

Report #6: Photo-Identification of Beluga Whales in Cook Inlet, Alaska:

Summary of annual survey effort and group size, location, and age-class composition in 2023

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Contract Number: 1305M321CNFFS0040-P22001-Mod1

Contract Title: Cook Inlet Beluga Whale Photo-Identification Studies
(2023 field season/cataloging)

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Project Period:

Draft Report Submission Date: July 17, 2024

Final Report Submission Date: September 27, 2024

Prepared for: National Marine Fisheries Service, Alaska Region

Citation:

McGuire, T. L. and J. R. McClung. 2024. Report #6: Photo-Identification of Beluga Whales in Cook Inlet, Alaska: Summary of annual survey effort and group size, location, and age-class composition in 2023. Report prepared by the Cook Inlet Beluga Whale Photo-ID Project for National Marine Fisheries Service, Alaska Region. 6pp.

2023 field team: Debbie Boyle, Kyoko Hada, John McClung, Brian McGurgan, Chandera Tolley, Amy Willoughby, and Gina Himes Boor. Thanks to JBER, ADF&G, NMFS AKR and MML, UW, 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 2023, identify individual whales from photographs, and summarize results in a series of six reports. This report, the sixth in the series, is entitled *Summary of annual survey effort and group information (e.g., size, location, and group composition) in 2023*. Detailed background information and methods for this long-term project are included in previous annual reports, available at www.cookinletbelugas.com.

Results

Annual Survey Effort

The 2023 field season was the 19th consecutive field season for the CIBW Photo-ID Project. Between March 7 and October 31, field photographers conducted or participated in 220 vessel- and land-based surveys in Cook Inlet, Alaska. (Table 1, Table 2, Figure 1), bringing the project total to 1,024 photo-ID surveys since 2005. Vessel-based surveys in 2023 were conducted in collaboration with field teams from JBER, ADF&G, and NMFS utilizing vessels operated by ADF&G and JBER. The Cook Inlet study area is divided into five survey sub-areas: Susitna River Delta, Knik Arm, Turnagain Arm, Chickaloon Bay/Fire Island, and Kenai River Delta. A Kenai-based field photographer was added in 2022, which increased effort and the number of groups encountered in this sub-area (Table 1, Table 2).

Table 1. Annual number of CIBW Photo-ID Project surveys conducted in Cook Inlet, Alaska, from 2005 through 2023 according to survey sub-area.

Sub-Area	Year																			Total Number of Surveys
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
Susitna River Delta	16	17	5	8	13	14	11	13	8	9	10	11	9	11	12	9	11	9	8	204
Knik Arm	32	13	5	9	10	9	16	12	3	7	4	8	1	5	4	4	19	13	12	186
Turnagain Arm	0	4	5	12	12	15	16	15	12	8	8	7	3	9	12	24	26	24	65	277
Chickaloon Bay/Fire Island	4	1	1	2	1	0	2	5	2	2	1	0	0	1	1	0	1	0	2	26
Kenai River Delta	0	0	0	0	0	0	4	14	6	0	0	0	3	6	3	3	9	150	133	331
Annual Number of Surveys	52	35	16	31	36	38	49	59	31	26	23	26	16	32	32	40	66	196	220	1,024

Table 2. Photo-ID survey effort and beluga whale groups encountered in Cook Inlet, Alaska in 2023

	2023				
	Susitna River Delta	Knik Arm	Turnagain Arm	Kenai River Delta	Chickaloon Bay/ Fire Island
Range of Survey Dates	May 17-May 21 & Aug-2 to Aug-18	Aug-2 to Oct-11	March-18 to May-6 & Aug-12 to Oct-22	Mar-7 to May-16 & Aug-26 to Oct-31	Aug-4 to Aug-17
Number of Surveys	8	12	65	133	2
Number of Groups Encountered	11	15	93	86	5
Number of Beluga Sightings	314	431	997	1,009	44
Mean Number of Groups per Survey	1.8	1.3	1.4	0.65	2.5
Mean Number of Belugas per Survey	39.35	35.9	15.3	7.6	22
Mean Group Size	28.5	28.7	10.7	11.7	8.8
Maximum Group Size	60	118	50	55	20
Group Size Range	1-60	3-118	1-50	2-55	3-20

