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

STOCK DEFINITION AND GEOGRAPHIC RANGE

In the eastern North Pacific Ocean, harbor porpoise are found in coastal and inland waters from Point Barrow, along the Alaskan coast, and down the west coast of North America to Point Conception, California (Gaskin 1984). Harbor porpoise are known to occur year-round in the inland trans-boundary waters of Washington and British Columbia, Canada (Osborne et al. 1988), and along the Oregon/Washington coast (Barlow 1988, Barlow et al. 1988, Green et al. 1992). Aerial survey data from coastal Oregon and Washington, collected during all seasons, suggest that harbor porpoise distribution varies by depth (Green et al. 1992). Although distinct seasonal changes in abundance along the west coast have been noted, and attributed to possible shifts in distribution to deeper offshore waters during late winter (Dohl et al. 1983, Barlow 1988), seasonal movement patterns are not fully understood.

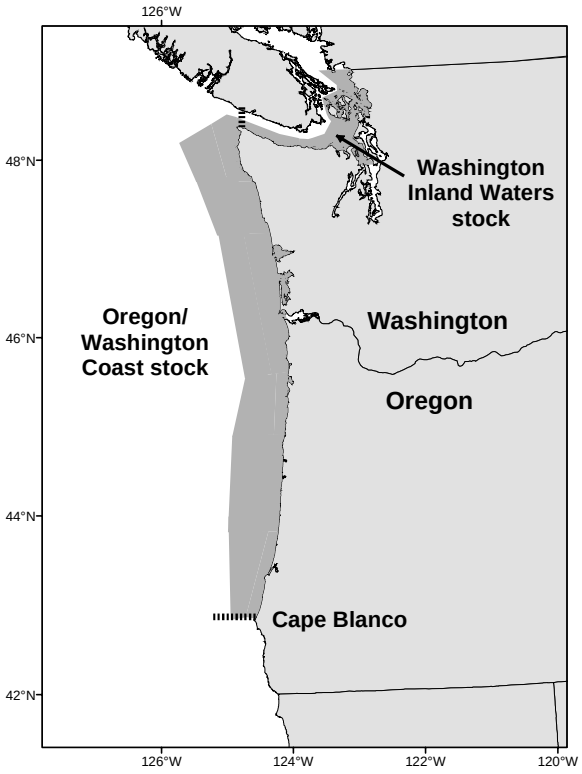

Figure 1. Stock boundaries (dashed lines) and approximate distribution (shaded areas) of harbor porpoise along the coasts of Washington and northern Oregon.

Investigation of pollutant loads in harbor porpoise ranging from California to the Canadian border suggests restricted harbor porpoise movements (Calambokidis and Barlow 1991). Stock discreteness in the eastern North Pacific was analyzed using mitochondrial DNA from samples collected along the west coast (Rosel 1992) and is summarized in Osmek et al. (1994). Two distinct mtDNA groupings or clades exist. One clade is present in California, Washington, British Columbia, and Alaska (no samples were available from Oregon), while the other is found only in California and Washington. Although these two clades are not geographically distinct by latitude, the results may indicate a low mixing rate for harbor porpoise along the west coast of North America. Further genetic testing of the same data, along 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 demonstrate that harbor porpoise along the west coast of North America are not panmictic or migratory and that movement is sufficiently restricted that genetic differences have evolved. Recent preliminary genetic analyses of samples ranging from Monterey Bay, California, to Vancouver Island, British Columbia, indicate that there is small-scale subdivision within the U.S. portion of this range (Chivers et al. 2002). This is consistent with low movement suggested by genetic analysis of harbor porpoise specimens from the North Atlantic, where numerous stocks have been delineated with clinal differences over areas as small as the waters surrounding the British Isles.

Using the 1990-1991 aerial survey data of Calambokidis et al. (1993) for water depths <50 fathoms, Osmek et al. (1996) found significant differences in harbor porpoise mean densities ($z=5.9$, $p<0.01$) between the waters of coastal Oregon/Washington and inland Washington/southern British Columbia, Canada (i.e., Strait of Juan de Fuca/San Juan Islands). Although differences in density exist between coastal Oregon/Washington and inland Washington waters, a specific stock boundary line cannot be identified based upon biological or genetic differences. However, harbor porpoise movements and rates of intermixing within the eastern North Pacific are restricted, and there has been a significant decline in harbor porpoise sightings within southern Puget Sound since the 1940s; therefore, following a risk averse management strategy, two stocks are recognized: the Oregon/Washington Coast stock (between Cape Blanco, OR, and Cape Flattery, WA) and the Washington Inland Waters stock (in waters east of Cape Flattery) (see Fig. 1). Recent genetic evidence suggests that the population of eastern North Pacific harbor

porpoise is more finely structured than is currently recognized (Chivers et al. 2002). All relevant data (e.g., genetic samples, contaminant studies, and satellite tagging) will be reviewed to determine whether to adjust the stock boundaries for harbor porpoise in Oregon and Washington waters.

