PACIFIC WHITE-SIDED DOLPHIN (*Lagenorhynchus obliquidens*): Central North Pacific Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

The Pacific white-sided dolphin is found throughout the temperate North Pacific Ocean, north of the coasts of Japan and Baja California, Mexico. In the eastern North Pacific the species occurs from the southern Gulf of California, north to the Gulf of Alaska, west to Amchitka in the Aleutian Islands, and is rarely encountered in the southern Bering Sea. The species is common both on the high seas and along the continental margins, and animals are known to enter the inshore passes of Alaska, British Columbia, and Washington (RIWC 1997).

The following information was considered in classifying Pacific white-sided dolphin stock structure based on the Dizon et al. (1992) phylogeographic approach: 1) Distributional data: geographic distribution is continuous; 2) Population response data: unknown; 3) Phenotypic data: two morphological forms are recognized (Walker et al. 1986, Chivers et al. 1993); and 4) Genotypic

Figure 21. Approximate distribution of Pacific white-sided dolphins in the eastern North Pacific (shaded area).

data: preliminary genetic analyses on 116 Pacific white-sided dolphin collected in four areas (Baja California, the west coast of the U. S., British Columbia/southeast Alaska, and offshore) were not statistically significant to support phylogeographic partitioning, though lend credence support the hypothesis that animals from the different regions are sufficiently isolated to treat them as separate management units (RIWC 1997). Based on this limited information, stock structure throughout the North Pacific is poorly defined, yet the northern form occurs north of about 33°N from southern California to Alaska, whereas the southern form ranges from about 36°N southward along the coasts of California and Baja California. The northern and southern forms can not, however, currently be differentiated for abundance and mortality estimation, and are thus managed as a single unit. Because the California and Oregon thresher shark/swordfish drift gillnet fishery operates between 33°N and 45°N and is known to interact with Pacific white-sided dolphins, two stocks are recognized: 1) the California/Oregon/Washington stock, and 2) the Central North Pacific stock (Fig. 21). The California/Oregon/ Washington stock is reported separately in the Stock Assessment Reports for the Pacific Region.
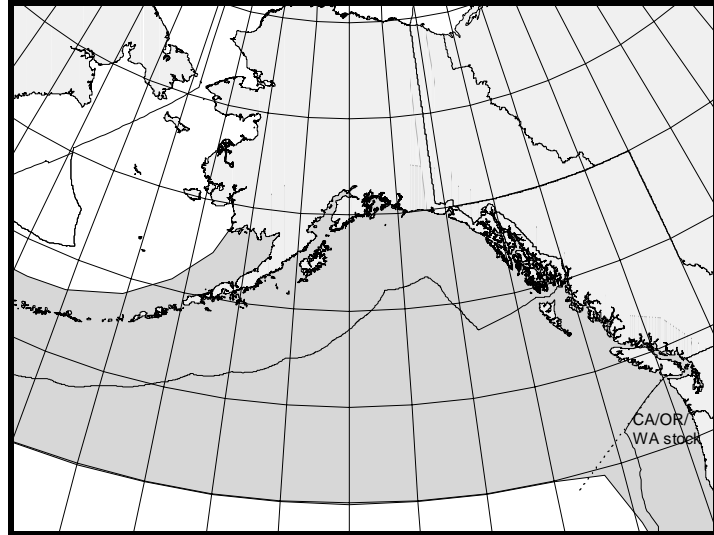
POPULATION SIZE

The most recent population abundance estimate for Pacific white-sided dolphins was calculated from line transect analyses applied to the 1987-90 central North Pacific marine mammal sightings survey data (Buckland et al. 1993). The abundance estimate was 931,000 (CV=0.900; 95% CI 206,000-4,216,000) animals, after a regression adjustment for size-biased sampling of schools. It should be noted, however, that Buckland et al. (1993) suggested that Pacific white-sided dolphins show strong vessel attraction, based on a high concentration of sightings close to the trackline during sampling. A correction factor has not yet been estimated for such vessel attraction behavior for Pacific white-sided dolphins, yet it may be more extreme than the 0.2 determined for Dall's porpoise (*Phocoenoides dalli*).

