

IN-PERSON MEETING PROGRAM & ABSTRACTS

Challenging Paradigms in Ecological Restoration

13th SER MIDWEST-GREAT LAKES CHAPTER MEETING

April 1 to 3, 2022

Manakiki Golf Course, Willoughby, Ohio



WELCOME

Welcome to the shores of Lake Erie and the Thirteenth Annual Meeting of the Society for Ecological Restoration's Midwest-Great Lakes Chapter. Our primary meeting goal is to critically assess the foundations and paradigms of the science and practice of ecological restoration in the Midwestern United States. Our secondary meeting goal is to bring together all who are interested in ecological restoration and contribute to advancing the field of ecological restoration. In summary, the scientific agenda for our three day in-person meeting features a special plenary session on threatened and endangered species, 16 contributed poster presentations, a workshop, 14 contributed oral presentations, four offsite field trips, and one volunteer service project on a range of topics that reflected our meeting theme. This is the sixth year we are able to offer meeting attendees continuing education credits. Notably, our Meeting Hosts (Cleveland Metroparks) have organized a fantastic special plenary session on threatened and endangered species that brings together individuals from state agencies, public park districts, federal agencies, non-profit groups, and private consulting firms in Ohio to share their stories related to protecting, managing, and restoring threatened and endangered plants and animals in Ohio.

2022 ANNUAL MEETING COMMITTEE

The Chapter extends its sincere appreciation to the members of the Annual Meeting Committee for their time and effort in coordinating and developing the Thirteenth Annual Chapter Meeting: *Rocky Smiley (Chairperson), Mary Damm, Steve Glass, Brad Gordon, Jennifer Grieser, Martha Holzheuer, Chris Lenhart, Chris May, Jessica Miller, Keith Summerville, and Jeremy Weber.*

ACKNOWLEDGEMENTS

We are very grateful for the generous support provided by our meeting hosts and sponsors that enabled us to hold a sponsorship reception, support student participation, defray food costs, and make our Annual Meeting as environmentally friendly as possible. We greatly appreciate the contributions of the members of the Local Planning Committee (Jennifer Grieser (Chairperson), Constance Hausman, Sam Carlo, and David Calco) who assisted with planning the meeting and provided onsite help. We are exceptionally grateful to Mia Piro who helped with compiling abstracts, annual meeting outreach efforts, and providing technical assistance for the virtual sessions. We thank Laura Capponi for their help with setting up the online registration page and help with maintaining the registration database. We thank Martha Holzheuer for her work in enabling us to offer continuing education credits through SER. We thank Mark Krivchenia for updating our annual meeting webpage. We are thankful for the participation of the meeting presenters, moderators, tour leaders, field trip leaders, volunteers, and attendees at our Thirteenth Annual Meeting.

MEETING HOST



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2022 MEETING SCHEDULE OVERVIEW

Friday April 1

9:00 am – 6:00 pm	Check in (Foyer)
9:00 am	Continental breakfast begins (Ballroom)
9:45 am to 12:30 pm	Threatened and Endangered Species Plenary Session – Part 1 (Ballroom)
12:30 pm – 1:30 pm	Lunch (Ballroom)
1:30 pm – 4:00 pm	Threatened and Endangered Species Plenary Session – Part 2 (Ballroom)
4:00 pm – 6:00 pm	Poster Session & Sponsorship Reception (Hannah Grille)

Saturday April 2

8:00 am – 11:00 pm	Check in (Foyer)
8:00 am	Continental breakfast begins (Ballroom)
8:30 am – 10:30 am	Workshop (Hannah Room)
10:30 am – 10:40 am	Break
10:40 am – 12:00 pm	Concurrent Oral Presentation Sessions (Ballroom, Hannah Room)
12:00 pm – 12:40 pm	Lunch (Ballroom)
12:40 pm – 1:40 pm	Concurrent Oral Presentation Sessions (Ballroom, Hannah Room)
1:40 pm – 2:00 pm	Travel to Meeting Host Field Tour site
2:00 pm – 5:00 pm	Meeting Host Field Tour

Sunday April 3

9:00 am – 11:00 am	Valley View Restoration – 100 years in the Making Field Trip
9:00 am – 12:00 pm	Worked Over But Working: Transforming Post-Industrial Sites to Functional Landscapes and Coastal Wetland Restoration at Mentor Marsh Field Trips
10:00 am – 12:30 pm	Rehabilitating Landscape Legacies to Restore Ecosystem Resilience Field Trip and Behind the Scenery - Acacia Service Project
<i>Additional details related to offsite field trips are provided in their abstracts below</i>	

Tuesday April 5 **Special Post-Meeting Virtual Session**

9:00 am – 11:00 am	<ul style="list-style-type: none"> - Special presentation by SER Global Executive Director Bethanie Walder who will speak on the UN Decade of Restoration and SER’s role in that important effort - A presentation on SER Global’s Certified Ecological Restoration Practitioner Program - SER MWGL Chapter’s Business meeting highlighting SER MWGL Chapter accomplishments and initiatives - SER MWGL Chapter’s Awards Ceremony recognizing the best student presentations and outgoing SER MWGL Chapter Officers
<i>All registrants will receive email with more information on registering for this free zoom webinar</i>	

All times are eastern daylight time

SPECIAL PLENARY SESSION – FRIDAY APRIL 1, 2022

Finding, Protecting, Managing, and Restoring Threatened and Endangered Species

The objective of this special plenary session is to share stories of success, struggles, and controversy related to protecting, managing, and restoring threatened and endangered plants and animals within terrestrial and aquatic ecosystems in Ohio.

9:45 to 10:00 am: Grieser, Jenn*¹ and Keith Summerville*². **Welcoming Comments and Opening Remarks.** ¹Cleveland Metroparks, Cleveland, Ohio. ²SER Midwest-Great Lakes Chapter & Drake University, Des Moines, Iowa.

Wildlife

10:00 to 10:30 am: Parsons, Kate*. **Endangered Species and Land Management.** Ohio Division of Wildlife, Columbus, Ohio.

This presentation will highlight Ohio's endangered species and the challenges of land management using examples from Ohio and the Division's land management practices and habitat goals.

10:30 to 11:00 am: Pira, Paul*. **Protecting Ohio's Rare Native Brook Trout through Stream Restoration.** Geauga Park District, Chardon, Ohio.

Native brook trout have a long history of being a species of special conservation concern in Ohio. Current populations are extremely restricted in distribution and have recently shown signs of further decline. The long-term survival of unique heritage species such as Ohio's brook trout will take a combination of cooperative partnerships, direct active management, creative restoration projects, and a collective consensus to prioritize cold-water conservation.

11:00 to 11:30 am: Cepek, Jon*. **The Value of Rare Wildlife Species in Natural Resource Management.** Cleveland Metroparks, Cleveland, Ohio.

The discoveries of rare species, and the return of extirpated species, can be exciting to conservation professionals: however, their relevance must be conveyed to the public. Rare species can be used to illustrate the effects of humans, the value of conservation and the importance of natural resources management. This talk will expand on the topics above while sharing information about exciting new wildlife finds within Cleveland Metroparks.

11:30 am to 12:00 pm: Selig, Mike*. **Spotted Turtles – Repatriation Potential for Turtles from the Illegal Wildlife Trade.** Cleveland Metroparks Zoo, Cleveland, Ohio.

Is it possible to reintroduce pet trade rescued native/rare turtles? In this presentation I will discuss key steps for evaluating that possibility that include genotyping the turtles (compare to local populations), evaluating potential habitat sites (what requirements are essential), protection (nest protection from predators), and monitoring.

12:00 to 12:30 pm: **Panel Discussion.** All speakers will take questions from the audience and further discuss their views related to protecting, managing, and restoring threatened and endangered animals in Ohio.

12:30 to 1:30 pm: **Lunch**

Plants

1:30 to 2:00 pm: Gardner, Rick*. **Rare Plant Recovery, Collection, and Propagation.** Ohio Division of Natural Areas and Preserves, Columbus, Ohio.

Conserving rare plants ex-situ and transplanting them to other sites has been a strategy for decades and within the last decade the interest in a more “hands on” approach has increased. This talk will discuss Ohio’s rare plant law, rare plant conservation across the state, the positives, and negatives of collecting/transplanting rare plants and a call for better communication among conservation partners in rare plant conservation.

2:00 to 2:30 pm: Reinier, John*. **Monitoring and Managing Rare Plants in Cleveland Metroparks.** Cleveland Metroparks, Cleveland, Ohio.

Several new rare plant discoveries in Cleveland Metroparks have changed perceptions about the value of certain habitat types found in the park district and adjacent areas. This information is informing the development of new management and restoration strategies focused on the long-term success of these species.

2:30 to 3:00 pm Johnson, Ethan*. **Ex Situ Conservation at Holden Forests and Garden.** Holden Forests and Gardens, Cleveland, Ohio.

