

Report #3: Photo-Identification of Beluga Whales in Cook Inlet, Alaska:

Summary of reproduction of identified individuals in 2024

Prepared by:

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*2024 field team: Debbie Boyle, Kyoko Hada, Brian McGurgan, John McClung, Chandera Tolley, Tamara McGuire, Samantha Murk. Thanks to JBER, ADF&G, NMFS, AKBMP, BWA and the public for sharing sightings and photos. 2024 photo-processing team: John McClung, Chandera Tolley, Mackenzie Garner, Samantha Murk, and Tamara McGuire. Photos taken with NMFS permit #27128. *G.K. Himes Boor is employed by the National Marine Mammal Foundation and wrote the code to produce Table 1.*

Background

The Cook Inlet Beluga Whale (CIBW) Photo-Identification (ID) Project was contracted by National Marine Fisheries Service (NMFS) to use non-invasive photo-ID techniques to help fill data gaps regarding individual and population characteristics of this endangered beluga population, with the goal of providing information to aid NMFS in conservation and management actions. The contract specified that the CIBW Photo-ID Project would conduct a minimum of 25 photo-ID surveys in 2024, identify individual whales from photographs, and summarize results in a series of six reports. This report, the third in the series, is entitled, *Summary of reproduction of identified individuals in 2024*. Detailed background information and methods for this long-term project are included in previous annual reports, available at www.cookinletbelugas.com.

Results

Possible and presumed mothers

Identified belugas were classified as *presumed mothers* if they appeared in the same uncropped photo frame with a calf alongside them (Figure 1a). When the relationship between a calf and adult was suggestive of a mother-calf relationship but ambiguous, either because other adults were near the pair, little difference in color or size, or more than several meters between the adult and the calf, the larger identified individual was classified as a *possible mother* (Figure 1b).



Figure 1. Photograph of a presumed mother and calf (a) and a possible mother and calf (b).

With the cataloging of the 2024 field season photographs, there are 285 presumed- and possible-mothers in the right-side catalog and 307 presumed- and possible-mothers in the left-side catalog (Table 1). If the ambiguous possible-mother classifications are removed, 244 individuals in the right-side catalog and 252 individuals in the left-side catalog are presumed to be mothers (dual-side mothers are included in the counts for two respective sides and are not listed separately here).

Carcass-recovery data indicates two presumed mothers from the right-side catalog and four presumed mothers from the left-side photo-ID catalog are known to have died between 2005 and 2024. Based on lack of photographic resightings since 2006 (Table 1), one of the presumed right-side mothers may have died and four of the presumed left side-mothers may have died. This leaves 241 right-side and 244 left-side individuals who are presumed to be mothers that may still be in the population in 2024.

Table 1. Summary of presumed and possible mothers in the 2005–2024 CIBW photo-ID catalog.

Number of:	Left-Side Catalog	Right-Side Catalog
Presumed and possible mothers	307	285
Presumed and possible mothers presumed dead ¹	4	1
Presumed and possible mothers known to have died	4	3
Presumed and possible mothers presumed to be alive in 2024	299	281
Presumed mothers	252	244
Presumed mothers presumed dead ¹	4	1
Presumed mothers known to have died (carcass recovery data)	4	2
Presumed mothers presumed to be alive in 2024	244	241

¹ i.e., presumed dead if not photographed since 2006 - using the 18-year maximum inter-annual sighting period in the catalog; see report #2.

Mothers of known sex and age

Remote biopsy samples collected by NMFS and colleagues between 2016 and 2019 allowed for the genetic sex and approximate age of 51 individual belugas to be determined. Table 2 summarizes the sighting and reproductive history of the six previously biopsied females who were photographed in 2024. Based on photographic records, these mothers' ages at the birth of their first documented calf were estimated to be between 12 and 21 years old (± 3 years). Five of the six females were photographed with calves in 2024 (D17121 was photographed in 2024, but not with a calf).