In other words, the abundance estimates for Pacific white-sided dolphins may be biased upwards by more than five-fold.

Minimum Population Estimate

The minimum population estimate (N_{MIN}) for this stock is calculated according to Equation 1 from the PBR Guidelines (Wade and Angliss 1997): $N_{MIN} = N/exp(0.842*[ln(1+[CV(N)]^2)]^{1/2})$. Using the population estimate (N) of 931,000 and its associated CV of 0.900, N_{MIN} for the Central North Pacific stock of Pacific white-sided dolphin is 486,719.

Current Population Trend

At present, there is no reliable information on trends in abundance for this stock of Pacific white-sided dolphin.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is not currently available for the Central North Pacific stock of Pacific white-sided dolphin. Thus, it is recommended that the cetacean maximum net productivity rate (R_{MAX}) of 4% be employed for this stock (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 of unknown status (Wade and Angliss 1997). Thus, for the Central North Pacific stock of Pacific white-sided dolphin, PBR = 4,867 animals (486,719 x 0.02 x 0.5).

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Between 1978 and 1991, thousands of Pacific white-sided dolphins were killed annually incidental to high seas fisheries. However, these fisheries have not operated in the central North Pacific since 1991.

Six different commercial fisheries in Alaska that could have interacted with Pacific white-sided dolphins were monitored for incidental take by NMFS observers from 1990 to 1995: Bering Sea (and Aleutian Islands) and Gulf of Alaska groundfish trawl, longline, and pot fisheries. For the fisheries with observed takes, the range of observer coverage over the 6-year period, as well as the annual observed and estimated mortalities are presented in Table 17. The mean annual (total) mortality was 0.2 (CV=1.0) in the Bering Sea groundfish trawl fishery and 0.8 (CV=1.0) in the Bering Sea groundfish longline fishery. The 1992 mortality in the Bering Sea groundfish trawl fishery occurred during an unmonitored haul and therefore could not be used to estimate mortality for the entire fishery. Therefore, 1 mortality was used as both the observed mortality and estimated mortality in 1992 for that fishery, and should be considered a minimum estimate. Combining the estimates results in a mean annual (total) mortality rate of 1 Pacific white-sided dolphin in observed fisheries.

The Prince William Sound salmon drift gillnet fishery was also monitored by observers in 1990 and 1991. In 1990, observers boarded 300 (57.3%) of the 524 vessels participating in that 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). The low level of observer coverage for this fishery apparently missed interaction with Pacific-white sided dolphins which had occurred, as logbook mortalities were reported in both years (see Table 17) which were not recorded by the observer program.

An additional source of information on the number of Pacific white-sided dolphins killed or injured incidental to commercial fishery operations is the logbook reports maintained by vessel operators required by the MMPA interim exemption program. During the 4-year period from 1990 to 1993, logbook reports from 3 unobserved fisheries (see Table 17) resulted in an annual mean of 2.25 mortalities from interactions with commercial fishing gear. It is unclear exactly which Bristol Bay fishery caused the 1990 mortalities because the logbook records from the Bristol Bay set and

drift gillnet fisheries were combined. They have been attributed to the Bristol Bay drift gillnet fishery due to the more pelagic nature of the fishery. 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 all Alaska fisheries. Complete logbook data after 1993 are not available.

It should be noted that no observers have been assigned several of the gillnet fisheries that are known to interact with this stock, making the estimated mortality unreliable. However, the large stock size makes it unlikely that unreported mortalities from those fisheries would be a significant source of mortality for the stock. The estimated minimum annual mortality rate incidental to commercial fisheries (4; based on observer data (1) and logbook reports (rounded up to 3) where observer data were not available) is less than 10% of the PBR (487) and, therefore, can be considered to be insignificant and approaching zero mortality and serious injury rate.

