

## BELUGA WHALE (*Delphinapterus leucas*): Beaufort Sea 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).



**Figure 15.** 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.

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. 15).

### POPULATION SIZE

The sources of information to estimate abundance for belugas in the waters of northern Alaska and western Canada have included both opportunistic and systematic observations. Duval (1993) reported an estimate of 21,000 for the Beaufort Sea stock, similar to that reported by Seaman et al. (1985). The most recent aerial survey was conducted in July of 1992, and resulted in an estimate of 19,629 (CV = 0.229) beluga whales in the eastern Beaufort Sea (Harwood et al. 1996). To account for availability bias a correction factor (CF), which was not data-based, has been recommended for the Beaufort Sea beluga whale stock (Duval 1993), resulting in a population estimate of 39,258 (19,629 × 2) animals. A CV for the CF is not available; however, this CF was considered negatively biased by the Alaska SRG considering that aerial survey CFs for this species have been estimated to be between 2.5 and 3.27 (Frost and Lowry 1995).

### Minimum Population Estimate

For the Beaufort Sea stock of beluga whales, the minimum population estimate ( $N_{\text{MIN}}$ ) is calculated according to Equation 1 from the PBR Guidelines (Wade and Angliss 1997). Thus,  $N_{\text{MIN}} = N/\exp(0.842 \times [\ln(1 + [\text{CV}(N)]^2)]^{1/2})$ . Using the population estimate (N) of 39,258 and an associated CV(N) of 0.229,  $N_{\text{MIN}}$  for this stock is 32,453.

**Current Population Trend**

The current population trend of the Beaufort Sea stock of beluga whales is unknown.

**CURRENT AND MAXIMUM NET PRODUCTIVITY RATES**

A reliable estimate of the maximum net productivity rate is currently unavailable for the Beaufort Sea 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:  $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$ . As the stock trend is unknown, the recovery factor ( $F_R$ ) for this stock is 0.5 (Wade and Angliss 1997). Thus, for the Beaufort Sea stock of beluga whales,  $PBR = 324$  animals ( $32,453 \times 0.02 \times 0.5$ ).

**ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY**

**Fisheries Information**

The total fishery mortality and serious injury for this stock is estimated to be zero as there are no reports of mortality incidental to commercial fisheries in recent years.

**Subsistence/Native Harvest Information**

The subsistence take of beluga whales from this stock within U. S. waters is reported by the Alaska Beluga Whale Committee (ABWC). The most recent Alaska Native subsistence harvest estimates for the Beaufort Sea beluga stock are provided in Table 20 (Frost and Suydam 1995; Frost 1998; Frost 2003; K. Frost, University of Alaska, Fairbanks, pers. comm. 2004). Given these data, the annual subsistence take by Alaska Natives averaged 53 belugas during the 5-year period from 1999 to 2003. Recent harvest reports are not considered negatively biased even though they are based on on-site harvest monitoring and harvest reports from well established ABWC representatives. The 1993-95 data are negatively biased because reliable estimates for the number of animals struck and lost are not available prior to 1996.

**Table 20.** Summary of the Alaska Native subsistence harvest from the Beaufort Sea stock of beluga whales, 1999-2003. 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	45+	N/A	35	10+
2000	117	N/A	66	51
2001	43	N/A	25	18
2002	27	N/A	24	3
2003	34	N/A	34	unknown
Mean annual take (1999-2003)	53			

The subsistence take of beluga whales within Canadian waters of the Beaufort Sea is reported by the Fisheries Joint Management Committee (FJMC). The data are collected by on-site harvest monitoring conducted by the FJMC at Inuvialuit communities in the Mackenzie River delta, Northwest Territories. The most recent Canadian Inuvialuit subsistence harvest estimates for the Beaufort Sea beluga stock are provided in Table 21 (Harwood et al, in press; data for 2000-2003 from FJMC Beluga Monitor Program, Fisheries Joint Management Committee, Inuvik, NT, Canada). Given these data, the annual subsistence take in Canada averaged 99 belugas during the 5-year period from 1999-2003. Thus, the mean estimated subsistence take in Canadian and U. S. waters from the Beaufort Sea beluga stock during 1999-2003 is 152 (53 + 99) whales.

**Table 21.** Summary of the Canadian subsistence harvest from the Beaufort Sea stock of beluga whales, 1999-2003. N/A indicates the data are not available.

