Ohio Natural History Conference

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Columbus, OH

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Conference Schedule

(Presenters are given in bold. See program for abstracts.)

8:30	Refreshments and Registration; Set-up posters
9:00	Welcome and Announcements
9:15	**Keynote Presentation – Guy Denny** "Reading Ohio's Landscape"
10:15	Award Presentations
10:30	Break
	Paper Session I
10:45	"The influence of forest composition on amphibian communities in upland constructed wetlands" – **Michael P. Graziano** and Stephen N. Matthews, The Ohio State University
11:05	"Evaluating the science in citizen science programs" – **Nicholas Smeenk** and Gregory Lipps, The Ohio State University
11:25	"The periodical cicadas of Ohio: new discoveries and upcoming emergences" – **Gene Kritsky**, Mount St. Joseph University
11:45	Lunch (The Plaza Terrace); View Museum Exhibits
12:30	**Poster Session**, with authors in attendance (The Plaza Terrace)
1:00	Break
	Paper Session II
1:15	"Natural history IS NOT DEAD: Let's get busy and start filling in the dots!" – **Jason Larson**, Richland County Park District
1:35	"Do white-tailed deer and amur honeysuckle affect litter- and soil-dwelling invertebrates?" – **Michael B. Mahon**, Kaitlin U. Campbell, and Thomas O. Crist, Miami University
1:55	"The ants of Ohio: a decade after Coovert." – **Kal Ivanov**, Virginia Museum of Natural History

2:15 "Natural history and management of red-eared sliders in Cleveland Metroparks" – **Owen M. Lockhart**, Cleveland Metroparks

2:35 Break

Paper Session III

2:50 "Examining independent effects of habitat amount and fragmentation on the Cerulean Warbler (*Setophaga cerulean*)" – **Bryce T. Adams**, Kaley J. Donovan, and Stephen N. Matthews, The Ohio State University

3:10 "Changes to the spider (Order: Araneae) community after an EF-2 tornado impacted a north-central Ohio forest" – **Sarah J. Rose** and P. Charles Goebel, The Ohio State University

3:30 "Native plant materials production in the Oak Openings region" – **Jenella Hodel**, Metroparks of the Toledo Area

3:50 Closing Remarks

4:00 Adjournment

~ Note: Full program with abstracts will be available online at www.ohiobiologicalsurvey.org.

The Influence of forest composition on amphibian communities in upland constructed wetlands

Michael P. Graziano and Steven N. Matthews
School of Environment and Natural Resources
The Ohio State University

Plant communities have foundational impacts on both aquatic and terrestrial ecosystems. The loss of fire in eastern hardwood forests is changing the composition and structure of forest communities, resulting in loss of oak-hickory regeneration and an increase in red maple in the understory. Many amphibians are dependent upon certain forest communities and the microhabitats associated with them, and exposure to altered plant communities may represent a novel set of conditions affecting amphibian populations. We created a total of fourteen pools consisting of two treatments: seven in areas of primarily managed/oak-hickory overstory and an additional seven in primarily unmanaged/red maple overstory. Wetlands were sampled the following spring, resulting 401 adult captures comprising 12 pool-breeding species. Initial analyses suggest that there is a trend for different communities to colonize each treatment, and the loss of oak-hickory forests may have landscape-level effects on pool-breeding amphibian communities.

Evaluating the Science in Citizen Science Programs

Nicholas Smeenk and Gregory Lipps

Ohio Biodiversity Conservation Partnership
The Ohio State University, Columbus, Ohio 43210

The use of citizen science projects for data collection is increasing in popularity, with as many as 66 projects already collecting amphibian or reptile data. The allure of crowd sourcing science and involving citizens is easy to understand, evidenced by the 2,046 reptile and amphibian observations from Ohio in three popular citizen science databases (iNaturalist.org, HerpMapper.org, and NAHERP.org). Although citizen science projects have become increasingly prevalent in herpetological research, there has been surprisingly little research into examining these programs to determine their utility in providing scientifically rigorous data. Our evaluation focused on determining if submitted observations: (1) provided basic information including the date, observer, and location; (2) included a quality photograph showing the diagnostic features necessary to identify the species; and, (3) were available to agencies and qualified researchers. Finally, we compared records meeting these criteria to previously documented distributions to determine the contribution citizen scientists are making to our knowledge of the distribution of Ohio's amphibians and reptiles. We conclude that citizen scientists could play a valuable role, but that programs to collect data need to address some serious issues related to the accessibility, accuracy, and precision of the data.

AUTHOR BIOS:

Nicholas Smeenk (Nick) is currently the Amphibian and Reptile Conservation Research Associate with the Ohio Biodiversity Conservation Partnership at The Ohio State University. He holds a B.S. in Wildlife Resources from the University of Idaho and obtained an M.S. in Environmental Science from Ohio University where he studied the population ecology of diamondback terrapins in the Chesapeake Bay. He is currently working on competing a Ph.D. in Natural Resource Science at the University of Nebraska – Lincoln where he is studying wetland ecological assessment techniques and amphibian community ecology.

Gregory Lipps (Greg) is the Amphibian and Reptile Conservation Program Manager with the Ohio Biodiversity Conservation Partnership at The Ohio State University. Greg has worked as a herpetologist throughout Ohio for over a decade, surveying populations and developing partnerships to conserve the state's amphibian and reptile species and their habitats. He earned his M.S. from Bowling Green State University and was a contributing author and editor of the Amphibians of Ohio (2013) book.

The Periodical Cicadas of Ohio: New Discoveries and Upcoming Emergences

Gene Kritsky
Department of Biology, Mount St. Joseph University,
Cincinnati, OH 45233, cdarwin@aol.com.

Ohio is home to four established broods of 17-year cicadas and one brood of 13-year cicadas. The 17-year broods include Brood V, which occurs over the eastern half of Ohio; Brood VIII, which occurs in the extreme northeastern portion of the state; Brood X, which is found mostly in the southwestern part of the state with a few scattered populations in the northwest; and Brood XIV, which occurs in the south-central part of the state. Ohio's only 13-year brood is Brood XXII, which is restricted to Clermont and Brown counties and was verified in 2014. Three species of 13-year periodical cicadas (Magicicada tredecim, M. tredecassini, and M. tredecula) emerged, adding three new state species records. Brood V will emerge this year, Brood VIII in 2019, Brood X in 2021, and Brood XIV in 2015. A four-year-early acceleration of Brood X is expected to occur in 2017. If this population is large enough to satiate predators and reproduce, this will establish a new 17-year brood in the state that will be designated Brood VI.

AUTHOR BIO:

Gene Kritsky is Professor and Chair of Biology at Mount St. Joseph University in Cincinnati. Kritsky received his B.A. in Biology from Indiana University, and his M.S. and Ph.D. in entomology from the University of Illinois.

Do white-tailed deer and Amur honeysuckle affect litter- and soil-dwelling invertebrates?

Michael B. Mahon, Kaitlin U. Campbell, Thomas O. Crist

Miami University, Oxford, OH

The overabundance of white-tailed deer (Odocoileus virginianus) and the presence of invasive Amur Honeysuckle (Lonicera maackii) negatively affect biodiversity and ecosystem function in eastern United States forests. Deer and honeysuckle decrease diversity and cover of plants in the understory, which may cascade to herbivorous or detrivorous invertebrates. However, few studies have examined how they affect forest floor invertebrates. Ants (Formicidae) play key functional roles in forest ecosystems (e.g. ecosystem engineers, predators, and seed dispersers). Exotic earthworms (Lumbricidae) increase litter decomposition and nutrient availability in forest ecosystems. Therefore, changes to ant and earthworm communities can have cascading effects on ecosystem processes. We examined the response of ant and earthworm communities to long-term deer exclosure and honeysuckle removal in a mid-successional deciduous forest in southwestern Ohio. Ant abundance and richness; earthworm abundance and richness; and standing litter biomass were sampled and analyzed from five sites from 2011 to 2015. Sites consisted of paired 20x20-m deer exclosure and control plots, each with split-plot removal of honeysuckle and control subplots. Ant richness and abundance were positively related to standing litter biomass. Earthworm abundance was positively related to deer presence, but earthworm richness was not different among treatments. Standing litter biomass was negatively related to deer presence, while honeysuckle presence had a weak positive effect on leaf litter biomass. Our results show little effect of honeysuckle treatment on the invertebrate community, but provide evidence that deer overabundance has mixed effects on these communities. These changes may have cascading effects on forest ecosystem health and functioning.

