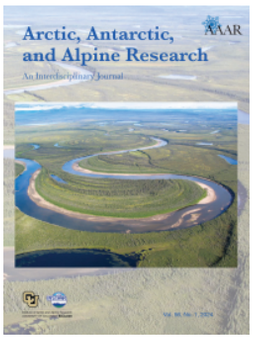

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How does the changing marine environment affect hunters' access to Pacific walruses?

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ARCTIC ANSWERS

How does the changing marine environment affect hunters' access to Pacific walruses?

THE ISSUE. Over thousands of years, Indigenous hunters in the Bering and Chukchi seas have adapted to changes in weather, sea ice, and sea state that influence their access to walruses. In recent decades, however, those conditions have been changing at unprecedented rates. Safely adapting to changing conditions will be essential to the well-being of communities.

WHY IT MATTERS. Nineteen coastal communities in Alaska and eighteen in the Russian Far East[1,2] depend on Pacific walrus for food and cultural activities. Access to Pacific walruses by those communities depends on sea ice that is seasonally close to the communities and favorable to migrating walruses (Figure 1). Recent changes in sea ice, winds, and waves in the Bering and Chukchi seas, however, make access to walruses more costly, dangerous, and unpredictable. Adaptive decisions by hunters and their co-management partners need to be informed by understanding of future environmental conditions.

STATE OF KNOWLEDGE. For Indigenous communities in the Bering and Chukchi seas, access to Pacific walruses is integral for community well-being, providing nutritional, economic, cultural, and spiritual value through the harvesting of meat as well as ivory and skins for arts, tools, and boat covers.[1,3] The accessibility of walruses to hunters is influenced by recent and rapid changes in the physical and biological components of the marine environment.

Walruses rely on sea ice as a platform for resting, foraging, and giving birth during their seasonal migrations between breeding areas and feeding grounds. Shifting seasonality and diminishing extent and thickness of ice (Figure 2) are decreasing hunters' access to Pacific walruses, as documented by Indigenous and scientific observers.[1] Direct effects include unpredictable and often brief appearance of ice carrying migrating walruses. Additionally, that ice is often too broken or distant from hunting communities. Hunters' access to walruses depends on the walruses' use of ice at local scales and on hunting strategies specific to individual communities. Those strategies developed to take advantage of historical patterns of migration, weather, and ice conditions have changed dramatically in recent decades. Now, hunters are adapting strategies to the changes in seasonality and ice conditions. For example, at St. Lawrence Island in the Bering Sea, thick sea ice used to funnel walruses close to the community of Gambell, but as ice has thinned, one of us (Apassingok) has observed that it breaks apart and fails to concentrate walruses and other prey near the community. Increasingly, walruses are present in ice-diminished waters outside of the historical fall and spring migration periods, but boat access to those walruses is limited to brief periods when the animals are near shore or during long trips in open boats to distant ice.

When the walruses are near shore, boat access is hampered by densely packed ice, apparently due to increasingly strong currents (pers. comm., Indigenous Knowledge Holder, Merlin Koonooka via M. Apassingok). Hunters who are able to penetrate the ice to harvest walruses sometimes are forced by tight ice to spend all night in their open boats before being able to get back to shore. As the walruses move past St. Lawrence Island, hunters travel as far as 100 miles to find walrus-bearing ice (pers. comm., Indigenous Knowledge Holder Perry Pungowiyi). The longer hunting excursions are dangerous to hunters, require more gas for boats, and limit the amount of meat that can be harvested per trip.