Capture for satellite tagging between 1999 and 2000 also allowed for the genetic sex, and in some cases, the approximate age to be determined for a few belugas. One satellite-tagged female of known age has been matched to the CIBW photo-ID catalog. Beluga D111 was captured and satellite tagged by NMFS in 2000 and genetically determined to be female. Age at time of tagging was determined to be 14.3 years old (Keith Hernandez/Scott Baker, Oregon State University) indicating she was born in approximately 1986. She has been photographed every year of the photo-ID study (2005-2024) except 2006. In 2009 she was photographed with a calf that was estimated to be two years old or younger, in 2014 with a calf that was at least two years old, in 2015 with a newborn, and in 2019 with another newborn, which has been photographed maturing in 2020 and 2022. At the time D111 was first photographed with a calf, she would have been approximately 23 years old and likely gave birth to the observed calf between the ages of 21 and 23. She was 33 years old when she was most recently photographed with a newborn. D111's observed inter-birth interval for each of her two most-recent births was four years (i.e., she was photographed with a newborn in 2015 and 2019). In 2024, she was photographed with a large calf alongside, which was confirmed by unique marks to be the same calf that was photographed with D111 in 2019, 2021, and 2022. These photographic records from 2024 indicate the calf was five years old and still in close association with the mother in some photo sequences of surfacings but absent in others on the same survey days, which provides additional information about the period of association of mothers and maturing calves.

Table 2. Photographic sightings in 2024 of six females sampled remotely during the 2016–2019 Cook Inlet Beluga Biopsy Study. U = unknown pregnancy status, either because sample was not collected, not analyzed, or results were not available. Matches between the CIBW Photo-ID Project catalog and biopsy photos are updated semi-annually; please contact Tamara McGuire (tamaracookinletbelugas@gmail.com) before using the data in this table as results may have changed.

Biopsy Date	Biopsy ID	Photo-ID Catalog #	First Identified	Genetic Sex ¹	First photographed w/calf 2005 – biopsy ²	Pregnant at biopsy ³	First photographed w/ calf after biopsy ³	Epigenetic age at biopsy (years) ⁴	Estimated year biopsied whale born ⁵	Estimated age at first documented birth ⁶	Evidence of pregnancy at or before biopsy ⁷
Aug 20, 2016	DLCIB 16-36	D220	2005	F	2007 J1+	Yes	2019 YOY	22	1994	12 (assumed birth 2006)	Yes
Sep 2, 2017	DLCIB 17-02	D19173	2014	F	2017 J1- pre biopsy	No	2019 J3+ & YOY	13	2004	12 or 13	Yes
Sep 9, 2017	DL-CIB17-12	D18993	2016	F	No	U skin only	2020 J2+	15	2002	16	No/U
Sep 10, 2018	DLCIB 18-09	D17121	2014	F	2014 possible; 2018 J1- prebiopsy	U skin only	2020 J1-	21	1997	20 or 21, (17 possible)	Yes
Sep 11, 2018	DLCIB 18-12	D20266	2012	F	No	No	2020 J1-	16	2002	17 or 18	No
Aug 31, 2019	DLCIB 19-10	D3833	2007	F	2015 J1-	No	2019 J1+	23	1996	18 or 19	Yes

¹ Genetic sex from biopsy samples analyzed by Nick Kellar, NMFS Southwest Fisheries Science Center, and Kim Parsons, NMFS Northwest Fisheries Science Center

² Exact calf ages determined from year first seen as a neonate and estimated calf ages based on physical appearance. YOY = young of year; J1- calf is one year old or younger; J1+ calf is at least one year old; J2+ calf is two years old or older; J3+ calf is at least three years old (Himes Boor et al. 2023).

³ Pregnancy status from hormones in blubber samples analyzed by Nick Kellar, NMFS Southwest Fisheries Science Center; delayed due to pandemic.

⁴ Epigenetic aging from biopsy samples (Bors et al. 2021)

⁵ Estimated birth year = Biopsy year - epigenetic age.

⁶ Age of mother at birth of first calf in the photographic record or when biopsied when pregnant. -/+ 3 years for epigenetic aging range.

⁷ Evidence of pregnancy from hormonal status at biopsy ³, or photographic documentation ² with calf born before biopsy.