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CHAPTER 1

MIGRATORY CONNECTIVITY OF A WIDELY DISTRIBUTED SONGBIRD, THE AMERICAN REDSTART (*SETOPHAGA RUTICILLA*)

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Abstract.—Determining the degree of connectivity between breeding and wintering populations is critical for understanding the ecology and evolution of migratory systems. We analyzed stable hydrogen isotopic compositions in tail feathers (δD_w) collected from 26 sites in 11 countries throughout the wintering range of the American Redstart (*Setophaga ruticilla*), a Nearctic–Neotropical migratory passerine bird. Feathers were assumed to have molted on the breeding grounds, and δD_w was used to estimate breeding origin. Values of δD_w were highly correlated with longitude of sampling location, indicating that breeding populations were generally distributed along the east–west axis of the wintering grounds. Within the Caribbean region, Florida, and Bahamas, δD_w values were negatively correlated with winter latitude, which suggests that American Redstarts exhibit a pattern of chain migration in which individuals wintering at northern latitudes are also the most northern breeders. To identify the most probable breeding regions, we used a likelihood-assignment test incorporated with a prior probability of breeding abundance using Bayes's rule. Expected δD values of feathers from five breeding regions were based on interpolated δD values from a model of continent-wide growing-season δD values in precipitation (δD_p) and were adjusted to account for a discrimination factor between precipitation and feathers. At most wintering locations, breeding assignments were significantly different from expected frequencies based on relative breeding abundance. Birds wintering in eastern and western Mexico had a high probability of breeding in northwest and midwest North America, whereas birds in the Greater and Lesser Antilles were likely to have originated from breeding regions in the northeast and southeast, respectively. Migratory connectivity, such as we report here, implies that the dynamics of breeding and nonbreeding populations may be linked at a regional scale. These results provide a key opportunity for studying the year-round ecology and evolution of spatially connected populations in a migratory species. *Received 12 September 2005, accepted 25 May 2006.*

Resumen.—Es importante determinar el grado de conectividad entre las poblaciones en reproducción y las poblaciones en invernada, para entender la ecología y evolución de los sistemas migratorios. Analizamos la composición isotópica de hidrógeno estable (δD_w) en plumas de la cola de *Setophaga ruticilla*, una especie de ave migratoria Neártica-Neotropical, colectadas a lo largo de las áreas de invernada en 26 sitios en 11 países. Se admitió que las plumas habían crecido en los sitios de anidación y δD_w se uso para estimar el origen de nacimiento. Los valores de δD_w estuvieron altamente correlacionados con la longitud de las localidades muestreadas, lo que indica que las poblaciones en reproducción estuvieron, por lo general, distribuidas a lo largo del eje este-oeste de los sitios de invernada. Los valores de δD_w, dentro de la región caribeña, Florida

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