INDICATOR #04

Seabirds – murres (guillemots)

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Newfoundland, Canada Liz Leyden/iStockphoto

The two species of murres (known as guillemots in Europe), the thick-billed murre, *Uria lomvia*, and common murre, *Uria aalge*, both have circumpolar distributions, breeding in Arctic, sub-Arctic, and temperate seas from California and northern Spain to northern Greenland, high Arctic Canada, Svalbard, and Novaya Zemlya. The thick-billed murre occurs mostly in Arctic waters, while the common murre, although overlapping extensively with the thick-billed murre, is more characteristic of sub-Arctic and temperate waters. They are among the most abundant seabirds in the Northern Hemisphere with both species exceeding 10 million adults [1].

Murres feed from coastal to pelagic waters, mostly over the continental shelf and slope, taking a wide range of small fish (<50 g) and invertebrates, including annelids; pteropod and cephalopod molluscs; and mysid, euphausiid, amphipod, and decapod crustaceans. Common murres generally are greater fish eaters than thick-billed murres [1]. Adults of both species weigh about 1 kg, can remain under water for up to 4 minutes, and dive regularly to depths greater than 100 m, reaching a maximum depth of approximately 150 m. Their diving capacity, allied to their typical foraging radius of up to 100 km from the colony, means that murres sample a relatively large volume of the marine environment around their colonies [2, 3].

Murres breed in very large colonies of up to one million birds on mainland cliffs or offshore islands (Figure 4.1). In most places, they lay their eggs in the open, making them easy to count. Consequently, their population trends are relatively easy to assess and this, allied to their abundance and widespread distribution, makes them ideal subjects for indicating changes in marine ecosystems.

Population/ecosystem status and trends

Both species have shown regional population changes over the past three decades and although no obvious global trend has been identified, the majority of populations have shown declines [7]. The sensitivity of murre populations to changes in environmental conditions has been demonstrated on a hemispheric scale by recent studies by the Circumpolar Seabird Group of CAFF. By combining population trend data from around the Arctic with information on sea surface temperature (SST) and decadal-scale oscillations, it has been shown that both species tended to show negative population trends where there was a large change in SST [7]. Colony growth was most often positive where conditions remained relatively stable (Figure 4.2).

In contrast, the northern species, the thick-billed murre, exhibited highest population growth where conditions warmed moderately, whereas the common murre showed highest rates of increase where conditions cooled moderately. In the context of global warming, this result suggests that not only the direction but the magnitude of change may be important in determining outcomes and that species, even those closely related, may not necessarily react in the same way to a given temperature change.

Other major problems facing murres include gillnet and oil spill mortality and in some parts of their range, hunting (especially of the thick-billed murre in Greenland). Populations in several countries have declined due to drowning in fishing nets. In addition, they are highly susceptible to oiling and are often the most numerous species killed by oil spills.