Public gardens and arboreta around the world are increasingly embracing their role as protectors of the world’s plants by creating collections of wild-sourced plants for ex-situ conservation purposes. This talk will share the story of Holden’s 50-year history of caring for many of Ohio’s rare plants. In the future, Holden looks to collaborate with land managers to hold significant collections of native plants that can be used for future restoration efforts.

3:00 to 3:30 pm: Trimbath, Ryan¹ and Michael Liptak². **Rare Plant Survey in Cuyahoga Valley National Park.** ¹Cuyahoga Valley National Park, Brecksville, Ohio. ²EnviroScience, Stow, Ohio.

The Cuyahoga Valley National Park (CVNP) supports a diversity of state listed and regionally rare plant species as well as regionally rare plant communities. Through the decades the area has received extensive visitation and recreational use. Our talk will include: a brief history of rare plants at CVNP, results for the 2021 park wide rare plant survey, documentation of visitor impacts on rare plants, and a discussion of preservation and future restoration of rare plant communities at CVNP.

3:30 to 4:00 pm: **Panel Discussion.** All speakers will take questions from the audience and further discuss their views related to protecting, managing, and restoring threatened and endangered plants in Ohio.

POSTER SESSION – FRIDAY APRIL 1, 2022

Hannah Grille: 4:00 pm – 6:00 pm		
Poster#	Presenters	Title
1	Eysenbach, Sarah	Evaluating vegetation changes at Acacia Reservation
2	Shaffer, Erik	Fire facilitates flowers on former fairways
3	Philipps, Josh & Patrick Lorch	Acacia Reservation Bioblitz five years post restoration
4	Reinier, John	Assessing potential and implementing wetland restoration actions at Acacia Reservation
5	Durkalec, Mike & Claire Weldon	Restoring the fish community of Euclid Creek in Acacia Reservation
6	Daniels, N.K., J. Bowman, N. Sullivan, A. Mackey, D. Che, & Binay Sapkota	Assessment and prioritization of culverts For enhanced fish passage
7	Umek, Lauren & N. Rana	Restoration and habitat improvements in a post-industrial landscape on Chicago's southeast side
8	Flinn, Kathryn M. , M.N. Dolnicek, & A.L. Cox	Gap dynamics and disease-causing invasive species drive the development of an old-growth forest over 250 years
9	Schiafo, Rory B. & R. Barak	Examining the understory plant communities across an oak woodland restoration chronosequence in Cook County, Illinois
10	Daigle, Rebecca & P. Nyamai	Initial responses to restoration treatments at two altered oak savanna ecosystems in West Michigan
11	Harbol, Samuel C. , K. E. Mueller, & K. L. Stuble	Recent effects of girdling, a slow release of competition, on canopy structure in a post-agricultural secondary forest in northeast Ohio
12	Dawson-Glass, Emma & K. Stuble.	Species-specific tree growth responses to microbial inoculation during reforestation
13	Griffin, Amanda Lee , F.S. Sivakoff, A. Starkey, R. Swab, K. Goodell, & A.C. McCall	The effect of reclaimed mine soils on plant growth
14	Galloway, Emily, M. , P.A. Price, Emily Grman, & J.T. Bauer	Restoring mutualisms to reintroduce rare legumes.
15	Cazzato, Karly C. , Alex Bowers , & J.T. Bauer	Predicting plant abundance in a restored prairie.
16	Slater, Julie , A. Zearley, & D. Tomashefski	Public-private partnerships to support the environmentally responsible growth of the native plant industry

bolded names above signify the presenter of the presentation

POSTER PRESENTATION ABSTRACTS (ALPHABETICAL ORDER)

Cazzato, Karly C.*, Alex Bowers*, and Jonathan T. Bauer. Predicting plant abundance in a restored prairie. Miami University, Oxford, Ohio. Email: cazzatkc@miamioh, bowersd4@miamioh.edu

Investigating the mechanisms that promote abundance in plant communities can improve our understanding of community assembly in restored systems. Plant traits are important predictors of plant species abundance across many ecosystems. Alternatively, plant-soil feedback has been shown to predict abundance within certain sites. Plant-soil feedback estimates emerge through the influence of plants and soil microorganisms on one another's fitness. Because these estimates are produced through the interaction between the plants and the site-specific microbial community, plant-soil feedback may be able to capture site-specific information influencing abundance that plant traits cannot. We measured nine traits that reflect tradeoffs in the plant economic spectrum. We also conducted a two-phase greenhouse experiment to calculate average feedback across 19 plant species from a local restored prairie. We found that species with low nitrogen content were more common, suggesting the resource use efficiency was an important predictor of abundance. However, plant-soil feedback was a very weak predictor of abundance within our site. This finding contradicts previous studies that did find plant-soil feedback to have strong predictive abilities and emphasizes the need for experimentation to identify the conditions under which plant-soil feedback is able to predict abundance.

Daigle, Rebecca* and Priscilla Nyamai. Initial responses to restoration treatments at two altered oak savanna ecosystems in West Michigan. Grand Valley State University, Allendale, Michigan. Email: daigler@mail.gvsu.edu

Oak savannas have greatly declined since the 1800's, and management is needed in order to maintain these rare community types. A combination of prescribed burns and mechanical thinning are a common practice used to increase abundance and diversity of native vegetation in the ground layer. This on-going study examines the effect of a combination of prescribed burns and girdling to restore ecosystem structure and native vegetation in the ground layer at two nature preserves in Kent County, Michigan. The experimental design at each of the research sites consists of 60 total 5m x 5m plots containing 30 plots that received restoration treatments and the other 30 plots were used as a control, where no treatment was implemented. Treatments involve conducting a prescribed burn, followed by selectively girdling mesophytic tree species (primarily maple). The goal of these treatments is to reduce canopy cover and create favorable conditions on the ground surface for germination and establishment of native forbs and graminoids. Data collected from the study plots include the abundance of trees in all layers, cover of shrubs, cover of forbs and graminoids in the ground layer, as well as site characteristics such as condition of the ground surface. The study is ongoing and we will present preliminary results of some observations we have made so far with the data already collected. We hope that the findings of this study will directly inform land management decisions and contribute to protecting this imperiled community type.

Daniels, Natalie. K., Jen Bowman, Nora Sullivan, Amy Mackey, Daniel Che, and Sapkota, Binay,*. Assessment and Prioritization of Culverts For Enhanced Fish Passage. Ohio University, Athens, Ohio. Email: bs568720@ohio.edu

Culverts can be an impediment to fish passage, impacting fish populations and spawning of both migratory and non-migratory species. With increased opportunities to invest in both water resources and infrastructure, prioritizing and selecting potential locations for culvert replacement to remove fish barriers is timely. In this project, we engaged with stakeholders in the eastern basin of Lake Erie to discuss and visit both potential and completed culvert replacement project sites; these stakeholders would be strong potential partners for ODOT in the future. The OHIO team also reviewed approved NPS-IS plans for identification of fish passage barriers that may be useful planning and design-ready project sites for ODOT to pursue if funding were available. The OHIO team also developed a method to prioritize and identify potential culvert replacement project locations using a GIS-based analysis. Culverts in target, high quality watersheds on perennial or intermittent streams are identified. Their openness ratio is then calculated; a low openness ratio is poor for fish passage and suggests that the site could be a good candidate. Aerial imagery and LiDAR data are then used to calculate an average slope of the culvert from the streambed upstream to the streambed downstream of the culvert. A high average slope would suggest either a highly sloped culvert or a low to moderate slope culvert with a vertical disconnection on the downstream end; either case would be poor for fish passage. Natural breaks in the data suggested that sites with high slope (>10%) and sites with moderate slope (4-10%) should be field verified as potential project sites.

Dawson-Glass, Emma*, and Katharine Stuble. Species-specific tree growth responses to microbial inoculation during reforestation. Holden Arboretum, Kirtland, Ohio. Email: edawson-glass@holdenfg.org

Soil microbial communities impact tree growth and survival. Adding microbial inoculum from natural reference forests to trees during reforestation has grown in popularity in recent years. However, studies have shown mixed tree responses this method. In some cases, inoculum additions can improve tree establishment. In others, inoculum may not benefit tree establishment if additions contain pathogens or if nutrients are readily available at field sites. Moreover, responses to inoculum may be variable across tree species depending on their mycorrhizal associations. As such, the impact of inoculum can be context dependent, obscuring the applicability of this technique. Here, we ask: How do tree species with different microbial associations respond to various inoculum communities? We inoculated individuals from nine tree and shrub species (5 with arbuscular mycorrhizal associations, 4 with ectomycorrhizal associations) with microbial inoculum collected from three forest types: young, old-growth dominated by ectomycorrhizal-associated trees, and old-growth dominated by endomycorrhizal-associated trees. We planted these trees into an old field undergoing restoration and compared relative growth and mortality rates of inoculated trees/shrubs to those of uninoculated controls over two growing seasons. Preliminary analyses show no consistent responses to inoculation. Both ectomycorrhizal and endomycorrhizal-dominant inoculum increased growth in two species relative to the control, while young and endomycorrhizal-dominant inoculum decreased growth in another two species. Most species did not respond to inoculation, regardless of mycorrhizal associations. Survivorship did not differ significantly by inoculum or mycorrhizal association, though it did differ by species. Together, these results suggest a lack of generalizable benefits associated with microbial

inoculum during restoration. Rather, these findings suggest that impacts are likely nuanced and species-specific, with beneficial impacts in some instances from some inoculum types, but no effect on or even reductions in growth driven by others.

