



Careers in Ecology

Program and Abstracts

2015 Annual Conference
Mid-Atlantic Chapter
Ecological Society of America
April 17 – 19, 2015

Hosted by the Department of Biology,
Elizabethtown College, Elizabethtown, PA



Elizabethtown College

Map and Directions to campus

Please visit <http://www.ETOWN.EDU/Map/> for an interactive map of the campus.

Friday night social will be held at the Bowers Writers House (#34 on the campus map below). Bowers Writers House is nestled in a private setting and can be hard to find. For a GPS, use address 840 College Hill Lane, Elizabethtown, PA 17022. Limited parking is available at Bowers and on Cherry Street. Alternatively, you can park on campus and take the walking path. Please see the image below for details.



Saturday program will be held in the Masters Center for Science, Mathematics and Engineering (#14 on the campus map below), which is comprised of Esbenshade, Lyet, and Musser. Registration will be in the foyer of the Masters Center. Parking is available on either side of the building. For a GPS, use 701 College Avenue, Elizabethtown, PA 17022. This is a private residence opposite the Masters Center.

Sunday field trip will meet in the parking lot to the west of the Masters Center, in front of the Hoover Building (#11 on the campus map below)



CAMPUS MAP

Letter House - Admissions..... 1	Lyet Wing for Biological Science..... 13	College Store..... 24	Tennis Courts..... 35
President's Home..... 2	Masters Center for Science, Mathematics and Engineering..... 14	Health and Wellness Center..... 24	Founders Residence Hall..... 36
Schlosser Residence Hall..... 3	Eshenshade Hall..... 15	Koons Activity Venue (KAV)..... 24	Brinser Recreational Field..... 37
Student-Directed Learning Communities..... 4	Letter Chapel and Performance Center..... 16	Tampest Theatre..... 24	Wolf Field—Hockey/Lacrosse..... 38
Rifkinsparger Alumni House..... 5	Special Events and Programs..... 17	Brinser Residence Hall..... 25	Hackman Apartments..... 38
Penn State Hershey Medical Group..... 6	Brown Building..... 18	High Library..... 26	Boyd Stadium..... 40
Wenger Center for the Humanities..... 7	Bucher Meadhouse/Young Center for Arabist and Petas Studies..... 19	Alpha Hall..... 27	Volleyball Sand Court..... 41
Nicarry Hall..... 8	Schreiber Quadrangle..... 20	Over Residence Hall..... 28	Practice Field..... 42
Steinman Center for Communications and Art..... 9	Track and Field Venue..... 21	Myer Residence Hall..... 29	Sothball Field..... 43
Zig Memorial Hall..... 10	Thompson Gymnasium..... 22	Royer Residence Hall..... 30	Ira R. Herr Soccer Field..... 44
Hoover Center for Business..... 11	Jay Weik (Athletic Hall of Fame)..... 23	Residence Life..... 31	Soccer Field..... 45
Musser Hall..... 12	Student Center/Bressman Commons..... 24	Campus Security/Information Center..... 32	Parking..... P
		Church of the Brethren..... 33	
		Bowers Writers House..... 34	

Z24814

EXPLORE
ELIZABETHTOWN COLLEGE.

CONNECT
www.etown.edu/social



Meeting Schedule

Friday, April 17, 2015.

7 – 8:30 pm. Evening social at the Bowers Writers House, Elizabethtown College. Enjoy casual conversations and hear reading of original works of ecological fiction. Light hors d'oeuvre courtesy of the Elizabethtown College's Office of the Provost. Free, but space is limited.

Saturday, April 18, 2015.

7:30 – 9:00 am. Registration and Continental Breakfast. Foyer of Masters Center for Science, Mathematics, and Engineering, Elizabethtown College.

9:00-9:15 am. Opening remarks. David Bowne, Chair and Susan Traverso, Provost and Senior Vice-President of Elizabethtown College. Gible Auditorium. Masters Center.

9:15-10:15 am. Keynote Address. Phyllis Pouyat Thibodeau, M.Ed. CMC. SIT Graduate Institute. Career Ecosystems: Strategies for your Sustainable Future! Gible Auditorium, Master Center.

10:15-10:30 am. Morning break. Masters Center.

10:30-11:30 am. Panel discussion on career options in ecology. Gible Auditorium, Master Center

Richard Pouyat, U.S. Forest Service

Doug Boucher, Union of Concerned Scientists

Jeffrey Hartranft, Pennsylvania Department of Environmental Protection

Joe Berg, Biohabitats, Inc.

11:30 am – 1:30 pm.

Informal break-out sessions to discuss career paths before, during, and after lunch.

Lunch. The Marketplace, The Brossman Commons, Elizabethtown College. #24 on the campus map.

12:30 – 1:30 pm. MA-ESA business meeting. Tower Room, adjacent to the Marketplace

1:30 – 2:30 pm. Oral Session 1. Masters Center.

2:30 – 3:00 pm. Afternoon Break.

3:00 – 4:00 pm. Oral Session 2. Masters Center.

4:00 – 5:30 pm. Poster Session. Masters Center.

6:00 – 8:30 pm. Banquet and Student Presentation Awards. Speaker will be Melissa Anley-Mills, Social Media lead for the U.S. Environmental Protection Agency's Office of Research and Development. Babbo's Italian Grill. 2000 West Main Street, Mount Joy, Pa. ~Three miles from campus.

8:30 pm - ?. Student activities

Sunday, April 19, 2015.

8:00 am – 12:30 pm. Field trip to compare/contrast two stream restoration sites in Lancaster County, PA. Conewago Creek and Big Spring Run.

Keynote and Panel Speakers

Phyllis Pouyat Thibodeau, M.Ed. CMC
SIT Graduate Institute

Career Ecosystems: Strategies for your Sustainable Future!

Saturday, April 18, 9:15 – 10:15 M
Gibble Auditorium, Masters Center.

Richard Pouyat, U.S. Forest Service
Doug Boucher, Union of Concerned Scientists
Jeffrey Hartranft, Pennsylvania Department of Environmental
Protection
Joe Berg, Biohabitats, Inc.

Careers in Ecology Panel
Saturday, April 18, 10:30 – 11:30 M
Gibble Auditorium, Masters Center

Melissa Anley-Mills,
Social Media lead for the U.S. Environmental Protection Agency's
Office of Research and Development

Saturday, April 18, 6:00 – 8:30
Babbo's Italian Grill. 2000 West Main Street, Mount Joy, Pa

Oral Presentation Concurrent Session 1

Time	Session 1A Careers/Education Gibble Auditorium	Session 1B Animal Ecology Esbenshade 270	Session 1C Plant Ecology Esbenshade 187	Session 1D Microbial Ecology Esbenshade 370
1:30 PM	<p><i>Adaptive management and your career: A process perspective for the aspiring ecologist</i></p> <p>Kornbluh, Ursinus College</p>	<p><i>Two-year Emergence Patterns and Distribution of Overwintering Wood Frogs (<i>Rana sylvatica</i>)</i></p> <p>Cromartie, Melchiore, Johnson Stockton University</p>	<p><i>Native and non-native perennials respond similarly to different brownfield soil conditions in a greenhouse experiment</i></p> <p>Perzley, Holzapfel, Rutgers University</p>	<p><i>Land use and soil lichen communities in the NJ Pinelands</i></p> <p>Howe Rutgers University</p>
1:45 PM	<p><i>Stream Temperatures: Two Inquiry-Based Lab Activities for Ecology Class</i></p> <p>Simmons, Mount St. Mary's University</p>	<p><i>Voluntary Diving Patterns in Adult and Juvenile Diamondback Terrapins</i></p> <p>Dahl, Trumbauer, Vatnick, Baker Widener University</p>	<p><i>The photosynthetic capacity of mature <i>Betula populifolia</i> trees growing in metal contaminated soil</i></p> <p>Salisbury, Gallagher, Grabosky, Rutgers University</p>	<p><i>Analysis of the Interaction between the Human Skin Microbiome and its Environmental Surroundings</i></p> <p>Landis, Wohl Elizabethtown College</p>
2:00 PM	<p><i>Digitizing and Databasing a Regional Virginia Herbarium</i></p> <p>Sell, Alerding, Richard Virginia Military Institute</p>	<p><i>Temporal Variation in Leaf Litter Invertebrates Available to <i>Plethodon cinereus</i></i></p> <p>Barker, Matlaga, Ludica Susquehanna University Munoz, Penn State</p>	<p><i>Two centuries of wildfire on North Fork Mountain, West Virginia</i></p> <p>Stetler, Howard Arcadia University</p>	<p><i>Impact of Zucchini yellow mosaic virus on the competitive ability of pollen in a population of transgenic wild squash</i></p> <p>Weakland, Harth, Stephenson, Penn State University</p>

2:15 PM			<p><i>Clonal integration and the sharing of resources in common milkweed, <i>Asclepias syriaca</i></i></p> <p>Seward, Dagleish, The College of William and Mary</p>	<p><i>Impacts of Zucchini yellow mosaic virus on the establishment and spread of Powdery Mildew in wild squash</i></p> <p>Nowak, Harth, Stephenson, Penn State University</p>
---------	--	--	---	---

Oral Presentation Concurrent Session 2

Time	Session 2A Land Use Gibble Auditorium	Session 2B Animal Ecology Esbenshade 270	Session 2C Plant Ecology Esbenshade 187
3:00 PM	<p><i>How can we make our work interpretable 10 years hence, in areas with slow habitat damage by deer, invasive plants, etc?</i></p> <p>Meyer Natural History Society of MD</p>	<p><i>Does Exploratory Behavior Provide an Advantage in Foraging Tasks in Eastern Fence Lizards (<i>Sceloporus undulatus</i>)</i></p> <p>Reylander – Lehigh Carbon Community College Rosier – Penn State University</p>	<p><i>The microclimatic characteristics of a lowland tropical forest in Iquitos, Peru: ecological implications</i></p> <p>Silverio, Pulhac, Metcalf, DellaValle Widener University</p>
3:15 PM	<p><i>Land use effects on earthworm community composition on agricultural lands in Southwestern Virginia</i></p> <p>Wieboldt, Collins Roanoke College</p>	<p><i>Monitoring monitors: Genetically sourcing invasive populations of Nile monitors (<i>Varanus niloticus</i>)</i></p> <p>Dowell, Hekkala– Fordham University Wood – University of Louisville Campbell – University of Tampa</p>	<p><i>Severe weather and tree mortality in two mixed hardwood forest tracts in the New Jersey Highlands</i></p> <p>Wlodawski, Gubitosi, Wiener Ramapo College of New Jersey</p>

<p>3:30 PM</p>	<p><i>Spatial Analysis of Total Habitat and Six Endangered Species Habitats Disturbed by Marcellus Shale Drilling Activities in Selected Areas of Pennsylvania</i></p> <p>Gensel Widener University</p>	<p><i>Adjacent Land Cover as an Indicator of Amphibian Species Richness in Frederick County, Maryland Wetlands</i></p> <p>Michael, Boulton Hood College</p>	<p><i>Challenges for tree recruitment in suburban forests: deer x invasive plants</i></p> <p>Morrison The College of New Jersey</p>
<p>3:45 PM</p>	<p><i>The effects of restoration treatments and flooding regime on plant community distributions in restored geographically isolated wetlands</i></p> <p>Russell, Beauchamp Towson University</p>	<p style="background-color: #cccccc;"></p>	<p style="background-color: #cccccc;"></p>

Poster Presentations

	Title	Author(s)	Primary Affiliation
1	Effect of Inoculant Characteristics on Nodulation Efficiency in Rhizosphere Mutualism	Anderson, Hogan, Alerding	Virginia Military Institute
2	Sexual Dimorphism in the Masseter Muscle of the Eastern Hellbender (<i>Cryptobranchus alleganiensis alleganiensis</i>)	Appod, Greathouse	Washington and Jefferson College
3	The Ramapo Mountains (New Jersey Highlands) as a site for observing raptor migration	Assante, Scherm, Wiener	Ramapo College of New Jersey
4	Spatial distribution of American chestnut seedlings and saplings in a forest tract along the highest ridge of the New Jersey Highlands	Bara, Wiener	Ramapo College
5	A feasibility study of using unmanned aerial vehicles to survey avian abundance by using audio recordings.	Barr, Wilson	Gettysburg College
6	Spatial and temporal relationships between forest bird declines and prevalence of the hemlock woolly adelgid in the northeastern United States	Blum, Wilson	Gettysburg College
7	Effects of Herbicides on <i>Oplismenus undulatifolius</i> (Wavyleaf Basket Grasses)	Cleaver, Beauchamp	Towson University
8	Earthworms, the herb layer, and invasion success of two non-native plants in eastern, suburban forests	Dalal, Timko, Morrison	The College of New Jersey
9	Effect of food type on <i>Dugesia</i> (Platyhelminthes) behavioral response: Are some foods tastier?	Dawson, Collins	Roanoke College
10	Overwintering habitat selection by painted turtles in relation to water temperature	Diehl, Kearns, Bowne	Elizabethtown College
11	Where's the stink? Landscape features influencing distribution of <i>Sternotherus odoratus</i>	Doran, Bowne	Elizabethtown College
12	Potential facilitation of a native forb by white-tailed deer reduces the productivity of a non-native grass in post-agricultural woodland	Fairley, Habeck	Kutztown University
13	Movements of painted turtles in the changing water temperatures of Lake Placida	Foose, Bowne	Elizabethtown College
14	Preliminary analysis of invasive plant species occurrence along the Appalachian National Scenic Trail in Pennsylvania	Grow, Habeck, Orlousky	Kutztown University
15	Evaluating the Impacts of a Novel Wetland Restoration on Amphibians	Gruber, Conway, Bowne	Elizabethtown College
16	Gut microbial community in Maryland populations of <i>Onthophagus taurus</i> Schreber	Hagadorn, Mitchell, Estes, Hotopp, Price,	Salisbury University
17	Consequences of Plant Density and Natural versus Simulated Herbivory for Common Milkweed	Hey, Dagleish, Couture	College of William & Mary
18	Agricultural transition in Pennsylvania as a major ecological factor.	Jackson, Potapov	Bryn Athyn College