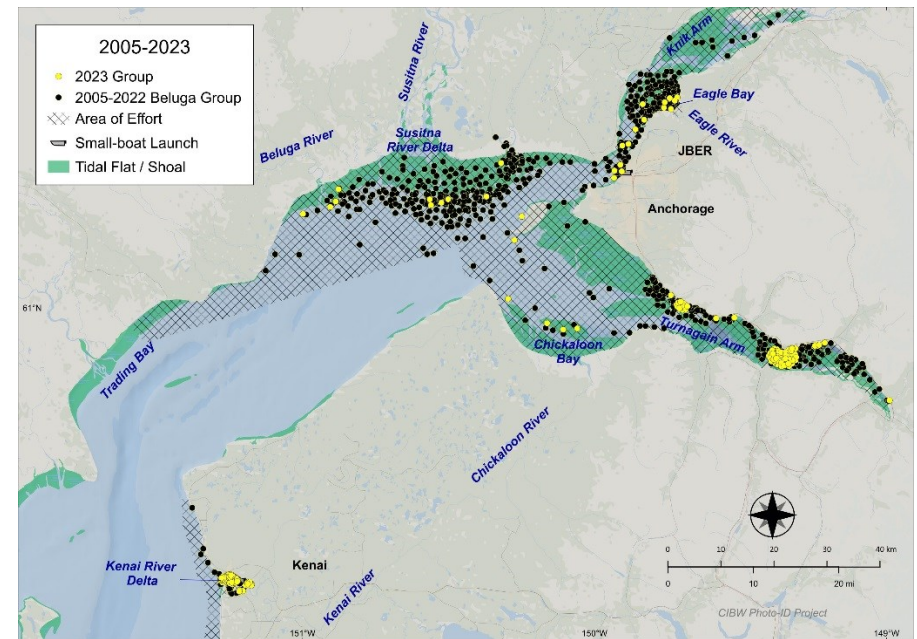
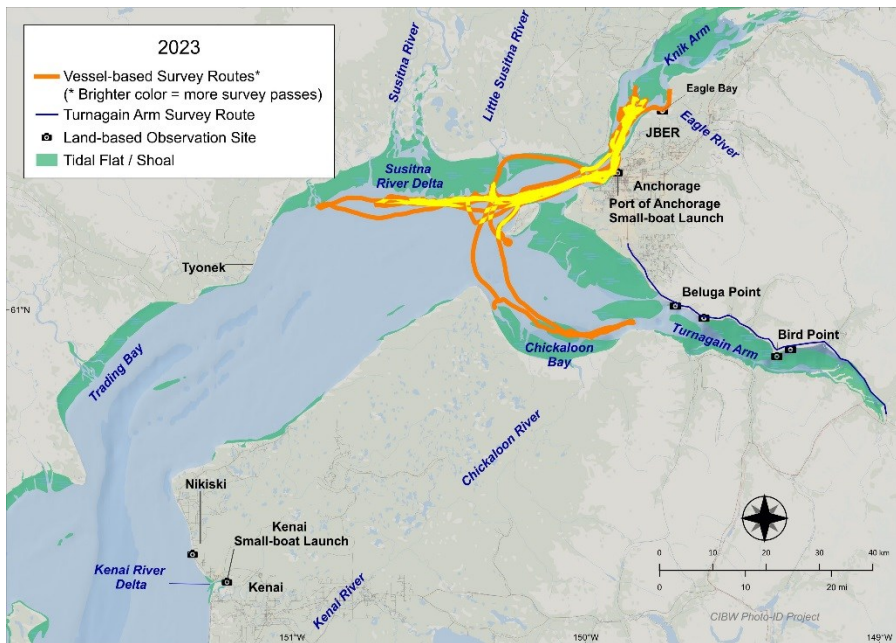


Figure 1. Vessel routes (from daily GPS track lines) with land-based stations and survey routes for all photo-ID surveys conducted in 2023. The level of effort of the vessel-based surveys is indicated by the intensity of the colors of the track lines. See Table 1 for the exact number of surveys.