Durkalec, Mike and Claire Weldon*. Restoring the fish community of Euclid Creek in Acacia Reservation. Cleveland Metroparks, Cleveland, Ohio. Email: cgw@clevelandmetroparks.com

After Cleveland Metroparks took on management of Acacia Reservation and conducted an Ecological Restoration Master Plan, the Park District received significant grant funding to complete a variety of restoration projects. One project included the excavation of a stable 950-foot portion of Euclid Creek, including floodplain connectivity, diverse aquatic habitats and substantial riparian vegetation. Staff completed pre- and post-restoration monitoring via Ohio EPA protocols for assessing stream habitat and fish community. While the habitat scored well, the fish community did not. Cleveland Metroparks received approval and completed a project to translocate a more diverse assemblage of fish species from lower in the Euclid Creek watershed.

Eysenbach, Sarah*. Evaluating vegetation changes at Acacia Reservation. Cleveland Metroparks, Cleveland, Ohio. Email: sre@clevelandmetroparks.com

After the acquisition of Acacia Country Club (now Acacia Reservation), Cleveland Metroparks Natural Resources Division implemented a monitoring program to track changes in plant communities as restoration activities progress. The initial sample took place in 2013 with annual samples into 2018. A total of 40 sample points (10m x 10m plots) were scattered across the reservation, using the Generalized Random Tessellation Stratified (GRTS) survey design. Estimation of percent cover for species and ground cover (i.e. bare ground, leaf litter, mulch) were collected. Staff analyzed species richness, Shannon-Wiener Diversity index and Floristic Quality Assessment index (FQAI) to determine trends in plant community change. Overall, 34 plots in Acacia Reservation showed increasing trends in richness, diversity, and FQAI score. However, managed fairways and roughs displayed larger increases in these plant community indexes. The former fairways and roughs left fallow had turf grass that formed a dense root mat and a thick aboveground thatch that created a competitive barrier for new plant establishment. Although, the plant species composition is changing within these plots with and without management, succession is restricted in the unmanaged plots.

Flinn, Kathryn M.*, Madison N. Dolnicek, and Abigail L. Cox. Gap dynamics and disease-causing invasive species drive the development of an old-growth forest over 250 years. Baldwin Wallace University, Berea, Ohio. Email: kflinn@bw.edu

Investigating the disturbance regimes of unharvested forests helps us understand their past, present, and future trajectory and gives us a model for forest management. In addition, we can use the trajectories of old-growth forests to set targets for ecological restoration. Here we used tree rings to examine the recruitment patterns, growth dynamics, and disturbance chronologies of American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and eastern hemlock (*Tsuga canadensis*) in A.B. Williams Woods, an old-growth forest in the North Chagrin Reservation of Cleveland Metroparks, Ohio, over the past 250 years. We found that beech and sugar maple recruitment peaked around 1900 and continued through the 1900s, while hemlock recruitment peaked during 1825-1875, then declined and effectively

ended in the early 1900s. Hemlock grew fastest during the 1800s according to ring width and basal area increment, while sugar maple ring width surpassed beech and hemlock in the 1900s. All three species showed a dramatic increase in growth from 1980-2010. Beech and sugar maple established regardless of canopy gaps, but 73% of hemlocks originated in gaps. In most decades, less than 10% of trees experienced gap recruitment or growth release, suggesting that ongoing, endogenous canopy mortality was the primary disturbance shaping this forest. However, a more severe forest-wide disturbance occurred during the 1980s-1990s when the scale insect causing beech bark disease was introduced, with > 30% of living trees showing growth releases in those decades. Another synchronous release occurred in the 1930s when blight-killed chestnuts were removed; 16% of trees showed releases. Despite being protected as a park, the development of this old-growth forest has been shaped more by disease-causing invasive species than natural disturbances over the past century. This result emphasizes the pervasiveness of human impacts even in communities we look to as examples of natural pattern and process.

Galloway, Emily, M.^{1*}, Paul A. Price², Emily Grman², and Jonathan T. Bauer¹. Restoring mutualisms to reintroduce rare legumes. ¹Miami University, Oxford, Ohio. ²Eastern Michigan University, Ypsilanti, Michigan. Email: gallowe@miamioh.edu

Microbial mutualists, such as rhizobia bacteria, are essential for the success of many plant species. In the absence of these soil microbes, many plants may not have the ability to succeed in a newly established community. My goal is to test whether the absence of species-specific rhizobia mutualists explains why some plants establish poorly in restorations. We focused on *Lespedeza capitata*, *Dalea purpurea*, and *Amorpha canescens* as study plant species because they are rare and difficult to re-establish in restorations. In a greenhouse experiment, I grew each plant species in either sterile soil or live soil collected from a prairie restoration and in each soil treatment, I tested the effects of species-specific rhizobia bacteria inoculum on plant growth. I found that *Lespedeza capitata* and *Amorpha canescens* formed more nodules in live soil than sterile soil. Rhizobia inoculation further increased nodulation and dry biomass of *Lespedeza* and *Amorpha* in live soil. This indicates that there are essential microbes in the soil and that essential microbes may be otherwise missing from restorations.

Griffin, Amanda Lee^{*1}, Frances S. Sivakoff², Anna Starkey¹, Rebecca Swab¹, Karen Goodell³, and Andrew C. McCall⁴. The effect of reclaimed mine soils on plant growth. ¹The Ohio State University, Columbus, Ohio. ²The Ohio State University, Marion, Ohio. ³The Ohio State University, Newark, Ohio. ⁴Denison University, Granville, Ohio. Email: griffin.794@osu.edu

Even after reclamation, surface-mined soils can have altered biological, physical, and chemical properties, which can inhibit plant growth. To investigate how reclamation practices influence plants, we compared *Lotus corniculatus* growth using reclaimed soil at different time periods from a former coal surface mine. We collected soils from three reclamation permit areas located in Ohio: A permit (reclaimed pre-1972), B permit (1972-1978), and C permit (1979-1982). We collected control soils from nearby unmined areas. Topsoil was not replaced in A permit sites before seeding, while B and C sites received six inches of topsoil. Experimental soil was tested for elemental concentrations and contamination factors calculated for each reclaimed soil type. We hypothesized that *L. corniculatus* grown on A

soils would have lower biomass compared to those grown on later-reclaimed soils or control soils. *Lotus corniculatus* grown on Permit A soils had significantly greater dry root biomass and higher root: shoot ratios compared to those grown on all other soils. We found that B and C soils had higher aluminum, and lower strontium, and C soils had higher iron and manganese contamination factors than A soils. All plants showed evidence of rhizobia bacteria nodules. Contrary to our expectations, A soils had lower contamination factors for multiple elements, and produced larger plants than the B, C, and control soils. *Lotus corniculatus* interactions with rhizobial symbionts may have compensated for differences in soils. Furthermore, time since reclamation, which was greatest for A permit soils, may have favored microbial communities.

Harbol, Samuel C.*¹, Kevin E. Mueller², and Katharine L. Stuble¹ Recent effects of girdling, a slow release of competition, on canopy structure in a post-agricultural secondary forest in northeast Ohio. ¹Holden Arboretum, Kirtland, Ohio. ²Cleveland State University, Cleveland, Ohio. ²Holden Arboretum, Kirtland, Ohio. Email: sharbol@holdenfg.org

Light levels in a forest understory, determined by canopy structure, influence forest functions, including plant community and soil characteristics. Less intense forest management methods, such as tree girdling, that are less disruptive to the canopy are viewed more favorably for secondary forests of poor health metrics, but their effects have not been studied at fine spatial scales. The Working Woods Learning Forest, a secondary growth forest located at Holden Arboretum in northeast Ohio has been managed with canopy thinning, with 20% of the tree basal area girdled over two years. At locations experiencing different levels of localized girdling, we used hemispherical photos to measure canopy openness (n = 204) and a LICOR 2200C to measure leaf area index (LAI) and diffuse non-interceptance (DIFN) (n = 143), from immediately pre-treatment through two years post-treatment. We used a repeated measures ANOVA to examine the effects of girdling (the presence or absence of girdling within 10 meters of each measurement), time (relative to girdling), and their interaction. For all three canopy structure metrics, differences between locations with and without girdling were apparent (p<0.01 for canopy openness, <0.001 for LAI and DIFN). LAI and DIFN varied from year to year (p<0.001). But there was no interaction between girdling and time (relative to girdling implementation p>0.3), indicating that although pre-treatment canopy structure was different for locations experiencing localized girdling or not, girdling had not yet induced substantial, detectable effects on canopy structure up to 1.5 years after treatment. However, hints of treatment are apparent especially for DIFN, which showed a trend towards divergence between girdled and ungirdled locations over time (pre-treatment girdled locations had 12% higher median DIFN, but 1.5 years after treatment that difference increased to 47%). Additional measurements may provide insight into the temporal response of canopy structure to localized girdling.