19	Demographic study of smooth coneflower (<i>Echinacea laevigata</i>) populations in southwest Virginia: Evaluating the stability of a federally endangered species	Johnson, Collins, Ryan, Klopf, Truslow	Roanoke College
20	Modeling the impacts of sea level rise on ecosystem services of the urban-coastal fringe in Jamaica Bay, New York.	Kleinbeck, Piana, Meixler	Rutgers University
21	An historical timeline of ESA's efforts to promote ecological literacy and enhance human diversity among ecologists	Klemow, Cid, Solomon, Mourad, Reynolds	Wilkes University
22	Vegetation Assessment of the Transco Natural Gas Pipeline in Northeastern Pennsylvania.	Klemow, Alghusn, Tekalign, Davis, Dech, Kropiewnicki, Smith	Wilkes University
23	The Effects of CO ² and Temperature on Soil Microbial Nitrogen of Urban and Rural Forests	Kulka, McIntosh, Yarwood	University of Maryland
24	Road crossing by the white-tailed deer: when and where?	Landels <i>et al.</i>	Bryn Athyn College
25	Impacts of pollinator habitat and water quality on a sustainable soybean farm in Thurmont, Maryland	Marino, Vines, Boulton	Hood College
26	The effects of deer and <i>Microstegium vimineum</i> invasion on native woody and herbaceous plants	Matthews, Eckert, Janet	The College of New Jersey
27	Dung Beetle Populations on Organic and Conventionally Managed Cattle Pastures throughout Maryland	Mitchell, Hagadorn, Price	Salisbury University
28	Comparative Growth and Condition Index of the Eastern oyster, <i>Crassostrea virginica</i> , existing in urban areas of the Hudson-Raritan Estuary	O'Donnell, Medley	Monmouth University
29	The Role of Hydrochory in the Dispersal of <i>Oplismenus undulatifolius</i> Seeds	Picciani, Epps, Beauchamp	Towson University
30	The root of the matter: A phylogenetic study of polyphenol oxidase (PPO) enzyme distribution within the plant family Poaceae (grass) and the highly invasive genus Bromus	Plank, Evangelista, Kafkewitz, Holzapfel	Rutgers University
31	Home range structure in a space-time cube: an example of the White-tailed Deer	Potapov, Fredrik, Higgins, Cooper	Bryn Athyn College
32	Using Geographical Information Systems Technology to Develop an Agricultural Management System for a Family-Operated Farm in Bucks County, PA	Randolph	Widener University
33	Is aggregative oviposition beneficial to emerald ash borer fitness?	Ritchey, Kilgore	Washington & Jefferson College
34	Carbon sequestration of native and invaded dunes	Rodenberg, Keiling, Daneshgar	Monmouth University

35	Effects of wind on movements of the white-tailed deer.	Rodgers, Bryntesson, Cooper, Higgins, Potapov	Bryn Athyn College
36	Are insect growth regulators ineffective at controlling a honeybee pest? Experimental evidence from the small hive beetle (<i>Aethina tumida</i>)	Rogers, Boulton	Hood College
37	Change in dung beetle communities across seven counties of Maryland's Eastern Shore	Simons, Molina, Price	Salisbury University
38	The effects of resource translocation on the success of the clonal offspring of <i>Fallopia japonica</i>	Talabiska, Matlaga	Susquehanna University
39	Effects of deer and <i>Microstegium vimineum</i> invasion on non-native woody plants in suburban forests	Vaughn, Goolic, Janet	The College of New Jersey
40	On the border: Is emerald ash borer associated with ash trees exposed to higher light intensity?	Wilkes, Kilgore	Washington & Jefferson College
41	Effects of planting depth on Japanese Knotweed (<i>Fallopia japonica</i>) rhizome performance	Wood, Matlaga	Susquehanna University

Oral Abstracts

Oral Session 1A. Careers/Education

1. Adaptive management and your career: A process perspective for the aspiring ecologist
Andrea Kornbluh, Ursinus College

The application of ecological principles to natural resource use and stewardship has resulted in the practice of adaptive management. Resource management that is “adaptive” uses experience as a guide to decision-making, particularly in cases where there is recognized uncertainty about the ecosystem of interest or best management practices. Managers use a structured process to meet immediate objectives while building the knowledge and capacity to make better decisions in the future. The National Park Service, for example, uses this approach to study the short- and long-term effects of prescribed fire on plant populations. An ecologist can take a similar approach to her career, adapting to the shifting job market while steadily building a set of foundational skills. Key components of this approach include: allowing change; documenting and reorganizing your experience and lessons; seeking performance evaluations; focusing on a professional trajectory rather than an end goal; and learning to recognize the relationships between power, economics, and environment. The broad and inclusive nature of ecology makes it widely applicable, but those same aspects can make it difficult for employers to perceive your worth. Adjusting your self-presentation to new opportunities while remaining cognizant of your true strengths will enable you to develop your career systematically and mindfully.

2. Stream Temperatures: Two Inquiry-Based Lab Activities for Ecology Class

Jeffrey Simmons, Mount St. Mary's University

Two online laboratory activities for Ecology courses, both of which have been pilot-tested and evaluated, will be described. After completing the activities students should be able to: 1) describe daily and seasonal temperature patterns, 2) explain how and why stream temperatures vary spatially, 3) explain how stream temperature affects biota, and 4) apply the heat budget concept to a stream. In the first activity students manipulate large datasets of stream temperatures to answer questions about temporal and spatial variability in streams. Spreadsheet software skills are an important

component of this exercise. In the second activity, students use a publicly available heat budget model (SSTEMP) to simulate the heat budget of a stream and manipulate variables in the model to perform hypothesis tests. Assessment results showed significant improvements in learning and spatial imagination.

3. Digitizing and Databasing a Regional Virginia Herbarium

Sierra Sell, Virginia Military Institute

Anne Alerding, Virginia Military Institute

Rowe Richard, Virginia Military Institute

Herbaria are important historical collections of plants and a repository of temporal biodiversity. They are capable of holding information on plant morphological features, geographical locations of plant populations, changes in plants over time, and the collector/investigator. With the preservation of these plants, herbaria are an extremely valuable resource for ecologists. The herbarium at the Virginia Military Institute (VMI) is the fifth largest in the state of Virginia and contains about 30,000 specimens. Nearly a century of vascular plant data is stored within the collection, with dates ranging from the 1880s through the 1980s. The geographical range includes local Virginia taxa to exotic plants collected from as far as Puerto Rico and Japan. The objective of our research project is to digitize and database the entire collection and make it available online via iDigbio. To facilitate this digital transition, plants must be mounted on paper and photograph ready; about half of VMI's collection lies unmounted. In the summer of 2014, about 10% of the collection was mounted, barcoded, and digitized. Early estimates indicate that there is an average of 10 to 20 samples of each species of plant, sampled from different field locations. The goal of the digitization project is to make data available in the VMI collection available to researchers worldwide to support a variety of ecological projects by providing on-line access.

Oral Session 1B Animal Ecology

4. Two-year Emergence Patterns and Distribution of Overwintering Wood Frogs (*Rana sylvatica*)

Jamie Cromartie, Stockton University

Alex Melchiorre, Stockton University

TJ Johnson, Stockton University

The wood frog (*Rana sylvatica*) utilizes distinct habitats for different portions of its annual lifecycle to feed, breed, and overwinter. The loss of one habitat could cause serious consequences for the population. This report covers the second year of a study to sample wood frogs moving towards a breeding pond at Richard Stockton College of New Jersey. The goal is to investigate their winter distribution and determine whether a reduced 175 ft. or the standard 300 ft. buffer zone protects the majority of the wood frogs' winter habitat. Three concentric rows of drift fence and pitfall traps were constructed February 3, 2015. The first row was near the edge of the vernal pond, the second row was 175 ft. away, and the third row was 300 ft. away. In 2014, continuous calling began March 11, and we observed the first egg mass on March 12. Forty-four percent of total captures occurred at the outer two fences, showing that a significant portion of the population spent the winter farther than 175 ft. away from the breeding pond. In 2015, the first suitable night occurred March 5, followed by heavy snow on the 6th. No frogs have been trapped. We will continue to monitor and report on the frogs as the season progresses.

5. Voluntary Diving Patterns in Adult and Juvenile Diamondback Terrapins

Erika Dahl, Widener University

Wolfgang Trumbauer, Widener University

Itzick Vatnick, Widener University

Matthew Drake, Widener University

Patrick J. Baker, Widener University

Amy Thomson, Widener University

Roger Wood, Widener University

The diamondback terrapin (*Malaclemys terrapin*) is a species of turtles found from Massachusetts to the Gulf of Mexico that lives in brackish waters. Terrapin females

are active during the spring and summer months when mating and nesting is prevalent. The species faces challenges during this time due to high incidence of crab trapping, which can drown the turtles if they are trapped. Previously, we elucidated the voluntary diving behavior of adult male and female turtles and calculated their aerobic threshold and ability to remain submerged. Little is known about the preferences of hatchling and juvenile diamondback terrapins during the first few years of their lives. This study is aimed to elucidate the patterns of hatchlings and juvenile diamondback terrapin voluntary dive times and compare them to the patterns of adult terrapins in a similar laboratory setting.

6. Temporal Variation in Leaf Litter Invertebrates Available to *Plethodon cinereus*

Zachary Barker, Susquehanna University

Tanya Matlaga, Susquehanna University

Carlos Ludica, Susquehanna University

David Muñoz, Penn State College of Agricultural Sciences

One of the most abundant predators present in Eastern deciduous mixed forests is the Red Backed salamander (*Plethodon cinereus*). However, the impact of this predator on leaf litter invertebrate communities is not well understood. We examined *P. cinereus* activity in spring and fall seasons by quantifying individuals found under cover boards in 9 plots (10 m x 5 m; 50 boards in each) at Camp Karoondinha in central PA. Simultaneously we collected leaf litter samples in each plot and extracted invertebrates using Berlese funnels. We quantified the richness and abundance of invertebrates in each sample to gain understanding of phenological changes in the food supply available to *P. cinereus*. We calculated Shannon-Wiener diversity indices and correlation coefficients to show the strength of the relationship between invertebrate diversity and *P. cinereus* activity. Lastly, using analysis of variance we examined how invertebrate diversity varies by plot and sampling date. Preliminary data indicate that leaf litter samples are dominated by members of the orders Collembola and Acari, with taxon richness varying from five to eight orders. In addition, variation by sample date and location indicates that food sources available to *P. cinereus* are impacted by phenology and site characteristics.

Oral Session 1C Plant Ecology

7. Native and non-native perennials respond similarly to different brownfield soil conditions in a greenhouse experiment

Julia Perzley, Rutgers University

Claus Holzapfel, Rutgers University

Plants growing in brownfields have to cope with stressful conditions including high levels of contaminants. I conducted a greenhouse experiment with perennial Asteraceae species to test the hypothesis that certain characteristics of brownfield soil negatively impact the growth of dominant natives more than they affect dominant non-natives. The species studied were natives *Solidago canadensis* and *Eupatorium serotinum*, and non-natives *Cirsium arvense* and *Artemisia vulgaris*. Three treatments mimicked salient brownfield conditions. Soil texture was altered by mixing gravel into topsoil, low nutrients were achieved by adding nutrients to all other treatments including the control, and high metal levels were created by adding soluble salts of chromium, lead, and zinc. A combination treatment was also included. The plants were grown for four months and then were harvested for above- and belowground biomass. Species identity, treatment, and species-treatment interaction significantly influenced the variance of above- and belowground biomass. *Artemisia* and *Solidago* responded similarly across all treatments, with highest biomass in the control treatment, a slight reduction in the gravel treatment, and a larger reduction in the metal treatment. *Eupatorium* biomass peaked in the altered texture treatment, but otherwise performed similarly to *Artemisia* and *Solidago*. Since native *Solidago* and *Eupatorium* performed similarly in brownfield soil conditions to non-native *Artemisia*, there is no support for the hypothesis that non-native species are better adapted to these brownfield conditions than natives. Lower abundance of natives in brownfields may be due to priority effects, competition, propagule pressure, or effects not measurable in one season.

