

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 summer concentrations in upper Cook Inlet, Bristol Bay, the eastern Bering Sea (i.e., Yukon Delta, Norton Sound), eastern Chukchi Sea (including Kotzebue Sound), and Beaufort Sea (Mackenzie Delta) (Hazard 1988). Seasonal distribution is affected by ice cover, tidal conditions, access to prey, temperature, and human interaction (Lowry 1985). Satellite transmitters on whales from the Beaufort Sea, Eastern Chukchi Sea, and Eastern Bering Sea stocks show monthly home ranges that are relatively distinct among these populations' summering areas and autumn migratory routes (e.g., Hauser et al. 2014). Belugas satellite-tagged in Bristol Bay

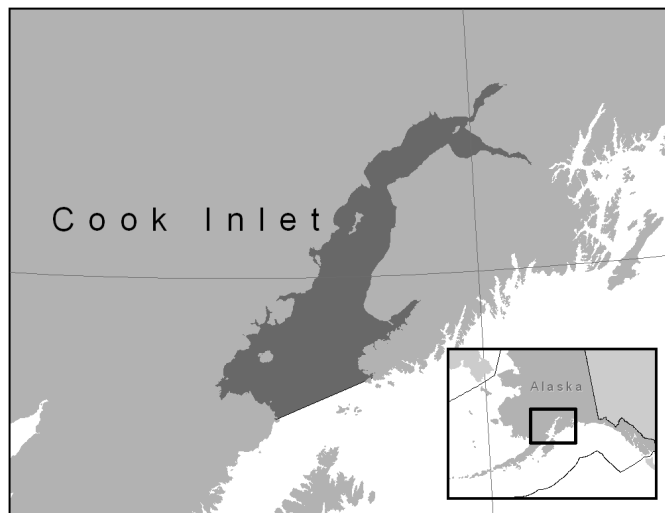


Figure 1. Approximate distribution of beluga whales in Cook Inlet.

(Quakenbush 2003, <http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.bristolbaybeluga>) and Cook Inlet (Goetz et al. 2012a) remained in those areas throughout the year.

Beluga whale stock structure was based on the Dizon et al. (1992) phylogeographic approach: 1) Distributional data: geographic distribution discontinuous (Frost and Lowry 1990); 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 populations in summering areas (O’Corry-Crowe et al. 2002). Based on this information, five beluga whale stocks are recognized within U.S. waters: 1) Cook Inlet (Fig. 1), 2) Bristol Bay, 3) Eastern Bering Sea, 4) Eastern Chukchi Sea, and 5) Beaufort Sea.

During ice-free months, Cook Inlet beluga whales are typically concentrated near river mouths (Rugh et al. 2010). The winter distribution of this stock is not well known; however, there is evidence that some whales inhabit upper Cook Inlet year-round (Hansen and Hubbard 1999, Rugh et al. 2004, Lammers et al. 2013). During summers from 1999 to 2002, satellite tags were attached to a total of 15 belugas to determine their distribution through the fall and winter months (Hobbs et al. 2005, Goetz et al. 2012a). Ten tags transmitted from August to December and, of those, four tags deployed on males transmitted into March and one into late May (Goetz et al. 2012a). All tagged belugas remained in Cook Inlet.

A review of all marine mammal surveys conducted in the northern Gulf of Alaska between 1936 and 2000 found only 31 beluga sightings among 23,000 marine mammal sightings, indicating that very few belugas occurred in the Gulf of Alaska outside Cook Inlet (Laidre et al. 2000). A small number of beluga whales (fewer than 20 animals: Laidre et al. 2000, O’Corry-Crowe et al. 2006) are regularly observed in Yakutat Bay. Although not included in the Cook Inlet Distinct Population Segment (DPS), as listed under the Endangered Species Act (ESA), NMFS regulations under the Marine Mammal Protection Act (MMPA) (50 CFR 216.15) include the beluga whales occupying Yakutat Bay as part of the depleted Cook Inlet stock (75 FR 12498, 16 March 2010). Notice-and-comment rulemaking procedures would be required to change this regulatory definition. Until such procedures are completed, Yakutat Bay belugas remain designated as “depleted” and part of the Cook Inlet stock.