AUTHOR BIOS:

Michael B. Mahon received his B.A. from Drake University and is currently pursuing his PhD in Ecology, Evolution and Environmental Biology at Miami University. His research interests include community ecology, ecosystem ecology, and conservation biology,

Kaitlin U. Campbell received her B.S. and M.S. degrees from The Ohio State University and her PhD in Ecology, Evolution and Environmental Biology at Miami University. She is currently working as a post-doctoral fellow at Miami University. Her research interests include community ecology, landscape ecology, entomology, acarology, and biodiversity.

Thomas O. Crist received his B.A. from McPherson College, M.F.S. from Yale University, and PhD from Utah State University. He is the Chair of the Department of Biology at Miami University. His research interests include landscape ecology, biodiversity, and conservation biology.

The Ants of Ohio – a Decade after Coovert

Kal Ivanov

Virginia Museum of Natural History, Department of Recent Invertebrates

I revisit the list of Ohio ants for the first time since the publication of the "Ants of Ohio" in 2005, based on literature records, museum collections, and new sampling events across the state. I update the list to accommodate 18 additional species and a number of name changes to taxa already present. Currently a total of 135 species, including 10 ant exotics, are reliably reported from the state. These species represent most of the North American groups, lacking only the more tropical members of the subfamilies Cerapachyinae, Ectatomminae, and Pseudomyrmecinae. Ohio's ant diversity is dominated by the genus Formica (26 species); other speciose genera include Strumigenys (14), Camponotus (11), Lasius (10), Temnothorax (10), and Myrmica (9). I also provide distributional and ecological information for some of Ohio's most interesting species, and I offer a brief comparison to ant lists for surrounding areas. With this update I hope to encourage future explorations of the myrmecofauna of Ohio where new records are undoubtedly to be expected.

AUTHOR BIO:

I received my Master's Degree in Entomology from Sofia University (Bulgaria), and my Ph.D. in Ecology from Cleveland State University. I am currently an assistant curator in the Department of Recent Invertebrates at the Virginia Museum of Natural History. My research interests are in the area of Formicidae (and Hymenoptera in general) taxonomy and natural history; terrestrial isopods distribution and natural history; biodiversity; community and urban ecology; and invasion biology.

Natural History and Management of Red-eared Sliders in Cleveland Metroparks

Owen M. Lockhart

Cleveland Metroparks, Division of Natural Resources

Red-eared Sliders are listed as one of the world's 100 worst invasive species by the Invasive Species Specialist Group (ISSG) of the IUCN Species Survival Commission. Historic records suggest that sliders may be native to southern Ohio, but populations are now established throughout the state thanks to the release of an untold number of discarded pets. Despite their proliferation, little is known of the ecology outside of their native range. Fortunately, the natural history traits of turtles make removal of individuals an effective management policy with long-lasting impacts. As part of invasive species management within Cleveland Metroparks, captured sliders are removed and euthanized. Tissues from these specimens contribute to several conservation-minded projects, and skeletons are donated to a research collection for additional studies. This management program not only relieves pressure on native species but has generated natural history data on this species that are generally lacking in Ohio. Management coupled with a public education program is hoped to reduce Red-eared Slider populations to a level that has negligible impacts on native wildlife. In this presentation, I discuss the slider management program within the park system and present data gathered towards a better understanding of this species' natural history in northern Ohio.

AUTHOR BIO:

Owen Lockhart is a Ph.D. candidate in the Department of Biological, Geological and Environmental Sciences at Cleveland State University. His dissertation addresses the role of plethodontid salamanders in the forest-floor food web. He also works as an aquatic research and management technician for the Cleveland Metroparks.

Examining independent effects of habitat amount and fragmentation on the cerulean warbler (Setophaga cerulea)

Bryce T. Adams, School of Environment and Natural Resources, The Ohio State University

Kaley J. Donovan, School of Environment and Natural Resources, The Ohio State University

Stephen N. Matthews, School of Environment and Natural Resources, The Ohio State University

Habitat loss and fragmentation are considered primary causative agents for the decline of many imperiled species, but discerning their relative contribution has remained elusive as fragmentation usually occurs through a process of habitat loss. Understanding relative influences of spatial pattern, that is all habitat and matrix types present (landscape composition) and their spatial arrangement (landscape configuration), will help managers to better conserve wildlife. We examined independent effects of landscape composition and configuration on the distribution of a Neotropical migratory forest songbird of high conservation concern in the Appalachian Foothills Region of Southeast Ohio using a species-centered approach. This quantitative method uses species distribution models (SDM) to measure landscapes. We used boosted regression trees, environmental variables obtained through remote sensing, and occurrence data from 304 point count locations from May-July 2015 to predict cerulean warbler (Setophaga cerulea) breeding habitat suitability across our study area. We developed four hypotheses, translated them into statistical models, and evaluated their relative support under an information-theoretic approach using AIC and our SDM. We found support for our habitat (habitat and matrix composition) hypothesis (w_i = 35%) and fragmentation (landscape configuration measured as patch density) hypothesis (w_i = 21%). By controlling for species-specific perceptions of landscapes, we detected some level of sensitivity to landscape configuration, and suggest conserving large, connected patches of cerulean warbler habitat (identified in our SDM) as a management tool. These results demonstrate how an appreciation of species-specific habitat distributions may help improve our ability to conserve forest-dependent wildlife in the Appalachian Foothills Region.

(Author Bios on following page)

AUTHOR BIOS:

Bryce is an ecologist and life-long Ohioan. He is pursuing a PhD from the School of Environment and Natural Resources at The Ohio State University under the direction of Stephen Matthews. Bryce's work incorporates species distribution modeling into examining species responses to landscape-level habitat and fragmentation.

Kaley is a Master of Science candidate under Stephen Matthews in the School of Environment and Natural Resources working on creating habitat suitability index models for avian species of concern in a public forestland. She completed her Bachelor of Science at SUNY-ESF, and has enjoyed working in the Adirondack Mountains, east coast seashores, and the foothills of the Appalachians in Southeast Ohio.

Stephen Matthews is an Assistant Professor of Wildlife Landscape Ecology in the School of Environment and Natural Resources at The Ohio State University and also hold an appointment as an ecologist with the US Forest Service's Northern Research Station. His research focuses on understanding the responses of wildlife and ecological systems to changing landscapes.

