Where have the swans gone?

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The research was only possible because of the code some swans carry. Sightings of these tagged animals - often by citizen scientists - offer insight into the whereabouts of individual swans and changes therein. In winter, the swans favour areas with an air temperature of 5.5 °C. Credit: Bart Nolet/NIOO-KNAW

Nearly 13 kilometers per year: that is the rate at which the wintering area of Bewick's swans has shifted east over the past 50 years. It's a discovery with consequences for the conservation of this migratory species, writes a team of researchers led by the Netherlands Institute of Ecology (NIOO-KNAW) in *Global Change Biology*.

Why are Bewick's swans, a protected species, declining sharply in Ireland and Britain? And to a lesser extent also in the Netherlands, their main wintering area? "This decline in North-West Europe was not consistent with our data on breeding success and survival," says NIOO animal ecologist Rascha Nuijten. "That's why we started this research."

The first indication the researchers had was that in Germany the number of wintering swans was actually increasing rather than declining. To find out more, an international team was formed that also included members from Estonia and the United Kingdom (Wildfowl & Wetlands Trust).

Between tundra and delta

Unlike their 'cousin' the mute swan, Bewick's swans migrate across great distances. They move between their breeding area in the Russian tundra and wintering grounds in North-West Europe and elsewhere.

"We found that both the time spent in the wintering grounds and the location of those wintering grounds changed significantly over the past fifty years," says Nuijten. "The time has been reduced—what we call 'short-staying' - and the area has shifted east, towards the breeding area: 'short-stopping.'"

So what has triggered these changes? "We see a similar shift east in the 5°C temperature line across Europe in winter. This would suggest that the changes in the swans' wintering behavior are driven by the warming of the climate."

Not so traditional after all

Instead of cosying up somewhere in Britain or the Netherlands, the average Bewick's swan is now spending winter in spots hundreds of kilometers more to the east—shortening the migratory journey to their breeding grounds considerably. Compared to 1970, the swans also arrive later and leave earlier. In total, the researchers estimate they have cut their 'winter holiday' short by almost nine weeks. Actually, 'holiday' is probably the wrong word: it's the time for recovering and fattening up before the all-important journey to their breeding grounds the next spring.

Should I stay or should I go? Nuijten now knows the answer: "We found out that individual swans are not changing the duration of their stay during their lifetime. So the observed shifts were caused by directional differences between generations." Distance is a different story, however. The researchers observed that swans can shorten the distance of their migration within their lifetime. "For a species that has the reputation of being traditional, that's an exciting discovery!"

Nature conservation

The researchers' findings suggest that Bewick's swans are, to an extent, able to adapt to climate change. What the observed changes mean for them in other times of the year is not yet clear. But it does have consequences for the optimal conservation and management of the species, says Nuijten.

"Some places have become much less important for the swans and other places much more. So when it comes to nature conservation and management, species dynamics—in relation to climate change for instance—need to be taken into consideration."

More information: Rascha J. M. Nuijten et al, Concurrent shifts in wintering distribution and phenology in migratory swans: Individual and generational effects, *Global Change Biology* (2020). DOI: 10.1111/gcb.15151