



## GOLDEN EAGLES ON THE HEE



Two Golden Eagle images captured on HEE trail cameras

Dr. Barny Dunning, Field Supervisor Jeff Riegel, and a handful of graduate and undergraduate students initiated a pilot project on the HEE this winter in collaboration with researchers from West Virginia University who are trying to determine the use of forested landscapes in the eastern United States by Golden Eagles.

Western populations of these majestic birds are generally associated with open habitats like prairies or agricultural areas. However, eagles from the small population in eastern North America are often reported during winter months in forested landscapes feeding on mammal carcasses such as deer killed by hunters. They seem to prefer small forest openings, much like those created in some of the HEE harvest areas.

To better assess the winter range and habitat preferences of eastern Golden Eagles, the scientists at West Virginia University have coordinated the deployment of camera traps across states from Maine to Alabama. Cameras were placed in December 2013 in a couple of locations on the HEE; these are the first sites being used in Indiana. In order to lure the eagles in, Jeff has the enviable privilege of dragging road-killed deer into the woods to place in front of the cameras! But the work has paid off; we've already captured hundreds of images of Golden Eagles feeding.

## HEE Birding Field Day 2014

A HEE Birding Day has been tentatively scheduled to take place on Saturday, June 7 at the HEE sites at Morgan-Monroe State Forest. The schedule is still being determined, but it looks like we'll plan on spending the morning in the field with a number of different groups out identifying birds. We'll come back inside to tally our bird counts, then have an afternoon session with a few presentations indoors related to HEE bird research to date and forest management and birds. As details become available, they'll be posted on the Events and Announcements page of the HEE website (<http://www.ag.purdue.edu/programs/hee/Pages/events.aspx>).



# HEE RESEARCH SPOTLIGHT

## Ecology of Cerulean Warblers in a Managed Forest Landscape

*Sasha Auer, Kevin Barnes and Dr. Kamal Islam, Ball State University*

The Cerulean Warbler is a small Nearctic-Neotropical songbird that breeds in the hardwood forests of Indiana and much of the eastern United States. It is classified as endangered in Indiana and as a federal species of concern due to population declines of 3% per year in recent decades. The HEE is one of several studies in the U.S. focusing on Cerulean Warbler response to silvicultural treatments. Dr. Kamal Islam and his graduate students have been monitoring the effects of the HEE harvesting methods on Cerulean Warbler abundance, territory size, and reproductive success for the past seven years and elsewhere in Indiana for even longer. Abundance increased in even-aged and control units following harvesting treatments. It decreased in uneven-aged units in the years immediately following harvests, but has increased to pre-treatment levels in recent years. Territory size has thus far not been affected by treatments; more data are needed to assess reproductive success.

In addition to long-term monitoring, Dr. Islam's most recent graduate students, Kevin Barnes and Sasha Auer, are conducting individual Cerulean Warbler research projects. Kevin is studying the cues Cerulean Warblers use when selecting breeding territories. He is investigating the influence of both structural habitat cues and social cues on male breeding site selection. More specifically, he will determine the influence of both vertical and horizontal canopy structure within male territories. In addition, he conducted an experiment to see if Cerulean Warblers use the presence of conspecifics for breeding site selection by broadcasting male vocalizations.

Sasha is investigating Cerulean Warbler nestling diet to determine prey preference and annual and seasonal fluctuations of prey. Her methods include filming the warbler parents as they deliver prey items (arthropods) to their nestlings and collecting branch clippings to sample arthropods in breeding territories. The specific types of arthropods in the diet are identified by watching the videos. While filming in 2012, Sasha was able to document predation of a Cerulean Warbler nestling by a Red-bellied

Woodpecker. This activity had never previously been recorded, and led to the publication of a short report in the *Wilson Journal of Ornithology* (see new HEE publications section on page 4 for details).

Both Kevin and Sasha plan to complete their projects in early 2014, so some of their final results will be available soon.

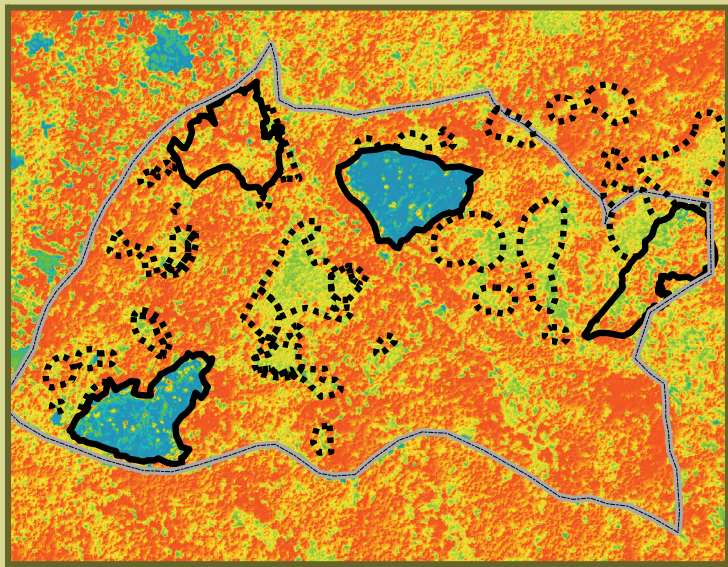


Graduate students Sasha Auer (r.) and Kevin Barnes (l.) hold female and male Cerulean Warblers during a banding session.

