PENNSYLVANIA CHAPTER OF THE WILDLIFE SOCIETY

AND

THE SOCIETY OF AMERICAN FORESTERS

2016 Annual Conference & Workshop

Penn's Woods: The Science Behind Pennsylvania's Wildlife Habitat

April 15 – 16, 2016
Ramada Inn, State College

Raffle and Auction Donations

The following individuals, businesses, and organizations donated items for the fundraising raffle this year. Information on donors is located at each raffle bucket. Please consider patronizing these businesses and thank those individuals and organizations for their commitment to improving the profession of wildlife management in Pennsylvania. Thanks again to all the donors.

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Sponsorship

Pennsylvania Trappers Association (Gold level)

Blue Mountain Chapter of Safari Club International (Gold level)

Conference At-a-Glance**

Friday, 15 April 2016

8:00 a.m. – 4 p.m.	**Workshop Fieldtrips,** Boxed Lunch provided with paid workshop registration, all trips are limited to 30 people. **Habitat Management for Wildlife** – hosted by Clay Lutz (PGC) focusing on various projects performed on Penn State University's Stone Valley Experimental Forest. **Natural Gas Mitigation** – hosted by Doug D'Amore (PA DCNR) focusing on reclamation using the Appalachian Region Reforestation Initiative (ARRI) method and managing for wildlife. **Use of Prescribed Fire on State Gamelands** – hosted by Mike Pruss (PGC) on state gamelands 176 near State College.
5 – 10 p.m.	**Student - Professional Mixer, Chairman's Room**

Saturday, 16 April 2016

Breakfast	Coffee, pastries and fruit
8:30 – 11:50 a.m.**	**Plenary Session, Ballroom A:** *New Ways of Looking at the Land: Novel Approaches of Integrating Wildlife and Habitat* PLENARY SPEAKERS: Cathy Haffner, Pennsylvania Game Commission Ellen Shultzabarger, PA Dept. of Conservation and Natural Resources Lisa Williams, Pennsylvania Game Commission Mike Eckley, The Nature Conservancy
12 – 1 p.m.	**Lunch**, **Ballroom B** (May be purchased until April 1st)
12 – 1 p.m.	**Wildlife Leadership Academy Poster Session, Conference Center Lobby**

1 – 4:20 p.m.** **Concurrent Paper Sessions: Ballroom A, Forum Room, Directors Room**
Session 1: Graduate Student Presentations
Session 2: Graduate, Undergraduate, and Professional
Session 3: Professional Presentations

4:30 – 5:30 p.m. **Member & Business Meeting of State Wildlife Chapter, Forum Room**
(Board Members required, all others welcome)

5 – 6:30 p.m. **Poster Session, Conference Center Lobby**
Presenters should be present and prepared to answer questions.

6:30 – 10:00 p.m. **Grand Banquet, Ballroom:**

"Sustainability through Fusion: Wildlife Conservation in the 21st Century"
Cal DuBrock, Goddard Chair in Forestry and Environmental Resource Conservation, Penn State's College of Agricultural Sciences

(Banquet dinner purchased with registration until April 1st)

**Schedule subject to change.

**********Continuing Education Credits Available through TWS**********
The Wildlife Society will allow a maximum of 12.5 contact hours (3 hours for day 1 and 9.5 hours for day 2) in Category I of the Certified Wildlife Biologist Renewal/Professional Development Certificate Program for participation in the 2016 TWS/SAF spring conference and workshop.

Wildlife Workshop

Friday, April 15, 8:00am – 4:00pm

Field Trip 1: Habitat Management for Wildlife

Host: Clay Lutz, Regional Wildlife Diversity Biologist, PGC

Time	Activity
8:30am	Departure to Penn State University's Stove Valley Forest. Transportation provided.
8:30am – 9:00am	**TRAVEL TO STONE VALLEY FOREST**
9:00am – 10:00am	A walk around the Woodcock Trail
10:45am – 11:45am	Developing a Prescription for Success
12:00pm – 12:45pm	**LUNCH at Perez Lake (provided)**
1:00pm – 1:45pm	Review of Management Tools
2:00pm – 2:45pm	Tour Mothersbaugh Swamp site to evaluate recent treatments
2:45pm – 3:00pm	Tour Discussion and Wrap-up
3:30pm – 4:00pm	**RETURN TRAVEL TO RAMADA**

Wildlife Workshop

Friday, April 15, 8:00am – 4:00pm

Field Trip 2: Natural Gas Mitigation

Host: Doug D'Amore, District Forester, PA DCNR

Time	Activity
8:30am	Departure to Sproul State Forest. Transportation provided.
8:30am – 9:45am	**TRAVEL TO SPROUL STATE FOREST**
9:45am – 10:30am	Tour Exco Pad 10
10:55am – 11:45am	Tour Andarko Pads 344 B and 342 D
12:00 – 12:45pm	**LUNCH at Two Rock Run Vista (provided)**
1:15pm	Logway Run Strip Mine/Superior Pipeline
2:00pm	Dominion Cove Point Revegetation
2:30pm	Orviston Dump Strip Mine and Anadarko Litke Pad A
3:00pm – 4:15pm	**RETURN TRAVEL TO RAMADA**

Field Trip 3: Use of Prescribed Fire on State Gamelands

Host: Mike Pruss, Private Lands Section Chief, PGC

Time	Activity
8:30am – 9:00am	Introduction, Chairman's Room
9:00am – 9:30am	**TRAVEL TO SCOTIA, SGL 176**
9:30am – 11:30am	Visit Field Site 1
11:30am – 12:00pm	**LUNCH at SGL 176 (provided)**
12:15pm – 1:45pm	Visit Field Site 2
2:00pm – 3:30pm	Visit Field Site 3
3:30pm – 4:00pm	**RETURN TRAVEL TO RAMADA**

Plenary Schedule

Saturday, April 16, 8:30am – 11:50am
Ballroom A

New Ways of Looking at the Land: Novel Approaches of Integrating Wildlife and Habitat

Moderator: Emily Thomas

Time	Title/Topic	Presenter	Affiliation
8:30am – 8:40am	Opening remarks	Emily Thomas	PA TWS
8:40am – 9:15am	Pennsylvania's Wildlife Action Plan: Habitat considerations for species of greatest conservation need	Cathy Haffner	PGC
9:15am – 9:50am	Ecosystem management on state forest lands: Managing for sustainability and biodiversity	Ellen Shulzabarger	PA DCNR
9:50am – 10:05am	**BREAK**		
10:05am – 10:40am	Baby trees need hugs too: The art and science of managing young forests for wildlife	Lisa Williams	PGC
10:40am – 11:15am	Embracing tradition and preserving legacy: An integrated approach to conserving hunting, fishing, and social club lands	Mike Eckley	TNC in PA
11:15am – 11:50am	Moderated discussion		

Session Synopsis*

*Paper titles have been converted to short-hand only to accommodate the side-by-side comparison chart.

Time	**Session 1**: Forum Room Moderator: Margaret Brittingham	**Session 2**: Director's Room Moderator: Rob Blye	**Session 3**: Ballroom A Moderator: Emily Boyd
1:00–1:20	Williamson – Modeling habitat for pheasant restoration	Fogelman - Effects of Japanese knotweed detritus	Hoyt - Captive propagation of Allegheny woodrat
1:20–1:40	Keller – FLIR technology locating American woodcock	Kessler - Research based education in interactive learning environment	Williams - Susceptibility of ruffed grouse to West Nile
1:40–2:00	Johnson - American woodcock habitat use	Sprauer - Adaptations of bobcats to diverse ecosystems	Vreeland - Timing of spring wild turkey hunting to nest incubation
2:00–2:20	Fiss – Habitat of golden-winged warbler fledglings	Smith - Analysis and ID of *Pantherophis* clade	Regester - Ecology of the eastern hellbender in western Pennsylvania
2:20–2:40	Barenblitt – Forest stand complexity on songbird diversity	Gingery – White-tailed deer fawn behavior and survival	Picone - Benefits from cooperation with the Pennsylvania herp atlas
2:40–3:00	**Break**	**Break**	**Break**
3:00–3:20	Rodríguez – Vegetation structure for migratory birds in Honduras	Begley-Miller - Forest habitat in the context of deer	Stauffer - Forest songbirds in forest plant communities
3:20–3:40	Toenis – Effects of hemlock decline on bird community	Shirk – Grasslands at Fort Indiantown Gap	Goguen – Predation events using video at veery nests
3:40–4:00	Langlois – Forest fragmentation with shale gas	Gardner - Abundance trends for regal fritillary	Bearer - Managing for adaptation: Strategies for resilience and diversity?
4:00–4:20	Serno – Effects of roads on bird community composition		McWilliams – Acres of young forest habitat needed in Pennsylvania