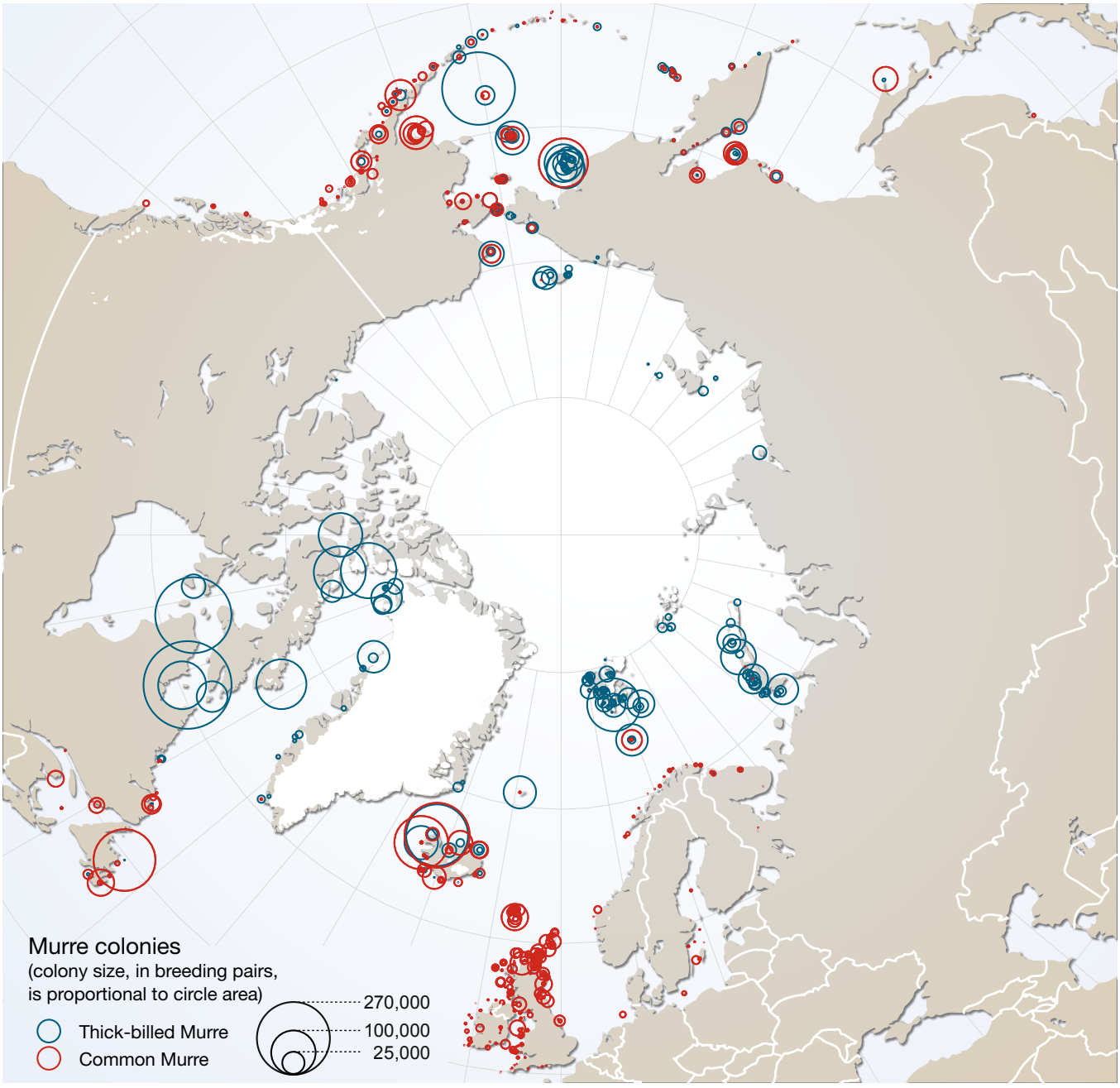

Figure 4.1: The distribution of thick-billed and common murre colonies in the North [4–6].