Philipps, Josh* and Patrick Lorch. Acacia Reservation Bioblitz Five Years Post Restoration. Cleveland Metroparks, Cleveland, Ohio. Email: jjp1@clevelandmetroparks.com

Cleveland Metroparks conducted two bioblitzes at Acacia Reservation, in 2013 and 2018, to inventory the presence of as many species as possible. These timeframes represent the growing season just after golf activities ceased and Metroparks took on property management and five years later. Cleveland Metroparks utilized amateur and expert scientists to catalogue observations in iNaturalist. The contributors identified 273 more total

species in 2018, including 108 additional plant species. Other observation categories included mammals, birds, amphibians, fungi, arthropods, fish and macroinvertebrates.

Reinier, John. Assessing Potential and Implementing Wetland Restoration Actions at Acacia Reservation. Cleveland Metroparks. Cleveland, Ohio. Email: jer@clevelandmetroparks.com

The acquisition of what is now Acacia Reservation presented Cleveland Metroparks with an exciting opportunity to restore several wetlands and streams on the property. Located in a heavily-developed area of the Euclid Creek watershed, the Acacia property is one of the last remaining significant green spaces in northeastern Cuyahoga County. Using current and historical aerial imagery, on-the-ground investigation, and information gleaned from discussions with past golf course employees, we were able to construct a picture of where there was good potential for wetland and aquatic resource restoration on the property. The results of our investigations showed much of the property was underlain with clayey, somewhat poorly drained soil and, as expected, had been artificially drained through a subsurface tile system. Suspected locations of main tile lines were located using high-resolution color-infrared imagery and those locations were then excavated to confirm the location and depth of tile. Following the disruption of several tile lines, additional earthwork was completed to slow the flow of surface water across the property. Areas of seasonally to semi-permanent ponding are now common across the former golf course with native wetland flora and fauna becoming well-established. Additional restoration work completed through a partnership between Cleveland Metroparks and Biohabitats Inc. resulted in several additional acres of wetland habitat being restored and a significant increase in important wetland functions and services in the watershed.

Schiafo, Rory B* and Rebecca Barak. Examining the understory plant communities across an oak woodland restoration chronosequence in Cook County, Illinois. Northwestern University and Chicago Botanic Garden. Email: rschiafo@u.northwestern.edu

The Forest Preserves of Cook County (FPCC), composed of over 50,000 acres of natural lands, is one of the oldest and largest forest preserve districts in the United States. However, human land-use and urbanization, alterations to fire regimes and invasive plant species have left many of the natural areas heavily degraded. To improve biodiversity and ecosystem health across the preserve, FPCC has implemented ecological restoration efforts across over 12,200 acres of the preserve. Among the ecosystem types under active restoration, include oak dominated woodlands. These woodlands are characterized by a semi-open canopy of *Quercus* spp., with a high diversity of understory of grasses, sedges, and herbaceous perennials. The restoration of these diverse habitats includes removal of invasive Buckthorn (*Rhamnus cathartica*), reintroduction of prescribed fire, and seeding native species. My research aims to understand the temporal trajectories of plant community change in restored oak woodlands. I am studying the understory plant communities in seven oak woodlands that have been restored using similar methods, but that vary in restoration age, ranging from 4-52 years of active management. Here, I report on the results of plant community surveys conducted in 2021 in this restoration chronosequence. Both plant species richness ($p=0.0024$) and Shannon's Index of Diversity ($p=0.0025$) increased with restoration age. However, visualization of community composition through non-metric multidimensional scaling (NMDS) revealed no clear difference in community composition across sites of different restoration ages. Future work will include assessing functional trait diversity across

this chronosequence to further understand the mechanisms of plant community change. By contributing to our understanding of the trajectories of plant community change during restoration, this research will contribute to future ecological restoration efforts in oak woodlands.

Shaffer, Erik. Fire Facilitates Flowers on Former Fairways. Cleveland Metroparks. Cleveland, Ohio. Email: exs@clevelandmetroparks.com

Cleveland Metroparks has been utilizing prescribed fire for land management since the mid-1980s. Prescribed fire stimulates new growth, resets succession, provides competitive advantage to native species, creates microhabitats for plants and animals and controls invasive plants. After a phased approach to initially establish meadows from former turf grass, the Park District then used prescribed fire at Acacia Reservation to further enhance the areas into vibrant pollinator meadows. In addition to positive public feedback, overall wildlife diversity in and around these meadows has increased.

Slater, Julie^{1*}, Alyssa Zearley², and David Tomaszewski³. Public-private partnerships to support the environmentally responsible growth of the native plant industry. ¹Meadow City Native Plant Nursery, Cleveland, Ohio. ²Forgotten Fruits, Euclid, Ohio. ³The Ohio State University, Columbus, Ohio. Email: julie.m.slater@gmail.com

The Mid-Atlantic Regional Seed Bank's 2020 survey shows that commercial availability of native plant material for restoration continues to fall short of demand. Additionally, demand for native plants among private landowners has increased in recent years. This growing demand for native plants is being met by a mix of large nurseries which use conventional horticultural methods including heavy pesticide use and clonal propagation, and smaller operations which struggle to consistently meet buyer demand. Few among these growers are able to report the provenance of their plants or maintain genetic diversity, as recommended in SER's International Standards for Native Seeds in Ecological Restoration. Conservation organizations are uniquely poised to raise the ecological integrity of the native plant industry by providing technical expertise, access to wild-collected seeds, and limited financial investment. Based on our experience, we recommend the following means whereby conservation organizations can facilitate the responsible growth of the native plant industry. Firstly, we support an increase in public-private partnerships which invest in the growth of small, environmentally sound native plant nurseries through large pre-orders. Secondly, we propose that non-profit conservation organizations formulate plans for sharing seeds with growers of native plants. This could be accomplished by partnering with for-profit seed nurseries willing to follow SER's guidelines or by creating non-profit seed libraries or nurseries maintained by conservation alliances. Finally, we encourage organizations with horticultural expertise to form initiatives to equip native plant growers to increase production while keeping pesticide use to a minimum. Such partnerships have the potential to increase the quantity and quality of plantings on both public and private land, thereby expanding conservation organizations' footprints. We hope to start a conversation about these possibilities, to involve other growers, and to receive feedback from the wider conservation community.

Umek, Lauren* and Naureen Rana. Restoration and habitat improvements in a post-industrial landscape on Chicago's southeast side. Chicago Park District, Chicago, Illinois. Email: lauren.umek@chicagoparkdistrict.com

Urban development and industrialization often disconnects areas with high habitat potential from their historic watersheds. Restoration of these ecosystems is critical for maintaining and improving local biodiversity and ecosystem function. This poster discusses the restoration of Marian R. Byrnes Park, a 135-acre public space that is just 2 miles west of the Lake Michigan coastline on the southeast side of Chicago. This poster will demonstrate how industrial and residential water has resulted in a combination of typical restoration challenges such as soil contamination and invasive species dominance, but also unique opportunities for conservation. Slag, a by-product of the steel industry that was discharged into the historically connected wetlands have made some planting and restoration efforts limited due to shallow soils but has also created an anthropogenic "slag-wetland" with unique species assemblages of high conservation value. This poster will explore challenges and opportunities of restoring this post-industrial site that is immediately adjacent to a neighborhood.

WORKSHOP – SATURDAY APRIL 2, 2022

Performance-Based Decision Making in Ecological Restoration Project Planning and Assessment. (Hannah Room)

Time: 8:30 am to 10:30 am

Instructors: Fevold, Brick¹, Craig J. Palmer¹, Timothy Lewis¹, and Louis Blume². Performance-based decision making in ecological restoration project planning and assessment. ¹General Dynamics Information Technology, Alexandria, Virginia. ²U.S. Environmental Protection Agency, Great Lakes National Program Office, Chicago, Illinois. BF Email: brick.fevold@gdit.com; CP Email: craig.j.palmer@gdit.com; TL Email: timothy.lewis2@gdit.com; LB Email: blume.louis@epa.gov

Defining ecological restoration project success is often an elusive concept. To operationalize the definition of project success, we advocate for the development of goals and objectives that are specific, measurable, achievable, results-oriented, and time-bound. And, where the assessment of project success is then evaluated based on evidence in the form of monitoring data thoughtfully collected, this information can be used to support unbiased assessment and decision making. A principal challenge in determining whether a project's goals and/or objectives have been achieved successfully involves the need to obtain data that are not only accurate and reproducible but also complete, representative, and comparable across space and time. In collaboration with the U.S. EPA Great Lakes National Program Office, and an interagency committee, we published guidance entitled "*Application of Quality Assurance and Quality Control Principles to Ecological Restoration Project Monitoring*" (EPA-905-K19-001, 2019). The goal of the guidance is to inform scientists and practitioners on quality best practices fundamental to effective ecological restoration planning and oversight, and informed decision making. A critical planning component is to establish clear and relevant project goals, specific and measurable objectives, and data quality acceptance criteria for data quality indicators (DQIs) such as precision, bias and accuracy, detectability (sensitivity), completeness, representativeness, and comparability. In this workshop, attendees will work with exercises to practice developing project goals and objectives, and acceptance criteria for DQIs based on a real case study. Speakers will provide brief oral presentations followed by exercises and group discussions.

