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The Bird Genoscape Project

North American Bird Bander

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News, Notes, Comments

The Bird Genoscape Project

Neotropical migratory birds are declining across the Western Hemisphere. Without efficient methods for mapping migratory connectivity, it is difficult to identify whether the greatest stressors occur on breeding, migratory, or wintering grounds. Historical and current efforts to connect breeding, wintering, and migratory populations through large-scale banding programs or small tracking devices have met with limited success because recapture of small-bodied birds is rare. Thus there is an urgent need for a tracking technology that is minimally invasive, reliable, and capable of characterizing migratory patterns on a broad scale.

What is a Genoscape?

A genoscape is a map of genetic variation across the geographic range of a species. It can be used to trace the breeding origin and wintering ground of a bird captured anywhere along its migratory pathway using DNA contained within a **single feather**.

What is the Bird Genoscape Project?

The Bird Genoscape Project is an effort to map the population-specific migratory flyways of species of migratory birds. The first step towards determining the population-specific migration routes is building a genoscape. By harnessing recent advances in next-generation sequencing, we can scan the genomes of these birds and identify base pairs that are unique to a particular population.

Conservation Application

The Bird Genoscape Project provides efficient genetic tools for monitoring declining migratory bird species in the face of climate change and other anthropogenic stressors. The findings of the project serve as the essential first step towards building effective conservation and management strategies. In addition, the Genoscape Project also has the potential to engage citizen scientists on a large scale, as well as to invigorate the birding community with highly improved species range maps.

How can you help?

Our goal is to collaborate with multiple research and educational institutes, government agencies, non-profit organizations and bird biologists across North, Central and South America to build genoscapes for many more species of conservation concern. Specifically, we are looking for help in the following two ways:

We are currently working to build genoscapes for >14 species of North American birds, with a particular interest in samples from the wintering areas and migration stations. If you are interested in participating in sample collection for any of our target taxa, please contact Kristen Ruegg (kristen.ruegg@colostate.edu) and visit our website for further details on highlight species and sample collection procedures: <https://www.birdgenoscape.org/>

In the spring of 2020, Bird Genoscape Project student Marina Rodriguez will be initiating a project to determine the extent to which climate change is impacting survival and fitness in Yellow Warbler populations (*Setophaga petechia*), across their range. This study is following up on work by our group identifying regions of high vulnerability to climate change recently published in *Science* (Bay et al 2018). The study will take place in the Western and Eastern regions of the United States and we are currently looking for collaborators to help take blood samples from the same individuals during the 2020 and 2021 breeding seasons. If you are interested in participating in this project, please contact Marina Rodriguez (mdrodriguez10@gmail.com).

Literature Cited

Bay, R. A., R. J. Harrigan, V. L. Underwood, H. L. Gibbs, T. B. Smith, and K. C. Ruegg. 2018. Genomic signals of selection predict climate-driven population declines. *Science* 359:83-86.