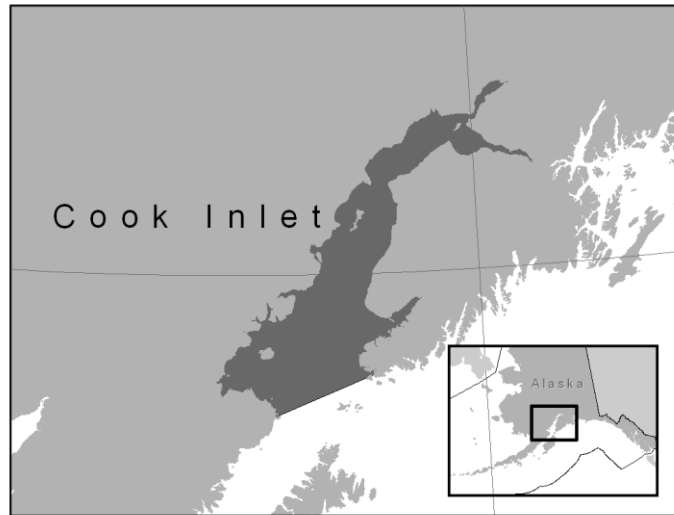


## BELUGA WHALE (*Delphinapterus leucas*): Cook Inlet Stock

### 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, and the Mackenzie Delta (Hazard 1988). Satellite transmitters on a few whales from the Beaufort Sea, Chukchi Sea and eastern Bering Sea stocks have lasted through the winter demonstrating that beluga whales from these summering areas overwinter in the Bering Sea and the stocks may use separate wintering locations (Suydam 2009; Alaska Beluga Whale Committee, unpubl. data). Belugas found in Bristol Bay and the northern Gulf of Alaska/Cook Inlet remain in those areas throughout the year (Shelden 1994; Quakenbush 2003; NMFS and ADF&G, unpubl. data). Seasonal distribution is affected by ice cover, tidal conditions, access to prey, temperature, and human interaction (Lowry 1985).



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

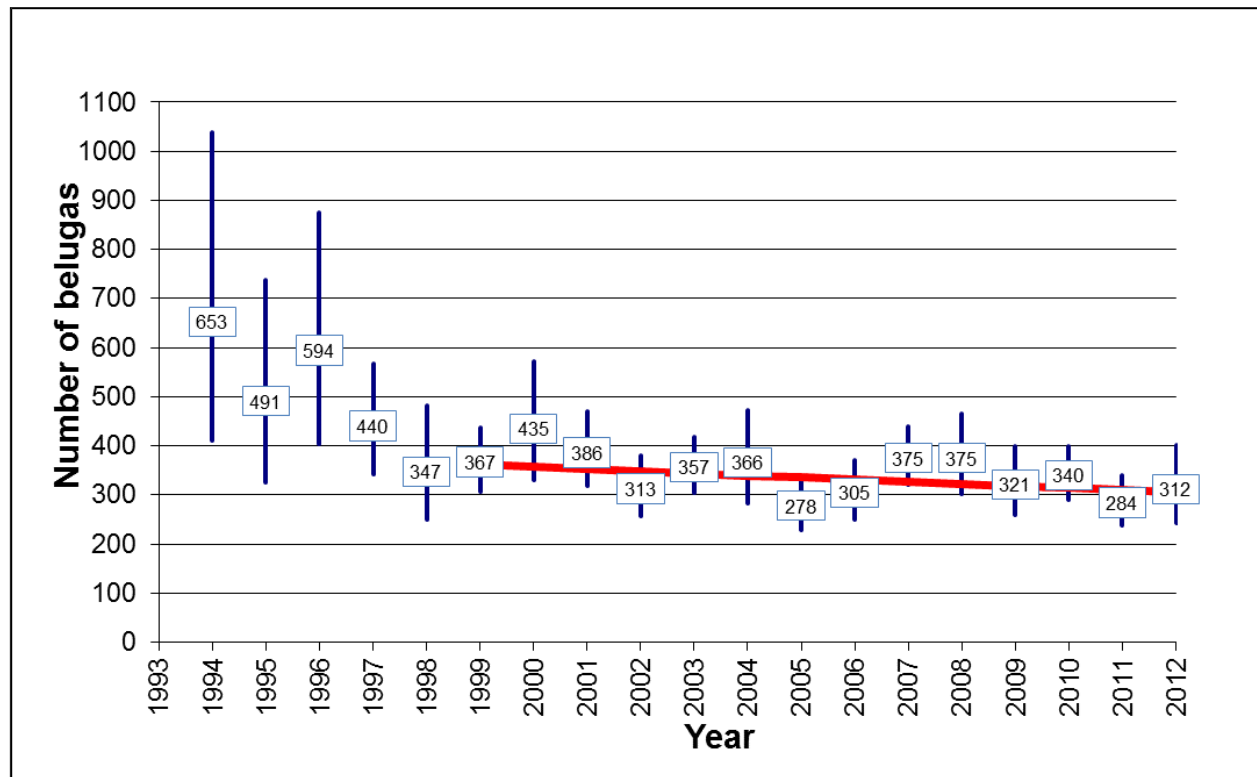
The following information was considered in classifying beluga whale stock structure based on the Dizon et al. (1992) phylogeographic approach: 1) Distributional data: geographic distribution discontinuous (Frost and Lowry 1990); 2) Population response data: possible extirpation of local populations, 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, 5 beluga whale stocks are recognized within U.S. waters: 1) Cook Inlet, 2) Bristol Bay, 3) eastern Bering Sea, 4) eastern Chukchi Sea, and 5) Beaufort Sea.