Access to walruses is indirectly affected by basin-scale ice changes that influence the walrus movements. In summer, the ice edge on which nursing females and their calves rest is increasingly north of the continental shelf. The waters there are too deep for effective feeding by walruses on their bottom-dwelling prey.[1] Increasingly, walruses are resting on land instead of ice during summer months, requiring them to expend more energy to reach feeding areas. Resting ashore also exposes walrus to greater mortality from predation and lethal stampedes. At the same time, preferred prey are declining in biomass and shifting northward from historical feeding areas south of St. Lawrence Island, demonstrating ecosystem effects that could further limit access to walruses.[1,4] Additional impacts on the population may result from increasing frequency of harmful algal blooms and expanding ship traffic.[5] The number of walruses coming ashore near St. Lawrence Island during the fall migration declined from more than 10,000 in the 1970s to approximately 1,000 starting in the early 1990s. The decline was observed by a local observer, Preston Rookok, and he suggested that it might have resulted from disturbance associated with increased ship traffic.

WHERE THE RESEARCH IS HEADED. The Eskimo Walrus Commission (EWC), the U.S. Fish and Wildlife Service, and the U.S. Geological Survey continue to collaborate on improving methods of estimating population size and biological indicators of population health. More accurate population estimates will be vital in monitoring the impacts of declining sea ice. Methods currently being explored include aerial surveys at coastal haulout locations, mark–recapture estimates using genetic markers, and use of satellite imagery.[6] The capacity of the

Figure 1. Pacific walruses are available to Indigenous hunters in the Bering Strait region when local ice conditions favor access to the animals along their seasonal migrations to and from the Chukchi Sea.

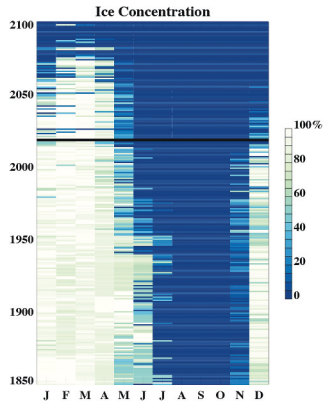

Figure 2. Ice cover near St. Lawrence Island decreased in extent and seasonal duration in the twentieth century and is projected to decline substantially in the current century. The graphic shows sea-ice concentration for the historical period (pre-2020; Walsh et al. 2019, https://doi.org/10.7265/jj4s-tq79) and a climate model projection (post-2020; Kay et al. 2015, doi:https://doi.org/10.1175/BAMS-D-13-00255.1). The historical data are based on observations from a number of sources and represent fractional ice cover in a roughly 20 km × 20 km area centered at 190° E, 63° N. The model output represents fractional ice cover in a roughly 65 km × 65 km area at 190° E, 63° N. The historical and projected time periods are delineated with a horizontal black line.

changing ecosystem to support the population is being investigated through ecosystem modeling as part of a co-management initiative between the EWC and the U.S. Fish and Wildlife Service. The EWC has also supported the development of new methods to monitor walrus and assess their body condition. Sustained ecosystem observations are critical to monitor shifting ecosystem structure and determine the changing quality, quantity, and location of the walruses' preferred prey items. The EWC also collaborates with academic, Indigenous, and policy researchers through the Study of Environmental Arctic Change to better predict the impacts of environmental change on hunters' access to walruses.

One of us (Rookok, Jr.) observed that ice cover at St. Lawrence Island has continued to decline in the last two decades. Moreover, new analyses of historical ice conditions coupled with modeling of future ice conditions reveal declining sea ice in the Bering Sea, expanding the typically ice-free months of July through October to potentially year-round open water by 2100 (Figure 2). Recent winters with minimal Bering Sea ice cover underscore that the transition to year-round open water is unlikely to be gradual. To address critical food security issues during low harvest years, a marine mammal emergency harvest declaration mechanism is needed, perhaps following the State of Alaska's existing approach for fish. Emergency declarations would provide critical support to manage subsistence shortages effectively. Better anticipation of ice loss events through improved prediction is also needed and future collaboration between hunters and sea-ice scientists should focus on downscaling models to capture the timing, density, thickness, and movements of ice at local scales and the attending impacts on walrus.

Disclosure statement

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Supplementary material

Supplemental data for this article can be accessed online at https://doi.org/10.1080/15230430.2024.2367632.

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