8. The photosynthetic capacity of mature *Betula populifolia* trees growing in metal contaminated soil

Allyson Salisbury, Rutgers University

Frank Gallagher, Rutgers University

Jason Grabosky, Rutgers University

Carbon sequestration by forests, including those in the urban environment, is an important component of many climate forcing mitigation initiatives. However, given the abiotic stresses experienced by urban trees (e.g. low water availability, high temperatures, pollution), these forests may not exhibit the same growth and carbon sequestration patterns as their rural counterparts. To improve our understanding of the ability of urban forests to act as carbon sinks, we studied the photosynthetic parameters of mature *Betula populifolia* trees growing on a brownfield in Jersey City, New Jersey that exhibits high concentrations of soil metals. The study tested the hypothesis that photosynthetic parameters would be significantly impaired by higher metal concentrations in the soil. Photosynthetic parameters, including maximum carboxylation efficiency, carbon dioxide compensation point, and dark respiration rate, were calculated from gas exchange measurements. Monthly measurements were made from May through September 2014. Overall, there was no significant difference between the measured parameters in trees of the high and low soil metal load plots. Though, when compared against the default parameters of a carbon sequestration model, the model overpredicted the parameters for the site's trees. Seasonal patterns were observed: dark respiration was lowest in July while maximum carboxylation efficiency was highest in August. The study's findings suggest that other factors may be influencing photosynthetic productivity in the site in addition to heavy metal contamination.

9. Two centuries of wildfire on North Fork Mountain, West Virginia

Ruth Stetler, Arcadia University

Lauren Howard, Arcadia University

Fire suppression policy has altered disturbance regimes of forested ecosystems in the United States. Preventing burning in fire-adapted communities can lead to successional shifts in forest composition and structure, with negative effects on biodiversity. In high elevation *Pinus pungens* and *P. rigida* communities in West Virginia, prescribed fire has been proposed as a method of combating these shifts by reducing competition and boosting pine recruitment rates. However, more research on the historic range of variability of fire in the central Appalachian region is necessary. We analyzed 14 fire-scarred pine cross-sections to determine historic burn patterns on North Fork Mountain, a representative ridgetop pine community in northeast West Virginia. We investigated the possible influence of climate on fire regime using superposed epoch analysis to compare precipitation before and during 41 fire events between 1785 and 2011. The mean fire interval (MFI) decreased from 7.2 years between 1785 and 1920 to 2.7 years after 1921. A shorter interval during the fire

suppression era was unexpected, although most fires occurred between 1925 and 1955 and no fire scars were observed after 1985. Lower than average yearly precipitation did not correlate with fire years, although prior to 1920, significantly wetter years occurred 3 years before a fire. This trend could be a result of increased fuel load produced by higher growth rates during these wet years. As rainfall did not correlate with fires post-1920, we propose that land use history has more strongly influenced fire occurrence in the last century.

10. Clonal integration and the sharing of resources in common milkweed, *Asclepias syriaca*
Mary Seward, The College of William & Mary
Harmony Dalgleish, The College of William & Mary

Density dependence is found in populations of organisms where density drives growth and death rates. While density usually causes negative growth rates in plants, in clonal plants the effects may be the opposite of this norm because clones are often integrated, meaning that seemingly independent plants are actually physically connected. Through this connection, they are able to share resources. *Asclepias syriaca*, the common milkweed, is a clonal plant of particular interest because of its relationship with the IUCN near threatened Monarch butterfly. Understanding the effects of density on common milkweed will allow researchers to better understand how to maintain healthy milkweed patches that will be capable of supporting the threatened butterfly. The goal of this research project is to investigate density patterns in four field sites across the state to determine if there is density dependence in the common milkweed. Data on plant density, height, and number of viable seed pods will be used to investigate the effects of density dependence. Density will be compared at different "windows" of 0.1-1 meter radii of each plant, as well as overall density of each transect. Density dependence, if present, will affect plant height and the number of seed pods. I expect that there will be density dependence, with plants growing larger and having more viable seed pods in dense patches. Additionally, differences in soil composition will be compared between patches of milkweed with varying densities of milkweed to investigate for the effects soil resources may have on density."

Oral Session ID Microbial Ecology

11. Land use and soil lichen communities in the NJ Pinelands

Natalie Howe, Rutgers University

Among the many unusual features of the New Jersey Pinelands National Reserve is the diversity and abundance of the lichens there. In some areas, they form extensive mats on the sandy soils that can influence soil nutrient cycling and decomposition processes. I characterized the lichen communities on 5 such sites across the Pinelands, and measured soil properties including soil moisture, soil organic matter, soil nutrient availability, and soil micro-arthropod abundance. In this study, I describe the different land uses and fire histories of these sites, and use ordination methods to compare the lichen communities and the soil processes taking place at each site. I found that the lichen communities and the soils below them were similar across very different land use histories, with the exception of one site, the Manumuskin River Preserve. This site had more soil organic matter, more soil moisture, more microbial respiration, and has higher collembolan abundance. This is important work because it reinforces the conservation value of that particular site. Also, these findings challenge traditional conceptions of lichen ecology; many tree-dwelling lichen communities are restricted to old growth forests, but my work shows that soil lichen communities across the NJ Pinelands are more robust to habitat disturbances than we had expected.

12. Analysis of the Interaction between the Human Skin Microbiome and its Environmental Surroundings

Aurora Landis, Elizabethtown College

Debra Wohl, Elizabethtown College

Factors influencing the composition of communities are of fundamental importance in ecology. The microbial community found on the human skin is constantly interacting with external microbial communities. This study aims to evaluate the interaction between the human skin microbiota and that of the environment. Surface samples (n=10) were collected from lab tables and volunteer's forearms (n=31) before and after a three-hour lab class in accordance with IRB approved protocols. Samples were analyzed for changes in microbial communities by measuring (1) numeric differences in microbial diversity using culture based methods, (2) changes in microbial diversity determined by Randomly Amplified Polymorphic DNA (RAPD) finger-printing,

and (3) changes in functional diversity using Ecolog plates. No significant results were identified for numeric differences (CFU/ml) in microbial samples taken from people or from tables ($p=0.706$, $p=0.468$ respectively). On average, 21.9 ± 17.6 CFU/ml were present on forearms prior to lab and 23.7 ± 18.1 CFU/ml after lab. DNA concentrations for all samples, cell density, ranged from 2.3-15 ng/ μ l with no significant difference before and after lab for tables or people ($p=0.860$, $p=0.133$ respectively). Changes in functional diversity were determined based on Ecolog plates. Data were analyzed using SPSS hierarchical clustering, which showed tables and forearms form unique clusters. These results also showed functional diversity changed in response to people-table interactions. It is anticipated that DNA fingerprinting will further support these findings; interactions of <3hrs can significantly alter microbial diversity and function within the community.

13. Impact of Zucchini yellow mosaic virus on the competitive ability of pollen in a population of transgenic wild squash

Danelle Weakland, Penn State University

Jacquelyn Harth, Penn State University

Andrew Stephenson, Penn State University

Gene flow between cultivated squash and wild squash (*Cucurbita pepo ssp. texana*) is common and well documented. It is likely that this has resulted in the introduction of a virus resistant transgene into wild Cucurbit populations. Unlike most traits of cultivated species, there are concerns that the presence of a virus resistant transgene (VRT) could lead to increased fitness and weediness of wild species and/or have indirect impacts on non-target species such as pollinators, herbivores, predators, soil fauna, and other plants in the community. We have extensively studied the interaction among the key components of the Cucurbita pathosystem, including two herbivores (cucumber beetles and generalist aphids) and the diseases they transmit (bacterial wilt disease and ZYMV), and their impact on the fitness of the VRT. Our data show that the frequency of seeds sired by VRT plants changes as Zucchini yellow mosaic virus (ZYMV) spreads through our fields with a higher frequency of seeds sired after peak ZYMV spread. Additionally, we see that a greater than expected proportion of seeds are sired by VRT plants, most likely due to the decreased competitive ability of pollen produced by ZYMV infected plants.

14. Impacts of Zucchini yellow mosaic virus on the establishment and spread of Powdery Mildew in wild squash

Kayla Nowak, Penn State University

Jacquelyn Harth, Penn State University

Andrew Stephenson, Penn State University

We have extensively studied the interactions among transgenic *C. pepo* ssp. *texana introgressives*, the primary herbivores (cucumber beetles and aphids), and the pathogens they transmit (*Erwinia tracheiphila*, and three mosaic viruses) and found that the fitness of the transgene during escape is influenced by the full ecological community. Indirect costs associated with increased exposure to herbivory by cucumber beetles and the bacterial wilt disease they transmit can mitigate the fitness benefits of the VRT. Recent evidence suggests that viral infection negatively impacts the establishment and spread of a third pathogen in our system, powdery mildew, further mitigating the fitness benefits of the VRT. Field studies reveal that because a higher proportion of transgenic plants remain virus free during the growing season, transgenic plants are both more likely to reproduce and yield a greater number of fruits. These results would suggest that transgenic plants have a strong selective advantage. However, we find that the fruit production of transgenic plants is only marginally greater than that of non-transgenic introgressives. In part, this can be explained by increased exposure of transgenic plants to *Erwinia*. Our data also show that healthy plants get proportionally more powdery mildew than virus infected plants. As a consequence, during widespread viral epidemics, transgenic plants get proportionally more powdery mildew than non-transgenic plants further reducing the benefits of the VRT. Additionally, powdery mildew symptoms are significantly more severe on healthy plants since transgenic plants remain healthy during viral outbreaks, they are disproportionately affected by powdery mildew.

Oral Session 2A Land Use

15. How can we make our work interpretable 10 years hence, in areas with slow habitat damage by deer, invasive plants, etc?

Eugene Meyer, Natural History Society of MD

Widespread damage is occurring in forests in the Mid-Atlantic region, damage evident on the scale of years. Articles published 10 or more years ago are becoming less interpretable if they do not note the most obvious signs of habitat over-simplification and collapse. This applies even to research on animals such as reptiles and amphibians where forests and fields are not the primary objects of study, but rather the contexts for animal growth, reproduction, survival from predation and exposure, and their detection

by biologists in studies. I will suggest what to look for, where to look for it, and why. Local records are important because these impacts differ greatly by location even at the same time in the same state. In ecology, textbooks and articles tend to overlook that severe deer damage varies geographically even though Aldo Leopold published a detailed article on that in 1947. It is summarized nicely in Warren's Hunter's Game. This presentation ends with positive points. First, old photos and notes on local conditions have value and can be useful enough to warrant publication. Second, recovery has aspects that we can detect quickly and easily. This presentation is meant less as a lecture, and more as a spur to discussion.

16. Land use effects on earthworm community composition on agricultural lands in Southwestern Virginia

Elsa Wieboldt, Roanoke College

Rachel Collins, Roanoke College

Humans focus agricultural practices to maximize productivity. Earthworm presence can increase the productivity of agricultural land. Some agricultural practices decrease habitat quality for earthworms through increased compaction, yet other practices increase habitat quality through increased carbon sources (i.e., farm animal dung). In order to understand how agricultural habitats affect earthworm communities, we investigated earthworm communities across three habitats (pasture, fence row, forest fragments). Earlier work showed little difference in diversity and abundance across habitats. Here, we speculated that earthworm may respond to habitats in terms of relative abundance among functional feeding groups (i.e., surface, intermediate, or deep dwelling niches). Specifically, we predicted that 1) because pastures have substantial surface food sources (i.e., dung and vegetation) the relative abundance of epigeic (surface dwelling) species would be highest; 2) fence rows are an ecotone between forests and pastures, therefore epigeic species relative abundance would be intermediate between the other two habitats; and 3) forest fragments are least compacted allowing earthworms to fill all three niches, evenly. To test our predictions, we collected earthworms in three habitat types at five farms in 2013 and 2014. Across habitat types, we found similar relative abundances in the functional feeding groups. Endogeic species (intermediate depth dwelling) had the greatest relative abundance and anecic species (deep dwelling) had the lowest abundance. Our results suggest that some other aspect of the environment is more important in controlling how earthworms fill niches than habitat type. Further, forest fragments in agricultural landscapes may be more heavily disturbed than they appear.

17. Spatial Analysis of Total Habitat and Six Endangered Species Habitats Disturbed by Marcellus Shale Drilling Activities in Selected Areas of Pennsylvania

Sarah Gensel, Widener University

Chad Freed, Widener University

Elizabeth Powell, Widener University

This project used geographic information systems (GIS) technology, a field investigation, and public data sources to both quantify the total land area disturbed by construction activities and the land area disturbed in selected endangered species habitats within the footprint of natural gas mining in the Marcellus Shale Formation for selected areas of Pennsylvania. Unconventional hydraulic fracturing techniques in the Marcellus require more land area for operation than conventional techniques for gas extraction. First, permitted well locations were spatially analyzed for density concentrations. Then orthophotos of the landscape in the densest areas were studied from pre-drilling conditions in 2005 and compared with their current condition to quantify general habitat and endangered species habitat disturbed by land-clearing operations. The disturbed areas were then digitized in a GIS to quantify the total amount of land area disturbed by well pad and pipeline construction. These areas were then intersected with the 2006 Land Cover Map of Pennsylvania to quantify the acreage of individual habitats that were cleared to support natural gas mining. In some areas habitat fragmentation was quantified spatially and temporally. The endangered species in this study are the Northern Flying Squirrel, Least Shrew, Indiana Bat, American Bittern, King Rail and one threatened species, the Long Eared Owl. The habitats that were analyzed in this study are old growth forest, wetlands, caves, undisturbed forests, and undisturbed field growth.