During the open water months in upper Cook Inlet (north of the forelands), beluga whales are typically concentrated near river mouths (Rugh et al. 2010; Fig. 1). 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, Hobbs et al. 2005). Satellite tags were attached to 17 belugas in late summer during 2000-2002 in order to determine their distribution through the fall and winter months (Hobbs et al. 2005). Ten tags transmitted through the fall, and of those, three tags deployed on adult males transmitted through April and late May (2003). None of the tagged belugas moved south of Chinitna Bay on the west side of Cook Inlet. A review of all marine mammal surveys conducted in the Gulf of Alaska from 1936 to 2000 discovered only 31 beluga sightings among 23,000 marine mammal sightings, indicating that very few belugas occur 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 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 Cook Inlet stock (75 FR 12498, 16 March 2010), defined as depleted in 50 CFR 216.15. Notice-and-comment rulemaking procedures would be required to change this regulatory definition. Until such procedures are completed, these animals remain designated as depleted and part of the Cook Inlet stock.

## POPULATION SIZE

Aerial surveys for beluga whales in Cook Inlet have been conducted by the National Marine Fisheries Service each year from 1993 to 2012. In 2013 the survey was not conducted due to cost considerations; a survey is planned for 2014 and is planned as a biennial survey in subsequent years. The survey protocol includes paired, independent observers. When groups were seen, a series of aerial passes were made to allow each observer to make independent counts simultaneously with video camera recordings of the whales (Rugh et al. 2000, 2005; Sheldon et al. 2013). This dual independent effort would provide two estimated counts and allow for the number of whale groups missed to be estimated.

The beluga whale abundance in Cook Inlet is estimated annually based on counts by aerial observers and video analysis of whale groups. Each count 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. 2000). When video counts are not available, observers' counts are corrected for availability and sightability using a regression of counts and an interaction term of counts 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. in press). This reduced the CVs by almost half, as represented in Figure 2. The most recent annual abundance estimate was conducted in June 2012, and resulted in an estimate of 312 whales (CV = 0.13) (Hobbs et al. in press). This estimate is more than the estimate of 284 for 2011; however, it falls within the statistical variation around the recent trend line (in red) 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.



