

Supplementary information to Kelly, B., Whiteley, A. & Tallmon, D. ‘The Arctic melting pot’ *Nature* **468**, 891 (2010); doi:10.1038/468891a.

**TABLE 1. POSSIBLE INTER-SPECIES HYBRIDIZATIONS**

SPECIES AT RISK OF HYBRIDIZATION	NOTES
1 Beluga ( <i>Delphinapterus leucas</i> )* x Narwhal ( <i>Monodon monoceros</i> )*	Belugas and narwhals both inhabit the Arctic Ocean and peripheral seas. A skull intermediate in morphology was collected in West Greenland in the 1980s. Local hunters reported seeing other whales of intermediate form in the region.
2 Harbour porpoise ( <i>Phocoena phocoena</i> ) x Dall's porpoise ( <i>Phocoenoides dalli</i> )	Harbour porpoises are found in temperate to boreal seas in the North Atlantic and North Pacific and will likely move north. Dall's Porpoises are found in the North Pacific up to 65°N. Extensive hybridization off the coast of British Columbia, Canada, has been attributed to locally low densities of harbour porpoises; similar hybridization may occur as the species interact in newly-colonized Arctic habitats where initial densities are likely to be low.
3 Harp seal ( <i>Phoca groenlandica</i> ) x Hooded seal ( <i>Cystophora cristata</i> )	Both species breed on pack ice of the North Atlantic Ocean and extend into the Arctic Ocean in summer months. A hybrid has been confirmed by molecular analysis. Diminishing ice will encourage species overlap.
4 Spotted seal ( <i>Phoca largha</i> )* x Ribbon seal ( <i>Histiophoca fasciata</i> )	Spotted seals are found in the Yellow, Okhotsk, Bering, Chukchi, and western Beaufort seas. Ribbon seals are found in Sea of Okhotsk, Bering Sea, and Chukchi Sea. Both species are seasonally associated with sea ice, and diminishing ice will encourage species overlap. Museum specimen (University of Alaska Fairbanks) provides evidence of a probable hybrid. Diminishing ice will encourage species overlap.
5 Ringed seal ( <i>Phoca hispida</i> )* x Ribbon seal ( <i>Histiophoca fasciata</i> )	Ringed seals occur in all seasonally ice-covered seas of the Northern Hemisphere. Ribbon seals as above. Diminishing ice will encourage species overlap.
6 Bowhead whale ( <i>Balaena mysticetus</i> )* x Right whale ( <i>Eubalaena</i> spp.)* (Some researchers place right whales in the genus <i>Balaena</i> )	Bowhead whales inhabit the Arctic Ocean and adjacent seas; Right whales are found in the North Pacific and North Atlantic up to the ice edge, and will likely move north. A possible hybrid was photographed in the Bering Sea by David Withrow (National Marine Mammal Laboratory, NOAA) in May 2009. Diminishing ice will encourage species overlap.
7 North Pacific Right whale ( <i>Eubalaena japonica</i> )* x North Atlantic Right whale ( <i>Eubalaena glacialis</i> )*	North Pacific and North Atlantic species range to the ice edge but do not penetrate the ice pack; increasing contact expected as individuals cross the Arctic Ocean in ice-free summers.
8 Polar bear ( <i>Ursus maritimus</i> )* x Brown/grizzly bear ( <i>Ursus arctos</i> )	Polar bears may spend more time ashore rather than on sea ice, where they will increasingly encounter brown bears, some of which are expanding northward. Hybrids have been noted in captivity and confirmed by molecular analysis in the wild.
9 Ringed seal ( <i>Phoca hispida</i> )* x Spotted seal ( <i>Phoca largha</i> )	Habitats as above. Increased gene flow between stocks possible as sea ice habitats contract.
10 Ringed seal ( <i>Phoca hispida</i> )* x Harbor seal ( <i>Phoca vitulina</i> )	Ringed seal habitat as above. Harbor seals range widely in temperate and sub-Arctic waters of the North Pacific and North Atlantic and north into the Bering and Barents Seas. They likely will move north where they will increasingly overlap with ringed seals.
11 Ringed seal ( <i>Phoca hispida</i> )* x Harp seal ( <i>Phoca groenlandica</i> )	Habitats as above. Harp seals likely will move north where they will increasingly overlap with ringed seals.
12 Spotted seal ( <i>Phoca largha</i> )* x Harbor seal ( <i>Phoca vitulina</i> )	Habitats as above, with overlap increasing as harbor seals move north. Museum specimen (University of Alaska Fairbanks) provides evidence of a probable hybrid.

\* = species listed — or candidates for listing — as endangered, threatened, or of special concern by one or more nations.

