

Adding pieces to the puzzle: Consolidating datasets from photo-id, stranding, and genetic studies extends what can be learned from satellite-tagging of endangered Cook Inlet beluga whales

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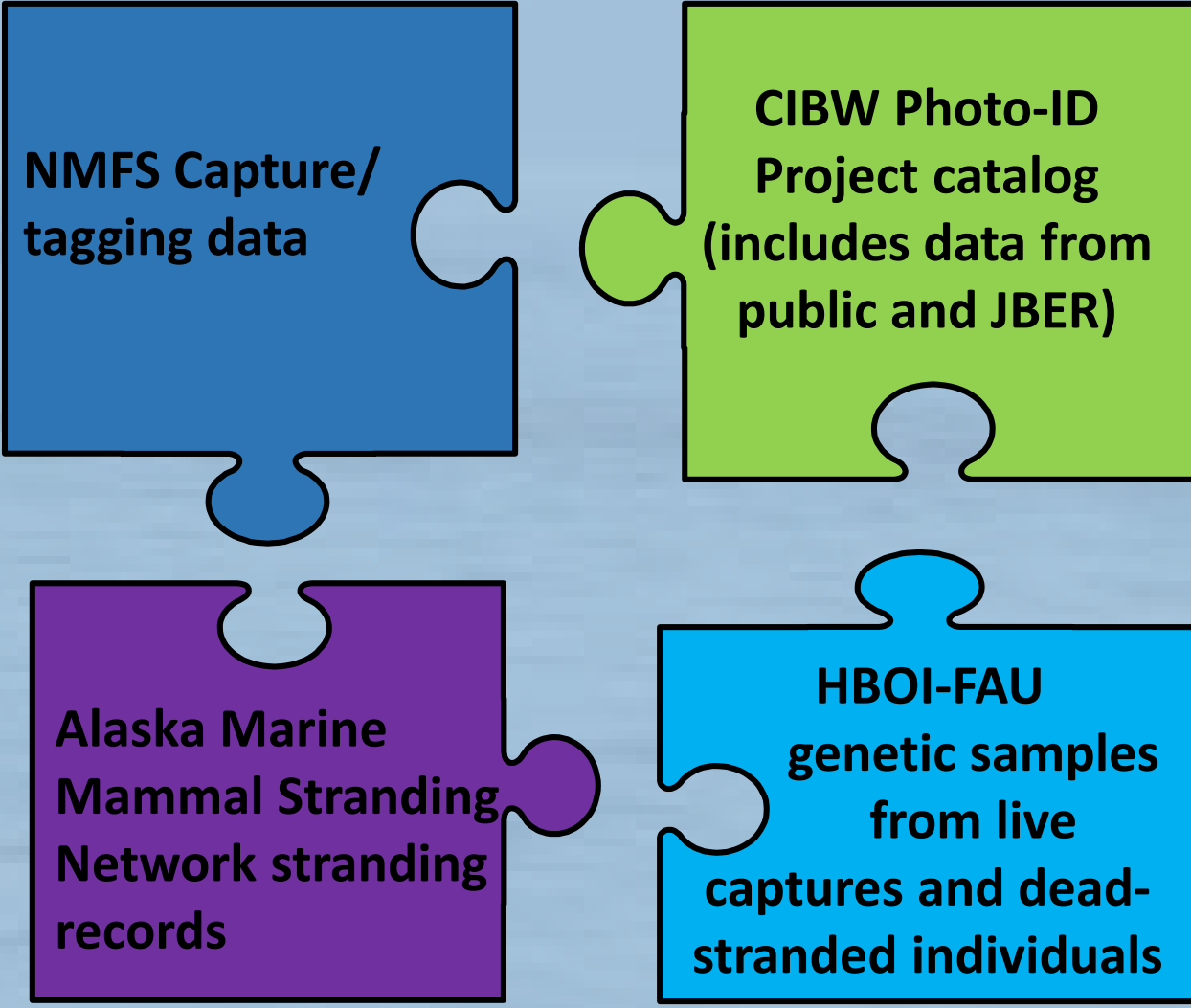
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Background

Between 1999 and 2002, the National Marine Fisheries Service (NMFS) captured 20 Cook Inlet beluga whales (CIBWs, *Delphinapterus leucas*) and instrumented 18 (8 males, 10 females) of them with satellite tags. Years later, the CIBW Photo-ID Project discovered several photo-identified CIBWs had scar patterns consistent with satellite-tag attachment methods and realized that photographic resighting of these individuals could provide post-tagging information about survival, reproduction, and movement/residency for decades beyond the original satellite tag life (1-295 days). Four datasets (below) were reviewed and combined to assemble life histories of the satellite-tagged CIBWs. These datasets spanned 1999-2015.



#Puzzle pieces throughout poster correspond to color of data sets above and depict origin of data.

