

Inaugural Kittatinny Ridge and Corridor Science Summit

**April 20th, 2012
Lehigh Gap Nature Center**

Organized by:

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Audubon PA

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Introduction

Lehigh Gap Nature Center (LGNC) is a member of the Kittatinny Coalition, a PA Department of Conservation and Natural Resources funded landscape-scale conservation initiative. The coalition, currently led by Audubon Pennsylvania and the Appalachian Trail Conservancy (ATC), is an alliance of organizations, agencies, and academic institutions working together with municipal officials and landowners with a mission to conserve the natural, scenic, cultural, and aesthetic resources of the Kittatinny Ridge and Corridor. During discussions at meetings of the Coalition, it had been noted that, in order to establish sound conservation goals and management plans for this landscape, it is critical to have good scientific data on habitat quality, biodiversity, and the impact of various environmental stressors on the wildlife, natural systems, and ecosystem functions of the Kittatinny. In other words, to do effective conservation work, it is important to know as much as we can about the resources we are trying to conserve.

There are several individuals and groups doing research along the Kittatinny, but there is no central repository for the information that has been collected, no comprehensive bibliography of published work, and the various researchers have not had a venue at which they could meet to discuss their results or shared interests. It is important for researchers to be aware of what types of studies are already being conducted in order to wisely use resources of time and money, to develop collaborations, and to identify data gaps.

To this end, in summer 2011, at a quarterly Coalition meeting, Diane Husic (LGNC Board member and Moravian College Chair of Biological Sciences) proposed that the coalition gather together researchers of all types for a Kittatinny Ridge science summit. Six months later, Dan Kunkle and Dr. Husic decided that the summit was very important, so we sought funding to convene such a gathering on a regional scale, covering the eastern Pennsylvania part of the Kittatinny Ridge from Delaware Water Gap to Fort Indiantown Gap. The Lehigh Valley Greenway CLI provided 50% of the funding, with Audubon PA and LGNC matching the LVG funds.

The purpose of this Eastern PA Kittatinny Science Summit was to bring together all the researchers who are currently or were previously engaged in ecologically oriented research in the Kittatinny Corridor in eastern Pennsylvania. In addition, we believed it was important for those involved with land conservation and policy development to hear the status of research along this landscape. Researchers of all types were invited to participate. This included:

- Professors and students from academic institutions in eastern PA;
- Conservation professionals from government agencies and private conservation organizations;
- Retired and private professionals;
- Citizen scientists from phenology monitors to watershed group members to hawkwatchers; and
- Land use specialists, planners, and land trust personnel.

In all, 65 people registered for the summit and almost 60 attended. (An Excel file of the registrants is attached, Appendix 1).

We anticipate several outcomes from this summit based on our vision and goals:

1. An immediate goal is to promote sharing of data and compilation of that data into proceedings to be shared by all. In addition, we at LGNC are working with ATC and Audubon PA to create a database of research information and a web site to house the database. There are many potential applications of such a resource so the website should be developed with an eye for flexibility and expansion as the Coalition moves forward.
2. A second goal is to analyze the research to identify strengths, weaknesses and gaps in the data. This will allow us to direct others toward productive research opportunities that help us strengthen our ecological knowledge base with respect to the Kittatinny. This would include citizen scientists, undergraduate and graduate students, and professional scientists. Opportunities for internships will be identified, and a monitoring program and proposals for other research projects will be drafted that addresses data gaps and weaknesses.
3. A third goal for the short term is to create a network of researchers who can be more productive working together than working in isolation. Unpredictable synergies always arise when collaboration occurs where none existed before. We predict that some of these synergies will develop but cannot predict what they might be. This collaboration will mobilize resources valuable in conservation of the Kittatinny and position us to be proactive as well as reactive about conservation issues on the Kittatinny.

