

Beluga, Eulachon, and Salmon



Photo by Madison Kosma

William R. Bechtol

Bechtol Research

bechtolresearch@hughes.net

Mat-Su Salmon Science & Conservation Symposium

November 20, 2025

Outline

- **Cook Inlet Beluga Whale (CIBW) Background**
- **Eulachon**
- **Salmon**
- **What Next – Options for Understanding?**

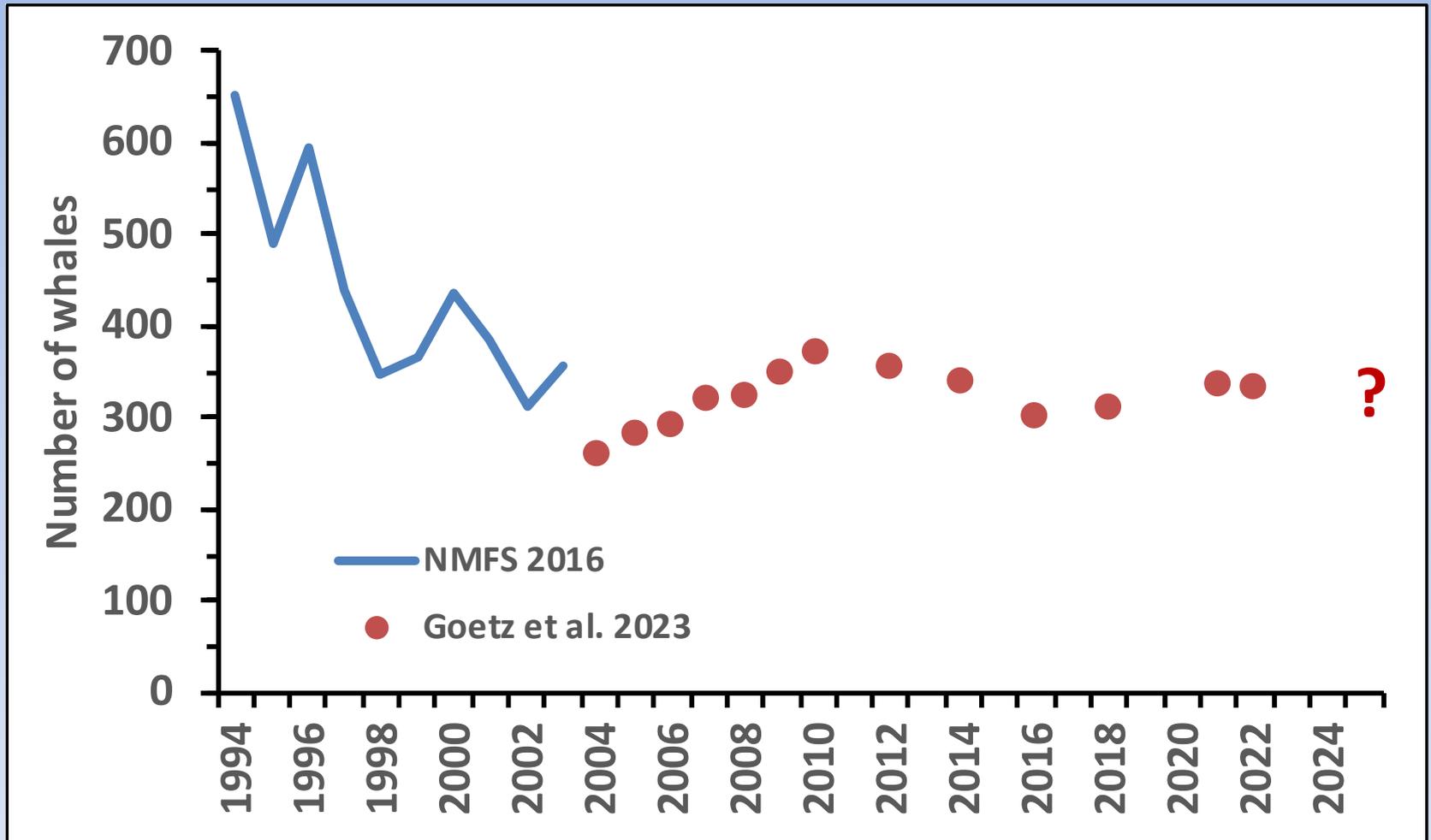
Supported by:

