

# Chum salmon in the Canadian Arctic tell a story of resilience amidst change

Karen Dunmall<sup>1</sup>, Jody Illasiak<sup>2</sup>, JD Storr<sup>3</sup>, and the entire Arctic Salmon Team<sup>4</sup>

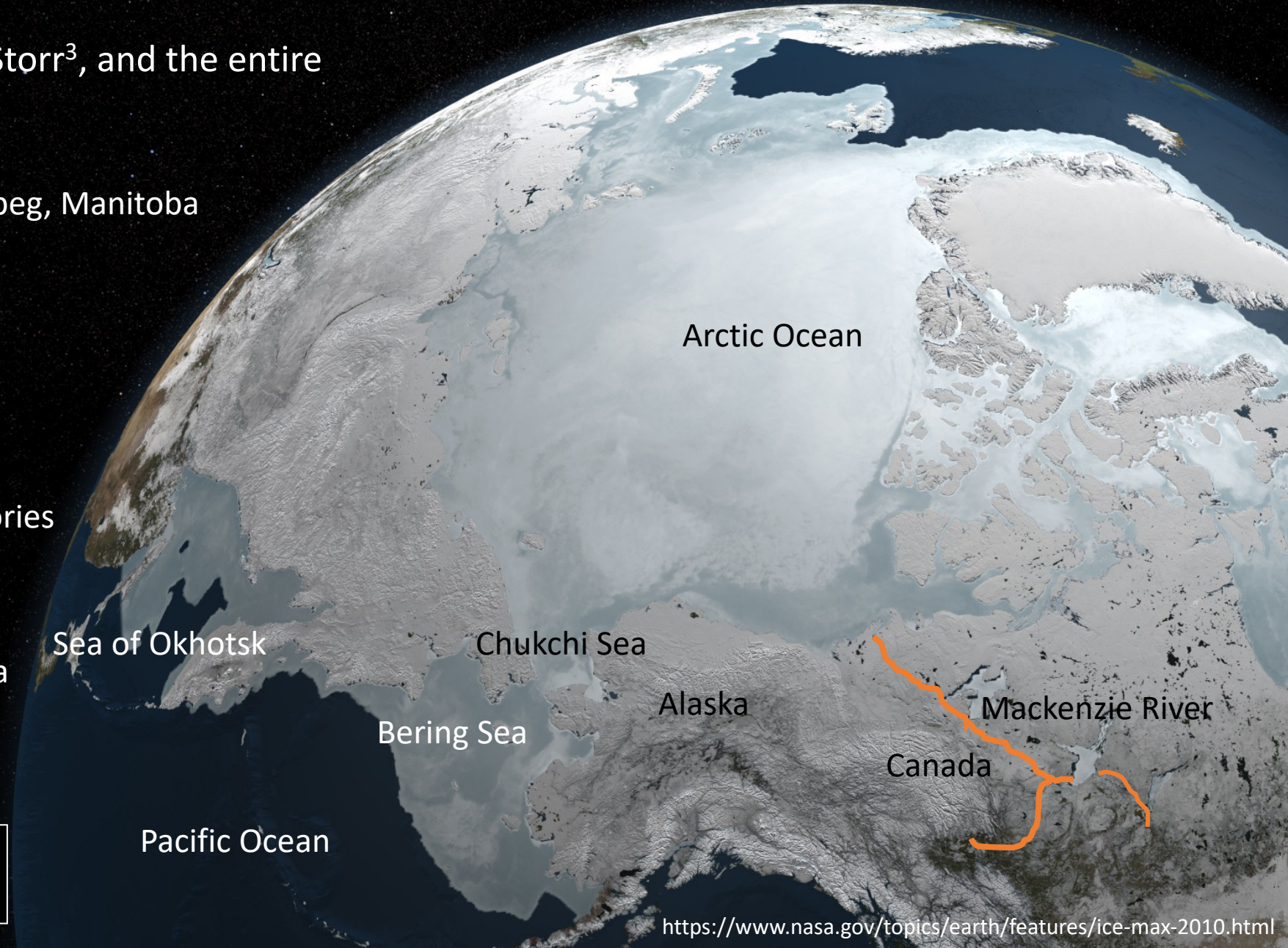
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# Collaborative projects:

Co-Authors: Community harvesters, Community members, The Arctic Salmon Network, DFO scientists, Academic scientists, Agency scientists, Territorial scientists, Alaskan scientists



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada



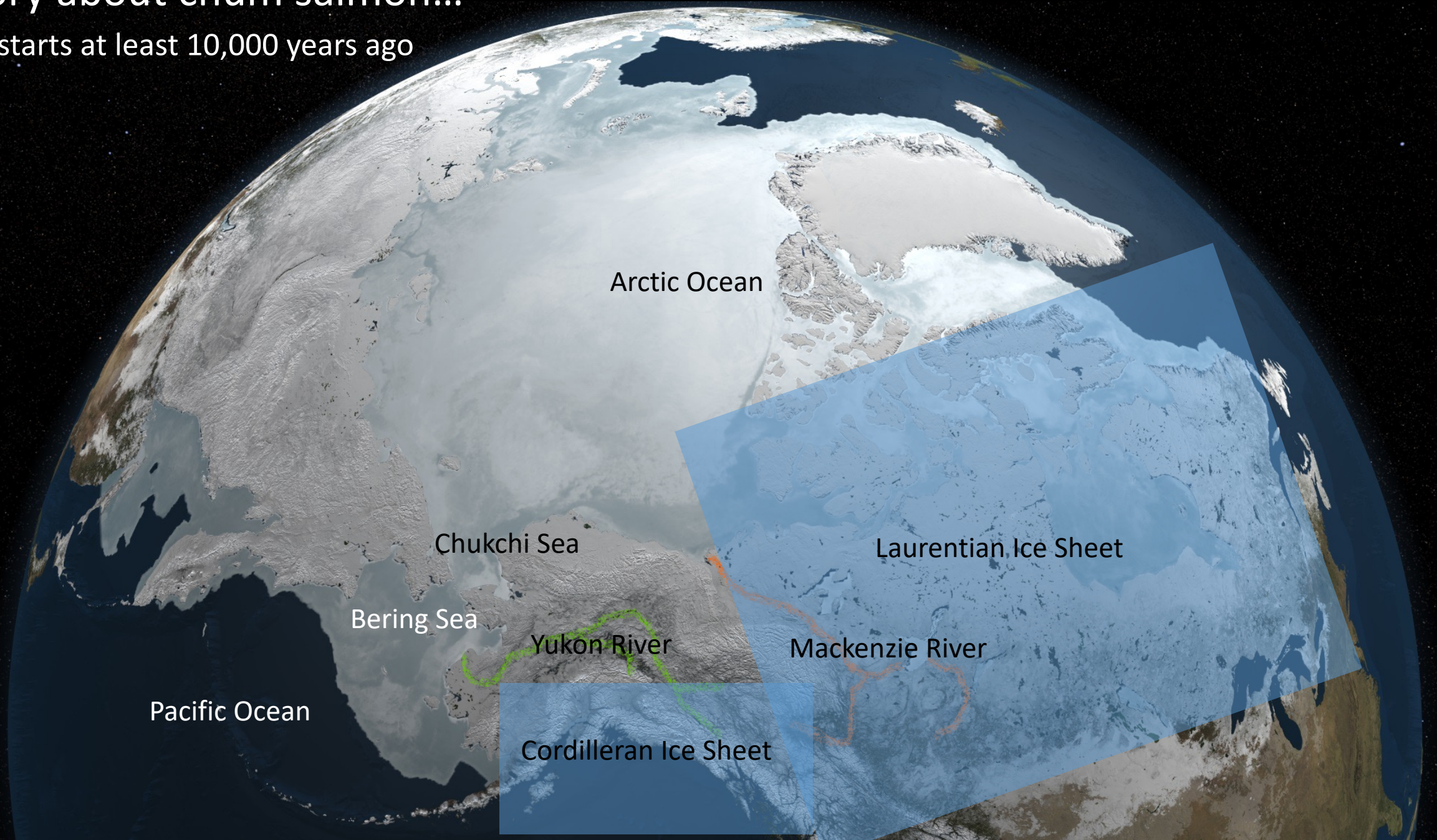
Co-Authors: Darcy McNicholl (DFO), Zander Chila (UVic), Trevor Lantz (UVic), Sara Gilk-Baumer (ADFG), Chris Habicht (ADFG), William Templin (ADFG), Vanessa Von Biela (USGS), Chris Zimmerman (USGS), Jim Reist (DFO),

