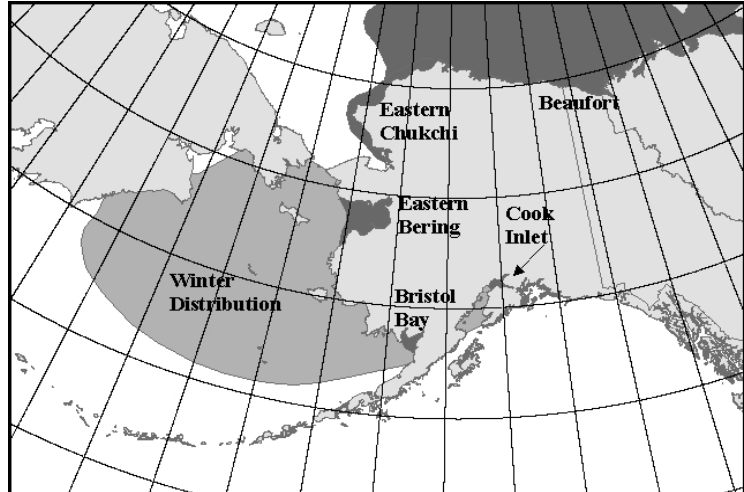


## BELUGA WHALE (*Delphinapterus leucas*): Cook Inlet Stock

### 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). Apparently most beluga whales from these summering areas overwinter in the Bering Sea, excluding those found in Cook Inlet (O'Corry-Crowe et al. 1997). 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, many 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, Suydam et al. 2001).



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

During spring and summer months, beluga whales in Cook Inlet are typically concentrated near river mouths in northern Cook Inlet (Rugh et al. 2000). Although the exact winter distribution of this stock is unknown, there is evidence that some—if not all—of this population may inhabit Cook Inlet year-round (Hansen and Hubbard 1999, Rugh et al. 2000). Satellite tags have been attached to nine belugas in late summer in order to determine their distribution through the fall and winter. Of these, six have lasted through the fall and one lasted into March. None have gone south of Chinitna Bay. A review of all cetacean surveys conducted in the Gulf of Alaska from 1936-00 discovered only 31 sightings of belugas among 23,000 sightings of other cetaceans, indicating that very few belugas occur in the Gulf of Alaska outside of Cook Inlet (Laidre et al. 2000). A small number of beluga whales (under 20 animals) also occur at least seasonally in Yakutat Bay; these are considered part of the Cook Inlet stock (65 FR 34590; 31 May 2000).

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, 2002). 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 have been conducted by the National Marine Fisheries Service each year since 1993. Starting in 1994, the survey protocol included paired, independent observers so that the number of whale groups missed can be estimated. When groups were seen, a series of aerial passes were made to allow each observer to make independent counts at the same time that a video camera was documenting the whale group (Rugh et al. 2000).

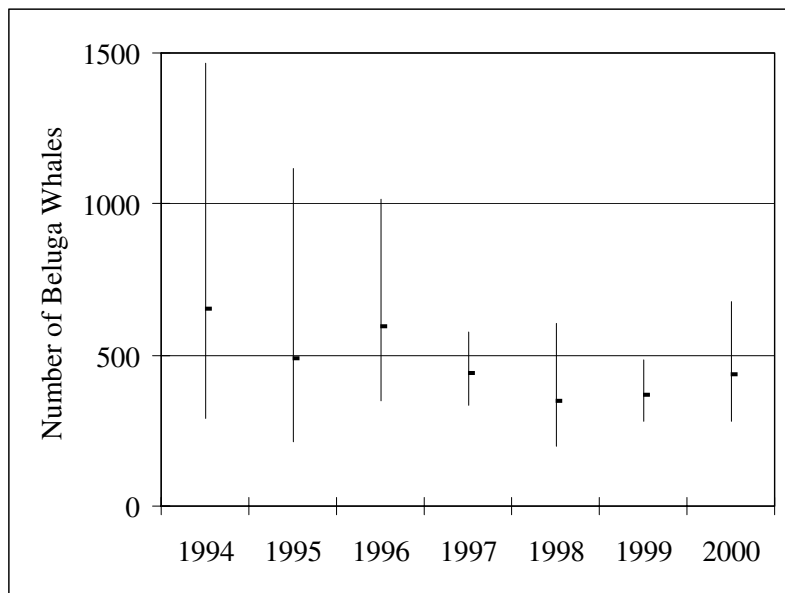
The annual abundances of beluga whales in Cook Inlet are estimated from counts by aerial observers and aerial video group counts. Each group size estimate is corrected for subsurface animals (availability correction) and animals at the surface that were missed (sightability correction) based on an analysis of the video tapes (Hobbs et al. 2000b). Each observer's counts are corrected for availability and sightability using a regression of counts and an interaction term of counts with encounter rate against the video group size estimates (Hobbs et al. 2000b). The most recent abundance estimate of beluga whales in Cook Inlet, resulting from the June 2001 aerial survey is 386 (CV = 0.087) animals (NMFS unpubl. data). Although the 2001 estimate of abundance is slightly lower than the estimate for 2000, the difference is not significant and is not believed to represent a decline in the population (NMFS unpublished data).

