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HARBOR PORPOISE (*Phocoena phocoena*): Bering Sea Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

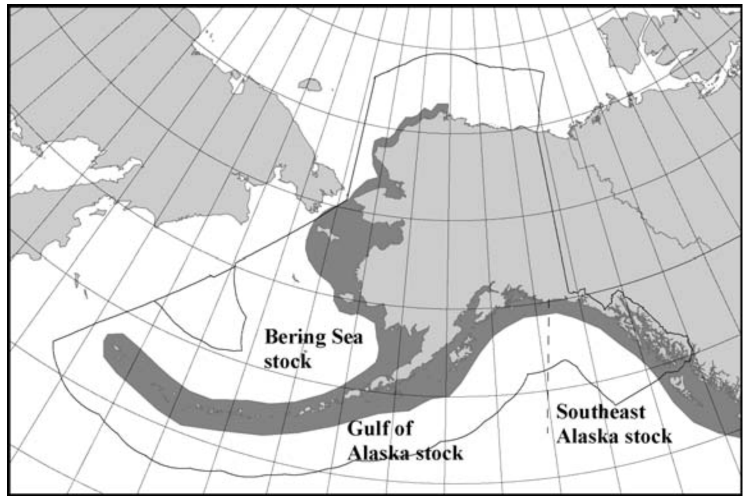

Figure 25. Approximate distribution of harbor porpoise in Alaska waters (shaded area).

In the eastern North Pacific Ocean, the harbor porpoise ranges from Point Barrow, along the Alaska coast, and down the west coast of North America to Point Conception, California (Gaskin 1984). The harbor porpoise primarily frequents coastal waters, and in the Gulf of Alaska and Southeast Alaska, they occur most frequently in waters less than 100 m in depth (Waite and Hobbs, in review). The average density of harbor porpoise in Alaska appears to be less than that reported off the west coast of the continental U.S., although areas of high densities do occur in Glacier Bay, Yakutat Bay, Copper River Delta, and Sitkalidak Strait. 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 mitochondrial DNA 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. Investigation of pollutant loads in harbor porpoise ranging from California to the Canadian border also suggests restricted harbor porpoise movements (Calambokidis and Barlow 1991). Further genetic testing of the same data mentioned above along with additional samples found significant genetic differences for 4 of the 6 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 to evolve genetic differences. This is consistent with low movement suggested by genetic analysis of harbor porpoise specimen from the North Atlantic. Numerous stocks have been delineated with clinal differences over areas as small as the waters surrounding the British Isles. Unfortunately, no conclusions can be drawn about the genetic structure of harbor porpoise within Alaska because of insufficient samples. Only 19 samples are available from Alaska porpoise and 12 of these come from a single area (Copper River Delta). Accordingly, harbor porpoise stock structure in Alaska remains unknown at this time.

Although it is difficult to determine the true stock structure of harbor porpoise populations in the northeast Pacific, from a management standpoint, it would be prudent to assume that regional populations exist and that they should be managed independently (Rosel et al. 1995, Taylor et al. 1996). The Alaska SRG concurred that while the available data were insufficient to justify recognizing three biological stocks of harbor porpoise in Alaska, it did not recommend against the establishment of three management units in Alaska (DeMaster 1996, 1997). Accordingly, from the above information, three separate harbor porpoise stocks in Alaska are recommended, recognizing that the boundaries were set arbitrarily: 1) the Southeast Alaska stock - occurring from the northern border of British Columbia border to Cape Suckling, Alaska, 2) the Gulf of Alaska stock - occurring from Cape Suckling to Unimak Pass, and 3) the Bering Sea stock - occurring throughout the Aleutian Islands and all waters north of Unimak Pass (Fig. 25). Information concerning the 4 harbor porpoise stocks occurring along the west coast of the continental United States (Central California, Northern California, Oregon/Washington Coast, and Inland Washington) can be found in the Stock Assessment Reports for the Pacific Region.

POPULATION SIZE

In June and July of 1999, an aerial survey covering the waters of Bristol Bay resulted in an abundance estimate of 47,356 (CV = 0.223). This estimate incorporated the Laake et al. (1997) correction factor for availability bias (2.96; CV = 0.18), and an estimate of 1.337 for average perception bias (CV = 0.062; Waite and Hobbs, in review). The estimate for 1999 can be considered conservative, as the surveyed areas did not include known harbor porpoise range near either the Pribilof Islands or in the waters north of Cape Newenham (approximately 59°N).

Minimum Population Estimate

The minimum population estimate (N_{MIN}) for this stock is calculated using Equation 1 from the PBR Guidelines (Wade and Angliss 1997): $N_{MIN} = N/\exp(0.842*[\ln(1+[CV(N)]^2)]^{½})$. Using the population estimate (N) of 47,356 and its associated CV of 0.223), N_{MIN} for the Bering Sea stock of harbor porpoise is 39,328.

Current Population Trend

The abundance of harbor porpoise in Bristol Bay was estimated in 1991 and 1999. The 1991 estimate was 10,946 (Dahlheim et al. 2000). The 1999 estimate of 47,356 is significantly higher than the 1991 estimate (Waite and Hobbs in review). However, there are some key differences between surveys which complicate direct comparisons. Transect lines were substantially more dense in 1999 than in 1991 and large numbers of porpoise were observed in 1999 in an area which was not surveyed intensely in 1991 (compare sightings in northeast Bristol Bay depicted in Figure 5 in Waite and Hobbs (in review) with Figure 4 in Dahlheim et al. 2000). In addition, the use of a second correction factor for the 1999 estimate confounds direct comparison. The density of harbor porpoise resulting from the 1999 surveys was still substantially higher than that reported in Dahlheim et al. (2000), but it is unknown whether the increase in density is a result of a population increase or is a result of survey design. Thus, at present, there is no reliable information on trends in abundance for the Bering Sea stock of harbor porpoise.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

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

POTENTIAL BIOLOGICAL REMOVAL

Under the 1994 reauthorized Marine Mammal Protection Act (MMPA), the potential biological removal (PBR) is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$. The recovery factor ($F_R$) for this stock is 0.5, the value for cetacean stocks with unknown population status (Wade and Angliss 1997). Thus, for the Bering Sea stock of harbor porpoise, PBR = 393 animals (39,328 × 0.02 × 0.5).