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Coppermine River, Nunavut

# A story about chum salmon...

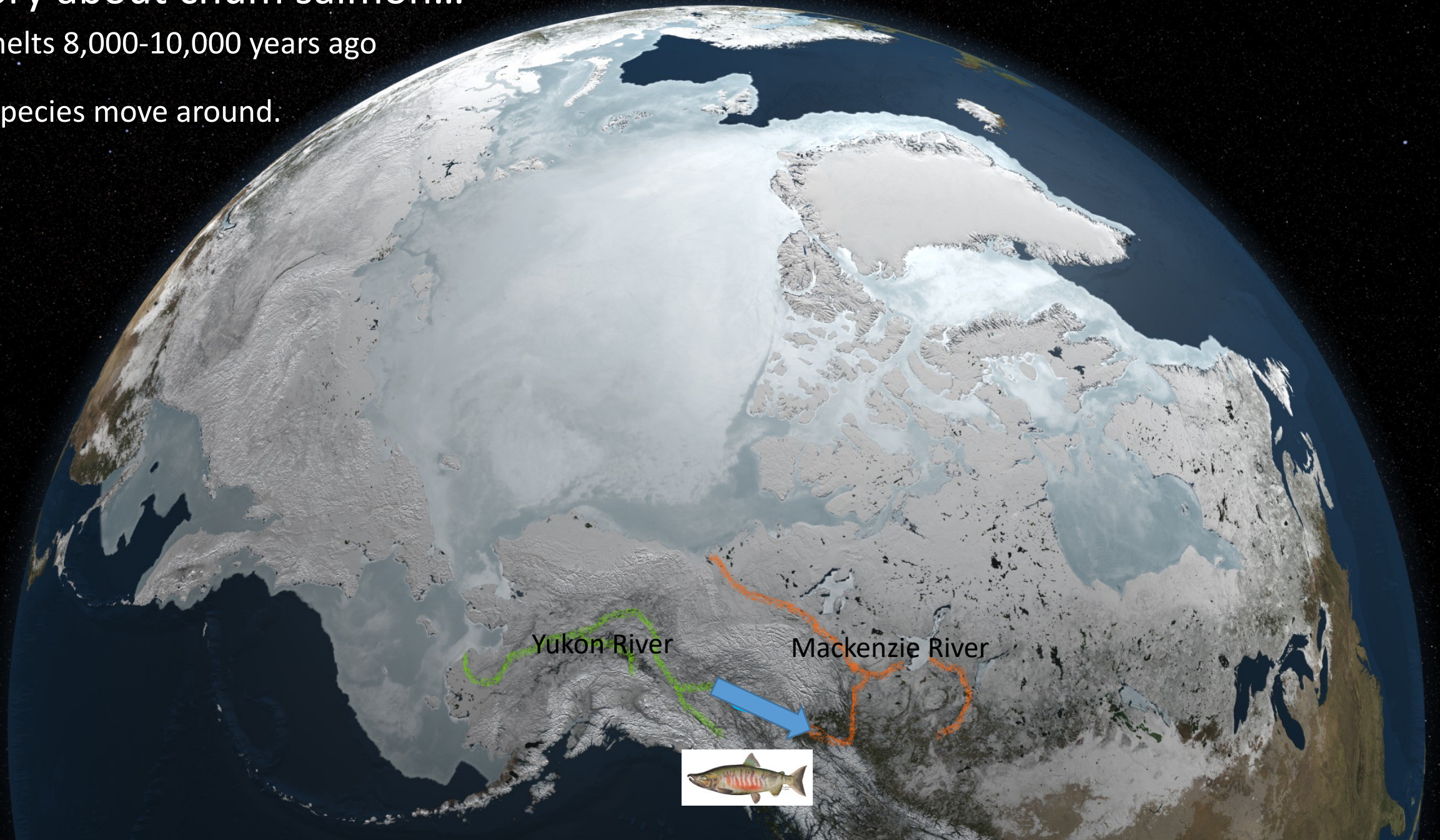
... that starts at least 10,000 years ago



# A story about chum salmon...

... ice melts 8,000-10,000 years ago

And species move around.





# Arctic Salmon



## Arctic Salmon Indigenous Knowledge Project

Requested by the co-management board to document Indigenous knowledge about salmon and changing environmental conditions in the Inuvialuit Settlement Region, Beaufort Sea, Canadian Arctic