Concurrent Session 1

Saturday, April 16, 1:00 – 4:20pm
Forum Room

Moderator: Margaret Brittingham

Time	Title	Presenter	Affiliation
1:00pm– 1:20pm	Modeling potential habitat for pheasant population restoration in Pennsylvania	Lacey Williamson†	Penn State University
1:20pm – 1:40pm	Use of FLIR technology in locating and monitoring American woodcock nests	Thomas Keller†	PA Game Commission
1:40pm – 2:00pm	American woodcock use of early successional communities	Kirsten Johnson†	Indiana University of Pennsylvania
2:00pm – 2:20pm	Habitat selection of golden-winged warbler fledglings in managed forests	Cameron Fiss†	Indiana University of Pennsylvania
2:20pm – 2:40pm	Forest stand complexity on songbird diversity within large tracts of forest	Abigail Barenblitt†	Penn State University
2:40pm – 3:00pm	**BREAK**		
3:00pm – 3:20pm	Relationship between forest structure and the neotropical migratory bird communities	Fabiola Rodríguez †	Indiana University of Pennsylvania
3:20pm – 3:40pm	Effects of hemlock decline on bird community composition at Delaware Water Gap National Recreation Area	Matthew Toenies†	Penn State University
3:40pm – 4:00pm	Forest fragmentation associated with shale gas development in northcentral Pennsylvania: 2007-2014	Lillie Langlois†	Penn State University
4:00pm – 4:20pm	The effects of roads on bird community composition in Pennsylvania's core forested landscape	Kimberly Serno†	Penn State University

† Indicates student presentation

Concurrent Session 2

Saturday, April 16, 1:00 – 4:20pm
Director's Room

Moderator: Rob Blye

Time	Title	Presenter	Affiliation
1:00pm–1:20pm	Effects of Japanese Knotweed detritus on benthic macroinvertebrate communities of the Susquehanna River	Kaelyn Fogelman†	Susquehanna University
1:20pm – 1:40pm	A study of research based education in creating an interactive learning environment	Anthony Kessler†	Millersville University
1:40pm – 2:00pm	Exploring the adaptations of bobcats to diverse ecosystems by identifying genomic regions under selection	Sarah Sprauer†	Duquesne University
2:00pm – 2:20pm	Analysis and identification of *Pantherophis* clade in Huntingdon County Pennsylvania	Katelin Smith†	Juniata College
2:20pm – 2:40pm	White-tailed deer fawn behavior and survival in Pennsylvania	Tess Gingery†	Penn State University
2:40pm – 3:00pm	**BREAK**		
3:00pm – 3:20pm	Forest habitat in the context of deer, soil chemistry, and competing vegetation	Danielle Begley-Miller†	Penn State University
3:20pm – 3:40pm	Maintaining grasslands at Fort Indiantown Gap provides benefits to wildlife, partners, and the military mission.	Toren Shirk	Temple University
3:40pm – 4:00pm	Trends in abundance over time for the last remaining eastern population of the regal fritillary	Ian Gardner	Temple University

† Indicates student presentation

Concurrent Session 3

Saturday, April 16, 1:00 – 4:20pm
Ballroom A

Moderator: Emily Boyd

Time	Title	Presenter	Affiliation
1:00pm– 1:20pm	Captive propagation efforts with the Allegheny woodrat (*Neotoma magister*)	Reginald Hoyt	Delaware Valley University
1:20pm – 1:40pm	Susceptibility of ruffed grouse (*Bonasa umbellus*) to West Nile virus	Lisa Williams	PA Game Commission
1:40pm – 2:00pm	Timing of spring wild turkey hunting in relation to nest incubation	Wendy Vreeland	Penn State University
2:00pm – 2:20pm	Ecology of the Eastern hellbender (*Cryptobranchus a. alleganiensis*) in western Pennsylvania	Kurt Regester	Clarion University
2:20pm – 2:40pm	Benefits from cooperation with the Pennsylvania herp atlas (PARS) at Fort Indiantown Gap	Rebecca Picone	Temple University
2:40pm – 3:00pm	**BREAK**		
3:00pm – 3:20pm	Forest songbird communities in forest plant communities	Glenn Stauffer	Penn State University
3:20pm – 3:40pm	Documentation of predation events using video cameras at veery nests in northeastern Pennsylvania.	Christopher Goguen	Penn State University - Hazelton
3:40pm – 4:00pm	Managing for adaptation: What strategies should we use to enhance resilience and diversity?	Scott Bearer	The Nature Conservancy
4:00pm – 4:20pm	How many acres of young forest habitat are needed in Pennsylvania?	William McWilliams	US Forest Service

Poster Session

Saturday, April 16, 5:00 – 6:30pm
Conference Center Lobby

Title	Presenter	Affiliation
Assessment of road culverts as passage barriers to wild and stocked trout in Pennsylvania headwaters	Karli Rogers †	Indiana University of Pennsylvania
PA mammal hair sampling and analysis	Alicia Shenko	Delaware Valley University
Pennsylvania Game Commission's bat acoustic transect surveys	Tammy Colt	PA Game Commission
Fire frequency and the impacts on habitat at Fort Indiantown Gap	Jarrod Derr	Temple University
Impact of invasive berry producing plants on feeding guild structure at wetlands in central PA	Zachary Adams†	Juniata College
Does Canis latrans' winter diet show similarities to that of Canis lupus?	Madeline Metzger †	Susquehanna University
Is the red-spotted newt (*Notophthalmus v. viridescens*) a local reservoir of amphibian pathogens?	Sean Quinn †	Clarion University
Under the glow: Increasing funnel trap capture rates for adult vernal pool amphibians	Michael Antonishak †	Penn State University
Is food diversity and availability a good predictor of barn owl (*Tyto alba*) nest distances in central PA?	Samantha Loh †	Susquehanna University

† Indicates student poster

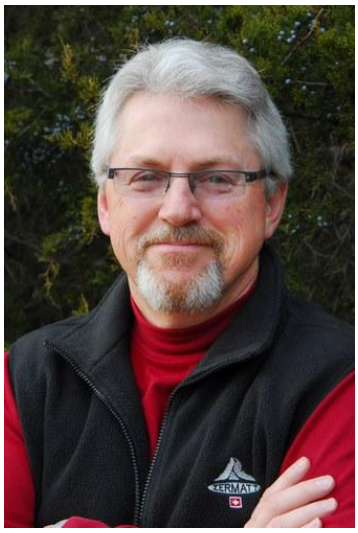
Banquet Presentation

Saturday, April 16, 6:30pm
Ballroom

Sustainability through Fusion: Wildlife Conservation in the 21st Century

Calvin W. DuBrock

The world is a troubling, ever-changing place and our policies and administrative systems and processes must adjust if we expect to sustainably provide natural resources for the common good and have our institutions and professions be seen by the public as relevant. Traditional conservation approaches and partnerships will need to be adapted and new trust relationships forged to protect and conserve public resources in the 21st Century. I will discuss customary approaches, trends, and challenges and outline some necessary steps to be successful as we speed forward toward 2100.



Cal is the Goddard Chair in Forestry and Environmental Resource Conservation at Penn State since his appointment in September 2015. He has worked as a statistician, wildlife biologist, manager and administrator with the US Fish and Wildlife Service, US Department of Energy and the Pennsylvania Game Commission, as well as a contractor for the Wildlife Management Institute. He worked for the Game Commission for 32 years and from 1991-2014 was the Wildlife Management Director responsible for all wildlife research and management programs including all game, nongame, and endangered and threatened wildlife species. Cal is a certified wildlife biologist with degrees in wildlife biology and wildlife management from Michigan State University and Virginia Tech. He is also a US Army veteran and currently lives in State College with his wife, Cindy.

Plenary Speakers

Pennsylvania's Wildlife Action Plan: Habitat considerations for Species of Greatest Conservation Need

State Wildlife Action Plans are non-regulatory blueprints for conservation actions needed to support Species of Greatest Conservation Need (SGCN) and their habitats. Originally published in 2005, Pennsylvania's Wildlife Action Plan (Plan) recently underwent a congressionally-required 10-year comprehensive review and revision, led by the Game Commission and Fish & Boat Commission in collaboration with conservation partners and the public. We developed a decision model to identify 664 bird, mammal, reptile, amphibian, fish, and invertebrate SGCN on which to focus efforts over the next 10 years. We then spatially-linked SGCN observations with a regionally standardized habitat classification system to derive primary and secondary habitat associations. Upland forests, streams/rivers, and wetlands accounted for 30%, 23%, and 12% of primary habitat for SGCN respectively. This presentation will provide an overview of the Wildlife Action Plan, with a special focus on habitat associations, habitat condition, and needed conservation actions to achieve healthy, sustainable native wildlife populations, natural communities and habitats in Pennsylvania.

