HARBOR PORPOISE (*Phocoena phocoena*): Gulf of Alaska 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 Washington.

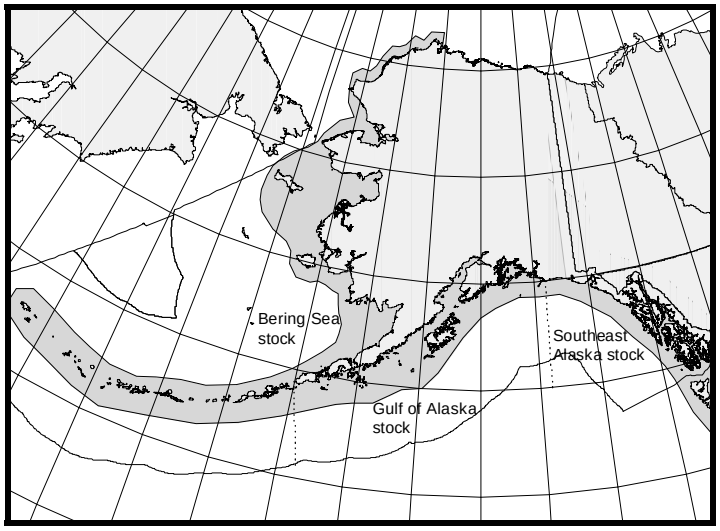

Figure 23. Approximate distribution of harbor porpoise in Alaska waters (shaded area). The distributions of all three stocks found in Alaska waters are shown.

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. 23). 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

Systematic aerial surveys of harbor porpoise covering portions of the Gulf of Alaska were conducted in 1991 (Dahlheim et al. 1992), 1992 (Dahlheim et al. 1993), and 1993 (Dahlheim et al. 1994). The 1991 aerial survey covering Cook Inlet waters resulted in an abundance estimate of 136 (CV=0.632) harbor porpoise (Dahlheim et al. submitted). The 1992 aerial survey covered the waters around Kodiak Island and along the south side of the Alaska Peninsula from Shelikof Strait to the Shumagin Islands. Inclement weather during the 1992 survey prohibited covering the portion of the Alaska Peninsula extending from the Shumagin Islands to Unimak Pass, approximately 160-165°W (Dahlheim et al. 1993). The 1992 survey resulted in an abundance estimate of 740 (CV=0.339) harbor porpoise around Kodiak Island and 551 (CV=0.122) harbor porpoise along the southern Alaska Peninsula (Dahlheim et al. submitted). The 1993 aerial survey covered the offshore Alaska waters from Dixon Entrance to Prince William Sound, resulting in an abundance estimate of 3,982 (CV=0.187) harbor porpoise (Dahlheim et al. submitted). Of the 106 harbor porpoise sightings during the 1993 aerial survey, 35 were encountered west of Cape Suckling (144°W), representing approximately 33% of the sightings. Prorating the abundance estimate to include only the portion of the survey conducted west of Cape Suckling results in an abundance estimate of 1,314 animals from the Gulf of Alaska harbor porpoise stock. This estimate is admittedly ad hoc and deemed provisional at this time, pending reanalysis of the 1993 aerial survey data. Until such reanalysis occurs, the coefficient of variation for the 1993 survey area (0.187) is considered a reasonable estimate for the CV of the portion of the survey conducted to the west of Cape Suckling. Adding the abundance estimates for the portions of the 1991-93 surveys within the range of the Gulf of Alaska harbor porpoise stock results in a total estimated abundance of 2,741 (136+740+551+1314; CV=0.134) animals.

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 Gulf of Alaska stock of harbor porpoise is 8,497 (CV=0.218) animals. This abundance estimate is conservative because several areas within the Gulf of Alaska were not included in the 1991-93 aerial surveys. These areas include the region from 160-165°W along the southern Alaska Peninsula (mentioned above) and the coastal waters from western Prince William Sound to the Kenai Peninsula (approximately 148-152°W).

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): $N_{MIN} = N/\exp(0.842*[\ln(1+[CV(N)]^2)]^{½})$. Using the population estimate (N) of 8,497 and its associated CV of 0.218, N_{MIN} for the Gulf of Alaska stock of harbor porpoise is 7,085.