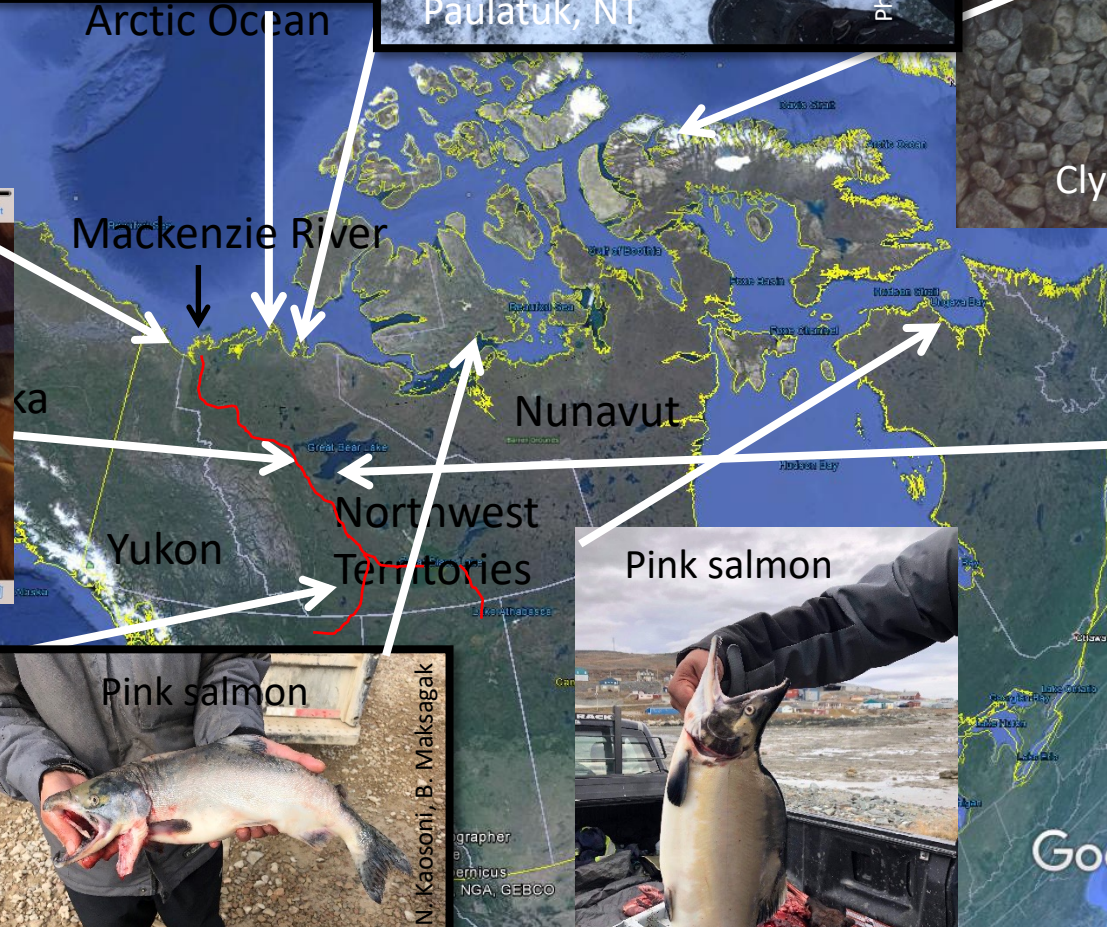
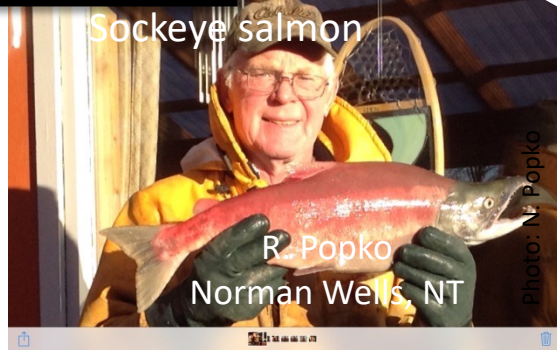
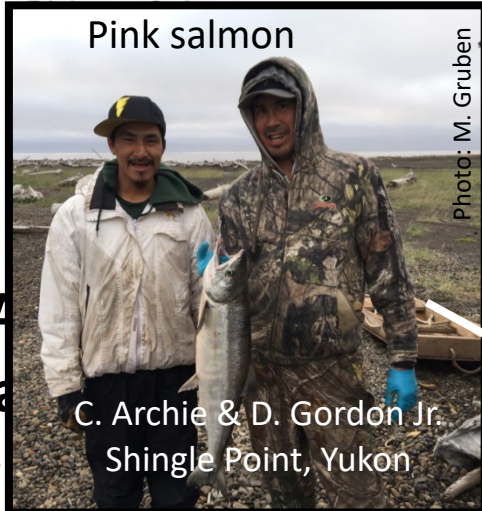


Zander  
UVic MSc  
T. Lantz, Co-sup

Chila, Z., K.M. Dunmall, T. A. Proverbs, T. C. Lantz, Aklavik Hunters and Trappers Committee, Inuvik Hunters and Trappers Committee, Sachs Harbour Hunters and Trappers Committee, Olokhaktomiut Hunters and Trappers Committee, and Paulatuk Hunters and Trappers Committee. 2021. Inuvialuit Knowledge of Pacific Salmon Range Expansion in the Western Canadian Arctic. CJFAS <https://doi.org/10.1139/cjfas-2021-0172> \* Editors Choice

