

Study pinpoints annual migration of red-throated loons in the eastern US

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Credit: Rick Gray

Red-throated loons are known for their superior fishing skills, but little has been known about the migratory patterns of this aquatic bird in eastern North America. A University of Maine study is the first to pinpoint four migration routes of the red-throated loon along the Atlantic coast of North America and their breeding grounds in the High Arctic, giving conservationists a clearer picture of how to conserve the

bird.

Understanding the migratory patterns of a species is essential to understanding its [population dynamics](#), as impacts that occur during migration can trickle down to each local population. As such, effective conservation of a species also requires an understanding of these migratory dynamics to determine key areas for supporting the animal and the potential threats to the ecosystems there.

"If you want to keep loons at a lake you have to understand all of the other waters that those loons rely on," says Brian Olsen, professor of ornithology in the UMaine School of Biology and Ecology and one of the authors of the study. "Each bird is supported by its own swath of the continent—from its summer lake, to its winter ocean grounds, to the off-shore bank where it stops for a few weeks each migration to rest and fish. If something goes wrong anywhere in that swath, the loon could disappear from all of the swath."

By tagging the birds with satellite transmitters, researchers at the University of Maine tracked red-throated loons for a year along their migratory routes from the U.S. mid-Atlantic coast to their [breeding grounds](#) in the Arctic. The red-throated loon is listed by the U.S. Fish and Wildlife Service as a species of conservation concern in both its Arctic breeding range and wintering areas of the Atlantic Flyway. The goals of the study were to provide more [accurate information](#) about the spatial use during the species' annual cycle in this sensitive area.

The researchers also examined the strength of what is called "migratory connectivity" in the species, or how likely it is that birds who breed near each other also winter near each other and use similar migration routes to get there. Species with high migratory connectivity can be particularly impacted by changes along migratory paths because any disruption that impacts one bird is likely to impact many of them.

Finally, the researchers used existing theories of migration to construct a movement network of the species in order to better understand the areas the birds frequent along the route and how they use them.

The UMaine researchers found four discrete migratory pathways for the red-throated loons that winter on the Atlantic coast; some ended in Canada and others in Greenland, some went straight up the Atlantic coast and others looped around the Great Lakes. There were key stopover over areas that served as hubs for the birds along these routes, like James Bay and lower Hudson Bay, the southern Great Lakes, the Gulf of St Lawrence, Nantucket Shoals and the major bays of the mid-Atlantic region like the Delaware Bay, Chesapeake Bay and Pamlico Sound.

Despite sampling just 5% of the North American Atlantic coast non-breeding range, an area equivalent to just 0.001% of the presumed Atlantic flyway breeding range, the birds studied spread out across 65% of that breeding range, suggesting that the mid-Atlantic region constitutes the core of the non-breeding range for red-throated loons that winter. The scattered migration also suggests that migratory connectivity is low, but anthropogenic disturbance or changing environmental conditions in a relatively small area of either the wintering range could have consequences across much of the North American breeding range.

Carrie Gray is a boreal research scientist for the National Audubon Society and the principal author of the study, which she conducted while earning her Ph.D. at UMaine. Gray explains that when the size of the wintering area is small relative to the size of the breeding range, it means a higher proportion of the population may experience the effects associated with environmental change in that wintering area.

"This can result in a positive outcome, for example, if regional forage fish abundance is above average one winter and birds experience a boom

in productivity the following summer. On the other hand, as climate change causes ocean temperatures to rise and forage fish distributions shift northward to track the colder waters that they are adapted to, it means the birds that rely on those fish must also shift northward," Gray says. "Tracking studies that follow individual red-throated loons over multiple years are needed to assess how 'hard-wired' they are to migrate to specific wintering areas, or whether their movements during the non-breeding season are flexible and allow them to respond to local conditions to track their resources."

There were also a few migration stopping points that appeared critically important for the species. For example, 90% of birds tracked in the spring and 61% tracked in the autumn relied on a small number of core use areas along the Atlantic coast of the Northeastern U.S. and Canadian Maritimes. Factors that could impact the loons in these areas could include exposure to contaminants and oil spills, risk of collision mortality and habitat displacement from offshore wind farms, the threat of bycatch mortality associated with [fishing nets](#) and inclement weather.

"A fishing vessel off the Nantucket Shoals is likely there for the same reasons the birds are," says Olsen. "The productive currents benefit fishing for both. But while the vessel operator may notice a handful of loons working the same waters they are, our study suggests that if they go out there every day for a few weeks, they could see a large proportion of all of the birds from the Atlantic coast of North America as they move through the region. There are just a handful of hotspots like this, and this study is the first to describe where they are."

Future, multiyear studies are needed to determine if the same birds take the same migratory route every year, which is also important to understand how easily ecological disturbances could impact the red-throated loon population. Still, the results of this study—published in the *Journal of Ornithology* in August 2022—will not only inform protection

efforts for the red-throated [loon](#), but underscores the importance of looking at the large-scale migratory patterns for conservation in general.

"Tracking studies allow us to follow birds along their incredible migration journeys and discover the places they rely on throughout the year. We need this information to identify the habitats that need to be protected to conserve bird populations. I'm thrilled we were able to expand on some of this knowledge in regards to red-throated loons and I'm encouraged to see, more and more in our field, a greater emphasis on bird conservation at the hemispheric scale," Gray says.

More information: Carrie E. Gray et al, Migration routes, high-use areas, and network connectivity across the annual cycle of an arctic seabird, *Journal of Ornithology* (2022). [DOI: 10.1007/s10336-022-02010-2#Abs1](#)

Provided by University of Maine

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