- **Alaska Wildlife Alliance**
- **Environmental Investigation Agency**

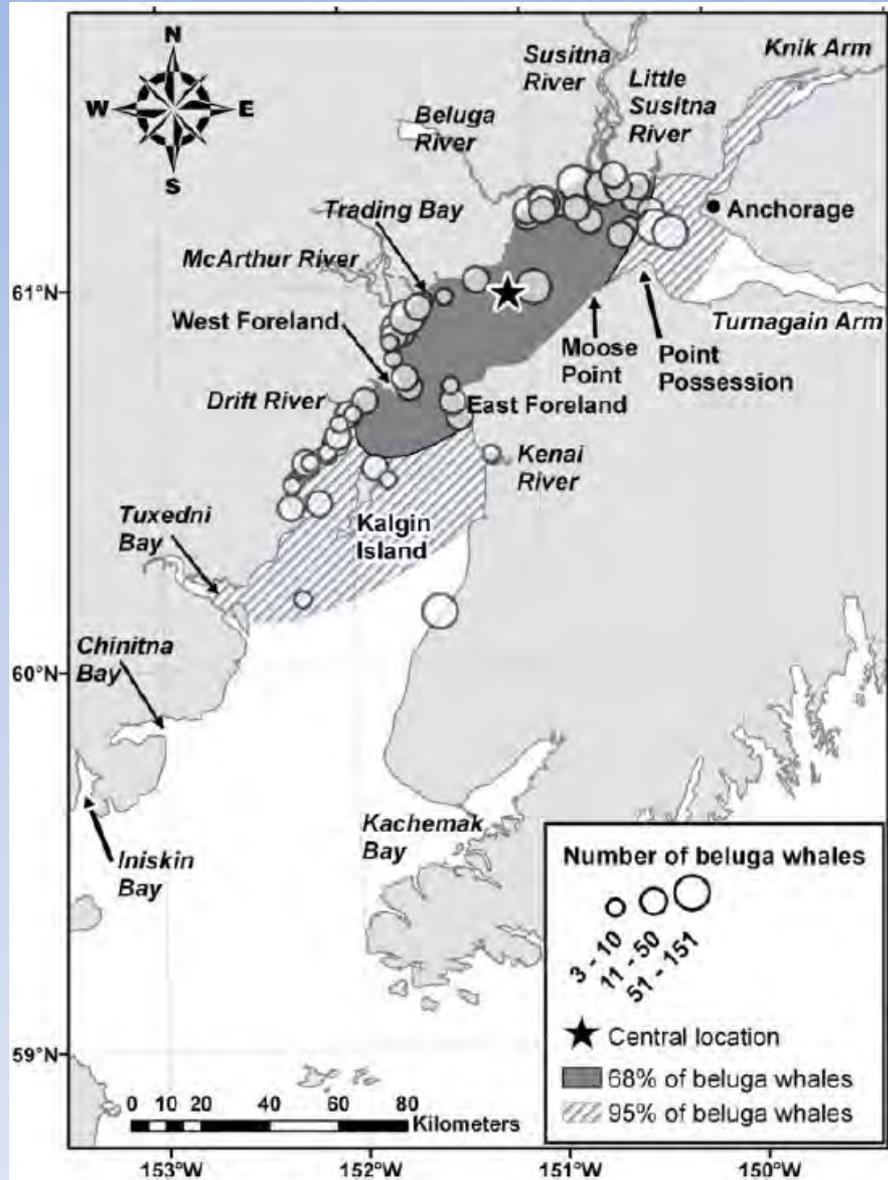
CIBW Background

- **1993 – 1998** - the population declined ~50%
- **2000** – designated as “depleted” under the Marine Mammal Protection Act
- **2008** – listed as “endangered” under the Endangered Species Act
- **2016** – CIBW Recovery Plan released