Figure 2. Beluga whale groups encountered during all photo-ID surveys conducted in 2005–2023 combined.

Group Size and Location

There were 210 groups encountered during photo-ID surveys in 2023 (Table 2; Figure 2). The mean number of belugas per survey (Table 2) in 2023 was greatest in the Susitna River Delta, and smallest in the Kenai River Delta; these patterns are similar to previous years of the study. Mean group size was greatest in the Susitna River Delta and Knik Arm, and the largest group observed in 2023 was in Knik Arm, unlike the previous years of the study where the largest groups of the year had been encountered in the Susitna River Delta (Table 3). The largest group encountered in 2023 also occurred a week later than had occurred in previous years.

Table 3. Summary of date and location of the maximum annual group size for each field season of beluga photo-ID surveys in Cook Inlet, Alaska during the 2005–2023 study period.

Year	Field Season	Location of Largest Observed Group of Year	Date of Largest Group of Year	Maximum Group Size Observed
2005	Apr 14 – Oct 21	Susitna River Delta	Jul 23	152
2006	May 12 – Oct 5	Susitna River Delta	Jul 26	61
2007	Jun 28 – Oct 27	Susitna River Delta	Jul 27	74
2008	May 21 – Oct 31	Susitna River Delta	Jul 29	121
2009	Jun 19 – Oct 28	Susitna River Delta	Aug 3	152
2010	May 9 – Oct 31	Susitna River Delta	Jul 16	173
2011	Apr 16 – Oct 31	Susitna River Delta	Jul 27	136
2012	May 2 – Oct 31	Susitna River Delta	Jul 20	200
2013	Apr 20 – Oct 31	Susitna River Delta Chickaloon Bay	Jul 22 & Jul 31 Sep 16	200
2014	Jul 8 – Oct 31	Susitna River Delta	Jul 27	250
2015	May 28 – Oct 22	Susitna River Delta	Jul 20	313
2016	May 24 – Sep 30	Susitna River Delta	Jul 19	148
2017	Jul 21 – Sep 26	Susitna River Delta	Jul 27 & Aug 5	300 & 302
2018	May 2 – Oct 25	Susitna River Delta	Jul 12	222
2019	May 18 – Oct 31	Susitna River Delta	Jun 3	200
2020	Apr 9 – Nov 9	Susitna River Delta	Jul 23	200
2021	Apr 9 – Oct 31	Susitna River Delta	Jun 5	125
2022	Mar 12 – Oct 31	Susitna River Delta	Jul 27	50
2023	Mar 7 – Oct 31	Knik Arm	August 11	118

Group Composition

Group composition data collected during surveys included the number of whales in each body-color category (white or gray) and age class (calves and neonates). Because belugas are born dark gray and lighten as they age, skin color can be used as an indicator of relative age. Groups whose composition could not be determined are not included in this summary. Group composition varied somewhat by survey sub-area. Almost all groups encountered contained white belugas, while most also contained gray belugas (Table 4). The exception was in Turnagain Arm, where only about three-quarters of the groups were noted to contain gray belugas. More information on calves and neonates encountered in 2023 are presented in reports #1 and #3.

Table 4. Percent color/age-class composition of beluga groups sighted during surveys of Cook Inlet, Alaska in 2023 (excluding those groups for which a color/age-class could not be determined).

2023 Sub-Area	% of groups containing:			
	White-Colored Whales	Gray-Colored Whales	Calves	Neonates
Susitna River Delta	100	100	100	33
Knik Arm	100	100	71	10
Turnagain Arm	98	76	51	12
Kenai River Delta	100	97	78	11
Chickaloon Bay/Fire Island	100	100	33	0

Figure 3. Average counts of belugas per survey by month for surveys conducted in 2023 (a) and in 2005–2023 combined (b). Values were obtained by partitioning the study area into grid cells 3 km by 3 km and calculating the average number of belugas detected per survey for each cell. JBER denotes Joint Base Elmendorf Richardson in Knik Arm.

