

Exploring the bioenergetics consequences of polar bear foraging on a novel diet of common eider eggs on East Bay Island, Nunavut

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Background

Polar Bears (*Ursus maritimus*) are threatened by climate change because these apex predators require ever-reducing sea-ice to hunt their main prey, seals¹. Consequently, species interactions are being altered in the Arctic. Some polar bears have been exploiting bird eggs, such as common eider (*Somateria mollissima*), and this has caused widespread reproductive failure in many common eider colonies². It is unclear what consequences this will have for polar bears and common eiders³.

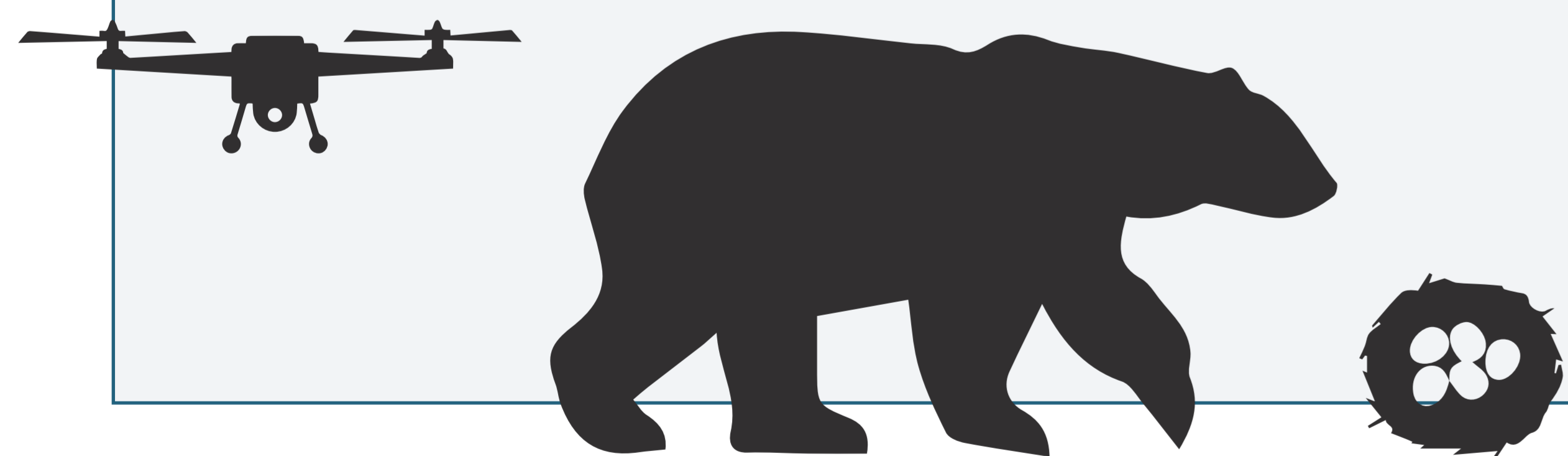
Objectives

Determine the energetic costs and benefits of polar bears foraging on common eider eggs.

Methods

- (1) We will use drone videography to document polar bears foraging in the East Bay Island common eider colony.
- (2) We will develop bioenergetics-based simulation models⁴ to recreate how polar bears forage on terrestrial food items.