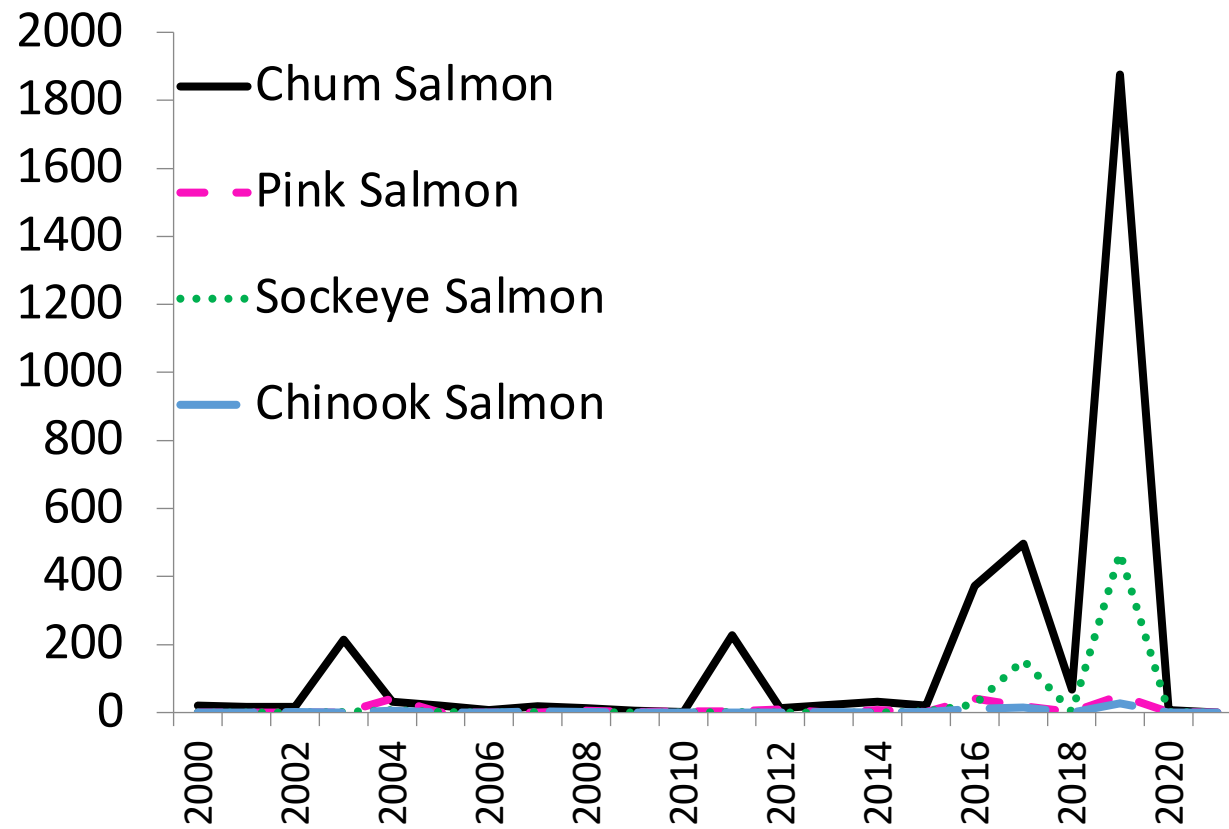
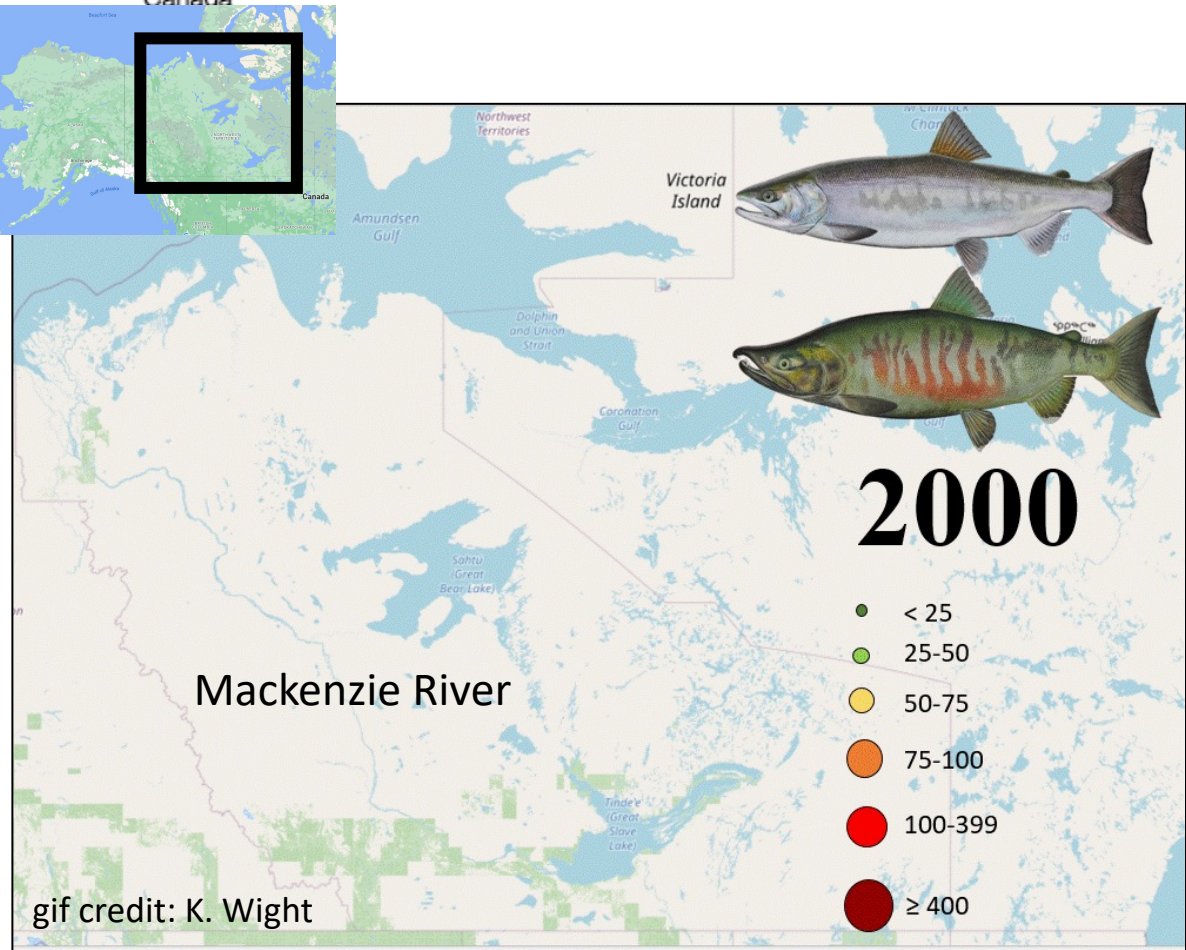
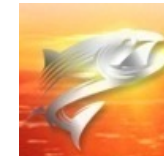


# mon



A community-based project that monitors biodiversity change of fish in subsistence harvests across the Canadian Arctic

# Arctic Salmon



Occurrences of chum salmon caught by subsistence harvesters and provided to Arctic Salmon from 2000 to 2021.

Total number of salmon provided by harvesters to Arctic Salmon from 2000 to 2021 across the Canadian Arctic.

From: Dunmall et al. 2013, 2018, 2021



## What happens to a fish once it is harvested?

- **Freeze it.** Harvester decides to trade it in \*
- **Receive it.** Local office (HTC, RRC, ENR, DFO) \*
- **Sample it.** Community-based technicians measure it and get tissues \*
- **Analyze it.** According to community-driven questions \*
- **Report on it.** Salmon assistants, social media, radio, other means \*