This project was the beginning of a process that should lead to more targeted research and monitoring and better data to inform our conservation action. Further summits will be needed for other regions of the Kittatinny and follow-up summits/meetings will be planned. Creating and managing the database of research information is a key step in this process and a web site for accessing the data is essential.

April 20th Summit

The Eastern PA Kittatinny Ridge Science Summit was hosted by Lehigh Gap Nature Center and facilitated by Dr. Husic on April 20, 2012. (The agenda for the summit is attached, Appendix 2). In summary, we began with reports from research “nodes” along the ridge including:

- The Appalachian National Scenic Trail (AT) and Delaware Water Gap National Recreation Area (DEWA)
- Cherry Valley National Wildlife Refuge (Cherry Valley NRA)
- Lehigh Gap Nature Center (LGNC)

- Hawk Mountain Sanctuary (HMS)
- Fort Indiantown Gap (FIG)

Following those presentations were breakout sessions for various ecological topics including:

- Terrestrial ecology
- Watershed ecology
- Biodiversity/Inventories/Surveys
- Conservation Planning
- Ecological Restoration
- Climate Adaptation and Resilience

Lunch time was lengthened to include time for networking and viewing of posters brought by participants. Following lunch, three additional reports were heard concerning the Eastern PA Phenology Project and its concentration on the ridge and corridor, conservation mapping on the ridge by the Lehigh Valley Planning Commission, and the work of Audubon PA and ATC on the ridge. Afternoon breakout sessions concentrated on organisms with the following groupings:

- Insects/Invertebrates
- Birds
- Vertebrates other than Birds
- Plants

Since few people were interested in a microbe group, those participants joined with other groups.

The summit ended with a wrap-up session on where do we go from here in terms of future summits, collaboration and grant possibilities, and sharing the information of all researchers with the group. Following are rough notes and summaries of each presentation and breakout session as well as wrap-up session notes.

Notes on the Reports from Ecological Research Nodes

- **Appalachian Trail and Delaware Water Gap NRA (Nat'l Park Service, Marian Orlousky)**
 - Rare plant monitoring and management at Little Gap Swamp and Big Offset Barrens
 - Invasive Species Management ongoing (protocol available)
 - Phenology monitoring occurring through National Phenology Network and AT MEGA Transect
 - Vital Signs monitoring plan in place
 - Acid deposition monitoring (there is a data gap here along the Kittatinny)
 - American Chestnut inventory
 - Water quality inventory
 - Vegetation mapping
 - Mammal inventory
 - NPS maintains data base on line with resources, reports and publications regarding these projects.
(<http://science.nature.nps.gov/im/units/appa/index.cfm>)
- **Cherry Valley NWF (Mike Horne, USFWS and Bud Cook, TNC PA)**
 - 20,000 acres designated for acquisition, 180 acquired thus far
 - Habitat inventory
 - Invasive species inventory
 - Bog Turtles are an important species on this refuge (16 Bog Turtle populations on Refuge with 414 turtles found)
 - Possible habitat for Indiana Bats
 - TNC is doing a statewide forest inventory which has identified large unfragmented tracts along the Kittatinny at Cherry Valley
 - (<http://.....>)
- **Lehigh Gap Nature Center (Dan Kunkle)**
 - Originally Wildlife Information Center founded by Donald Heintzelman in part to support raptor migration monitoring project at Bake Oven Knob which began in 1961 and continues today
 - Long history of involvement with Kittatinny Ridge and Corridor issues dating back to 1990; original member of Kittatinny Coalition (**Appendix 3**)
 - Lehigh Gap Restoration Project at Palmerton Superfund site began in 2002; LGNC portion of suite revegetated by 2006
 - Ecological inventory completed in two parts
(<http://lgnc.org/resources/reports>)
 - Bibliography of Superfund site and research at Lehigh Gap
(<http://lgnc.org/resources/reports>)

