

Non-breeding regions of Eurasian Reed Warbler populations breeding in Finland, Jordan, and Kazakhstan: Using Stable Hydrogen Isotope to show within-population difference and inter-population overlap.

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ABSTRACT

Identifying factors that shape population dynamics of migratory birds is essential for proper conservation strategies. To this end, it is crucial to unravel the geographical whereabouts of populations of migratory birds. Stable hydrogen isotope analysis is widely applicable in monitoring migratory birds because of the availability of water throughout the globe and within all organisms (through food web) and shows a global pattern in the distribution of its signatures in precipitation and can be used to trace the origins of tissues. In this study, we used stable hydrogen isotope ratios in feathers grown in Africa to show the non-breeding regions of Eurasian Reed Warbler, *Acrocephalus scirpaceus* populations breeding in Finland, Jordan, and Kazakhstan. We assigned $\delta^2\text{H}$ ratios of feather keratin grown on non-breeding grounds to calibrated predicted isotopic maps from stable hydrogen in precipitation. The predicted non-breeding region for the Finnish population was western Africa and Central Africa, that of the Jordan population was southern West Africa, and Southern Africa for Kazakh population. We found low within-population differences and low inter-population overlap in predicted non-breeding regions. There was higher inter-population overlap between the Kazakh and Jordan populations (13.39%) than the Kazakh and Finnish (0%) or the Jordan and Finnish (0.96%) populations. The migratory route (a consequence of the location of breeding ground relative to Africa) a population uses to enter Africa (South-West for Finnish and South-east for Jordan and Kazakh) determined the percentage overlap in non-breeding regions between populations. This strategy could be advantageous at the species level in the face of localized land-use change (but not wide-spread land-use change) but detrimental in the face of continental-scale climate change.