**Figure 2.** Annual abundance estimates of beluga whales in Cook Inlet, Alaska 1994-2012 (Hobbs et al. in press). Vertical bars depict plus and minus one standard error. Over the last 10 years (2002-2012), the rate of decline (red trend line) has been -0.6% per year.

### **Minimum Population Estimate**

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

### **Current Population Trend**

The corrected annual abundance estimates for the period 1994-2012 are shown in Figure 2. The trend for 2002 to 2012 is an annual decline of 0.6% ( $\text{SE} = 0.011$ ). The 2008 status review of the population indicated there was an 80% chance that the population would decline further (Hobbs and Sheldon 2008).

### **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 ( $R_{\text{MAX}}$ ) 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 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:  $\text{PBR} = N_{\text{MIN}} \times 0.5R_{\text{MAX}} \times F_R$ . In reports from 1998 through 2005, NMFS calculated a value for PBR. However, 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, 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 OSP. Thus, the PBR for this stock is undetermined.

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

#### **New Serious Injury Guidelines**

NMFS updated its serious injury designation and reporting process, which uses guidance from previous serious injury workshops, expert opinion, and analysis of historic injury cases to develop new criteria for distinguishing serious from non-serious injury (Angliss and DeMaster 1998, Andersen et al. 2008, NOAA 2012). NMFS defines serious injury as an “*injury that is more likely than not to result in mortality.*” Injury determinations for stock assessments revised in 2013 or later incorporate the new serious injury guidelines, based on the most recent 5-year period for which data are available.

#### **Fisheries Information**

In 1999 and 2000, observers were placed on Cook Inlet salmon set and drift gillnet vessels because of the potential for those fisheries to entangle beluga whales. No mortalities or serious injuries were observed in either year (Manly 2006). No observer data have been collected in these fisheries since 2000. However, two entanglements have since been reported: 1) on July 14, 2005 a set net fisherman near Nikiski reported a beluga was entangled and then released from his net and the whale’s condition was unknown; and 2) on May 7, 2012 a fisherman reported that a juvenile beluga was entangled in his salmon fishing net during a special use subsistence fishery near Kenai; the whale was dead, and necropsy findings reported this animal was in poor health prior to entanglement.

The estimated minimum mortality rate incidental to commercial fisheries is unknown, although probably low because only one known beluga mortality was reported in over 10 years.

#### **Subsistence/Native Harvest Information**

Subsistence harvest of beluga whales in Cook Inlet has been important to one local village (Tyonek) and the subsistence hunter community in Anchorage. Between 1993 and 1999, the annual subsistence take ranged from

30 to more than 100 animals (Mahoney and Shelden 2000). The average annual subsistence harvest, including struck and lost, for 1995 and 1996 was 87 whales (Cook Inlet Marine Mammal Council).

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 by Alaska Natives conducted under cooperative agreements between NMFS and affected Alaska Native organizations. There were no signed co-management agreements in 1999, 2004, and 2007, so no harvest was authorized. Harvest from 2001 through 2004 was 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 determine a long-term harvest plan, which allowed for 8 whales to be harvested during 2005-2009. From 2008 until recovery, 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 over the previous 10-year period; no harvest is allowed if the previous 5-year average abundance is less than 350 belugas. Because the 5-year average abundance during 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). Since the average abundance of Cook Inlet beluga whales remains below 350 whales (2008-2012), no harvest is allowed for the 5-year period 2013-2017.

