

BELUGA WHALE (*Delphinapterus leucas*): Cook Inlet Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Beluga whales are distributed throughout seasonally ice-covered arctic and subarctic waters of the Northern Hemisphere (Gurevich 1980), and are closely associated with open leads and polynyas in ice-covered regions (Hazard 1988). Depending on season and region, beluga whales may occur in both offshore and coastal waters, with concentrations in Cook Inlet, Bristol Bay, Norton Sound, Kasegaluk Lagoon, and the Mackenzie Delta (Hazard 1988). It is assumed that most beluga whales from these summering areas overwinter in the Bering Sea, excluding those found in the northern Gulf of Alaska (Shelden 1994). Seasonal distribution is affected by ice cover, tidal conditions, access to prey, temperature, and human interaction (Lowry 1985). During the winter, beluga whales occur in offshore waters associated with pack ice. In the spring, they migrate to warmer coastal estuaries, bays, and rivers for molting (Finley 1982) and calving (Sergeant and Brodie 1969). Annual migrations may cover thousands of kilometers (Reeves 1990).

The following information was considered in classifying beluga whale stock structure based on the Dizon et al. (1992) phylogeographic approach: 1) Distributional data: geographic distribution discontinuous in summer (Frost and Lowry 1990), distribution unknown outside of summer; 2) Population response data: possible extirpation of local populations; distinct population trends between regions occupied in summer; 3) Phenotypic data: unknown; and 4) Genotypic data: mitochondrial DNA analyses indicate distinct differences among summering areas (O'Corry-Crowe et al. 1997). Based on this information, 5 stocks of beluga whales are recognized within U. S. waters: 1) Cook Inlet, 2) Bristol Bay, 3) eastern Bering Sea, 4) eastern Chukchi Sea, and 5) Beaufort Sea (Fig. 18).

POPULATION SIZE

Aerial surveys for beluga whales in Cook Inlet were conducted annually in June or July during 1994-99 using an 'approach' survey technique that involves repeated circling of observed groups, and videotape recording. The approach technique differs from 'passing mode' surveys performed for belugas in other stocks, in that during passing surveys the aircraft maintains a straight flight path. The approach technique allows each group of whales observed and recorded on video to be corrected for 1) animals that were under the surface, and 2) animals missed by observers yet recorded on video. The sum of median counts for all groups observed in the 1994-99 surveys is 281, 324, 307, 264, 193, and 217 whales, respectively (Rugh et al. In Press). Median counts are appropriate for comparisons between surveys since the effects of outliers (extremes in high or low counts) are reduced, they can be compared to other surveys which lack multiple passes over whale groups, and are more appropriate than maximums corrected for missed whales (Rugh et al. 1996).

The abundance of beluga whales in Cook Inlet is estimated from aerial observer counts and aerial video group size estimates. The group size estimates are corrected for subsurface animals (availability) and animals at the surface that were missed (sightability) based on an analysis of the video tapes. Observer counts are corrected for availability and

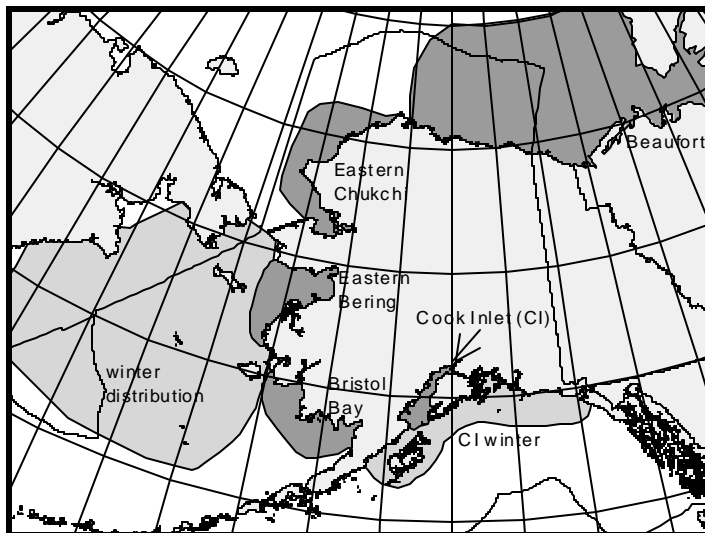


Figure 18. Approximate distribution of beluga whales in Alaska waters. The dark shading displays the summer distributions of the five stocks. Winter distributions are depicted with lighter shading.

sightability using a regression of counts and an interaction term of counts with encounter rate against the video group size estimates (Hobbs et al. In Press). The most recent abundance estimate of beluga whales in Cook Inlet resulting from the June 1999 aerial survey is 375 (CV=0.20) animals (Hobbs et al. In Review).