POPULATION SIZE

Aerial surveys during June documenting the early summer distribution and abundance of beluga whales in Cook Inlet were conducted by NMFS each year from 1993 to 2012 (Rugh et al. 2000, 2005; Sheldon et al. 2013). In 2013, NMFS changed to a biennial survey schedule after detailed analysis showed that there would be no reduction in assessment quality (Hobbs 2013).

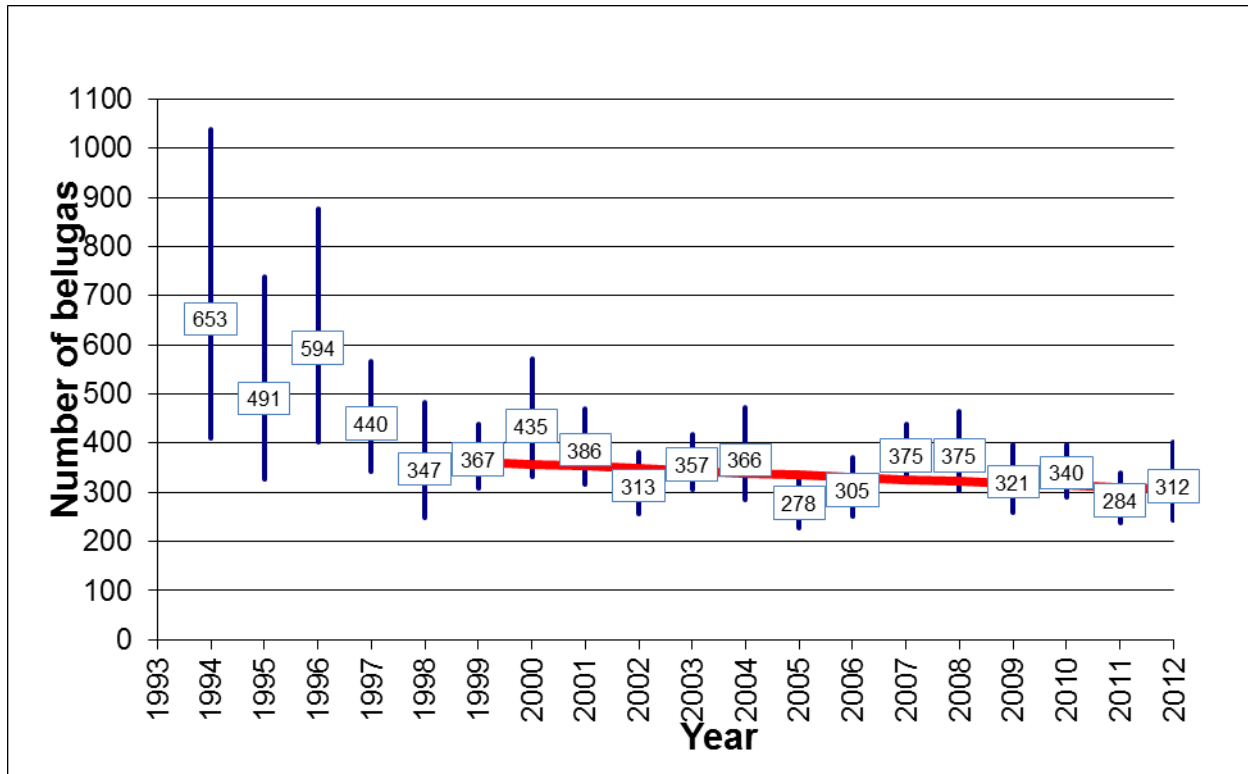


Figure 2. Annual abundance estimates of beluga whales in Cook Inlet, Alaska 1994-2012 (Hobbs et al. 2015). Vertical bars depict plus and minus one standard error. From 1999 to 2012, the rate of decline (red trend line) has been -1.60% per year (with a 97% probability that the growth rate is declining), while the 10-year trend (2002-2012) has been -0.6% per year.