### OTHER MORTALITY

Mortalities related to stranding events have 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. The majority of whales involved in a live stranding event probably survive, recognizing that some mortalities are missed by observers if whales die later from stranding-related injuries. The number of whale mortalities suspected to have resulted from live strandings: 5 belugas in 1996, 5 whales in 1999, 5 belugas in 2003 (Vos and Shelden 2005); and 1 beluga in 2005 (Hobbs and Shelden 2008). In 2012 there were 38 whales involved in 3 live stranding events, with no mortalities reported (Table 1). Most live strandings have occurred in Knik Arm and Turnagain Arm, shallow and dangerous waterways, and 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 (Vos and Shelden 2005; Hobbs and Shelden 2008; NMFS, unpubl. data). \*Harvested belugas are not included in the number dead.

Year	Number Dead from Natural or Unknown Causes	Number of Belugas per Live Stranding Event* (# associated known mortalities)
1994	108	186 (0)
1995	3	0
1996	12	63(0), 60(4), 20-30(1), 1(0), 10-20(0)
1997	3	0
1998	14	30(0), 5(0)
1999	12	58-70(5), 12-13(0)
2000	13 (3 predations)	8(0), 15-20(0), 2(0)
2001	10	0
2002	10	0
2003	20 (1 predation)	2(0), 46(5), 26(0), 32(0), 9(0)
2004	13	N/A
2005	6	7(1)
2006	8	12(0)
2007	15	0
2008	11 (1 predation?)	28(0), 30(0)
2009	4	17-20 (0)
2010	5 (1 predation)	11(0), 2(0)
2011	3	2(0)
2012	3	12(0), 23(0), 3(0)
Total	179	735-738 (16)

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 1985 to 2002 there are 18 reported sightings of killer whales in upper Cook Inlet (Shelden et al. 2003). The most recent possible predation event was reported in upper Cook Inlet in June 2010, where an adult beluga carcass, discovered near Point

Possession, showed evidence of possible predation, but poor body condition of the beluga carcass prevented a positive determination.

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, and August 2012, still entangled in the rope line (T. McGuire, LGL Alaska Research Associates, Inc., 2000 W. International Airport Road, Anchorage, AK 99502, pers. comm., 15 February 2013).

## 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. 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 2014, in advance of finalizing the Recovery Plan for Cook Inlet Beluga Whales (<http://www.alaskafisheries.noaa.gov/protectedresources/whales/beluga/recovery/ci.htm>).

## Habitat Concerns

Based on visual observations and satellite tagging, the distribution of Cook Inlet belugas during May-September is currently restricted to the upper inlet (north of the forelands), especially the Susitna Delta, Knik Arm, Turnagain Arm, and Chickaloon Bay (Rugh et al. 2000, 2005, 2010; Goetz et al. 2007). When Cook Inlet is ice-covered, belugas expand their distribution into the waters of the upper inlet and mid-inlet (Hobbs et al. 2005). With the limited range of this stock, Cook Inlet belugas are vulnerable to human-induced or natural perturbations within their preferred habitat. Although the best available information indicated that human activities, including those associated with oil and gas development, were not a contributing factor in the stock becoming in danger of extinction (65 FR 38778; 22 June 2000), potential effects from human activities impeding on beluga recovery remain a concern (73 FR 62919, 22 October 2008). 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; competition with fisheries; increased predation by killer whales; contaminants; noise; vessel traffic; 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). As part of the NMFS Recovery Plan for Cook Inlet Beluga Whales, acoustic threats are being evaluated and a list of actions will be proposed to better understand the impact of anthropogenic noise on Cook Inlet belugas, fill the gaps in knowledge and improve mitigation. A photo-identification study (McGuire et al. 2014) identified belugas that had probably been struck by boat propellers or ships. Projects planned that may alter the physical habitat include a highway bridge across Knik Arm, highway improvements, coal mine construction and operation near Chuitna River; oil and gas exploration and development, as well as seismic surveys; and expansion and improvements to the Port of Anchorage. Beluga whale critical habitat includes two geographic areas of marine habitat in Cook Inlet that comprise 7,800 km<sup>2</sup> (3,013 mi<sup>2</sup>), excluding waters by the Port of Anchorage (76 FR 20180, 11 April 2011).

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