

**Report #5: Photo-Identification of Beluga Whales in Cook Inlet, Alaska:**

**Summary of human interactions: observations of human activities (non-research) during beluga surveys and signs of anthropogenic trauma (entanglement, puncture, vessel strike) in 2023**

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## 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 fifth in the series, is entitled, *Summary of human interactions: observations of human activities (non-research) during beluga surveys and signs of anthropogenic trauma (entanglement, puncture, vessel strike) in 2023*. Details of the long-term Photo-ID Project background and methods can be found in previous project reports, available at [www.cookinletbelugas.com](http://www.cookinletbelugas.com).

## Results

### Observations of human activities (non-research) during beluga surveys in 2023

Human activities occurring in the vicinity of encountered groups with the potential to affect belugas were noted during photo-ID surveys (Table 1). The majority of observed human activities were incidental in the sense that most people appeared to be unaware of the presence of belugas. Aircraft activity (e.g., small recreational and commercial planes and helicopters, large commercial aircraft for cargo and passengers, military fighter and transport aircraft) was the human activity most commonly noted. Other human activities that were observed near belugas included vessel-based shipping/transport, vessel-based duck hunting, vessel-based seal hunting by Alaska Natives (in kayaks and motorized boats), the train whistle along Turnagain Arm, and non-research drones being flown over/near belugas.

Table 1. Human activities observed in the vicinity of belugas during surveys in 2023, according to months and survey area. No surveys were conducted during January, February, November, or December. x = no effort, 0 = no belugas, A = aircraft, V = vessel, T=train (whistle, RR service trucks on track).

Month	Susitna River Delta	Knik Arm	Turnagain Arm	Kenai River Delta	Chickaloon Bay/Fire Island
March	x	x	0	A	x
April	x	x	0	A,V	x
May	A	x	0	A	x
June	x	x	x	x	x
July	x	x	x	x	x
August	A	A,V	A,T	A,V	None noted
September	x	A	A, T, non-research drone, paddle boarders, windsurfers/surfers	A,V, duck hunters	x
October	x	A	A, windsurfers/surfers, including hydrofoil surfboard	A,V, seal hunters, heavy equipment working on dock and pier	x

### Signs of anthropogenic trauma (entanglement, puncture, vessel strike) in 2023

All photos of identified whales photographed in 2023 were examined for signs of anthropogenic trauma. Categories of scars were developed by comparing scars and deformities seen on individuals in the CIBW Photo-ID Project catalog and stranding photos to descriptive classifications and photographs of injuries to other marine mammal species. Marks that likely came from non-anthropogenic sources such as competition, predation, disease, and the physical environment are not included in this summary. Scars from research (e.g., satellite tags and biopsy) were not included in this analysis but are summarized in report #4. Scars appearing to be consistent with anthropogenic sources were categorized as three types: puncture, vessel strike, or entanglement. Scars were then classified as confirmed (unambiguous evidence, such as an attached rope),

possible (ambiguous, the mark also could have been from another source or non-human related), or no (without any evidence of anthropogenic trauma) in each of the scar type categories.

Results from the 2023 photo review are summarized according to the 114 right-side individuals (Table 2), 118 left-side individuals (Table 3), and 114 combined dual-side individuals (Table 4) photographed in 2023. Of these, 22% (n=25) of right-side individuals, 22% (n=26) of left-side individuals, and 32% (n=37) of dual-side individuals had signs of possible anthropogenic trauma. Further investigations are needed to determine which of these scars are most consistent with anthropogenic trauma. All of these scars had been noted in previous years (i.e., none were fresh in 2023). There was one whale with confirmed anthropogenic trauma photographed in 2023, but the photographed marks indicative of vessel strike were already healed when the beluga was first photographed in 2005.

Table 2. Summary of 25 belugas photographed in 2023 in the right-side CIBW Photo-ID catalog with scars consistent with anthropogenic trauma from entanglement, vessel strikes, and non-research punctures (i.e., excluding biopsy and tag scars). Three individuals had multiple scars types, so numbers in the table are not additive. These data are preliminary and possible scars merit further evaluation.

<b>114 Right-side Whales Photographed in 2023</b>	<b>Possible</b>	<b>Confirmed</b>
Total Number of Whales with Puncture Scars	10	0
Total Number of Whales with Vessel-Strike Scars	8	1
Total Number of Whales with Entanglement Scars	10	0

Table 3. Summary of 26 belugas photographed in 2023 the left-side CIBW Photo-ID catalog with scars consistent with anthropogenic trauma from entanglement, vessel strikes, and non-research punctures (i.e., excluding biopsy and tag scars). Five individuals had multiple scars types, so numbers in the table are not additive. These data are preliminary and possible scars merit further evaluation.

<b>118 Left-side Whales Photographed in 2023</b>	<b>Possible</b>	<b>Confirmed</b>
Total Number of Whales with Puncture Scars	13	0
Total Number of Whales with Vessel-Strike Scars	11	0
Total Number of Whales with Entanglement Scars	9	0

Table 4. Summary of 37 belugas photographed in 2023 in the dual-side CIBW Photo-ID catalog with scars consistent with anthropogenic trauma from entanglement, vessel strikes, and non-research punctures (i.e., excluding biopsy and tag scars). Eight individuals had multiple scars types, so numbers in the table are not additive. These data are preliminary and possible scars merit further evaluation.

<b>114 Dual-side Whales Photographed in 2023</b>	<b>Possible</b>	<b>Confirmed</b>
Total Number of Whales with Puncture Scars	21	0
Total Number of Whales with Vessel-Strike Scars	13	1
Total Number of Whales with Entanglement Scars	13	0

One individual photographed in 2023, beluga D135 showed signs of possible previous entanglement. Although scars from possible entanglement were first noted in 2013, photos from 2023 showed more of the body and tail and provided stronger evidence. There are signs of possible previous entanglement around the neck (Figure 1 a, b) and tailstock (Figure 1 c-h). We do not know the source of the possible entanglement, but suspect a line of unknown origin.