### 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 386 and its associated CV(N) of 0.087,  $N_{MIN}$  for the Cook Inlet stock of beluga whales is 359.

### Current Population Trend

In general, uncorrected counts have ranged from 300 to 500 beluga whales within Cook Inlet between 1970 and 1996 (Rugh et al. 2000). However, median counts since 1996 have been below 300 animals (264 in 1997, 193 in 1998, 217 in 1999, and 184 in 2000). The corrected abundance estimates for the period 1994-00 are shown in Figure 19. A statistically significant trend in abundance was detected between 1994 and 1998 (Hobbs et al. 2000a), although the power was low due to the short time series. However, the 1998 abundance estimate (349) was approximately 50% lower than the 1994 abundance estimate (653). In addition, a review of beluga distribution data over the past three decades shows there has been a reduction in offshore sightings in upper Cook Inlet and a dramatic reduction in sightings in lower Cook Inlet (Rugh et al. 2000). Since 1998, this decline seems to have stopped (Hobbs et al. 2000a).



**Figure 19.** Abundance of beluga whales in Cook Inlet, Alaska 1994-2000. 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 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  $F_R$  and PBR for the Cook Inlet stock of beluga whale were both undetermined in Small and DeMaster (1995), 1.0 and 15 in Hill et al. (1997), and 1.0 and 14 in Hill and DeMaster (1998). However, based on the recent information on stock size, trends in abundance, and level of the subsistence harvest, the Alaska Scientific Review Group (SRG) (Ferrero 1999) has recommended that NMFS reduce the  $F_R$  to the lowest value possible (0.1). Further, the Alaska SRG noted the resulting PBR would be 0.61 (assuming an  $N_{MIN}$  of 303

as the 1999 population size 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 Alaska SRG at this time. Rather, NMFS has selected an  $F_R$  of 0.3 based on the following: this stock has been listed as “depleted” under the MMPA (65 Federal Register 34590, 31 May 2000; which typically is associated with a  $F_R$  of 0.5); and NMFS has not listed this stock as endangered under the Endangered Species Act (65 Federal Register 38778, 22 June 2000; 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 = 2.2 animals ( $359 \times 0.02 \times 0.3$ ) for the Cook Inlet stock of beluga whale.

## ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

### Fisheries Information

In 1999 and 2000, observers were placed on Cook Inlet salmon set and drift gillnet vessels because of the potential for these fisheries to incur incidental mortalities of beluga whales. No mortalities were observed in either year (Merkelein et al., in review). 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 1990-00, fisher self-reports indicated no mortalities of beluga whales from interactions with commercial fishing operations (Table 17a). Logbook data are available for part of 1989-94, 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).

**Table 17a.** Summary of incidental mortality of beluga whales (Cook Inlet stock) due to commercial fisheries for 1999-2001.

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	99-00	obs data		0, 0	0	0
Cook Inlet salmon set gillnet	99-00	obs data		0, 0	0	0
Observer program total	93-99					0
Minimum total annual mortality						0

Based on a lack of reported mortalities, the estimated minimum mortality rate incidental to commercial fisheries is zero belugas per year from this stock.

### Subsistence/Native Harvest Information

Subsistence harvest of beluga whales in Cook Inlet has been important to local villages. Between 1993 and 1999, the subsistence take ranged from 30 animals to over 100 (Mahoney and Sheldon 2000). The most thorough subsistence harvest surveys were completed by the Cook Inlet Marine Mammal Council during 1995-97; while some of the hunters believe the 1996 estimate was positively biased, the 1995-97 CIMMC take estimates are considered reliable. The average annual subsistence harvest between 1995 and 1997 was 87 whales.