Current Population Trend

At present, there is no reliable information on trends in abundance for the Gulf of Alaska 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 the Gulf of Alaska 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 Gulf of Alaska stock of harbor porpoise, PBR = 71 animals (7,085 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 Gulf of Alaska stock of harbor porpoise were monitored for incidental take by NMFS observers during 1990-95: Gulf of Alaska groundfish trawl, longline, and pot fisheries. No incidental mortality of harbor porpoise was observed in these fisheries. Observers also monitored the Prince William Sound salmon drift gillnet fishery in 1990 and 1991, recording 1 mortality in 1990 and 3 mortalities in 1991. These mortalities extrapolated to 8 (95% CI 1-23) and 32 (95% CI 3-103) kills for the entire fishery, resulting in a mean kill rate of 20 (CV=0.60) animals per year for 1990 and 1991. In 1990, observers boarded 300 (57.3%) of the 524 vessels that fished in the Prince William Sound salmon drift gillnet fishery, monitoring a total of 3,166 sets, or roughly 4% of the estimated number of sets made by the fleet (Wynne et al. 1991). In 1991, observers boarded 531 (86.9%) of the 611 registered vessels and monitored a total of 5,875 sets, or roughly 5% of the estimated sets made by the fleet (Wynne et al. 1992). Logbook reports from this fishery detail 6, 5, 6, and 1 harbor porpoise mortalities in 1990, 1991, 1992, and 1993, respectively. The extrapolated (estimated) observer mortality accounts for these mortalities, so they do not appear in Table 19. The Prince William Sound salmon drift gillnet fishery has not been observed since 1991; therefore, no additional data are available for that fishery.

An additional source of information on the number of harbor porpoise mortalities incidental to commercial fishing operations is the logbook reports maintained by vessel operators as required by the MMPA interim exemption program. During the 4-year period between 1990 and 1993, logbook reports from 2 unobserved fisheries (see Table 19) resulted in an annual mean of 4.5 mortalities from interactions with commercial fishing gear. In 1990, logbook records from the Cook Inlet set and drift gillnet fisheries were combined. As it is not possible to determine which fishery was responsible for the harbor porpoise mortalities reported in 1990, both fisheries have been included in Table 19. 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 Gulf of Alaska fisheries, except the Prince William Sound salmon drift gillnet fishery for which observer data were presented above. Complete logbook data after 1993 are not available.

Table 19. Summary of incidental mortality of harbor porpoise (Gulf of Alaska 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 or stranding data.

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Prince William Sound salmon drift gillnet	90-91	obs data	4-5%	1, 3	8, 32	20 (CV=.60)
Observer program total						20
				Reported mortalities		
Cook Inlet salmon drift and set gillnet fisheries	90-93	logbook	n/a	3, 0, 0, 0	n/a	[≥0.75]
Kodiak salmon set gillnet	90-93	logbook	n/a	8, 4, 2, 1	n/a	[≥3.75]
Minimum total annual mortality						≥24.5

Strandings of marine mammals with fishing gear attached or with injuries caused by interactions with fishing gear are a final source of mortality data. In the period from 1990 to 1994, 12 harbor porpoise scarred with gillnet marks were discovered stranded in Prince William Sound (Copper River Delta). These stranding reports were likely

the result of operations in the Prince William Sound salmon drift gillnet fishery. The extrapolated (estimated) observer mortality for this fishery accounts for these mortalities, so they do not appear in Table 19.

A reliable estimate of the mortality rate incidental to commercial fisheries is considered unavailable because of the absence of observer placements in several gillnet fisheries mentioned above. However, the estimated minimum annual mortality rate incidental to commercial fisheries is 25, based on observer data (20) and logbook reports (rounded to 5) where observer data were not available. This estimated annual mortality rate is greater than 10% of the PBR (7.1) and, therefore, cannot 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 the Gulf of Alaska 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 mortality. However, based on the best scientific information available, the estimated level of human-caused mortality and serious injury (25) is not known to exceed the PBR (71). Therefore, the Gulf of Alaska 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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