Minimum Population Estimate

The minimum population size (N_{MIN}) for this stock is calculated according to Equation 1 from the PBR Guidelines (Wade and Angliss 1997): $N_{MIN} = N / \exp(0.842 \times [\ln(1 + [CV(N)]^2)]^{1/2})$. Using the population estimate (N) of 357 and its associated CV(N) of 0.20, N_{MIN} for the Cook Inlet stock of beluga whales is 303.

Current Population Trend

In general, uncorrected counts have ranged from 300 to 500 beluga whales within Cook Inlet between 1970 and 1996. However, median counts since 1996 have been below 300 animals (264 in 1997, 193 in 1998, and 217 in 1999). The abundance estimates for the period 1994-99 are shown in Figure 19 (Hobbs et al. In Review). A statistically significant trend in abundance has been detected, although the power was low due to the short time series. However, the 1999 abundance estimate (357) is approximately 45% lower than the 1994 abundance estimate (653). In addition, a review of beluga distribution data suggest there has been a reduction in offshore sightings in upper Cook Inlet and a reduction in sightings in lower Cook Inlet (Rugh et al. In Review).

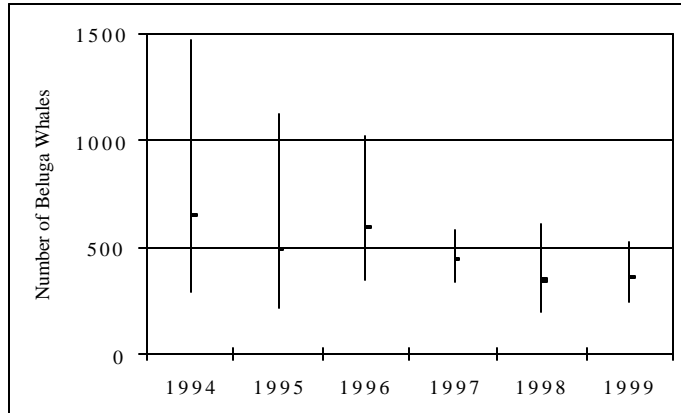


Figure 19. Abundance of beluga whales in Cook Inlet, Alaska 1994-98 (adapted from Hobbs et al. 1998). Error bars depict 95% confidence intervals

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is currently not available for the Cook Inlet stock of beluga whales. Hence, until additional data become available, it is recommended that the cetacean maximum theoretical 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 F_R and PBR for the Cook Inlet stock of beluga whale in Small and DeMaster (1995), Hill et al. (1997), and Hill and DeMaster (1998) were “undetermined” and “undetermined”; 1.0 and 15; and 1.0 and 14, respectively. However, based on the recent information on stock size, trends in abundance, and level of the subsistence harvest, the Alaska Scientific Review Group (ASRG) (Ferrero 1999) has recommended that NMFS reduce the FR to the lowest value possible (i.e., 0.1). Further, the ASRG noted the resulting PBR would be 0.54 (assuming an N_{min} of 273 and an R_{max} of 0.04) and recommended that the agency use this value in managing interactions between Cook Inlet belugas and commercial fisheries in Cook Inlet.

NMFS has chosen not to accept the recommendation of the ASRG at this time. Rather, NMFS has selected an F_R of 0.3 based on the following: 1) this stock has formally been proposed for listing as depleted under the MMPA (which typically is associated with a F_R of 0.5), 2) in March 1999, NMFS was petitioned to list this stock as endangered under the Endangered Species Act, where NMFS has a period of 1 year to make an evaluation as to the merits of the petition (note: a listing of endangered is typically associated with a F_R of 0.1, while a listing of depleted or threatened is associated with a F_R of 0.5). Furthermore, the major mortality factor for this stock, subsistence harvest, has been reduced through legislation and cooperative efforts by Alaskan Natives. Thus, the $PBR = 1.8$ animals ($303 \times 0.02 \times 0.3$) for the Cook Inlet stock of beluga whale. Additional data were collected on this stock in 1999.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Three types of commercial fishing gear, (purse seine, drift gillnet, and set gillnet) could possibly entangle beluga whales in Cook Inlet. These nets are used to catch each of the five species of Pacific salmon, as well as Pacific herring. There are no observer data prior to 1998, as fishery observers had not monitored any of these fisheries within Cook Inlet. However, in 1999 observers were placed on Cook Inlet set and drift gillnet vessels. No mortalities were observed. An additional source of information on the number of beluga whales killed or injured incidental to commercial fishery operations is the self-reported fisheries information required of vessel operators by the MMPA. During the period between 1990 and 1998 fisher self-reports indicated no mortalities of beluga whales from interactions with commercial fishing operations (Table 17a). 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 4 for details).