CIBW Population Estimates

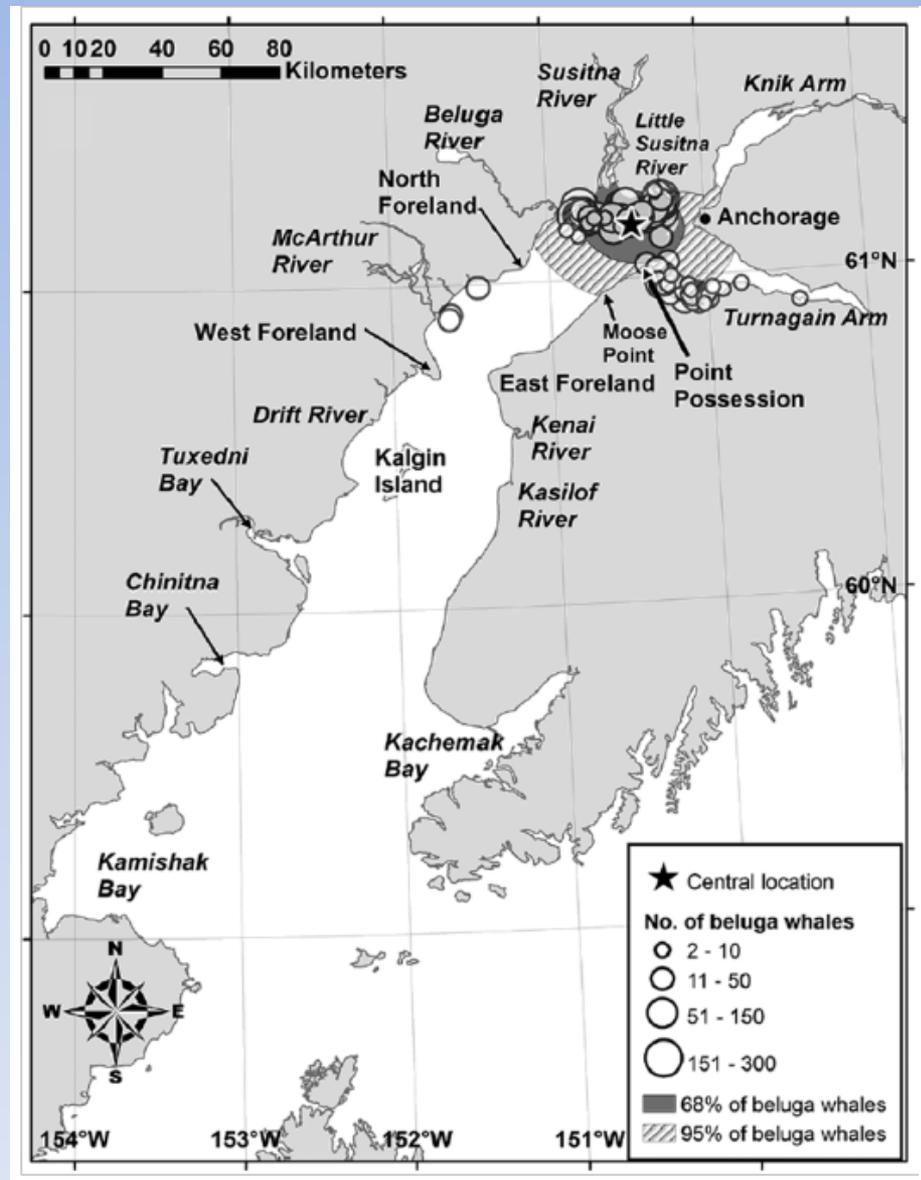


1978-1979



Rugh et al. 2010; NMFS 2016

2009-2014



Shelden et al. 2015b; NMFS 2016

CIBW Threats to Recovery

- Catastrophic events
- Cumulative effects
- Noise
- Disease agents
- Habitat loss/degradation
- **Reduction in prey**
- Unauthorized take
- Pollution
- Predation
- Subsistence hunting