Cathy Haffner is a Wildlife Biologist and Conservation Planning Coordinator in the Wildlife Diversity Division of the Pennsylvania Game Commission's Bureau of Wildlife Management. In this capacity, she serves as the agency lead on implementation and revision of the Wildlife Action Plan, contributes to landscape-scale conservation initiatives, and fosters collaborations with diverse partners to improve outcomes for wildlife. Cathy obtained a M.S. in Conservation Biology at the University of Minnesota and B.S. in Resource Ecology & Management at the University of Michigan. Since the late 1990s, she has worked toward the conservation and recovery of small populations, particularly birds. As an avid hiker, kayaker, and cross-country skier, Cathy enjoys her free time exploring Penn's Woods and paddling remote waters with her family.

Ecosystem Management on State Forest Lands: Managing for Sustainability and Biodiversity

The talk will be a quick overview of the Bureau of Forestry—and how the Bureau is set up to maintain a sustainable forest while also providing wildlife habitat. Overall focus will be the bureau and forest management with examples of our wildlife-focused projects.

Ellen Shultzabarger has been with PA DCNR working on forest and species conservation for 12 years. She is Chief of the Conservation Science and Ecological Resources division within the PA Bureau of Forestry. The division is the ecological arm of the bureau, focusing on wildlife, native and non-native plants, the management of the PA Natural Heritage Program and Wild Resource Conservation Program. Prior to working for DCNR's Bureau of Forestry, she worked for MassWildlife in their Natural Heritage & Endangered Species Program and the National Wildlife Federation. Ellen attended The Ohio State University and Tufts University.

Baby Trees Need Hugs Too: The Art and Science of Managing Young Forests for Wildlife

The lack of early successional habitat has profound impacts on wildlife in Pennsylvania. Awareness of this conservation issue has taken off in recent years, spawning State, Regional and Federal initiatives to restore this missing habitat component. But creating a young forest is about more than cutting trees. Creating high-quality habitat for one species, the ruffed grouse, is difficult. Creating high-quality habitat for multiple species is much harder. There has never been a better time for foresters and wildlife biologists to work together to wed the Art and Science of young forest management.

Lisa Williams received her B.S. in Ecology/Environmental Studies at Juniata College in Huntingdon PA and her M.S. in Wildlife and Fisheries Sciences at Penn State University. A long-time biologist with the PA Game Commission, Lisa spent decades working with declining species and coordinated the development of Pennsylvania's first Wildlife Action Plan, a comprehensive review of conservation needs for imperiled wildlife. For the past five years, Lisa has been the Commission's program biologist for ruffed grouse, American woodcock, mourning doves and several other game birds. Her particular interest lies in the restoration and management of young forests and other early succession habitats because of the critical need for this habitat by many declining species. Lisa a frequent contributor to the Game News magazine and most-recently authored an article titled, "Baby Trees Need Hugs Too" for Pennsylvania Forests magazine.

Embracing Tradition and Preserving Legacy: An Integrated Approach to Conserving Hunting, Fishing, and Social Club Lands

Hunt, Fish, and Social Clubs represent a significant landowner segment within Pennsylvania. Their ownerships typically are large and often located within forest-dominated landscapes that are important for conservation values. Launched in 2009, The Nature Conservancy's Working Woodlands program has proven an attractive model for preserving club lands and maintaining their legacies while helping them to access much needed revenue streams through certified forestry and ecosystem markets. Working Woodlands is a partnership between the Conservancy and private landowners that protects and sustainably manages privately owned forests by combining Forest Stewardship Council (FSC) certification with management plan development and emerging carbon markets. This presentation will explain the mechanics of the Working Woodlands program, provide perspective on how it functions within the context of hunt clubs, and describe potential opportunities and benefits for forestry and wildlife professionals.

Mike Eckley is a Society of American Foresters (SAF) Certified Forester and is Director of Forest Conservation for The Nature Conservancy (TNC) in Pennsylvania. His work focus has been on assisting with the development and implementation of the Conservancy's Working Woodlands program (www.nature.org/workingwoodlands), which combines working forest easements and forest certification to provide enrolled private forest landowners access into ecosystem markets. More specifically, Mike helps to manage the Conservancy's Forest Stewardship Council group certificate and is responsible for providing leadership and administrative oversight to actively managed fee and eased properties totaling more than 80,000 acres across Pennsylvania. Prior to joining TNC, Mike spent time working as a state land management forester with the Ohio Division of Forestry and as a service forester with the Virginia Department of Forestry. Mike received a B.S. in Forest Resources Management and a minor in Communications from West Virginia University and an MS in Forestry at the University of Maine-Orono. He is native to Centre County, PA and lives with his wife and two children in the outskirts of Williamsport - Clinton County, PA.

Abstracts

Paper Presentations

(Listed alphabetically by last name of presenter--italicized)

Influence of forest stand complexity on forest songbird diversity within large tracts of forest in Pennsylvania.

Abigail Barenblitt, Margaret Brittingham, David Miller, Kimberly Serno, Glenn Stauffer; Penn State University, 235 Forest Resources Building Penn State University, University Park, PA 16802; 409 Forest Resources Building Penn State University, University Park, PA 16802; 411 Forest Resources Building Penn State University, University Park, PA 16802; 235 Forest Resources Building Penn State University, University Park, PA 16802; 434 Forest Resources Building Penn State University, University Park, PA 16802

Abigail Barenblitt, (814) 865-4430, acb298@psu.edu; graduate student presentation

Pennsylvania is characterized by large tracts of forests that provide a variety of ecosystem services, as well as habitat for neotropical migrant songbirds. As resource extraction and development continue to alter Pennsylvania forests, prioritizing habitat for conservation is critical. According to niche theory established by MacArthur and MacArthur in the 1960's and 1970's, habitat with more available niche space should be able to support more species. Past management practices, soil acidification, and heavy deer browsing have led to the simplification of forest stands. My research asks: Does the diversity of songbird communities increase as a function of structural and compositional complexity of forest stands within large tracts of forest? As of the 2015 breeding season, we performed 744 point count surveys within 7 State Gamelands and 6 State Forests in Northcentral Pennsylvania to index avian communities within this region. These point counts were spatially dispersed 250m apart to ensure independent sampling. We performed vegetation surveys at these same point count locations to connect each surveyed point with vegetation features including stand structure and dominant ground, shrub, and tree species. Additionally, we returned to a subset of these locations to collect more detailed vegetation information such as basal area and woody debris. We analyzed our data using GLM's in program R. Preliminary analysis of our data suggests that the number of bird species found within a stand is positively influenced by the amount of ground and understory cover and negatively influenced by the amount of midstory and canopy cover.

Managing for adaptation: What strategies should we use to enhance resilience and diversity?

Scott Bearer and Mark Anderson, The Nature Conservancy, 220 West Fourth Street, Williamsport, PA 17701.

Scott Bearer, (570) 321-9092, sbearer@tnc.org; professional presentation

The Nature Conservancy (TNC) has developed a functional dataset, commonly known as the 'Northeast Resilience Project', which allows managers to characterize the resilience of habitats

across the landscape based on combined measures of complexity and connectedness. While the data included have a variety of useful applications, such as prioritization and conservation, they were not meant to suggest appropriate management actions that might enhance resilience. In recent years, however, TNC and others have developed new theories in forest and habitat management that provide the opportunity to downscale these spatial models to a possible suite of management options that may help increase the resilience and adaptive capacity of our Appalachian forests. Here, we provide a summary of these recommended management options that enhance resilience. We also discuss how we are integrating these techniques into a multi-partner, landscape-level habitat management collaboration, known as the Pennsylvania Resiliency Network. This collaboration is currently working to enhance resilience and adaptation along the Kittatinny Ridge in central Pennsylvania, and we hope the success of the partnership will allow us to develop additional cross-boundary projects in targeted landscapes across the Appalachians.

Greater than the sum of its parts: Understanding forest habitat in the context of deer, soil chemistry, and competing vegetation.

Danielle R. Begley-Miller, Pennsylvania Cooperative Fish and Wildlife Research Unit, Pennsylvania State University, University Park, PA 16802; Duane R. Diefenbach, U.S. Geological Survey, Pennsylvania Cooperative Fish and Wildlife Research Unit, Pennsylvania State University, University Park, PA 16802; Marc E. McDill, Pennsylvania State University, University Park, PA 16802; Christopher S. Rosenberry, Pennsylvania Game Commission, Harrisburg, PA 17110; and Emily Just, Department of Conservation and Natural Resources, Bureau of Forestry, Harrisburg, PA 17105

Danielle R. Begley-Miller, (937) 733-8981, dfb5098@psu.edu; graduate student presentation

White-tailed deer (*Odocoileus virginianus)* modify forest habitat through browsing preference. Deer, however, are not the only factor influencing forest habitat in Pennsylvania. Other challenges such as soil acidification, disease, invasive species, and competing vegetation also affect forest conditions. We used 2 years (2014-2015) of summer (May-August) forest inventory data collected across a range of vegetation treatments (fence, lime, and herbicide) in the Rothrock and Bald Eagle State Forests to assess the relative role of deer, soil chemistry, and competing vegetation (Ericaceae) on forest understory plant community structure and composition. Drivers of plant community composition identified by single-species occupancy models and multivariate cluster analysis were soil acidity (pH 2.47-4.89), tree density, canopy openness, slope, and elevation. Most importantly, competing vegetation (Ericaceae) clusters tended to occur on sites with the lowest pH (< 4.00) and moderate to high tree densities. Occupancy of Indian cucumber-root (*Medeola virginiana*)—a deer-preferred forb—was not related to pH, but did increase with increasing percent cover of understory vegetation. Other deer-preferred lilaceous understory herbs like Canada mayflower (*Maianthemum canadense*), and Solomon's seal (*Polygonatum spp.*) were rare to absent. These results indicate that pH is a significant driver of Ericaceous plant community dominance, but limit the scope of inference regarding the direct effects of white-tailed deer browsing on understory plant communities.

