Updated Status of Prey Species for Endangered Cook Inlet Beluga Whales

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BACKGROUND

Cook Inlet beluga whales (CIBW) are a distinct population segment and an apex predator important for subsistence, culture, and the Cook Inlet ecosystem. A decline of the CIBW population by nearly 50% during 1993–1998 was attributed to unsustainable harvesting, with harvesting reduced in 1999, then eliminated in 2005 (NMFS 2016). Under the Marine Mammal Protection Act, CIBW was listed as depleted in 2000, then as endangered under the Endangered Species Act in 2008. During 2008–2018, the CIBW population continued to decline at 2.3% per year (Shelden and Wade 2019), raising concerns on what is inhibiting CIBW recovery. Surveys in 2021 and 2022 suggested a nominal increase of 0.9%/year (Goetz et al. 2023).

No specific cause(s) have been identified to date, but a reduction in the abundance, quality, availability, or seasonality of prey is a threat identified in the CIBW recovery plan (NMFS 2016). Understanding CIBW prey linkages remains uncertain because diet composition has been derived from a relatively small number of whales. Of 27 CIBW stomachs sampled during 2002–2013, `67% (n=18) contained prey, with 94% of non-empty stomachs containing fish (67% occurrence for salmon, 39% had gadids, and 11% each had smelt, flounders, other identified fish, and unidentified fish) and 50% containing invertebrates (Quakenbush et al. 2015; L. Quakenbush, ADF&G, pers. com.).

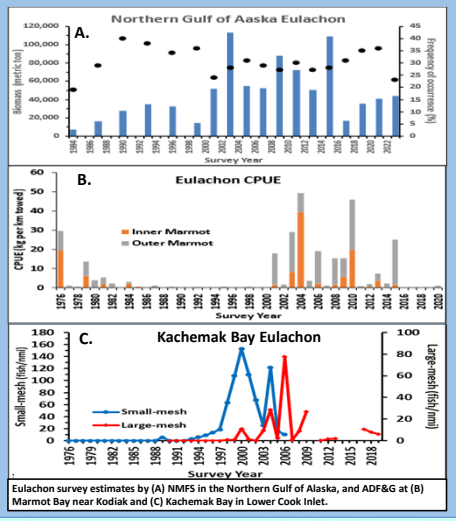
Previous analyses (Bechtol et al. 2016, 2022; NMFS 2016) examined prey availability, focused on anadromous eulachon and salmon which co-occur with CIBW in ice-free months, as well as other prey identified in CIBW stomachs. The current analysis updates information on presumed CIBW prey.

Spring is a critical time as CIBW emerge from winter with low energy reserves and must accumulate sufficient energetic reserves to survive the next winter. Adult females are often lactating or pregnant. Eulachon, a fish with high fat content, aggregate during spring spawning migrations in Upper Cook Inlet, but few quantitative data have been collected on these returns.

Salmon are presumed to be the major prey during June to August when CIBW build the bulk of their energy reserves. All five species of Pacific salmon occur in Cook Inlet, although salmon availability differs spatially and temporally, and CIBW prey selectively is poorly understood. In the northern inlet where CIBW congregate, commercial salmon harvests are driven by sockeye in the summer and coho in the fall. Norman et al. (2019) found CIBW population size and growth correlated with Deshka River escapement of Chinook and coho salmon.

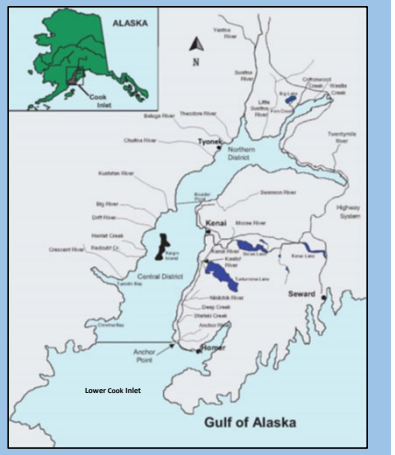
Understanding linkages between CIBW and their prey is critical to adapting management strategies that promote CIBW recovery while maintaining fisheries and ecosystem function. A lack of data on CIBW prey availability and CIBW prey selectivity inhibits that understanding.`

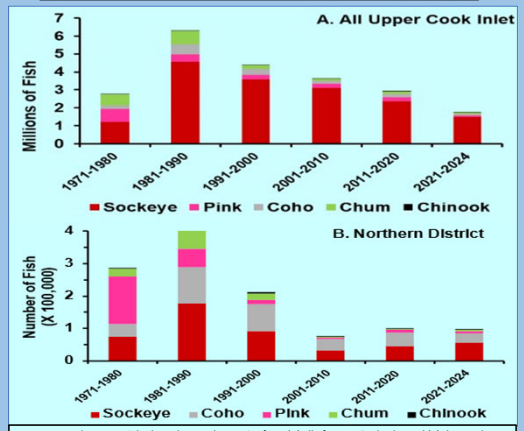
Area/Species	Method/Gear	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Cook Inlet beluga whale	Aerial survey	*	*	*		*		*		*		*			*	*		
Upper Inlet eulachon	Commercial dipnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Upper Inlet eulachon	Personal use dipnet/gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Northern District Chinook	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northern District sockeye	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northern District coho	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northern District pink	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Northern District chum	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Upper Inlet Pacific herring	Commercial gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Deshka River Chinook	Weir escapement	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*
Deshka River pink	Weir escapement	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*
Little Susitna Chinook	Weir escapement	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*
Little Susitna coho	Weir escapement	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
Kenai River sockeye	Sonar escapement	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Offshore Test Fishery	Survey gillnet	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Gulf of Alaska eulachon	Survey trawl		*		*		*		*		*		*		*		*	
Marmot Bay eulachon	Survey trawl	*	*	*	*	*	*	*	*					*				
Kachemak Bay - Lower Cook Inlet	Trawl survey	*	*		*	*	*				*	*	*					
Kamishak Bay - Lower Cook Inlet	Trawl survey			*		*												



