

FEATURE ARTICLES

**ESTIMATING ORIGINS OF THREE SPECIES OF NEOTROPICAL MIGRANT
SONGBIRDS AT A GULF COAST STOPOVER SITE: COMBINING STABLE
ISOTOPE AND GIS TOOLS**

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Abstract. Measurement of stable-hydrogen isotopes (δD) in feathers of migrating birds can provide information on where feathers were grown in North America, at least to an approximate band of latitude. This approach has greatly increased our ability to investigate aspects of avian migration and stopover ecology, since origins of unmarked individuals at migration stopover sites can be estimated for the first time. However, few studies have explored the power of combining isotope measurements with geographic information system (GIS) methods. We measured δD values in feathers of hatching-year (HY) Swainson's Thrushes (*Catharus ustulatus*, $n = 60$), Wood Thrushes (*Hylocichla mustelina*, $n = 113$), and Gray Catbirds (*Dumetella carolinensis*, $n = 158$) at Ft. Morgan Peninsula, Alabama ($30^{\circ}10'N$, $88^{\circ}00'W$), a migration stopover site along the Gulf coast. By applying an elevation-corrected hydrogen isotope basemap for birds in North America, we derived a GIS surface depicting expected feather δD values across the continent. We then used GIS to constrain the possible origins of the sampled populations by considering only values falling within the North American breeding ranges of the species. We depicted likely origins of migrating birds by the 50% and 75% tolerance limits of the data. Our GIS analysis indicated that our captured populations represented much-reduced regions of possible origin based on the North American breeding distributions. Gradients in abundance data from the North American Breeding Bird Survey (BBS) allowed us to further narrow possible origins within isotopic boundaries for Wood Thrushes and Gray Catbirds. This exercise provided a means by which priority regions and habitats could be assessed at large continental scales based on actual productivity. We suggest the combination of isotopic and GIS tools provides a powerful means to derive conservation priorities and to investigate key factors involved in the ecology of avian migration and stopover.

Key words: deuterium, geographic information systems, migratory connectivity, stable isotopes, stopover.