

Wintering location and breeding success of individual Ipswich sparrows: 2006 progress report

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Summary

A study using stable isotope analysis to determine the wintering locations and diets of individual Ipswich sparrows, and to relate those data to breeding success, was started in 2006. Feather samples were collected from over 100 adults, and the fates of their 70 nests were followed. As of January 2007, preliminary isotope analysis results are starting to arrive and are discussed here, along with reports of colour-banded sparrows in Maine and Maryland. In spring and summer 2007, the sample size will be increased and data on the arrival and pairing dates of returning birds will be collected.

Introduction

The Ipswich sparrow (*Passerculus sandwichensis princeps*) is arguably Canada's best known endemic songbird, breeding almost exclusively on Sable Island and wintering along the Atlantic coast from Maine to Florida, where it is a highlight of the winter birding experience (McLaren and Horn 2006). Its combination of a tightly packed breeding range and a latitudinally broad wintering range make it ideal for studying perhaps the most basic question about migration: why do some birds migrate so far, while others pass the winter fairly close to their breeding grounds?

For the Ipswich sparrow, this question is of more than academic interest. It is listed by the Committee on the Status of Endangered Wildlife in Canada as "Special Concern", and its population is apparently limited by events during migration and wintering, rather than during the breeding season (Stobo and McLaren 1975, Horn 1999). Thus understanding the sparrow's migration and wintering needs is important for its conservation.

Recent work in other species has shown that the wintering location and diet of individual birds can be determined from the ratio of stable isotopes (i.e., forms of a chemical element having different atomic sizes) found in their feathers. In 2006, Catherine Dale began an MSc project to use this new tool to relate the breeding success of individual Ipswich sparrows to where they spent the winter. One might expect, for example, that individuals that winter farther north save time and energy by migrating less far, but at the cost of a poorer diet, compared to individuals that fly farther south.

In 2006, Catherine measured the breeding success of sparrows in high and low quality breeding habitat, taking feather samples from each for later isotope analysis. Once the isotope results are complete, she will then relate the breeding success to where these individuals wintered and what they ate. She will also return next season (2007) to increase her sample size and to determine the arrival and pairing dates of all the study

subjects, to see whether birds that migrate farther are slower to arrive and pair.

Discussion of results to date

A total of 107 adults were banded and sampled (62 at the high quality site, 45 at the low quality site) and the fates of 70 nests (containing 211 nestlings in total) were followed. Territories were more densely packed than reported in previous studies (Stobo and McLaren 1975), and breeding success more variable; many nests failed or fledged only a subset of young.

Initial isotope analyses were restricted to analysis of sulphur isotopes, because the ratio of sulphur isotopes is needed for interpretation of other isotope ratios. Specifically, if the ratio of d34 sulphur exceeds 10 ‰, then there is a high proportion of marine content in the diet, making it hard to use the ratio of other isotopes (specifically, hydrogen isotopes) to determine wintering latitude.

The sulphur analysis (contracted to the Queen's University Stable Isotope Lab) showed that 7 out of 11 birds had d34S ratios > 10 ‰ (only birds positively known to have moulted their feathers while wintering were included in this initial sample). This result suggests that over half of the birds have a marine component in their diet (they may be eating amphipods, e.g. beach fleas, on seaweed washed up on the beach, for example). Other possibilities exist and are being explored, however. For example, some work suggests that island species have particularly high d34S ratios, so that hydrogen ratios can be used to determine wintering latitude after all.

In the meantime, a larger sample of feathers has now been sent to the University of New Brunswick's Stable Isotopes in Nature Laboratory for analysis of hydrogen (which, again, can indicate wintering latitude), carbon (which can indicate habitat type and can help determine latitude), and nitrogen (which can indicate the proportion of insects versus plant material, e.g. grass seeds, in the diet).

It is also worth noting that over-wintering colour banded Ipswich sparrows were reported from Portland and Kittery Maine and from Assateague Island, Maryland. The latter report was in response to an appeal for such sightings that Catherine sent on birding email lists covering the Atlantic coast (BIRDCHAT and BIRDEAST).

Literature cited

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