Understanding population trends of the aarluk (*Orcinus orca*) in the eastern Canadian Arctic and associated implications

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Source: Kemeny, 2019

Community and Citizen Science in the Far North Conference 2024

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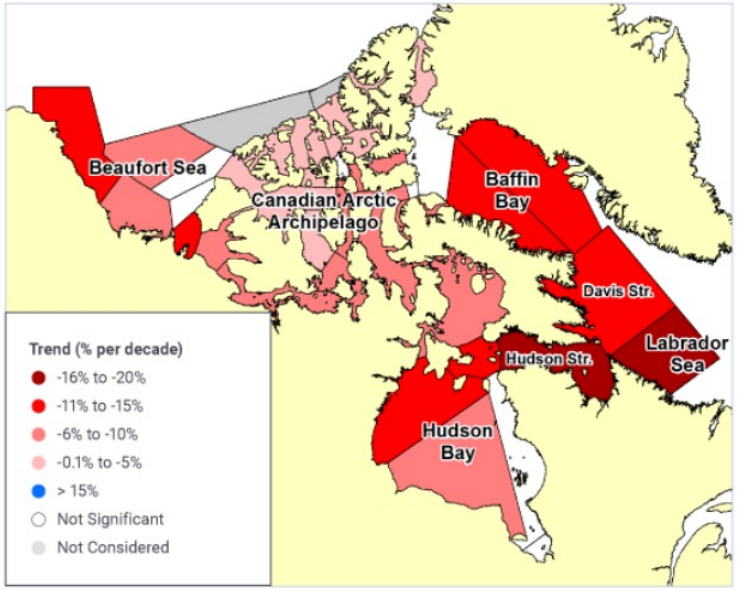
Changes in the Arctic

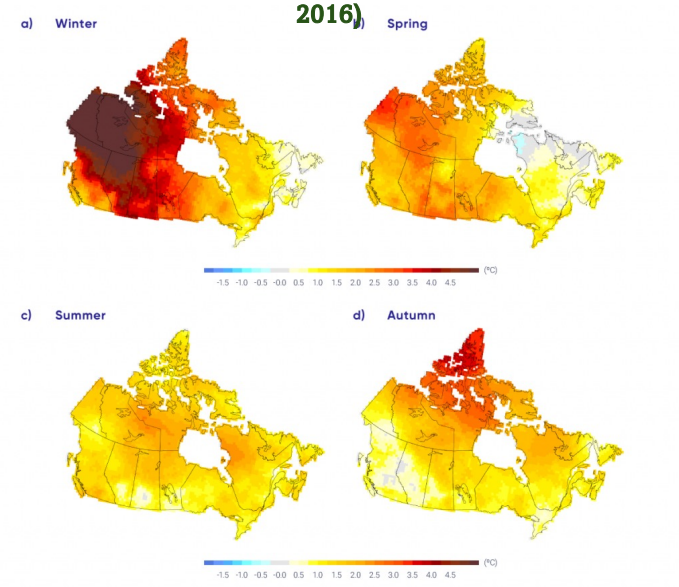
- Mean temperatures increased by 2.3 °C from 1948-2016
- Decreased total summer sea ice from -5% to -20% per decade

Trends in Arctic summer total ice (1968-2016)



Source: Canada's Changing Climate Report (Derksen et al., 2019)

Observed changes (°C) in seasonal mean temperatures (1948-2016)