In their assessment of California harbor porpoise, Barlow and Hanan (1995) recommended two stocks be recognized in California, with the stock boundary at the Russian River. Based on recent genetic findings (Chivers et al. 2002), California coast stocks were re-evaluated and significant genetic differences were found among four identified sampling sites. Revised stock boundaries, based on these genetic data and density discontinuities identified from aerial surveys, resulted in six California/Oregon/Washington stocks where previously there had been four (Carretta et al. 2001): 1) the Washington Inland Waters stock, 2) the Oregon/Washington Coast stock, 3) the Northern California/Southern Oregon stock, 4) the San Francisco-Russian River stock, 5) the Monterey Bay stock, and 6) the Morro Bay stock. The stock boundaries for animals that occur in Washington/northern Oregon waters are shown in Figure 1. This report considers only the Oregon/Washington Coast stock. Stock assessment reports for Washington Inland Waters, Northern California/Southern Oregon, San Francisco-Russian River, Monterey Bay, and Morro Bay harbor porpoise also appear in this volume. Stock assessment reports for the three harbor porpoise stocks in the inland and coastal waters of Alaska, including 1) the Southeast Alaska stock, 2) the Gulf of Alaska stock, and 3) the Bering Sea stock, are reported separately in the Stock Assessment Reports for the Alaska Region. The harbor porpoise occurring in British Columbia have not been included in any of the U.S. stock assessment reports.

POPULATION SIZE

In August and September 2002, an aerial survey of Oregon, Washington, and southern British Columbia coastal waters, from shore to 200 m depth, resulted in an uncorrected abundance estimate of 11,036 (CV=0.11) harbor porpoise in U.S. waters north of Cape Blanco, OR (J. Laake, unpubl. data). Using a correction factor of 3.42 (1/g(0); g(0)=0.292, CV=0.366) (Laake et al. 1997a), to adjust for groups missed by aerial observers, the corrected estimate of abundance for harbor porpoise in coastal Oregon (north of Cape Blanco) and Washington waters is 37,745 (CV=0.38).

Minimum Population Estimate

The minimum population estimate for this stock is calculated as the lower 20th percentile of the log-normal distribution (Wade and Angliss 1997) of the 2002 population estimate of 37,745, which is 27,705 harbor porpoise.

Current Population Trend

There are no reliable data on population trends of harbor porpoise for coastal Oregon, Washington, or British Columbia waters, however, the uncorrected estimates of abundance for the Oregon/Washington Coast stock in 1997 (11,599) and 2002 (11,036) were not significantly different (Z=-.31, P=0.76) (Laake et al. 1998a; J. Laake, unpubl. data).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is currently not available for harbor porpoise. Therefore, until additional data become available, it is recommended that the cetacean maximum theoretical net productivity rate (R_{MAX}) of 4% (Wade and Angliss 1997) be employed for the Oregon/Washington Coast harbor porpoise stock.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size (27,705) times one-half the default maximum net growth rate for cetaceans (½ of 4%) times a recovery factor of 0.5 (for a stock of unknown status, Wade and Angliss 1997), resulting in a PBR of 277 harbor porpoise per year.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Within the EEZ boundaries of coastal Oregon and Washington, human-caused (fishery) mortalities of harbor porpoise are presently known to occur only in the northern Washington marine set gillnet fishery. During 1992-1993, the Washington/Oregon Lower Columbia River, Washington Grays Harbor, and Washington Willapa Bay drift gillnet fisheries were monitored at observer coverages of approximately 4% and 2%, respectively. There were no observed harbor porpoise mortalities in these fisheries.