- Strong partnerships with academic institutions for research including undergraduate and graduate research projects
 - Succession monitoring, grassland enhancement monitoring, vegetative cover monitoring all ongoing
 - Invasive species management plan in place as part of Superfund process
 - Superfund activity continues along side LGNC management of revegetation area
 - Weather monitoring network set up on refuge by Hargreaves at Lehigh University (<http://lgnc.org/resources/weather>)
 - Bake Oven Knob Area Winter Bird Survey since 1997
 - Potential use of prescribed fire for maintaining grassland and monitoring of effects
 - Potential for introduction of Regal Fritillary butterfly
- **Hawk Mountain Sanctuary (Dave Barber and Laurie Goodrich)**
 - Raptor migration monitoring since 1934 with hourly counts since 1960s, along with songbird, waterfowl, Monarch Butterfly migration monitoring, etc. (<http://www.hawkmountain.org/science/research/research/page.aspx?id=289>)
 - Inventory and management plan in place including a master list of biota at HMS
 - Nesting and wintering birds, Ovenbird monitoring, butterfly census
 - American Kestrel nest box monitoring in corridor
 - Raptor road surveys in corridor
 - Rainfall amount and pH monitored
 - Nature notebook
 - Vulture population and migration studies
 - Stopover Ecology of Raptors study
 - Published reports available at (<http://www.hawkmountain.org/science/scientific-publications/scientific-publications/page.aspx?id=323>)
- **Fort Indiantown Gap (Dave McNaughton and Virginia Tilden)**
 - Fire ecology studies
 - Regal Fritillary program (http://www.dmva.state.pa.us/portal/server.pt/community/featured_topics/13476/regal_fritillary_butterflies_at_fort_indiantown_gap/726675)
 - Following inventories updated since 1993
 - Vegetation
 - Regal Fritillary and other invertebrates
 - Birds
 - Herps
 - Game species
 - Water Quality

Notes from Habitat Focus Breakout Sessions

A. Terrestrial Ecology Group

Louise Bugbee, Bud Cole, Ned Fetcher, Lee Dietterich, Jim Kunkle

Louise Bugbee, PSU Lehigh County Ext. – Just started collecting data on deer tick diseases at LGNC – want to monitor over time to see any increases or decreases in tick populations and disease occurrence, then and educate visitors to diseases and risks.

Jim Kunkle, DEP regional office. Helping to oversee work on Palmerton Superfund site reclamation. 70 acres of deer fencing are in and are being reforested by CBS from Lehigh Gap to Little Gap. Planting “resource islands” of pitch pine and red oak. Also doing aerial spreading of grasses from Ernst Seeds: big bluestem, switchgrass, little bluestem, side oats gamma, Indian grass, Canada wild rye, etc.

Lee Dietrich, University of Pennsylvania -- hoping to do research at LGNC – research on soil and microbes to help with future restoration. Would like to examine cool-season grasses to see how they grow, survive, and stabilize site – and how they interact with mycorrhizal (sp.) fungi as compared to warm-season grasses.

Ned Fetcher, Wilkes University – looking at food web of restored grassland to determine how organisms are using restored grassland and how the food web is connected to surrounding landscape. Have pre-proposal into NSF to look at food web. Comparing LGNC and to restored site in Luzerne County – 80 or so acre warm season grasslands. Seems to be a complete food web based on the warm-season grasses. Also found that there is a lot of carbon coming in from surrounding landscape or is left over from previous detritus. Have an unpublished taxonomic data base of insects collected at LGNC. Using other approaches to determine if insects are eating birches or grasses.

Bud – Bertch-Hokendauqua-Catasauqua Watershed Assoc. Community education on dam removal and watershed improvement. All three are tribs of the Lehigh running off the south side of the Ridge. Want to collect background water quality data from streams and upgrade DEP status.

Gaps?

What impact will recolonization of birches have on overall ecology of site?

How ecology of Kittatinny functions as a system.

Data on decomposition of dead trees on zinc plant-impaired part of ridge.