Susceptibility of Ruffed grouse (*Bonasa umbellus*) to West Nile virus.

Justin D. Brown and Lisa M. Williams, Pennsylvania Game Commission, 2001 Elmerton Avenue, Harrisburg, PA 17110; Richard A. Bowen and Angela M. Bosco-Lauth, Department of Biomedical Sciences, Colorado State University, 3701 Rampart Road, Fort Collins, CO 80523-1683; and Nicole M. Nemeth, Department of Pathobiology, University of Guelph, 419 Gordon Street, Guelph, Ontario, Canada, N1G 2W1

Lisa Williams, (814) 863-8370 (primary author), judbrow@pa.gov (primary author); professional presentation

Since its arrival in the U.S. in 1999, West Nile virus (WNV) has impacted the health of numerous avian species. WNV was first identified in Pennsylvania in 2000 and was detected statewide by 2002. The Ruffed grouse (*Bonasa umbellus*) is an important gamebird species and the state bird of Pennsylvania. Ruffed grouse populations in Pennsylvania have declined precipitously from 2002-2005 and a robust recovery has not followed. In order to provide insights into potential impacts of WNV on Ruffed grouse, an experimental infection study was performed. Eighteen juvenile grouse were included in the study; 10 naïve to WNV, 5 vaccinated against WNV, and 3 negative controls. After WNV inoculation, clinical disease, lesions, virus replication, and antibody production were monitored. Forty percent (4/10) of the naïve birds inoculated with WNV were euthanized on 7-8 days post-inoculation (DPI) due to severe disease. Lesions in these birds included severe inflammation in the heart and to a lesser extent the brain. Among the 6 naïve grouse that survived to the end of the trial at 14 DPI, 4 had severe lesions in the brain and/or heart suggesting longer-term survival of these birds in the wild would have been compromised. Vaccinated grouse exhibited no clinical signs and had no lesions-associated with WNV infection. The results of the study indicate juvenile grouse are susceptible to WNV-induced disease. To expand upon these data, samples were collected from Pennsylvania Ruffed grouse during the 2015-2016 hunting season to measure antibodies to WNV throughout the state. Those results are pending.

Habitat selection of Golden-winged Warbler fledglings in managed forests: the importance of structural diversity in local landscapes.

Cameron Fiss, Indiana University of Pennsylvania, Indiana, PA 15705; Darin McNeil, Cornell University, Ithacha, NY 14850; Marja Bakermans, Worcester Polytechnic Institute, Worcester MA, 01609; and Jeff Larkin, Indiana University of Pennsylvania, Indiana, PA 15705 & American Bird Conservancy, The Plains, VA 20198.

Cameron Fiss, (717) 860-3243, ldmq@iup.edu; graduate student presentation

Like many songbirds, one aspect of the Golden-winged Warbler's (*Vermivora chrysoptera*) ecology that remains largely unstudied is the post-fledging period. Studies involving other fledgling songbirds have revealed high levels of mortality during this period and the use of habitats that are structurally different from nest sites. State and federal agencies and their partners are implementing management guidelines to create Golden-winged Warbler nesting habitat on public and private forest lands. It is important that these efforts result in nesting habitat that is proximate quality to post-fledging habitat in order to maximize the benefits to population recovery. Using radio-telemetry, we studied the movements and landscape-scale habitat selection

of dependent fledgling Golden-winged Warblers across a managed forest landscape in northeastern Pennsylvania. We created cover type maps in GIS to determine used and available habitat for each radio-tracked bird. Results indicate that fledglings used a variety of cover types and forest age classes besides the regenerating timber harvests in which their nests were located. Average distance moved during the first 4 days post-fledging was 35 m and habitat use was confined primarily to the nesting habitat. Fledglings moved on average 166 m daily after the first 4 days post-fledging and habitat use became increasingly more varied. These results highlight the importance of managing forested landscapes in a way that optimizes the distribution and diversity of forest structure in areas where Golden-winged Warbler conservation is a goal.

Effects of Japanese Knotweed (*Fallopia japonica*) detritus on benthic macroinvertebrate communities of the Susquehanna River main stem.

Kaelyn J. Fogelman and David Matlaga, Susquehanna University, 514 University Avenue, Selinsgrove Pa, 17870

Kaelyn Fogelman, (570) 590-7785, fogelman@susqu.edu; undergraduate student presentation

Japanese Knotweed (*Fallopia japonica*) is an invasive species rapidly spreading throughout the understory of Riparian forests in Central Pennsylvania. There are concerns that this species may impact aquatic ecosystems because allocthonous material forms the basis for aquatic food webs and can impact benthic communities. This study assesses the effects of Japanese Knotweed leaf litter on the benthic macroinvertebrate communities of the Susquehanna River. Three distinct sites within the Susquehanna were chosen to compare benthic macroinvertebrate communities within Japanese knotweed and American sycamore (*Platanus occidentalis*) leaf packs. Experimental leaf packs were removed after 25 and 50 days of exposure. In addition, we are quantifying the accumulation of knotweed and sycamore biomass in naturally occurring leaf packs in the Susquehanna River. Sycamore and knotweed represented approximately half of the total biomass in naturally occurring leaf packs following abscission in the fall of 2015. We predict that macroinvertebrate communities within low-quality knotweed litter will have relatively low diversity compared to high-quality native sycamore litter. This study will begin to evaluate how the riparian invader, Japanese Knotweed, influences the benthic communities of the Susquehanna River.

Trends in abundance over time for the last remaining eastern population of the Regal Fritillary.

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The last known occurrence of the eastern form of the Regal Fritillary Butterfly (*Speyeria idalia*) is at Ft. Indiantown Gap National Guard Training Center, a military base located in south-central Pennsylvania. This grassland dependent species currently exists as 3-4 subpopulations spread amongst 3 training ranges and 4 training areas. Each of these sites readily supports host plants: violets for larvae, nectar plants for adults, and warm season grass cover for all life stages.

Standardized population monitoring surveys have been conducted since 1998 and have employed methods commonly used to track population size and other parameters of interest. Here, the results of four sets of mark-release-recapture surveys from 2001, 2005, 2009, and 2014 are presented. Data sets were analyzed using Program Mark which can generate estimates of population size, survival, and encounter rate. Population levels at most research sites either remained stable or increased overtime while one site declined in later surveys. Land clearing and range construction efforts from 2008-2010 opened forested and mid-successional habitat directly adjacent to fields with core regal populations and was likely responsible for population growth. Reasons for the decrease at one site are unknown but may be linked to habitat and dispersal. Management and conservation concerns surrounding this species are discussed.

White-tailed deer fawn behavior and survival in Pennsylvania.

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White-tailed deer (*Odocoileus virginianus*) fawns are the most vulnerable life stage and predation is usually the primary source of mortality. Increases in predator populations have prompted concern regarding white-tailed deer recruitment across North America. Fawns in Pennsylvania are subjected to predation as well as other sources of mortality such as starvation, disease, parasites, poaching, and vehicle collisions. Maternal behaviors can influence fawn survival via predator avoidance, habitat selection, and aggressive defense. We present preliminary results from the first year of a 3-year study of white-tailed deer fawn survival. We fitted mother-fawn pairs with radio collars that recorded separation events (>130 m), proximity (<130 m), and survival status. We captured 42 neonatal fawns in May and June 2015, including 2 mother-fawn pairs. Survival rate at 34 weeks was 0.40 with predation accounting for 59% of deaths. Coyote (*Canis latrans*), black bear (*Ursus americanus*), and bobcat (*Lynx rufus*) each accounted for equal amounts of predation. Levels of maternal attentiveness in one mother-fawn pair indicated the doe spent an average of 47%, 32%, and 66% of time within 130 m of her fawn in weeks 1-2, 3-8, and 8-16 respectively.

Documentation of predation events using video cameras at veery nests in northeastern Pennsylvania.