Table 17. Summary of incidental mortality of Pacific white-sided dolphins (Central North Pacific 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, 1, 0, 0, 0	0, 0, 1, 0, 0, 0	0.2 (CV=1.0)
BSA groundfish longline (incl. misc. finfish and sablefish fisheries	90-95	obs data	27-80%	0, 0, 0, 0 0, 1	0, 0, 0, 0 0, 4	0.8 (CV=1.0)
Observer program total						1.0
				Reported mortalities		
Prince William Sound salmon drift gillnet	90-93	logbook	n/a	1, 4, 0, 0	n/a	[≥1.25]
Southeast Alaska salmon drift gillnet	90-93	logbook	n/a	0, 0, 1, 0	n/a	[≥.25]
Bristol Bay salmon drift gillnet	90-93	logbook	n/a	3, 0, 0, 0	n/a	[≥.75]
Minimum total annual mortality						≥3.25

Subsistence/Native Harvest Information
There are no reports of subsistence take of Pacific white-sided dolphins in Alaska.

STATUS OF STOCK
Pacific white-sided dolphins are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Based on currently available data, the level of human-caused mortality and serious injury (4) does not exceed the PBR (4,867). Therefore, the Central North Pacific stock of Pacific white-sided dolphins is not classified as a strategic stock. Population trends and status of this stock relative to OSP are currently unknown.

REFERENCES

Anon. 1997. Report of the sub-committee on small cetaceans. Rep. Int. Whal. Commn. 47: in press.

Buckland, S.T., K. L. Cattanach, and R. C. Hobbs. 1993. Abundance estimates of Pacific white sided dolphin, northern right whale dolphin, Dall's porpoise and northern fur seal in the North Pacific, 1987/90. Pp. 387-407, *In* W. Shaw, R. L. Burgner, and J. Ito (eds.), Biology, Distribution and Stock Assessment of Species Caught in the High Seas Driftnet Fisheries in the North Pacific Ocean. Intl. North Pac. Fish. Comm. Symposium; 4-6 November 1991, Tokyo, Japan.

Chivers, S. J., K. M. Peltier, W. T. Norman, P. A. Akin, and J. Heyning. 1993. Population structure of cetaceans in California coastal waters. Paper SOCCS9 presented at the Status of California Cetacean Stocks Workshop, held in La Jolla, California, March 31-April 2, 1993. 49 pp.

Credle, V. R., D. P. DeMaster, M. M. Merklein, M. B. Hanson, W. A. Karp, and S. M. Fitzgerald (eds.). 1994. NMFS observer programs: minutes and recommendations from a workshop held in Galveston, Texas, November 10-11, 1993. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-94-1, 96 pp.

Dizon, A. E., C. Lockyer, W. F. Perrin, D. P. DeMaster, and J. Sisson. 1992. Rethinking the stock concept: a phylogeographic approach. Conserv. Biol. 6:24-36.

Wade, P. R., and R. Angliss. 1997. Guidelines for assessing marine mammal stocks: report of the GAMMS workshop April 3-5, 1996, Seattle, Washington. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-12, 93 pp.

Walker, W. A., S. Leatherwood, K. R. Goodrich, W. F. Perrin, and R. K. Stroud. 1986. Geographical variation and biology of the Pacific white-sided dolphin, *Lagenorhynchus obliquidens*, in the north-eastern Pacific. Pp. 441-465, *In* M. M. Bryden and R. Harrison (eds.), Research on Dolphins, Clarendon Press, Oxford.

Wynne, K. M., D. Hicks, and N. Munro. 1991. 1990 salmon gillnet fisheries observer programs in Prince William Sound and South Unimak Alaska. Annual Rept. NMFS/NOAA Contract 50ABNF000036. 65 pp. NMFS, Alaska Region, Office of Marine Mammals, P.O. Box 21668, Juneau, AK 99802.

Wynne, K. M., D. Hicks, and N. Munro. 1992. 1991 Marine mammal observer program for the salmon driftnet fishery of Prince William Sound Alaska. Annual Rept. NMFS/NOAA Contract 50ABNF000036. 53 pp. NMFS, Alaska Region, Office of Marine Mammals, P.O. Box 21668, Juneau, AK 99802.