Table 17a. Summary of incidental mortality of beluga whales (Cook Inlet stock) due to commercial fisheries from 1990 through 1998 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from self-reported fisheries information. Data from 1994 to 1998 (or the most recent 5 years of available data) are used in the mortality calculation when more than 5 years of data are provided for a particular fishery. n/a indicates that data are not available. Observer data for two Cook Inlet fisheries were also available for 1999.

Fishery name	Years	Data type	Range of observer coverage	Reported mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Cook Inlet salmon drift gillnet	1999	obs data		0	0	0
Cook Inlet salmon set gillnet	1999	obs data		0	0	0
Observer program total	93-99					0
Cook Inlet salmon drift gillnet	90-98	logbook s/ self reports	n/a	0, 0, 0, 0, n/a n/a, n/a, n/a, n/a	n/a	[0]
Cook Inlet salmon set gillnet	90-98	logbook s/ self reports	n/a	0, 0, 0, 0, n/a n/a, n/a, n/a, n/a	n/a	[0]
Minimum total annual mortality						0

In the past, beluga mortalities have been attributed to Cook Inlet fisheries with the fishing-related mortality during the 3-year period from 1981 to 1983 estimated at 3-6 animals per year (Burns and Seaman 1986). Accordingly, though there were no self-reported fishery mortalities of beluga whales, the Cook Inlet gillnet fisheries (having a combined total of over 1,325 active permits in 1997) have been included in Table 17a because logbook records (fisher self-reports required during 1990-94) are most likely negatively biased (Credle et al. 1994).

Based on a lack of reported mortalities, the estimated minimum mortality rate incidental to commercial fisheries is zero belugas per year from this stock. However, a reliable estimate of the mortality rate incidental to commercial fisheries is currently unavailable because of the absence of observer placements in the Cook Inlet fisheries mentioned above. The Cook Inlet salmon set and drift gillnet fisheries are scheduled to be observed again in 2000.

Subsistence/Native Harvest Information

A study conducted by the Alaska Department of Fish and Game (ADF&G), in cooperation with the Alaska Beluga Whale Committee (ABWC) and the Indigenous People’s Council for Marine Mammals, estimated the subsistence take in 1993 at 17 whales based on surveys of 16 of 19 households known to have hunted in 1993 (Table 17b: Stanek 1994). This was considered a minimum estimate, and was increased by adding the estimated number of whales taken from households not surveyed (3) and by hunters from areas outside of Cook Inlet (10) resulting in an estimated total take of 30 (17 + 3 + 10) whales. However, in consultation with native elders from the Cook Inlet region, the Cook Inlet Marine Mammal Council (CIMMC) estimated the annual number of belugas taken by subsistence hunters to be greater than 30 animals (DeMaster 1995: p. 5).

There was no systematic Cook Inlet beluga harvest survey in 1994. Instead, Cook Inlet harvest data for 1994 were compiled at the November 1994 ABWC meeting. Representatives of the CIMMC, ADF&G Division of Subsistence, and an active Cook Inlet hunter each presented harvest information they knew about. They discussed the information among themselves to eliminate redundancy, and agreed upon a final 1994 harvest estimate of 19 retrieved and 2 struck and lost. This included 2 belugas taken in Cook Inlet by hunters from Kotzebue Sound. The ADF&G representative estimated that there were 35-50 active beluga hunting households in the Cook Inlet region.

Table 17b. Summary of the Alaska Native subsistence harvest from the Cook Inlet stock of beluga whales, 1993-99. n/a indicates the data are not available.

Year	Reported total number taken	Estimated range of total take	Reported number harvested	Estimated number struck and lost
1993	30 ¹	n/a	n/a	n/a
1994	21 ¹	n/a	19 ¹	2 ¹
1995	70	n/a	42	26
1996	123	98-147	49	49-98
1997	70 ²	n/a	35 ²	35 ²
1998	44 ²	n/a	21	21
1999	0	0	0	0
Mean annual take (based on 1996, 1997 and 1999)	65			

¹ Estimated value (see text); ² Represents a minimum value.