Prey in CIBW Stomach Samples, 2002–2013

Number of Stomachs by Month

	March	April	May	June	July	August	September	October	November	Total number	FO
Stomachs sampled	1	0	0	3	4	7	3	8	1	27	
Stomachs with prey	1	0	0	2	4	5	1	5	0	18	67%
Stomachs with fish	1	0	0	2	3	5	1	5	0	17	94%
Salmon	0	0	0	2	3	4	1	2	0	12	67%
Gadid	1	0	0	0	0	1	1	4	0	7	39%
Smelt	1	0	0	0	1	0	0	0	0	2	11%
Flounder	0	0	0	0	1	0	1	0	0	2	11%
Other identified fish	0	0	0	0	1	0	1	0	0	2	11%
Unidentified fish	1	0	0	0	0	1	0	0	0	2	11%
Stomachs w/inverts	1	0	0	0	3	1	0	4	0	9	50%
Shrimp	0	0	0	0	1	1	0	4	0	6	33%
Amphipod	0	0	0	0	1	0	0	1	0	2	11%
Polychaete	1	0	0	0	0	0	0	1	0	2	11%
Other Id inverts	1	0	0	0	2	1	0	0	0	4	22%
Unid inverts	0	0	0	0	0	0	0	1	0	1	6%

FO - Frequency of occurrence – prey types only show percent for non-empty stomachs

Source - Quakenbush et al. (2015); L. Quakenbush, ADF&G, pers. com.

Prey Consumed

- **Salmon**
 - **Gadids (Cod)**
 - **Smelt (eulachon)**
 - **Flounder**
 - **Invertebrates**
-
- **But – small sample sizes and limited spatial coverage**

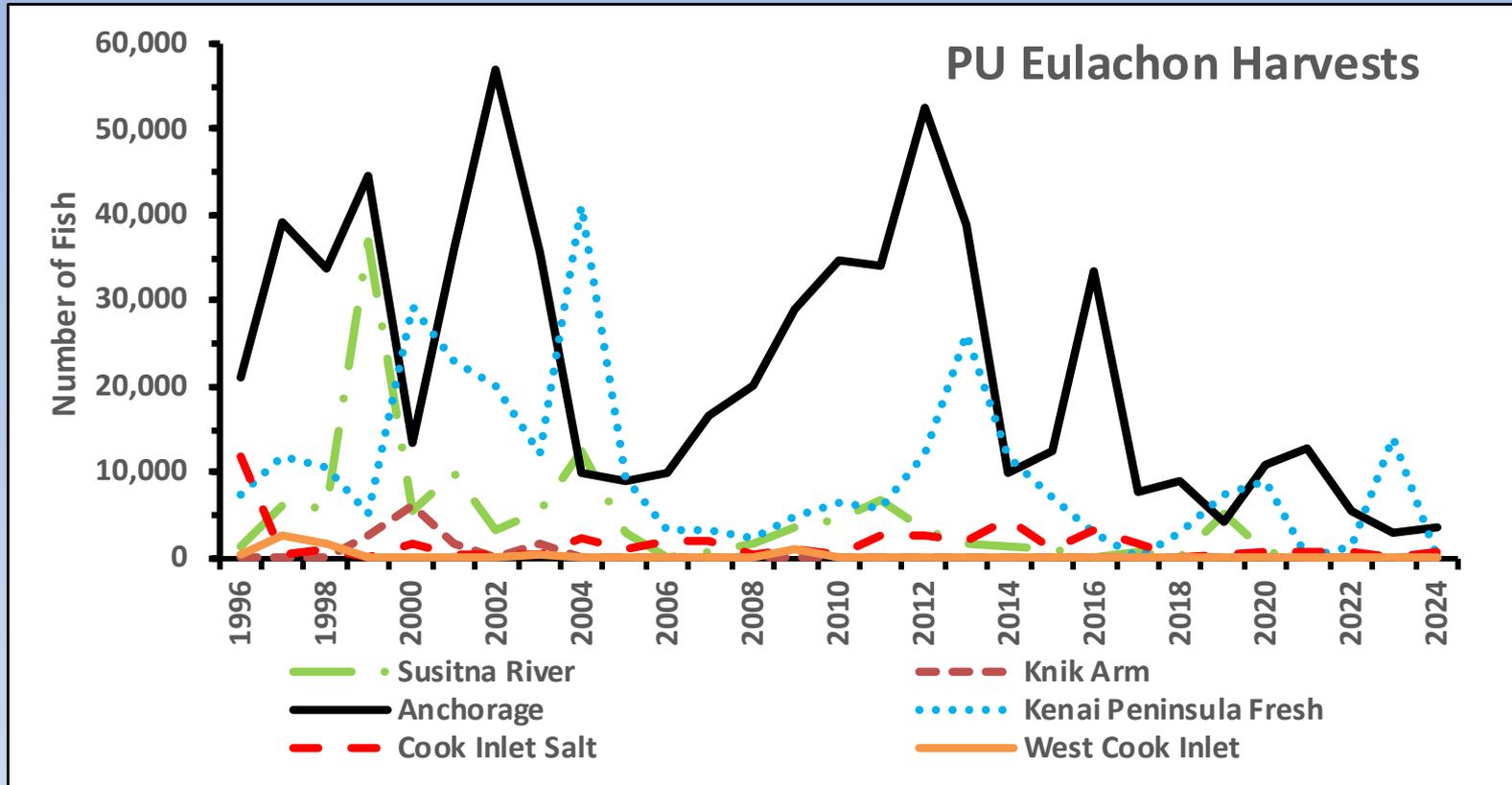
Data on Eulachon (Smelt)

