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Loss of Arctic Ice May Promote Hybrid Marine Mammals

Scientists have expected for some time that the Arctic Ocean will be ice-free in summer by the end of this century. Writing in the December 15 issue of the journal Nature, a trio of researchers say the seasonal loss of this ice sheet, a continent-sized natural barrier between species such as bears, whales and seals, could mean extinction of some rare marine mammals and the loss of many adaptive gene combinations.

Marine mammalogist and first author Brendan Kelly of the National Oceanic and Atmospheric Administration's marine mammal lab in Juneau, with conservation geneticist Andrew Whiteley of the University of Massachusetts Amherst and evolutionary Biologist David Tallmon of the University of Alaska, say genes developed over millennia in isolated populations have given many Arctic marine animals sets of fine-tuned adaptations, helping them uniquely thrive in the harsh environment. Their article for the first time looks ahead to speculate on what biologists can expect as these populations meet, hybridize by interbreeding and mix their gene pools.

The authors call for immediate monitoring and stepped-up study of many already rare, threatened or endangered bears, whales and seals in the coming decades, before discrete populations begin to disappear through interbreeding.

As Whiteley explains, the picture is complicated and it is hard for biologists to know exactly what to expect because hybridization can have beneficial consequences in the first generation. But in later generations, the process begins to have more negative effects as genomes mix and any genes

associated with environment-adapted traits are recombined. Genes related to any trait that once allowed the animal to thrive in a specific habitat can be diluted, leaving the animal less well suited to surviving and reproducing there.

In some cases hybridization, which is one of nature's sources of evolutionary novelty, might not be so bad, the authors acknowledge. But in other cases such as interbreeding between the rare North Pacific right whale, with fewer than 200 individuals believed to be left, and more numerous bowhead whales, interbreeding could mean extinction of the rarer, smaller population.

In a chart accompanying their Nature article, Kelly, Whiteley and Tallmon identify 22 marine mammal species they believe may be at risk of hybridization. They report that several Arctic hybrids have been documented already by DNA testing. For example, hunters shot a white bear with brown patches in 2006 that later was confirmed to be a polar bear-grizzly bear hybrid.

Brendan P. Kelly, Andrew Whiteley, David Tallmon. The Arctic melting pot. *Nature*, 2010; 468 (7326): 891 DOI: 10.1038/468891a