Changes to the spider (Order: Araneae) community after an EF-2 tornado impacted a North-Central Ohio forest

Sarah J Rose and P. Charles Goebel

School of Environment and Natural Resources
The Ohio State University, Wooster, Ohio

Catastrophic winds, such as those associated with thunderstorms and tornadoes, are important natural disturbances that affect ecosystem structure and function in the Central Hardwood Forest region. Few studies, however, have evaluated the natural succession of a forest impacted by catastrophic winds. In 2010, the forests of the Secrest Arboretum at the Wooster campus of The Ohio State University were impacted by an EF-2 tornado, providing an opportunity to quantify the recovery of a relatively undisturbed natural forest ecosystem. In 2013 the spider (Order: Araneae) community was sampled in both the tornado-impacted area and an adjacent unimpacted reference area. A total of 3,316 spiders from 24 families were collected; with 21 families present in the reference stand, and all 24 families present in the tornado-impacted stand. We observed a shift in the spider community composition related to the catastrophic canopy disturbance associated with the tornado-impacted (e.g. higher densities of wolf spiders (Family: Lycosidae) in the tornado stand when compared to the reference stand). Both Shannon Diversity Index and overall spider abundance were greater in the tornado impacted stand when compared to the reference stand (t-test: $p = 0.02$ and 0.03, respectively). This observational study provides important baseline information on the role that natural disturbances processes, and their legacies, play in regulating the structure and composition of spider communities. This information is valuable in developing restoration strategies that emulate natural models of ecosystem development.

AUTHOR BIOS:

Sarah J Rose is a PhD candidate with the School of Environment and Natural Resources with The Ohio State University. She received her B.S. from Ohio State in 2008, and has worked on several ecological research projects, and is currently focused on understanding the dynamics of spider communities after disturbance.

Dr. P. Charles Goebel is a Professor and Assistant Director of the School of Environment and Natural Resources, The Ohio State University, Wooster, OH. His research interests include forest restoration ecology, riparian ecology and management, forest community and ecosystem ecology, and watershed management and restoration.

Native Plant Materials Production in the Oak Openings Region

Jenella Hodel

Metroparks of the Toledo Area

Availability of local ecotype seed is a major limiting factor in restoring native habitats in the Oak Openings region of Ohio and Michigan. Metroparks of the Toledo Area created the Blue Creek Seed Nursery to produce large quantities of diverse native plant materials. This operation is one piece of a concerted effort by the Green Ribbon Initiative's Native Plant Working Group to provide native plant materials for ecological restoration across the region. Hundreds of native species from dozens of families are collected annually, resulting in roughly a ton of inventory for use in restoration projects. Rare and declining species, as well as critical faunal associates are targeted for propagation. The nursery also provides vast educational and outreach opportunities, including volunteer training and workdays, school and community group tours and programs, and undergraduate field experience. Research opportunities across the spectrum of seed production and distribution are extensive, as this is relatively unexplored thus far in the region.

AUTHOR BIO:

My early experience in the field of ecological restoration included several positions with The Nature Conservancy's Indiana, Michigan, and Minnesota/Dakota chapters, primarily in grassland systems. My duties in these positions ranged widely: from invasive species control to monitoring bison herds, from propagating native species to prescribed burning. Three years ago I transitioned to my current position with Metroparks of the Toledo Area as the Blue Creek Seed Nursery Crew Leader. I have a BS in biology, a BS in clinical laboratory sciences, and graduate work in restoration ecology.

Preserving Dehydrated Vertebrate Fluid Specimens: A Simple Method for Museums

David Dyer and Juli Six
Ohio History Connection

When the preservative used in fluid-preserved museum specimens evaporates, the specimens are in jeopardy of being disposed of, or at a minimum are often rendered unfit for research or exhibition purposes. Singer (2014) outlined a procedure using concentrated water vapor to rehydrate specimens, and then staging them through increasing strengths of preservative. This procedure had been used in the past on herpetofauna, and Singer (2014) showed the efficacy for use on mammal and fish specimens. We extend the use of this procedure to preserve historic human remains, and show that small to medium-sized museums can adopt this rehydration method.

Author Bios:

David Dyer is a Curator of Natural History at the Ohio History Connection. He works with curation and management of museum collections, and specializes in identifying and interpreting faunal remains from archaeological sites, wildlife forensic cases, and Pleistocene sites.

Juli Six specializes in the identification of fragmented human skeletal remains. As an Archaeology Collections Assistant at the Ohio History Connection she performs stewardship duties for the human remains and database which comprise the Society's NAGPRA collection. She also provides research support to patrons in the State Archives and Library as a Public Service Librarian.

The use of anthropogenic materials in nest construction of three northeastern songbirds along a rural-urban gradient

Caitlin Elkins[1], Jennifer M. Clark[1], and Dr. Loren Merrill[2]

[1]Hiram College, Hiram, OH and [2]University of Illinois at Urbana-Champaign, Urbana, IL

Songbirds are known to use a variety of natural materials such as twigs, leaves, bark, and grasses to construct their nests. However, when songbirds nest in urban habitats, the availability of anthropogenic nesting materials (i.e., plastics) may supplement some natural materials commonly used. This study examined the use of anthropogenic material used in nest construction by three northeastern songbirds from central Illinois: American Robin (Turdus migratorius), Gray Catbird (Dumetella carolinensis), and Northern Cardinal (Cardinalis cardinalis). Nests were collected during the summer of 2014 and 2015 in and around central Illinois. Nest habitats included forest preserves, public parks, agricultural land, and other urbanized areas. The individual number of artificial pieces and percent composition (measured as biomass) of anthropogenic material was measured in each nest. Regardless of species type, there was no significant effect of number of artificial pieces used in nest construction (ANOVA, P=0.4011) or percent composition (ANOVA, P=0.4035) between urban and rural habitats. Similarly, the number of artificial pieces used in urban only nests did not show species-specific effects (ANOVA, P=0.7038). However, the percent composition of artificial nesting material of Northern Cardinal nests was significantly higher than American Robin nests (ANOVA, P=0.0196). These results suggest species-specific behavioral shifts in these songbirds in response to urbanization and how they utilize available nesting materials with changing environments.

Author Bios:

Caitlin Elkins is a senior at Hiram College pursuing a major in biology and a minor in mathematics. She is strongly interested in ornithology and conservation biology. She plans to travel before pursuing a graduate degree. She would like to incorporate avian research into her future plans.

Jennifer Clark is an assistant professor of biology at Hiram College. She received her PhD in Ecology from Kent State University in 2009 and focused her research on factors structuring stream crayfish distribution patterns. Her current research focuses on how natural abiotic and biotic parameters structure stream communities and how land use impacts community structure and ecosystem function.

Loren Merrill is a post-doctoral research fellow at the University of Illinois at Urbana-Champaign. He earned his B.S. at Cornell University and his Ph.D. and the University of California, Santa Barbara. Between 2012 and 2013 he spent his time at Oklahoma State University as a postdoctoral researcher. His research is focused on how urbanization of nesting habitats for shrub-nesting birds impacts the chick condition as well as parental investment while examining physiological and parasitological parameters.

The effect of artificial light on shelter use by juvenile and adult crayfish (Orconectes obscurus)

Ashley M. McGuire and Jennifer M. Clark

Hiram College, Hiram, OH

The negative impacts of artificial light have been well-documented for several species, including disruption of navigating sea turtle hatchlings, increased injury/mortality of nocturnal migratory birds, and decreased mating activity of amphibians. Artificial light may have severe consequences for crepuscular and nocturnal animals, with the potential to alter foraging and mating behaviors and predator-prey interactions. In this study, we examined the effect of artificial light on shelter use by juvenile and adult crayfish, Orconectes obscurus, in five gallon bucket mesocosms using PVC shelters. Game cameras were mounted above buckets and pictures were taken at 30-minute intervals over a 24-hour time period. Crayfish were exposed to both normal, ambient light (control, n=40 of each size) and artificial LED light (n=40 of each size class). Both juvenile and adult crayfish increased shelter use during crepuscular periods when exposed to artificial light (juvenile, χ^2=9.09, P=0.0026; adult, χ^2=5.13, P=0.0235). Similarly, adult crayfish used shelters more frequently during nighttime hours when exposed to artificial light (χ^2=86.51, P<0.0001). However, unlike adult crayfish, artificial light did not significantly affect shelter use of juvenile crayfish during nighttime hours (χ^2=0.004, P=0.9516). Results suggest that artificial light can have substantial size-specific consequences for shelter use by O. obscurus. Increased shelter use due to artificial light could decrease reproductive opportunities for adult crayfish and decrease foraging time for both juveniles and adults. Further, since juvenile crayfish did not increase shelter use under artificial light conditions, this could lead to increased susceptibility to predators when more visible in artificially lit environments.