Results

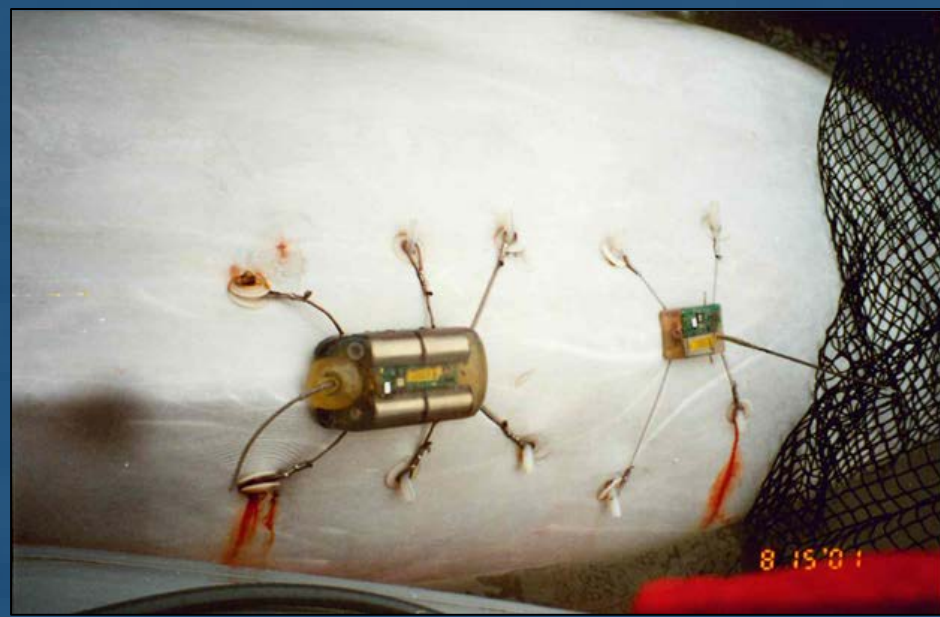
- 15 of the 20 captured CIBWs were later identified as individuals within the CIBW Photo-id catalog (14 with tag scars, 1 captured but not tagged). Ten were photographed as recently as 2015, representing 50% of the 20 CIBWs originally captured.
- Three satellite-tagged whales have been confirmed dead since 2002; match confirmation was provided by a flipper-band, and by genetic fingerprinting of two whales recovered dead. Photo-id records also suggest that a fourth whale may have died after 2007.
- Seven individual whales in the photo-id catalog could be photographically matched to their original capture photos. Genetic samples taken during tagging confirmed that three of these were males and four were females. Seven others are suspected to be females based on close accompaniment by calves in photographs.
- Five of the 14 cataloged satellite-tagged whales had signs of tag-site infection in photos, eight had signs of deformity above the tag site, and two displayed damage to the pectoral fins from flipper bands applied during tagging.
- All of the 15 captured/satellite-tagged whales in the photo-id catalog were resighted in Upper Cook Inlet's Susitna River Delta, and most were also resighted in Knik Arm and Turnagain Arm, displaying distribution and movement patterns consistent with those obtained from the transmitting tags.

Conclusion

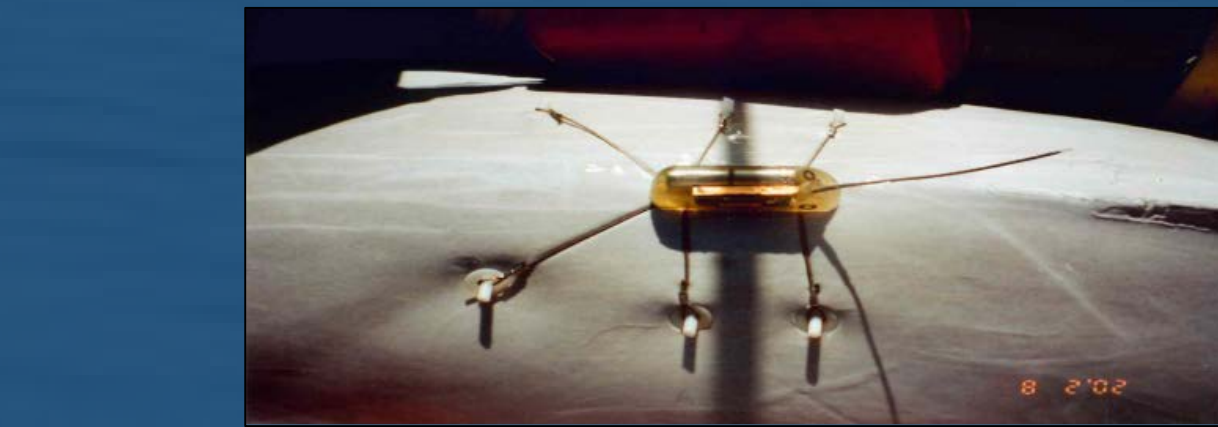
Combining these four datasets broadens what can be learned about these individuals and the population, extending the temporal range of the satellite tags, and adding biological data to the photo-id catalog.