B. Watershed Ecology

Michael Cox, Frank Kuserk, Art Kney, Laura Reichendorf, Beth Sheckler, Darryl Speicher, Jim Vogt

Research Projects completed/in progress:

Monroe County Conservation District – water quality study back to mid 1980's. Over the past several years, realized the need to focus on what DEP is requiring (protocol). (3 years ago changed protocol to replicate the State's protocol). (Ex: Cherry Creek) Data exists for this study (macroinvertebrates). Continuous monitoring probes on-line available possibly. Broadhead Creek Watershed Association – Monroe and Pike County. Water quality data available on Cherry Creek for last 12 years at least.

Getting students involved in Bushkill Creek Watershed. Ex: students might do a thesis or report, but this wealth of information may not readily be available. So what if a student does a coliform study. What happens with this information after the study is done? How can you prove where it is coming from? This information is not "reported." So how can we track or report this information? Where would this information be posted? It could be valuable information. (A large amount of information to collect: who is conducting study, what tools are being used, where are tests being sent? Are the labs EPA certified?) There are a lot of groups out there. Maybe contact a certain group.

Scientific Collector's Permit from PA Fish & Boat Commission. Where does this information go? Use data for where certain fish species thrive. Is the information made public? Not sure.

Aquashicola Creek - looking for it to become an EV stream. On-going testing. Submitted petition. Looking at invasive plant species. What about plant indexes? Starting this year to see how bad the problem is. A lot of people do not have the money to get the information on a website for the public to view. We want to think about a model that this group could think about, to get this information out there. You need funds to hire people to put information on-line. Organization is lacking.

Problem: protocols are changing all the time! Each state is so different, that it is hard to compare studies. But it is the raw data that counts. A lot of good information is out there.

GIS is a great tool! But not many people know how to use it. And it is very expensive. We all have data! We just don't know what to do with it! How can someone learn how to use GIS? Courses are available. What about a community college?

A key person is needed in the area! It will take years to get this "central" person/location.

It would be good to see the changes of species over time. A lot of good ideas out there. We just don't know how to start putting all the information together. This organization must come from a group that has FUNDING. DEP may not be a good idea, as they are understaffed, and budget is a concern. Where will information be stored???? What about PEC (Pennsylvania Environmental Council)? Their main focus is at municipal level.

What about Delaware River Basin Commission? Think from a watershed perspective. Or do we break it up, and look at a smaller scale. Set up a model that works! Look at an individual entity or coalition possibly? Lehigh Gap Nature Center has collected studies, and is a good start.

C. Biodiversity Breakout

Laurie Goodrich, Dan Mummert, Dave Barber, Peter Saenger, Anita Collins, Michele Miller, Marian Orlousky, Rocky Gleason, Dave McNaughton, Dan Kunkle, Teresa Mackey

Projects completed/in progress:

- Anita Collins-USGS Native bee survey. Both scientist and citizen scientist involved. Found many endangered plant species have specific pollinators, so interconnected relationships. Something lacking is people who can do identifications. Developing easier to use online system so more folks can do IDs using the system. PA has about 400 native bee species. Have IDed 89 species at LGNC and one invasive bee species. Need more data to understand whether there are rare bees in PA. Only 300 or so of the 400 estimated bee species are known, described species. Don't need more sites to sample. Using soap bowl traps to collect samples and they work well. Need more data and more people to ID to support research. Can say this more generally for many genera of invertebrates. Outside a few pest species and bio-control species, data and good ID keys is lacking. Not realistic to tackle all inverts, can we target some for K-Ridge. Have to have the people can ID to decide what to focus on. Another need is research/data on ants and ? (ask Dave McNaughton for "?"). Funding is also always a challenge. Steve Johnson for moths. Sam Smith also for moths.
- Hawk Mtn (Laurie and Dave)—monitoring birds migrating and breeding, wintering. Gaps—inventory data from 12 years ago, need to update or re-do. Have good info on plants and birds, small mammals and butterflies. Some good info on salamanders and amphibians. Knowledge of surrounding land and how it relates to ecology/species at HMS. Data gap for bats and invertebrates. Data gap for bird kills due to tall structures. Data gap for night migrants—song birds and owls.
- Dan Mummert—Not directly involved with research on the Kittatinny Ridge, but is in contact with folks doing research with Allegheny woodrats. Frequency of data on wood rats is a problem and a gap. Need more bat surveys along the ridge due to Marcellus shale and wind proposals. PGC needs to do more inventories on their lands on all taxa. Updating all their SGLs mgmt. plans.
- Peter Saenger—No active research on the Ridge.
- Anita-Use existing data but some generated by them. Missing data on animals for the two counties. Laurie says some bird data may be available for the counties.

