

Title: Kittatinny Ridge Ecological Monitoring (Year 1)

Faculty Mentor: Dr. Diane Husic¹
Professor, Department of Biological Sciences

Student Researcher: Kerry Reider

Project Start Date: May 27, 2014²

Project Duration: 10 weeks

Project Description:

Summary: We propose to work in a four-county section of the Kittatinny Ridge and Corridor in eastern Pennsylvania (a critical natural resource and landscape). Four priorities will be addressed by this project:

- To garner critical information that will help to further validate the ecological value of the Kittatinny Ridge and Corridor in order to make a strong and credible case to the public about the need for conservation of the Kittatinny;
- To survey the habitat quality and diversity (and document with digital photography) and identify ecological communities along the Ridge that are at most risk from environmental stressors;
- Monitor avian (bird) species, which serve as key indicators of habitat quality and natural systems' responses to environmental stressors, through point count surveys, between two well studied areas (the Delaware Water Gap and the Lehigh Gap Wildlife Refuge);
- To use surveys of avian species of conservation concern to help determine forest habitat integrity and to provide empirical data to test the climate vulnerability index model developed by the Pennsylvania Natural Heritage Program.³

This first year of data collection will serve as a baseline information as to the status of the Kittatinny Ridge. Protocols will be tested, and if successful, can be utilized by others for future monitoring to assess ecological change in subsequent years both in the same study area and for the entire length of the Kittatinny Ridge and Corridor. The need for this monitoring has been identified in the 2010 *Pennsylvania Climate Change Adaptation Plan*⁴ and at the past two Science Summits of the Kittatinny Coalition (2012, 2013).⁵

Background and Significance: The Kittatinny Ridge and corridor, a vital natural resource and treasured landscape, runs through 185 miles of Pennsylvania and is part of a larger 250 mile geological feature that crosses through New Jersey into New York known as the Kittatinny-Shawangunk Ridge and Corridor. It is the Commonwealth's largest Important Bird Area, is a globally important migratory corridor for raptors, and contains large blocks of interior forest habitat critical for migrating and breeding songbirds. The Kittatinny is also home to the iconic Appalachian Trail, Hawk Mountain Sanctuary, Lehigh Gap Wildlife Refuge, Delaware Water Gap National Recreational Area, Cherry Valley National Wildlife Refuge, several raptor migration count locations that are registered with the Hawk Migration Association of North America, state game lands, parks and recreation areas, and it serves as a scenic backdrop to twelve counties.

¹ For this project, we will be working with Dr. Terry Master, Professor of Biological Sciences from East Stroudsburg University

² For this project, Kerry will need to begin learning bird calls over the remainder of the spring 2014 semester and will go out in the field with Drs. Husic and Master ahead of time to scope out the monitoring locations and travel routes.

³ (<http://www.naturalheritage.state.pa.us/>).

⁴ PA Department of Environmental Protection, 2010, *Pennsylvania Climate Change Adaptation Plan*:

<http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-92911/27000-RE-DEP4303%20Pennsylvania%20Climate%20Adaptation%20Planning%20Report.pdf>

⁵ See: <http://kittatinnyridge.org/science/index.html> and <http://lgnc.org/wp/wp-content/uploads/2013/07/Summit-Proceedings-2012.pdf>

Despite the ecological, economic, recreational and aesthetic importance of the Ridge, there are numerous threats including habitat loss on the slopes and in the contiguous valleys due to residential and commercial development, fragmentation due to construction of gas pipelines, high voltage transmission lines, and wind turbines; over-browsing by white-tailed deer; and invasions by forest-threatening insects and alien plant species. Changing climate may cause conditions to become unsuitable for many of the important hardwood tree species in Pennsylvania. This, in turn, negatively impacts critical habitat for key resident and migratory bird species.

Comprehensive biodiversity surveys exist for sites along the ridge including Hawk Mountain, Fort Indiantown Gap (home to the last viable population of the Eastern Regal Fritillary), Lehigh Gap Wildlife Refuge, Delaware Water Gap, and Cherry Valley National Wildlife Refuge. Surveys show great diversity along the Ridge (1460 and 2000 species are typical), but the studies used inconsistent methodologies and were designed to meet different goals. Information about regions along the Ridge and Corridor between these critical sites is much scarcer and little has been documented about the differences in diversity on the south versus north slopes of the Ridge.

Birds have a long history of being bioindicators of environmental change since the days of canaries in the coal mines. Measurements of frequency of occurrence and diversity can provide good information of habitat quality (e.g. forest structure, composition, and health). Because numerous reports now document the impact of climate change on bird migration patterns, the timing and location of breeding, and on bird habitat and population, the proposed surveys and data mining could provide important information on climate change adaptation already occurring. Analysis of phenology data for forest bird species from Monroe and Northampton Counties (which border the easternmost part of the Kittatinny Ridge) was conducted by Anna Meola for her 2011 SOAR project and Honors thesis. The results indicated that all 17 species examined arrive earlier than they did three decades.⁶ Forest health and habitat composition (e.g. with the spread of invasive species) are also likely to change, and our proposed surveys and landscape digital album will provide baseline information on current conditions (vegetative cover, forest structure, invasive plant species) to compare with historical records and future monitoring.