- **Eulachon, Smelt, Hooligan, Candlefish**
 - Only spend 1-3 weeks in freshwater
 - 17% - 20% oil content
- **Important in spring when belugas emerge from a winter of low prey availability and are encountering a period of birthing and nursing**
- **Support Commercial, Subsistence, and Personal Use fisheries**
- **Commercial Fishery (Susitna River mouth) managed for an arbitrary annual harvest limit**
- **Personal Use and Subsistence harvests are unlimited, but likely relatively minor**
- **Data on eulachon population trends?**



Photo – A.M. Mueller

Upper Cook Inlet Personal Use Harvests



Personal Use Eulachon Harvests

- **Data from ADF&G Sport Fish Division mail-out survey**
- **No harvest survey specific to Personal Use**
- **Under existing survey categories, likely confusion between**
 - **Freshwater vs. Saltwater**
 - **Area Fished**
- **Personal Use estimates largely undocumented and hugely underestimate local and total harvest**
- **Magnitude of PU harvests substantially less than Upper Cook Inlet commercial harvest.**

Susitna River Eulachon

- **1982-1983 Su-Hydro studies** – looked at spawning distribution and age/sex/size composition
- **2013 Su-Hydro study** – estimated sonar passage and collected age/sex/size composition
- **2016 ADF&G study** – estimated spawning population based on fecundity of spawning females and downriver larval passage
- **2024 AK Board of Fisheries Harvest Reduction** – ecosystem concerns and no annual assessment
- **NPRB Proposal** – 2024, exploring resubmission

Proposed Susitna River Eulachon Study

Proposed sonar site near river mile 17.5 shown in red, same as 2013 study. Blue lines show approximate locations of ADFG's three 2016 dipnet sites. We propose only dipnetting at ADFG Sites 1 and 2; augmented by qualitative drone reconnaissance flights into two areas in the braided channels marked in yellow.