TABLE 2. POSSIBLE INTRA-SPECIES HYBRIDIZATIONS

	POPULATIONS AT RISK OF HYBRIDIZATION	NOTES
1	North Atlantic Minke whale ( <i>Balaenoptera acutorostrata acutorostrata</i> ) x North Pacific Minke whale ( <i>B. a. scammoni</i> )	Increased gene flow between Atlantic and Pacific subspecies possible as individuals cross the Arctic Ocean in ice-free summers.
2	North Atlantic Harbor porpoise ( <i>Phocoena phocoena phocoena</i> ) x North Pacific Harbor porpoise ( <i>P. p. vomerina</i> )	Increased gene flow between Atlantic and Pacific subspecies possible as individuals cross the Arctic Ocean in ice-free summers.
3	Atlantic walrus ( <i>Odobenus rosmarus rosmarus</i> )* x Pacific walrus ( <i>O. r. divergens</i> )*	Increased gene flow between subspecies likely as individuals cross the Arctic Ocean in ice-free summers.
4	Pacific walrus ( <i>O. r. divergens</i> )* x Laptev walrus ( <i>O. r. laptevi</i> )	Increased gene flow between subspecies likely as individuals cross the Arctic Ocean in ice-free summers.
5	Bearded seals ( <i>Erignathus barbatus barbatus</i> ) x ( <i>E. b. nauticus</i> )*	Subspecies bordering Eurasia and Canada likely to mix as individuals cross the Arctic Ocean in ice-free summers.
6	Eastern North Atlantic Harbour seals ( <i>Phoca vitulina vitulina</i> ) x Western North Atlantic Harbour seals ( <i>P. v. concolor</i> )	Increased gene flow between Atlantic and Pacific subspecies likely as individuals cross the Arctic Ocean in ice-free summers.
7	Western North Atlantic Harbour seals ( <i>P. v. concolor</i> ) x North Pacific Harbor seals ( <i>P. v. richardii</i> )	Increased gene flow between Atlantic and Pacific subspecies likely as individuals cross the Arctic Ocean in ice-free summers.
8	Eastern North Atlantic Harbour seals ( <i>Phoca vitulina vitulina</i> ) x North Pacific Harbour seals ( <i>P. v. richardii</i> )	Increased gene flow between Atlantic and Pacific subspecies likely as individuals cross the Arctic Ocean in ice-free summers.
9	Spotted seals ( <i>Phoca largha</i> )*	Found in the Yellow Sea, Okhotsk, Bering, Chukchi seas and Sea of Japan. Relationships between eight breeding groups poorly known; three distinct populations suggested. Increased gene flow possible if individuals follow declining ice.
10	Baltic Sea Ringed seal ( <i>Phoca hispida botnica</i> )* x Sea of Okhotsk Ringed seal ( <i>P. h. ochotensis</i> )*	Found in all seasonally ice-covered seas in the Northern Hemisphere. Relationships between breeding groups poorly known. Increased gene flow possible if individuals follow declining ice.
11	Sea of Okhotsk Ringed seal ( <i>P. h. ochotensis</i> )* x Arctic Ringed seal ( <i>P. h. hispida</i> )*	Found in all seasonally ice-covered seas in the Northern Hemisphere. Relationships between breeding groups poorly known. Increased gene flow possible if individuals follow declining ice.
12	Humpback whales ( <i>Megaptera novaengilae</i> )*	Found in all oceans including to Arctic sea ice edge. Increased gene flow between Atlantic and Pacific populations possible as individuals cross the Arctic Ocean in ice-free summers.
13	Bowhead whales ( <i>Balaena mysticetus</i> )*	Found in the Arctic Ocean and adjacent seas. Increased gene flow between stocks possible as individuals cross the Arctic Ocean in ice-free summers.
14	Fin whales ( <i>Balaenoptera physalus</i> )*	Widely distributed in North Atlantic and North Pacific and southern portions of seasonally ice-covered seas. Increased gene flow between Atlantic and Pacific populations possible as individuals cross the Arctic Ocean in ice-free summers.
15	Sperm whales ( <i>Physeter macrocephalus</i> )*	Widely distributed in all oceans except the Arctic Ocean. Increased gene flow between Atlantic and Pacific populations possible as individuals cross the Arctic Ocean in ice-free summers.
16	Beluga whales ( <i>Delphinapterus leucas</i> )*	Numerous distinct stocks in the Arctic Ocean and peripheral seas. Increased gene flow likely as individuals cross the Arctic Ocean in ice-free summers.
17	Narwhals ( <i>Monodon monoceros</i> )*	Apparently numerous distinct stocks inhabiting the Arctic Ocean and peripheral seas. Increased gene flow between stocks possible as sea ice habitats contract.
18	Killer whale ( <i>Orcinus orca</i> )*	Found in all oceans with greatest densities in high latitudes. Numerous distinct breeding stocks have been recognized as corresponding to ecotypes, but recent molecular analyses suggest multiple species. Arctic Ocean distribution limited by seasonal sea ice. Recent expansion into Hudson Bay attributed to reduced sea ice. Increased gene flow between Atlantic and Pacific stocks possible as individuals cross the Arctic Ocean in ice-free summers.
19	Ribbon seals ( <i>Histiophoca fasciata</i> )	Found in the Sea of Okhotsk, Bering Sea, and Chukchi Seas. Uncertain relationship between breeding groups in Okhotsk and Bering seas. Potentially increased gene flow as sea ice habitats contract.
20	Hooded seals ( <i>Cystophora cristata</i> )	Three distinct stocks have been identified breeding on the pack ice of the Northwestern Atlantic Ocean, the Greenland Sea, and the White Sea, but molecular data do not support the separation. Potentially increased gene flow as sea ice habitats contract.
21	Harp seal ( <i>Phoca groenlandicus</i> )	Two or three distinct stocks breeding on the pack ice in the North Atlantic Ocean off eastern Canada, off eastern Greenland, and in the White Sea off the coast of Russia. Potentially increased gene flow as sea ice habitats contract.
22	Polar bear ( <i>Ursus maritimus</i> )*	Polar bears are broadly distributed in the circumpolar Arctic in 19 apparently discrete populations. Potentially increased gene flow as sea ice habitats contract.

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