18. The effects of restoration treatments and flooding regime on plant community distributions in restored geographically isolated wetlands

Kimberley Russell, Towson University

Vanessa Beauchamp, Towson University

Wetland creation and restoration has become a controversial practice due to the variability of criteria used to evaluate structural and functional success. Plant community diversity is an important structural quality to have within a wetland because it can be used as a proxy for other functional processes that are more difficult to measure. In order to account for the variability within wetlands, diversity is most effectively measured using partitioning within individual patches (alpha), between patches (beta), and overall species diversity (gamma). Jackson Lane Preserve is an

example of a large, multiple wetland mitigation project located in Caroline County, Maryland that has high variability in size and restoration techniques. The variability within this project served as a good model for the analysis of environmental variables and restoration techniques that provide plant alpha and beta diversity success at different spatial scales. Almost a decade after creation and restoration, eight wetlands within Jackson Lane were sampled for species richness and fourteen additional environmental variables. Formulated Akaike Information Criterion (AIC) models presented straw type, flooding regime, and coarse woody debris (CWD) as the most influential variables on plant species diversity. Non-metric multidimensional scaling (NMDS) analysis showed CWD as the primary environmental variable that controlled wetland plant community composition. The use of CWD is a restoration practice that should be used in any depression wetland mitigation in order to increase biodiversity.

Oral Session 2B Animal Ecology

19. Does Exploratory Behavior Provide an Advantage in Foraging Tasks in Eastern Fence Lizards (*Sceloporus undulatus*)

Kimberly Reylander, Lehigh Carbon Community College
Renee Rosier, Penn State University

For many taxa, individuals that are more active also tend to grow more quickly and have larger body size, which can have significant impacts on fitness. This correlation may result from increased food intake as more active individuals encounter more food items. This predictive relationship has been confirmed for filter feeding animals that must move in order to eat; however, species that use an ambush foraging strategy can also exhibit this pattern of high activity and large body size despite more sporadic feeding events. This relationship suggests that there must be an energetic advantage to higher activity rates even for ambush predators. Ambush predators with higher innate activity levels may be more motivated to eat (i.e., greater appetite) and/or they may encounter potential food items more frequently, which could support larger body size. I tested the assumption that active individuals will eat more using eastern fence lizards (*Sceloporus undulatus*) as a model system. I measured the activity rates of individual lizards (and their tendency to explore) using open field trials and appetite by recording the number of prey items consumed in home enclosures. Additionally, I tested each lizard twice in a maze with concealed mealworms to evaluate foraging tasks. I expect that the more active/exploratory individuals will eat more overall and will also

encounter prey more frequently. If activity rates and/or exploratory behavior do not increase prey encounters, this would suggest that larger body size is unlikely to be the result of accelerated food intake from increased activity.

20. Monitoring monitors: Genetically sourcing invasive populations of Nile monitors (*Varanus niloticus*)

Stephanie Dowell, Fordham University

Jared Wood, University of Louisville

Todd Campbell, University of Tampa

Sergios-Orestis Kolokotronis, Fordham University

Evon Hekkala, Fordham University

Invasive species are the second leading cause of biodiversity loss in the United States, preceded only by anthropogenic habitat destruction. The effects of invasive species are particularly severe for the state of Florida, which is currently ranked as having the highest number of established non-native reptile and amphibian species in the world. The recent introduction of the Nile monitor, *Varanus niloticus*, has the potential to severely damage Florida's ecosystem if the population is not controlled quickly. This large (up to 2 meters in length), carnivorous lizard species is native to sub-Saharan Africa. The broad geographic range encompasses a variety of climates and habitats. By determining the specific source of the introduced population, we can better understand the environmental adaptations of *V. niloticus* in Florida. Using 4251 bp of mitochondrial and nuclear sequence data as well as 11 microsatellite loci, we mapped the genetic structure of *V. niloticus* across its native distribution. By comparing the non-native individuals to this established library of genetic variation, we reliably assigned the Florida *V. niloticus* to a source population in coastal West Africa. Using the environmental characteristics of the source population, we performed species distribution modeling to predict the potential spread of *V. niloticus* in the United States. This information can be used to focus eradication attempts and surveying on areas with the highest likelihood of occurrence to prevent the spread of this destructive invader.

21. Adjacent Land Cover as an Indicator of Amphibian Species Richness in Frederick County, Maryland Wetlands

Evelyn Michael, Hood College

April Boulton, Hood College

Amphibians are frequently used as environmental indicators because their populations are often affected when undesirable environmental conditions occur. Many

amphibian species require forested corridors for migration to wetlands where breeding occurs in spring and summer months. Other land covers, specifically those influenced by humans, deter amphibians from reaching their wetland destinations. While past studies have explored the effects wetlands have on amphibians, this research focuses on the effect land cover adjacent to wetlands has on amphibian species richness, in particular whether certain land covers promote migration to wetland breeding grounds. Amphibian species richness at 14 wetland sites in Frederick County, Maryland was observed for five years. A 200-m buffer of adjacent land cover around wetland sites was manually digitized using ArcMap™ 10.1. Land cover categories consisted of agriculture, impervious, lawn, natural cover, and water. Overall, the wetland sites surrounded by increased natural cover promoted greater amphibian species richness. Impervious surface showed a negative correlation to amphibian species richness, although not significant. This research supports the idea that various amphibian species require vegetative and aquatic areas as migration corridors to reach wetlands, especially the most sensitive species. As indicator species, amphibians represent a multitude of organisms that depend on natural corridors and they highlight the necessity of natural cover restoration and protection.

Oral Session 2C Plant Ecology

22. The microclimatic characteristics of a lowland tropical forest in Iquitos, Peru: ecological implications

John Silverio, Widener University
Peter Pulhac, Widener University
Blake Metcalf, Widener University
Emily Bateman, Widener University
Nick DellaValle, Widener University
Joseph D'Auria, Widener University
Sarah Benson, Widener University
Itzick Vatnick, Widener University
Stephen Madigosky, Widener University

The vertical nature of tropical lowland forests is an important dimension often overlooked as a reason for species diversity. Clearly, much more research needs to be conducted to determine why particular organisms occupy various regions within the forest canopy. Herein, we explore and characterize the physical

dimension of a primary forest located outside of Iquitos, Peru. A series of data loggers were strategically employed throughout the canopy at the Amazon Conservatory Tropical Studies (ACTS) in north east Peru. Data loggers were placed on a string line at 1.5m intervals from the forest floor to approximately 30m above the ground. Loggers were programmed to record temperature every two minutes over the duration of three days. These data were correlated with weather events that occurred during this interval. Parameters such as UV-A, UV-B and PAR were recorded along with rainfall. Results indicate that the canopy is distinctly stratified although very narrowly so. The variation of temperature and relative humidity noted throughout the forest is ideal to support a wide array of organisms.

23. Severe weather and tree mortality in two mixed hardwood forest tracts in the New Jersey Highlands

Brian Wlodawski, Ramapo College of New Jersey

Alyssa Gubitosi, Ramapo College of New Jersey

Eric Wiener, Ramapo College of New Jersey

In recent years, several severe storms have impacted forests of the New Jersey Highlands. The purpose of this study was to examine the species composition and spatial dispersion of canopy and subcanopy trees that were killed by storms. In 2013 and 2014, surveys of all toppled trees, and point-quarter surveys of neighbors of the toppled trees were conducted in two forest plots (37 ha and 59 ha), which are separated by 10 km. For each dataset, chi square analysis was used to compare the species composition of toppled trees with expected values calculated from the species composition of the neighboring trees. Over 400 trees were killed by storms, and spatial patterns of mortality tended to be aggregated. Furthermore, in both forests direct mortality of *Quercus rubra* (red oak) was statistically significantly greater than predicted by the abundance of conspecific neighbors, while patterns for other species tended to vary between the sites. Additional surveys of each site's overall tree flora will be used to determine whether conclusions about the impacts of storm mortality on forest tree species composition vary across different scales. Further analysis will also examine whether topography, edaphic features and tree physiognomy are predictive of spatial trends.

24. Challenges for tree recruitment in suburban forests: deer x invasive plants

Janet Morrison, The College of New Jersey

Fragmented forests in the suburban/exurban landscape are essential for biodiversity and ecosystem services, and they offer nearby human populations a connection to nature. However, many of these forests exhibit a striking lack of juvenile trees, along with overabundant deer and invasion by multiple non-native plant species. Both factors may act against tree recruitment and therefore threaten the future of suburban forests, but their relative strengths and interactive effects are not understood. Two dominant herb layer invaders in eastern forests are garlic mustard (*Alliaria petiolata*) and Japanese stilt-grass (*Microstegium vimineum*). We have established a well-replicated factorial field experiment with all combinations of staged invasions of one, both, or neither species, and exclusion or presence of deer (with fences), across six forests in central New Jersey (224 16 m² plots). In the three most deer-impacted forests, percent cover of juvenile trees increased more from 2012-2014 in fenced vs. unfenced plots, and decreased more in plots with *Microstegium* addition (ANOVA, $P=0.02$ for both effects). Tree species richness also was affected in these forests. It increased the most in fenced plots without *Microstegium* and the least in unfenced plots with *Microstegium* addition. These effects were not apparent in the three forests with lower deer pressure, which also experienced less *Microstegium* invasion success. These early results point to a dual role for deer: as direct herbivores on juvenile trees but also as facilitators of invasion by an herbaceous plant species that itself has a direct negative effect on trees of the future forest.

Poster Abstracts

1. Effect of Inoculant Characteristics on Nodulation Efficiency in Rhizosphere Mutualism

Reid Anderson, Virginia Military Institute

Conor Hogan, Virginia Military Institute

HP Paultre, Virginia Military Institute

Anne Alerding, Virginia Military Institute

Several environmental variables affect the efficiency of *Bradyrhizobium japonicum* and soybean (*Glycine max* L.) mutualism, such as composition of soil, pH, concentrations of mineral nutrients, and water availability. States such as Virginia, West Virginia, and Kentucky have a long history of coal mining and thus a superabundance of soil contaminated with heavy metals. Altering the chemical delivery method of bacterial inoculants may improve rhizosphere chemistry in soils that were considered previously uncultivable. We tested two *B. japonicum* inoculants, one in a more acidic peat medium and the other in a more basic humus medium. The inoculants were introduced to sterilized seeds in vermiculite, and we analyzed nodule dry weight and chlorophyll content of the first expanded trifoliolate leaves. The peat-based bacterial inoculant significantly increased nodule dry weight (10%) and chlorophyll content (4%) over the humus-based inoculant. Our results demonstrate that lower rhizosphere pH at the site of mutualism initiation promotes nodulation of *B. japonicum*, which leads to more plant biomass allocation to nodules which could lead to greater N supply in support of chlorophyll production. Future research will investigate the best use of acidic or basic inoculants to reclaim heavy metal contaminated soils for agricultural use.

2. Sexual Dimorphism in the Masseter Muscle of the Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*)

Evan Appod, Washington and Jefferson College

Joe Greathouse, the Wilds

Conservation efforts regarding the Eastern Hellbender are dependent on compiling demographic information concerning population dynamics and sex ratios. The window for these studies is limited due to a lack of reliable sexual dimorphism in the hellbender outside of the breeding season. Sexual dimorphism typically exist in populations with intense male-male competition for mates. The only current dimorphic trait is the swelling of the cloaca in males during the breeding season. We examined if the masseter muscles could be utilized as a reliable indicator of hellbender sex through

samples of hellbender populations throughout West Virginia streams during the breeding season. We analyzed 12 morphological features of the hellbender including masseter height, length, and width, tail length, and snout-to-vent length, among other traits and found that the masseter height/tail base circumference ratio did significantly differ between males and females ($df=20$, $t=-2.504$, $p=0.021$). However, this feature was considered an unreliable dimorphism due to swelling of the cloaca interfering with tail circumference during the breeding season. Both the masseter height/total length ($df=20$, $t=-1.999$, $p=0.06$) and masseter height/SVL ($df=20$, $t=-2.014$, $p=0.058$) approached significance and may prove to be reliable indicators of sex if a more representative sample of the population is collected and analyzed. Although hellbenders depict several potential morphological sexual dimorphisms, only one reliable indicator is still known and research concerning this dilemma is still required to advance hellbender research.

3. The Ramapo Mountains (New Jersey Highlands) as a site for observing raptor migration

Anthony Assante, Ramapo College of New Jersey

Kyle Scherm, Ramapo College of New Jersey

Eric Wiener, Ramapo College of New Jersey

The purpose of this study was to ascertain whether the Ramapo Mountains (Bergen and Passaic Counties, New Jersey) might serve as a useful site to monitor migrating raptors. Among the three ridges that make up the Ramapo Mountains, two lookouts at 302 m and 268 m elevation were identified as effective sites to view migrant raptors, depending on wind direction. During 170 hours of observation between September 8 and November 10, 2014, 10,167 migrating raptors of 15 species were recorded. *Buteo platypterus* (broad-winged hawk) was by far the most common species, followed by *Accipiter striatus* (sharp-shinned hawk). Because other hawk-watching sites in the region reported 200 % or more observation time than this study, comparisons with the ten closest sites in northern New Jersey, southeastern New York and western Connecticut focused on just the days on which data were recorded in the Ramapo Mountains. The Ramapo Mountains had the first, second or third highest number of *B. platypterus* on four of the seven observation days during their peak period of migration. The highest numbers occurred with light winds from the northwest, north or east. The Ramapo Mountains had the first, second or third highest number of *A. striatus* on seven of the twelve observation days during their peak migration. The highest numbers occurred with winds from the south, southwest or west. In conclusion, the Ramapo Mountains have excellent potential for monitoring raptors during autumn migration.

