

# Harp seals on thin ice after 32 years of warming

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Warming in the North Atlantic over the last 32 years has significantly reduced winter sea ice cover in harp seal breeding grounds, resulting in sharply higher death rates among seal pups in recent years, according to a new Duke University-led study.

"The kind of [mortality](#) we're seeing in eastern Canada is dramatic. Entire year-classes may be disappearing from the population in low ice years – essentially all of the pups die," said David W. Johnston, research scientist at the Duke University Marine Lab. "It calls into question the resilience of the population."

The study, published today in the peer-reviewed journal *PLoS ONE*, is the first to show that seasonal [sea ice](#) cover in all four harp seal breeding regions in the North Atlantic has declined by as much as 6 percent per decade since 1979, when satellite records of ice conditions in the region began.

Harp seals rely on stable winter sea ice as safe places to give birth and nurse their young until the pups can swim and hunt on their own. Female seals typically seek out the thickest, oldest ice packs in sub-Arctic waters each February and March, and have adapted to the spring melt by developing unusually short, 12-day nursing periods.

"As a species, they're well suited to deal with natural short-term shifts in climate, but our research suggests they may not be well adapted to absorb the effects of short-term variability combined with longer-term

climate change and other human influences such as hunting and by-catch," Johnston said.

To assess the cumulative impacts of these factors, the researchers analyzed satellite images of winter ice from 1992 to 2010 in the Gulf of St. Lawrence – a major breeding region off Canada's east coast – and compared them to yearly reports of dead seal pup strandings in the region. They also compared the stranding rates to recorded measurements of the relative strength of the North Atlantic Oscillation (NAO), a climate phenomenon that controls the intensity and track of westerly winds and storms and greatly affects winter weather and sea ice formation in the region. These analyses revealed that higher pup mortalities occurred in the Northwest Atlantic harp seal herd in years with lighter ice cover and when the NAO was weaker.

Analysis of older data revealed that NAO-related changes in seasonal ice cover may have contributed to major declines in seal populations on the east coast of Canada from 1950 to 1972 and to a period of steady recovery from 1973 to 2000.

"This clearly shows that harp seal populations across the Atlantic fluctuate pretty much in synch with NAO trends and associated winter ice conditions," Johnston said. "But there's a caveat: regardless of NAO conditions, our models show that sea [ice cover](#) in all harp seal breeding regions in the North Atlantic have been declining by as much as 6 percent a decade over the study period. The losses in bad years outweigh the gains in good years."

A key unanswered question, he added, is whether seals will be able to respond to the long-term trend by moving to other, more stable ice habitats.

Recent reports that some harp seals are whelping in new [breeding](#)

[grounds](#) off East Greenland indicate some shifting may be taking place, but thousands still return each year to traditional breeding grounds in the Gulf of St. Lawrence or along the Front, off Newfoundland, regardless of ice conditions.

"There's only so much ice out there, and declines in the quantity and quality of it across the region, coupled with the earlier arrival of spring ice breakup, is literally leaving these populations on thin ice," Johnston said. "It may take years of good ice and steady population gains to make up for the heavy losses sustained during the recent string of bad ice years in eastern Canada."

Provided by Duke University

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