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Three different commercial fisheries operating within the range of the Bering Sea stock of harbor porpoise were monitored for incidental take by NMFS observers during 1990-98: Bering Sea (and Aleutian Islands) groundfish trawl, longline, and pot fisheries. The harbor porpoise mortality was observed only in the Bering Sea groundfish trawl fishery. The range of observer coverage over the 9-year period, as well as the annual observed and estimated mortalities are presented in Table 23. The mean annual (total) mortality rate resulting from observed mortalities was 1.1 (CV = 0.39).

An additional source of information on the number of harbor porpoise mortalities incidental to commercial fishery operations is the self-reported fisheries information required of vessel operators by the MMPA. During the period from 1990 to 1998, fisher self-reports from 2 unobserved fisheries (see Table 23) resulted in an annual mean of 0.5 mortalities from interactions with commercial fishing gear. However, because logbook records (i.e., fisher self-reports required during 1990-94)are most likely negatively biased (Credle et al. 1994), these are considered to be minimum estimates. These totals are based on all available fisher self-reports for fisheries occurring within the range of the Bering Sea harbor porpoise stock, except the Bering Sea groundfish fisheries for which observer data were presented above. Logbook data are available for part of 1989-1994, after which incidental mortality reporting requirements were modified. Under the new system, logbooks are no longer required; instead, fishers provide self-reports. Data for the 1994-95 phase-in period is fragmentary. After 1995, the level of reporting dropped dramatically, such that the records are considered incomplete and estimates of mortality based on them represent minimums (see Appendix 7 for details).

Fisher self-reports for three fisheries listed in Table 23 did not report any harbor porpoise mortality over the 1990-93 period. These fisheries have been included above because of the large number of participants and the significant potential for interaction with harbor porpoise.

Table 23. Summary of incidental mortality of harbor porpoise (Bering Sea stock) due to commercial fisheries from 1990 through 2001 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from logbook reports. Data from 1994 to 1998 are used in the mortality calculation when more than 5 years of data are provided for a particular fishery. n/a indicates that data were not available.

Fishery name	**Years**	**Data type**	**Range of observer coverage**	**Observed mortality (in given yrs.)**	**Estimated mortality (in given yrs.)**	**Mean annual mortality**
Bering Sea/Aleutian Is. (BSAI) groundfish trawl	97-01	obs data	62-77%	1, 1, 0, 0, 1	2, 1, 0, 0, 2	1.1 (CV = 0.39)
Observer program total						1.1
				Reported mortalities		
AK Peninsula/Aleutian Island salmon set gillnet	90-01	logbooks/ self-reports	n/a	0, 0, 2, 0, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[≥0.5]
Bristol Bay salmon drift gillnet	90-01	logbooks/ self-reports	n/a	0, 0, 0, 0, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[0]
Bristol Bay salmon set gillnet	90-01	logbooks/ self-reports	n/a	0, 0, 0, 0, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[0]
AK Kuskokwim, Yukon, Norton Sound, Kotzebue salmon gillnet	90-01	logbooks/ self-reports	n/a	0, 0, 0, 0, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[0]
Minimum total annual mortality						≥1.6

The estimated minimum annual mortality rate incidental to commercial fisheries is rounded up to 2 animals, based on observer data (1.1) and logbook reports (0.5) where observer data were not available. However, a reliable estimate of the mortality rate incidental to commercial fisheries is currently unavailable because of the absence of observer placements in the gillnet fisheries discussed above. Therefore, it is unknown whether the kill rate is insignificant. At present, annual mortality levels, less than 39 animals per year (i.e., 10% of PBR), can be considered to be insignificant and approaching zero.

Subsistence/Native Harvest Information

Subsistence hunters in Alaska have not been reported to take from this stock of harbor porpoise.

Other Mortality

During the period from 1981 to 1987, 7 harbor porpoise mortalities have resulted from gillnet entanglement in the area from Nome to Unalakleet, 3 were reported near Kotzebue from 1989 to 1990, and some take of harbor porpoise is likely in the Bristol Bay gillnet fisheries (Barlow et al. 1994). A similar set gillnet fishery conducted by subsistence fishers incidentally took 6 harbor porpoise in 1991 near Point Barrow, Alaska (Suydam and George 1992). When averaged over the period from 1981 to 1990, the resulting annual mortality attributable to subsistence gillnets is 1.4 porpoise ((7 + 3 + 6)/11 = 1.4)

STATUS OF STOCK

Harbor porpoise are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. The lack of surveys in a significant portion of this stock's range results in a conservative PBR for this stock. Logbook records are most likely negatively biased (Credle et al. 1994) resulting in an underestimate of incidental kill. However, based on the best scientific information available, the estimated level of human-caused mortality and serious injury (4, based on 2 mortalities in commercial fisheries plus 2 (rounded up from 1.4) in subsistence gillnets) is not known to exceed the PBR (86). Therefore, the Bering Sea stock of harbor porpoise is not classified as a strategic stock. Population trends and status of this stock relative to OSP are currently unknown.

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