Beluga, Cook Inlet stock

Class: Mammalia
Order: Cetacea

Delphinapterus leucas pop. 4

Note: This assessment refers to this subspecies only. A species level report, which refers to all associated subspecies, is also available.

Review Status: Peer-reviewed **Version Date:** 15 May 2018

Conservation Status

NatureServe:	*Agency:*		
G Rank: G5T1	ADF&G: Species of Greatest Conservation Need	IUCN: Near Threatened	Audubon AK:
S Rank: S1	USFWS: Listed Endangered	BLM:	

Final Rank

Conservation category: **II. Red**

high status and either high biological vulnerability or high action need

Category	Range	Score
Status	-20 to 20	20
Biological	-50 to 50	20
Action	-40 to 40	-20

Higher numerical scores denote greater concern

Status - variables measure the trend in a taxon's population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing). **Score**

Population Trend in Alaska (-10 to 10) 10

The Cook Inlet beluga population has been declining since at least 1994, and does not show signs of recovery (Hobbs et al. 2015; Shelden et al. 2015a; Muto et al. 2017).

Distribution Trend in Alaska (-10 to 10) 10

The distribution of the Cook Inlet beluga population has contracted since the 1970s (Huntington 2000; Rugh et al. 2000; Rugh et al. 2010; NMFS 2008a; Muto et al. 2017), and this trend is continuing (Shelden et al. 2017).

Status Total: 20

Biological - variables measure aspects of a taxon's distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable). **Score**

Population Size in Alaska (-10 to 10) 10

Recent surveys estimate a population size between 310 and 350 individuals (Muto et al. 2017; Shelden et al. 2017).

Range Size in Alaska (-10 to 10) 4

Found throughout Cook Inlet year-round (Hobbs et al. 2005; Goetz et al. 2012), but range is most

restricted in the summer (O'Corry-Crowe et al. 2018), and is ~3,800 sq. km. The small, isolated Yakutat Bay population is considered part of the Cook Inlet stock (Muto et al. 2017), and has a range size of ~1,000 sq. km. The combined range is 4,800 sq. km.

Population Concentration in Alaska (-10 to 10) 2

Population is restricted to Cook Inlet and Yakutat Bay (Hobbs et al. 2005; Goetz et al. 2012). Distribution shifts seasonally in response to availability of anadromous fish (Ashford et al. 2013). In the summer, concentrations occur near river mouths and estuaries around Beluga River, the Susitna Delta, Turnagain Arm, Knik Arm, and Chickaloon Bay (Goetz et al. 2007; Ashford et al. 2013; Lammers et al. 2013). In the fall, winter, and spring they disperse further west and south, near Kalgin Island (Ashford et al. 2013; Lammers et al. 2013).

Reproductive Potential in Alaska

Age of First Reproduction (-5 to 5) 3

Estimates range from 6 to 14 years old (Burns and Seaman 1986; Suydam 2009). Average female age at first reproduction was 8 years in the eastern Chukchi Sea (Suydam 2009).

Number of Young (-5 to 5) 5

Adult females produce a single calf every two to three years (Burns and Seaman 1986; Suydam 2009).

Ecological Specialization in Alaska

Dietary (-5 to 5) -5

Opportunistic feeders with a diverse diet of fish and invertebrates. Consume eulachon and salmon during the summer; in the fall, they switch to other fish species such as cod, sculpin, and flatfishes as spawning fish decline (Goetz et al. 2012; Ashford et al. 2013; Quakenbush et al. 2015). Also consume invertebrates, especially shrimp (Quakenbush et al. 2015).

Habitat (-5 to 5) 1

Unlike other beluga populations, the Cook Inlet DPS is restricted to relatively shallow waters. Beluga habitat selection within Cook Inlet varies by season (NMFS 2016). During fish spawning seasons (spring and summer), beluga concentrate at the mouth of freshwater rivers where prey concentrations are high (NMFS 2008a). During fall and winter, belugas disperse and tend to shift to deeper, more southerly waters (Hobbs et al. 2005; Lammers et al. 2013; NMFS 2016).

Biological Total: 20

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs). **Score**

Management Plans and Regulations in Alaska (-10 to 10) -10

Protected under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act. The MMPA prohibits sport and commercial hunting. A conservation plan was finalized in 2008 and a recovery plan is in place (NMFS 2008a; NMFS 2016). Beluga are actively managed by NOAA's National Marine Fisheries Service (NMFS; https://alaskafisheries.noaa.gov/pr); the Cook Inlet stock is co-managed by the Cook Inlet Marine Mammal Council. Because of low population size, subsistence hunting is currently not permitted (Muto et al. 2017).

Knowledge of Distribution and Habitat in Alaska (-10 to 10) -10

Seasonal movements, habitat use, and distribution patterns have been well-documented through aerial surveys, satellite telemetry, and acoustic surveys (e.g. Rugh et al. 2000; Laidre et al. 2000; Goetz et al. 2007; Rugh et al. 2010; Goetz et al. 2012; Ashford et al. 2013; Shelden et al. 2013;

Hobbs et al. 2015; Shelden et al. 2016; O'Corry-Crowe et al. 2018).

