marine Mammal Protection Act (MMPA) Stock Assessment Reports, the following harbor porpoise stocks are designated in the Pacific Ocean: 1) Morro Bay, 2) Monterey Bay, 3) San Francisco-Russian River, 4) Northern California/Southern Oregon, 5) Central Oregon, 6) Northern Oregon/Washington Coast, 7) Washington Inland Waters, 8) Northern Southeast Alaska Inland Waters, 9) Southern Southeast Alaska Inland Waters, 10) Yakutat/Southeast Alaska Offshore Waters, 11) Gulf of Alaska, and 12) Bering Sea. Reports for harbor porpoise stocks within waters of California, Oregon, and Washington appear in this volume. The five Alaska harbor porpoise stocks are reported separately in the Stock Assessment Reports for the Alaska Region.

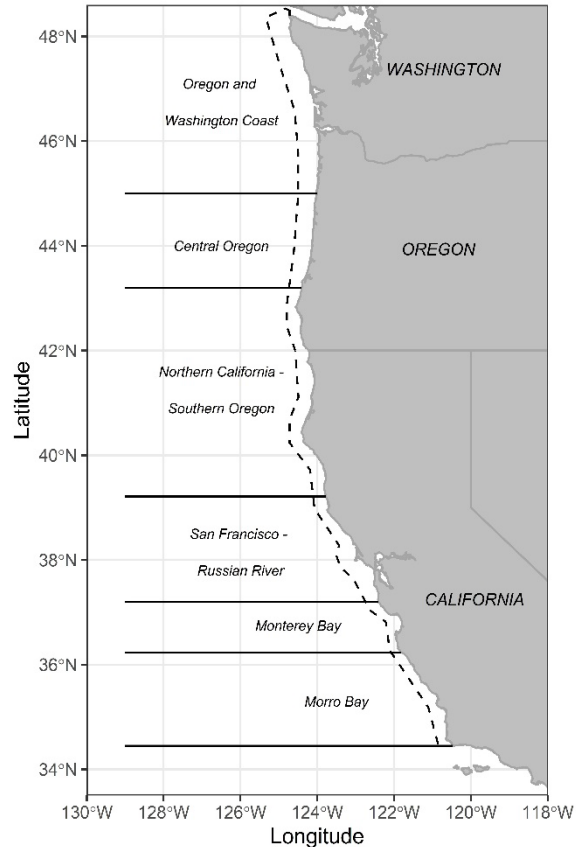


Figure 1. Stock boundaries and distributional range of harbor porpoise along the outer U.S. West Coast. Dashed line represents an approximate boundary for harbor porpoise habitat (0-200m water depth).

POPULATION SIZE

Aerial surveys were previously conducted off Oregon and Washington during 2010-2011 (Forney *et al.* 2014), yielding an abundance estimate for the northern Oregon/Washington coast stock of 21,487 (CV=0.44). More recently, Forney *et al.* (2023) estimated a similar abundance of 22,074 (CV = 0.391) harbor porpoise within shelf waters (0-200m water depth) of this stock’s range based on a habitat-based density model developed from 2021-2022 aerial surveys off Oregon and Washington. Both estimates included a correction factor of 3.42 ($1/g(0)$; $g(0)=0.292$, CV=0.366) (Laake *et al.* 1997) to adjust for groups missed by aerial observers.

Minimum Population Estimate

The minimum population estimate for this stock is calculated as the lower 20th percentile of the log-normal distribution of the 2021-2022 abundance estimate, or 16,068 animals.

Current Population Trend

There are no reliable data on population trends of harbor porpoise for coastal Oregon and Washington; however, the 2010-2011 (Forney *et al.* 2014) and 2021-22 (Forney *et al.* 2023) abundance estimates are very similar.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Based on what are argued to be biological limits of the species (i.e. females give birth first at age 4 and produce one calf per year until death), the theoretical, maximum-conceivable growth rate of a closed harbor porpoise population was estimated as 9.4% per year based on a human survivorship curve (Barlow and Boveng 1991). This is very similar to the growth rate of 9.6% per year (95% credible interval: 6.2% - 13.0%) estimated by Forney *et al.* (2020) for the Morro Bay harbor porpoise stock between 1991 and 2012, based on long-term aerial surveys. Because a reliable estimate of the maximum net productivity rate is not available for the Northern Oregon / Washington Coast harbor porpoise stock, we use the default maximum net productivity rate (R_{MAX}) of 4% for cetaceans (Wade and Angliss 1997).

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (16,068) times one-half the default maximum net growth rate for cetaceans ($\frac{1}{2}$ of 4%) times a recovery factor of 0.5 (for a stock of unknown status, Wade and Angliss 1997), resulting in a PBR of 161.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

There were 16 strandings or reports of fishery-related mortality and serious injury of harbor porpoise within the range of the northern Oregon/Washington coast stock during 2017-2021 (Carretta *et al.* 2023), resulting in a mean annual mortality of at least 3.2 harbor porpoise (Table 1). Stranding numbers are considered a minimum because not all stranded animals are found, reported, or examined for cause of death (via necropsy by trained personnel). Interactions with tribal fisheries are derived from annual reports submitted by the Northwest Indian Fisheries Commission (NWIFC) to NMFS.

Table 1. Summary of incidental mortality and serious injury of harbor porpoise (Northern Oregon/Washington Coast stock) in commercial and tribal fisheries that might take this species and calculation of the mean annual mortality rate; n/a indicates that data are not available. Mean annual takes are based on 2017-2021 data unless noted otherwise.

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean annual takes (CV in parentheses)
Gillnet fishery (tribal) ¹	2017-2021	Fishery self-report	n/a	0, 0, 2, 0, 0		>0.4 (n/a)
Unidentified gillnet fishery	2017-2021	stranding	n/a	0, 3, 1, 0, 1		>1.0 (n/a)
Unidentified fishery	2007-2011	stranding	n/a	8, 0, 0, 0, 1	n/a	>1.8 (n/a)

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean annual takes (CV in parentheses)
Minimum total annual takes						>3.2 (n/a)

¹This is a tribal fishery; therefore, it is not listed in the NMFS list of commercial fisheries.

STATUS OF STOCK

Harbor porpoise along the outer coast of northern Oregon and Washington are not listed as threatened or endangered under the Endangered Species Act nor as depleted under the Marine Mammal Protection Act. The status of this stock relative to its Optimum Sustainable Population (OSP) level and population trends is unknown. Based on currently available data, the minimum annual level of total human-caused mortality and serious injury (3.2 per year) does not exceed the PBR (161). Therefore, the Northern Oregon/Washington Coast stock of harbor porpoise is not classified as a “strategic” stock under the MMPA. The minimum annual fishery mortality and serious injury for this stock (3.2) is not known to exceed 10% of the calculated PBR (16.1) and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate.

OTHER FACTORS THAT MAY AFFECTING THE STOCK

Harbor porpoises are sensitive to disturbance by a variety of anthropogenic sound sources, and the limited range of several U.S. West Coast harbor porpoise stocks makes them particularly vulnerable to potential impacts (see overview in Forney *et al.* 2017). A recent habitat concern along the U.S. West coast includes the use of acoustic deterrent devices ('seal bombs') that are used in commercial fishing activities off California (Simonis *et al.* 2020), especially in the Monterey Bay region.

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