The abundance estimate for beluga whales in Cook Inlet is based on counts by aerial observers and video analysis of whale groups. Paired, independent observers count each whale group while video is collected during each counting pass. Each count 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. 2000). When video counts are not available, observers' counts are corrected for availability and sightability using a regression of counts and an interaction term with an encounter rate against the video count estimates (Hobbs et al. 2000). The estimate of the abundance equation variance was revised using the squared standard error of the average for the abundance estimates in place of the abundance estimate variance and the measurement error (Hobbs et al. 2015). This reduced the CVs by almost half. The June 2012 survey resulted in an estimate of 312 whales (CV = 0.13) (Hobbs et al. 2015). This estimate is more than the estimate of 284 belugas for 2011; however, it falls within the statistical variation around the recent trend line and probably represents variability of the estimation process rather than an increase in the population from 2011 to 2012. Annual abundance estimates based on aerial surveys of Cook Inlet belugas during the most recent 3-year period were 340 (2010), 284 (2011), and 312 (2012), resulting in an average abundance estimate for this stock of 312 (CV = 0.10) belugas. The most recent annual abundance estimate survey was conducted in June 2014 and is currently undergoing analyses.

Minimum Population Estimate

The minimum population estimate (N_{MIN}) is calculated according to Equation 1 from the potential biological removal (PBR) guidelines (Wade and Angliss 1997). Thus, $N_{MIN} = N/\exp(0.842 \times [\ln(1+[CV(N)]^2)]^{1/2})$.

Using the 3-year average population estimate (N) of 312 animals and an associated $CV(N)$ of 0.10, N_{MIN} for the Cook Inlet beluga whale stock is 280 belugas.

Current Population Trend

The corrected annual abundance estimates for the period 1994-2012 are shown in Figure 2. From 1999 to 2012, the rate of decline was -1.60% (SE = 0.75%) per year, with a 97% probability that the growth rate is declining (i.e., less than zero) (Hobbs et al. 2015).

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

A reliable estimate of the maximum net productivity rate is currently not available for the Cook Inlet beluga whale stock. Hence, until additional data become available, the cetacean maximum theoretical net productivity rate (R_{MAX}) of 4% is recommended to be employed for this stock (Wade and Angliss 1997). This figure is similar to the 4.8% annual increase that has been documented for the Bristol Bay beluga stock (Lowry et al. 2008).

POTENTIAL BIOLOGICAL REMOVAL

Under the 1994 reauthorized MMPA, the PBR was defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$. In past Stock Assessment Reports from 1998 through 2005, NMFS calculated a value for PBR. Given the low abundance relative to historic estimates and low known levels of human-caused mortality since 1999, this stock should have begun to grow at or near its maximum productivity rate (2-6%), but for unknown reasons the Cook Inlet beluga whale stock is not increasing. Because this stock does not meet the assumptions inherent to the use of the PBR, NMFS has decided it would not be appropriate to calculate a maximum number that may be removed while allowing the population to achieve its Optimum Sustainable Population. Thus, the PBR for this stock is undetermined.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Detailed information (including observer programs, observer coverage, and observed incidental takes of marine mammals) for federally-managed and state-managed U.S. commercial fisheries in Alaska waters is presented in Appendices 3-6 of the Alaska Stock Assessment Reports.

The estimated minimum average annual mortality and serious injury rate incidental to U.S. commercial fisheries is unknown, although probably low, because only one known beluga mortality has been reported in the past 10 years.