Kenai River Mile 14 Eulachon

Average number of detections per frame per hour, summed by year

<u>Year</u>	<u>Index</u>	<u>Relative scale</u>
2013	3,921	extremely high
2014	189	moderate
2015	656	high
2016	47	low
2017	0	very low
2018	484	high
2019	29	low
2020	47	low
2021	842	high
2022	35	low
2023	59	low
2024	31	low

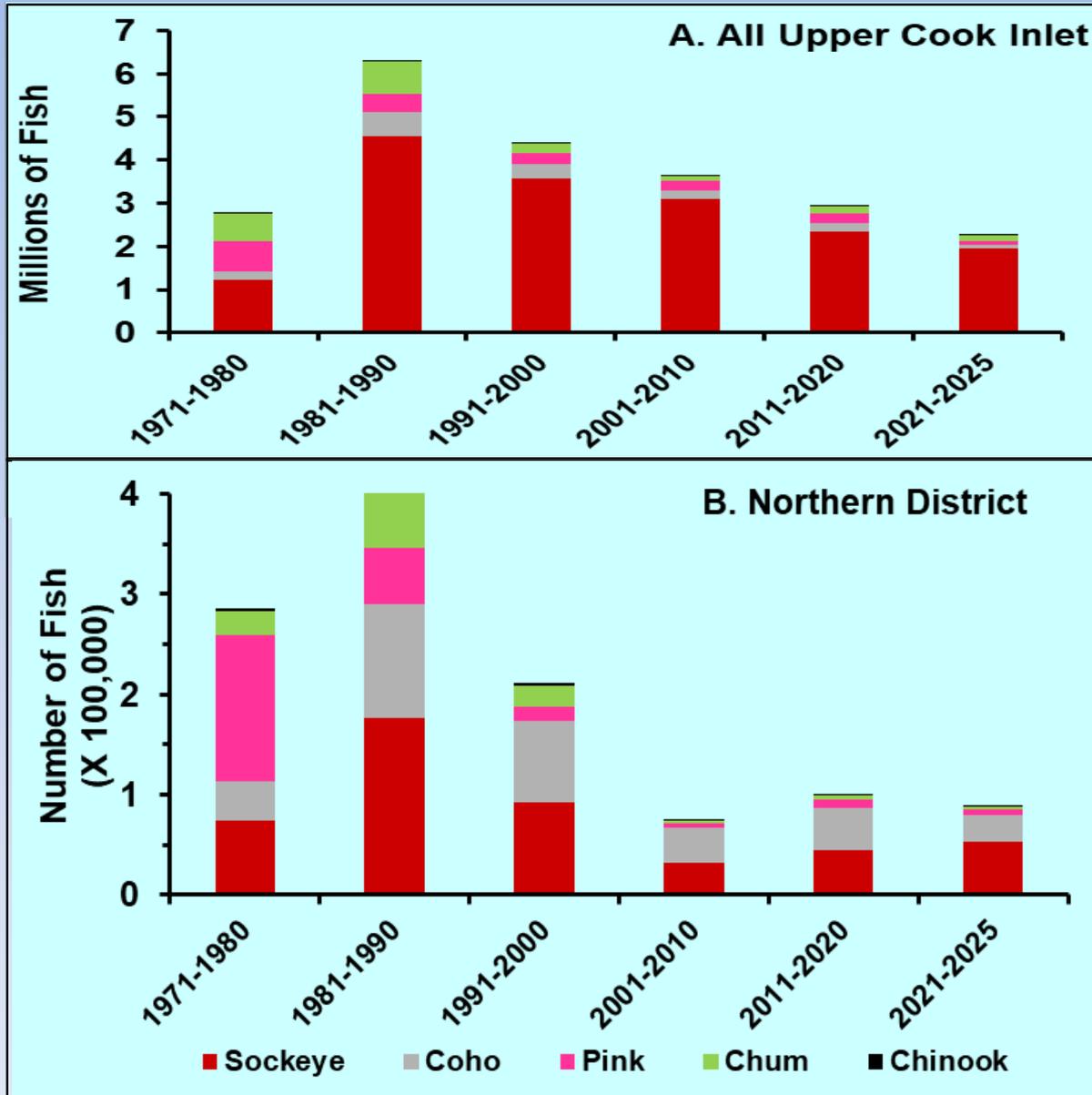
A.M. Mueller, Aquacoustics, pers. com.