- ATC—Data gaps for nonnative invasive plants and methods for site restoration associated with invasive control. Rare animal inventory is dated. Also, early detection of invasives. Chuck Bergeron of Bugwood.com.
- Rocky (PNHP)—Data gap—getting info that people know that they don't know.

Data gaps:

- Laurie—As a group, it seems like the biggest gap is sharing knowledge.
- Dan—There is a lot of emphasis on the rare stuff. Need to concentrate on the common stuff. Also, does anyone do transects as a cross-section of the ridge rather than along the ridge? Laurie says they do. Important due to climate change to do the cross section.

D. Conservation Planning

Jackie Speicher, Rob Neitz, Bruce Rabenold, Mike Kaiser, Don Heinzelman, Kent Baird, Mike Horne, Elsa Kerschner, Kim McKee, Adam Keller, Phil Wallis, Karl Oplinger, Frank O'Donnell, Marion O'Donell, Jeanne Ortiz

Don: Inventory of old growth tree stands. There are some along the Ridge – on private property. 250 years old, hemlock. Some a few acres. No one has tried to inventory and set up a database. Update the literature database regarding biological taxa. Have some databases but need to be updated. Continue landscape re-photography. Maintain archives of notebooks, data sheets. In library there are archives with Bake Oven Knob info. How extensive has been white-nosed syndrome affected bats. Open long-term inventories of flora and fauna 50 + years and far into the future. We have short-term.

Karl: Some of it is only private, like some volumes at Muhlenberg. Some of them stolen. Dr Mezerle and Dr. Holland(?)

Kaiser: Planners can look at landscape in more general fashion. In shorter amount of time. Look at maps in report. Descriptions of geography, water quality, woodlands. Aerial photo. Good starting point for more detailed research. Also, contract with WPC for Nat Resources Inventory. Get down to more finite detail. Very hard, labor intensive work. Some landowners ok with it and some not. Get good background info from LVPC and can help guide places like Plainfield who want to pursue preservation activities.

Worried about game lands and lands adjacent to them. Municipalities can help protect the natural resources. Contact local elected officials.

Don: Herparia? Dr. Robert Shaffer has a huge herperia and at Academy of Natural Sciences. Botanical data. 50 years of corridor investigations. Gold mine of studies. First specimens at ANS back up at Muhlenberg. Didn't make it understandable for lay people. Was his life.

Don: Younger people reinvent the wheel. Don't do detailed literature searches. A lot of resources. People not keeping lands forever. PA Dutch kept the land in conservation easements.

Kaiser: Public surveys. People concerned about loss of land to development. Concerned about conservation activities. Interested in trails and riparian buffers along streams. Getting attention. Don't have to drive too far to appreciate the environment. People love that. Don't lose track of that. Support for conservation activities. We need to capture that and educate. Get people together that have common interests.

Kent: Politics – county has tried to turn back and silliness of sensitive lands. Has been missing clearinghouse of the science. Kent is searching for – with almost too many places to go to find it. Have turned officials back to open space. People holding data in their own systems. ATC is developing on-line clearinghouse. What is the best breakdown for the data?

Don: LGNC has 6000 volumes. One of the finest wildlife libraries. Dr. Shaffer at Penn – had to print doctoral dissertations. In library.