Eulachon survey estimates by (A) NMFS in the Northern Gulf of Alaska, and ADF&G at (B) Marmot Bay near Kodiak and (C) Kachemak Bay in Lower Cook Inlet.

Photo by Madison Kosma

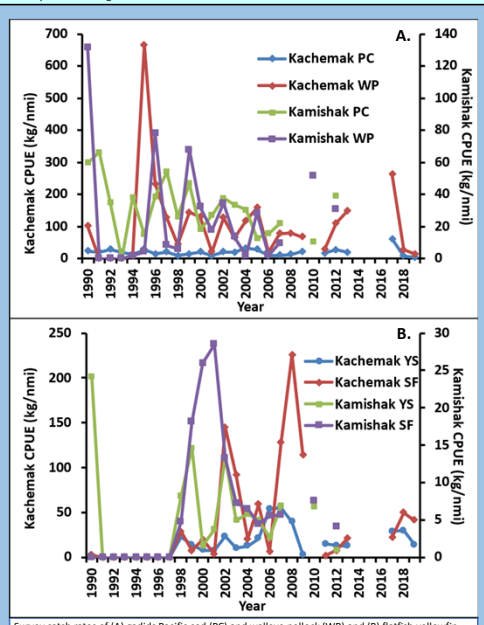




Average annual commercial salmon harvest by species from (A) all of Upper Cook Inlet and (B) the Northern District by decade during 1971–2024.

FINDINGS

- Eulachon, a major spring prey that also supports annual commercial and personal use harvests, lacks consistent, fishery-independent surveys in Upper Cook Inlet. The Susitna River spawning migration was assessed in 2016. Otherwise, a biennial multispecies survey by NMFS occurs in the nearby northern Gulf of Alaska, and inconsistent ADF&G surveys have occurred in nearby Lower Cook Inlet and also near Kodiak Island. Eulachon populations were generally high in the mid-2000s to early 2010s, but at relatively low levels in recent years.
- Monitoring of salmon escapements at several northern Cook Inlet tributaries has been reduced in recent years due to budget cuts and/or flooding. Commercial salmon harvests, averaged by decade, declined over the past 40 years. Returns of Chinook salmon have declined across Alaska, and coho salmon are also down.
- Other species (e.g., gadids and flatfishes) observed in CIBW stomachs are not assessed in Upper Cook Inlet. Multispecies surveys of these species in Lower Cook Inlet have been inconsistent.
- Energetics models for CIBW and their prey are hampered due to no or inconsistent data on many prey items. For instance, Norman et al. (2019) found a relationship between Deshka river Chinook and coho salmon escapement and CIBW population size and growth, but lacked sufficient data to include eulachon.
- Data on prey availability from fall to spring are not available.



Survey catch rates of (A) gadids Pacific cod (PC) and walleye pollock (WP) and (B) flatfish yellowfin sole (YS) and starry flounder (SF) NMFS in Kachemak and Kamishak bays in Lower Cook Inlet.

SOME RECOMMENDATIONS/OPTIONS

- Implement fishery-independent eulachons surveys in Upper Cook Inlet.
  - A survey (e.g., sonar and/or eDNA) in the Susitna River help inform any link between eulachon abundance and CIBW needs.
  - A retrospective analysis of Kenai River sonar data could inform general eulachon population trends.
- Reinstate salmon escapement monitoring at additional northern Cook Inlet tributaries.
- Reinstate surveys of other species (e.g., gadids and flatfishes) in Lower Cook Inlet as indices for Upper Cook Inlet prey availability.
- Further develop energetics models for CIBW and their prey, including not just salmon escapements but also eulachon, perhaps including harvested biomass.

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ACKNOWLEDGEMENTS:

This project was funded by a grant from the Environmental Investigation Agency through the Alaska Wildlife Alliance. The following individuals also contributed their experience and knowledge to this project: Mike Byerly, Don Degan, Bronwyn Jones, Brandon Key, David Koster, Colton Lipka, Brian Marston, Barbara Mahoney, Mandy Migura, James Miller, Anna-Maria Mueller, Steve Okkonen, Olav Ormseth. Ted Otis, Lori Quakenbush, Wyatt Rhea-Fournier, Nicole Schmitt, Kally Spalinger, Rob Spangler, Lucas Stumpf, Cody Szuwalski, and Alyssa Wood. Any misinterpretation of data, or errors in relaying the available information, rest with the author.