CONCURRENT ORAL PRESENTATION SESSIONS SATURDAY APRIL 2, 2022

Techniques and Assessment for Working Land Restoration. 10:40 am – 12:00 pm Ballroom.

10:40 – 11:00	Daniels, C., Angela Burdell , & Theresa N. Wolanin	Regionalized native seed mixes tested post construction in electric utility corridor
11:00 – 11:20	Goerig, David J.	Using unmanned aerial vehicle (UAV) platforms to perform natural area restoration and maintenance
11:20 – 11:40	Keele, Emma C. , D.D. McNeil, & J. Larkin	An assessment of monarch butterfly (<i>Danaus plexippus</i>) use of early successional communities managed for Golden-Winged Warbler (<i>Vermivora chrysoptera</i>) in the western Great Lakes
11:40 – 12:00	Starkey, Anna, S. Fitzgerald, & F.S. Sivakoff	Reclamation history affects floral color and pollinator preference across surface-mined land

Stream and Wetland Restoration. 10:40 am – 12:00 pm. Hannah Room.

10:40 – 11:00	Lenhart, Christian F.	Implications of climate change for stream restoration and culvert design for greater resilience in Midwestern rivers
11:00 – 11:20	Nussle, Sean B.	Using innovative drone and macroinvertebrate techniques at a full-delivery, stream and wetland mitigation in-lieu fee program site in Columbiana County, Ohio
11:20 – 11:40	Grieser, Kevin A. & S. Hoehne	From farmland to wetlands, restoration at the Redhorse Bend Preserve
11:40 – 12:00	Goerig, David J.	The ins and outs of storm water basin maintenance in urban areas

bolded names above signify the presenter of the presentation

CONCURRENT ORAL PRESENTATION SESSIONS SATURDAY APRIL 2, 2022

Application of Restoration Concepts. 12:40 pm – 1:40 pm. Ballroom.

12:40 – 1:00	Swab, Rebecca M.	Restoration can further equality: reframing restoration with environmental justice, the human hierarchy of needs, and the breath of life
1:00 – 1:20	May, Christopher A.	Daylighting human quality of life benefits of ecological restoration
1:20 – 1:40	Quent, Peter	Balancing risk in environmental restoration construction

Forest Restoration Techniques. 12:40 pm – 1:40 pm. Hannah Room.

12:40 – 1:00	Miller Jessica A. & Rebecah Troutman	Ohio forest edge and old field restoration: demonstrating replicable methods for private landowners
1:00 – 1:20	Wagner, Alexa & K. Stuble	Forest management drives recruitment dynamics in the forest understory
1:20 – 1:40	Summerville, Keith S. & Sophia Van Zee	Changes in forest lepidopteran community structure over 15 years following timber stand improvement to stimulate oak regeneration

bolded names above signify the presenter of the presentation

ORAL PRESENTATION ABSTRACTS (ALPHABETICAL ORDER)

Daniels, Cheryl, Angela Burdell*, and Theresa N. Wolanin*. Regionalized native seed mixes tested post construction in electric utility corridors. Davey Resource Group, Kent, Ohio. Emails: angela.burdell@davey.com; theresa.wolanin@davey.com

Seeding of utility ROWs has historically used non-native turfgrass species to prevent erosion and meet the qualifications of national and state level standards. However, many companies are exploring the use of native species in their post-construction seedings with the aim of reducing woody encroachment while also improving erosion control. American Electric Power (AEP) is testing the performance of native seed mixes to determine if they are compatible with common construction practices along electric utility corridors or rights-of-way (ROWs) in three regions of the United States (U.S.). AEP developed the seed mixes to be locally representative for the Eastern U.S. (tested in West Virginia), the Midwest (Ohio), and the South (Oklahoma). This study presents the results of the second year of data collection, where the performance of the seed mixes was evaluated in terms of the groundcover provided, the average bare ground, the extent and severity of any erosion present on site, and the presence or absence of woody plant and invasive encroachment. This talk will discuss the ability of the seeded sites to meet AEP's short and long-term goals of vegetation management, SWPPP requirements, and the resulting plant community in the second year of establishment. Based on the findings, we will discuss further monitoring recommendations.

Goerig, David J.* The ins and outs of storm water basin maintenance in urban areas. Davey Resource Group, Kent, Ohio. david.goerig@davey.com

Storm water basins and associated infrastructures are necessary in urban areas. These facilities reduce soil erosion and help keep our streams clean. Much natural area maintenance and restoration work in urban areas is within these basins and drainage corridors. This presentation will introduce to the attendees the different types of storm water basins and related infrastructures. Further discussion will relate to how these facilities can fail to function properly when they are not maintained. Over the years, Davey Resource Group has successfully remediated many storm water drainage issues involving multi-faceted storm water infrastructure activities. This presentation will review some of the most common issues associated with storm water basins including good invasive vegetation management. Attendees will receive a standard basin inspection form. Examples of actual bid specifications Davey Resource Group has worked under will be shared.

Goerig, David J.* Using unmanned aerial vehicle (UAV) platforms to perform natural area restoration and maintenance. Davey Resource Group, Kent, Ohio. david.goerig@davey.com

Unmanned Aerial Vehicles (UAV) are commonly known as Drones. These flying platforms can be equipped with sprayers, seeders, and cameras. There are many advantages for using drones to perform natural area restoration and maintenance work, however there are specific site limitations that dictate when they cannot be used. This presentation will introduce the participants to drone technology. It will overview the Federal and State licensing required for businesses, equipment, the operators. Further discussion will relate to the ground support equipment needed with these machines. Davey Resource Group operates the largest privately owned fleet of UAVs in the US. They use this equipment to inventory native,

naturalized, and invasive vegetation cover, survey utility right-a-way corridors, support urban tree canopy management plans, application of herbicides, native seedings, and much more.

Grieser, Kevin A.* and Suzanne Hoehne. From farmland to wetlands, restoration at the Redhorse Bend Preserve. Biohabitats, Cleveland, Ohio. Email: kgrieser@biohabitats.com

One of the ways the Ohio Department of Natural Resources' H2Ohio Program is combating agricultural phosphorus runoff and harmful algal blooms is by converting marginal farmland along those contributing waterways to new wetlands. In 2020, Biohabitats was awarded an H2Ohio project with the Black Swamp Conservancy to restore 55 acres of farmland along the Sandusky River at their Redhorse Bend Preserve in Fremont, OH to emergent marsh, floodplain & riparian forest, and meadow. Taking advantage of the site's topography, a dike along the Sandusky River was lowered to increase flooding on the site and improve wetland hydrology and a series of shallow berms and depressions were created to capture and retain water on the landscape. The berms and depressions were constructed of soil and mulch, which increases denitrification and improves water quality. Large woody debris habitat features were also integrated into the project to provide additional aquatic and terrestrial habitat for wildlife. This presentation describes the techniques used, provides a recent local example, and demonstrates how their benefits meet the goals of the H2Ohio Program.

Keele, Emma C*¹, Darin D. McNeil², and Jeffery Larkin^{1 3}. An assessment of monarch butterfly (*Danaus plexippus*) use of early successional communities managed for Golden-Winged Warbler (*Vermivora chrysoptera*) in the western Great Lakes. ¹Indiana University of Pennsylvania, Indiana, Pennsylvania. ²University of North Carolina-Wilmington, Wilmington, North Carolina. ³American Bird Conservancy, The Plains, Virginia. Email: gsncc@iup.edu

The monarch butterfly (*Danaus plexippus*) and Golden-winged Warbler (GWWA; *Vermivora chrysoptera*) are both target species of USDA-NRCS working lands programs in the western Great Lakes, Working Lands for Wildlife (WLFW) and Regional Conservation Partnership Program (RCPP), respectively. The goal of this project is to assess how management for GWWA habitat through the RCPP benefits monarchs in the western Great Lakes. We surveyed 49 study sites in two early successional community types across northern Wisconsin and Minnesota during the summer of 2021. Additionally, we compared data from RCPP-GWWA sites with those specifically managed for pollinators. Monarch immatures, monarch adults, and milkweed were more abundant and prevalent at pollinator managed sites compared to RCPP-GWWA sites (all p-values < 0.001). Although, GWWA sites still provided valuable habitat for monarchs. Within RCPP-GWWA sites, the presence of immature monarchs, adult monarchs, and milkweed were associated with multiple landscape and within-site variables. Presence of immature monarchs was positively associated with percent area of pasture/hay and herbaceous wetlands, but negatively associated mixed forests within the surrounding landscape. The presence of milkweed was also positively associated with pasture/hay and herbaceous wetlands, but negatively associated with woody wetlands within the surrounding landscape. Presence of adult monarchs was positively associated with percent cover of small shrubs. Lastly, the presence of immature monarchs was positively associated with flowering plant prevalence and flowering plant abundance. As milkweed density increased, immature monarch density increased (p-value <0.001), but there were no relationships with adult monarchs (p-value = 0.62). This study provides context for how well habitat management that targets a GWWA is augmenting monarch-specific

conservation efforts in the region. Additionally, this project identified important landscape and within-site habitat variables that can be used to inform management recommendations to maximize habitat management outcomes for GWWA and monarchs in the western Great Lakes.