\* = happens in the communities



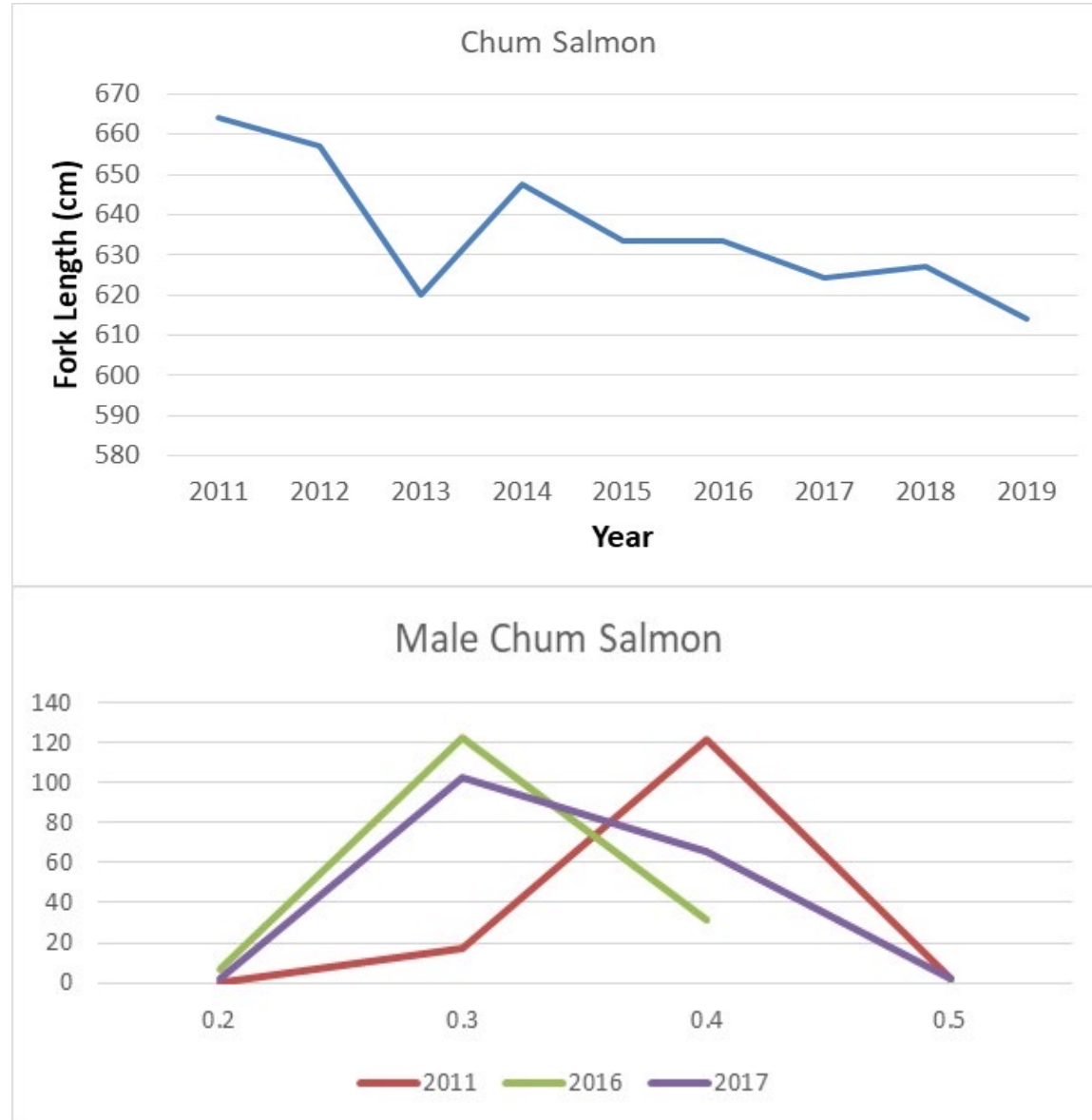
R. McLeod processing salmon heads in Inuvik (left);  
M. Kotokak Sr. received training remotely (right)





## Age Sex Length Results

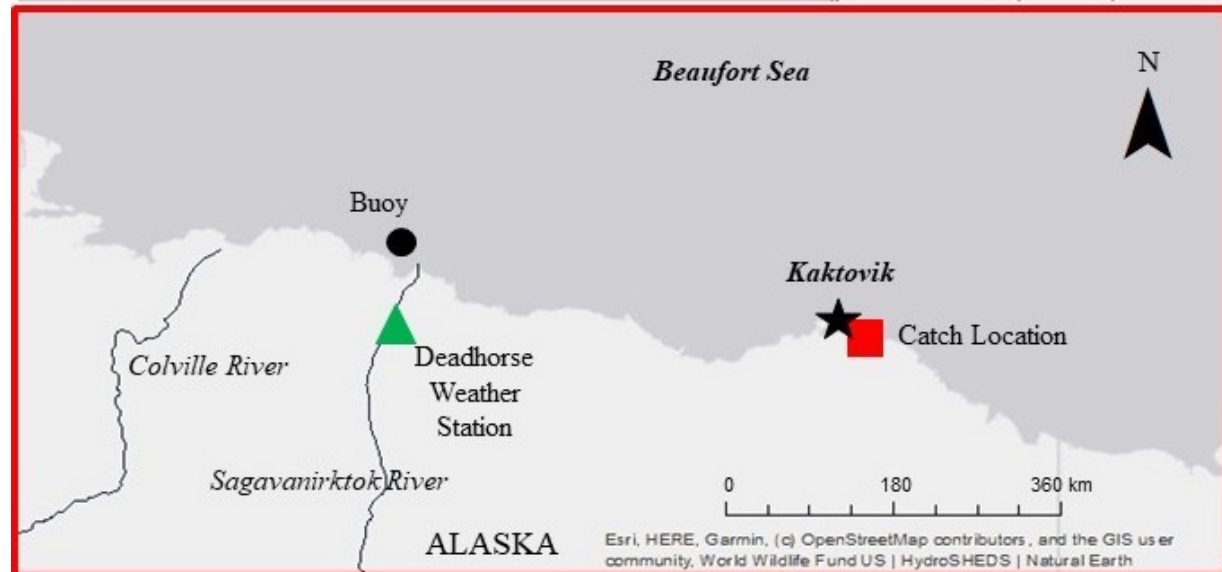
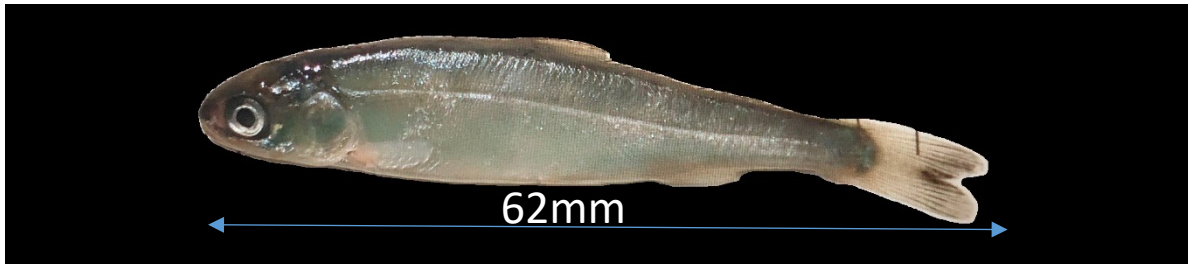
- Chum salmon seem to be getting smaller over time
- Chum salmon appear to be getting younger over time
- Chum salmon harvested are mostly males, except for those caught in the Mackenzie River delta





## Juvenile Chum in Kaktovik

- Caught in a USGS monitoring project in August 2017.
- Shifts spawning distribution of chum salmon to the North American Arctic
- First evidence of Arctic nearshore survival in chum salmon.