A summary of Cook Inlet beluga whale subsistence harvest data is provided in Table 17b (ABWC unpubl. data, ABWC, P.O. Box 69, Barrow, AK, 99723; CIMMC unpubl. data, 26339 Eklutna Village Rd., Chugiak, AK, 99567). The most thorough subsistence harvest surveys were completed in Cook Inlet by the CIMMC during 1995-97. While some of the local hunters believe the 1996 estimate of struck and lost is positively biased, the 1995-97 CIMMC take estimates are considered reliable. The annual subsistence take by Alaska Natives during this period averaged 87 whales. In 1998, NMFS only received reports of hunter’s taking 21whales in Cook Inlet which was considered a minimum estimate lacking a complete harvest report from CIMMC. Given the struck and lost estimate for Cook Inlet of 1:1, the harvest for 1998 was estimated to be at least 42 beluga whales. Lacking reliable data throughout the time series from 1993 to 1998, it is not

possible to determine the trend in subsistence take. Similarly, subsistence mortality for the Cook Inlet stock has been averaged over the last three reliable estimates (1996, 1997 and 1999) instead of a 5-year period as used for the other four beluga whale stocks addressed in this document.

OTHER MORTALITY

Mortalities related to stranding events have been reported in Cook Inlet. For example, in June of 1996, 63 animals stranded in the Susitna Delta (Rugh et al. 1997). Four of these animals are known to have died as a result of the stranding event (B. Smith, pers. comm., NMFS, 222 W 7th Ave., Anchorage, AK, 99513). Such mortalities are not likely to be associated with human-related activities. In September, 1999, at least 60 beluga whales stranded in Turnagain Arm, of which, six were subsequently found dead. There were no indications that the stranding event had resulted from human interactions.

STATUS OF STOCK

An analysis of available data on the population size and dynamics of the Cook Inlet beluga whale stock led NMFS to conclude that this stock is currently below its Optimum Sustainable Population level. Thus, this stock was listed as “depleted” under the MMPA (56 FR 34590; May 31, 2000). NMFS also made a determination that this stock should not be listed under the ESA at this time (65 FR 38778; June 22, 2000) primarily because the subsistence harvest, which appears to have been responsible for the majority of the decline in this stock, was prohibited in 1999 through an act of Congress; preliminary results indicate that, once the subsistence harvest ceased, the decline in the stock ceased (65 FR 38778; June 22, 2000). In addition, NMFS and local subsistence groups are actively pursuing the development of a comanagement agreement which would allow subsistence harvest, but at a level far below historical levels.

A reliable estimate of the annual rate of mortality incidental to commercial fisheries is unavailable; therefore, it is unknown whether the kill rate is insignificant. At present, annual commercial fishery-related mortality levels, less than 0.18 per year (i.e., 10% of PBR), can be considered insignificant and approaching zero mortality and serious injury rate. However, based on currently available data, the estimated annual level of total human-caused mortality through 1999, 65 beluga whales (estimated exclusively from subsistence harvest data), exceeds the PBR (1.8) for this stock. Thus, the Cook Inlet beluga whale stock is classified as strategic. The estimated level of human-caused removals in 1998 is not sustainable.

Efforts to develop co-management agreements with Native organizations for several marine mammal stocks utilized by Native subsistence hunters across Alaska, including belugas in Cook Inlet, have been underway for several years. In 1995, development of an umbrella agreement among the Indigenous People’s Council for Marine Mammals, U.S. Fish and Wildlife Service, and NMFS was initiated. The agreement was ultimately signed in August, 1997. During 1998, efforts were initiated to formalize a specific agreement with local Alaska Native Organizations and NMFS regarding the management of Cook Inlet belugas, but without success. In the absence of a co-management agreement, Federal legislation was implemented in May, 1999, placing a moratorium on beluga hunting in Cook Inlet until a co-management agreement is completed. Prior to the expiration of the moratorium, a co-management agreement is expected to be completed, through which a longer term rule for managing harvests will be proposed. Determination of sustainable harvest levels for this stock will be based on analysis of information gathered under the co-management agreement, once in place.

Habitat Concerns

NMFS recognizes that municipal, commercial, and industrial activities are of concern and may affect the water quality and substrate in Cook Inlet. This includes commercial fishing, oil and gas development, municipal discharges, noise for aircraft and ships, shipping traffic, and tourism. However, no indication currently exists that these activities have had a quantifiable adverse impact on the beluga whale population. The best available information indicates that these activities, alone or cumulatively, have not caused the stock to be in danger of extinction. Protection from industrial development is being provided at most locations where beluga whales commonly occur. However, susceptibility to adverse impacts may be greater now than in the early 1990s because the stock, in its currently reduced state, occupies a more restricted portion of its prior range in Cook Inlet.

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