Lenhart, Christian F.*^{1,2}. Implications of climate change for stream restoration and culvert design for greater resilience in Midwestern rivers. ¹University of Minnesota, St. Paul, Minnesota. ²Barr Engineering, Minneapolis, Minnesota. Email: lenh0010@umn.edu

Streamflow patterns have changed dramatically in the upper Midwest in recent decades from climate, land-use, and drainage changes. Mean annual streamflow has more than doubled in some streams, with increases occurring at all flow levels. Hydrologic analysis using the Indicators of Hydrologic Alteration software for 16 watersheds in Minnesota, Wisconsin, and the eastern Dakotas. showed that changes were greater, percentagewise in the low-to-mean flow levels. However, flow changes are mediated by drainage and flow pathways on the landscape with tile drainage strongly regulating flow in agricultural areas. The timing of climatic and hydrologic changes also have consequences for streamflow regimes, with less snow-melt runoff flooding in the spring, but more summer to early fall flooding. The increased magnitude of flow has led to channel enlargement, particularly widening, across the region, particularly in the southern parts of Minnesota, Iowa and the eastern Dakotas. Altered timing may affect ecological processes such as riparian vegetation establishment and survival. Consequently, hydrologic changes have implications for stream restoration design including design discharge selection, low-flow channel design, flood management and culvert design for aquatic organism passage (AOP). In intermittent streams and those with more variable flow, low flow channels are important to aquatic life especially during drier conditions. Design of culverts is important for climate change resilience as culverts appropriately sized to fit bankfull stream dimensions and maintain sediment continuity are more likely to withstand increasing high flow events while maintaining connectivity. Case studies of hydrologic change and stream restoration projects across the Midwest and north central U.S. are presented, addressing some of the above considerations. Projects in Minnesota and North Dakota that reduce channel width-to-depth ratio in over-widened channels and use stream simulation at road crossings are discussed.

May, Christopher A. Daylighting human quality of life benefits of ecological restoration. GEI Consultants, Lansing, MI. Email: cmay@geiconsultants.com

The ecological benefits of restoration projects are routinely measured using metrics such as acres of improved area, increase in target species abundance, or reduction in sediment loads. The human quality of life (i.e., human wellbeing) benefits of ecological restoration projects are rarely considered during project planning or measured either as a baseline prior to restoration or as a result of a restoration action. I provide an example for developing human quality of life (QOL) indicators for ecological restoration projects. QOL indicators can be relevant to restoration priorities (e.g., birding visits increase with bird abundance and diversity) and resonate with a local community (e.g., increased recreation translates to a better economy). I also present results of a recent analysis of data from 11 years of Great Lakes Restoration Initiative (GLRI) projects that indicates GLRI projects are incorporating metrics for QOL benefits despite not being required for funding and not being reported. Human quality of life metrics can provide an important complement to ecological data by

providing further (social) justification for funding programs and building community support for ecological restoration efforts.

Miller Jessica A.* and Rebecah Troutman*. Ohio forest edge and old field restoration: demonstrating replicable methods for private landowners. Holden Forests & Gardens, Kirtland Hills, Ohio. Email: jmiller@holdenfg.org

Forests have high ecological and cultural importance in Ohio. 85% of forested land is privately owned and managed, which places private owners in an important and challenging position as forests in the state are becoming increasingly fragmented. Meanwhile, healthy early-successional habitat is decreasing, a concern not only for high-priority birds, wildlife, and pollinators but also for the would-be forests of the future. Restoration paradigms exist to address these challenges but are rarely demonstrated in Ohio in ways accessible to private landowners who are positioned to make the most collective impact. We created an edge restoration site at the Working Woods demonstration forest at Holden Arboretum that demonstrates how landowners can navigate the process from start to finish. Working with agencies that serve the needs of private landowners including the Ohio Division of Wildlife, Division of Forestry, and NRCS, a 5-acre management plan was created to turn the hard, clean-cut edges of a pocket-field into a smooth transition zone to a meadow which would succeed into young forest. Surveys of breeding birds and vegetation were conducted before and after management activities. In 2021, the project commenced with edge feathering through selective felling, enhanced reversion through woody invasive control, and soft and hard-mast tree and shrub planting. The project has resulted not only in a physical demonstration area which will continue to provide data on the effects of these restorations, but also a narrative of the steps, resources, time and ongoing effort required for a landowner to replicate the project on their own woods. Woodlands adjacent to fields pose a restoration opportunity and chance alter the traditional management paradigm of mowing right up to the edge of trees: Creating soft edge habitats and encouraging forest regeneration on adjacent meadows increases early successional habitat and biodiversity, and bolsters ecosystem health.

Nussle, Sean B.* Using innovative drone and macroinvertebrate techniques at a full-delivery, stream and wetland mitigation in-lieu fee program site in Columbiana County, Ohio. Davey Resource Group Inc. Kent, Ohio. Email: sean.nussle@davey.com

Davey Resource Group has implemented a full-delivery In-Lieu Fee site for a client which will provide compensatory mitigation for unavoidable impacts separately authorized by Clean Water Act Sections 404 and 401 permits, Section 10 of the Rivers and Harbors Act, and/or isolated wetlands and ephemeral streams authorized by Ohio Revised Code Section 6111. The project site consists of a 40.2-acre wetland project and a 9.1-acre stream project situated both northwest and southwest of Old State Route 558 in Salem Township, Columbiana County, Ohio. The site was previously devoted to agricultural land use with areas of row crops, pasture, and hay production. However, its location within the floodplain of Stone Mill Run and the presence of on-site wetlands proved less than ideal for agricultural production. Disturbed wetlands comprised 15.9 acres of the site (ORAM scores: 30.5-41.5) while 2,569 linear feet of eroded and channelized stream (QHEI and HHEI scores of 51 and 43, respectively) were also present at the site. Wetland rehabilitation and re-establishment as well as stream restoration were conducted at the project site. Initial plan development,

planting and construction methods, hydraulic monitoring equipment, novel drone practices, and novel macroinvertebrate surveys have led to preliminary success at the site.

Quent, Peter*. Balancing risk in environmental restoration construction. EnviroScience, Stow, Ohio. Email: pquent@enviroscienceinc.com

Interruptions to environmental systems during construction pose a multitude of risks despite the intended design improvements of stability and resilience. The benefits of constructed restoration projects are not immediate and require time to fully function. Ground disturbance, flow diversions and stripping topsoil are a few of the physical changes that cause increased risk. Couple those physical changes with a changing climate delivering more frequent and intense rainfall events the risk factors can become compounded. Risks are manifested by soil loss, sedimentation, unintended sediment transport and project setbacks, to name a few. Communication between the contractor foreman and environmental oversight staff is vital to plan for situations as they develop in the fluid construction sequence. High water events occur randomly, thus causing the restoration area to undergo immense physical stressors, occasionally, before the project is complete. The risks associated with one of these “tests” occurring before a project is complete is compounded by a multitude of factors unique to each project. The level of risk will increase with the size, complexity and duration of a project. The contingency action plan for these events is the responsibility of the project team requiring a quick, real-time assessment of risk and avoidance/mitigation efforts. What are acceptable and unacceptable risks? This discussion will provide an overview of risk recognition during constructions. We will touch on seasonal timing, gradient, grade control, unfinished elevations etc., as well as potential strategies for protecting, minimizing, and preserving the fragile nature of these sites during construction.