Bruce: Impressed how fast people at AT meeting started talking about protecting the Kittatinny Ridge. Need a firecracker to get them to spend money on it.

Rob N: Concerned citizens. We represent orgs that know issues and steps needed. We miss concerned people and how to help them take steps. Rob has PA Land Choice on civics on working in your township and community to do zoning, comp plans. Has done workshops for teachers and local communities/municipalities. No idea about tools and resources available to them. Bigger projects need groundswell of support.

Phil: Fed, state, local law can we deploy and what species related to that. Pick bald or golden eagles, bog turtles. Organizing principle: what species are related to law. Citizen engagement needs. Some species more attractive than others. Gets people involved. Use science to get people to get ot Land Choices. Patterns: we look for patterns. Need indicator species from science. Patterns, people, politicians, those with money - pay attention to. What patterns are there? Water is huge. Love the word “clean”. How can citizens help get the data?

Ian McCarg: Design with nature. The PATTERNS.

Key Talking Points

Data needs, old growth forests, update literature, white nose syndrome, long-term research

Clearinghouse: Private collections of data

Have generalized data (LVPC) which sets up more detailed studies

People love natural resources. Help them take the next steps. Big projects need support.

Package science for citizens and municipal officials. Educate. Ex: PA Land Choices.

Use data to show politicians support for natural resources.

Students/researchers need to see what's available before stating new research.

Need for indicator species. Use laws where they exist to protect species.

E. Ecological Restoration

Sherry Acevedo, Charlie Root, Julie Eckenrode, Judy Henckel, Tim Latz, Jim Thorne, Virginia Tilden

?No notes?

F. Climate Adaptation and Resilience

Bud Cook, Greg Czarnecki, Tamara Gagnolet, Diane Husic, Bruce Hargreaves, Andrea Harmer, Karen Lutz, Andy Pitz,

?No notes?

Reports from Conservation Planning Nodes

Audubon PA and Appalachian Trail Conservancy, Kittatinny Coalition, Phil Wallis and Kim McKee. See <http://kittatinnyridge.org/index.html>

Lehigh Valley Planning Commission (conservation mapping), Mike Kaiser. See <http://www.lvpc.org/UntitledFrameset-7.html>

Eastern PA Phenology Project, Diane Husic. See <http://lgnc.org/research/phenology>

Taxonomic Focus Breakout Sessions

A. Insects/Invertebrates/Microbes

Laura Richenderfer, Ned Fetcher, Anita Collins, Art Kney, Louise Bugbee, Bud Cole, Frank Kuserk, Teresa Mackey, Beth Sheckler, Virginia Tilden, Tamara Gagnolet

Research projects completed/in progress:

Restored grasslands, looking at food web based on introduced warm season grasses. Have been collecting insects on a 40 x 40 plot since 2008. Finding that consumers and predators are using warm season grasses (the carbon in the grasses). Considered “functioning” ecosystem. Approximately 3 years of data. (located on Wildlife Refuge). Current manuscript hoping to send off within 1 week.

Study site: Nature Center. Started trapping in 2007, particularly niches around the Osprey House here. Identified 87 (out of the current samples). Wide variety of species that have lived here, or moved back in. Found one invasive species. Part of a National survey.

Tick project/surveillance to test for lime. Working with director of infectious disease. Looking for infection rates. Kittatinny Ridge is a site to do this. First year that this is being done at this site. A good site since a lot of people walk/ride on the trails.

Native Bee project – on-line identification system that is user-friendly. But not devoting much more than that. Possibly two people working on this for the whole east coast.

Students have done a bunch of studies on macroinvertebrates at the 3 ponds located here at Kittatinny Ridge.

Working on stream studies to try and get the stream to be classified as EV. Continuous monitoring.