Preliminary data suggest that the study area may prove even more valuable during spring migration.

4. Spatial distribution of American chestnut seedlings and saplings in a forest tract along the highest ridge of the New Jersey Highlands

Danielle Bara, Ramapo College of New Jersey

Eric Wiener, Ramapo College of New Jersey

Since the American chestnut tree (*Castanea dentata*) was nearly wiped out by a blight (*Cryphonectria parasitica*) during the first half of the 20th century, today the only remnants of most American chestnut tree populations are sporadic, short-lived saplings that continue to sprout from remnant roots. The purpose of this study was to examine the spatial and size distributions of a fairly extensive population of American chestnut seedlings and saplings that have sprouted from roots in a 10.3 hectare survey area (450 m - 475 m elevation) in Northwestern New Jersey. Additional objectives were to evaluate environmental factors that might be correlated with chestnut sapling establishment and growth, and to provide baseline data for future surveys. Preliminary data show that most of the more than 200 American chestnut saplings at the study site occur along the one large, open trail where abundant sunlight penetrates to the forest floor. An understanding of the degree to which the successful regeneration of young American chestnut trees relies on moderate to large canopy openings in the forest could help in efforts to establish populations of blight resistant, hybrid strains of chestnuts trees in forests across their historic range. As such, results from this study are serving as a guide in the search for forest microhabitats that might serve as candidate sites for chestnut restoration projects in other forest areas of the New Jersey Highlands.

5. A feasibility study of using unmanned aerial vehicles to survey avian abundance by using audio recordings.

Janine Barr, Gettysburg College

Andrew Wilson, Gettysburg College

Roadside counts are commonly used to assess songbird abundance, but they result in oversampling habitat edges and underrepresenting core habitats, areas of steep terrain, and wetlands. Accessing off-road habitats can be logistical challenging and time-consuming, resulting in low survey efficiency. Aerial ecological surveys, using unmanned aerial vehicles (UAVs, or drones) have already proven to be valuable in wildlife monitoring. Previous studies have used photography or videography to provide permanent documentation of wildlife surveys through low altitude aerial imagery. A

significant advantage of UAVs over manned aircraft is their greater safety and lower costs. We propose that UAVs can also be used to conduct audio surveys of vocal species. Here, we report on experiments to test the feasibility of using UAVs to conduct point counts of songbirds.

To establish the detection radius of bird songs recorded with a microphone attached to a UAV (DJI Phantom 2.0), recordings of the songs of five regionally abundant bird species (Wood Thrush, Eastern Towhee, Song Sparrow, Chipping Sparrow, and Eastern Meadowlark) were broadcast at distances of up to 140m from the UAV, which was flown at three altitudes (20m, 40m, and 60m). We found that detection rates and radial detection distances of the broadcasts did not differ with UAV altitude. Bird recordings were clearly audible at radial distances of 60m. We conclude that it is feasible to use UAVs to conduct aerial point counts that are comparable with traditional terrestrial bird point counts, and describe additional field experimentation needed to refine our survey protocols.

6. Spatial and temporal relationships between forest bird declines and prevalence of the hemlock woolly adelgid in the northeastern United States

Julie Blum, Gettysburg College

Andrew Wilson, Gettysburg College

The eastern hemlock (*Tsuga canadensis*) is a vital foundation tree species throughout the eastern United States, providing essential structural diversity and habitat for more than 120 different animal species. Within the past few decades, *T. canadensis* has undergone significant declines that are largely associated with the hemlock woolly adelgid (HWA; *Adelges tsugae*), an exotic, aphid-like insect native to East Asia. Since the early 1970s, the HWA has spread throughout southern New England, large portions of the Mid-Atlantic region, and in southern Appalachia. Research has shown that loss of the eastern hemlock is drastically altering forest community structures, potentially impacting a wide variety of forest fauna, including avian populations strongly associated with hemlock forests. Here we present research investigating the correlation between HWA infestation and recent declines of hemlock-associated forest birds in the Eastern US. We analyzed bird population trend data for 746 North American Breeding Bird Survey (BBS) routes for the period 1966-2013, and related trends to forest cover, hemlock prevalence, and the temporal spread of HWA. We found a significant correlation between the timing of HWA arrival and declines of conifer obligate songbirds; for example, the Black-throated Green Warbler (*Setophaga virens*) and the Blue-headed Vireo (*Vireo solitarius*) showed steep declines on BBS routes, commencing around four years after initial HWA infestation. Populations of

forest generalist birds (e.g. Red-Eyed Vireo, Tufted Titmouse, White-Breasted Nuthatch, and Ovenbird) showed linear population trends throughout the period, with no change in population trajectory following HWA infestation.

7. Effects of Herbicides on *Oplismenus undulatifolius* (Wavyleaf Basket Grasses)

Megan Cleaver, Towson University

Vanessa Beauchamp, Towson University

Invasive species are a threat to ecosystems due to their potential ability to out-compete and displace native species. These effects can cause alterations in food webs and reductions in biodiversity. *Oplismenus undulatifolius* (wavyleaf basket grass) is a new invasive grass species in the mid-Atlantic area. *Oplismenus undulatifolius* possesses the relatively unique mechanism of seed dispersal for grasses: producing an adhesive substance on its seeds allowing for effortless transportation on a host and into a new location. Having this advantage, *O. undulatifolius* is capable of reaching and dominating suitable landscapes if unmanaged. One potential method of management is the usage of herbicides. Although herbicides can work effectively on targeted populations, there is also the drawback that excessive amounts can result in the decrease of biodiversity. The efficacy of Roundup Pro, used at varying concentrations of 9,14,18, and 36 oz/acre, and Envoy Plus, applied at concentrations of 16, 20, and 24 oz/acre, was tested on *O. undulatifolius* in June 2014. Comparison of *O. undulatifolius* cover and plot-level species richness prior to treatment and again in October 2014 indicated both herbicides, at all concentrations, and hand weeding successfully reduced wavyleaf populations in comparison to when no treatments were applied. Roundup Pro and hand weeding were considered to be more effective than Envoy Plus in both experimental locations. Even though, *O. undulatifolius* populations were reduced or eradicated through treatments, species richness in the Roundup Pro treated plots also decreased compared to untreated control plots, furthering the concept of herbicides affecting the biodiversity negatively.

8. Earthworms, the herb layer, and invasion success of two non-native plants in eastern, suburban forests

Priya Dalal, The College of New Jersey

Cynthia Timko, The College of New Jersey

Janet Morrison, The College of New Jersey

North American forest ecosystems are greatly affected by earthworm populations. They modify soil microenvironments and affect bottom-up change by

shifting nutrient cycling and interacting with native and non-native invasive plants. Garlic mustard (*Alliaria petiolata*) and Japanese stilt-grass (*Microstegium vimineum*) are two invaders that can dominate the herb layer in eastern, suburban forests, including our study forests. We aimed to assess the potential for earthworms to influence both the herb layer plant community and the success of these two invaders. We investigated the relationship between earthworm abundance, native abundance, and invasion success of *A. petiolata* and *M. vimineum*, in 4 x 4 m plots that are part of a large field experiment in which we have staged novel invasions. In late June, 2014, we extracted earthworm samples in each plot by electroshocking, and censused all plants in the herb layer in early fall. We recovered six non-native and one native earthworm species from 32 plots across two forests in central New Jersey. Earthworm abundance was much greater in the forest with higher deer pressure (20.6 vs. 3.6 worms per sample, on average), which had only 0% – 4.7% native herb layer cover. In that forest, earthworm abundance was positively correlated with native herb cover ($r = 0.54$, $P = 0.02$), which counters the documented negative effects on plant communities by some non-native earthworms. In contrast, there was some indication of a negative relationship between earthworms and *Microstegium* cover (but none with *Alliaria* cover, which was very low).

9. Effect of food type on *Dugesia* (Platyhelminthes) behavioral response: Are some foods tastier?

Kelly Dawson, Roanoke College

Rachel Collins, Roanoke College

Animals use chemical cues to find food and avoid predation. Lunged snails for example will quickly find shelter when there is a predator cue, such as crushed conspecifics, added to the water. A previous study demonstrated that *Dugesia* (Platyhelminthes), however, are equally attracted to food and predator cues. We wanted to further explore whether *Dugesia* behavioral responses varied with different food types. We observed 24-hour starved *Dugesia* behavioral responses to three food cues: crushed conspecifics, beef liver, and commercial food pellets. We predicted that *Dugesia* would be more attracted to the liver and conspecifics than the commercial food pellet because of the higher protein content in the animal-based food sources. Our treatments were the three food cues each replicated four times. An experimental unit comprised of a round 986cm² dish with the food cue placed near one edge and 10 *Dugesia* placed on the opposite side of the dish. Every minute we recorded the distance each animal was from the food cue for 10-minutes. We found that *Dugesia* were more attracted to the liver and least attracted to the food pellet. Their response to conspecifics was intermediate. Our results suggest that this detritivore makes

feeding decisions based on food type and that they do not avoid crushed conspecifics to the same degree as other aquatic invertebrates do.

10. Overwintering habitat selection by painted turtles in relation to water temperature

Lindsay Diehl, Elizabethtown College

Haley Kearns, Elizabethtown College

David Bowne, Elizabethtown College

How individual animals select habitat is a fundamental question in ecology. This selection may vary as needs of an animal seasonally change. We investigate how *Chrysemys picta* (Eastern painted turtle) use habitat at Elizabethtown College in the fall and winter, a period of lower activity. We hypothesize that *C. picta* will select overwintering locations on campus based largely on higher water temperature and should therefore, select the warmer pond. As ectotherms, turtle body temperature is dependent on external temperature. Five *C. picta* from Lake Placida and five from Weird Pond were fitted with temperature-sensitive radiotransmitters and then released back into their respective ponds. By use of telemetry, we located and determined the temperature of individual turtles on a daily basis from early September to late November 2014. Three of the five turtles released into Lake Placida remained there for the entire study, while one moved from Lake Placida to Weird Pond and back to Lake Placida, and another moved from the lake to land, and back to the lake. Of the five turtles released into Weird Pond, only one remained there for the entire study. Two moved to either land or to Lake Placida, but eventually returned to Weird Pond. One moved from the pond to land, back to the pond, and ended in Lake Placida. The last turtle left Weird Pond shortly after being released and remained on land for the duration of the study, ending in Flooded Dump. These movements reflect the complexity of turtle movement behavior.

11. Where's the stink? Landscape features influencing distribution of *Sternotherus odoratus*

Alexandra Doran, Elizabethtown College

David Bowne, Elizabethtown College

Sternotherus odoratus (stinkpot) is a common species of turtle, with a range from New England to central Texas, and can be found in slow moving bodies of water. However, this species is not found in any pond on the Elizabethtown College campus, despite the campus being well within its range. This project was piloted to determine a potential reason for the absence of the turtle on campus. We hypothesize that if more forested land is present around a pond then it is more likely that the species will be

detected. This study utilized data collected by TurtlePop, a collaborative project of the Ecological Research as Education Network. Faculty and students in the eastern United States surveyed turtles over a two-year period. Using ArcGIS software, we then measured the amount of forest, agricultural fields, open water, and roads around each pond at three distances (100, 250, 500 m). We then used logistic regression to determine if landscape characteristics can explain the presence of *S. odoratus*. Through comparison of ponds where *S. odoratus* is and is not located, we can begin to determine which landscape features influence the geographic distribution of this species. This may help explain why this species is not on the Elizabethtown College campus.

12. Potential facilitation of a native forb by white-tailed deer reduces the productivity of a non-native grass in post-agricultural woodland

Hannah Fairley, Kutztown University

Christopher Habeck, Kutztown University

Microstegium vimineum is a non-native annual grass that is impacting biodiversity in eastern deciduous forests. Management of *Microstegium* is typically conducted by removal once annually for five years. Our goal was to create a plan to decrease the time needed to eradicate *Microstegium*. Within our experiment, we made three predictions: 1) hand weeding *Microstegium* multiple times during the growing season will increase the speed of eradication, 2) deer exclusion will reduce stiltgrass and increase native species cover, and 3) the combination of multiple removals and deer exclusion would be more efficacious than either treatment on their own. To test these predictions, eight paired 1m² quadrats were established in eight 100m² plots during June 2013. Half of all plots excluded deer. Each quadrat within a pair was assigned to receive either a single event or multiple removal events of *Microstegium* per growing season. We measured species covers and evaluated the efficacy of the treatments using a split-plot ANOVA. Our results do not support any of our predictions. Multiple removals did not reduce *Microstegium* cover in any treatment combination. On the contrary, total plant cover ($F_{1,6} = 8.721$, $p = 0.0255$) and relative cover of *Microstegium* ($F_{1,6} = 4.805$, $p = 0.071$) was greatest when deer were excluded. We suspect that deer facilitation of a native annual, *Persicaria pennsylvanica* ($F_{1,6} = 9.93$, $p = 0.012$), is the mechanism driving these counterintuitive patterns. We conclude that, in our post-agricultural woodland system, deer negatively impact the productivity of a non-native grass by facilitating a native annual forb.

