# Novel approach to track migration of arctic-breeding avian species

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A group of scientists led by Prof. Oliver P. Love try to determine how snow bunting populations are linked in space and time. Considering that the snow bunting poses an extra challenge to monitor due to its inaccessible breeding locations, nomadic lifestyle and small body size, they argue, combining multiple sources of data is the most appropriate approach to track patterns of the birds' migratory connectivity.

Animals move around the globe in billions, sometimes - like the snow bunting - one of the iconic Arctic-breeding species, covering huge distances and enduring the most extreme frigid weather conditions. In this conspicuously white sparrow-sized bird, animal migration epitomizes a stunning success of biological adaptation – with Snow Bunting representing the only songbird to breed as far north as the Arctic Circle. Indeed, there is nothing north of the snow bunting's breeding ground except the North Pole and the polar ice cap. These passerines thrive in chilly, alpine conditions, playing and singing in temperatures dipping as low as -20F.

Although snow buntings (*Plectrophenax nivalis*) have so far been considered common and widespread, enjoying stable numbers and extensive nesting and wintering habitats, their North American populations have shrunk by 64% over the past four decades, according to the National Audubon Society .

These alarming statistics may reflect how nature and wildlife are responding to climate change and rising temperatures. Because snow

buntings need snow and cold, the increasingly warmer winters are the species' primary long-term threat. And although considerable attention is currently being paid to the conservation of migratory birds, this species remains still relatively under-studied. New data and novel methods of research are needed to assess the conservation implications of habitat changes in wintering locations as well as the effects of climate change on their breeding success. Fresh light on the migration patterns of remote populations of this avian species is shed by the recent work of a group led and inspired by Prof. Oliver P. Love - a wildlife biologist from the University of Windsor in Ontario, Canada.

In the article "Strong Migratory Connectivity in a Declining Arctic Passerine" published recently in *Animal Migration* - an open access journal by Versita – Christie Macdonald, a student of Love's, and her colleagues try to determine how snow bunting populations are linked in space and time. Considering that the snow bunting poses an extra challenge to monitor due to its inaccessible breeding locations, nomadic lifestyle and small body size, they argue, combining multiple sources of data is the most appropriate approach to track patterns of the birds' migratory connectivity.

The authors discovered that the population of snow buntings in North America is divided. The individuals to the east of Hudson Bay do not regularly mix with the ones to the west of Hudson Bay. These two sub-populations also migrate different distances. The article supports the idea that thorough studies into this species need to embrace a versatile mix of data - including geolocator technology, stable-isotope analysis , mark-recapture (banding) data along with citizen science data. Macdonald and colleagues show strong evidence for an east-west parallel migratory system, with Hudson Bay acting as a migratory divide. While band recoveries suggest strong migratory connectivity among eastern wintering populations (more than 95% of band recoveries reveal connections between western Greenland and eastern North America),

novel application of geolocators and stable-hydrogen isotope analysis to a Canadian breeding population reveal a high degree of migratory connectivity within western North American wintering populations.

Both sub-populations need to be conserved in order to save the overall population and, more importantly, the effects of global warming and other anthropogenic changes on one sub-population may be different from its effects on the other sub-population.

The mixed-data approach described in *Animal Migration* (with geolocators being used for the first time on arctic-breeding passerines) is innovative and still uncommon but a better understanding of winter movement and connectivity between wintering and breeding populations should help direct timely conservation efforts for this and other iconic Canadian Arctic-breeding avian species

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