What research is needed for conservation of insects and invertebrates? Research on the insects and invertebrates themselves! We need to know more about food chains. We want to get the public involved! What about a Bio-Blitz? It is a 24 hour study where you collect as

much information as you can in 24 hours in your study area (insects, macroinvertebrates, plants, mammals, etc.) Concentrate on species-specific instead though! Get students involved!

How does the work of group members meet these needs? Pond and Study guides, a key to figuring out the macroinvertebrates. But this is different than invertebrates. Our group feels like we know a lot about macroinvertebrates, but not invertebrates. Insect indicators! (lets you know about water quality of the stream, pond, etc.) Is there something like this for invertebrates (terrestrial)? DNA bar-coding = collecting DNA tissue from an organism, and it will provide possible options of what that organism is. Could this be done with an insect? Contact Natural Heritage Program (who collect inventory of where rare species are found). But they may not be able to give out exact locations.

What are the key threats to insects and invertebrates along the Kittatinny Ridge? Very windy along the Kittatinny Ridge. Will that have an affect? Since located on the side of a mountain, not an ideal location for warm season grasses.

What are the gaps in research that are needed? There is a big gap in the research itself! Largely uncollected and unknown! Most not identified. We do not know a lot about insects! Is there some sort of “key” that will let us know if the area is sensitive, tolerant, etc.? There is no governing body over terrestrial insects right now in Pennsylvania! That is a problem. Even if it may be “endangered”, no one has jurisdiction over it!

Identify key indicator insects and invertebrates for monitoring: Macroinvertebrates! Key indicators of water quality.

B. Birds

Rob Neitz, Judy Henckel, David Barber, Adam Keller, Peter Saenger, Andy Pitz, Don Heintzelman, Laurie Goodrich, Terry Master, Dan Mummert, Darryl Speicher, Paul Zeph, Dan Kunkle

More research needed on what migrating hawks need during migration – feeding, roosting, resting. Ex: Lack of stopover habitat along coast could be connected to decline in kestrels.

Research needed to document nest locations of all raptors.

Why whip-poor-will decline?

Is there a conflict between kestrels and screech owls? How effective are kestrel nest boxes?

Question on location of black vulture nests along the ridge – BBA should have that answer.

Study needed of hemlock groves and nesting passerines as an association.

National Park Service monitors 24 streams within DWG for breeding birds – started 6 years ago

Research on wind turbine impacts on migrants. Do we have good research data on bats using the ridge? Particularly the western third?

Need one good study showing impact of towers on songbirds.

Bird nesting surveys are needed that transect the entire width of the ridge – bottom to top and down the other side.

Quarterly roadside raptor surveys needed – would make a good citizen science project. Identify routes and collect data every year into the future.

Relationship between habitat changes higher on the ridge and impacts on water flow lower on the ridge – connect to well and municipal water sources.

Kent can use a biodiversity index of riparian corridors. Which riparian areas are the most biodiversity rich? This would be valuable for landowner work.

Contact Ephraim Zimmerman (WPC) for studies discussed during Goddard Forum regarding 1) Louisiana Waterthrush and 2) Marcellus Shale drilling wellpads – they may have implications for development activities on the Kittatinny.

C. Vertebrates other than birds discussion group notes

Greg Czarnecki, Kim McKee, Carl Oplinger, Jackie Speicher

Generate other research opportunities

Focus on “non-traditional” vertebrates

Public education component and promotion of importance of other taxa and their place in unique habitats

Develop grant priorities that focus on other species or topics that focuses on these groups, e.g. fragmentation, alternate energies, climate change

Cross taxonomic networking opportunities and inter-related studies

Connection with younger “conservationists” and exposure to the biological world

Recruiting teachers, developing curricula, develop economic connections with local communities and neighbors through various means

Conservation/Land Use planning

Linkages to citizen science/community science

Develop engagement nodes along the ridge

Key threats: habitat restoration and preservation, lack of interest in biological world

“Nature deficit disorder”

Connect research topics to what would be of interest to the general public through publications, web sites, teachers, etc.

