MS Thesis
Department of Environmental Science and Policy
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Characterizing the Genomic Signatures of Early-stage Parapatric Ecological Speciation in the Atlantic Song Sparrow

ABSTRACT

The most basic model of speciation requires two main components: divergent natural selection and isolation. But how does natural selection facilitate the rise of new species without isolation? If a species occupies different habitats across its range, then parapatric (i.e. adjacent) populations can be exposed to divergent selection, possibly leading to speciation.

The song sparrow (Passerellidae: *Melospiza melodia*) is a common songbird with a range of subspecies found across North America. One of these subspecies, the Atlantic song sparrow (*M.m. atlantica*), is a habitat specialist that is only found in sand dunes and saltmarshes along the east coast. Another subspecies, the eastern song sparrow (*M.m. melodia*), occurs adjacently to the Atlantic song sparrow in successional habitats. The major difference between these subspecies is bill size; the Atlantic song sparrow has a much larger bill, which it uses to efficiently radiate body heat in hot coastal environments.

Even though it is a major cause of speciation, previous studies have been unable to characterize how ecologically-driven parapatric divergence looks on the genomic level because of limitations in genetic technologies. We used a contemporary genomic method, RADseq, to assess how the genomes of these divergently-adapted subspecies have been shaped by ecological selection.