EXAMPLES OF MATCH BETWEEN PHOTOS OF INDIVIDUAL BELUGAS DURING TAGGING AND PHOTO-ID CATALOG# :

Capture/Tagging Data	
NMFS CIBW ID Number	CI-01-06
Date captured/tagged	15 August 2001
Capture location	Knik Arm
Sex (visual/genetics at capture)	female
Color recorded at capture	white
Length at capture (cm)	401
Photo-ID Resight Data	
Photo-ID number and name	R103/L493 "Strapped"
Years resighted	All years 2005-2015
Number of years resighted	11
Maximum number of resightings per year (and year)	12 in 2008
Span of records (photo-id and/or tagging)	2001-2015
Presumed mother (seen with calves?)	yes
Locations sighted	Susitna River Delta, Knik Arm, Turnagain Arm
Tag-site condition (infections, margins)	Tag scars and biopsy scars conspicuous but clean margins and no signs of infections
Other (e.g., abnormal body condition, disease, trauma)	New scar in 2015- right side-possible tooth rake marks
Flipper bands?	Not used in 2001 tagging



Dual-side photo of female whale CI-01-06 captured and tagged on August 15, 2001. Photo courtesy of NMFS®.



Left-side photo of CI-02-05 captured and tagged on August 2, 2002. Photo courtesy of NMFS®.



Left-side photo of CI-01-01 captured and tagged on August 10, 2001. Photo courtesy of NMFS®.



Dual-side photo of CI-02-08 captured and tagged on August 4, 2002. Photo courtesy of NMFS®.



Left-side photo of whale R103/L493 "Strapped" in 2006. This photo shows five pin scars plus one biopsy scar. Photo courtesy of CIBW Photo-ID Project®.



Left-side necropsy photo of L2303/R17366 "Sash" on June 12, 2015. Note left pectoral fin damage and concave tag site. Photo courtesy of Kathy Burek Huntington®.



Left-side photo of R243/L7861 "Scrappy" in 2011. Possible infection of left tag scars. Photo courtesy of CIBW Photo-ID Project®.



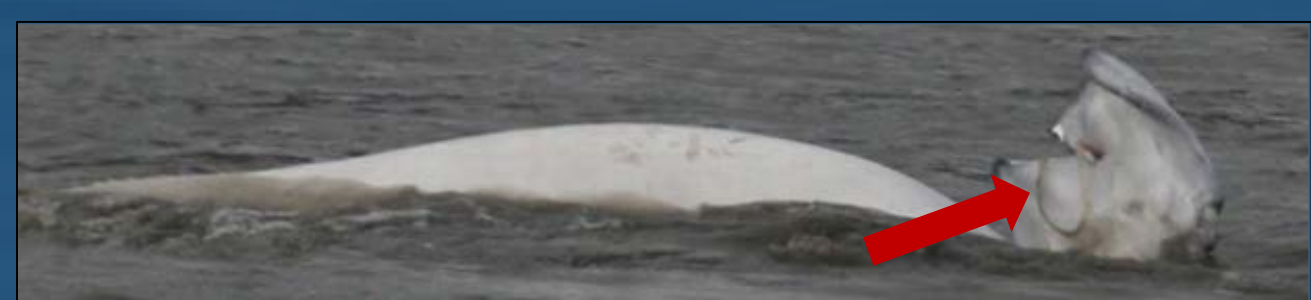
Right-side photo of R103/L493 "Strapped" in 2015. Photo courtesy of CIBW Photo-ID Project®.



Right-side photo of L2303/R17366 "Sash" in 2014. Photo courtesy of CIBW Photo-ID Project®.



Right-side photo of R243/L7861 "Scrappy" in 2005. Photo courtesy of CIBW Photo-ID Project®.



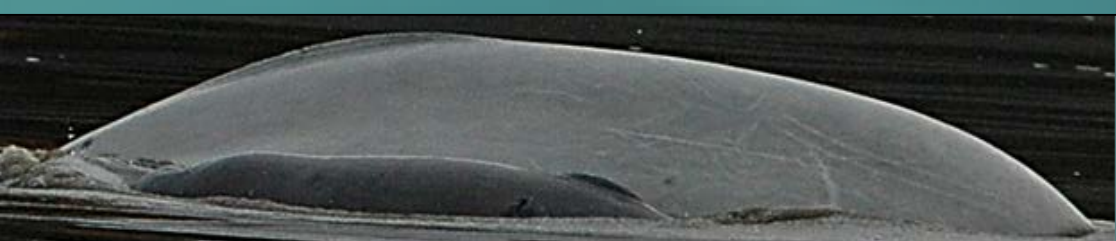
Left-side photo of dead L2579/R115 "Sashtoo" on May 27, 2014. Note damaged left pectoral fin. Photo courtesy of Bill Streever.