Author Bios:

Ashley McGuire is an undergraduate at Hiram College, graduating in May 2016 with a B.A. in Biology. Ashley led the American Institute of Biological Science chapter during her undergraduate career. Currently she is looking into a research career.

Jennifer Clark is an assistant professor of biology at Hiram College. She received her PhD in Ecology from Kent State University in 2009 and focused her research on factors structuring stream crayfish distribution patterns. Her current research focuses on how natural abiotic and biotic parameters structure stream communities and how land use impacts community structure and ecosystem function.

The Oak Openings Preserve Frog Survey

[1]Stephen Timmons, [2]Kim High, and [2]Karen Menard

[1]University of Toledo and [2]Metroparks of the Toledo Area

Amphibian populations are an important part of the ecological whole, serving as indicators of overall ecosystem health. The Oak Openings Preserve Frog Survey has been in operation since 1994 and is the longest running frog survey in Ohio. It operates annually, up to seven nights per week, from March 1 through May 31, along a 0.9-mile linear transect through different habitats. Beginning one-half hour after sunset, trained volunteers walk the survey path and record the species and numbers of anurans calling in the adjacent ditches. Data analysis by University of Toledo graduate student, Stephen Timmons, has included studying the effects of seasonal temperature and precipitation on anuran call phenology, specifically the peak date, season length, and peak call magnitude. Initial analyses indicate that the temporal effect on call phenology of the three biggest populations of frogs in our study: Spring Peeper (Pseudacris crucifer), Western Chorus Frog (Pseudacris triseriata) and Wood Frog (Rana sylvatica), shows no definite positive or negative trend. However, when compared to seasonal climate data, a definite trend emerges within the 21 years of this study. Warmer mean temperatures from January through April and higher total precipitation in the preceding calendar year lead to an earlier seasonal peak date, moving up by as much as five days. Within the same analysis, the seasonal lengths are shown to be unaffected by these climate conditions. The shift to earlier in the year in the entire call season indicates a response to warming temperatures. Within the same analysis, the seasonal lengths are shown to be unaffected by these climate conditions.

Author Bios:

Stephen Timmons is an Environmental Science Master's student at the University of Toledo and former Metroparks Research and Monitoring intern. He is studying the effect of climate on Oak Openings frog populations using multilevel regression modeling techniques.

A 32-year veteran Naturalist/Historical Interpreter at Metroparks of the Toledo Area, Kim High is a Certified Interpretive Trainer with the National Association for Interpretation and has taught Environmental Studies and Natural Areas Interpretation at Bowling Green State University for over fifteen years. In 2015, she was the recipient of the National Association of County Park and Recreation Officials Professional Fellow Award and the Ohio Certified Volunteer Naturalist Outstanding Mentor Award.

Karen Menard works for Metroparks of the Toledo Area as the Research and Monitoring Supervisor and is involved with much of the species monitoring in Oak Openings Preserve and other Metroparks. Karen is also a Certified Interpretive Guide with the National Association of Interpretation.

The Ohio Hellbender Partnership

[2]Gregory Lipps and [1]Nicholas Smeenk

[2]Ohio Biodiversity Conservation Partnership; [1]The Ohio State University, Columbus, Ohio

The Eastern Hellbender (Cryptobranchus a. alleganiensis) is a state listed endangered species in Ohio. Originally found throughout all of the major drainages flowing towards the Ohio River, the salamander's distribution has been greatly curtailed by a variety of insults to our waterways. A statewide survey from 2006 – 2009 found an 82% decline in the relative abundance of Hellbenders compared to surveys in the mid-1980s, with young individuals missing from nearly all populations. The Ohio Hellbender Partnership consists of individuals from a wide range of federal, state, and local government agencies, zoos, non-governmental organizations, land trusts, universities, and other interested parties working together to implement a conservation plan that will reverse the Hellbender's decline. Our strategies include the conservation of existing habitat and restoration of degraded areas, as well as repatriating or augmenting populations with head-started individuals reared in biosecure facilities from wild-collected eggs. To date, the partners have protected several important areas, undertaken several restoration projects to reduce sedimentation, and released 249 captive-reared Hellbenders with another 1,100 currently being raised for release. Addressing the complex issues such as those facing Hellbenders and their habitats requires a diverse and dedicated partnership.

Author Bios:

Gregory Lipps (Greg) is the Amphibian and Reptile Conservation Program Manager with the Ohio Biodiversity Conservation Partnership at The Ohio State University. Greg has worked as a herpetologist throughout Ohio for over a decade, surveying populations and developing partnerships to conserve the state's amphibian and reptile species and their habitats. He earned his M.S. from Bowling Green State University and was a contributing author and editor of the Amphibians of Ohio (2013) book.

Nicholas Smeenk (Nick) is currently the Amphibian and Reptile Conservation Research Associate with the Ohio Biodiversity Conservation Partnership at The Ohio State University. He holds a B.S. in Wildlife Resources from the University of Idaho and obtained an M.S. in Environmental Science from Ohio University where he studied the population ecology of diamondback terrapins in the Chesapeake Bay. He is currently working on competing a Ph.D. in Natural Resource Science at the University of Nebraska – Lincoln where he is studying wetland ecological assessment techniques and amphibian community ecology.

Nectar Variation in Tallgrass Prairie and Oak Savanna Forb Species of Northwest Ohio

Paige Arnold and Helen Michaels

Bowling Green State University

Agricultural development has reduced the abundance of tallgrass prairies and oak savannas, which once spanned across the Midwestern U.S., to less than 1% of Midwestern vegetation. These reductions have led to a critical decline in the abundance and diversity of plant species and insect pollinators. Understanding the key resources for butterfly pollinators is vital for preserving and restoring native habitats and their biodiversity. Considering nectar is the primary food source for many butterflies, its composition can have important effects on butterfly longevity and reproduction. Specifically, flowers pollinated by butterflies are thought to be associated with high sucrose concentrations and/or rich in amino acids. The aim of this study was to determine sugar concentrations and relative amounts of amino acids in nectar of species native to the tallgrass prairies and oak savannas of Northwest Ohio. We examined within and between species variation in nectar sugar and amino acid concentrations through a survey of 19 native prairie and oak savanna species. Preliminary analysis revealed an inverse relationship between amino acids and sugar concentrations, where species with high sugar concentrations had lower amounts of amino acids. Asclepias sullivantii, for example, had the highest sugar concentration at 66 Brix (% mass sucrose), but was among the lowest amounts of amino acids at 14.45 ng/µl. This survey gives insights into variation in adult butterfly food resource quality. These data can help determine which nectar species are most valuable for restoration and conservation plans that aim to aid in the overall restoration of butterfly species.

Author Bios: Paige Arnold completed her Bachelor's degree in Biology, specializing in conservation and ecology, at Bowling Green State University. Here she was active in undergraduate research projects focusing on plant pollinator interactions that involved the study of bumble bee foraging behavior on lupines and orchid pollination ecology. Through working for the Toledo Metroparks in their Natural Resources Division in land management and native plant propagation, she became interested in plant and insect restoration. These experiences ultimately led to her current position as a graduate student at Bowling Green State University studying nectar chemistry and its effects on butterfly fitness.

