SNOT FOR SCIENCE

Using respiratory condensate to measure stress levels in Western Hudson Bay belugas (*Delphinapterus leucas*)

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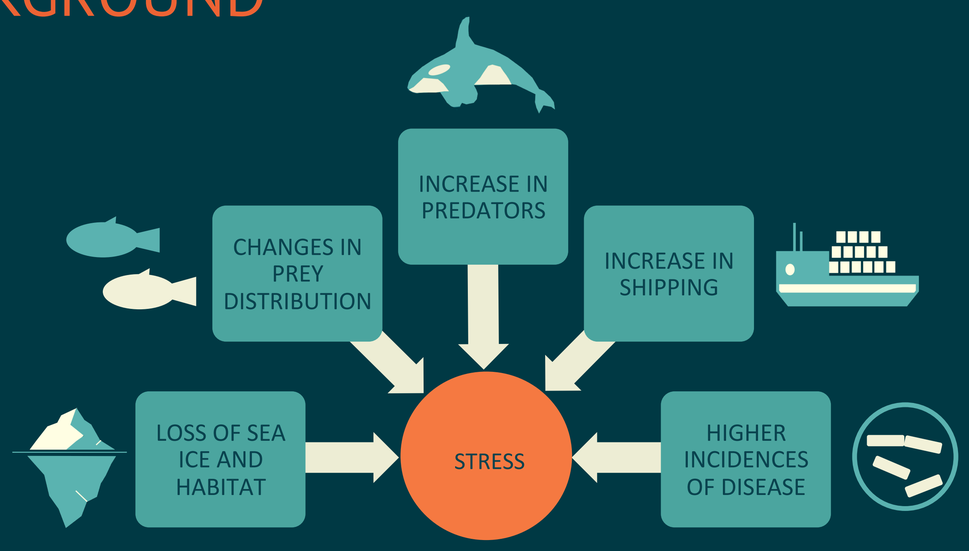
BACKGROUND



The consequences of climate change are being felt throughout the Arctic and have the potential to increase stress in marine mammals. Acute stress is an adaptive trait; however, chronic stress can be maladaptive. In humans, chronic stress is associated with infertility, heart disease, and decreased immune function.

