Can polar bears and narwhals cling on as the ice shrinks?

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As part of the *Journal of Experimental Biology*'s Special Issue dedicated to climate change, Anthony Pagano (San Diego Zoo Global, USA) and Terrie Williams (University of California, Santa Cruz, USA), discuss the

impact of environmental change on two iconic polar species; the polar bear and narwhal. Their review article is published in *Journal of Experimental Biology*.

Mammals in the Polar Regions face an uncertain future as unprecedented warming drives catastrophic sea ice loss, driving polar bears onto land, after losing access to sea ice and the highly calorific seals upon which they feed, forcing the animals to depend on lower calorie diets. The scientists say, "A polar bear would need to consume approximately 1.5 caribou, 37 Arctic char, 74 snow geese, 216 snow goose eggs (i.e.54 nests with 4 eggs per clutch) or 3 million crowberries to equal the digestible energy available in the blubber of one adult ringed seal." They add, "Few resources exist on land within the polar bears' range that could compensate for declines in seal feeding opportunities."

Pagano and Williams have measured the energetic cost of movement for narwhals and polar bears and found that major ice loss translated into elevated locomotor that are 3- to 4-fold greater than expected when sea ice cover is normal. This increase in energy consumption, coupled with the loss of access to the polar bear's main food source leaves them particularly vulnerable to starvation.

The scientists also consider how the high costs of diving for narwhals, coupled with the loss of reliable breathing holes upon which they depend, due to unpredictable sea ice shifts, have led to the mammals becoming trapped beneath the ice. The narwhal's slow swimming paces also leaves them vulnerable to attacks by killer whales open water.

The scientists warn that the decline of both apex predators will 'lead to rapid changes in the Arctic marine ecosystem."

More information: Anthony M. Pagano et al, Physiological consequences of Arctic sea ice loss on large marine carnivores: unique

responses by polar bears and narwhals, *The Journal of Experimental Biology* (2021). DOI: 10.1242/jeb.228049

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