Congress imposed a moratorium on beluga harvest in Cook Inlet because of the decline in the Cook Inlet beluga whale stock until NMFS developed a cooperative plan for harvest management with the local Alaska Native organizations. Thus, the best estimate of subsistence take in 1999 and 2000 is zero. Harvest is now conducted under a comanagement agreement between the Alaska Native organizations and NMFS; under that agreement, one whale taken in both 2001 and 2002. A summary of Cook Inlet beluga whale subsistence harvest data for 1999-01 is provided in Table 17b.

**Table 17b.** Summary of the Alaska Native subsistence harvest from the Cook Inlet stock of beluga whales, 1999-2001. 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
1999	0	0	0	0
2000	0	0	0	0
2001	1	-	1	0
2002	1	-	1	0
Mean annual take, 2001-02	1			

<sup>1</sup> Estimated value (see text); <sup>2</sup> Represents a minimum value.

#### OTHER MORTALITY

Mortalities related to stranding events have been reported in Cook Inlet. In August 1996, 60 beluga whales stranded in Turnagin Arm and four of these animals are known to have died as a result of the stranding event (Moore et al. 2000). In September 1996, 20-30 beluga stranded in Turnagin Arm and one animal died. In August 1999, at least 60 beluga whales stranded in Turnagain Arm, of which; five were subsequently found dead (Moore et al. 2000). Because Turnagin Arm is a shallow, dangerous waterway, it is not frequented by motorized vessels; thus, it is highly unlikely that the strandings 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 designated as “depleted” under the MMPA (65 FR 34590; 31 May 2000). NMFS also made a determination that this stock should not be listed under the ESA at this time (65 FR 38778; 22 June 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; 22 June 2000, Hobbs et al. 2000a). In addition, NMFS and local subsistence organizations are actively pursuing the development of a co-management agreement which would allow subsistence harvest, but at a level far below historical levels.

Two fisheries suspected of possibly incurring incidental serious injuries or mortalities of beluga whales were observed in 1999 and 2000, but no takes of beluga whales were observed. At present, annual commercial fishery-related mortality levels can be considered insignificant and approaching zero mortality and serious injury rate. In addition, based on the level of subsistence harvest in 1999 and the fact that there is currently a moratorium on the harvest, the total level of human-caused mortality does not exceed the PBR (1.8) level for this stock. However, because the Cook Inlet beluga whale stock has been designated as “depleted” under the MMPA, the Cook Inlet beluga whale stock is classified as strategic.

Efforts to develop co-management agreements with Native organizations for several marine mammal stocks harvested 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. Comanagement agreements between NMFS and the Cook Inlet Marine Mammal Council have since been signed in 2000, 2001, and 2002.

### Habitat Concerns

NMFS recognizes that municipal, commercial, and industrial activities may be 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 (Moore et al. 2000). 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 (65 FR 38778; 22 June 2000:). 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 previously because the stock, in its currently reduced state, occupies a more restricted portion of its prior range in Cook Inlet.