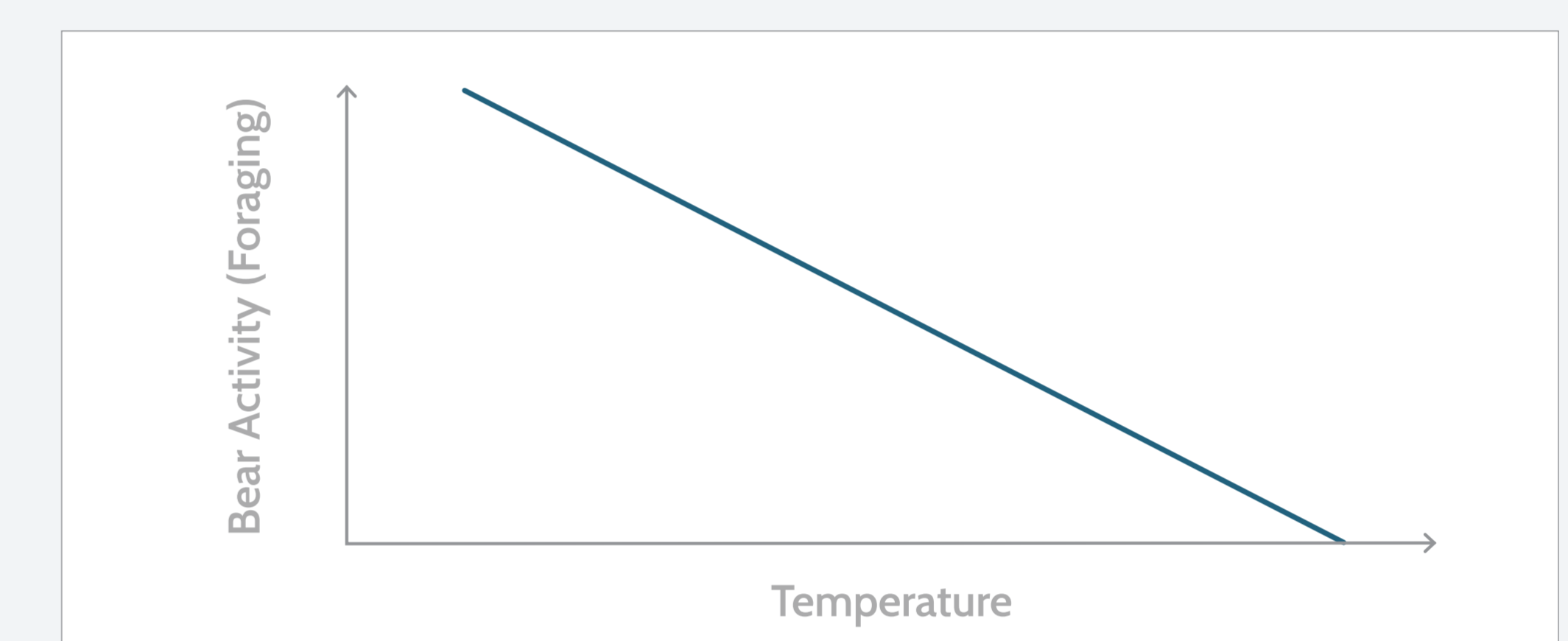
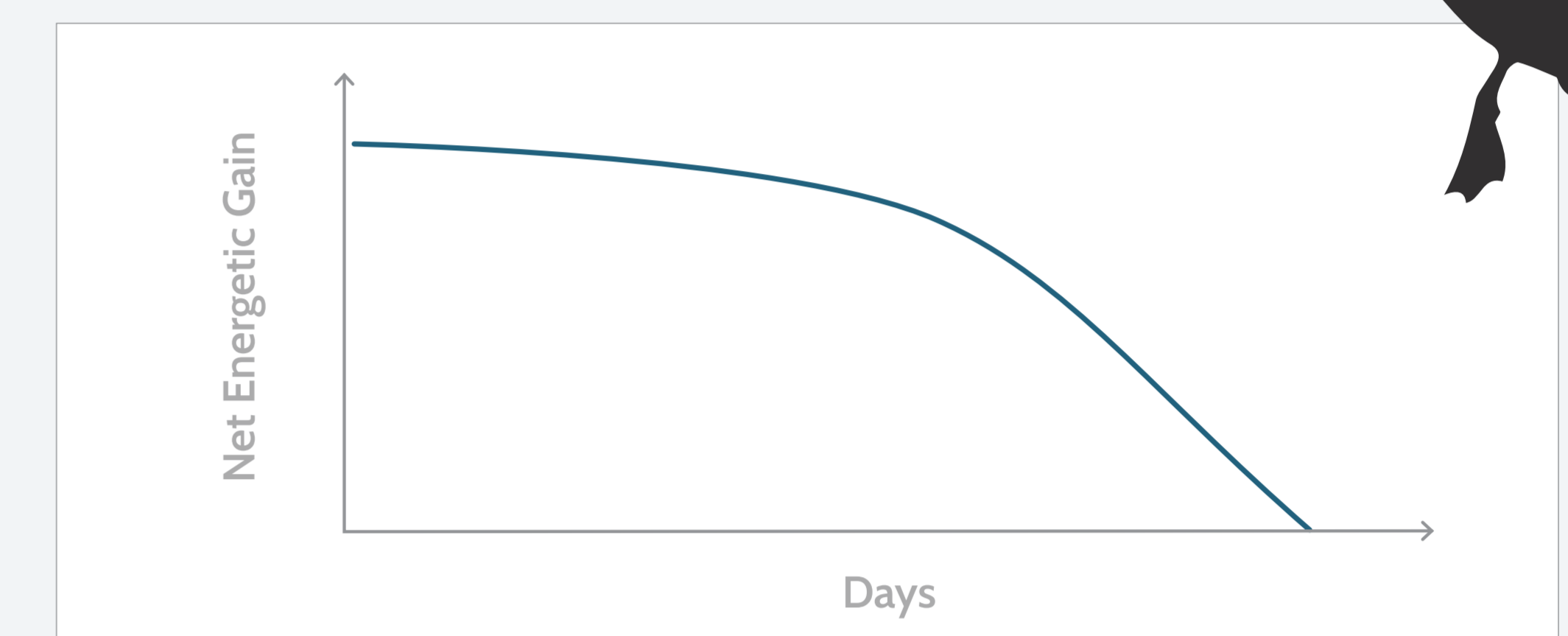
Combined, these methods will help determine whether polar bears experience net energetic gains under current and future environmental change in the warming Arctic.



Predictions

We predict the energetic consequences of nest foraging will vary depending on: (1) the amount of days into the eider breeding season and (2) the ambient temperature.

- (1) As the eider breeding season progresses, the amount of energy available to polar bears diminishes. As a consequence, the cost of movement might outweigh the benefit of consuming eider eggs.
- (2) Due to the polar bears' tendency to overheat from terrestrial locomotion⁵, polar bears will be more active (foraging) in the early mornings and evenings when ambient temperature is low. Similarly, bears will be more active on cooler days.



Impacts and Significance

This study will contribute to: (1) comprehensively describing polar bear foraging ecology during ice-free periods, and (2) bioenergetics consequences of a novel supplemental diet. Additionally, (3) we can next begin to predict the response of common eider populations to future polar bear predation pressure.

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