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The primary cause of nesting failure for most songbirds is predation, yet it is often difficult to determine the actual predator at a nest because predation events are often quick and rarely observed. As a result, the actual assemblage of predators impacting a songbird population, and the

relative importance of individual predator species, are rarely known. As part of a long-term study of a veery (*Catharus fuscescens*) population in Luzerne County, northeastern Pennsylvania, we used infrared, weatherproof video cameras connected to digital video recorders to study predation events at veery nests during summer 2014 and 2015. During each summer, we placed video cameras at a sample of veery nests allowing 24-hr monitoring of activity. We then viewed video to document and describe interactions between veeries and predators at each nest (i.e., predator events). Over both years, we monitored 36 veery nests recording 32 predator events; 17 successful (at least 1 egg or young taken) and 15 unsuccessful. The 17 successful predation events involved 8 predator species (5 mammal and 3 bird species), and mostly (88%) occurred during daylight. The 15 unsuccessful predator events involved 6 potential predator species (4 mammal species, 1 snake species, and ants) and were evenly divided between day and night. Based on our videos, veeries are impacted by a wide variety of predator species but appear to be capable of defending their nests only against small species.

Captive propagation efforts with the Allegheny woodrat (*Neotoma magister*).

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The Allegheny woodrat (*Neotoma magister*) is a species of conservation concern throughout its range, with population declines attributed to habitat fragmentation, loss of hard-mast resources, disease mortalities due to raccoon roundworm (*Baylisascaris procyonis*), and loss of genetic variability. It is a species of Immediate Concern within the Pennsylvania Wildlife Action Plan, with G3G4 and S3 Natural Heritage rankings, and is listed as Threatened within the Commonwealth. Active woodrat metapopulations have declined, and there is concern that the disruption of connectivity between metapopulations has resulted in genetic isolation. Genetic rescue may be required to prevent the increasing effects of inbreeding and the ultimate local extinction of the species. This may be achieved through the translocation of wild woodrats or via the introduction of woodrats produced via captive propagation. This project seeks to provide captive-bred woodrats for restocking efforts. Methods utilized were identical to those adopted by Timothy Smyser of Purdue University, which resulted in offspring being made available for genetic rescue efforts in Indiana. In June 2012, the Purdue University colony was moved to Delaware Valley University. To date, no offspring have been produced at Delaware Valley University from captive propagation. We will present methodologies and preliminary information on a new protocol being explored during the 2016 breeding season. We will provide a hypothesis for the failure of reproduction within the captive colony, and will make recommendations for future actions that may be taken to continue the attempts to provide captive-reared offspring for genetic rescue efforts.

American Woodcock use of early successional communities managed for golden-winged warblers.

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Kirsten E. Johnson, (517) 441-1035, ZBDW@iup.edu; graduate student presentation

Significant declines in the availability and quality of early successional plant communities have been linked to population declines among numerous wildlife species including many shrubland birds. Among those experiencing the fastest declines, the Golden-winged Warbler (*Vermivora chrysoptera*) has exhibited losses as rapid as 2.6%/yr range-wide, a rate five times higher than other early-successional bird species. Golden-winged Warblers (GWWA) were selected for targeted management under USDA-Natural Resource Conservation Service's "Working Lands For Wildlife" (WLFW) program. WLFW has resulted in 9,500 acres of new GWWA nesting habitat in the Appalachian region. American Woodcock (*Scalopax minor*) is another species of conservation need that may benefit from early-successional habitat created via WLFW. In 2015, we conducted American Woodcock singing grounds surveys at 257 patches of early successional habitat on private lands enrolled in WLFW and on public lands managed for GWWA. Woodcock were detected on 119 of 257 sites (46%). Occupancy was similar between private and public sites, while woodcock density was higher on public land sites. Future work will focus on understanding microhabitat and landscape influences on woodcock occupancy.

The use of Forward Looking Infrared Radar (FLIR) technology in locating and monitoring American woodcock nests.

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Methods of locating American Woodcock (*Scolopax minor*; hereafter woodcock) whether individuals, nests, or broods, have remained largely unchanged for over 75 years. Primary methods of searching for and locating woodcock have been the use of pointing dogs or telemetry after transmittering individuals through capture using mist nets, nightlighting, or modified live traps. In order to determine nest initiation along three singing-ground survey routes in southwestern Pennsylvania, we used Forward Looking Infrared Radar (FLIR) cameras to locate individual woodcock, nests, and broods in the spring (24 March - 11 May) of 2015. We chose to use FLIR instead of previously used techniques in order to minimize disturbance to nesting hens and determine whether it would be a reliable method for locating nests. We searched likely and unlikely woodcock nesting cover adjacent to singing-ground survey routes. We located a total of 28 nests and four broods, two of which were not linked to a previously known nest. We also located 180 individual woodcock. Searching took place over 22 days and included a total of 59.55 hours. Nest searching efficiency using FLIR was 0.47 nests/hour compared to other published reports of efficiency using historical search methods ranging from 0.08 - 0.4 nests/hour. This rate

is not only more efficient, but also provides a noninvasive approach to locating and monitoring nesting woodcock. This technology also proved to be excellent at locating other bird and mammal nests and has many possible uses in the future for wildlife research.

A study of research based education in creating an interactive learning environment.
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Anthony Kessler, (717) 855-0061, ajkessle@millersville.edu; undergraduate student presentation

The implementation of research projects as a teaching model for Science, Technology, Engineering, and Math (STEM) courses may increase student retention in STEM academic programs for undergraduate students. I participated in and evaluated a model STEM undergraduate course offered at Millersville University that was structured around a field research project involving the radio tracking of pen-raised ring-necked pheasants (*Phasianus colchicus*). In this course, students in the class gathered data on pheasant movement patterns and survival. Students also designed their own experimental research project to compare ecological differences (e.g., soil types, vegetative cover, insect diversity, etc.) between areas that pheasants used compared to areas they avoided. Students then produced a research paper and presented their results. Pre- and post-surveys were issued to undergraduate biology students enrolled in this course, and those that were not, to determine the effectiveness of using an applied research project as a teaching model to improve student interest and retention in STEM undergraduate curricula, specifically Biology. Based on my results, I found that students that participated in the applied research based course were more likely to take another biology course and maintain their current major. Based on these initial results, future applied research based courses will be developed and monitored to determine if they indeed improve retention for STEM undergraduate students.

Rates and patterns of change in forest fragmentation associated with shale gas development in northcentral Pennsylvania: 2007-2014.
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Lillie A. Langlois, (570) 753-8467, lal276@psu.edu; graduate student presentation

The northcentral region of Pennsylvania encompasses the state's largest block of continuous forest and is of regional significance as a source population for forest-dependent wildlife. The rapid expansion of shale gas development within this region results in direct loss of habitat at well sites, pipelines, and service roads; however the resulting habitat fragmentation surrounding these areas may be of greater importance. We selected Lycoming County as a proxy for northcentral Pennsylvania to measure rates of shale gas development since it began in 2007 across three time periods (2010, 2012, 2014), including the number of wells permitted, drilled, and producing gas (a measure of pipeline development), habitat conversion, habitat fragmentation on both private and public land. Shale gas development is greatest on private land (538 private and 303 public wells drilled) and the ratio of wells per pad is lower on private compared to public (3.4 and 5.4 wells/pad, respectively). As of 2010, 425 wells were permitted, 158 drilled, and 53 producing gas,

decreasing core forest by 770 ha or 0.1 percent. As of 2012, 1155 wells were permitted, 660 drilled, and 330 producing gas, decreasing core forest by 59.9 km^2 or 1.9 percent. Loss of core forest was nearly double on private than public land (2.1 and 1.2 percent, respectively), which likely result from best management practices implemented on public land. As of 2014, 1674 wells were permitted, 914 drilled, and 709 producing gas, suggesting a continued loss of core forest. Values for 2014 will be presented along with predictions for future loss of core forest given different build out scenarios. Our results suggest major changes in landscape composition have already occurred within several years as a result of shale gas development and highlight the importance of maintaining the remaining areas of core forest habitat.

How many acres of young forest habitat are needed in Pennsylvania?

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William H. McWilliams, (610) 557-4050, wmcwilliams@fs.fed.us; professional presentation

Young forest supports a diverse list of important fauna. Studies of species that depend on young forest for food, shelter, and territory commonly site habitat rarity or loss as a critical concern. The USDA, Forest Service, Forest Inventory and Analysis (FIA) program's database was used to examine the status of the Commonwealth's young forest. By 1920, timbering had left most of the State in a sapling-seedling condition. The first FIA inventory in 1955 revealed that sapling-seeding stands accounted for 23 percent of the forest land. Pennsylvania's forest land currently totals 16.9 million acres, but only 9 percent is sapling-seedling size. The current distribution of forest land by stand size was compared to historical trends and an optimal distribution for wildlife. The analysis suggests that at least 2 million additional acres of healthy young forest are needed to improve the balance of habitat for species that depend on young forests. Increasing the area and extent of young forest habitat would increase food availability for multiple trophic levels and the area available for feeding, breeding, and nesting. Expanding the forage area available for deer would disperse impacts of browse on tree seedlings. This is important because tree seedlings set composition and structure trajectories for future forest development and are key indicators of young forest health.