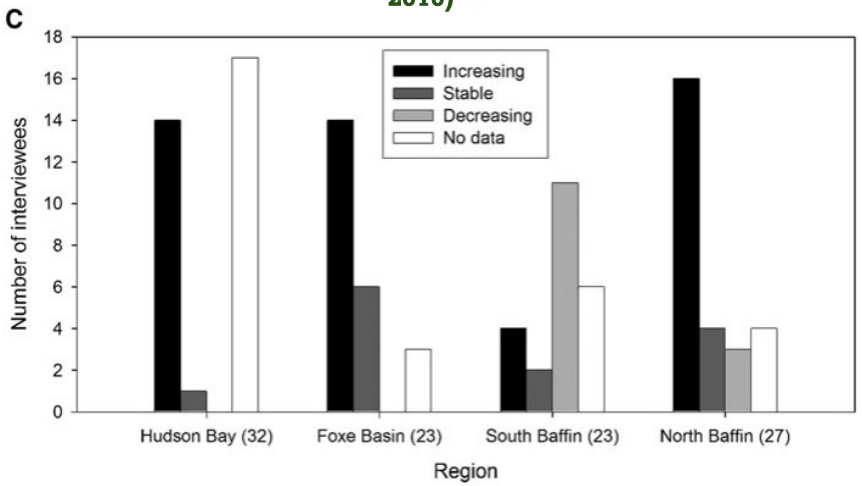


Source: Canada's Changing Climate Report (Derksen et al., 2019)

Changes in the Arctic

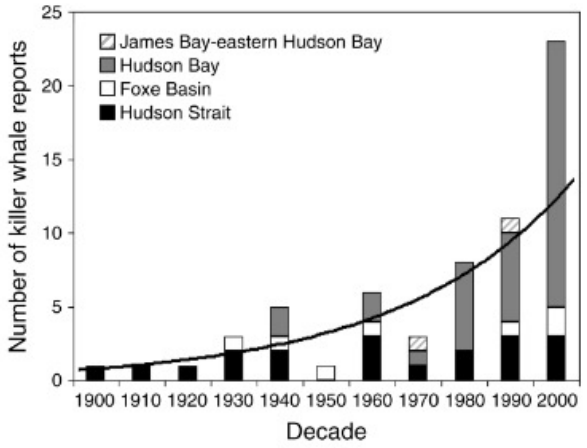
- Number of sightings in literature is rising exponentially
- 70% interviewees from an Inuit knowledge survey note the population and/or the number of sightings is increasing

Observed trends in sighting frequency or population size according to an Inuit knowledge survey of 11 Nunavut communities (2008-2010)



Source: Higdon, Westdal & Ferguson, 2013

Number of killer whale reports per decade (1900-2004)

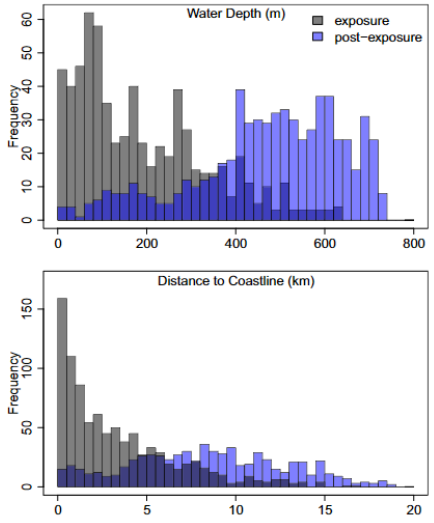


Source: Higdon & Ferguson, 2009

Ecosystem Impacts

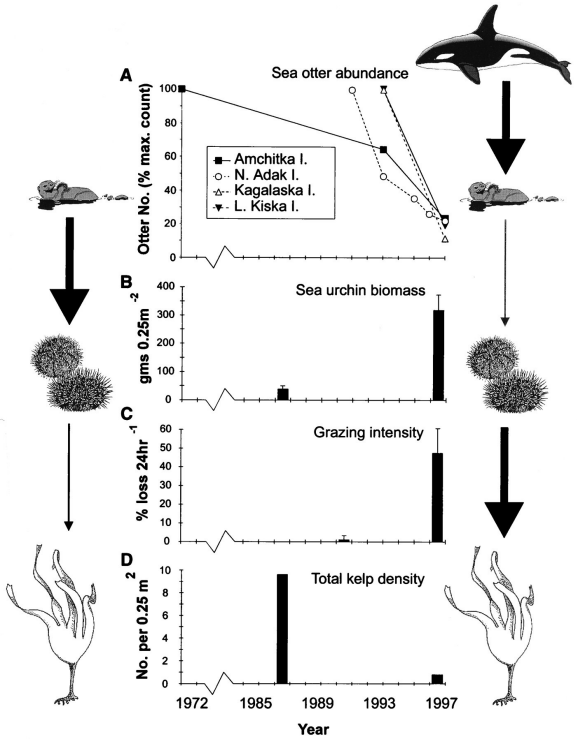
- Aarluk are higher-trophic level predators which can significantly impact local ecosystem functioning