EXAMPLES OF CONFIRMED SATELLITE-TAGGED INDIVIDUALS IN THE PHOTO-ID CATALOG UNMATCHED TO INDIVIDUALS DURING TAGGING#:

Capture/Tagging Data	
NMFS CIBW ID Number	Unable to match
Photo-ID Resight Data	
Photo-ID number and name	R549/L1936 "Tagger"
Years resighted	2005, 2006, 2009, 2011, 2014, 2015
Number of years resighted	6
Maximum number of resightings per year (and year)	5 in 2006
Span of records (photo-id and/or tagging)	2005-2015
Presumed mother (seen with calves?)	yes
Locations sighted	Susitna River Delta, Knik Arm, Turnagain Arm
Tag-site condition (infections, margins)	Tag scars conspicuous but healed
Other (e.g., abnormal body condition, disease, trauma)	Slightly concave along dorsal crest between tag scars



Right-side photo of R549/L1936 "Tagger" in 2014. Photo courtesy of CIBW Photo-ID Project®.



Left-side photo of R549/L1936 "Tagger" in 2006 with an accompanying calf. Photo courtesy of CIBW Photo-ID Project®.

Capture/Tagging Data	
NMFS CIBW ID Number	Unable to match
Photo-ID Resight Data	
Photo-ID number and name	L480 "Dimples-L"/R49 "Dimples-R"
Years resighted	2005, 2006, 2008, 2010, 2011, 2012, 2014, 2015
Number of years resighted	8
Maximum number of resightings per year (and year)	10 in 2011
Span of records (photo-id and/or tagging)	2005-2015
Presumed mother (seen with calves?)	yes
Locations sighted	Susitna River Delta, Knik Arm, Turnagain Arm
Tag-site condition (infections, margins)	Only one tag scar visible, and appears to heal cleanly then close
Other (body condition, infections, trauma)	site around tag scar concave, some concavity of dorsal crest over tag site



Left-side photo of L480 "Dimples-L"/R49 "Dimples-R" in 2005. Photo courtesy of CIBW Photo-ID Project®.

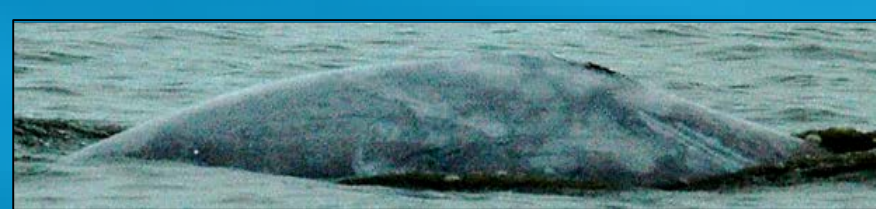


Left-side photo of L480 "Dimples-L"/R49 "Dimples-R" in 2015. Photo courtesy of CIBW Photo-ID Project®.

MATCH BETWEEN PHOTOS OF INDIVIDUAL BELUGA AT CAPTURE AND PHOTO-ID CATALOG (WHALE CAPTURED, NOT TAGGED)#:



Left-side photo of untagged female whale captured on May 31, 1999. Photo courtesy of NMFS®.



Left-side photo of whale L2191 in 2007. Photo courtesy of CIBW Photo-ID Project®.

Capture/Tagging Data	
NMFS CIBW ID Number	None Described in Ferrero et al.
Date captured/tagged	2000
Capture location	31 May 1999
Sex (visual/genetics at capture)	2 km up the Little Susitna River
Color recorded at capture	female
Length at capture (cm)	gray
	230
Photo-ID Resight Data	
Photo-ID number	L2191*
Years resighted	2007
Number of years resighted	1
Maximum number of resightings per year (and year)	1 in 2007
Span of records (photo-id and/or tagging)	1999-2007
Presumed mother (seen with calves?)	no
Locations sighted	Susitna River Delta
Tag-site condition (infections, margins)	Not tagged
Other (e.g., abnormal body condition, disease, trauma)	large white patches- skin infection?
Flipper bands?	No record of use during tagging/flippers not seen in tagging or photo-id photos

*not an individual in the catalog- classified as "temporary folder" because only seen one day and profile does not meet criteria to be considered an individual in the catalog.

^aCIBW Photo-ID photos taken with NMFS MMPA/ESA research permits # 14210 and #18016.

^bNMFS satellite-tag capture photos taken under permits # 957 and 782-1438 (Amendment 3).

^cStranding photos taken under permit #932-1905/MA-009526 and supported by Prescott Grant NA12NMF4390162.