One entanglement in a subsistence fishery was reported to the Alaska Regional Office on May 7, 2012. A fisherman reported a juvenile beluga entangled in his salmon fishing net near Kenai. The beluga was dead and necropsy findings indicated that it was in poor health prior to entanglement and the cause of death was drowning.

Alaska Native Subsistence/Harvest Information

Subsistence harvest of beluga whales in Cook Inlet has been important to one local village (Tyonek) and the Alaska Native subsistence hunter community in Anchorage. Between 1993 and 1999, the annual subsistence take ranged from 30 to more than 100 animals, not including belugas struck but lost (Mahoney and Sheldon 2000).

Following a significant decline in Cook Inlet beluga whale abundance estimates between 1994 and 1998, the Federal government took actions to conserve, protect, and prevent further declines in the abundance of these whales. In 1999 and 2000, Public Laws 106-31 and 106-553 established a moratorium on Cook Inlet beluga whale harvests except for subsistence hunts conducted under cooperative agreements between NMFS and affected Alaska Native organizations. These cooperative agreements, also referred to as co-management agreements, were not signed in 1999, 2004, and 2007, so no harvest was authorized. Harvests from 2001 through 2004 were conducted under harvest regulations (69 FR 17973, 6 April 2004) following an interim harvest management plan developed through an administrative hearing. Three belugas were harvested in Cook Inlet under this interim harvest plan. In August 2004, an administrative hearing was held to create a long-term harvest plan. This plan allowed 8 whales to be harvested between 2005 and 2009. Under the plan, allowable harvest levels are established for a 5-year period, based on the average abundance in the previous 5-year period and the growth rate during the previous 10-year period. A harvest is not allowed if the previous 5-year average abundance is less than 350 belugas. Because the 5-year average abundance during the period 2003-2007 was 336 (i.e., below 350 whales), no harvest was allowed

during the subsequent 5-year period 2008-2012 (73 FR 60976; 15 October 2008). The average abundance of Cook Inlet beluga whales remained below 350 whales during the period 2008-2012; therefore, a harvest is not allowed for the 5-year period 2013-2017.

Other Mortality

Mortality related to stranding events has been reported in Cook Inlet (Table 1). Improved record-keeping was initiated in 1994, and reports have since included the number of dead and live stranded belugas. Most whales involved in a live stranding event probably survive, although some mortalities may be missed by observers if whales die later from strand-related injuries. In 2012, there were 38 whales involved in three live stranding events, with no mortalities reported (Table 1). There were no live stranding events reported to NMFS in 2013. In 2014, at least 76 whales were involved in a single live stranding event in Eagle Bay in Knik Arm. That same year, necropsy results from two dead whales found near Kincaid Park along Turnagain Arm suggested the whales had recently live stranded, and that the live stranding may have contributed to their deaths, although no live stranding events were reported to NMFS (Table 1). Most live strandings occur in Knik Arm or Turnagain Arm, both of which are shallow and dangerous waterways. Turnagain Arm has the largest tidal range in the U.S., with a mean of 9.2 m (30 ft).

Table 1. Cook Inlet beluga strandings investigated by NMFS during 2009-2014 (NMFS, unpubl. data).

Year	Beachcast carcasses	Number of belugas per live stranding event (number of associated known or suspected mortalities)
2009	4	16-21 (0)
2010	5	11(0), 2(0)
2011	3	2(0)
2012	3	12(0), 23(0), 3(0)
2013	5	0
2014	10	76 (0), unknown (2)
Total	30	145-150 (2)

Another source of beluga whale mortality in Cook Inlet is killer whale predation. Killer whale sightings were not well documented and appear to be rare in the upper inlet prior to the mid-1980s. From 1982 through 2014, killer whale sightings in upper Cook Inlet (north of East and West Foreland) were reported to NMFS 29 times, and 9-11 beluga mortalities were suspected to be a direct result of killer whale predation. The last confirmed killer whale predation of a beluga in Cook Inlet occurred in 2008 in Turnagain Arm. In June 2010, a beluga carcass found near Point Possession was speculated to have injuries associated with killer whale predation; however, the poor condition of the beluga carcass prevented a positive determination of cause of death. From 2011 through 2014, NMFS has received no reports of killer whale sightings in upper Cook Inlet or possible predation attempts.