Benefits from cooperation with the Pennsylvania Herp Atlas (PARS) at the National Guard Installation Fort Indiantown Gap.

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In just the second year of the Pennsylvania Amphibian and Reptile Survey (PARS), the statewide atlas citizen science project, Fort Indiantown Gap National Guard Training Center (FIG) has broken a decade long drought on new species detection within the installation boundary. While survey efforts have been intensive in the past, refinement of techniques with other individuals assisting in the survey and some better search criteria have coalesced into the addition of three

new species to the installation lists since 2014. Beyond the new findings, the installation has managed to better communicate with the PA Fish and Boat Commission, the state regulators on herps. This relationship has facilitated several new studies on turtle telemetry and wood turtle habitat occupation. The project has also pulled in new volunteers, linked us to one new employee, and promoted FIG within the community.

Ecology of the Eastern Hellbender (*Cryptobranchus a. alleganiensis*) in western Pennsylvania.

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The Eastern Hellbender (*Cryptobranchus a. alleganiensis*) is a large, permanently aquatic salamander inhabiting streams throughout the lower Allegheny River drainage. In total, four single-season studies have been conducted in the region. During a nine year study, we assessed populations distributed among 22 watersheds by conducting 50 reach-level searches within four focal watersheds for 5–7 years and 16 searches at secondary watersheds. We quantified local and regional patterns of use of cover, growth rate, demography, injury, and biomass. Juvenile and adult hellbenders were patchily distributed and abundant in reaches with suitable habitat where size class was positively correlated with individual rock cover area. The proportions of juvenile and adult size classes, mean scaled body mass of adults, and sex ratios were different among populations. Mean annual growth rate declined as a power function of size class. Sexual maturity for males occurred during the decline of initial rapid growth whereas females matured after growth rate was lower and relatively constant. Density averaged 14.9±2.1 ind/ha (range=5.1–55.6) and biomass averaged 9.4±1.3 kg/ha (2.4–36.3) during the study period. One-half of all hellbenders had at least one injury and the probability of injury increased with increasing size class. Missing digits, scars, and tail damage accounted for 78% of injuries; males had a higher overall prevalence of injury than females and significantly more injuries to the tail. Most characteristics of Eastern Hellbender populations were highly variable among focal watersheds but collectively indicate the conservation status of the species is relatively secure in the region.

An exploratory analysis of the relationship between vegetation structure and the neotropical migratory bird community in tropical dry forests of Honduras, Central America.

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The Agalta Valley in Honduras is a pasture and crop dominated landscape with scattered remnants of tropical dry forest (TDF). The TDF of Honduras is home to endangered and endemic plant species as well as the only endemic bird species, the Honduran Emerald hummingbird (*Amazilia luciae*). During a year-long study focused on the Honduran Emerald ecology, we used point count surveys and associated vegetation sampling to inventory the avifauna using TDF remnants. We explored the use of TDF forest remnants by migratory birds during their two annual migratory periods (October-December; March-April). We used logistic regression to model

relationships between avian guilds and vegetation variables that characterized plant species composition and structure. We classified the migratory bird species into seven guilds following two criteria: diet and strata of habitat used. We detected 176 bird species of which 25% were Neotropical migratory species. Model results suggested that four of seven avian guilds were influenced by vegetation composition and structural features. We will discuss and expand upon these important avian-vegetation relationships. Our results have identified vegetation variables that should be considered in future studies that examine factors that influence Neotropical migratory bird use of TDF. Moreover, we hope that the dissemination of diverse ecology aspects of TDFs will inform conservation partners as to the importance this imperiled community.

The effects of roads on bird community composition in Pennsylvania's core forested landscape.

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Roadways are a prominent feature on the landscape and a major factor in determining the impact of human development on wildlife populations. This is especially true in areas characterized by low development, such as north-central PA where roads act as the major source of land modification and fragmentation. Roads act to affect wildlife through multiple mechanisms including fragmentation, alteration of habitat structure, and traffic disturbance. Understanding mechanisms is necessary to minimize the impacts of roads on wildlife populations. Our goal was to determine whether and how bird communities differ between roadside and off road surveys and identify which road-characteristics have the greatest effect on forest bird communities. In 2015 we conducted point counts at 1255 locations, 511 roadside and 755 forest interior points, within 7 State Games Lands and 6 State Forests in Northcentral Pennsylvania. We analyzed data using multi-species occupancy models, allowing us to measure factors most strongly related to road-effects and to determine species-groups most affected by roads. Our results indicate that canopy width is a better indicator of road effects than the presence of a road itself and as expected, road-effects are most strongly negative for forest interior species, such as Black-throated Green Warblers and positive for human-associated species, such as American Robins. We will discuss the implications this has on the interpretation of results from large scale surveys, such as BBS and Pennsylvania's BBA which are only conducted on roads, as well as minimizing road impacts on forest bird communities in Pennsylvania's core forested landscape.

Maintaining grasslands at Fort Indiantown Gap provides benefits to wildlife, partners, and the military mission.

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Fort Indiantown Gap (FIG) National Guard Training Center holds the largest single native grassland-meadow complex in PA. The absence of industrial agriculture combined with 80 years of military training maintained a mosaic of ecosystems with differing soil types, successional ages, and complexities. FIG has 584 ha of high quality native warm-season grasslands, 755 ha of mowed fields with both native and exotic grasses, 1,050 ha of shrubland and scrubland, and 4,349 ha of woodlands. This landholding provides habitat for over 110 PA Wildlife Action Plan species of conservation need, including the only Eastern population of the grassland endemic regal fritillary butterfly *Speyeria idalia*; a responsibility species of immediate conservation concern. Habitat is managed through a variety of methods: mowing, manual removal of woody vegetation, selective herbicide, seeding or planting plants, but primarily through prescribed fire. Fire is used at FIG to control fuel load and restore grassland and savanna habitat, which benefits tactical military training exercises and early seral stage habitat dependent wildlife species. The preferred fire return interval depends on the objective and vegetation structure for an area. The intervals are 3-5 years for grassland habitat, annually to reduce fuel load and wildfire threat for military training, and 5-10 years for forested area regeneration. FIG ecotype seed is also propagated by Ernst Conservation Seeds, Inc. and used for restoration projects across the country. There is potential for sustainable grasslands in Pennsylvania and the East, but it will require continued collaboration and research on multiple levels.

Analysis and identification of *Pantherophis* clade in Huntingdon County Pennsylvania.

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This study was conducted to identify the clade of *Pantherophis* in Huntingdon County, Pennsylvania. Recent publications indicate that *Pantherophis spiloides* is commonly found in Huntingdon County but field observations suggested that it was *Pantherophis alleghaniensis* instead. We collected seventeen specimens of *Pantherophis* and compared scale counts and measurements to published numbers of the two clades. Sub-caudal counts for Huntingdon County *Patherophis* (female: 73.8 +/- 3.6, male: 79.4 +/- 6.2) did not significantly differ from published values for *spiloides.* However dorsal blotch counts (36.8 +/- 5.6) were much higher than *spiloides* and within range to published *alleghaniensis* counts. These results indicate a possibility of hybridization in Huntingdon between the two clades. Genetic analysis is needed to fully address this situation.

Exploring the adaptations of bobcats to diverse ecosystems by identifying genomic regions under selection.

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The bobcat (*Lynx rufus*) is one of the most successful carnivores in North America. As a generalist, the bobcat thrives in diverse environments and has broad prey use. Our objective is to examine local adaptations of bobcats in different regions of the US through genomic analysis and contrast it with the specialist, Canada lynx (*Lynx canadensis*). Double digest restriction site associated DNA sequencing (RADseq) libraries were prepared in 17 bobcat samples from 3 populations (New Mexico, Montana, Vermont) for Illumina sequencing on a MiSeq, HiSeq, and NextSeq using modified methods of Elshire et al. (2011) and Peterson et al. (2012). Reads were mapped to the domestic cat genome and mapped and non-mapped reads were used to construct a catalog of potential loci distributed across the entire genome. The reads mapped evenly to all chromosomes and yielded genotypes for 17,196 loci were shared across >50% of the samples. The pairwise AMOVA F_{ST} between eastern and western bobcat populations was 0.063, and between norther and southern bobcat populations was 0.042. Vermont harbored the most divergent bobcat populations. When bobcats and Canada lynx were compared the AMOVA F_{ST} was 0.273. The genotyped loci were used to reconstruct haplotypes, and the ones with outlier F_{st} and gene diversity values were identified as potentially located on chromosomal regions that have been under strong selection pressures. We are currently expanding our population sample sizes and genome coverage based on this data in order to identify genomic differences that may be driving inter and intra-species adaptations.