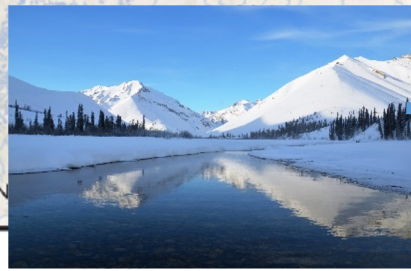
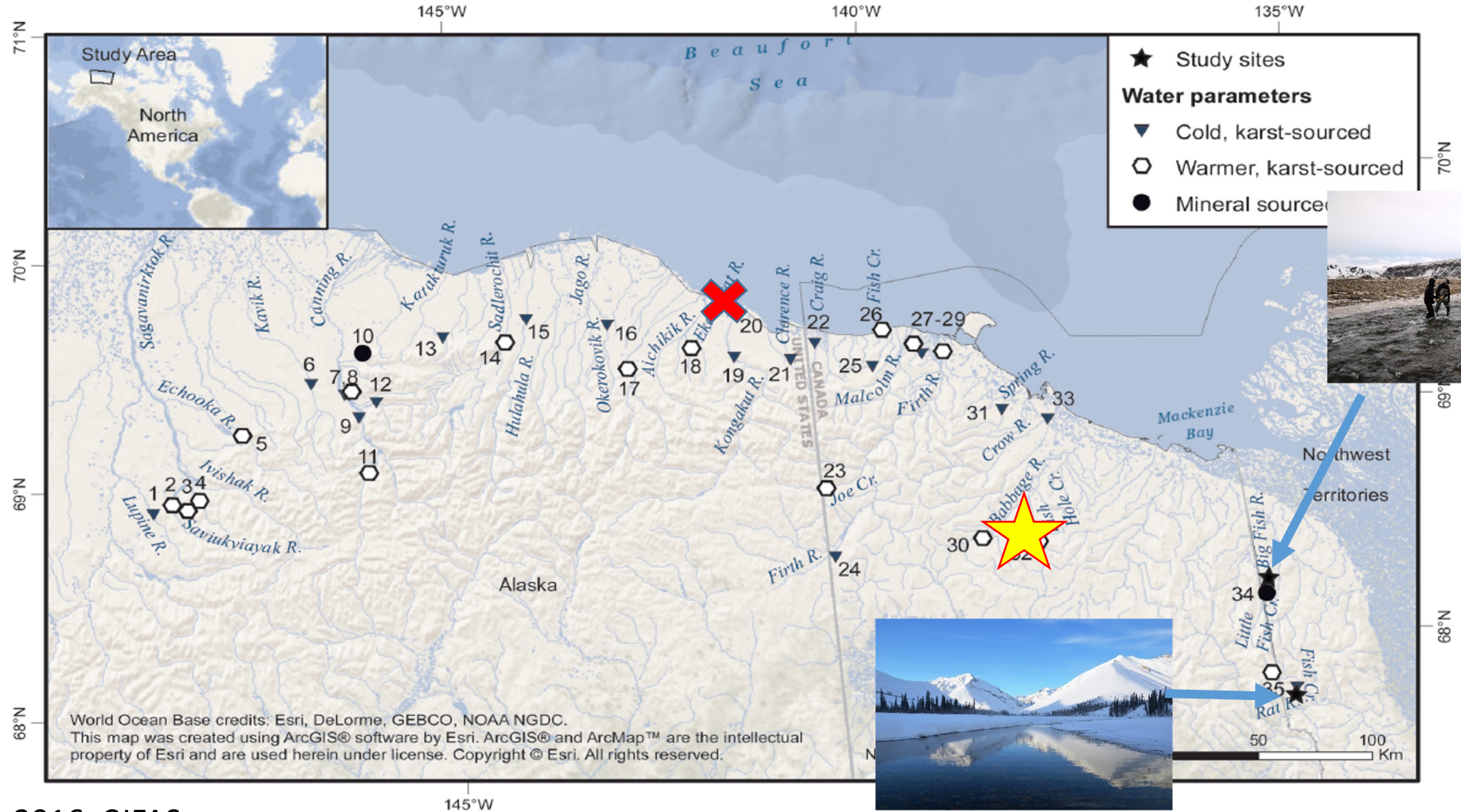
Dunmall, K.M., McNicholl, D.G., Zimmerman, C., Gilk-Baumer, S., Burril, S., and V. Von Biela. 2022. First juvenile Chum Salmon confirms successful reproduction for Pacific salmon in the North American Arctic. CJFAS. <https://doi.org/10.1139/cjfas-2022-0006>



# Arctic Salmon



Is there thermally suitable habitat for salmon in the freshwater in the North American Arctic?





# Arctic Salmon



Increasing salmon is concerning to Indigenous harvesters, both as a tangible example of broader ongoing changes and due to the potential for salmon to interact with Arctic fishes.

