

Migrant Bird Research at Old Dominion University

Erin L. Heller, J. Andrew Arnold, Eric L. Walters, Department of Biological Sciences, Old Dominion University, Norfolk, Virginia

In 2011, Old Dominion University recruited Dr. Eric Walters as a faculty member to bolster its ornithology program within the Department of Biological Sciences. Prior to being hired by ODU, Eric was working in the Bird Population Studies section of the Lab of Ornithology at Cornell University. Since arriving in Virginia, he has begun several local research initiatives that focus on migrant birds. Thanks to the Virginia Society of Ornithology, two of Dr. Walters' graduate students, Erin Heller and Andrew Arnold, were awarded JJ Murray Small Research Grants in 2014. Here we report on their research endeavors as part of their overall graduate work at ODU.

Land in the United States is urbanized at about 1.6% per year and thus it is anticipated that within the next 30 years, approximately two-thirds of the U.S. population will live in cities (Theobald 2005). This increase in urbanization causes the displacement of wildlife as suitable habitat is lost. As cities grow, many species either find refuge in fragmented patches within urban settings or they disappear altogether (Bradley and Altizer 2006). As land becomes more urbanized, avian diversity tends to decrease (Philippe et al. 2002, Melles et al. 2003).

Given the role that the coastal region of Virginia serves as a major migratory flyway, the concomitant increase in human populations creates a potential conflict to successful migration. Our lab's research examines the effect of this increasing urbanization on the health of birds and their environment. This is where the graduate research conducted by Erin and Andrew comes in.

Erin is examining the role of this increasing urbanization on the relationship between birds and their propensity to be parasitized by ticks. Of the fourteen tick species documented in coastal Virginia, many are found feeding on Virginia birds. Erin has been sampling birds for ticks at sites that vary in their level of urbanization within coastal Virginia's urban matrix. Nearly 1,000 ticks have been removed from birds to date and these samples, along with blood collected from the bird hosts, are being tested for potential tick-mediated pathogens.

Preliminary results reveal that the mean number of ticks per bird is greater at less urbanized sites and that ticks are more commonly found on ground-foraging bird species such as Carolina Wrens and Brown Thrashers. Nearly 90% of the ticks removed from birds were larval rabbit ticks (*Haemaphysalis leporispalustris*). Interestingly, at least ten birds were parasitized by ticks that tested positive for *Borrelia burgdorferi*, the causative agent of Lyme disease. This ongoing study demonstrates how levels of urbanization can influence avian host choice by ticks and increases knowledge of the corresponding relationship between urbanization and disease prevalence, which ultimately could reduce human health risks.

Along with our work on ectoparasites, our research group is also studying how migrant species use forested habitat during fall migration. Andrew's work attempts to assess factors that influence how migrants choose stopover habitat during migration along the Delmarva Peninsula. Migratory landbirds generally require stopover sites for resting and refueling purposes while traveling between breeding and wintering grounds. Finding quality locations where metabolic needs can be met is essential for survival and, thus, identifying and protecting high quality sites is critical for prioritizing conservation efforts (Chernetsov 2006; Sheehy et al. 2011; Smith et al. 2007).

The overarching goal of Andrew's study is to ultimately be able to distinguish high quality habitat from stopover areas that are only used by necessity. As birds migrate south along the coast of the mid-Atlantic, some may simply be funneling along land masses and stopping because of geographic happenstance. Others may be choosing particular habitat types to refuel as they prepare to head across water bodies or inhospitable habitats. Andrew has been sampling stopover habitats at 36 sites in coastal Virginia and Maryland where he has been quantifying habitat features, fruit and insect abundance, and overall species makeup at these sites during the fall migration period.

As part of this larger study, we have been sampling blood from migrants at Kiptopeke State Park on the southern tip of Virginia's Eastern Shore. This site,

located at the southern tip of what is considered a “geographic funnel”, serves as a stopover site for high numbers of migratory bird species (Watts and Mabey 1994). While the sheer density of migrants has highlighted the potential global importance of this site, the nature of how migrants are using the habitat remains unknown. By measuring individuals’ metabolite levels, an unbiased assessment of diet associated with habitat quality is possible (Guglielmo et al. 2005).