PRELIMINARY RESULTS

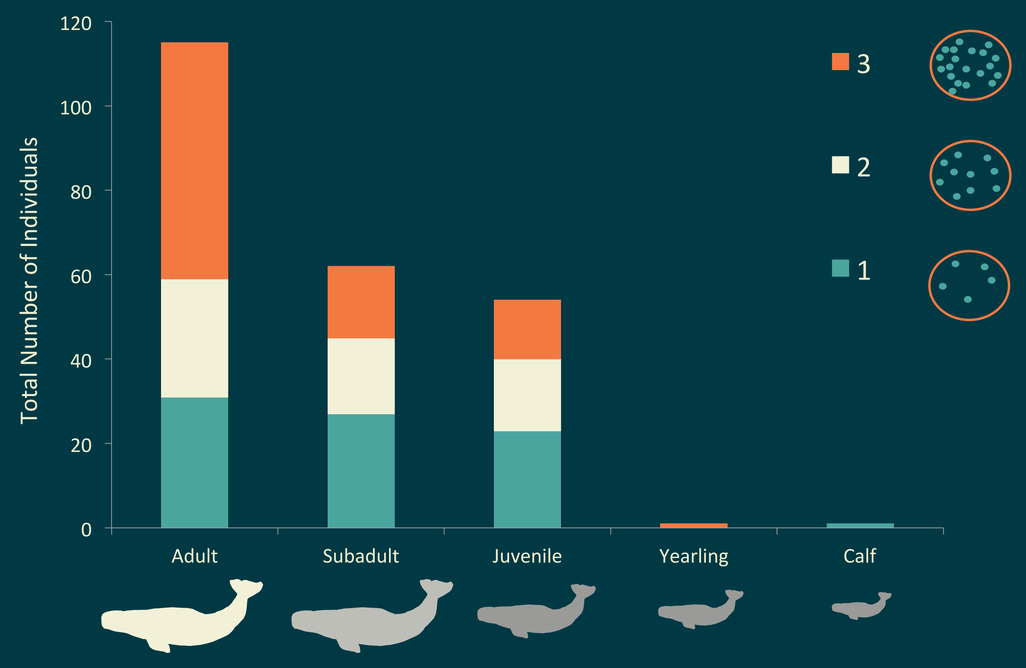


Figure 1. Bar graph of the total blow samples collected from each age class and ranked quantities. The beluga graphics represent the matrix used to determine age class. The legend on the right represents the ranked quantities.

OBJECTIVES

1. Develop a method to collect blow samples from unrestrained beluga in Western Hudson Bay.

2. Quantify baseline cortisol levels of the Western Hudson Bay beluga population.

HOW DO WE MEASURE STRESS IN WHALES?

BLOOD

\+ Gold standard
\- Stress response

BLUBBER

\+ Large quantities
\- Invasive

FECES

\+ Non-invasive
\- Contamination

SKIN

\+ Large quantities
\- Invasive

BLOW

\+ Non-invasive
\- New methodology

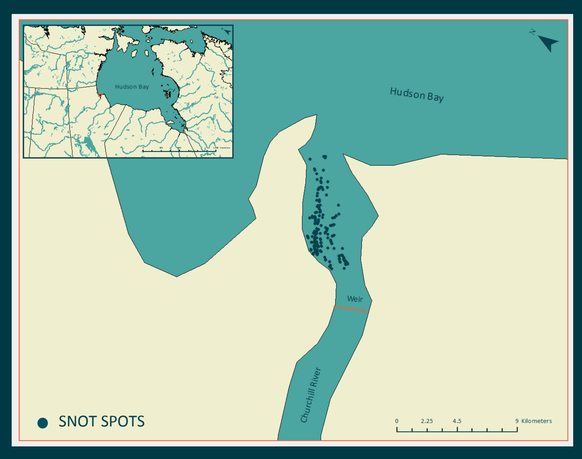
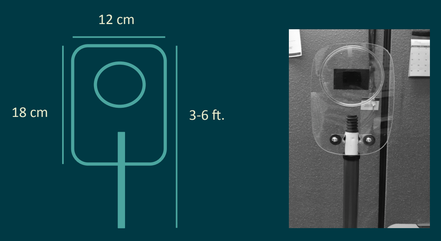


Figure 2. Locations within the Churchill River estuary where blow was collected.

We successfully collected 233 blow samples during our pilot field season. Estimated age classes and quantities were recorded for each sample (Figure 1). Sample locations were also recorded (Figure 2).

SAMPLE COLLECTION



PAINTERS POLE ✔
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PETRI DISH ✔

NEXT STEPS

To quantify baseline stress levels, the age class, sex, and reproductive state of each individual must be determined, as stress differs between males vs. females and pregnant females vs. non-pregnant females.

AGE CLASS
- Based on size, colouration, and behaviour
- Determined during sample collection

→ **SEX**
- Genetics to determine sex

→ **REPRODUCTIVE STATUS**
- Enzyme immunoassays to quantify progesterone, an indicator of pregnancy

→ **BASELINE STRESS**
- Enzyme immunoassays to quantify baseline cortisol and corticosterone levels

SIGNIFICANCE

The proposed research will provide essential baseline data, which can be used as reference to monitor the long-term impacts of climate change and associated threats on the health of the Western Hudson Bay beluga population.

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REFERENCES

Wright *et al.*, 2009, IWC; Burek *et al.*, 2008, Ecol Appl **18;** Thompson, *et al.*, 2009, PloS one **9(12);** Frère *et al.*, 2010, PloS one 5(8); Richard *et al.*, 2017, Gen Comp Endocrinol 246

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