Cook Inlet Salmon



Commercial Salmon Harvests

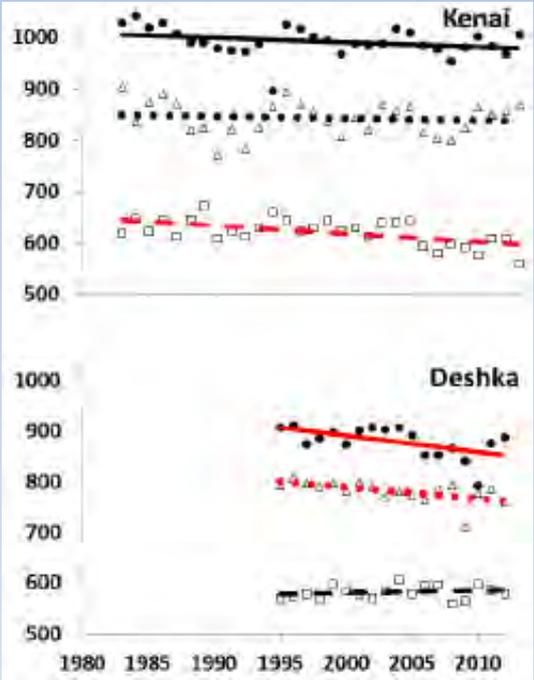
Average by Decade



Declining Fish Size

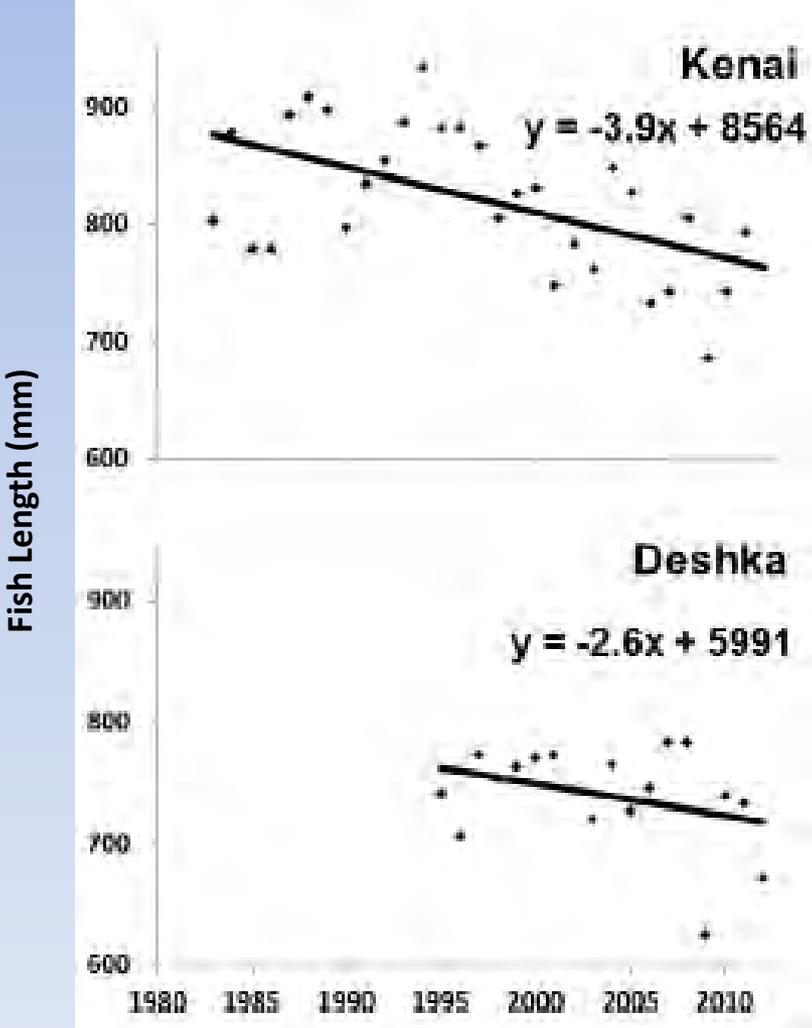
- Lewis et al. 2020
 - Fewer older Chinook salmon
 - Smaller Chinook salmon size at age
 - Reduced nutritional value per fish
 - Reduced number of eggs per fish