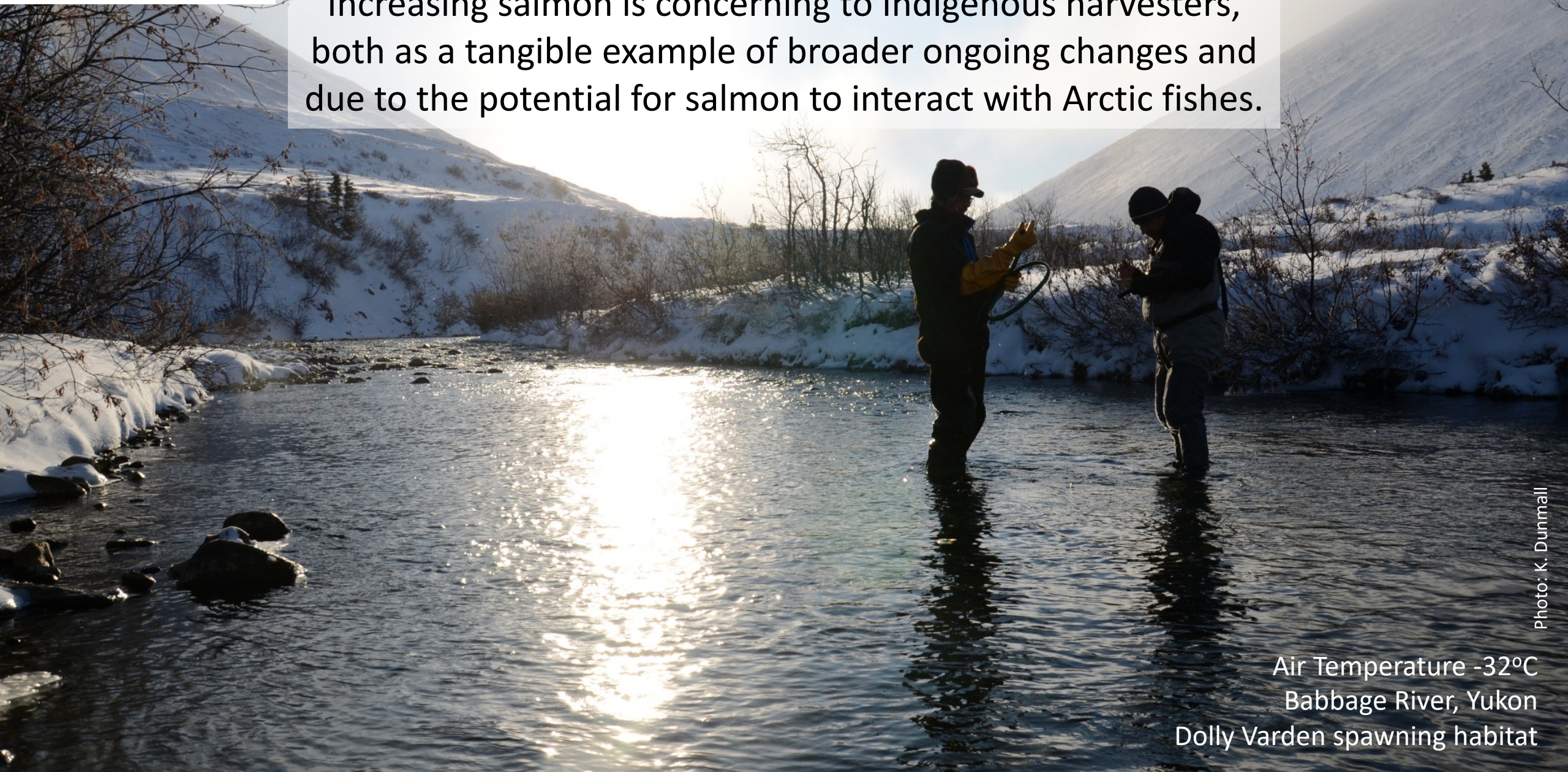


Photo: K. Dunmall

Air Temperature -32°C  
Babbage River, Yukon  
Dolly Varden spawning habitat



## Next steps: Why?

September 2020 sea ice extent

Pacific Ocean

Arctic  
Ocean

Sea ice was at  
its second  
lowest extent  
on record in  
2020



But there were  
no salmon in  
the Canadian  
Arctic in 2020

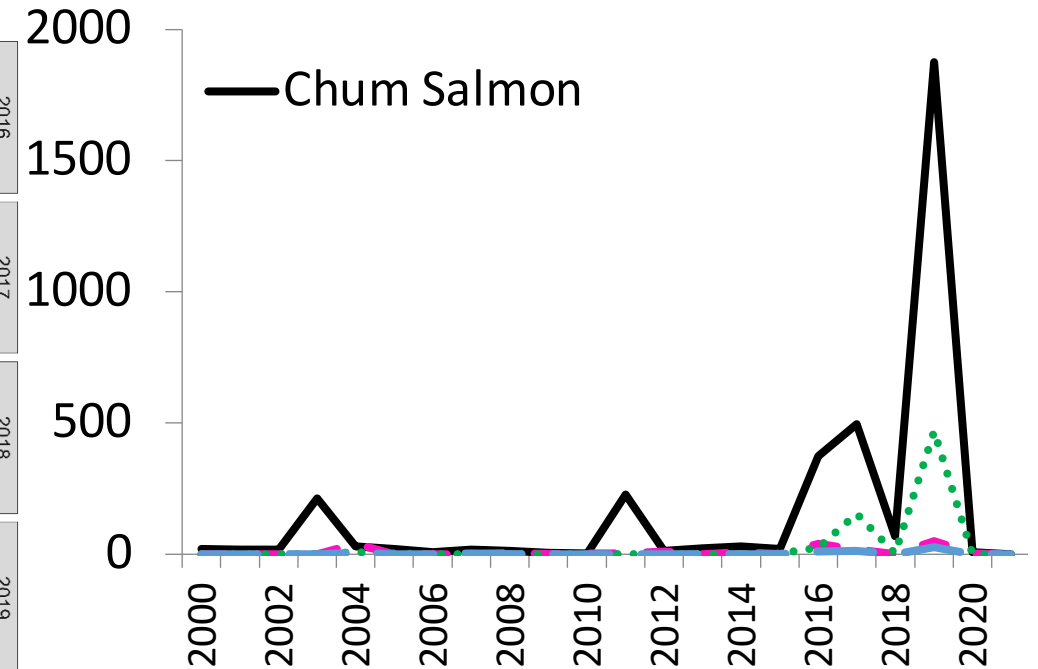
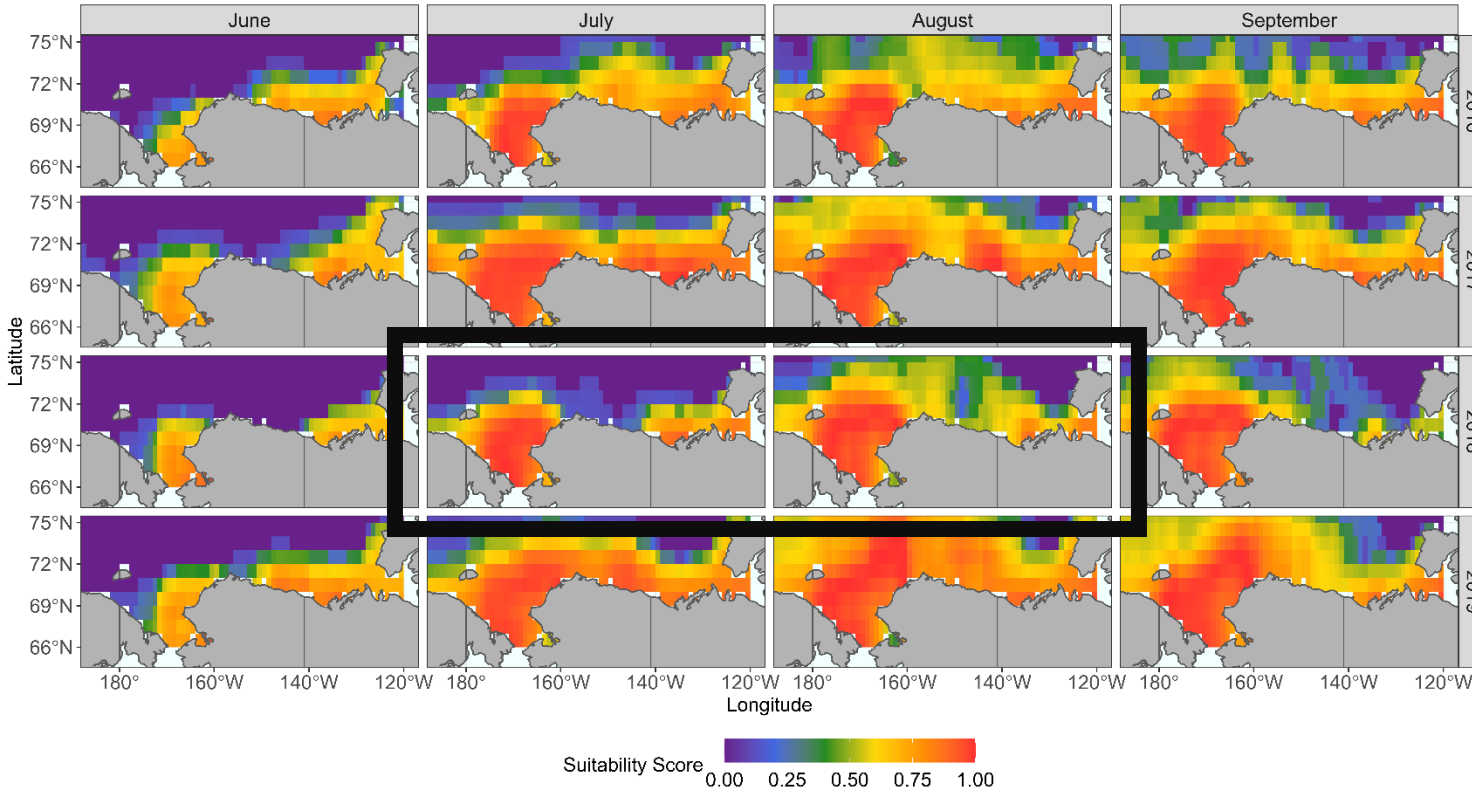
# Arctic Salmon