Current economic situation and philosophical adversity to biological research leading to declines in funding opportunities.

Grant matching difficulties

Gaps in research:

Kittatinny primarily viewed as a bird corridor

Movement of animals along corridor, across breaks in corridors such as roads, etc.

Tunnels for crossings, etc.

Indicator or keystone species

Impact of deer and other destructive species

Interactions of environmental stressors to impact resources

D. Plants

Dave McNaughton, Charlie Root, Marian Orlousky, Tim Latz, Rocky Gleason, Jim Vogt, Mike Kaiser, Bruce Hargreaves, Jim Kunkle, Michele Miller, Diane Husic, Jim Thorne, Lee Dietterich, Sherry Acevedo

Interactions between plants and soil microbes

Question 1:

- Education – varying gap of understanding
- Diversity of habitat
- Rare species are having disturbance dependency – it is important to understand how it works & effects populations
- What effect is climate change – a lot of changes are happening; when do you plant
- Plants used for alternative fuels? Invasive species is threat for this use; identify a productive alternate fuel source
- Old growth trees coming down, area exposed to invasives
- Impact of ticks – field tree rows
- Plants affecting other things
- Biodiversity – more data and research on practical restoration methods from a disturbed setting; in a cost effective way
- Wind turbines
- missing a lot of species we need that we are losing to maintain the habitat; work with groups who are restoring;
- concern with native thistles, violets
- Williams Transco gas line and vegetation management – problem of clear cutting; need for proper vegetation
- Powerline vegetation management – problem of clear cutting; need for proper vegetation
- Coordinate with right-of-way maintainers of disturbance and restoration efforts; be careful of broadcast spraying
- Impact from utility companies on conservation easement; what are the alternatives and useful habitat
- Consider development of a plan to approach the economic savings for PPL/utility company to target only a few areas for spraying
- Climate change and impact on forest environment; loss and change in habitat
- Challenge on what plants, shrubs, and trees do you revegetate with?
- Forest environment may be going through a drastic change, that we are unsure of what would happen
- Invasive plant inventory, mapping, and database collection

Question 2: gaps in research

- Missing community data; origin of existing landscape
- Emerald ash borer threat and impact to the ridge; it is in Bucks County now; challenge is EAB may travel with someone from another invested area; it will survive 2” and below stem

- Population monitoring over time; locations are identified; year to year evaluation of ongoing monitoring; how is habitat changing
- On the ground identification – what are the key monitoring sites to ground truth; what are the key places? Id good monitoring sites
- Need consistent methods for monitoring
- Forest health – forest structure diversity – aerial flyover
- Come up with consistent protocols for citizen science; schools, groups, professional botanists, universities, interested citizens
- Long-term management & retention for trained volunteers
- Education and outreach - use of photographs for identification for invasives and native plants
- Internships, schools, universities
- Host workshops for volunteers, club members
- Education process with municipal officials & public works/parks crew – on correct identification of native plants & invasive plants; distinction between common id such as sumac vs. ailanthus
- National Science Foundation – possible partnership

Notes from Wrap-up Discussion and Future Opportunities

- Suggestion: Make this a template for other sessions like it along the ridge.
 - Not just PA but 3 states, eventually.
 - D. Heintzelman noted that Mohonk Preserve in NY has done something similar with science in their region.
- Subgroups could stay connected with meetings of the coalition centered on a particular topic throughout the year.
- Landscape Rephotography could be a valuable tool – LGNC has photos from 1990s
- Vernal Pools is another possible focus missed today
- Data entry and accessibility are a big issue
 - One-size fits all approach does not work; need an approach designed to specific need
 - Data base should be searchable
 - Data entry by citizen scientists should be allowed an easy
 - We should collect examples of web data sets that work as samples for us (e.g. eBird)
 - Mapping could be used to create grid of the ridge to click for studies in that area; search should also be available by taxa or ecological topic
- Bibliography of Kittatinny Research would be valuable