Starkey, Anna*, Sean Fitzgerald, and Frances S. Sivakoff. Reclamation history affects floral color and pollinator preference across surface-mined land. The Ohio State University, Columbus, Ohio. Email: starkey.166@osu.edu

Surface-mined land presents a unique opportunity for plant establishment and pollinator conservation, but the soil quality of mined land varies widely depending on how the land was treated after mining ended. These different reclamation histories likely affected soil quality, which in turn can affect plant establishment and plant traits relevant to pollination, like flower color. The objective of this study was to determine if the reclamation history of surface-mined land, as represented by the federal reclamation permit in place during mining activities, affects flower color and pollinator visitation to floral resources. We hypothesized that the color reflectance of flowers would vary across reclamation types and predicted that pollinators would choose to visit flowers grown in more recently reclaimed areas (hereafter referred to as “reclaimed”) compared to those grown in areas mined prior to federal regulations (referred to as “abandoned”). To test this, we utilized an ultraviolet-sensitive camera to photograph *Lotus corniculatus* flower petals grown in abandoned and reclaimed surface-mined sites across the Wilds, a conservation center in eastern Ohio. We also grew *L. corniculatus* plants in a greenhouse in abandoned and reclaimed soil treatments, and then transported the flowers to the Wilds and measured honey bee and bumble bee visitation choice between the treatments. Across sites with different reclamation permits, we found that the visible green, blue, and ultraviolet blue wavelengths reflected by the flower petals differed significantly, with flowers grown in reclaimed areas having higher reflectance values. Our results also indicate

that both honey bees and bumble bees show a preference for flowers grown in reclaimed soils compared to those grown in abandoned soils. Pollinator preference contributes to successful plant establishment, and these results inform future restoration efforts by assessing the impacts of reclamation history on plant floral traits and ultimately on plant fitness as mediated through plant-pollinator interactions.

Summerville, Keith S.*, and Sophia Van Zee. Changes in forest lepidopteran community structure over 15 years following timber stand improvement to stimulate oak regeneration. Drake University, Des Moines, Iowa. Email: keith.summerville@drake.edu

The lack of oak regeneration in hardwood communities of the eastern deciduous forest association contributes to ongoing patterns of mesophication at stand and landscape scales. For the last 15 years, the Hardwood Ecosystem Experiment has explored how restoration and management tools can successfully regenerate oaks while sustaining understory and zoological species diversity. The goal of this study was to track longitudinal variation in lepidopteran community structure and test hypotheses regarding how applied disturbances such as small-scale timber harvest affected moth species. Beginning in 2007, I sampled Lepidoptera from 20 forest stands subjected to no management, even-aged timber harvest, or uneven-aged timber harvest. A total of 49,479 moths representing a total of 384 species from 2007-2013 and 2020-1. Mean species richness varied significantly because of inter-annual variation, but a greater number of species were generally sampled in control and shelterwood managed stands. The difference in mean species richness between shelterwood-control stands and patch cut or clear-cut stands was nontrivial; less intensively harvested stands support about 50% more species than more intensively managed stands. Importantly, moth communities in those more intensively managed stands appear to have experienced the largest decline in richness immediately post-harvest with species re-accumulation tracking successional dynamics at the stand-level. Ordination revealed that many of the forest stands sampled in 2020-1 contained moth communities very similar to those sampled pre-harvest. The contrasting results from comparisons of species richness versus community composition are somewhat consistent with results from other studies which suggest that most generalist species reattain post-disturbance abundance following logging, while the less common species and specialists are found in some, but not all, of the stands per harvest treatment. Importantly, oaks (and their associated Lepidoptera) appear resilient to timber harvest when less than 40% of the standing bole is removed.

Swab, Rebecca M.* Restoration can further equality: reframing restoration with environmental justice, the human hierarchy of needs, and the breath of life. The Ohio State University, Columbus, Ohio. Email: swab.1@osu.edu

Environmental justice involves ensuring all people have access to environmental benefits such as green spaces and have protection from environmental health hazards such as air pollution. Restoration can and should play a key role in mitigating current environmental injustices. Determining restoration goals while considering the psychological concept of human's hierarchy of needs will help restorationists better address the needs of underserved and vulnerable populations. Further, the hierarchy of needs was based upon First Nations' 'breath of life' theory, which places human experience in an interconnected web of reality with an ultimate goal of cultural perpetuity. Considering restoration utilizing this framework

will help restorationists simultaneously accomplish successful and enduring restoration activities, achieve environmental justice goals, and further society.

Wagner, Alexa^{1*} and Katie Stuble². Forest management drives recruitment dynamics in the forest understory. ¹Case Western Reserve University, Cleveland, Ohio. ²Holden Arboretum, Kirtland, Ohio. Email: asw87@case.edu

Forest management can be used to move secondary growth forests from low diversity, low productivity, and highly invaded states toward mixed-aged stands of diverse native woody and herbaceous species. Demographic shifts among woody species in the forest understory in response to overstory thinning and non-native species removal help determine the trajectories of forest communities post-management. Here, we explore the impacts of forest management on understory dynamics in a post-agriculture mixed mesophilic hardwood forest. Specifically, we treated forest plots with one of three management treatments: 1) overstory thinning (girdling of approximately 20% of trees to open the canopy), 2) overstory thinning coupled with non-native shrub removal, or 3) unmanaged control. We monitored understory demographics of woody vegetation including seedling recruitment, mortality, and growth. We find that over the first three years following management implementation, recruitment was higher in areas in which the overstory was thinned in tandem with invasive shrub removal ($p = 0.04$). However, growth rates of woody seedlings were not impacted by forest management ($p = 0.95$), nor was mortality ($p=0.45$). Mortality was, however, marginally variable from year to year ($p = 0.05$). Shifts in recruitment within the forest understory will be key driving forest responses to management and setting up trajectories for future forests, but there is limited evidence that management is impacting mortality among woody seedlings.

MEETING HOST FIELD TOUR – SATURDAY APRIL 2, 2022

From Upland Forest to Stream Restoration and Everything in Between. Jenn Grieser, Connie Hausman, Josh Philipps, and Dan Volk, Cleveland Metroparks, Cleveland, Ohio.
Email: jmg2@clevelandmetroparks.com

Field trip participants are responsible for their own transportation to the AB Williams Parking Lot at North Chagrin Reservation (10 min from Manakiki).

Participants will split into two groups to experience both segments.

AB Williams Woods: Visit this historic setting that contains mature beech maple and hemlock hardwood forest. Learn about 225+ year old Moses Cleveland Trees, AB Williams' historic records and modern comparison. And explore ways that Cleveland Metroparks is managing these aging forests in light of various pests, such as Elongate Hemlock Scale and Beech Leaf Disease. The walk for this portion of the fieldtrip is ~1 mile on flat, unpaved terrain.



Beecher's Brook / Foster's Run: After a brisk walk to the southern terminus of North Chagrin Reservation, observe a recently completed stream restoration project, which includes removal of a fish migration barrier and installation of habitat/grade control structures and a variety of bioengineering methods. As we return uphill, the group will pass by an aged stream daylighting project on Fosters Run and evaluate whether or not the project was successful. Further upstream (and uphill) we will explore an area slated for infrastructure removal and stream restoration funded through Ohio Department of Natural Resources H2Ohio program. Please note: While the majority of this walk will be on paved surface, roundtrip this hike will be 3 miles, including entirely uphill walk on the return. The uphill portion will be broken up by several stops along the way.

The final half hour of this fieldtrip will allow participants to explore interpretive exhibits and owl aviary at North Chagrin Nature Center and the ponds, wetlands and boardwalk that surround it. Amphibian breeding season should be in full swing and this area will provide ample opportunity for observation through sight and sound.



OFFSITE FIELD TRIPS – SUNDAY, APRIL 3, 2022

9:00 am to Noon: *Worked over but Working; Transforming Post-industrial Sites to Functional Landscapes (bus tour)*. Paul Kovalcik and Jeff Jowett, Northeast Ohio Regional Sewer District, Cleveland, Ohio. Email: kovalcik@neorsd.org , jowettj@neorsd.org

Fieldtrip participants should meet in the parking lot at Manakiki at 9:00 am to load the buses. Parking is limited or non-existent at most of the sites. Attendees are strongly encouraged to use the transportation that has been provided. Masks should be worn while in vehicles.

As part of its Project Clean Lake Combined Sewer Overflow (CSO) control and Green Infrastructure Grant programs, the Northeast Ohio Regional Sewer District (NEORS) has overseen or funded the installation of over 50 green infrastructure projects throughout greater Cleveland. This field trip led by NEORS staff, will visit several of these projects, which have been designed to remove stormwater before it enters the combined sewer system. Given the urban nature of the area, many of the sites have a legacy of industrial or residential use, and required considerable work to remove abandoned infrastructure, buildings, and trash before functioning green infrastructure facilities could be constructed. While none of the sites can be deemed “restored”, they now provide valuable services such as pollinator habitat, and the capture and filtration of stormwater runoff.



From Manakiki, the bus will travel to the Morgana Run and Kingsbury Run watersheds/sewersheds to the Fleet Avenue basin. From there the bus will make a brief stop at the Morgana Bluff Stormwater Wetland, and then proceed on to the Urban Agriculture Green Infrastructure and Woodland Central green infrastructure sites. Next the vans will travel to East Cleveland and visit the E.140th Green Infrastructure sites, which are in the Nine Mile Creek watershed/sewershed. Other local restoration and green infrastructure projects will be pointed out along the route. Participants will have the opportunity to learn about NEORS's CSO Control Program and efforts to repurpose post-industrial sites into functioning landscapes. Local lore and infamous historic Clevelanders will be discussed along the way. The tour will be suited for attendees who are not comfortable walking long distances, but appropriate walking footwear is recommended. The buses do not have restroom facilities, so please use them prior to departure.