Forest songbird communities in forest plant communities.

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State Game Lands and State Forests in Pennsylvania are delineated into discreet terrestrial and palustrine plant community types based on the presence of characteristic woody and herbaceous vegetation. Such classification might help predict forest bird communities or areas of forest songbird species richness if different community types can reliably predict the presence of different forest songbird species. We used a multispecies occupancy approach and data from the 2nd Pennsylvania Breeding Bird Atlas to investigate relationships between a restricted set of aggregated forest community types and occupancy probability of 55 forest- and edge- associated songbird species on State Game Lands and State Forests in Pennsylvania. Predicted richness was marginally greatest in palustrine and terrestrial forest with a substantial conifer component, but different bird species were associated with different forest community types. Also, the conifer component appeared to be more important when only species strongly associated with forest

interiors were considered. Although management to achieve or change certain forest community types may be difficult, our results can provide some insight about how forest bird communities relate to forest plant communities.

Effects of hemlock decline on bird community composition at Delaware Water Gap National Recreation Area.

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Matthew J. Toenies, (320)-360-5589, mkt5213@psu.edu; graduate student presentation

Since its arrival from eastern Asia in the early 1950s, hemlock woolly adelgid (*Adelges tsugae*) has caused widespread decline of eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*) throughout the eastern United States. Previous research has identified several bird species as being strong hemlock associates that are predicted to decline as hemlock declines. This study aimed to examine (1) whether bird community composition has changed over a fifteen-year period of hemlock decline and (2) whether changes were correlated with degree of hemlock decline across 11 hemlock stands at Delaware Water Gap National Recreation Area in northeastern Pennsylvania. We conducted variable-radius point counts at 80 sites across 11 hemlock stands and 11 hardwood stands, and compared results to previous surveys conducted in the same stands in 2000, which coincided with early stages of adelgid infestation. Habitat measurements suggest that hemlock at the sites has declined in abundance and relative health. Hemlock basal area declined an average of 9.54 % across hemlock stands, and hemlocks at 70 % of point count locations had health scores of 3 or greater, representing moderate to severe defoliation. Results of occupancy modeling of point count data show that, within hemlock stands, species richness declined for hemlock-associated species, including Acadian Flycatcher (*Empidonax virescens*), Blue-headed Vireo (*Vireo solitarius*), and Black-throated Green Warbler (*Setophaga virens*). Species richness increased for deciduous-associated species, including Veery (*Catharus fuscescens*) and Eastern Wood-Pewee (*Contopus virens*). Our results indicate that degradation of hemlock stands has led to shifts in bird communities in northeastern Pennsylvania.

Timing of spring wild turkey hunting in relation to nest incubation.

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Several states, including Pennsylvania, have established spring wild turkey (*Meleagris gallopavo*) hunting seasons to open, on average, near median date of incubation initiation of turkey nests. This reduces illegal and undesired hen harvest and possibly nest abandonment, while maintaining hunter satisfaction of hearing gobblers when most hens are incubating eggs. However, Pennsylvania's spring season structure was established in 1968. Given earlier spring phenology,

and potentially more variation in spring weather due to climate change, there is concern that timing of nest incubation for Pennsylvania turkeys could be changing. Our objective was to determine if nest incubation and opening of spring turkey hunting have continued to coincide. We attached satellite transmitters to 254 female turkeys (2010–2014) and estimated median incubation initiation date to be 2 May, which was 2 days earlier than median date during a statewide study during 1953–1963 and 9 days earlier than during a smaller scale study in south–central Pennsylvania during 2000–2001. However, incubation initiation varied greatly among years and individual hens during all 3 studies. During 4 of 5 years of our study, Pennsylvania's spring season opened 3 to 8 days prior to median date of incubation initiation. Over the 5 years, the earliest date of incubation initiation to the latest was >2 months. Consequently, in years of late incubation, a constant season opening date set near the long-term median date of incubation initiation exposes few additional hens to risk and hunter satisfaction is likely maintained at higher levels than would be seen with a more conservative approach of opening the season later.

Modeling potential habitat for pheasant population restoration in Pennsylvania.

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Ring-necked pheasants (*Phasianus colchicus*) are a non-native species that reached peak numbers in Pennsylvania in the 1970's, but have since declined most likely due to a lack a suitable habitat. Pheasants are popularly known as an agriculturally dependent bird and the changes in farming practices, increase in size of farming fields, and advances in pesticides have decreased the mosaic of habitats needed to provide adequate cover, breeding, and wintering habitats. This project will take a closer look at the habitat needs of pheasants to restore population sizes and reach a population goal of 10 hen pheasants per square mile set by the Pennsylvania Game Commission. Crowing counts were conducted at randomly selected points within Wild Pheasant Recovery Areas to obtain population estimations in conjunction with flushing surveys to find sex ratios. At these same points, a microhabitat map layer was digitized based on Anderson level IV classification. Both crowing counts and habitat surveys were conducted from 2013 to 2015. To overcome the issue of detection probability when calculating population estimations, a survey was conducted using radio collared wild pheasants to estimate how often a cock pheasant crows and the probability that an observer is able to hear a bird given that it actually crows. Models will be constructed to estimate pheasant population size based on the composition of habitat types.

Abstracts

Posters

(listed alphabetically by last name of presenter--italicized)

Impact of invasive berry producing plants on feeding guild structure at wetlands in central Pennsylvania.

Zachary S. Adams, Juniata College, 1700 Moore St, Huntingdon, PA 16652

Zachary Adams, (717) 926-3926, adamszs15@juniata.edu; undergraduate student poster

I compared avian feeding guild structure between two wetlands with differing abundance of invasive berry producing plants in Huntingdon County, Pa in the fall of 2015. Two transects at each of the two wetlands were surveyed six times and bird species and counts were recorded. Vegetation was sampled once per transect and a total number of native and invasive berry producing plants was determined. Average abundance, bird density, and conservation scores were calculated for each site. Very few invasive berry producing plants were found at one wetland, while high numbers of berry producing invasive plants such as Autumn Olive (*Eleaegnas* umbellatum) were found at the other wetland. Average abundance at the wetland with no invasive berry producing plants (12.42 birds per visit) did not significantly differ from the wetland with abundant invasive (12.04 birds per visit) (t=.04, p=.48). Richness, density, and conservation score also did not differ between the two sites. The abundance of invasive species at Fouse's Crossing did not decrease bird abundance in the wetland. However, these results differ dramatically from a previous year's study showing that short term datasets are inadequate to full asses this research question.

Under the glow: Increasing funnel trap capture rates for adult vernal pool amphibians

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Michael Antonishak, (570) 406-2202, mxa201@psu.edu; undergraduate student poster

In this study, we aim to improve survey techniques for monitoring amphibian populations that rely on ephemeral wetlands such as vernal pools. Traditional methods usually require significant effort to set up survey equipment (e.g. drift fences), but here we determine how to increase captures for aquatic funnel trap surveys, a viable alternative that provides sufficient capture data while reducing the time and effort it takes to survey one vernal pool. We demonstrate the utility of the method in a local vernal pool network, and we test the hypothesis that commercially available glow sticks will significantly improve capture rates of breeding adult amphibians. Twelve vernal pools were surveyed for the duration of the 2015 amphibian breeding season. Treatments were systematically applied (glow sticks or control) to each trap each night. Treatments were alternated so that each trap received approximately the same number of trap nights with glow stick or control treatment. Over 4500 amphibians were captured. We discovered that glow sticks increased mean captures of the Spotted Salamander (*Ambystoma maculatum*) by

3.28 – 5.30 times, Jefferson's Salamander (*Ambystoma jeffersonianum*) by 2.06 – 2.72 times, and wood frogs (*Lithobates sylvaticus*) by 2.40 – 2.94 times more than traps without treatment. These results show that aquatic funnel traps are effective at surveying adult vernal pool amphibians, and glow sticks provide a lure for amphibians resulting in an increase of captures. By simply adding glow sticks to aquatic funnel trap surveys, researchers, conservationist, and management agencies can significantly improve the efficacy of their surveys and monitoring programs.

Pennsylvania Game Commission's bat acoustic transect surveys.