Knowledge of Population Trends in Alaska (-10 to 10) -10

Extensive sampling, small population size, and restricted range have allowed for strong estimates of population size and trends (Hobbs et al. 2015; Muto et al. 2017). Population estimates have been calculated since 1993 (NMFS 2016).

Knowledge of Factors Limiting Populations in Alaska (-10 to 10) 10

A number of potentially limiting factors have been identified, but it is unknown which factors are the most important (Carter and Nielsen 2011; NMFS 2016). Initial population declines may have been due to overharvesting, though other factors may have played a role, and it is not known why the population has not rebounded (Mahoney and Shelden 2000; NMFS 2008a; Muto et al. 2017). Proposed limiting factors include habitat degradation (Mahoney and Shelden 2000; NMFS 2016), changes in prey type or abundance (NMFS 2016; Nelson 2017), disease, contaminants (Reiner et al. 2011; Hogeut et al. 2013), and noise pollution (Small et al. 2017). It is possible that several of these factors are interacting with each other to prevent recovery (NMFS 2016). Mortalities due to fisheries, stranding events, and predation by killer whales are generally low and these factors are not considered significant (NMFS 2016; Muto et al. 2017).

Action Total: -20

Supplemental Information - variables do not receive numerical scores. Instead, they are used to sort taxa to answer specific biological or management questions.

Harvest:	None or Prohibited
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Population
% Global Range in Alaska:	>10%
% Global Population in Alaska:	Endemic
Peripheral:	No

References

Ashford, J. R., T. Ezer, and C. M. Jones. 2013. River discharge predicts spatial distributions of beluga whales in the Upper Cook Inlet, Alaska, during early summer. Polar Biology 36(8):1077–1087. DOI: 10.1007/s00300-013-1330-8

Burns, J. J., and G. A. Seaman. 1986. Investigations belukha whales in coastal waters of western and northern Alaska II. Biology and ecology. Final Report submitted to NOAA, Alaska Department of Fish and Game, Outer Continental Shelf Environmental Assessment Program Research, Unit 612, Fairbanks, AK, USA.

Carter, B. T. G., and E. A. Nielsen. 2011. Exploring ecological changes in Cook Inlet beluga whale habitat though traditional and local ecological knowledge of contributing factors for population decline. Marine Policy 35(3):299–308. DOI: 10.1016/j.marpol.2010.10.009

Goetz, K. T., D. J. Rugh, A. J. Read, and R. C. Hobbs. 2007. Habitat use in a marine ecosystem: Beluga whales Delphinapterus leucas in Cook Inlet, Alaska. Marine Ecology Progress Series 330:247–256. DOI: 10.3354/meps330247

Goetz, K. T., R. A. Montgomery, J. M. Ver Hoef, R. C. Hobbs, and D. S. Johnson. 2012. Identifying essential summer habitat of the endangered beluga whale Delphinapterus leucas in Cook Inlet, Alaska. Endangered Species Research 16:135–147. DOI: 10.3354/esr00394

Hobbs, R. C., K. L. Laidre, D. J. Vos, B. A. Mahoney, and M. Eagleton. 2005. Movements and area use of belugas, Delphinapterus lencas, in a Subarctic Alaskan estuary. Arctic 58(4):331–340.

Hobbs, R. C., K. E. W. Shelden, D. J. Rugh, C. L. Sims, and J. M. Waite. 2015. Estimated abundance and trend in aerial counts of beluga whales, Delphinapterus leucas, in Cook Inlet, Alaska, 1994-2012. Marine Fisheries Review 77(1):11–31. DOI:

10.7755/MFR.77.1.2

Hoguet, J., J. M. Keller, J. L. Reiner, J. R. Kucklick, C. E. Bryan, A. J. Moors, R. S. Pugh, and P. R. Becker. 2013. Spatial and temporal trends of persistent organic pollutants and mercury in beluga whales (Delphinapterus leucas) from Alaska. Science of The Total Environment 449:285–294. DOI: 10.1016/j.scitotenv.2013.01.072

Huntington, H. P. 2000. Traditional knowledge of the ecology of belugas, Delphinapterus leucas, in Cook Inlet, Alaska. Marine Fisheries Review 62:134-140.

Laidre, K. L., K. E. W. Shelden, D. J. Rugh, and B. A. Mahoney. 2000. Beluga, Delphinapterus leucas, distribution and survey effort in the Gulf of Alaska. Marine Fisheries Review 62(3):27–36.

LammeLammers, M. O., M. Castellote, R. J. Small, S. Atkinson, J. Jenniges, A. Rosinski, ..., and C. Garner. 2013. Passive acoustic monitoring of Cook Inlet beluga whales (Delphinapterus leucas). Journal of the Acoustical Society of America 134(3):2497–2504. DOI: 10.1121/1.4816575

Mahoney, B. A., and K. E. W. Shelden. 2000. Harvest history of belugas, Delphinapterus leucas, in Cook Inlet, Alaska. Marine Fisheries Review 62(3):124-133.