Helen J. Michaels, a faculty member in the Department of Biological Sciences, earned a PhD in Plant Biology from the University of Illinois at Urbana-Champaign in 1986. Following a post-doctoral appointment from 1986-1989 at the University of Michigan, she began teaching and research as an Assistant Professor in Biological Sciences at BGSU in 1990. Her primary research interest is in plant ecology and evolution, with current research projects focusing on plant mutualisms (plant-pollinator and plant-microbial interactions) and mating systems, restoration ecology, and molecular systematics and ecological genomics of plants. Dr. Michaels developed BGSU's Specialization in Ecology and Conservation and has served as Curator of the BGSU Herbarium and Faculty Coordinator for Steidtmann Woods Sanctuary.

Midstory Canopy Arthropod Diversity Using Lindgren Funnel Traps and Sticky Boards

Bradley S. Cordle and Donald P. Althoff
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The class Arthropoda represents one of the most diverse and successful taxa on Earth with a total estimate of global richness approaching 10 million species. Documenting this diversity is challenging yet needed to inventory and monitor such biota long-term. We deployed Lindgren funnel traps and sticky boards in a hardwood forest in southeast Ohio from May-September 2015 to assess the biodiversity. Five, 10-day sampling periods yielded 11,588 specimens representing 22 taxonomical orders and 80 families. Traps positioned on white oak accumulated a greater abundance of arthropods (n=6,077) and species richness (n=185) compared to arthropod abundance (n=5,507) and species richness (n=149) collected on shagbark hickory. Average precipitation showed the most significant relationship when paired with arthropod abundance collected on both white oak (R^2 =83.3, p=0.031) and shagbark hickory (R^2 = 78.1, p=0.015) Ambient temperature (ranged 18◦C - 33◦C) also appeared to have a positive association with arthropod abundance. Interestingly, overall abundance declined steadily each sequential sampling period. Although Lindgren Funnel traps accumulated higher abundance and species richness of arthropods than sticky boards, sticky boards was more effective at collecting a higher abundance of Hymenopterans, especially capturing members of the family Cynipidae (gall wasps).

Author Bios:

Brad Cordle is currently a senior at the University of Rio Grande majoring in Wildlife Conservation. He has an A.S. in Wildlife Management from Hocking College (2014).

Don Althoff is currently associate professor of wildlife conservation at the University of Rio Grande. He has a B.S. from the Ohio State University (1976), an M.S. from the University of Nebraska (1978), and a Ph.D. from Penn State University (1983).

Estimating Canopy Closure: A Comparison of Spherical Densiometer vs. Digital Image Methodology

Katelynn S. Dearth and Donald P. Althoff

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Canopy density has a significant impact on the composition and structure on the understory of forested communities. Spherical densiometers, have been the standard for measuring canopy closure for many years. Using a spherical densitometer—especially when multiple individuals are involved—can lead to high levels of inter-observer variability resulting in decreased precision. With the availability of high quality cameras now standard on smart phones, acquisition of digital images has the potential to facilitate the measurement of canopy coverage when combined with image analysis software. Using two observers who made measurements independently, we collected canopy coverage estimates using a spherical densitometer while also acquiring digital images using an smart phone positioned inside a box (to restrict the field of view) mounted on a tripod. A total of 45 sample sites were selected based on a general ocular estimates of canopy coverage: 15 were considered light coverage, 15 were considered moderate coverage, and the remaining 15 heavy coverage. Canopy cover estimates using the spherical densitometer method revealed modest inter-observer variability. However, coverage estimates using this method were always less, percentage-wise, than those obtained using digital images. Furthermore, graphical analysis, using 95% CI, indicated more variability at light and heavy sites between spherical densitometer user estimates when compared to digital images. Considering the relative ease of collecting digital images, the ability to archive such images, and the software analysis capabilities available for free (i.e., Image J), use of digital images methodology to document canopy coverage is recommended over the spherical densitometer approach.

Author Bios:

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Lark Sparrow Monitoring at Oak Openings Preserve

Val Hornyak and Karen Menard

Metroparks of the Toledo Area

Over the last three breeding seasons, time was spent observing the state endangered Lark Sparrows' (Chondestes grammacus) preferred nesting spots, approximate arrival/departure times, courtship/breeding behavior, and overall nest success at sites in Oak Openings Preserve Metropark. The current monitoring focused mostly on original Lark Sparrow sites studied by researcher, Michelle Grigore, during 1993-2002. This earlier study established species requirements and investigated best management practices in those breeding areas of Oak Openings Preserve.

Currently, there are approximately 27-29 pairs of Lark Sparrows that breed at Oak Openings Preserve Metropark. In order to maintain desirable breeding habitat, land management practices have been continual since the early 90's at Oak Openings Preserve. Prescribed burns and invasive species removal are facilitated on a regular basis within these sites. In 2015, areas at optimal breeding sites were "scraped," creating more of a contiguous sand barren habitat for this species. Continued management of established sites may increase nest success and add some additional territory options. Numbers of these birds may increase if new, large sites are opened up. Overall, the population is expanding outside Oak Opening Preserve and may be reproducing on some other large sites, adjacent to Oak Openings Preserve where pairs have been observed. This three-year observational study suggests that the Lark Sparrow population is near capacity in Oak Openings Preserve on suitable habitat that is currently available.

Author Bios:

Val Hornyak is a Metroparks Volunteer with a lifelong interest in birds and birding. She is a Herpetologist by trade with experience in conservation field work with other endangered species. She has been involved in Lark Sparrow research in the Oak Openings since 1994, which included nest monitoring and investigating habitat requirements for the population of Chondestes grammacus at Oak Openings Preserve.

Karen Menard works for Metroparks of the Toledo Area as the Research and Monitoring Supervisor and is involved with much of the species monitoring in Oak Openings Preserve and other Metroparks. Karen is also a Certified Interpretive Guide with the National Association of Interpretation.

Baseline Ecological Profiling of Mammalian Diversity for a Riparian Conservation Easement

Jeffrey L. Martin, Lindsey Polsley, Anna Brown, and Dr. Sarah Minter

Shawnee State University, Portsmouth, Ohio

The diversity of mammal species inhabiting a 660 acre tract of property located along Skull Hollow Creek near South Webster, Ohio was investigated. No prior mammalian surveys had been conducted on this property, which is in transitional ownership to become a natural preserve. Our study sought to document mammal diversity using six transects along the riparian zone of Skull Hollow Creek. To maximize sampling success, we utilized a diversity of monitoring techniques. Four mechanical trap types including Sherman, trip-trap, pitfall, and Museum Special snap trap, were set at each of three locations within each transect. Additionally, a single-door steel trap measuring ~ 43 x 18 x 18 cm and one Moultrie 880 IR trail camera were set in the bank of the riparian zone, at the head of each transect. Mechanical trapping occurred once weekly, for a total of 936 trap nights. Camera trapping occurred intermediately throughout the study, as possible. Our twelve week investigation began on 20 July and continued through 6 October 2015. A total of 41 specimens (35 live, 6 dead) were physically collected, representing six species. Peromyscus spp. were the most commonly captured mammals. The Sherman trap collected the greatest number of individuals among mechanical trap types. Camera trapping documented a total of nine species, with an overlap of three species caught via mechanical traps. In all eleven species of mammals were recorded.

Author Bios:

Jeffrey (Lee) Martin is a senior undergraduate biology student at Shawnee State University. He plans to attend graduate school and obtain a MS degree in wildlife ecology following graduation in May of 2016.

Lindsey Polsley is a senior undergraduate biology student at Shawnee State University. She plans to either obtain an environmental biologist position or join the Peace Corps following graduation in May of 2016.

Anna Brown is recent graduate from Shawnee State University where she obtained a BS of Biology in December of 2015.

Sarah Minter is an Assistant Professor of Biology at Shawnee State University where she teaches courses focused on organismal biology and advises undergraduate research students. She received her PhD in Entomology from the University of Kentucky in 2011.