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Tammy Colt, (814) 233-2281, tcolt@pa.gov; professional poster

In 2014 and 2015, the Pennsylvania Game Commission recorded bat calls on 36 pre-determined mobile survey routes to (1) provide current information on summer location of bat species in PA; (2) track potential changes in species composition and activity over time within established survey routes; and (3) detect the presence of endangered, threatened, rare, and previously undocumented species. Call analysis of 71 sampling nights resulted in 6,078 recorded bat detections. Bat activity ranged from 22 to 169 bat detections with an average of 85.5 per route. Six of the 9 species known to occur in PA were recorded. Analysis software failed to identify 3,608 files (59.4%) to the species level. Of the 2,215 files identified to species, the majority were big brown bat (*Eptesicus fuscus*; 67.3%), followed by hoary bat (*Lasiurus cinereus*; 12.6%), eastern red bat (L. borealis; 12.3%), silver-haired bat (Lasionycteris noctivagans; 7.0%), tri-colored bat (*Perimyotis subflavus*; 0.6%), and northern long-eared bat (*Myotis septentrionalis*; 0.05%). Also, 4.2% of the files could only be identified to a guild. Interestingly, while not historically common in PA we detected two evening bats (*Nycticeius humeralis*; 0.1%) on different routes in the northeast and southcentral area of the state. While mobile acoustic surveys do provide challenges (e.g., high proportion of unidentified calls), the results can be used to support other datasets.

Fire frequency and the impacts on habitat at Fort Indiantown Gap.

Jarrod M. Derr, Temple University; Timothy R. Haydt and Mark T. Swartz, Department of Military and Veterans Affairs, Fort Indiantown Gap NGTC, Wildlife Office Bldg. 11-19 Utility Rd. Annville, PA 17003

Jarrod M. Derr, (717) 269-6774, c-jaderr@pa.gov; professional presentation

The use of prescribed fire is a common method used to restore and modify various types of habitat. It is used commonly throughout much of the western and southern United States as management tool but less so in the Northeast. Fort Indiantown Gap National Guard Training Center (FIG-NGTC) and has one of the largest prescribed burn programs on a single landholding in Pennsylvania. The ease and quickness of application allows FIG-NGTC Natural Resource staff to use a rotational prescribed fire regime to manage the landscape for military use and fuels reduction as well as for ecological purposes that support a wide diversity of plants and wildlife. It has proven to be an effective tool for promoting and sustaining warm season grass fields and

wildflower meadows as well as typical Pennsylvania forest communities dominated by oak and hickory species. This method has also been commonly used to manage unwanted vegetation that easily encroaches on preferred habitat. For many years the effects of this management scheme have been monitored through various methods and have confirmed the benefits of using this tool to maintain early successional and forested habitats.

Is food diversity and availability a good predictor of barn owl (*Tyto alba*) nest distances in central PA?

Samantha M. Loh, Laura E. Scales, Rebekah Smith, Emily Mausteller, Laura Spence, Mario Giazzon, Dan Mummert, Clayton Lutz, Richard Fritsky, and Dr. Carlos A. Iudica. Biology Department & Ecology Program, Susquehanna University, 514 University Avenue, PA 17870 & The Pennsylvania Game Commission.

Samantha Loh, (240) 605-9083, loh@susqu.edu; undergraduate student poster

Barn owls (*Tyto alba*) are nocturnal predators known for requiring large portions of open land to hunt and roost while breeding. Due to the amount of prey needed to sustain each owl, we averaged a minimum distance of 1-2 km that probably allows them to avoid competition typically separates individual families in central PA. We noticed, however, what seems to be a "nest cluster" in Union County, Pennsylvania separated by a distance close to 0.5 km. With no published data to explain this natural event, we decided to both follow what prey items are available year-round with monthly live trapping, and to analyze consumed fauna in the owl pellets of the individuals in the cluster. Our preliminary data from owl pellet analysis portrays a diverse local fauna of small mammals and birds as prey items. Specifically 80% rodents, 18% insectivores, and 2% birds. Within the rodents, we have found about 90% voles and 10% mice. Within the insectivores, we have found several different species. Our 13 months long live-trapping suggests a high density but low diversity of prey items consisting of only *Peromyscus leucopus* and *Blarina brevicauda*. By comparing the diversity of the regurgitates within our cluster with values and analyses from other nests, combined with the results of our live trapping, we may be able to suggest an explanation of this phenomenon.

Does Canis latrans' winter diet show similarities to that of Canis lupus?

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Are coyotes in Pennsylvania still displaying solitary hunting strategies or are they behaving more like pack predators, as a consequence of their recent hybridization? Coyotes (*Canis latrans*) have been rapidly expanding into the Northeastern Region of the United States since the mid 1900's most likely due to anthropogenic changes in their habitat. Several studies suggest that in addition to being top predators, coyotes are opportunistic feeders and are able to switch prey based on availability and density. We hypothesized that coyote diets could resemble that of the gray wolves (*Canis lupus*) since coyotes in Pennsylvania show a degree of hybridization and are currently playing an apex predator role in our local ecosystems. For our research, one hundred and sixty

eight coyote stomachs were obtained throughout Pennsylvania from 2009-2012 and were dissected to define coyote winter diet. We expect to find insights that may allow us to answer the title question and gain knowledge that may prove useful for future management practices in the Commonwealth.

Is the Red-spotted Newt (*Notophthalmus v. viridescens*) a local reservoir of amphibian pathogens?

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Sean Quinn, (570) 994-4359, S.R.Quinn@eagle.clarion.edu; undergraduate student poster

The chytrid fungus (*Batrachochytrium dendrobatidis* (*Bd*)) and the viral pathogen *Ranavirus* have caused population declines in many amphibian species in some regions of the world. The status of most Pennsylvania species is unknown but the Red-spotted Newt (*Notophthalmus v. viridescens*) is known to be susceptible to both pathogens. Between May and October 2015, we tested 88 adult newts from a local system of 18 permanent ponds on State Game Land 63 (1420 ha) in Clarion County Pennsylvania. We collected one skin swab sample for *Bd* testing, humanely euthanized each salamander, and then dissected and preserved livers and kidneys for *Ranavirus* testing. Pathogen DNA was detected using conventional polymerase chain reaction assays and gel electrophoresis. We detected *Bd* in 18 of 18 ponds with a local prevalence of 0.58 (95% CI = 0.47–0.68, N = 88), *Ranavirus* in 2 of 9 ponds with a local prevalence of 0.09 (0.03–0.22, N = 44), and a local co-infection prevalence of 0.05 (0.01–0.16, N = 43). Our results show the Red-spotted Newt is an asymptomatic local reservoir for *Bd* for at least six months of the year and are the first report of *Ranavirus* in a western Pennsylvania population. The area we studied is a small network of local ponds with multiple species of amphibians present. Understanding the prevalence and distribution of both pathogens in the Red-spotted Newt, one of the most abundant amphibians in the state, is important for surveillance efforts and further studies of disease ecology in the region.

Assessment of road culverts as passage barriers to wild and stocked trout in Pennsylvania headwaters.

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Brook trout (*Salvelinus fontinalis*) are an iconic species in the Eastern United States due to their popularity as a sport fish and as an indicator of ecosystem health. In Pennsylvania, two primary threats to brook trout are habitat alteration and competition with non-native species. Road culverts can pose as barriers to migratory fish and other aquatic organisms, which isolates populations and reduces access to upstream spawning habitat. To categorize the degree to which culverts prevent fish movement, watershed managers use physical measurements to classify the passability of the each culvert. The Little Bear Creek watershed, a wild trout stream in the Loyalsock watershed,

contains three culverts categorized as barriers. It is unknown whether these culverts are indeed barriers to migratory fish, especially trout. Furthermore, brown trout (*Salmo trutta*), a non-native species, are commonly stocked in Pennsylvania streams and often establish reproducing populations that compete for resources with native brook trout. To measure how passable these culverts are, we tagged nearly 500 wild trout in 2015 with 23mm passive integrated transponder (PIT) tags. Antenna arrays were constructed on the upstream side and downstream side of each culvert, as well as a control site lacking man-made barriers to trout movement. Current results reveal that trout are moving through two of the three culverts. We will be able to test for correlations of trout movements with daily stream conditions. By "ground-truthing" culvert assessment methods, we anticipate our study will ultimately help watershed managers better prioritize culverts for removal or replacement.

PA mammal hair sampling and analysis.

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Hair sampling is a standard non-invasive method of monitoring mammal species and has the potential to detect those species able to avoid other survey methods. Data was collected as part of an overall mammal species inventory in which camera traps and live traps were the primary source of species presence. Hair collection devices included scent posts, carpet pads, cubbies, and hair corrals. Scent lures were used with the scent posts, carpet pads, and cubbies, while hair corrals were baited with a deer carcass. Although many species that should have been detected in the area were identified in camera photos and live traps, hair collection devices had little or no success. Most of the hair collection devices relied on the mammals being drawn to a scent lure which may have not been effective. Additionally, data may have been lost if animals were drawn to the scent lures but hair was not captured by the devices. The only successful outcome came from using the hair corral baited with a deer carcass. While this one method was successful, this study demonstrates that abundant and easily detectable species can avoid detection via hair sampling. Future improvements to these methods continue to be needed in order to refine and support their effectiveness when used in the field.