

BELUGA WHALE (*Delphinapterus leucas*): Bristol Bay 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).

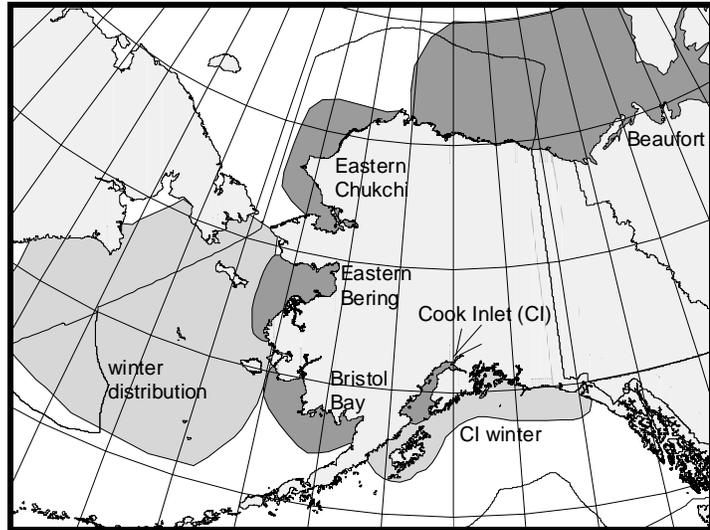


Figure 18. Approximate distribution of beluga whales in Alaska waters. The dark shading displays the summer distributions of the five stocks. Winter distributions are depicted with lighter shading.

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 (G. 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. 17).

POPULATION SIZE

The sources of information to estimate abundance for belugas in the waters of western and northern Alaska have included both opportunistic and systematic observations. Frost and Lowry (1990) compiled data collected from aerial surveys conducted between 1978 and 1987 that were designed to specifically estimate the number of beluga whales. Surveys did not cover the entire habitat of belugas, but were directed to specific areas at the times of year when belugas were expected to concentrate. Frost and Lowry (1990) reported an estimate of 1,000-1,500 for Bristol Bay, similar to that reported by Seaman et al. (1985). Most recently, the number of beluga whales in Bristol Bay was estimated at 1,555 in 1994 (Lowry and Frost 1998). This estimate was based on a count of 503 animals, which was corrected using radio-telemetry data for the proportion of animals that were diving and thus not visible at the surface (2.62, Frost and Lowry 1995b), and for the proportion of newborns and yearlings not observed due to their small size and dark coloration (1.18; Brodie 1971).

An aerial survey of Bristol Bay is scheduled to occur during the summer of 1999. Preliminary results from this survey are expected to be available in 2000.

Minimum Population Estimate

The survey technique utilized for estimating the abundance of beluga whales in this stock is a direct count which incorporates correction factors. Given this survey methodology, an estimate of the variance of abundance is unavailable. In addition, the abundance estimate is thought to be conservative because: 1) some whales may have been outside the survey area (i.e., Kuskokwim Bay), 2) no correction has been made for whales that were at the surface but were missed by the observers, and 3) the dive correction factor is probably negatively biased (Lowry and Frost 1998). Consistent with the recommendations of the Alaska Scientific Review Group (DeMaster 1997), a default CV(N) of 0.2 was used in the calculation of the minimum population estimate (N_{MIN}). N_{MIN} for this beluga whale stock is calculated using Equation 1 from the PBR Guidelines (Wade and Angliss 1997): $N_{\text{MIN}} = N / \exp(0.842 \times [\ln(1 + [CV(N)]^2)]^{1/2})$. Using the population estimate (N) of 1,555 and the default CV (0.2), N_{MIN} for the Bristol Bay stock of beluga whales is 1,316.

Current Population Trend

Population estimates from the 1950s (Brooks 1955, Lensink 1961) suggested there were about 1,000-1,500 belugas in Bristol Bay. The first abundance estimate (1,250) from aerial surveys was conducted in 1983. Consistency in count data and abundance estimates between 1993, 1994, and earlier surveys suggests that the Bristol Bay stock is stable, and at or near its historic size (Frost and Lowry 1990, 1995a, Lowry and Frost 1998).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is currently unavailable for the Bristol Bay 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: $PBR = N_{\text{MIN}} \times 0.5R_{\text{MAX}} \times F_R$. As this stock is considered stable (Frost and Lowry 1990) and because of the regular surveys to estimate abundance and the annual harvest monitoring program supported by the Alaska Beluga Whale Committee (ABWC), the recovery factor (F_R) for this stock is 1.0 (Wade and Angliss 1997, DeMaster 1997; see discussion under PBR for the eastern Bering Sea stock). Thus, for the Bristol Bay stock of beluga whales, $PBR = 26$ animals ($1,316 \times 0.02 \times 1.0$).