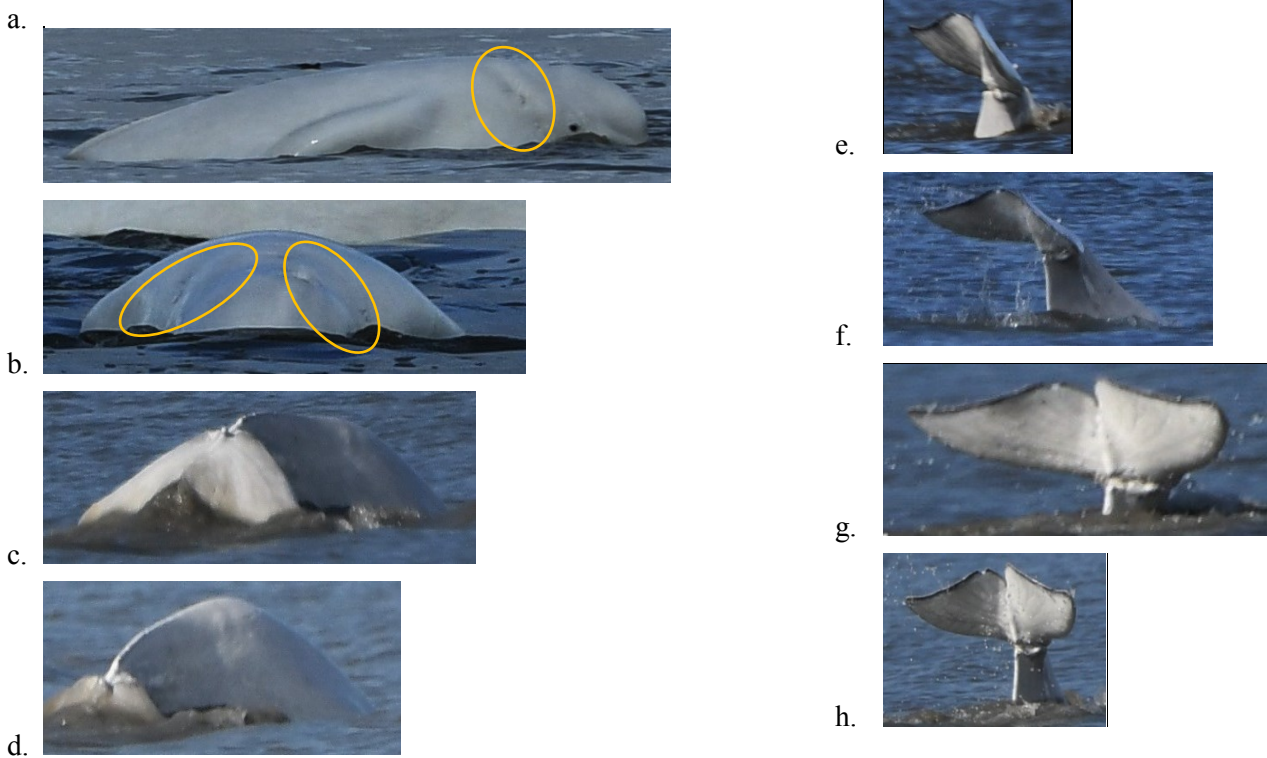


Figure 1. Beluga D135, right side photos from 2023. Possible entanglement scar visible left view of neck (a), and view of neck facing the front of the animal (b). Possible entanglement scar around the tailstock, visible along the top (c, d), and underside (e, f, g, h).

### **Injury or Disease of Unknown and/or Multiple Origins**

We do not know the cause, or causes, of the dorsal concavity exhibited by several whales in the catalog. Five whales with dorsal concavity (“swayback”) were photographed in 2023. Beluga D2379 is shown as an example in Figure 2. Possibilities are human-induced injury (e.g., vessel strike, gunshot, or entanglement), predation attempt, disease, emaciation, scoliosis or other genetic deformity, or some combination of the above. This beluga has a concave back, but also a large scar along its flank.

One possible source of infection that we hope to learn more about is the pathogen, *Erysipelothrix rhusiopathiae*, which can result in skin lesions and arthritis. Veterinarians with the Alaska Marine Mammal Stranding Network report that this pathogen has been found in CIBWs (Dr. Kathleen Burek-Huntington, pers. comm.), and we are curious to investigate if some of the skin lesions and spinal curvature we are photo-documenting might be associated with this pathogen. We will continue to follow these whales photographically, share their photographs with veterinarians with the Alaska Marine Mammal Stranding Network, and continue to screen all whales in the catalog for these deformities. Examination of the skeletons of these whales after they die may provide insight into the cause of the deformity.





Figure 2. Beluga D2379. Note the pronounced concavity behind the dorsal crest in 2017 and following years that was not present in 2005. The concavity was detected in 2008 and appeared to worsen through 2021. Photos in 2019 show discoloration on the right side which may be from a diatom infestation or an infection of unknown origin. This whale was not photographed in 2020. Both sides of the whale were photographed in 2022 and the whale appeared slightly less emaciated than the year before, resulting in a slightly less concave appearance, although this could be because the whale was photographed in October in 2022, whereas in previous years it had been photographed May-August, earlier in the ice-free season when it would not have had as many months to feed on migratory prey. However, photos of both sides of the whale in 2023 indicate poor body condition in September 2023, a month when most of the belugas appear to be at peak body condition.