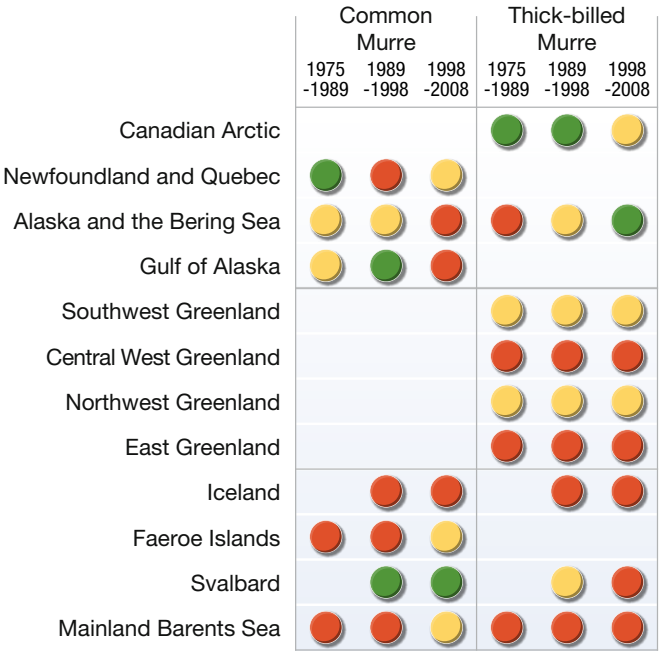

Figure 4.2: Changes in murre populations since 1975 by region and 'decade' (as defined by regime shifts in the Pacific Decadal Oscillation; see [7]). Green indicates positive population trends, yellow indicates stable populations, and red indicates negative population trends. (Data from [4, 7–12]).

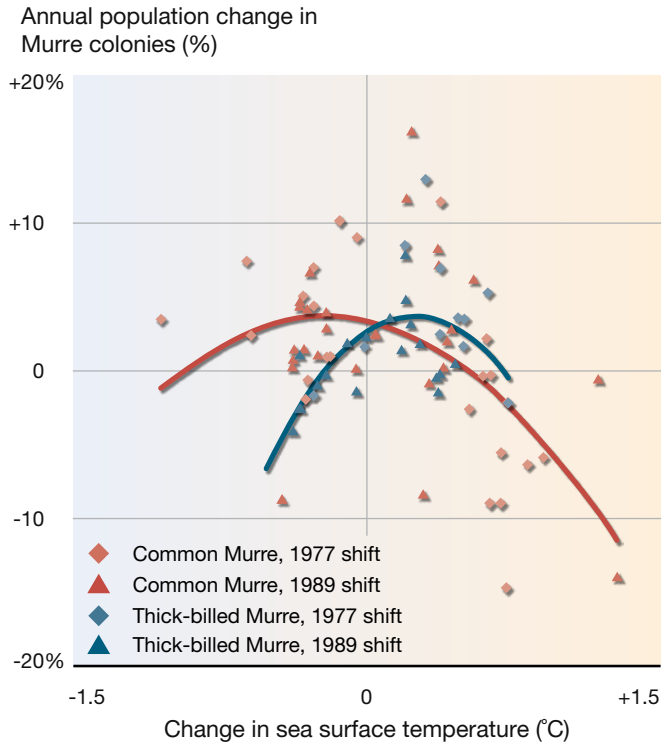

Figure 4.3: Annual rates of population change of individual murre colonies during 12 years after the 1977 climatic regime shift in the North Pacific and during 9 years after the 1989 shift, in relation to changes in sea surface temperatures around the colonies from one decadal regime to the next. Population data are from 32 *U. aalge* and 21 *U. lomvia* colonies, encompassing the entire circumpolar region. Ten sites supported both species, so 43 different study areas were represented. (Reprinted from [7]).

Concerns for the future

For the thick-billed murre, changes in the extent and timing of sea-ice cover over the past several decades [13] are leading to changes in phenology and reproduction with adverse consequences for nestling growth [14]. These changes seem likely to intensify. Aside from climate change, problems facing murres include fisheries interactions, contaminants, and oil spills [15] and, in some parts of their range, hunting (especially of thick-billed murres). Levels of some contaminants, especially mercury, have increased in murre eggs in the North American Arctic since the 1970s, although they remain at sub-lethal levels [16]. If climate change leads to increased shipping and oil and gas exploitation in Arctic waters, the increased risk of spills would also pose a potential hazard for murres, which are extremely susceptible to mortality from oil pollution [17].

Although both species of murre are currently abundant, many populations have been declining for several decades (Figure 4.2). In the long term, the decrease in range of thick-billed murres in response to the retreat of Arctic sea ice appears likely. Eventually it may be replaced by the common murre and other more southern auks.

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