One such metabolic approach has been to use plasma metabolite analysis, a method in which fuel and fat deposition rates of individuals are determined from triglyceride, free glycerol, and β -OH-butyrate concentrations. This approach allows for a more accurate assessment of habitat quality based on the nutritional content of food being consumed by individuals at stopover sites (Guglielmo et al. 2005; Seaman et al. 2006; Smith et al. 2007).

During the past two fall migration seasons we have collected over 700 plasma samples from approximately 40 species. The vast majority of migrants sampled at Kiptopeke were Yellow-rumped Warblers (28%), Gray Catbirds (16%), Hermit Thrushes (11%), and American Redstarts (6%).

We plan to expand this study in 2015 to include a larger sample of stopover sites along the Eastern Shore’s Delmarva Peninsula. Our hope is that by comparing sites, we will be able to make unbiased assessments about how migrants are using these sites. This type of data can help direct future research and conservation initiatives aimed at protecting vulnerable migratory species and their habitats.

Our work in Virginia has been funded in part by the Coastal Virginia Wildlife Observatory, the Virginia Academy of Science, the Virginia Coastal Zone Management Program, and the United States Fish & Wildlife Service. Both of the graduate studies outlined above would not have been possible without the generous support of the Virginia Society of Ornithology’s JJ Murray Small Research Grant. The migrant stopover project is a collaboration with Dr. Jeff Buler (University of Delaware) and Deanna Dawson (USGS).

Literature Cited:

- Anderson, J.F. 2002. The natural history of ticks. *Medical Clinics of North America* 86:205-218.
- Bradley, C.A. and S. Altizer. 2006. Urbanization and the ecology of wildlife diseases. *Trends in Ecology and Evolution* 22:96-102.
- Chernetsov, N. 2006. Habitat selection by nocturnal passerine migrants enroute: mechanisms and results. *Journal of Ornithology* 147:185-191.
- Guglielmo, C.G., D.J. Cerasale, and C. Eldermire. 2005. A field validation of plasma metabolite profiling to assess refueling performance of migratory birds. *Physiological and Biochemical Zoology* 78:116-125.
- Melles, S., S. Glenn, and K. Martin. 2003. Urban bird diversity and landscape complexity: species-environment associations along a multiscale habitat gradient. *Conservation Ecology* 7:5. [online] <http://www.consecol.org/vol7/iss1/art5>.
- Philippe, C., J. Jokimäki, J.P.L. Savard. 2002. Are urban bird communities influenced by the bird diversity of adjacent landscapes? *Journal of Applied Ecology* 38:1122-1134.
- Seaman, D.A., C.G. Guglielmo, R.W. Elner, and T.D. Williams. 2006. Landscape-scale physiology: Site differences in refueling rates indicated by plasma metabolite analysis in free-living migratory sandpipers. *Auk* 123:563-574.
- Sheehy, J., C. M. Taylor, and D. R. Norris. 2011. The importance of stopover habitat for developing effective conservation strategies for migratory animals. *Journal of Ornithology* 152 (Suppl 1):S161-S168.
- Smith, S.B., K.H. McPherson, J.M. Backer, B.J. Pierce, D.W. Podlesak, and S.R. McWilliams. 2007. Fruit quality and consumption by songbirds during autumn migration. *Journal of Ornithology* 119:419-428.
- Theobald, D.M. 2005. Landscape patterns of exurban growth in the USA from 1980 to 2020. *Ecology and Society* 10:32.
- Watts, B.D., and S.E. Mabey. 1994. Migratory landbirds of the lower Delmarva: Habitat selection and geographic distribution. Center for Conservation Biology Technical Report CCBTR-94-05, College of William and Mary, Williamsburg, Virginia.