Influence of Sampling Duration on Detection of Bats in Southeastern Ohio

Andrew T. Merkle, Donald P. Althoff, Jordan D. Maxwell, and Karen M. Roberts

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Acoustic monitoring (AM) provides an alternative and non-invasive approach—compared to mist netting--to determining the presence of bats. Because there is limited empirical data reported in the literature on the optimum length (i.e., number of nights) required to detect a bat species, we used AM equipment in southeast Ohio, to evaluate the influence of sampling duration on detection rates. From April to September 2015 (17 weeks), we rotated AM equipment among sites (n=24) located in Athens, Gallia, Jackson, and Vinton counties. Each site was sampled three times with each such deployment lasting 7-consecutive nights. A total of 7,197 call files of sufficient quality were obtained to determine a preliminary ID using analysis software. A manual review of those call files resulted in confident assignment of 4,544 call files to a specific species. We obtained sufficient detections for big brown, eastern red, evening, hoary, little brown, northern long-eared, silver-haired, and tri-colored bats to determine it typically required 1-5 nights to obtain the first-detection of a species. Depending on species it required 5-7 nights to reach a detection probability of 1. Based on our findings, passive AM intended to document presence/absence of bats in southeastern Ohio should be conducted for at least 5 consecutive nights at individual sites; 7 consecutive nights of deployment is highly recommended.

Author Bios:

Andrew Merkle is currently a technician with the Ohio Division of Wildlife. He has an A.S. from Hocking College (2013) and a B.S. from the University of Rio Grande (2015) majoring in Wildlife Conservation.

Don Althoff is currently associate professor of wildlife conservation at the University of Rio Grande. He has a B.S. from the Ohio State University, an M.S. from the University of Nebraska, and a Ph.D. from Penn State University.

Jordan Maxwell is currently a senior at the University of Rio Grande majoring in Wildlife Conservation. She has an A.S. from Hocking College (2014).

Karen Roberts is a retired forensic accountant and currently a volunteer with the Rio EcoMonitoring Program at the University of Rio Grande. She has a B.S. from Southern New Hampshire University.

Detection and Activity Patterns of Hoary Bats (Lasiurus cinereus) in Southeastern Ohio

Kelcie A. Severs and Donald P. Althoff

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Hoary bats (Lasiurus cinereus) are the most widespread bat species in the United States. They are nocturnal insectivores who typically use forested and sometimes suburban-urban landscapes. We used acoustic monitoring (AM) equipment to passively sample 24 sites in southeastern Ohio during 2015 to detect the presence of hoary bats. Deploying 4 AM units per week (i.e., 7 consecutive nights per site), from April – September, we recorded 957 call files that were of sufficient quality to confidently identify them as being made by hoary bats. At the 12 sites (50%) we detected hoary bats, there was a slight but not significant trend ($r=0.43$, $p=0.16$) between clutter rank across sites vs. night to first detection. Based on timing of recorded calls, the hoary bat activity pattern observed in late May to early June peaked between 2300-0100 hr. However, activity for late July to early July switched to a bimodal pattern with one peak at 2300 hr and the other at 0300 hr. This change in the timing of peak searching effort is important to consider when deciding the best hours of the night to deploy mists nets to capture hoary bats or conduct either active or passive surveys using AM equipment.

Author Bios:

Kelcie Severs is currently a senior at the University of Rio Grande majoring in Wildlife Conservation. She has an A.S. in Wildlife Management and a GIS/GPS Certification from Hocking College (2014).

Don Althoff is currently associate professor of wildlife conservation at the University of Rio Grande. He has a B.S. from the Ohio State University (1976), an M.S. from the University of Nebraska (1978), and a Ph.D. from Penn State University (1983).

Does greenspace design influence urban vacant lot soil biodiversity and ecosystem functioning?

Nicole C. Hoekstra and Mary M. Gardiner
The Ohio State University

Due to decades of economic decline, Cleveland, Ohio holds approximately 20,000 vacant lots covering roughly 3,600 acres of land (US Census, 2012). Following demolition of foreclosed or abandoned homes, vacant lots are seeded with a turf grass mixture and mown monthly throughout the summer. With a focus on increasing biodiversity, we are studying management strategies encompassing four planting treatments that include grasses and prairie forb mixes. Here we test whether vegetation diversity affects soil biota within vacant lot communities during early stages of treatment establishment.

The goals of this study were to determine if:

1) vegetation richness affects soil invertebrate richness
2) ground cover affects soil invertebrate richness
3) soil invertebrate richness affects soil properties

Author Bios:

Mary Gardiner, PhD, received her PhD from Michigan State University in 2008 and established the Agricultural Landscape Ecology Laboratory (ALE Lab) at The Ohio State University as an Assistant Professor in 2009. Nicole Hoekstra received her MS from Winthrop University in 2013 and in the same year began working in the ALE lab as a Research Assistant managing and conducting research in the urban study systems of Cleveland, Ohio. The ALE Lab is interested in understanding how the design and management of an urban greenspace or agroecosystem influences food web structure and function. We are particularly interested in understanding mechanisms that explain the biodiversity-ecosystem function patterns found within these habitats. Our goal is to advance the sustainability of food production and urban ecosystem management. We are also actively engaged in outreach related to enhancing home landscapes, greenspaces and small-scale farms as habitats for beneficial arthropods and work with the public to survey lady beetle populations across the state annually.

An Updated ATBI (All-Taxa Biotic Index) for the Barbara A. Beiser Field Station, Washington County, Ohio

Dave McShaffrey[1], Natalie Turner[4], Derek Hennen[2,1] MaLisa Spring[3,1] Molly Mays[1], Benjamin Reed[4], Logan Eckels[1], Katy Lustofin[1] and Chris Monroe[1]

[1]Marietta College Department of Biology and Environmental Science and Institute of Arthropod Research; [2]Virginia Tech Department of Entomology; [3]Ohio State University Department of Entomology; [4]Marietta College Department of Biology and Environmental Science

The Barbara A. Beiser Field Station occupies approximately 31 hectares at 39.419270N and 81.361025W along 780m of the Little Muskingum River in Washington County, Ohio. The land rises steeply from 180m AMSL at the river to 275m AMSL on the adjoining ridge about 500m distant. Since 2008, the property has been managed as a field station by Marietta College under an agreement with the Friends of Lower Muskingum River, a land trust. From 2008 to 2016 the property was sampled by classes from the college and by individuals working on taxa-specific projects (Hemiptera, Diplopoda, Apoidea, Reptilia, Amphibia, Mammalia, Coleoptera, Lepidoptera) and ecological projects (old field studies, cover mapping, water quality); other opportunistic sampling also occurred. As compared to the preliminary ATBI completed in 2014, the number of records increased from 712 to 1,575 and the number of species went from 435 to 628. The majority of the records (770) are documented by photos while 238 records are based on collected specimens. The largest single class represented in the ATBI is the Insecta with 379 of the 539 species of animals tallied. Plants are represented by 99 species (55 in 2014) while 11 additional species of Fungi have been added for a total of 13 species of Fungi. Game cameras have confirmed the presence of Coyote (Canis latrans) and Bobcat (Lynx rufus). The Beiser Field Station is rapidly becoming one of the best-documented sites in terms of biodiversity in southeastern Ohio.

Author Bios:

Dr. Dave McShaffrey is professor of biology and environmental science at Marietta College and director of the Barbara A. Beiser field station. His research interests include use of benthic macroinvertebrates as indices of water quality, distribution and ecology of Chironomidae, functional morphology of aquatic invertebrates, forensic entomology, biogeography of Odonata, and other stuff.

Natalie Turner is a 2015 graduate of Marietta College who studied the botany of the old-field habitat at the station in 2014.

