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

STOCK DEFINITION AND GEOGRAPHIC RANGE

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. Relatively high densities of harbor porpoise have been recorded along the coasts of Washington and northern Oregon and California. Relative to the waters off the west coast of the continental U. S., harbor porpoise do not occur in high densities in Alaska waters (Dahlheim et al. submitted). 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

Figure 24. Approximate distribution of harbor porpoise in Alaska waters (shaded area). The distributions of all three stocks found in Alaska waters are shown.

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). Aerial surveys (Dahlheim et al. 1994) reveal a lower density of harbor porpoise between Yakutat and Cape Suckling. Accordingly, from the above information, three separate harbor porpoise stocks in Alaska are recommended: 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. 24). Information concerning the 4 harbor porpoise stocks occurring
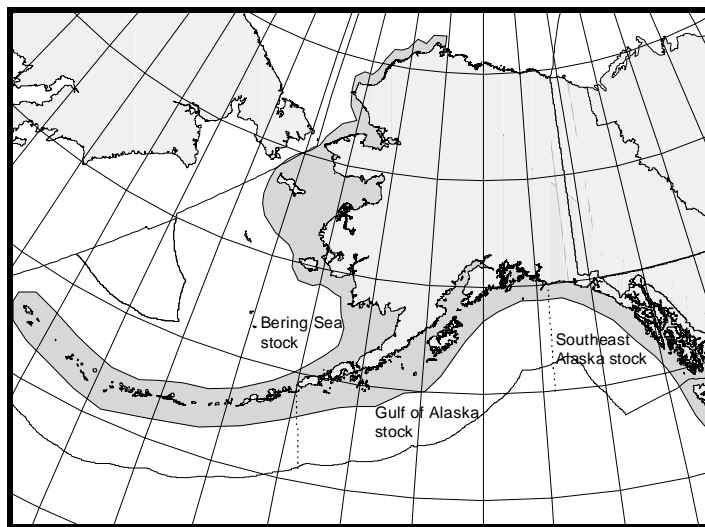
along the west coast of the continental U. S. (Central California, Northern California, Oregon/Washington Coast, and Inland Washington) can be found in the Stock Assessment Reports for the Pacific Region.

POPULATION SIZE

In the summer of 1991, an aerial survey covering the Bristol Bay region was conducted resulting in an abundance estimate of 3,531 (CV=0.243) harbor porpoise (Dahlheim et al. submitted). No survey effort was conducted in the vicinity of the Pribilof Islands or along the Aleutian Islands because of the lack of commercial fisheries that could potentially affect harbor porpoise in those areas (Dahlheim et al. 1992). In addition, no survey effort was conducted north of Cape Newenham (approximately 59°N), when harbor porpoise are regular visitors as far north as Point Barrow during the summer months (Suydam and George 1992). Clearly, the 1991 survey covered only a fraction of the range occupied by the Bering Sea stock of harbor porpoise.

Correction factors for harbor porpoise aerial surveys have been estimated at 3.1 (CV=0.171) (Calambokidis et al. 1993) from Puget Sound, Washington, and 3.2 (Barlow et al.1988) from the west coast of the continental U. S. The correction factor of 3.1 should be used for this harbor porpoise stock, as both estimates are considered conservative for Alaska aerial surveys due to differences in survey conditions. Therefore, the total corrected abundance estimate for the Bering Sea stock of harbor porpoise is 10,946 (3,531 x 3.1; CV=0.300) animals.

In the previous stock assessment, harbor porpoise in Alaska were considered a single stock composed of 29,744 animals (Small and DeMaster 1995). If the abundance estimates for the 3 Alaska stocks of harbor porpoise in this volume are pooled, the resulting estimate would also be 29,744 animals (10,301+8,497+10,946).

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): $N_{MIN} = N/\exp(0.842*[\ln(1+[CV(N)]^2)]^{\frac{1}{2}})$. Using the population estimate (N) of 10,946 and its associated CV of 0.300, N_{MIN} for the Bering Sea stock of harbor porpoise is 8,549.

Current Population Trend

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 re-authorized 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 = 86 animals (8,549 x 0.02 x 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 1990-95: 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 6-year period, as well as the annual observed and estimated mortalities are presented in Table 20. The mean annual (total) mortality rate resulting from observed mortalities was 0.60 (CV=.67). In 1990, observers also boarded 59 (38.3%) of the 154 vessels participating in the Alaska Peninsula/Aleutian Island salmon drift gillnet fishery, monitoring a total of 373 sets, or roughly 4% of the estimated number of sets made by the fleet (Wynne et al. 1991). The low level of observer coverage for this fishery apparently

missed interactions with harbor porpoise which had occurred, as logbook mortalities were reported in 1990 (see Table 20) which were not recorded by the observer program.

An additional source of information on the number of harbor porpoise mortalities incidental to commercial fishery operations is the logbook reports maintained by vessel operators as required by the MMPA interim exemption program. During the 4-year period from 1990 to 1993, logbook reports from 2 unobserved fisheries (see Table 20) resulted in an annual mean of 1.25 mortalities from interactions with commercial fishing gear. However, because logbook records are most likely negatively biased (Credle et al. 1994), these are considered to be minimum estimates. These totals are based on all available logbook 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. Complete logbook data after 1993 are not available.

Logbook records for three fisheries listed in Table 20 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. 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).

Table 20. Summary of incidental mortality of harbor porpoise (Bering Sea stock) due to commercial fisheries from 1990 through 1995 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from logbook reports. Data from 1991 to 1995 are used in the mortality calculation when more than 5 years of data are provided for a particular fishery.

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. (BSA) groundfish trawl	90-95	obs data	53-74%	0, 0, 0, 0, 1, 1	0, 0, 0, 0, 2, 1	0.6 (CV=.67)
Observer program total						0.6
				Reported mortalities		
AK Peninsula/Aleutian Island salmon drift gillnet	90-93	logbook	n/a	2, 0, 1, 0	n/a	[≥0.75]
AK Peninsula/Aleutian Island salmon set gillnet	90-93	logbook	n/a	0, 0, 2, 0	n/a	[≥0.5]
Bristol Bay salmon drift gillnet	90-93	logbook	n/a	0, 0, 0, 0	n/a	[0]
Bristol Bay salmon set gillnet	90-93	logbook	n/a	0, 0, 0, 0	n/a	[0]
AK Kuskokwim, Yukon, Norton Sound, Kotzebue salmon gillnet	90-93	logbook	n/a	0, 0, 0, 0	n/a	[0]
Minimum total annual mortality						≥1.85

The estimated minimum annual mortality rate incidental to commercial fisheries is rounded up to 2 animals, based on observer data (0.60) and logbook reports (1.25) 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 8.6 animals per year (i.e., 10% of PBR) can be considered to be insignificant and approaching zero mortality and serious injury rate.

Subsistence/Native Harvest Information

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

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 (2) 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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