13. Movements of Painted Turtles in the Changing Water Temperatures of Lake Placida

Lisa Foose, Elizabethtown College

David Bowne, Elizabethtown College

Radiotelemetry was used to track the movements of ten painted turtles (*Chrysemys picta*) across the campus of Elizabethtown College, particularly in Lake Placida. In late August 2014, the ten painted turtles were trapped on Elizabethtown College, fitted with temperature-sensitive radio transmitters, and released back into their sites of capture. The turtles were tracked almost daily through early December. In Lake Placida, each turtle's location was recorded as two compass bearings that were triangulated to one of eight quadrants. The length of ten transmitter pulses was recorded and converted to temperature data using calibration curves. It was hypothesized that less movement would be seen in Lake Placida in warmer water temperatures. At the end of daily data collection, five turtles were in Lake Placida for a long enough period of time so that the data could be analyzed well. We found no significant differences in daily movement among turtles, most likely because of the small size of the lake. It was found that each turtle moved the same amount every day and that there were no seasonal changes in movement. These results may indicate that the productivity of the aquatic habitats involved in the study was slightly greater at warmer temperatures, resulting in less movement needed to acquire resources such as food. At colder temperatures, productivity was lower and resources were scarce, resulting in greater, more random movements needed.

14. Preliminary analysis of invasive plant species occurrence along the Appalachian National Scenic Trail in Pennsylvania

David Grow, Kutztown University

Christopher Habeck, Kutztown University

Marian Orlousky, Appalachian Trail Conservancy

Invasive plant species can threaten the biodiversity and functioning of ecosystems. However, the threat of invasions are undocumented in many areas. Resource managers need data on the location and magnitude of damaging forces to adequately evaluate mitigation options. During summer 2014, we surveyed the distribution and abundance of invasive plants along Appalachian National Scenic Trail (A.T.) in Pennsylvania to guide management of this resource. We recorded the location and size of invasions with the condition that points of invasion were separated by a trail distance of 30 m. At each invasion point, we collected environmental variables as

possible predictors of invasion location and size. Here, we report preliminary results for the four most abundant plant species: *Alliaria petiolata*, *Berberis thunbergii*, *Microstegium vimineum*, and *Rosa multiflora*. We documented 2622 points of invasion along the 370 km of the PA-A.T., or 7.1 points km⁻¹. The total points and points km⁻¹ were highest for *Microstegium vimineum* (53% of all points; 3.8 points km⁻¹). Average area of individual invasions differed across species ($p < 0.0001$), being largest for *Microstegium vimineum* (7.6 ± 0.5 m²) and lowest for *Alliaria petiolata* (1.6 ± 1.0 m²). Given this preliminary analysis, we conclude that *Microstegium vimineum* represents a significant threat to the biological integrity of the PA-A.T. We are analyzing these data further to understand environmental patterns of invasion and the efficacy of using easily collected environmental data to predict areas vulnerable to invasion and proliferation.

15. Evaluating the Impacts of a Novel Wetland Restoration on Amphibians

Troy Gruber, Elizabethtown College

Ryan Conway, Elizabethtown College

David Bowne, Elizabethtown College

During the 19th century, Pennsylvania experienced drastic changes in wetlands due to the construction of milldams. A new technique involving removing legacy sediments from behind dams has been implemented as a restoration strategy in Pennsylvania streams. In this study the effects of this type of restoration on amphibian populations were examined. Big Spring Run in West Lampeter, PA was used as the location for this study. Salamanders were collected through a variety of different capture methods in order to maximize the probability of capture. Species, size, and the stage of life cycle were recorded for each salamander captured and then released. It was hypothesized that salamander population would decrease immediately after restoration with a steady increase of population in subsequent years. One species *Pseudotriton ruber* was predicted to increase in population as the restoration was expected to produce a more suitable habitat for the salamander. Data were collected during the summer before the restoration of October 2011 and again annually up to 2014. Analysis of the data showed a trend in *Eurycea bislineata* population that indicated a modest rebound after a large reduction in population immediately after the restoration, supporting our hypothesis. *Pseudotriton ruber* was only found post-restoration in 2012 leading to the conclusion that populations may be very small and more time may be needed for significant population growth.

16. Gut microbial community in Maryland populations of *Onthophagus taurus* Schreber

Mallory Hagadorn, Salisbury University

Kaitlyn Mitchell, Salisbury University

Anne Estes, University of Maryland Medical School

Julie C. Dunning Hotopp, University of Maryland Medical School

Dana L. Price, Salisbury University

Dung beetles (Coleoptera: Scarabaeidae and Geotrupidae) provide critical benefits to human society through rapid degradation and burial of animal dung. Vertically transmitted gut endosymbionts assist these beetles in digestion of cellulose (dung) and supplementation of essential nutrients lacking in this food resource. Hence, the presence of these endosymbionts allows dung beetles to occupy an ecological niche that would otherwise be unexploitable. Our research aims to examine the gut microbiota of the dung beetle species *Onthophagus taurus* Schreber in order to determine if they possess a core gut microbiome in populations across Maryland. Identifying core commonly occurring microbial species within a host population is important to understanding how these individuals function within a particular habitat. During July 2013, *O. taurus* specimens were collected from 28 Maryland cattle farms with varying livestock management practices. Using next-generation sequencing technology we assessed the gut microbial composition of 272 specimens. Dung beetle-microbial symbiosis is currently in its infancy; therefore, our research provides a foundation of knowledge regarding the gut microflora in *O. taurus*.

17. Consequences of Plant Density and Natural versus Simulated Herbivory for Common Milkweed

Melissa Hey, College of William & Mary

Harmony Dalgleish, College of William & Mary

John Couture, University of Wisconsin-Madison

To gain a better understanding of the drivers of escalation in defenses in common milkweed, *Asclepias syriaca*, we tested two hypotheses: (1) increased plant density results in competition which lowers plant defenses to herbivory and (2) Natural and simulated herbivory should induce the same defensive responses in milkweed as long as the simulated herbivory is done in the same relative amount and to the same plant tissue as natural herbivory. Our study consisted of common milkweed grown at low and high densities, which were then subjected to natural herbivory by monarch caterpillars or simulated herbivory done by ripping of foliar tissue. Plant size and defenses were sampled three times within a 72 hour timeframe. Our density treatments showed that competition has significant effects on all measures of size. As expected,

plants in the low-density treatments were consistently larger than those in the high-density treatment. For example, leaf area in the low-density was 44.47 ± 2.84 cm² versus the high-density which was 27.81 ± 2.57 cm² ($P = 0.003$). Height and basal stem diameter showed similar results. Plants in the high-density treatment had higher cardenolide concentrations than those in the low-density treatment after 24 and 48 hours, but this pattern reversed at 72 hours ($P = 0.04$). We also found that simulated herbivory induced significantly higher cardenolide concentrations than natural herbivory across both density treatments after 72 hours: Simulated = 7.20 ± 0.31 , Caterpillar = 6.44 ± 0.31 $\mu\text{g mg}^{-1}$ ($P = 0.04$).

18. Agricultural transition in Pennsylvania as a major ecological factor.

Rebecca Jackson, Bryn Athyn College

Eugene, Potapov, Bryn Athyn College

When the first settlers arrived in Pennsylvania the natural ecosystems began conversion into agricultural domains. The agricultural ecosystems expanded westwards and were accompanied by large scale deforestation of the state and development of the transportation system. Initially the transportation system was based on horses which required calculable amounts of hay fields. Development of technology replaced horses with steam or gas engines and thus the requirements for hay fields declined. The availability of artificial fertilizers eliminated the practice of crop rotation and caused a switch from traditional crops such as barley or wheat into corn. The dominance of corn in the agricultural landscape of Pennsylvania as well as the reduction of hay fields had a significant effect on the natural biodiversity of the region. This tradition coincided with the extinction of the Passenger Pigeon and Heath Hen. In the study we try to quantify the links between the trends towards monoculture and biodiversity in the region.

19. Demographic study of smooth coneflower (*Echinacea laevigata*) populations in southwest Virginia: Evaluating the stability of a federally endangered species

Hannah Johnson, Roanoke College

Rachel Collins Roanoke College

Huish Ryan, Hollins University

Ryan Klopff, Virginia Department of Conservation and Recreation

Sam Truslow, The Nature Conservancy

Smooth coneflower (*Echinacea laevigata*) is a federally-listed endangered perennial endemic to forest glade habitats (i.e., permanent forest openings with rocky, basic soils). These glades serve as specialized habitat for other endemic species as well.

Humans have altered forest dynamics causing trees encroachment in glades. In June and July 2014 we censused *E. laevigata* populations at three sites managed by the Virginia Department of Conservation and Recreation (VDCR) and The Nature Conservancy (TNC). These populations were previously surveyed in 2003 by the VDCR and TNC as part of the species recovery plan put in place. We found that population density was inversely correlated with canopy closure (linear regression $p=0.03$, $r^2=0.57$). Size class distribution varied across sites. The two largest populations illustrated a “j shaped” size distribution curve (most plants were less than 150 cm²) whereas smaller populations had flattened distributions. Similarly, large populations had more flowering plants in smaller size classes than in small populations where the flowering plants tended to be larger. Taken together, these results suggest that there are different population dynamics operating in large and small populations. Our next step is to see whether large and small populations are increasing or decreasing in density. Such information would likely elucidate how management techniques could most effectively be applied. Improving glade habitat quality for *E. laevigata* could benefit other endemics glade species.

20. Modeling the impacts of sea level rise on ecosystem services of the urban-coastal fringe in Jamaica Bay, New York.

Alexis Kleinbeck, Rutgers University

Max Piana, Rutgers University

Marci Meixler, Rutgers University

Sea level rise (SLR) is projected to impact coastal cities and ecosystem functions of urban-coastal landscapes. This study presents an original model for the Jamaica Bay watershed in New York City, addressing two target questions, 1) What are the ecosystem services provided by the urban-coastal fringe of the Jamaica Bay watershed; and 2) What is the projected impact of SLR on the provision of these ecosystem services? We developed a model that synthesizes two types of land cover data, a static SLR model, and empirical research on urban and wetland ecosystem services to calculate carbon sequestration (kg C/m²/yr) and carbon storage (kg C/m²) for present and future landscape conditions. The model results demonstrate that SLR will reduce carbon sequestration and carbon storage across all land cover types in the Jamaica Bay watershed. Between 2010 and 2100, majority of land loss due to SLR is in the coastal zone, resulting in a 91% decrease in wetlands and 27% decrease in maritime forest/shrub communities. Projections of total land loss (<6%) have significant impacts on carbon flow, indicating a 60% decrease in annual carbon sequestration and 9% decrease in carbon storage. The model may be extended to other urban coastal landscapes in the northeast United States and may be adapted for additional ecosystem

service measures. Ultimately, such modeling may be utilized to identify areas of ecological vulnerability and value to inform and direct conservation, restoration, and urban planning—thereby increasing the future resilience of coastal cities.

21. An historical timeline of ESA's efforts to promote ecological literacy and enhance human diversity among ecologists

Kenneth Klemow, Wilkes University

Carmen Cid, Eastern Connecticut State University

Laura Solomon, Wilkes University

Teresa Mourad, Ecological Society of America

Julie A. Reynolds, Duke University

Thanks to the contributions of many members and its leadership, ESA has been at the forefront of improving ecological literacy and promoting increased gender and ethnic diversity, especially in the last 25 years. As part of ESA's centennial celebration, members of the ESA's Committee for Diversity and Education are constructing a timeline to capture the historical milestones of education and diversity efforts undertaken by the ESA. Similar to the ESA's other timelines, the Education and Diversity timeline will be placed on Tiki-Toki software, and is linkable through the ESA's webpage. Work on collecting background information for the timeline was initiated in January 2015, and the timeline itself will become active and accessible in the weeks before the August 2015 ESA conference. The timeline is intended to remain open for additions and edits during and after the conference. The Education and Diversity timeline captures important ESA initiatives and profiles leaders fostering ecological literacy and enhancing human diversity among ecologists. The timeline recognizes and profiles those having a special impact on enhancing ecological literacy and human diversity among ecologists, including recipients of the Odum and Diversity Awards. Visitors to the timeline can trace the evolution of ESA's efforts in education and human diversity, and appreciate how early initiatives spawned later efforts (e.g. the first WAMIE report inspired the development of SEEDS and ESA's Office of Education and Diversity Programs).