Average Fish Size-at-Age



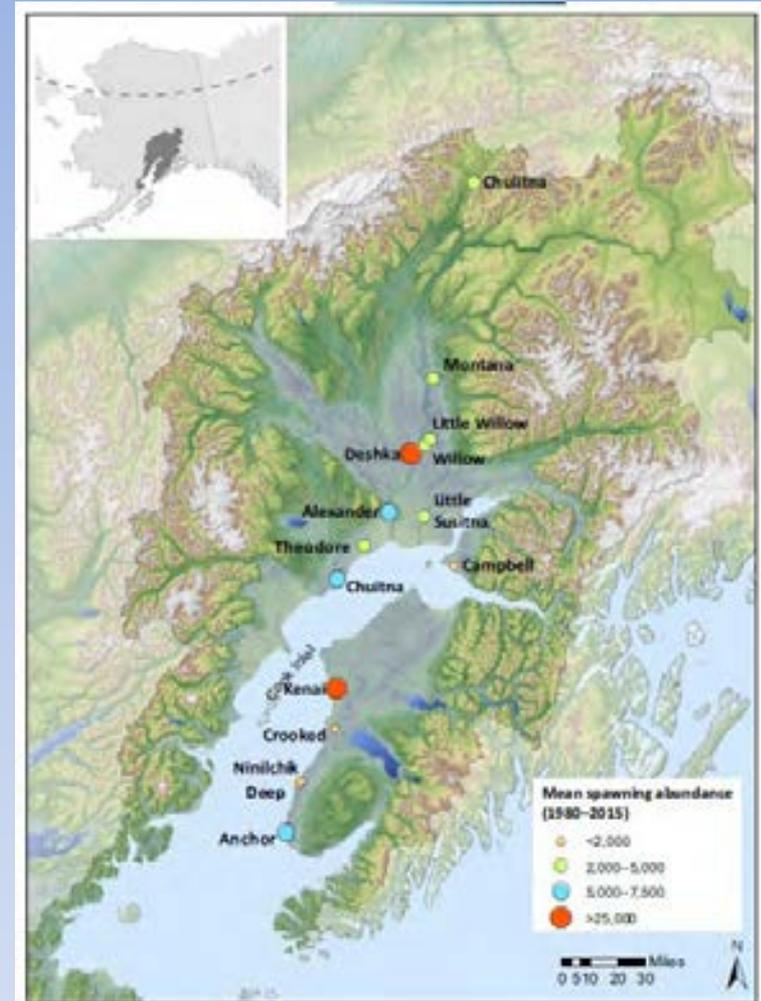
- 4-ocean – solid line
- 3-ocean – dotted line
- 2-ocean – dashed line

Average Fish Size



Other Studies

- Jones et al. 2020
 - Linked Chinook salmon productivity in 15 Cook Inlet tributaries to inriver water conditions after salmon spawning
 - Increased precipitation decreased productivity
 - Effects of increased temperature during spawning and rearing varied by tributary
 - Reached out to authors about replicating study



Where to go next?

- **Explore Susitna eulachon link to CIBW productivity**
 - **Build a mass-balance (Ecosim-type) model for Cook Inlet**
- **Compare Kenai eulachon data to other areas**
- **Genetics of Upper Cook Inlet eulachon vs. other populations**
- **Determine prey resources available from fall to spring**

Questions?

The Future

- Data – Very inconsistent
- Future surveys - uncertain given budgets
- Agency priorities?