Muto, M. M., V. T. Helker, R. P. Angliss, B. A. Allen, P. L. Boveng, ..., A. N. Zerbini. 2017. Alaska marine mammal stock assessments, 2016. NOAA Technical Memorandum NMFS-AFSC-355, Alaska Fisheries Science Center, National Marine Fisheries Service, Seattle, WA, USA.

Nelson, M. A. 2017. Fifty years of Cook Inlet beluga whale ecology recorded as isotopes in bone and teeth. M.Sc. thesis, University of Alaska Fairbanks, AK, USA.

National Marine Fisheries Service (NMFS). 2008a. Conservation plan for the Cook Inlet beluga whale (Delphinapterus leucas). National Marine Fisheries Service, Juneau, AK, USA.

National Marine Fisheries Service (NMFS). 2016. Recovery plan for the Cook Inlet beluga whale (Delphinapterus leucas). National Marine Fisheries Service, Alaska Region, Protected Resources Division, Juneau, AK, USA.

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. Molecular Ecology 6(10):955–970. DOI: 10.1046/j.1365-294X.1997.00267.x

O'Corry-Crowe, G., R. Suydam, L. Quakenbush, B. Potgieter, L. Harwood, D. Litovka, T. Ferrer, J. Citta, V. Burkanov, K. Frost, and B. Mahoney. 2018. Migratory culture, population structure and stock identity in North Pacific beluga whales (Delphinapterus leucas). PLoS ONE 13(3):1–32. DOI: 10.1371/journal.pone.0194201

Quakenbush, L. T., R. S. Suydam, A. L. Brown, L. F. Lowry, K. J. Frost, and B. A. Mahoney. 2015. Diet of beluga whales, Delphinapterus leucas, in Alaska from stomach contents, March-November. Marine Fisheries Review 77(1):70–84. DOI: 10.7755/MFR.77.1.7

Reiner, J. L., S. G. O'Connell, A. J. Moors, J. R. Kucklick, P. R. Becker, and J. M. Keller. 2011. Spatial and temporal trends of perfluorinated compounds in beluga whales (Delphinapterus leucas) from Alaska. Environmental Science & Technology 45(19):8129–8136. DOI: 10.1021/es103560q

Rugh, D. J., K. E. W. Shelden, and B. A. Mahoney. 2000. Distribution of belugas, Delphinapterus leucas, in Cook Inlet, Alaska, during June/July 1993-2000. Marine Fisheries Review 62(3):6–21.

Rugh, D. J., K. E. W. Shelden, and R. C. Hobbs. 2010. Range contraction in a beluga whale population. Endangered Species Research 12(1):69–75. DOI: 10.3354/esr00293

Shelden, K. E. W., D. J. Rugh, K. T. Goetz, C. L. Sims, L. Vate Brattstrom, J. A. Mocklin, B. A. Mahoney, B. K. Smith, and R. C. Hobbs. 2013. Aerial surveys of beluga whales, Delphinapterus leucas, in Cook Inlet, Alaska, June 2005 to 2012. NOAA Technical Memorandun NMFS-AFSC-263, Alaska Fisheries Science Center, AK, USA.

Shelden, K. E. W., C. L. Sims, L. Vate Brattstrom, K. T. Goetz, and R. C. Hobbs. 2015a. Aerial surveys of beluga whales (Delphinapterus leucas) in Cook Inlet, Alaska, June 2014. AFSC Processed Report 2015-03, Alaska Fisheries Science Center, NOAA, National Marine Fisheries Service, Seattle, WA, USA.

Shelden, K. E. W., K. T. Goetz, D. J. Rugh, D. G. Calkins, B. A. Mahoney, and R. C. Hobbs. 2016. Spatio-temporal changes in beluga whale, Delphinapterus leucas, distribution: Results from aerial surveys (1977-2014), opportunistic sightings (1975-2014), and satellite tagging (1999-2003) in Cook Inlet, Alaska. Marine Fisheries Review 77(2):1–31. DOI: 10.7755/MFR.77.2.1

Shelden, K. E. W., R. C. Hobbs, C. L. Sims, L. Vate Brattström, J. A. Mocklin, C. Boyd, and B. A. Mahoney. 2017. Aerial surveys, abundance, and distribution of Beluga whales (Delphinapterus leucas) in Cook Inlet, Alaska, June 2016. AFSC Processed Report 2017-09, National Marine Fisheries Service, National Marine Fisheries Service, Seattle, WA, USA. DOI: 10.7289/v5/afsc-pr-2017-09

Small, R. J., B. Brost, M. Hooten, M. Castellote, and J. Mondragon. 2017. Potential for spatial displacement of Cook Inlet beluga whales by anthropogenic noise in critical habitat. Endangered Species Research 32:43–57. DOI: 10.3354/esr00786

Suydam, R. S. 2009. Age, growth, reproduction, and movements of beluga whales (Delphinapterus leucas) from the eastern Chukchi Sea. Ph.D. thesis, University of Washington, Seattle, WA, USA.

Alaska Center for Conservation Science
Alaska Natural Heritage Program
University of Alaska Anchorage
Anchorage, AK