22. Vegetation Assessment of the Transco Natural Gas Pipeline in Northeastern Pennsylvania.

Kenneth Klemow, Wilkes University
Abdullatif Alghusn, Wilkes University
Berhe Tekalign, Wilkes University
Marc Davis, Wilkes University
Darrell Dech, Wilkes University
Christopher Kropiewnicki, Wilkes University
Carley Smith, Wilkes University

The expansion of the shale gas industry in Pennsylvania is leading to the installation of more than 16,000 miles of new gas pipeline statewide. Vegetation within pipeline corridors are maintained as herbs, grasses, and low shrubs to facilitate access and prevent tree roots from damaging the buried lines. Such vegetation prevents downstream erosion, and can provide habitat to grassland animals. However, corridors fragment forests and serve as potential avenues for invasive species. To better understand vegetation composition within an established pipeline ROW, vascular plants were assessed within a 1700' long segment of the Transco interstate pipeline in eastern Luzerne County in fall 2014. The identities and percent cover of all species were examined within seventeen 1m x 1m plots forming a transect along the segment. The corridor was about 100' wide, bordered on both sides by mixed hardwood / conifer forest. In all, 30 vascular plant species were identified. The three most abundant included wrinkleleaf goldenrod (*Solidago rugosa*), dewberry (*Rubus hispidus*), and Pennsylvania sedge (*Carex pensylvanica*) – with average cover being 47.0%, 27.9%, and 16.6%, respectively. Each of the other species averaged <4% cover. With one exception, all of the species were natives, and none was invasive. Seedlings of three tree species: red maple (*Acer rubrum*), eastern hemlock (*Tsuga canadensis*), and red oak (*Quercus rubra*) were observed. Succession to forest is apparently inhibited by mowing during the fall. These findings represent the baseline conditions, against which impacts of future pipeline expansion and construction can be compared.

23. The Effects of CO² and Temperature on Soil Microbial Nitrogen of Urban and Rural Forests

Elizabeth Kulka, University of Maryland
Marla McIntosh, University of Maryland
Stephanie Yarwood, University of Maryland

Soil microbial biomass is an important component of the soil nitrogen (N) pool. Although urbanization and climate change are increasing temperatures and CO² levels in urban forests, little is known about their effects on microbial biomass nitrogen (MBN) in urban forest soils. We investigated the effects of elevated temperature and CO² on MBN quantities from urban and rural forest soils. Soil samples were collected from three urban and three rural Baltimore Long-term Ecological Research (BLTER) forest sites in June and October, 2014. A greenhouse pot study was conducted to determine the effects of elevated temperature and CO² on MBN from these urban and rural forest soils. Soils were planted with one hybrid poplar cutting, and exposed to ambient and elevated temperature and CO² levels in factorial combination for 49 days. MBN was significantly greater in rural than urban forest soils before and after exposure to the treatments. In general, elevated temperature and CO² significantly increased soil MBN relative to ambient temperature and CO², whereas the CO² x temperature interaction did not significantly affect soil MBN.

Results suggest that future increases in CO² and temperature will increase pools of microbial N in both urban and rural forests in the Baltimore area. Rural forest soils also contained larger MBN pools than urban forest soils, which will likely persist under future climate conditions. This emphasizes the significance of microbial N pools in rural forest soils relative to urban forest soils."

24. Road crossing by the white-tailed deer: when and where?

Ryan Landels, Bryn Athyn College
Josh Alden, Bryn Athyn College
Jody Chapin, Bryn Athyn College
Phoenix Fritch, Bryn Athyn College
Minghui Jiang, Bryn Athyn College
Niraj Khatiwada, Bryn Athyn College
Swan Kim, Bryn Athyn College
Michael Rodgers, Bryn Athyn College
Fredrik Bryntesson, Bryn Athyn College
Edward Higgin, Bryn Athyn College

Sherri Cooper, Bryn Athyn College
Eugene Potapov, Bryn Athyn College

A total of 32 white-tailed deer were monitored using high density radio-tracking (5 min between fixes) in a suburban area north of the City of Philadelphia that includes the Pennypack Ecological Restoration Trust (PERT) preserve. We modeled the deer movements using the random walk approach and compared the number of crossings of the simulated and the real deer individuals. The random walk trajectories were constructed using turning angle and step distances sampled from the real animal data. The real deer trajectories were clustered within parcels surrounded by roads, whereas random trajectories crossed roads at random. On average, the real deer crossed roads much less than the 'random-walked' deer. There were significant differences in the numbers of daily crossings between the males and females: the male deer crossed roads less frequently. The timing of the deer crossings was similar to the overall activity pattern of the deer exhibiting two peaks: one at sunrise, another at the sunset. A GIS model of road crossings is given.

25. Impacts of pollinator habitat and water quality on a sustainable soybean farm in Thurmont, Maryland

Thomas Marino, Hood College
Angela Vines, Hood College
April Boulton, Hood College

Increasing food yield and establishing clean water are important issues in sustainable agriculture. This study reports on both issues whereby insect pollination was used to increase soybean yield and water quality was tested at this same farm in Thurmont, Maryland. We measured abundance of insect pollinators in two wild flower plots adjacent to a soybean field; one in its second season and one in its first season. The two different plots were examined for insect abundance in an effort to assess the importance of age of the flower plot in attracting pollinators. In addition, this farm site is next to a turkey CAFO (concentrated animal feeding operation), so water quality is an ongoing concern for the soybean fields. Our results have implications for sustainable farming in the Mid-Atlantic region.

26. The effects of deer and *Microstegium vimineum* invasion on native woody and herbaceous plants

Elizabeth Matthews, The College of New Jersey

Scott Eckert, The College of New Jersey

Janet Morrison, The College of New Jersey

Suburban forests are necessary for biodiversity and offer access to nature for many people. However, native plant communities in these forests may be altered by deer overpopulation, as well as by invasive species - possibly acting together. Both forces can affect growth and diversity of natives, and may do so differently for herbaceous and woody species. One common non-native plant species in suburban forests of the eastern U.S. is Japanese stilt-grass, *Microstegium vimineum*. In three forests in central New Jersey (deer density ca. 20/km²), we set up plots under all combinations of including or excluding deer and stilt-grass, in 4 x 4 m plots (32-40 plots per forest). We documented percent cover of native herbaceous and woody plants from pre-treatment (early Fall 2012) to two seasons post-treatment (early Fall 2014). Percent cover of native herbaceous plants increased overall, but was not significantly differently among any factorial treatments. In contrast, percent cover of native woody plants increased in fenced plots without deer (from an average of 8.25% to 10.68%) but decreased in unfenced plots (from 12.63% to 7.72%). Woody plant cover decreased in plots with added stilt-grass (from 11.50% to 8.24%), but not in plots without stilt-grass. The effects on woody plants were more pronounced in the two forests with greater ambient deer pressure. We detected no interaction effect between deer exclusion and stilt-grass addition. Woody plants – which provide important physical structure in a forest – appear to be particularly vulnerable to overabundant deer and stilt-grass invasion.

27. Dung Beetle Populations on Organic and Conventionally Managed Cattle Pastures throughout Maryland

Kaitlyn Mitchell, Salisbury University

Mallory Hagadorn, Salisbury University

Dana Price, Salisbury University

Dung beetles are well known for the ecological services they provide in agricultural ecosystems. Their role in nutrient cycling and suppression of dung breeding pests make them vital to the primary productivity of the pasture and health of livestock. The main objective of our research was to examine dung beetle populations on organic

and conventionally managed cattle farms throughout Maryland. We used 200 m baited pitfall transects to examine abundance and richness of dung beetles. Just three species, *Onthophagus taurus*, *O. pennsylvanicus*, and *O. hecate*, made up 74% of the total individuals collected (6,698 individuals). Although no significant difference was found for the total abundances of dung beetles sampled between farm types, *O. taurus*, an introduced species, was significantly more abundant on conventional farms, while native *O. hecate* was significantly more abundant on organic farms. Month had a significant effect on the abundances of these species.

28. Comparative Growth and Condition Index of the Eastern oyster, *Crassostrea virginica*, existing in urban areas of the Hudson-Raritan Estuary

Megan O'Donnell, Monmouth University

Tiffany Medley, Monmouth University

Oysters once thrived in the lower Hudson-Raritan Estuary (HRE) but due to anthropogenic discharges contaminating the waterway, oysters have become notably scarce. We identified eight locations of where wild oysters presently can be found. They include six water bodies including the Hackensack River, Hudson River, East River, Arthur Kill, Raritan Bay and western Long Island Sound. Oyster growth and condition index (CI), which is used to measure the physiological condition of an oyster, were determined at each location and compared to harvestable oysters analyzed from Long Island Sound, CT. Results show that the CI of most HRE market sized wild oysters were not significantly different from Long Island Sound market sized farmed oysters and the western Long Island Sound along with the Bronx, East River locations of the HRE had a significantly higher CI than all other locations. The positive quality of health of these wild oysters, as measured by the CI, helps to support the development of oyster restoration projects in these areas.

29. The Role of Hydrochory in the Dispersal of *Oplismenus undulatifolius* Seeds

Jacquelyn Picciani, Towson University

Amber Epps, Towson University

Vanessa Beauchamp, Towson University

Hydrochory is the dispersal of seeds through riparian ecosystems when seeds fall into the water and are transported downstream. Seeds can either float above water, be carried through turbulence and hydraulic mechanisms under water, or be sticky enough to attach to branches or leaf litter that migrate along the riparian ecosystem. Hydrochory is an important component of migration and increased genetic diversity

along riverbanks and floodplains, but can also facilitate the spread of invasive species. This research will evaluate the role of hydrochory in the dispersal of invasive *Oplismenus undulatifolius* (Wavyleaf Basketgrass). *Oplismenus undulatifolius* can create a monoculture on forest floors, leading to reduced understory diversity. This species spreads by zoochory through its sticky seeds, but the role of hydrochory in dispersal has not been assessed. Methods for determining the viability of *O. undulatifolius* as a hydrochoric species include testing the floatation time of the seeds and the ability to germinate after prolonged periods in water. Overall, 240 seeds will be tested. Every week, ten seeds were added to four vials of 20 mL of deionized water. After six weeks (on April 3), the germination of all the seeds will be tested by spreading them in flats in potting soil and placing them in the greenhouse. Determining how long *O. undulatifolius* seeds float and how they remain viable when submerged could help determine the role of hydrochory in *O. undulatifolius* dispersal. If successful, hydrochory will be another factor to consider when trying to remove *O. undulatifolius* from an ecosystem.

30. The root of the matter: A phylogenetic study of polyphenol oxidase (PPO) enzyme distribution within the plant family Poaceae (grass) and the highly invasive genus *Bromus*

Kimberly Plank, Rutgers University

Dominic Evangelista, Rutgers University

David Kafkewitz, Rutgers University

Claus Holzapfel, Rutgers University

Despite numerous attempts to rectify the Poaceae (grass) phylogeny using both morphological and genetic data, their evolution is not fully understood. Previous work has shown that the enzyme polyphenol oxidase (PPO) is present in the roots of some Poaceae species but not others, and is particularly high in the genus *Bromus*, which includes a number of notoriously problematic highly invasive species. Here, we (1) conducted enzyme assays of Poaceae species roots to test the hypothesis that invasives have high levels of PPO, whereas non-invasives have little or no PPO, (2) created a consensus tree by combining extant phylogenetic trees, and (3) mapped PPO and invasiveness onto our consensus tree to investigate the phylogenetic history and evolution of PPO to understand those evolutionary relationships. Results showed (1) invasive grass roots have significantly higher PPO levels than non-invasive grass roots ($P < 0.01$), in both *Bromus* and non-*Bromus*, and (2&3) phenetic PPO is somewhat phylogenetically tractable, suggesting high-PPO may be the ancestral condition, later lost by some genera. We illustrate PPO as a trait correlated to invasiveness, and highlight ongoing taxonomic classifications that may shed light on evolutionary

understanding of selection benefits of PPO and grass evolution, which are agriculturally, economically, and environmentally important.

31. Home range structure in a space-time cube: an example of the White-tailed Deer

Eugene Potapov, Bryn Athyn College

Bryntesson Fredrik, Bryn Athyn College

Edward Higgins, Bryn Athyn College

Sherri Cooper, Bryn Athyn College

We analyzed daily trajectories of 34 deer instrumented with GPS/GSM radio-collars which transmitted spatial and temporal data at high-frequency intervals (5 min) for the observation periods of 1 to 6 months. The deer trajectories were then converted into a space-time object (two spatial dimensions and one temporal dimension). This approach clearly separated the three types of movements. The first type included trajectory sections with stable spatial dimensions and regular diurnal and nocturnal timing, which corresponded to the movements within the daytime and night-time bedding areas. The second type was comprised of feeding trips characterized by the non-repeatable spatial dimensions and regular time distributions. The third type consisted of social trips that had non-repeatable spatial dimensions and were non-regular in time. Separation of the animal movement modes in space-time cube appears to be a trivial task since extracting subparts of space-time trajectories, flattening the cube across space or time, or transforming the cube geometry or content are equivalent of re-projecting the space-time along one of the 3 axis. Overall, the structure of the home range projected on conceptual space-time cube manifold provides a promising approach and visualization tool for spatial utilization of habitat during different behavioral modes.

32. Using Geographical Information Systems Technology to Develop an Agricultural Management System for a Family-Operated Farm in Bucks County, PA

Kathryn Randolph, Widener University

A small, family-operated farm was spatially analyzed using geographic information systems technology to develop an agricultural management system and improve agricultural production. Orthoimages were interpreted to provide geographic locations for land use coverage's and physical features. For the crop fields, polygons were constructed and edited to provide features that can then be spatially and temporally interpreted using a series of attributes that were input into a spreadsheet. A model was created so that the farmer can update the spreadsheet after each harvest

season and automatically see the geographic interpretations for each agricultural attribute for each field. With this new model, the farmers are able to organize their land covers, improve crop production for each harvest, and manage fertilizer and pesticide applications.

