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

Summary of reproduction of identified individuals in 2022

Prepared by:

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2022 field team: Debbie Boyle, Brian McGurgan, Kyoko Hada, Andrew Tafelski, Tamara McGuire, Eric Carlson, Amber Stephens. Thanks to JBER, ADF&G, NMFS, AKBMP, BWA, and the public for sharing sightings and photos.

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 2022, 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 2022.* 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).

a.

b.

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

With the cataloging of the 2022 field season photographs, there are 271 presumed- and possible-mothers in the right-side catalog and 292 presumed- and possible-mothers in the left-side catalog (Table 1). If the ambiguous possible-mother classifications are removed, 230 individuals in the right-side catalog and 238 individuals in the left-side catalog are presumed to be mothers.

Carcass-recovery data indicates three presumed mothers, and one possible mother, are known to have died. Based on lack of photographic resightings since 2010, 12 of the presumed right-side mothers may have died and nine of the presumed left side-mothers may have died. This leaves 217 right-side and 226 left-side individuals who are presumed to be mothers and are presumed to be alive in 2022.

Table 1. Summary of presumed and possible mothers in the 2005–2022 CIBW photo-ID catalog.

Number of:	Left-Side Catalog	Right-Side Catalog
Presumed and possible mothers	292	271
Presumed and possible mothers presumed dead[1]	11	13
Presumed and possible mothers known to have died	3	2
Presumed and possible mothers presumed to be alive in 2022	278	256
Presumed mothers	238	230
Presumed mothers presumed dead[1]	9	12
Presumed mothers known to have died	3	1
Presumed mothers presumed to be alive in 2022	226	217

[1] i.e., presumed dead if not photographed since 2010 - using the 12-year maximum inter-annual sighting gap 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 50 individual belugas to be determined. Table 2 summarizes the sighting and reproductive history of biopsied females who were photographed in 2022. Based on photographic records, mothers' ages at birth of their first documented calf were estimated to be between 12 and 21 years old (-/+ 3 years).

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 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 (2005-2022) 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 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 her two most-recent births was four years (i.e., she was photographed with a newborn in 2015 and 2019).

Table 2. Photographic sightings in 2022 of females sampled remotely during the 2016–2019 Cook Inlet Beluga Biopsy Study. Information on reproductive hormonal status of CIBWs biopsied in 2019 were not available at time of report. U = unknown, either because sample not collected, not analyzed, or results 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]	Photographed w/calf 2005 – biopsy[2]	Pregnant at biopsy[3]	Female seen w/ calf after biopsy[3]	Epigenetic age at biopsy (years)[4]	Year biopsied whale born[5]	Age at first birth [6]	Evidence pregnant at or before biopsy
Aug 20, 2016	DLCIB 16-36	D220	2005	F	2007 J1+	Yes	2019 YOY 2020 J1 2021 J2 2022 J3	22	1994	12 (assumed birth 2006)	Yes
Sep 2, 2017	DLCIB 17-02	D19173	2014	F	No	No	2017 J1- 2019 older & YOY 2021 J2-	13	2004	12 or 13	Yes
Sep 9, 2017	DLCIB 17-12	D18993	2016	F	No	U skin only	2019 J2+ 2020 J3+	15	2002	15	No
Sep 10, 2018	DLCIB 18-09	R17121	2014	F	2014 possible 2018 J1 Day of biopsy - possible	U skin only	2020 J1+	21	1997	20 or 21	Yes
Sep 11, 2018	DLCIB 18-12	D20266	2012	F	No	No	2020 J1- 2021 J2- 2022 J2-	16	2002	17 or 18	No
Aug 31, 2019	DLCIB 19-10	D3833	2009	F	2015 J1- 2017 J2+ 2018 J1- 2019 J2-	U	2021 YOY	23	1996	19	Yes
Aug 31, 2019	DLCIB 19-11	L27193	2017	F	2019	U	No	No result	U	U	Yes
Aug 31, 2019	DLCIB 19-08	R16674	2012	F	2014 YOY 2016 J2	U	2022 J2+	24	1995	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. Nomenclature developed by Gina Himes Boor, Montana State University: 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 younger; J3+ calf is at least three years old.

[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] 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] Cataloging complete through 2022.