Derek Hennen is a graduate of Marietta College and 2015 graduate of the University of Arkansas, where he earned an MS in Entomology. He is currently a Ph.D. student and Interfaces of Global Change Fellow at Virginia Tech, where his work focuses on millipede systematics.

(Bios continued on following page...)

(**Updated ATBI** -- Author Bios continued)

MaLisa Spring is a Graduate Research Fellow in the Entomology Department at The Ohio State University. Her current research focuses on urban greenspace design and the impacts on pollinator communities. She is a previous graduate of the Biology Department at Marietta College where she investigated the bee diversity in Washington County, Ohio.

Molly Mays is a biology major at Marietta College. She conducted a 2015 survey of Lepidoptera at the station.

Benjamin Reed is a biology major at Marietta College. He conducted a 2015-2016 survey of the small mammal species at the station. His interests are in natural history.

Logan Eckels is a 2015 graduate of Marietta College who conducted a 2014 study on the Coleoptera at the station.

Dr. Katy Lustofin is an associate professor of biology and environmental science at Marietta College whose research interests include bees and millipedes.

Chris Monroe is a 2015 graduate of Marietta College who conducted a 2014 study of the benthic macroinvertebrates of the Little Muskingum River adjacent to the station.

Mammal Research on a Shoestring Budget: A Comparison of Four Trapping Methods

Lindsey Polsley and Dr. Sarah Minter

Shawnee State University, Portsmouth, Ohio

Documenting biodiversity and natural history data have always been challenging. However, increasingly competitive funding and tightening budgets accentuates the need for information regarding efficient and economical means of collecting meaningful data. Four trap types for monitoring small mammal diversity were compared across two studies conducted in southeastern Ohio. Economics, efficiency, success, and ecological sensitivity were considered for Sherman trap, Museum Special snap trap, pitfall trap, and trip-trap. Two case studies were reviewed: a study conducted in winter 2014 in Shawnee State Forest and the other in summer 2015 in northeastern Scioto County, Ohio. Trap successes (total captures of individuals and taxa) were found to be equivalent between the Sherman and trip-trap, while pitfall and snap traps were less effective. Trap efficiency, as expressed by failure rate (defined as a trap triggered or bait lost; not resulting in capture) was calculated and compared across all trap types. Failure rates were higher during the summer study for all trap types, but with the pitfall and snap traps demonstrating the highest failure rates overall. With regard to ecological sensitivity, the Sherman and trip-trap resulted in the fewest deaths and injuries to animals. This finding has relevance for studies conducted in delicate ecosystems or involving endangered species. Economically, pitfall traps were the least expensive, followed by the trip-trap, snap trap, and Sherman trap, respectively, on a cost per trap basis. While the inclusion of all trapping techniques is merited for some investigations, this information could provide guidance for studies facing ecological or financial restrictions.

Author Bios:

Lindsey Polsley is a senior undergraduate biology student at Shawnee State University. She plans to either obtain an environmental biologist position or join the Peace Corps following graduation in May of 2016.

Sarah Minter is an Assistant Professor of Biology at Shawnee State University where she teaches courses focused on organismal biology and advises undergraduate research students. She received her PhD in Entomology from the University of Kentucky in 2011.

Metroparks of the Toledo Area Long-term Butterfly Monitoring in the Oak Openings of Northwest Ohio

Kim High and Karen Menard

Metroparks of the Toledo Area

Long-term butterfly monitoring on Metroparks of the Toledo Area properties is conducted in association with a statewide survey sponsored by the Ohio Division of Wildlife, Ohio Lepidopterists, Cleveland Museum of Natural History and Ohio Biological Survey. Since many butterflies are specialist species with restricted and obligate larval food sources, their biodiversity helps to measure the quality of the surrounding habitats, making them indicators of healthy ecosystems. This type of monitoring is especially important in the globally rare Oak Openings Region of Northwest Ohio, where natural area restoration and land corridor connections are occurring.

Metroparks volunteers have been gathering data from four fixed transects: Monclova Transect (Oak Openings Corridor: since 2012), Sand Pits Transect (Oak Openings Preserve: since 2001), Campbell/Mary's Savanna Transect (Oak Openings Preserve: since 1999) and Wildwood Transect (Wildwood Preserve: since 2008). Each transect has been routed to include a diverse arrangement of Oak Openings habitats. The information presented here summarizes species diversity and abundance with focus on Ohio-listed species and other species of local interest. Species featured include Dusted Skipper (Atrytonopsis hianna, Ohio species of concern) and Silver-bordered Fritillary (Boloria selene, Ohio threatened species) as well as these of local interest: Leonard's Skipper (Hesperia leonardus), Monarch (Danaus plexippus), American Copper (Lycaena phlaeas) and Edward's Hairstreak (Satyrium edwardsii).

Author Bios:

A 32-year veteran Naturalist/Historical Interpreter at Metroparks of the Toledo Area, Kim High is a Certified Interpretive Trainer with the National Association for Interpretation and has taught Environmental Studies and Natural Areas Interpretation at Bowling Green State University for over fifteen years. In 2015, she was the recipient of the National Association of County Park and Recreation Officials Professional Fellow Award and the Ohio Certified Volunteer Naturalist Outstanding Mentor Award.

Karen Menard works for Metroparks of the Toledo Area as the Research and Monitoring Supervisor and is involved with much of the species monitoring in Oak Openings Preserve and other Metroparks. Karen is also a Certified Interpretive Guide with the National Association of Interpretation.

Understory plant community response to edge type and Lonicera Mackii removal in an isolated urban woodlot

Mallory Dickey[1], Keith E. Gilland[2,] and Julia I. Chapman[3]

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Small mature woodlots are common in landscapes dominated by anthropogenic disturbances and may hold great biodiversity conservation potential. However, these areas are highly vulnerable to threats like exotic plant invasion and disturbance from recreational activity. Here, we sought to answer two questions related to the interaction of site characteristics and invasive species presence/removal on the herbaceous diversity of an isolated woodlot in Southwest Ohio. Specifically, we asked: 1)Is there a recovery of herbaceous plant diversity following bush honeysuckle removal in these types of forests?, 2) Does edge type and distance from edge affect patterns of forest herb diversity? As systematic sampling protocol was implemented via a series of $1m^2$ permanent plots at the Armbruster Nature Preserve in Middletown, OH and sampled three times throughout Spring 2015 following bush honeysuckle removal efforts. Species richness (S), evenness (J), and Shannon diversity (H) was calculated for each plot at each sampling date, and correlation analysis was used to determine if relationships exist between honeysuckle abundance and plant community diversity. Weak negative correlations existed between honeysuckle abundance, Shannon diversity (r=-.17) and species richness (r=-.34) largely driven by the almost total removal of honeysuckle in many plots. It appears that even isolated but mature second-growth forests may provide storehouses of biodiversity in the region and that simple invasive species removal may be sufficient to restore spring ephemeral diversity in these forest patches. However, important questions remain to be answered regarding possible legacy effects of longer-established honeysuckle populations on forest herb diversity in these isolated habitats.

Author Bios: Mallory Dickey is a junior at Miami University, studying Botany and Environmental Science. Her research interests include the ecology of small urban forest plots and their effects on communities, effects of invasive species removal, environmental education, and general botany.

Keith Gilland is a Visiting Assistant Professor of Statistics at Miami University Middletown. His research interests include the ecology of surface coal mine reclamation, American chestnut restoration, the dynamics and diversity of isolated forest patches in southwest Ohio, and the effects of invasive species removal in those habitats.

