Tracing the Geographic Origin of Migratory Birds Breeding on DoD Lands Using Stable Isotopes

Project # 10-427

Background:

Despite decades of research and banding efforts, we have only a rudimentary understanding of where birds that breed in North America reside during the winter non-breeding period. For most species, knowledge about how temperate breeding and tropical non-breeding populations are connected is limited to continental-scale range maps. Developing a finer-scale view of migratory connectivity would enable the study of local population dynamics and allow for directed conservation of vulnerable populations by Department of Defense (DoD) personnel. Moreover, documenting patterns of migratory connectivity could provide an important organizing template for DoD participation in international conservation efforts for migratory birds.

Objective:

The goal of this Legacy-funded research was to use intrinsic markers in tissues of five Neotropical-Nearctic migratory birds to understand local-scale connections between non-breeding areas in the Caribbean and breeding sites in eastern North America. This objective was accomplished by analyzing multiple stable isotopes in the tail feathers of birds captured at known locations during the breeding and non-breeding period. These feathers, which are grown by adults each year after reproduction and by juveniles in the nest, carry geographically distinct isotope signals that can be used to assign birds captured in the Caribbean to their putative breeding locations in North America.

Summary of Approach:

We linked breeding (military installations) and wintering locations (Caribbean) for five species of long-distance migrants: Prairie Warbler (*Dendroica discolor*), Northern Parula (*Parula americana*), Black-and-White Warbler (*Mniotilta varia*), American Redstart (*Setophaga ruticilla*), and Ovenbird (*Seiurus aurocapilla*). On the breeding grounds, we took a tail feather from birds to determine how isotopic signatures vary among breeding sites. We sampled birds at eight military installations in the Eastern Avifaunal Biome: Fort Stewart (GA), Fort Polk (LA), Fort Belvoir (VA), NSGA Sugar Grove (WV), Fort Leonard Wood (MO), Picatinny Arsenal (NJ), Westover Air Reserve Base (MA), and Fort Ethan Allen (VT).

Benefit:

This research provides important information and a critical model for the migratory connectivity between birds breeding on military bases and where they spend the non-breeding season in the tropics. Department of Defense personal are responsible for managing lands on military installations to protect suitable breeding areas for Neotropical migratory birds. Because migratory birds spend the majority of the annual cycle on their non-breeding grounds in the tropics, it is equally likely that events in the tropics, off of military bases, are also important drivers of population abundance of these birds. The task of quantifying annual ranges for migratory birds is an essential first step for improving their management. For installations running MAPS stations that show overwinter survival to be the limiting factor, this research will enable DoD to begin to identify the causes of this limitation by connecting their lands to overwintering areas. Thus, this research will develop the model that DoD personnel can use to better manage their natural resources.

Accomplishments:

To date, we have completed stable isotope analysis on over 500 individuals from 2009 and 2010 sampling efforts. The remaining feathers collected during the 2010 were analyzed at the Smithsonian Stable Isotope Mass Spectrometry Lab. We also made a presentation of our preliminary findings at the National Zoo's 2010 International Migratory Bird Day. Finally, we analyzed data and have prepared migratory connectivity maps for each of the five species. These maps draw on similar data collected during the winter non-breeding period in the Caribbean Basin with matching funds from the United State Forest Service - International Programs and in-kind support from the Smithsonian Institution.

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