Year	Reported total number taken	Estimated range of total take	Reported number harvested	Reported number struck and lost
1999	102	N/A	86	16
2000	89	N/A	82	7
2001	92	N/A	86	6
2002	88	N/A	85	3
2003	126	N/A	115	12
Mean annual take (1999-2003)	99			

### STATUS OF STOCK

Beaufort Sea beluga whales are not listed as “depleted” under the MMPA or listed as “threatened” or “endangered” under the Endangered Species Act. Based on a lack of reported mortalities, the estimated annual fishery-related mortality (0) is not known to exceed 10% of the PBR (32) and, therefore, is considered to be insignificant and approaching zero mortality and serious injury rate. Based on currently available data, the estimated annual level of human-caused mortality and serious injury (162) is not known to exceed the PBR (324). Therefore, the Beaufort Sea stock of beluga whales is not classified as a strategic stock. At this time it is not possible to assess the status of this stock relative to its Optimum Sustainable Population size.

### 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.
- Duval, W. S. 1993. Proceedings of a workshop on Beaufort Sea beluga: February 3-6, 1992. Vancouver, B.C. Env. Studies Res. Found. Rep. No 123. Calgary. 33 pp. + appendices.
- Finley, K. J. 1982. The estuarine habitat of the beluga or white whale, *Delphinapterus leucas*. *Cetus* 4:4-5.
- Frost, K. J. 1998. Harvest report: statewide summary for the eastern Bering Sea beluga population, 1995-97. Alaska Beluga Whale Committee Rep. 98-1. 15 pp.
- Frost, K. J. 2003. Harvest report: statewide summary for the western Alaska Beluga stocks, 1998-2002. Alaska Beluga Whale Committee Rep. 03-2. 16 pp.
- 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.
- Frost, K. J., and L. F. Lowry. 1995. Radio tag based correction factors for use in beluga whale population estimates. Working paper for Alaska Beluga Whale Committee Scientific Workshop, Anchorage, AK, 5-7 April 1995. 12 pp. (available upon request- Alaska Dep. Fish and Game, 1300 College Rd., Fairbanks, AK 99701).
- Frost, K. J., and R. Suydam. 1995. Harvests of beluga whales, *Delphinapterus leucas*, in Alaska, 1987-1994. Working paper for Alaska Beluga Whale Committee Scientific Workshop, Anchorage, AK, 5-7 April 1995. 14 pp.
- Gurevich, V. S. 1980. Worldwide distribution and migration patterns of the white whale (beluga), *Delphinapterus leucas*. *Rep. Int. Whal. Comm.* 30:465-480.
- Harwood, L. A., S. Innes, P. Norton, and M. C. S. Kingsley. 1996. Distribution and abundance of beluga whales in the Mackenzie Estuary, southeast Beaufort Sea and west Amundsen Gulf during late July 1992. *Can. J. Fish. Aquat. Sci.* 53:2262-2273.
- Harwood, L.A., P. Norton, B. Day and P. Hall. In press. The harvest of beluga whales in Canada's Western Arctic: hunter-based monitoring of the size and composition of the catch. *Arctic*.
- 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.
- 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 mammal species accounts*. Alaska Dep. Fish and Game, Game Tech. Bull. 7.

- 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.
- 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.
- Seaman, G. A., K. J. Frost, and L. F. Lowry. 1985. Investigations of belukha whales in coastal waters of western and northern Alaska. Part I. Distribution, abundance and movements. U.S. Dep. Commer., NOAA, OCSEAP Final Rep. 56:153-220. (available from NOAA-OMA-OAD, Alaska Office, 701 C. Street, P.O. Box 56, Anchorage, AK 99513).
- Sergeant, D. E., and P. F. Brodie. 1969. Body size in white whales, *Delphinapterus leucas*. *J. Fish. Res. Bd. Can.* 26:2561-2580.
- Shelden, K. E. W. 1994. Beluga whales (*Delphinapterus leucas*) in Cook Inlet - A review. Appendix *In* Withrow, D. E., K. E. W. Shelden, and D. J. Rugh. Beluga whale (*Delphinapterus leucas*) distribution and abundance in Cook Inlet, summer 1993. Annual report to the MMPA Assessment Program, Office of Protected Resources, NMFS, NOAA, 1335 East-West Highway, Silver Spring, MD 20910.
- 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.