33. Is aggregative oviposition beneficial to emerald ash borer fitness?

Josiah Ritchey, Washington & Jefferson College

Jason Kilgore, Washington & Jefferson College

A breadth of ecological, behavioral, and environmental factors affect the oviposition decisions faced by phytophagous insects, thus better understanding oviposition behavior may lead to more effective approaches for managing invasive insects. Emerald ash borer (EAB, *Agilus planipennis*) is one such invasive insect that is decimating ash (*Fraxinus spp.*) populations across eastern North America, and understanding female oviposition behavior could lead to management techniques that slow its spread. By selecting host trees already infested with larvae, thus reducing host tree defenses, females could increase offspring fitness, yet this result is not consistent in the literature. We investigated the association between EAB larval biomass and density (number per m² phloem) in white ash (*F. americana*) trees in a fragmented eastern deciduous forest. Randomly selected EAB-infested trees (n=4) were debarked (1.25-1.75 m from ground) to expose and collect developing larvae, and available phloem diameter was measured at 1.5 m. The azimuth for each larval gallery was recorded to detect spatial orientation on the stem. A majority of the larvae were congregated on the north-northeast side of the stem, with a positive linear relationship between larval biomass and density (R=0.84, p=0.16) despite the small sample size. These results indicate that aggregative ovipositioning by female EABs does occur and may increase offspring fitness, as suggested by another study with an invasive phytophagous beetle. Because current EAB distribution models do not take into account oviposition behavior, this information may be useful to better understand and control its infestation in North America.

34. Carbon sequestration of native and invaded dunes

Taylor Rodenberg, Monmouth University

Toniann Keiling, Monmouth University

Pedram Daneshgar, Monmouth University

Carbon storage in dunes may change with the introduction of a non-native invasive species. Carbon storage was compared between native dominated and Asiatic

sand sedge (*Carex kobomugi*) invaded dunes. We hypothesized that invaded dunes would store greater amounts of carbon because they have greater belowground biomass accumulation. Six study sites were established at Island Beach State Park and Sandy Hook National Park in New Jersey. Ten 1-square meter plots were randomly selected at each site; five in an invaded area and five in a completely native area. Plots were sampled in July and December 2014 to compare seasonal differences of diversity and carbon storage. Percent cover was used to determine the species diversity of each plot. During each sampling time, above and belowground biomass (up to 30 cm) was harvested from two invaded plots and two native plots at each site. Aboveground biomass was separated by species and belowground biomass was separated into roots and non-roots. The harvested biomass was dried, weighed, and a subsample was ground for analysis. A CN elemental analyzer was used to determine carbon and nitrogen content and C/N ratios of each sample. Though diversity was decreased with invasion, carbon storage was increased due to greater belowground biomass in invaded dunes. Aboveground biomass did not differ between native and invaded dunes, but both were reduced from summer to winter. Although sedge reduces native diversity of dunes, it holds value in potential carbon storage, which could help mitigate the effects of global climate change.

35. Effects of wind on movements of the white-tailed deer.

Michael Rodgers, Bryn Athyn College
Fredrik Bryntesson, Bryn Athyn College
Sherri Cooper, Bryn Athyn College
Edward Higgins, Bryn Athyn College
Eugene Potapov, Bryn Athyn College

A total of 32 white-tailed deer were monitored using high density radio-tracking (5 min between fixes) in a suburban area north of the City of Philadelphia that includes the Pennypack Ecological Restoration Trust (PERT) preserve. GPS location fixes of the deer were merged with weather parameters from a nearby weather station. The slope, aspect, elevation and habitat type of the deer GPS fixes were analyzed with respect to wind speed and wind direction. We analyzed movements of the deer after sudden changes of wind at different wind speed gradations. All tracked individuals were highly selective for the slope at the various wind speeds. Regression analysis of the aspect of a patch selected by deer versus wind direction reveals that the deer select patches with aspect directly opposite to the direction of the wind. Sudden change of wind might trigger relocation of the deer to the leeward areas.

36. Are insect growth regulators ineffective at controlling a honeybee pest? Experimental evidence from the small hive beetle (*Aethina tumida*)

Curtis Rogers, Hood College

April Boulton, Hood College

The small hive beetle (SHB), *Aethina tumida*, is an invasive honeybee parasite native to sub-Saharan Africa, which is thought to be a causal agent of Colony Collapse Disorder (CCD) in commercial honeybees (*Apis mellifera*). Insect growth regulators (IGRs) have proven successful for controlling a variety of pestiferous insects, including other beetle species. Two such IGRs, hydroprene and azadirachtin, were explored in the laboratory as a potential control for SHB. Newly hatched larvae were fed diets that contained 0.1, 1.0, 10, or 50 ppm of hydroprene-laced food, and 0.1, 1.0, or 10 ppm of azadirachtin-laced food. The larvae were then monitored throughout their growth and metamorphosis into adults to gauge any deleterious effects of the IGRs. In all treatments, both hydroprene and azadirachtin proved ineffective at controlling SHB larvae, and nearly all larvae survived to pupate into adults. There were no differences in the number of emerged adults between treatments. Current research suggests that hydroprene and azadirachtin may be more useful at inhibiting adult fecundity and egg hatchability. These preliminary results suggest future avenues of research, which will hopefully provide a means for beekeepers and farmers to protect their honeybees, a critical pollinator in commercial crops, from SHB infestations.

37. Change in dung beetle communities across seven counties of Maryland's Eastern Shore

Patrick Simons, Salisbury University

Michael Molina, Salisbury University

Dana Price, Salisbury University

Dung beetles (Coleoptera: Scarabaeidae and Geotrupidae) are beneficial insects for the ecosystem services they provide, including nutrient cycling and removal of dung. In addition they are highly sensitive to forest fragmentation and habitat disturbance, making them valuable biological indicators of species diversity. The goal of our research is to examine the species diversity of dung beetles in seven counties along Maryland's Eastern Shore. These data will allow us to examine the seasonality of Maryland's dung beetle communities, gain valuable natural history data regarding soil and forest preferences, and it will allow us to ask further questions regarding interspecific competition.

38. The effects of resource translocation on the success of the clonal offspring of *Fallopia japonica*.

Nicholas Talabiska, Susquehanna University

David Matlaga, Susquehanna University

Japanese knotweed (*Fallopia japonica*) is an aggressive invasive shrub spreading within Riparian forests of central Pennsylvania. The primary mode of reproduction for this species is asexual via the fragmentation of rhizomes. The aboveground shoots of *F. japonica* last one season yet dense, underground rhizome networks are long-lived. Resources are translocated between aboveground shoots below ground rhizomes seasonally. It is known that Nitrogen and Carbon are transported from aboveground shoots to below ground rhizomes prior to winter. However, it is not known how resource translocation influences the potential recruitment success of rhizome fragments. To address this we conducted a manipulative experiment in four sites of dense-monoculture stands of *F. japonica* along the West Branch of the Susquehanna River in Selinsgrove, Pennsylvania. The experiment consisted of two treatment factors: cut/uncut (0, 1 cut, and 2 cuts) and neighbor inclusion (0m, 0.5 m, 1.0 m, and 1.5 m). The first treatment administered cuts to aboveground shoots, cutting focal ramets to ground level. Focal ramets received the cut/uncut treatment along with neighbor inclusion, where shoots within an assigned diameter to the focal ramet were cut to ground level. After 18 weeks, ramets were excavated, cut into rhizome fragments and planted in the Susquehanna University green house for 18 weeks. Maximum shoot height, aboveground biomass, and leaf area were all measured. There was a significant positive correlation observed between each dependent variable (terminal leaf area and aboveground biomass) and the uncut ramet treatment. This is consistent with previous observed resource translocation and remobilization in *F. japonica*.

39. Effects of deer and *Microstegium vimineum* invasion on non-native woody plants in suburban forests

Mitchell Vaughn, The College of New Jersey

Ryan Goolic, The College of New Jersey

Janet Morrison, The College of New Jersey

Suburban forest plant communities are under pressure from intensive deer herbivory as well as invasive species. The differential impact these pressures have on species in the herb and shrub layers can structure forest communities. The passenger model of invasion suggests that deer preferentially eat native species over non-native

species, facilitating the success of non-natives. We are conducting a factorial field experiment with/without deer exclosures and with/without adding *Microstegium vimineum* (Japanese stilt-grass) to many 4x4 m plots in three suburban New Jersey forests with different ambient deer pressure. The percent cover of every plant species has been measured semi-annually since before treatments were applied (seed addition in November 2012, fences in March 2013), to follow invasion success and effects on plant assemblages. Here, we focused on the resident non-native plants, which are nearly all woody. Addition of *M. vimineum* had no effect on non-native woody plants, in any forest. In contrast, deer exclosures were strongly protective, but only in the forest with lower ambient deer pressure. That forest (Herronton) started out with appreciable non-native woody cover (about 10%); in fenced plots it remained stable, but it declined in unfenced plots, to 4.5% on average. We surveyed woody plants for deer browse and found that only 8.7% of natives were browsed, while 14.1% of non-natives were, with *Rosa multiflora* the highest (25.6%). These results question the idea that deer generally prefer native plants. It may be that frequency-dependent diet choices by deer lead to browsing on non-natives when they are relatively abundant.

40. On the border: Is emerald ash borer associated with ash trees exposed to higher light intensity?

Rebecca A. Wilkes, Washington & Jefferson College

Jason S. Kilgore, Washington & Jefferson College

Understanding the invasion patterns of non-native species is important to protect native communities. Forest fragmentation could contribute to invasive species success through disrupting environmental conditions, such as light, and increasing the amount of forest edge, yet little empirical work has demonstrated the interaction between forest light regime patterns and pest invasion patterns. We investigated this relationship for the emerald ash borer (EAB, *Agrilus planipennis*), an invasive phytophagous insect that contributes to ash (*Fraxinus spp.*) mortality, in a heavily fragmented eastern deciduous forest site. Large plots (60-m x 5-m) perpendicular to a maintained forest edge were partitioned into smaller subplots (10-m x 5-m), which were characterized for light intensity (canopy closure) and EAB intensity (number of EAB exit holes and ash canopy breakup). We found no indication that light intensity decreases with distance from the border ($F=1.28$, $p=0.28$). However, indicators of EAB intensity showed opposing trends: number of EAB exit holes decreased with distance from the border ($F=3.83$, $p=0.07$), while ash canopy decay increased with distance from the border ($F=3.11$, $p=0.10$). These findings suggest that EAB invades forests from the edge, while other factors may be contributing to ash decline in the interior. Further

investigation in a less fragmented habitat is needed to better understand the underlying drivers to infestation patterns of invasive insects, such as EAB, as well as gaining greater insight into edge effects, which can then be projected to the landscape scale.

41. Effects of planting depth on Japanese Knotweed (*Fallopia japonica*) rhizome performance

Shannon Wood, Susquehanna University

David Matlaga, Susquehanna University

Fallopia japonica is an aggressive invader of riparian habitats in both North America and Europe. Within these environments its primary mode of spread is by the fragmentation and dispersal of rhizomes during flooding events. During such events rhizome fragments may be covered by sediment and debris. It remains unknown how burial depth and rhizome size interact to influence the recruitment success (sprouting and growth) of rhizomes. We hypothesized that rhizome recruitment success would decline with burial depth but increase with rhizome mass. To test this hypothesis, we conducted a greenhouse experiment where *F. japonica* rhizomes (N=170), ranging in length from 0 cm to 13 cm were planted at three different depths (0 cm, 10.2 cm, 17.8 cm). We believe the treatment doesn't directly influence whether or not the rhizomes sprout. Weekly sprouting censuses revealed that rhizomes planted at the deepest burial depth produced slightly more sprouts than both the other burial depths. These preliminary results are in contrast to our hypothesis. However, in order to better understand the effects of the treatments on rhizome performance, data from the final destructive census needs to be analyzed. By understanding the performance of Japanese knotweed rhizomes, methods for controlling and better understanding the problematic invader can be discovered.

Sunday, April 19 Field Trip

We will tour two stream/wetland restoration projects that showcase different approaches to restoration. Both efforts are collaborations of many federal, state, and local agencies, academic institutions, businesses, and private landowners.

- 1) The Hershey Meadows site on the Conewago Creek. Please read more about this initiative at the following website:

<http://www.conewagoinitiative.net/>

<http://66.147.244.216/~conewag1/restoration-sites/hershey-meadows/>

- 2) The Big Spring Run project. This experimental restoration is designed to measure the success of a new restoration technique in which legacy sediments are removed. The resulting wetland approximates pre-European settlement conditions.

<http://www.bsr-project.org/>

Schedule

8:00 am. Meet in the parking lot to the west of the Masters Center, in front of the Hoover Building (#11 on the campus map). Bring waterproof boots if you have them. We have a limited number to loan.

8:15 – 9:45 am. Hershey Meadows, Conewago Creek Restoration Site.

9:45 – 10:30 am. Drive to Big Spring Run.

10:30 – 11:45 am. Big Spring Run restoration site

11:45 – 12:30. Drive back to Elizabethtown College.