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Three different commercial fisheries that could have interacted with beluga whales in Bristol Bay were monitored for incidental take by fishery observers during 1990-97: Bering Sea (and Aleutian Islands) groundfish trawl, longline, and pot fisheries. Observers did not report any mortality or serious injury of beluga whales incidental to these groundfish fisheries (Table 16a).

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. Observers have never monitored the Bristol Bay salmon set gillnet and drift gillnet fisheries which combined had over 2,900 active permits in 1996. During the period between 1990 and 1997, fisher self-reports included 1 mortality in both 1990 and 1991 from these fisheries (see Table 16a) resulting in an annual mean of 0.5 mortalities from interactions with commercial gear. However, because logbook records (fisher self-reports required during 1990-94) are most likely negatively biased (Credle et al. 1994), these are considered to be minimum estimates. The 1990 logbook records from the Bristol Bay set and drift gillnet fisheries were combined. As a result, the 1990 mortality may have occurred in the drift net fishery. Self-reported fisheries data are incomplete for 1994, not available for 1995, and considered unreliable after 1995 (see Appendix 4). Larger fishery-related mortalities resulting from these fisheries have been recorded in

the past. During the summer of 1983 the Alaska Department of Fish and Game documented 12 beluga whale mortalities in Bristol Bay related to drift and set gillnet fishing (Frost et al. 1984).

Table 16a. Summary of incidental mortality of beluga whales (Bristol Bay stock) due to commercial fisheries from 1990 through 1997 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate from self-reported fisheries information. Data from 1993 to 1997 (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.

Fishery name	Years	Data type	Range of observer coverage	Reported mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality
Observer program total	90-97					0
Bristol Bay salmon drift gillnet	90-97	self reports	n/a	0, 1, 0, 0, n/a, n/a, n/a, n/a	n/a	[\$0.25]
Bristol Bay salmon set gillnet	90-97	self reports	n/a	1, 0, 0, 0, n/a, n/a, n/a, n/a	n/a	[\$0.25]
Minimum total annual mortality						\$0.5

The estimated minimum mortality rate incidental to commercial fisheries is 1 animal per year (rounded up from 0.5), based entirely on logbook data. However, a reliable estimate of the mortality rate incidental to commercial fisheries is currently unavailable because of the absence of observer placements in the Bristol Bay gillnet fisheries that are known to interact with this stock.

Subsistence/Native Harvest Information

The subsistence take of beluga whales from the Bristol Bay stock is provided by the ABWC. The most recent subsistence harvest estimates for the stock are provided in Table 16b (Frost and Suydam 1995, Frost 1998). Given these data, the annual subsistence take by Alaska Natives averaged 19 belugas from the Bristol Bay stock during the 5-year period 1993-97. This estimate is based on reporting by ABWC representatives and is considered negatively biased because there is not a reliable estimate for the number of struck and lost prior to 1994.

Table 16b. Summary of the Alaska Native subsistence harvest from the Bristol Bay stock of beluga whales, 1993-97. 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	35 ¹	33-35 ¹	33-35	n/a
1994	18	n/a	16	2
1995	10	n/a	6	4
1996	19	n/a	18	1
1997	11	n/a	11	0
Mean annual take (1993-97)	19			

¹ Does not include the number of struck and lost.

STATUS OF STOCK

At present, annual mortality levels less than 2.6 per year (i.e., 10% of PBR) can be considered insignificant and approaching zero mortality and serious injury rate. However, it is unknown whether the mortality rate is

insignificant because a reliable estimate of the mortality rate incidental to commercial fisheries is currently unavailable. Beluga whales 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 estimated annual rate of human-caused mortality and serious injury (20, including subsistence harvests and fishery-related mortality) is not known to exceed the PBR (26). Therefore, the Bristol Bay stock of beluga whales is not classified as a strategic stock. However, as noted previously, the estimate of fisheries-related mortality is unreliable and, therefore, likely to be underestimated. The population size is considered stable, however, at this time it is not possible to assess the status of this stock relative to its Optimum Sustainable Population size.

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