A photo-identification study (Kaplan et al. 2009) did not find any instances where Cook Inlet belugas appeared to have been entangled in, or to have otherwise interacted with, fishing gear. However, in 2010, a beluga with a rope entangled around its girth was observed and photo-documented during the period of May through August. The same whale was photographed in July and August 2011, August 2012, and July 2013, still entangled in the rope line (McGuire et al. 2014). This whale is currently considered to have a non-serious injury (Helker et al. 2015).

STATUS OF STOCK

The Cook Inlet beluga whale stock was designated as “depleted” under the MMPA (65 FR 34590, May 21, 2000), and on October 22, 2008, NMFS listed Cook Inlet belugas as “endangered” under the ESA (73 FR 62919, October 22, 2008). Therefore, the Cook Inlet beluga whale stock is considered a strategic stock. There are no fisheries observers in Cook Inlet and there have been no voluntary reports of beluga mortalities in U.S. commercial fisheries. Annual mortality and serious injury rate for commercial fisheries is likely low, although the incompleteness of data for commercial fisheries operating within the range of Cook Inlet belugas is a concern for this small population. NMFS convened a Recovery Team to aid in the development of a Recovery Plan for the Cook Inlet beluga whales; the Recovery Team’s draft plan was submitted to NMFS in March 2013. NMFS intends to release a draft Recovery Plan for public review and comment in 2015, in advance of finalizing the Recovery Plan for Cook Inlet beluga whales.

HABITAT CONCERNS

Beluga whale critical habitat includes two geographic areas of marine habitat in Cook Inlet that comprise 7,800 km² (3,013 mi²), excluding waters by the Port of Anchorage (76 20180, 11 April 2011). Based on available information from aerial surveys, tagged whales, and opportunistic sightings, belugas remain within the inlet year-round. Since 2000, most whales have been found in the upper inlet north of East and West Foreland not only during the summer months (Rugh et al. 2010) but in the fall as well (Rugh et al. 2004), with tagged whales travelling between the lower and upper inlet and offshore waters >10 m deep during the winter (Goetz et al. 2012a). It is unknown if this contracted distribution is a result of changing habitat (Moore et al. 2000), prey concentration, or predator avoidance (Shelden et al. 2003) or can simply be explained as the contraction of a reduced population into a small number of preferred habitat areas (Goetz et al. 2007, 2012b). With the limited range of this stock, Cook Inlet belugas are vulnerable to human-induced or natural perturbations within their preferred habitat. Goetz et al. (2012b) modeled habitat preferences using NMFS' 1994-2008 abundance survey data. In large areas, such as the Susitna Delta and Knik Arm, they found a high probability of beluga presence in larger group sizes. Beluga presence also increased closer to rivers with Chinook salmon (*Oncorhynchus tshawytscha*) runs, such as the Susitna River. The Susitna Delta also supports two major spawning migrations of a small, schooling smelt (eulachon, *Thaleichthys pacificus*) in May and July. Additional effects that have the potential to impact this stock and its habitat include: changes in prey availability due to natural environmental variability, ocean acidification, and commercial fisheries; climatic changes affecting habitat; predation by killer whales; contaminants; noise; ship strikes; waste management; urban runoff; construction projects; and physical habitat modifications that may occur as Cook Inlet becomes increasingly urbanized (Moore et al. 2000, Lowry et al. 2006). Planned projects that may alter the physical habitat of Cook Inlet include highway improvements; mine construction and operation; oil and gas exploration and development; and expansion and improvements to ports.

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