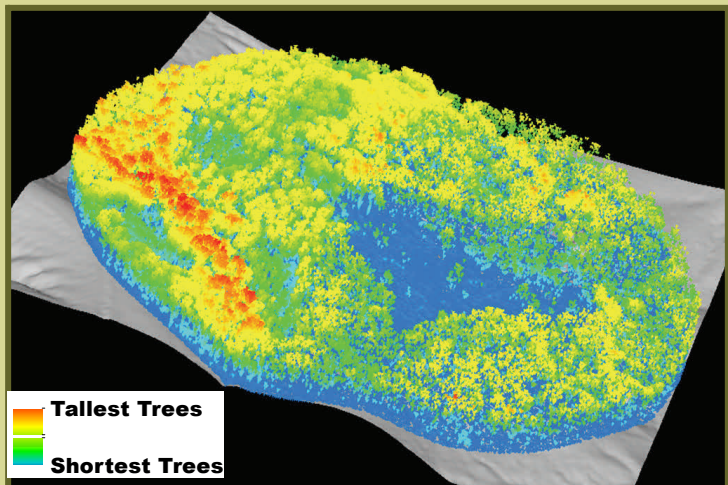


A Cerulean Warbler male brings food to his nestlings.

# HEE Mapping and LiDAR



Canopy height for HEE Unit 3 (top) Solid black lines represent 2008 clear-cuts and shelterwoods, dotted black lines indicate harvest boundaries digitized from paper records (data from Kevin Barnes, Ball State University).



A 3-D representation of one of the patch cuts in HEE Unit 7, representing relative tree heights as well as variation in elevation (image courtesy of Gang Shao, Purdue University).

As time allows, we've been working on updating some of the HEE maps. One of the things that we've been doing is identifying harvest areas on the HEE sites that occurred prior to project initiation; this will be particularly important as we plan the harvesting schedule for the duration of the project.

Some of the HEE units (especially Unit 3) were subjected to a lot of wind damage in the late 1980's and early 1990's; in heavily damaged areas small regeneration openings were created to remove broken canopy trees and to stimulate regeneration. Many of these areas are now dense, 20 - 30 year old tulip-poplar stands. The trees in these stands are still very small, so it doesn't make sense to harvest for many years. By mapping these areas, we are able to select areas for future treatments that are most appropriate, and save areas that need more years to grow for harvest towards the end of the project.

A couple of resources are being used to do this. The first are paper maps in records at Morgan-Monroe and Yellowwood State Forests, from which harvest boundaries can be digitized and incorporated into GIS layers (dotted lines on top left map). Secondly, we'll be utilizing work done with remotely-sensed LiDAR data to locate areas with relatively low tree heights, an indication forest stands that are younger than the area around them. Part of Kevin Barnes' work on Cerulean Warbler habitat was to use LiDAR to identify gaps in the canopy (top left image) and to relate those to Cerulean Warbler activity. Gang Shao, a PhD student at Purdue, also did some preliminary work modeling canopy structure on some of the HEE units (bottom left image). We're excited to see what we else we can do with these data!

## Attention HEE Alumni

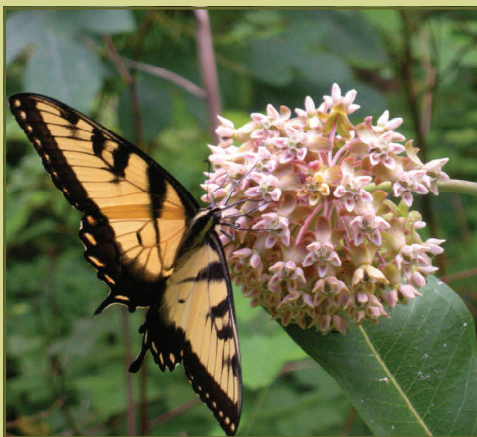
*I'd like to start a HEE Alumni update section to include in this newsletter. So anyone who's worked on the HEE in the past, whether graduate students or summer tech, please feel free to send me info ([meiera@purdue.edu](mailto:meiera@purdue.edu), 765-494-1472) about where you're at and what you're doing now. I'd also like to try to keep track of Alumni addresses so that we can let you know of important HEE events as they happen.*

## Summer 2013 Field Season



Summer 2013 HEE Vegetation Crew, plus fearless leader Jeff Reigel

The summer of 2013 was another busy year for the HEE. The housing facility at the old Tulip Trace Girl Scout Camp was full to capacity, with 17 field technicians, 6 graduate students, and a family of flying squirrels. More than 100 bats were captured, measured and re-released, thousands of trees were tallied, the domestic privacy of numerous Cerulean Warbler families was invaded, and dozens of white-tailed deer fawns had their every movement followed. Many thanks to all who made the season run smoothly.