Fishing effort in the northern Washington marine set gillnet fishery (areas 4, 4A, 4B, and 5) is conducted within the range of both harbor porpoise stocks (Oregon/Washington Coast and Washington Inland Waters) occurring in Washington State waters. Some movement of harbor porpoise between Washington's coastal and inland waters is likely, but it is currently not possible to quantify the extent of such movements. For the purposes of this stock assessment report, the animals taken in waters south and west of Cape Flattery, WA (areas 4 and 4A), are assumed to have belonged to the Oregon/Washington Coast stock, and Table 1 includes data only from that portion of the fishery. NMFS observers monitored 100% of the 50 net days (1 net day equals a 100-fathom length net set for 24 hours) of fishing effort in coastal waters in 2000 and observed three harbor porpoise takes; no fishing effort occurred in the coastal portion of the fishery in 1999 or 2001-2003 (Gearin, et al. 1994, 2000; P. Gearin, unpubl. data). There has been a reduction in fishing effort in the coastal portion of this fishery due to reduced numbers of chinook salmon (a target species) in coastal waters. The mean estimated mortality for this fishery in 1999-2003 is 0.6 (CV=0) harbor porpoise per year from this stock.

Table 1. Summary of incidental mortality and serious injury of harbor porpoise (Oregon/Washington Coast stock) in commercial and tribal fisheries and calculation of the mean annual mortality rate; n/a indicates that data are not available. Mean annual takes are based on 2000-2004 data unless noted otherwise.

Fishery name	Years	Data type	Percent observer coverage	Observed mortality	Estimated mortality	Mean annual takes (CV in parentheses)
Northern WA marine set gillnet (tribal fishery in coastal waters: areas 4 and 4A)	1999	observer	no fishery	0	0	0.6 (0)[1]
	2000		100%	3	3	
	2001		no fishery	0	0	
	2002		no fishery	0	0	
	2003		no fishery	0	0	
Estimated total annual takes						0.6 (0)

[1]The 1999-2003 mortality estimates are included in the average.

In 1995-1997, data were collected for the coastal portions (areas 4 and 4A) of the northern Washington marine set gillnet fishery as part of an experiment, conducted in cooperation with the Makah Tribe, designed to explore the merits of using acoustic alarms to reduce bycatch of harbor porpoise in salmon gillnets. Results in 1995-1996 indicated that the nets equipped with acoustic alarms had significantly lower entanglement rates, as only 2 of the 49 mortalities occurred in alarmed nets (Gearin et al. 1996, 2000; Laake et al. 1997b). In 1997, 96% of the sets were equipped with acoustic alarms and 13 mortalities were observed (Gearin et al. 2000; P. Gearin, unpubl. data). Harbor porpoise were displaced by an acoustic buffer around the alarmed nets, but it is unclear whether the porpoise or their prey were repelled by the alarms (Kraus et al. 1997, Laake et al. 1998b). However, the acoustic alarms did not appear to affect the target catch (chinook salmon and sturgeon) in the fishery (Gearin et al. 2000). In 2000, 84% of the sets (42 of 50 net days) in coastal waters were equipped with acoustic alarms and all three of the observed mortalities occurred in nets without alarms.

The Marine Mammal Authorization Program (MMAP) fisher self-reports, required of commercial vessel operators by the MMPA, are an additional source of information on the number of harbor porpoise killed or seriously injured incidental to commercial fishery operations. Between 2000 and 2004, there were no fisher self-reports of harbor porpoise mortalities from any MMAP-listed fishery operating within the range of the Oregon/Washington Coast stock. Although these reports are considered incomplete (see details in Appendix 1), they represent a minimum mortality.

According to Northwest Marine Mammal Stranding Network records, maintained by the NMFS Northwest Region, there have been no fishery-related strandings of harbor porpoise from this stock dating back to at least 1990. This estimate is considered a minimum because not all stranded animals are found, reported, or examined for cause of death (via necropsy by trained personnel).

Other Mortality

According to the Marine Mammal Stranding Network records, maintained by the NMFS Northwest Region, no human-caused harbor porpoise mortalities or serious injuries were reported from non-fisheries sources in 2000-2004. This estimate is considered a minimum because not all stranded animals are found, reported, or examined for cause of death (via necropsy by trained personnel).

STATUS OF STOCK

Harbor porpoise are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Based on the currently available data, the level of human-caused mortality and serious injury (0.6) does not exceed the PBR (277). Therefore, the Oregon/Washington Coast stock of harbor porpoise is not classified as "strategic." The total fishery mortality and serious injury for this stock (0.6: based on observer data) is not known to exceed 10% of the calculated PBR (27.7) and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate. The status of this stock relative to its Optimum Sustainable Population (OSP) level and population trends is unknown.

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