9:00 am to 11:00 am (transportation time not included): ***Valley View Restoration – 100 years in the Making (presentation & walking tour)***. Mike Johnson, Summit Metro Parks, Akron, Ohio. Email: mjohnson@summitmetroparks.org

Field trip participants should meet at Valley View Conservation Area, Summit Metro Parks (1212 Cuyahoga St., Akron, Ohio) at 9:00 am. This site is approximately 45 – 50 minutes from Manakiki. Valley View Conservation Area is the newest acquisition of the Summit Metro Parks. This former 200-acre golf course is being restored to a natural area. The completed project restored over 2,000 feet of headwater streams, nearly 1-mile of the mainstem of the Cuyahoga River, 80-acres of floodplain, and 30-acres of wetlands. The majority of the site will be forested but will also include some open area habitats. In addition to the ecological restoration, the site is being planned for outdoor recreation. Portions of the project have been completed via a Clean Ohio Grant from Ohio Public Works and also through National Oceanic Atmospheric Association and the Great Lakes Commission. The presentation will discuss project planning and ecological design, cultural resource preservation, funding, public participation, project implementation, and monitoring. Participants are encouraged to bring binoculars for viewing wildlife. Please wear clothes and shoes suitable for hiking in moderately rugged terrain. Golf carts will be provided to enable seeing more of the project area. Participants should also bring a reusable water bottle.



10:00 am to 12:30 pm (transportation time not included): ***Rehabilitating Landscape Legacies to Restore Ecosystem Resilience for the Future (walking tour)***. Constance Hausman, PhD, Cleveland Metroparks, Cleveland, Ohio. Email: ceh@clevelandmetroparks.com

Field trip participants should meet at Harper Ridge picnic area in South Chagrin Reservation (Hawthorne Parkway, Solon, OH) at 10:00 am. This site is approximately 20 minutes from Manakiki. Cleveland Metroparks will feature two very different restoration projects that each provide natural resource resilience from the impacts of climate change. Both projects are located at South Chagrin Reservation in the Sulphur Springs subwatershed, a tributary to the Chagrin River. The first legacy site was a private runway surrounded by



mature, forest and wetland mosaic. After acquisition, the partners worked with a consultant to disrupt unnatural drainage ways and daylight a small stream. The second legacy site was a former cattle pasture that had converted to a mature dense red maple forest. Recent timber harvest treatments were applied to stimulate young tree regeneration and to promote better species and structural diversity. The partners will describe ongoing monitoring and invasive plant control that will enhance the forest management activities. Participants should wear layered clothing and comfortable shoes and bring a reusable water

bottle. Site one may be wet and includes some off trail walking, but the ground is relatively level.

9:00 am to 12:00 pm (transportation time not included): ***Coastal Wetland Restoration at Mentor Marsh***. David Kriska, PhD, Cleveland Museum of Natural History, Cleveland, Ohio.
Email: dkriska@cmnh.org



Field trip participants should meet at Mentor Marsh State Nature Preserve (5185 Corduroy Rd., Mentor, OH) at 9:00 am. This site is approximately 25-30 minutes from Manakiki. As one of the most species-rich sites on the Great Lakes shoreline, Mentor Marsh is a National Park Service-designated National Natural Landmark (1966). The Marsh was named Ohio's first State Nature Preserve in 1971 and is a National Audubon Society Important Birding Area. This 806-acre wetland suffered dramatically in 1966 when salt-mine tailings leached into Blackbrook Creek. By 1973 most of the swamp forest trees and marsh plants had died, and the 4-mile-long wetland basin was overtaken by reed grass (*Phragmites australis*), a 15' to 24' tall nonnative invasive plant from Eurasia. The Cleveland Museum of Natural History began the large-scale restoration of Mentor Marsh in 2015. Guided by Museum restoration ecologists, the *Phragmites* monoculture was sprayed with an aquatic-safe herbicide and then physically mashed flat to allow native plants to grow. Over 180 species of native plant species have been documented sprouting from the soil seed bank, including 3 state-listed plants. Rare marsh birds—such as American and Least Bitterns, and Virginia, King and Sora Rails are nesting, and wading birds and waterfowl are now frequent. Yellow Perch fingerlings are now using the Marsh as a nursery and Northern Pike are spawning. Participants will discuss restoration challenges while visiting the West Basin that reached maintenance mode in 2020 and the East Basin where restoration was recently initiated and is mid-recovery. This field trip will be outdoors, so dress accordingly for cold weather and anticipated rapidly changing conditions given the immediate proximity to Lake Erie and its infamous Snow Belt lake-effect snow.

10:00 am -12:00 pm: ***“Behind the Scenery”-
Acacia Service Project (volunteer workday)***

Josh Philipps, Cleveland Metroparks, Cleveland,
Ohio. Email:jjp1@clevelandmetroparks.com

***Field trip participants are responsible for their
own transportation.***

The location of this field trip is the Acacia Reservation of Cleveland Metroparks. The field trip will be a hands on opportunity to contribute to the ongoing restoration activities at the former golf course transformed to natural area and park. Activities may include installing live stakes around constructed wetlands or repairing cages that protect young trees from deer browse pressure. We will walk through several different areas of the reservation and discuss opportunities, challenges, and lessons learned from the day to day management of a golf course restoration in an urban environment. Participants should dress accordingly for the weather and be prepared to travel off trail. Work gloves will be provided, although feel free to bring your own.

Please click [HERE](#) to complete a digital waiver in advance.



SPECIAL POST-MEETING VIRTUAL SESSION TUESDAY APRIL 5, 2022

All attendees will receive an email inviting them to join us for a special zoom webinar on **Tuesday April 5, 2022 from 9:00 am EST/8:00 CST to 11:00 am EST/10:00 am CST** that will feature the following:

- **A presentation by SER Executive Director Bethanie Walder** on ***An Introduction to the United Nations Decade on Ecosystem Restoration*** and the abstract for her talk is below:

The UN (United Nations) Decade on Ecosystem Restoration is underway and will continue through the end of 2030. Adopted by the UN in 2019 and running from 2021-2030, the UN Decade is an opportunity to significantly elevate ecosystem restoration as an important nature based solution to multiple global challenges, including the biodiversity and climate crises. The UN Decade has ambitious goals, including transformative societal change regarding our relationship with the natural world. SER was one of the first global partners to the Decade and has been playing an important advisory role, including commenting on the strategic guidance for the Decade, leading a collaborative effort to develop the 10 Guiding Principles for the Decade, and now following that up with the development of specific Standards of Practice for the Decade. SER also hosts Make a Difference Week, which is intended to help achieve that transformational change by empowering individuals to engage in restoration. Make a Difference Week helps people see that local restorative actions, collectively, can have beneficial global impact. This presentation will provide an introduction to the UN Decade, articulate the difference between ecological and ecosystem restoration, and share several of SER's high level past, current, and projected activities to support the Decade.

- **A presentation by John Salisbury** on ***SER Global's Certification Program for Ecological Restoration Practitioners***

- **SER MWGL Chapter's Business meeting** highlighting SER MWGL Chapter accomplishments and initiatives

- **SER MWGL Chapter's Awards Ceremony** recognizing the best student presentations and outgoing SER MWGL Chapter Officers

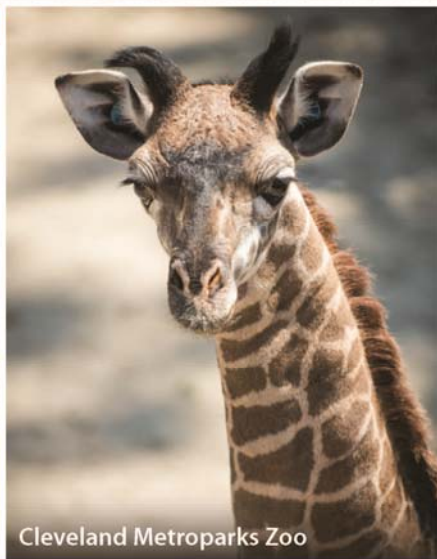
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ABOUT THE SER MIDWEST-GREAT LAKES CHAPTER

- We are a non-profit organization that was recognized by SER as a regional chapter in March 2008. The Chapter serves a seven state region of Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota, and Iowa.
- **Mission:** To promote the science and practice of ecological restoration to assist with the recovery and management of degraded ecosystems within the Midwestern and Great Lakes regions.
- **Membership Benefits**
 - *Opportunity to network with colleagues and showcase your work at annual chapter meetings and state level events held throughout the year*
 - *Reduced chapter meeting registration rates*
 - *Chapter communications consist of the Restoration News Midwest blog and other social media streams that highlight regional ecological restoration issues, news, projects, and practitioners*
 - *Opportunities to promote ecological restoration-related events and discuss ecological restoration-related issues through the chapter social media*
 - *Webinars on relevant restoration topics in the region*
 - *Student members eligible to apply for research and practice grants through our Student Grant Program*
 - *Membership within our international parent society*
- **Interested in becoming a member?** See <http://chapter.ser.org/midwestgreatlakes/>