Pattern of habitat use by narwhal during and after exposure to aarluk during a 17-day period



Source: Breed et al., 2017

Example of a trophic cascade caused by aarluk in the Aleutian archipelago, Alaska, USA (1972-1997)



Source: Estes et al., 1998

Aarluk-Inuit Relationship

- Inuit hunters in the Canadian Arctic, traditionally, very-rarely hunt the species, especially in open-water conditions for three reasons.

1. Cultural belief of retaliation from the species
2. Aarluk are dangerous and difficult to hunt
3. There is a preference for other animals

Source: Boehm et al., 2023

Aarluk-Inuit Relationship

- The impacts to subsistence livelihoods may be impacting how Inuit perceive of and interact with the species.

- Most (52%) interviewees held negative perceptions of the species
- Some (20%) interviewees held positive perceptions of the species
- These perceptions could change with the climate and with increasing pressures on hunting, such as in Pond Inlet in 2022 (right)

Source: Nunatsiaq News, 2022

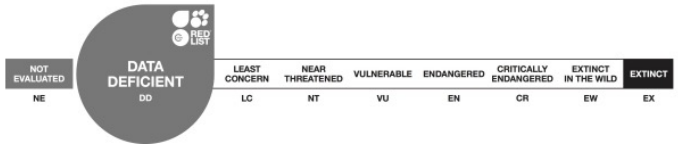
Persistent Uncertainty

- Despite ongoing efforts to understand the species and its demographic trends, there is still much uncertainty
- Making it difficult to predict how Inuit communities reliant on subsistence hunting may be impacted.

The IUCN Red List of Threatened Species™
ISSN 2307-8235 (online)
IUCN 2008: T15421A50368125
Scope: Global
Language: English

***Orcinus orca*, Killer Whale**

Assessment by: Reeves, R., Pitman, R.L. & Ford, J.K.B.



Hope and peril for Killer Whales and other Canadian species Français

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Methods

- To address persistent uncertainty, three methods will be utilized to understand and forecast the socioecological trends and implications of these changes.

1. Scenario forecasting using a modified Delphi survey
2. Focus groups and interviews with hunters/fishers in Pond Inlet, Nunavut
3. Community-based participatory mapping of aarluk sightings near the community

Source: Dawson et al., 2024

Anticipated Results

1. Clarifying ecological uncertainty (Informing conservation needs and future work)

Delphi survey

- Forecasts of:
  - The amount of time per year the population will remain in the Canadian Arctic
  - Whether the population is increasing, decreasing or stable
  - The range of the population within the Canadian Arctic
- Inventory and ranking (according to importance) of ecological implications from these changes

Opportunistic Sightings (Community Based Participatory Mapping and Sighting Database)

- Maps of aarluk sighting density and high-density areas corrected for observer effort

Anticipated Results

2. Clarifying social uncertainty (Informing policy needs and future work)

Focus group / interviews

- Inventory of social implications from and adaptation behaviours regarding:
  - The recent ecological changes associated with aarluk
  - The forecasted ecological changes associated with aarluk under different climate scenarios

Opportunistic Sightings (Community Based Participatory Mapping and Sighting Database)

- Maps of recent aarluk sighting and population density overlain with anthropogenic ocean-use patterns (shipping-routes, community hunting areas, etc.)

What does all this mean?

- This project encapsulates the complexities of cascading impacts from climate and environmental change for northern communities.

Re-thinking what are considered "traditional" practices under climate change?

Difficult decisions to be made regarding species conservation and Inuit subsistence?

What are the impacts of these decisions for Inuit sociocultural and physical wellbeing?

Thank you to our project partners and funders!

Questions about the project? Email me at nholl057@uottawa.ca

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