



We are assessing the ecological connectivity of Delaware forests, Florida barrier islands, and the Amazon basin. Birds are convenient ecological indicators. Using light archival tracking technology we are tracking birds from Delaware to the Amazon rainforests and back to Delaware via Florida coastal ecosystems. Thus, by assessing the ecological connectivity of these three regions we can gauge the effects of climate change on biodiversity at a global scale. Additionally, the Amazon basin is critical to preserve for all life on earth. Our research is addressing conservation needs in Amazonia by studying birds in Delaware with the realization that what happens Amazonia happens in Delaware.

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## Biodiversity, Ecological Connectivity, and Climate Change

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### Who cares and why?

Our natural systems are under continued and increasing threat from human activities. The protection and continued functioning of our natural ecosystems are essential for all life on earth. Birds are excellent ecological indicators. The health of bird populations reflects the health of our planet's ecosystems. To study ecological connectivity, and thus monitor ecosystem function for human well-

being, my lab is studying migratory songbirds. Our use of tracking technology to study the effect of climate change on the ecological connectivity of forests in Delaware, Florida, and Amazonia, will help inform decision-makers on how best to preserve our planet's natural resources while simultaneously protecting an important economic resource.

### What has the project done so far?

My laboratory has documented the importance of barrier island ecosystems in the preservation of songbird populations. Hundreds of thousands of North American songbirds use Gulf Coast barrier islands as critical stopover sites during spring migration. We have used avian blood plasma to document the refueling rate of transient birds. In addition to documenting the use of these barrier islands, we have used geospatial and remote sensing techniques to show that these islands are highly threatened by sea-level rise. Thus, avian blood plasma is a tool to gauge the effect of climate change and sea-level rise on coastal ecosystem function.

In addition, we have, for the first time, confirmed the ecological link between Delaware forests and South American rainforests. Using novel geolocator technology, we have tracked our study subjects from Delaware to South America, and back. By monitoring the full life-cycle of our study subjects, we have shown how Delaware forests are ecologically linked to rainforests of the Amazon basin. What happens in Brazil, affects the ecology and, therefore, the resilience of Delaware's forests.



## Impact Statement

- Examination of avian blood plasma  $\beta$ -hydroxy-butyrate and triglyceride levels of spring migratory birds arriving on Florida barrier islands from tropical America indicate these species are using barrier islands for re-fueling. This confirms the global ecological importance of coastal barrier island ecosystems as migratory stopover sites
- A geospatial model has projected the future effect of climate change (sea-level rise) on critical migratory stopover sites on Florida barrier islands
- Light archival technology has revealed the ecological connectivity of Delaware forests with Florida coastal ecosystems and the vast rainforests of the Amazon basin
- Life history monitoring of *Catharus fuscescens* in Delaware has revealed the potential carry over effects of climate change and rainforest destruction on the ecological functioning of Delaware forests
- The spatiotemporal movements of individual *Catharus fuscescens* in North and South America has implications for future global biodiversity preservation

### What research is needed?

Additional funding is desperately needed to sustain and expand this program if we are to continue in our quest to document ecological connectivity, obtain supporting information for biodiversity preservation, and study the effects of climate change at a global scale. Expansion of this project will engage more students in meaningful field research and will allow additional resources to be examined.

### Want to know more?

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Strategic Priority – Natural resources and environment; climate change

Additional links: <http://www.umes.edu/ard/Default.aspx?id=46285>

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