Julia Chapman is currently a doctoral student at The University of Dayton in Dr. Ryan McEwan's laboratory of environmental ecology. Her research interests include plant community assembly, the relationship between biodiversity and ecosystem function, and floristic surveys. She received her M.S. Biology degree from The University of Dayton in 2012 with a thesis focused on seedling, sapling, and herbaceous layer dynamics in an Appalachian old-growth forest stand at Lilley Cornett Woods in eastern Kentucky. Currently, her dissertation work focuses on spatial and temporal forest dynamics in both temperate and tropical systems, with an emphasis on patterns of functional and phylogenetic diversity in relation to environmental variation.

Floral resources of an invasive shrub provide prolonged beneficial effects to native bee communities

Michael Cunningham-Minnick and Thomas O. Crist

Miami University

Invasive plants outcompete and displace native species through soil chemistry alteration, space occupancy, allelopathy, shading effects, and competition for pollinators. Alien invasive floral resources affect neighboring native plant pollination detrimentally or beneficially depending on properties of the invasive plant and pollinator community. Amur honeysuckle (Lonicera maackii) is an alien invasive shrub with dense floral displays in spring and patchily distributed throughout much of Ohio. Previous experiments showed strong increases in the foraging bee community with the removal of L. maackii flowers, suggesting that L. maackii is a magnet species for native bees. However, the mechanisms behind this observation remain unknown. To define mechanistic responses of the bee community to L. maackii, we sampled bees from April to November (2015) along edges of 12 large forest remnants in southwestern Ohio and southeastern Indiana that collectively represented a density gradient of L. maackii. We also recorded tree species and floral counts of neighboring species within each 10 m x 100 m plot. From April 23 to July 2, we sampled 6,197 bees from 29 genera and 4 families. We found that bee community composition responded predictably to L. maackii density during the L. maackii blooming period (May 11 to June 1), increasing in abundance and richness. Data from June 2 to July 2 showed continued growth in bee communities regardless of patch size and surrounding floral availability. These results provide strong evidence that L. maackii is beneficially effecting native bee communities into the summer by providing supplemental food resources in the spring.

Author Bios:

Michael Cunningham-Minnick received his BS from The Ohio State University. He is currently pursuing a PhD in Ecology, Evolution, and Environmental Biology at Miami University. His research interests include community ecology, landscape ecology, biodiversity, and plant-pollinator interactions.

Thomas O. Crist received his BA from McPherson College, M.F.S. from Yale University, and PhD from Utah State University. He is the Biology Department Chair at Miami University. His research interests include landscape ecology, biodiversity, and conservation biology.

Using multiple methods to establish baselines to measure success of the Eagle Creek Restoration project

Jennifer M. Clark

Hiram College, Hiram, OH

Prior to being obtained by the college, the Hiram College Eagle Creek restoration site was heavily logged. Additionally, other upstream land use impacts have caused heavily eroded banks, high turbidity, a sandy benthos, and poor canopy cover. The main goal of the restoration project was to reconnect Eagle Creek with its floodplain and decrease flooding to downstream suburban areas. In an effort to monitor long-term changes in stream health, multiple methods were used to establish a baseline to assess restoration success in future years: measuring abiotic variables, Invertebrate Community Index [ICI], Index of Biological Integrity [IBI]), leaf retention (using leaf releases), and leaf decomposition (using artificial leaf packs). In comparison to our reference stream, turbidity, average depth, and temperature were significantly higher at the restoration site while percent canopy cover and average substrate size were significantly lower. Dissolved oxygen, velocity, and pH were within range of our reference stream. ICI scores were substantially higher at our reference site (ICI = 32) than the restoration site (ICI = 20) suggesting invertebrate communities are impaired. IBI scores ranged from poor to very good and did not match ICI scores to indicate overall stream health. Leaf releases showed 67-74% of leaves were retained and decomposition studies show mass loss of 16% of leaf material per day. Our data suggest that multiple methods should be used to measure stream health. All metrics will continue to be collected and compared to these baselines as part of a long-term study of restoration success.

Author Bios:

Jennifer Clark is an assistant professor of biology at Hiram College. She received her PhD in Ecology from Kent State University in 2009 and focused her research on factors structuring stream crayfish distribution patterns. Her current research focuses on how natural abiotic and biotic parameters structure stream communities and how land use impacts community structure and ecosystem function.

Bumble Bee Species (Bombus spp.) Presence and Absence in an Open Field at the Carlisle Reservation in Northeast Ohio (Lorain County, OH)

Brittany A. Biro and R. Chris Stanton

Baldwin Wallace University, Berea, OH

A decline in bumble bee species, as well as other pollinating insects, has been reported from around the world over the past 25 years. However in Ohio, very little work has been published in that time on the presence or absence of bee species. This preliminary study surveyed a healthy field of flowering plants in 2014 and 2015 with the goal of identifying which bumble bee species were present but did not attempt to document relative abundance. Six 100-meter transects were established in different parts of the field and were walked for ten minutes every 7 to 10 days in the late morning. Sampling dates ranged from July through August of 2014 and August through September of 2015. Any bumble bee observed was captured by aerial net and identified in the field but some specimens were taken to the lab to confirm their identification. Six species of bumble bees (Bombus) were collected in the study—the common eastern (B. impatiens), the black and gold (B. auricomus), the brown-belted (B. griseocollis), the half-black (B. vagans), the southern plains (B. fraternus), and the yellow (B. fervidus). However, a total of 19 species is known from Ohio so multiple species were not observed. These results indicate that some Bombus species may be absent in northeast Ohio but more sampling needs to be conducted. In this study, habitat disturbance played a role in bumble bee occurrence and may be a key factor in their suspected decline.

Author Bios:

Brittany A. Biro is from Fairport Harbor, Ohio. She is currently attending Baldwin Wallace University and will be graduating this spring with a Bachelor's of Science in Biology. After graduation she plans on working as a forensic analyst at the Bureau of Criminal Investigation.

Chris Stanton is a Professor of Biology at Baldwin Wallace University. He has a B.A. from Wittenberg University, a M.S. from the University of Tennessee, and a Ph.D. in entomology from The Ohio State University.

Emerald Ash Borer attraction to traps baited with peppermint vs Manuka oil

Chereka Stevens and Jennifer M. Clark

Hiram College, Hiram, OH

Since the introduction of the Emerald Ash Borer (EAB) to Detroit, Michigan in 2002, it has spread to 24 states in the U.S. as far west as Colorado, south into Georgia and Louisiana, and also into Canada. Detection of EAB's spread has mostly been by the use of baited traps using Manuka oil. However, several other oils may be viable that are more cost effective, more common and less harmful. Although, peppermint oil is commonly used as an insect repellant, there is some evidence that it may be a viable option to attract EAB. In this study, traps were baited with peppermint and Manuka oil to assess the efficacy of peppermint over Manuka oil. Traps were set in three ash trees in Newcomerstown, Ohio from July 1, 2015 through August 5, 2015, each with a peppermint and Manuka oil baited trap. The results showed similar amounts of EAB captured with both trap types (repeated-measures ANOVA, $P=0.3649$), with an average of five-seven EAB caught in each trap over the six week period with the exception of week two. The number of EAB captured peaked during week two (repeated-measures ANOVA, $P<0.0001$) with as many as 18 individuals trapped. These results suggest that peppermint oil does attract EAB and could be a viable option to replace Manuka oil for EAB detection and capture.

Author Bios:

Chereka Stevens is a senior Biology major at Hiram College. Her broad interest is studying animal behaviors. She is especially interested educating the public on wildlife aspects. She plans to get her wildlife rehabilitations license and work at a zoo. She plans to own an educational rehabilitation center or sanctuary.

Jennifer Clark is an assistant professor of biology at Hiram College. She received her PhD in Ecology from Kent State University in 2009 and focused her research on factors structuring stream crayfish distribution patterns. Her current research focuses on how natural abiotic and biotic parameters structure stream communities and how land use impacts community structure and ecosystem function.