## Next steps: Why?

- Modelled temperature tolerances by salmon species
- Applied that to sea surface temperatures in the Arctic
- Identified thermally suitable habitat for chum salmon
- Interpreted using Arctic Salmon data from harvesters

Chum: Monthly Suitability Score



Total number of salmon provided by harvesters to Arctic Salmon from 2000 to 2021 across the Canadian Arctic.

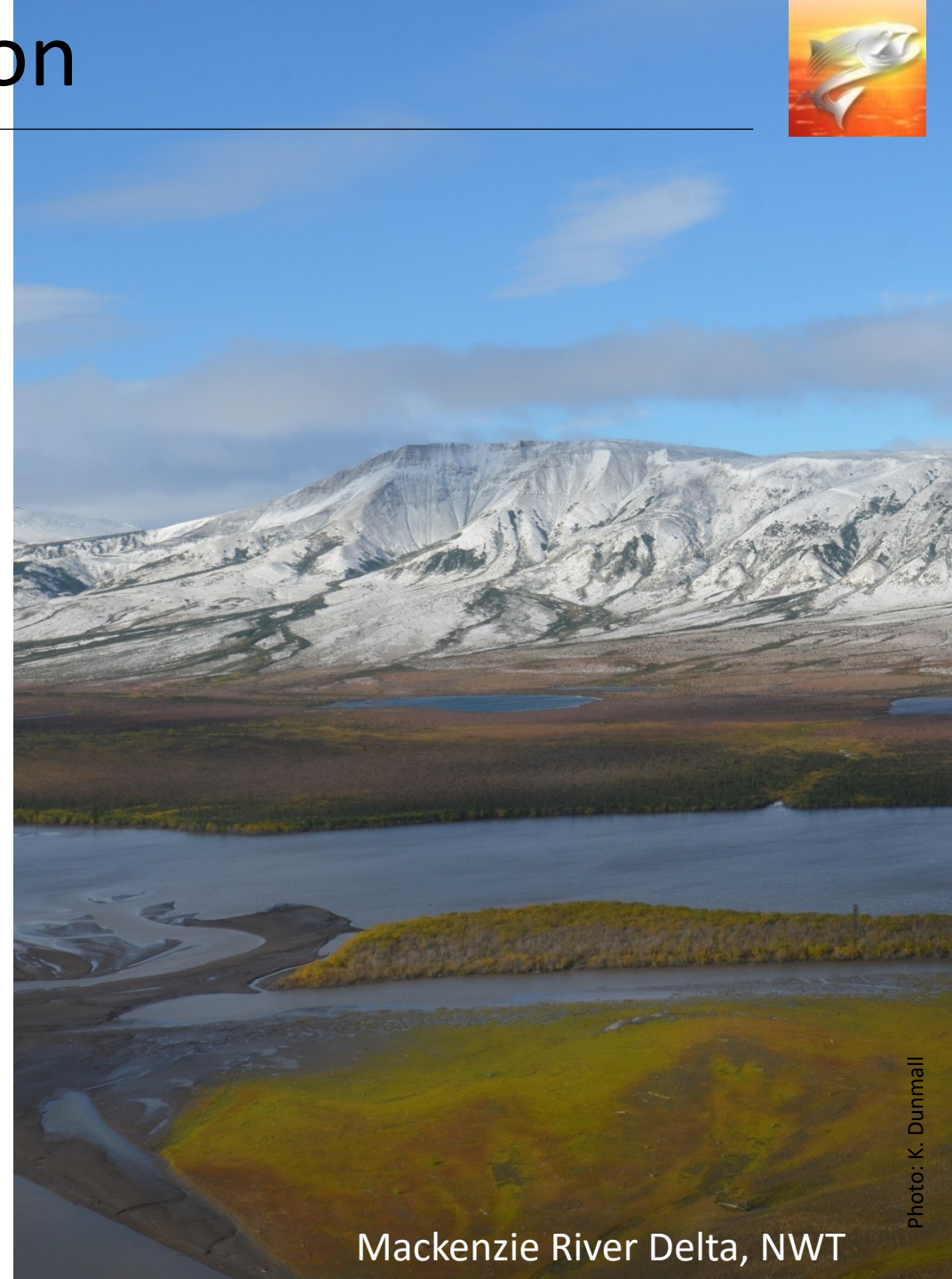
From: Dunmall et al. 2013, 2018, 2021

Joe Langan, Skip McKinnell, Curry Cunningham, Jordan Watson



## Summary

- A story about salmon
- Chum salmon have been present for generations
- Salmon are increasing in the Canadian Arctic
- Salmon are responding rapidly to rapid changes
- Salmon may establish in new areas
- **Increasing salmon is concerning**
- This is a story about people
- Talk: Perspectives on increasing salmon by Jody Illasiak & JD Storr; Oct 5 @ 11am



Mackenzie River Delta, NWT

# Acknowledgements

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- Fisheries and Oceans Canada
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- University of Manitoba
- Polar Continental Shelf Program
- Fisheries Joint Management Committee
- Gwich'in Land and Water Use Planning Board
- Sahtu Renewable Resources Board
- Gwich'in Renewable Resources Board
- Liber Ero Fellowship Program
- Garfield Weston Foundation
- NSERC

## Collaborators:

- Fisheries and Oceans Canada
- Alaska Department of Fish and Game
- Government of NWT, Parks Canada
- Joint Secretariat
- Gwich'in Renewable Resources Board
- Sahtu Renewable Resources Board
- Fisheries Joint Management Committee
- Dehcho AAROM Program
- Most Renewable Resource Committees, Hunters & Trappers Committees, Hunters & Trappers Organizations & Band Offices in the Northwest Territories and Nunavut

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Mackenzie River