*Do you have pictures from any HEE related event or activity?*

*If so, you can submit them to Andy Meier (meiera@purdue.edu) for archiving. Please include any information about the pictures.*



## New HEE Publications

**Auer, S.A., K.Islam, K.W.Barnes** and J.A.Brown. 2013. Documentation of Red-bellied Woodpecker predation of a Cerulean Warbler nestling. *The Wilson Journal of Ornithology* 125(3) 642-646.

<http://dx.doi.org/10.1676/12-163.1>

**Kellner, K.F., N.A.Urban<sup>a</sup>** and **R.K.Swihart**. 2013. Short-term responses of small mammals to timber harvest in the Central Hardwoods. *Journal of Wildlife Management* 77(8): 1650-1663.

<http://dx.doi.org/10.1002/jwmg.613>

Emphasis indicates: **HEE principal investigator (PI)**, *HEE graduate student*, <sup>a</sup> Former PI or graduate student

## New HEE Staff

We're happy to announce that Dr. Bryan Murray will be joining the HEE in 2014 as post-doctoral research fellow. He will focus on pulling together the many years of data that has been collected since the start of the HEE while designing some studies of his own to develop a better understanding of spatial variation in ecosystem dynamics in response to disturbance. You'll surely be hearing more about his work in future newsletters.

### 2014 Field Crew Positions

#### Field Assistant - 2014 Field Season

The HEE is currently seeking a Field Assistant (Temporary) as part of the HEE Field Crew for March-August of 2014. Applications must be received no later than 5:00 PM on January 24, 2014. Application instructions are included in the position announcement at the link above or at the HEE Jobs page (<http://www.ag.purdue.edu/programs/hee/Pages/jobs.aspx>).

#### Other Field Crew Positions - 2014 Field Season

Other field crew positions offered through Purdue will be advertised in early 2014 on the HEE jobs page (<http://www.ag.purdue.edu/programs/hee/Pages/jobs.aspx>). These will include positions doing vegetation surveys, breeding bird surveys, and small mammal trapping. Also keep your eye out for Cerulean Warbler, bat, and white-tail deer technician positions being offered by HEE researchers at Ball State University. Previous HEE summer employees are encouraged to apply.

## From the Project Coordinator

I've been thinking a lot about scale in the last few months. Scale is an issue of particular importance to the HEE project, but it's easy to forget. Some people might wonder why it's necessary to spend 100 years to determine responses to forest management over such a large area as the HEE covers. One of the biggest reasons is scale.

Here's what I mean by scale. Most people are familiar with geographic scale, especially as represented on maps. A map of the entire state of Indiana represents one scale, while a topographic map that includes only portions of one or two townships represents a very different scale. The very local map is able to represent a lot of very specific details: the names of town roads, ephemeral streams, elevation contours. But the local map doesn't tell you anything about the context in which the map occurs. You can't say how far it is to the nearest city, how to get to the nearest interstate, or which rivers the local streams feed into. The state map provides this general context but reduces all of the local detail to a single dot or a tiny square.

Ecological data works in much the same way. We can consider all of the HEE harvests to be somewhat equivalent to a local map; within each of the harvested areas there are distinct and unique ecological processes underway that are a direct response to the disturbance that has created the local environment. As an example, many of the HEE harvest areas are loaded with birds that breed only in early-successional habitat. On the other hand, fewer birds in the middle of these openings are of species that generally breed in mature forests. Traditional studies of forestry impacts often focus only on the scale of the forest stand<sup>1</sup>, approximately equivalent to the scale of the HEE harvests. However, accurate assessments of ecosystem processes also require us to be able to see the context in which the response is occurring. If we look at the scale of the entire HEE study area, which is conceptually equivalent to the state level map, the HEE harvests currently represent only a small point in the total area. Following the bird example, we see that when looking at the landscape scale, the relative distribution of birds is reversed. Birds that require brushy, recently disturbed habitat are restricted only to the harvest areas, but mature forest birds are generally much more common since most of the forest has not been harvested for 70 or more years.

The above example demonstrates the importance of scale across an area, but scale over time is important as well. One of the things that I think will be fascinating about this project will be to see how responses to harvesting change over time as more harvests occur and local habitats begin to aggregated at the level of the landscape. After 100 years, how will the accumulation of local effects on an annual basis impact landscape-level effects on a multi-decadal basis? If I make it to be 130 years old, I look forward to seeing the results!



Andy Meier  
HEE Project Coordinator

1. Puettmann, K.J. and J.C. Teppener. 2013. Multi-scale assessments highlight silvicultural opportunities to increase species diversity and spatial variability in forests. *Forestry*, available online at <http://dx.doi.org/10.1093/forestry/cto050>.



## Hardwood Ecosystem Experiment

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HEE Unit 6, Fall 2013