Methodology: Key goals of this proposal are to close information gaps in the 46-mile stretch of the Kittatinny Ridge and associated Corridor between Bake Oven Knob Road (in Lehigh and Carbon Counties) and the Delaware Water Gap (in Monroe and Northampton Counties). Working with Dr. Terry Master, an ornithologist at East Stroudsburg University, we have already begun to identify critical areas along the Appalachian Trail and on publicly accessible sites on the north and south faces of the Ridge to do bird counts (surveys) and will use avian monitoring protocols that were adopted for the PA Breeding Bird Atlas (PBBA) and previous survey work in the Delaware Water Gap National Recreation Area. While Kerry will be recording all species seen and heard at the predetermined locations, we will be particularly interested in a list of birds that are of conservation concern that has been generated using several sources including NatureServe,⁷ the Pennsylvania State Wildlife Action Plan,⁸ the 2nd PBBA, and the bird section in "Terrestrial Vertebrates of Pennsylvania: A Complete Guide to Species of Conservation Concern".⁹

Besides counting birds heard and observed at each site, a 360° series of digital photographs of the area will document the area for analysis of vegetation and habitat conditions. Habitat information collected over this landscape can help to identify the critical threats to the Kittatinny by comparing to satellite imagery and archival photographs of the Kittatinny landscape that were taken by Don Heintzelman in the 1990s.

Using the protocols that have been designed for field work by conservation professionals and experienced ornithologists, **Kerry will be conducting this study using credible methods that are**

⁶ Meola, A. "Using Ecological Monitoring and Citizen Science to Better Understand Climate Change Impacts in Eastern Pennsylvania", Honors Thesis, Moravian College, 2012

⁷ <http://www.natureserve.org/explorer/>

⁸ <http://www.wildlifeactionplans.org/pennsylvania.html>

⁹ Brittingham, et al., Johns Hopkins University Press; 1st edition (November 16, 2010) – Purchased by DWH for the project.

consistent with those found in peer-reviewed publications in ecology and environmental studies and with what has been done for the PA Breeding Bird Atlas.

Roles and Responsibilities: The project timeline would be as follows:

- Spring semester 2014: Finish identifying relevant PBBA count locations and design protocols. Drs. Husic and Master will train Kerry in the methodology, review maps and locations with him, and have him begin learning bird calls from CD recordings.
- Mid-May – June, 2014: Conduct on-the-ground bird surveys and photograph survey locations. Songbirds must be counted after the “safe-dates” to ensure that we aren’t catching migrating species, but before the end of the breeding season when males stop singing. At first, Drs. Husic and Master will be out in the field with Kerry doing the surveys. It is our hope that a second intern or student from ESU will accompany Kerry at other times.¹⁰ If not, Dr. Husic will accompany Kerry.
- July – early August, 2014: Kerry will be mining data from other sources¹¹ and conducting data analysis along with doing additional on-site forest integrity studies and habitat photography. During mid-summer, work in the field needs to be done in early morning before temperatures get too hot. In afternoons and on rainy days, the data analysis, GIS map generation, and report writing will be done.

Project Outcomes: We intend to build on past studies done by Drs. Husic and Master. Monitoring protocols will be tested and, if successful, could be used by citizen scientists (volunteers), scientists, Audubon chapters and other conservation groups along the entire length of the Kittatinny Ridge and Corridor for subsequent monitoring. In other words, a key goal of this project is to establish a collaborative model for research and conservation efforts to be replicated along the length of the Kittatinny Ridge Corridor. Data collected can be used in for public education and to inform future research related to the Kittatinny Ridge.

Kerry’s written report will be provided to Audubon PA and members of the Kittatinny Coalition which will hold the 3rd science summit in summer 2014 during the SOAR period. Kerry will present his work there, at Moravian’s “Scholars Day”, and hopefully at both NCUR and the 12th annual Lehigh Valley Ecology and Evolution Society conference in spring 2015.

In the project, we plan to pilot the use of an iPad for data entry and sound recording at the survey sites. We also hope to experiment with a GPS-enabled “point and shoot” digital camera for habitat documentation. Typically, TDS Trimble Yuma devices and SLR cameras have been used for this type of field work, but they are extremely expensive and heavy to carry around while climbing on rough terrain. If these lower cost, lighter weight, and smaller pieces of technology work, Dr. Husic will adapt some of Kerry’s protocols for her fall 2014 ENVR 112 Environmental Science course in which a large percentage of the class will be first year students who will have iPads.

Permits and Permissions: No permits required. Permission exists for surveying private lands. Most of the work is on public lands and since it requires no collecting, requires no permission or permits. We will inform the appropriate agencies of all information gathered. The National Park Service (AT and Delaware Water Gap NRA) and PA Game Commission own much of the land we will use for our work. One of the proposed monitoring sites includes the J. Deputy property that was recently donated to the college and the newly acquired “Alpine Property” that is managed by the Game Commission, neither of which have been extensively surveyed.