### CITATIONS

- 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.
- Ferrero, R. C. 1999. Minutes from the tenth meeting of the Alaska Scientific Review Group, 6-8 October 1999, Juneau, Alaska. 42 p. (available upon request - National Marine Mammal Laboratory, 7600 Sand Point Way, NE, Seattle, WA 98115)
- Finley, K. J. 1982. The estuarine habitat of the beluga or white whale, *Delphinapterus leucas*. *Cetus* 4:4-5.
- Frost, K. J., and L. F. Lowry. 1990. Distribution, abundance, and movements of beluga whales, *Delphinapterus leucas*, in coastal waters of western Alaska. Pp. 39-57, *In* T. G. Smith, D. J. St. Aubin, and J. R. Geraci (eds.), *Advances in research on the beluga whale, Delphinapterus leucas*. *Can. Bull. Fish. Aquat. Sci.* 224.
- Gurevich, V. S. 1980. Worldwide distribution and migration patterns of the white whale (beluga), *Delphinapterus leucas*. *Rep. Int. Whal. Comm.* 30:465-480.
- Hansen, D. J., and J. D. Hubbard. 1999. Distribution of Cook Inlet beluga whales (*Delphinapterus leucas*) in winter. Final Rept. OCS Study. MMS 99-0024. U.S. Dept. Int., Minerals Management Serv. Alaska OCS Region, Anchorage, AK. v. p.
- Hazard, K. 1988. Beluga whale, *Delphinapterus leucas*. Pp. 195-235, *In* J. W. Lentfer (ed.), *Selected marine mammals of Alaska. Species accounts with research and management recommendations*. Marine Mammal Commission, Washington, D.C.
- Hill, P. S., D. P. DeMaster, and R.J. Small (eds.) 1997. Alaska marine mammal stock assessments, 1996. U. S. Dept. Commer., NOAA Tech. Memo. NMFS-AFSC-78. 150pp.
- Hill, P. S. and D. P. DeMaster (eds.) 1998. Alaska marine mammal stock assessments, 1998. U. S. Dept. Commer., NOAA Tech. Memo. NMFS-AFSC-97. 166pp.
- Hobbs, R. C, D. J. Rugh, and D. P. DeMaster. 2000a. Abundance of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska, 1994-2000. *Mar. Fish. Rev.* 62(3):37-45.
- Hobbs, R.C., J.M. Waite, and D.J. Rugh. 2000b. Beluga, *Delphinapterus leucas*, group sizes in Cook Inlet, Alaska, based on observer counts and aerial video. *Mar. Fish. Rev.* 62(3):46-59.
- Laidre, K. L., K. E. W. Shelden, D. J. Rugh, and B. Mahoney. 2000. Beluga, *Delphinapterus leucas*, distribution and survey effort in the Gulf of Alaska. *Mar. Fish. Rev.* 62(3):27-36.
- Lowry, L. F. 1985. The belukha whale (*Delphinapterus leucas*). Pp. 3-13, *In* J. J. Burns, K. J. Frost, and L. F. Lowry (eds.), *Marine mammals species accounts*. Alaska Dep. Fish and Game, Game Tech. Bull. 7.
- Mahoney, B. A. and K. E. W. Shelden. 2000. Harvest history of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska. *Mar. Fish. Rev.* 62(3):124-140.
- Merkelein, M., B. Fadely, and A. S. VanAtten. In review. Marine Mammal Protection Act observer program, Cook Inlet, Alaska.
- Moore, S. E., K. E. Shelden, L. K. Litzky, B. A. Mahoney, and D. J. Rugh. 2000. Beluga whale, *Delphinapterus leucas*, habitat associations in Cook Inlet, Alaska. *Mar. Fish. Rev.* 62(3):60-80.

- O'Corry-Crowe, G. M., R. S. Suydam, A. Rosenberg, K. J. Frost, and A. E. Dizon. 1997. Phylogeography, population structure and dispersal patterns of the beluga whale *Delphinapterus leucas* in the western Nearctic revealed by mitochondrial DNA. *Mol. Ecol.* 6:955-970.
- O'Corry-Crowe, G. E., A. E. Dizon, R. S. Suydam, and L. F. Lowry. 2002. Molecular genetics studies of population structure and movement patterns in a migratory species: The beluga whale, *Delphinapterus leucas*, in the western nearctic. Pp 464, In C. J. Pfeiffer (ed.), *Molecular and cell biology of marine mammals*. Kreiger Publishing Company. Malabar, Florida.
- Reeves, R. R. 1990. An overview of the distribution, exploitation and conservation status of belugas, worldwide. Pp. 47-58, *In* J. Prescott and M. Gauquelin (eds.), *For the future of the beluga: Proceedings of the International Forum for the Future of the Beluga*. Univ. Quebec Press, Canada.
- Rugh, D. J., K. E. W. Sheldon, and B. Mahoney. 2000. Distribution of beluga whales in Cook Inlet, Alaska, during June/July, 1993 to 1999. *Mar. Fish. Rev.* 62(3):6-21.
- Sergeant, D. E., and P. F. Brodie. 1969. Body size in white whales, *Delphinapterus leucas*. *J. Fish. Res. Bd. Can.* 26:2561-2580.
- Small, R.J. and D. P. DeMaster (eds.) 1995. Alaska marine mammal stock assessments, 1995. U. S. Dept. Commer., NOAA Tech. Memo. NMFS-AFSC-57. 93pp.
- Stanek, R. T. 1994. The subsistence use of beluga whale in Cook Inlet by Alaska Natives, 1993. Draft Final Rep. Study No. 50ABNF200055, submitted to NMFS by Alaska Dep. Fish and Game, Juneau, AK. 24 pp.
- Suydam, R.S., L.F. Lowry, K.J. Frost, G.M. O'Corry-Crowe, and D. Pikkok, Jr. 2001. Satellite tracking of eastern Chukchi Sea beluga whales into the Arctic Ocean. *Arctic* 54(3):237-243.
- 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.