¹⁰ We have applied to Audubon PA for some funding to support this project by way of an intern from ESU and some equipment purchases.

¹¹ Other datasets include the 1st and 2nd PA Breeding Bird Atlas (PBBA) data from 1983-1989 and 2004-2008; the Cornell Laboratory of Ornithology eBird database; phenology data on spring arrival dates for forested bird species from the Eastern PA Phenology Project; and existing records from Bake Oven Knob, the Lehigh Gap Wildlife Refuge (the Ecological Assessment Reports from 2007 and 2007) and the Delaware Water Gap Recreation Area (the National Park Service Eastern Rivers and Mountains Network or ERMN ecological monitoring and the Vital Signs program).

Budget Items:

Student summer stipend: \$300/week for ten weeks:	\$3000
Faculty stipend for mentoring: \$100/week for ten weeks:	\$1000
Supplies:	
- Binoculars	\$1500 – \$2100

These are essential for spotting birds during the surveys. The Department of Biological Sciences has some pairs that we use for our classes, but they are old and of relatively low quality. We need higher-end binoculars for field research.

- iPad or iPad mini	\$330 – \$530
---------------------	---------------

This will be set up with the bird checklists along with avian photo and song id and plant id apps to confirm species identification in the field. It will be also be used for data entry and to test ease of use in field for future work and for students in environmentally-based courses.

- GPS-enabled digital camera	\$500
------------------------------	-------

To digitally document location of surveys and habitat conditions in the study areas. GPS tags in the photos allows for syncing with GIS mapping tools (ArcGIS is already available on campus Computers).

- Bird Song CD	Donated
----------------	---------

For learning bird calls and songs

Mileage for trips to survey locations	\$500 (estimated)
---------------------------------------	-------------------

Student campus housing for Kerry

We are asking for \$500 from SOAR to help cover some of the equipment and/or travel costs.

- We have submitted a proposal to Audubon PA for some funding to support this project as they have the PA DCNR grant for conservation of the Kittatinny Ridge, but have not yet heard back from them.
- Expenses not covered by SOAR or Audubon PA funds will be picked up by the Department of Biological Sciences and the Environmental Science and Studies program. Equipment purchased will be subsequently used for other student research and for class work.

Title: Kittatinny Ridge Ecological Monitoring Project (Year 1)

Faculty Mentor: Dr. Diane Husic
Professor, Department of Biological Sciences

Student Researcher: Kerry Reider
Environmental Science Major
2016

On Campus Housing: Yes

Student Statement for SOAR Project

I am pursuing this SOAR project because I have spent my whole life outdoors and I want to play a role in helping to preserve the environment. I have hiked, hunted, and fished my whole life and never took notice to the many different kinds of birds. Last summer, however, I interned at Jacobsburg State Park and did a lot of work banding songbirds, and educating the public about them. Through doing this experience, I realized how important the birds are to the environment and how much of an indicator they are of the environment's health. This made me appreciate the birds a lot more and now I would like to pursue a career dealing with birds or maybe in the state park system in general. I am also considering maybe joining the game commission and doing animal/bird banding with them. So any experience I can get in the field with birds and wildlife in general will be very beneficial. Thus, this SOAR project is a perfect way for me to learn more about birds and their habitat, and make a contribution towards an important conservation project.

In this project I will be bird watching and listening for their calls and then recording the types of birds I see and hear. This is a whole new way of researching birds than I have done in the past. Last summer when I was interning at Jacobsburg we were catching the birds in mist nets. Then taking them out of the nets and observing them while they were in our hands. Watching and listening for the birds will help me focus on learning their calls so I know how to identify them and learning how to identify certain birds from a distance. I will be working with Terry Master who is an ornithologist from ESU and he will be teaching me how to identify the different birds and help me with learning some of the calls. We may also get an intern from ESU who has been previously trained in bird watching and have them come into the field with me to assist in the bird watching.

I have never done a research project this large and that involves fieldwork, so this will be a great experience and further my options of careers that I may want to pursue. During this project I will learn how to analyze my data and I will be seeing a large range of research methods and reporting styles. I will learn how to come to conclusions based on the data that I have recorded through my research. This will help me in the rest of my college career and beyond if I choose to pursue a career that involves researching.

This project also relates directly to my major. I am currently taking classes that talk about the environment's health and the status of the environment. Through this project I can get some first-hand experience of what the environment's health actually is in this area. I can then use the results that I get and compare them to results of studies done in the past and see if the overall health of the environment has increased or decreased over the years. I will also be able to use this project as my honors thesis if I choose to continue it in the next couple years.

My expected outcome of this project is to record the numbers of as many birds as possible and the condition of the habitat where I found them. By finding out this information and knowing which birds are certain indicator species, I will have an idea of the specific types of habitats and vegetation that are missing in some areas. From documenting habitat quality and comparing it to bird numbers and diversity, we will get information on environmental threats and have baseline data for following studies to see if conservation efforts will make a positive impact or if worsening environmental threats have detrimental effect.