

## **Northwest Ohio Natural History and Research Conference Abstracts**

**February 26, 2024**

### **Metroparks Toledo and The Green Ribbon Initiative**

#### **ORAL PRESENTATIONS**

##### **Modeling Future Winter Waterfowl Distribution in Ohio and Throughout the Great Lakes Region**

Andrea Spurck, Ohio State University

Bob Gates, Ohio State University

**\*Brendan Shirkey, Winous Point Marsh Conservancy, \*Corresponding Author**

John Simpson, Winous Point Marsh Conservancy

Warming winter temperatures have affected duck distributions across the United States. Previous studies have reported and predicted delayed autumn migration, northern shifts in wintering ranges, and increased abundance in northern regions for many duck species. However, much of this research has spanned a continental scale and has not focused on impacts at more localized spatial scales. Increased abundance of wintering ducks in Ohio could substantially reduce food resources during spring migration. Shifts in duck distributions could also result in potential changes to duck hunting and viewing opportunities at different latitudes in fall and winter. The purpose of this research is to assess changing winter migration patterns in Ohio and the Upper Mississippi River/Great Lakes Region Joint Venture. The two main objectives of this research are: 1) Model historical Christmas Bird Count data as a function of increased winter temperatures and decreased winter snow cover and 2) use climate change projections to predict winter duck use into the future in Ohio and throughout the Great Lakes region. Results from these objectives could assist with conservation planning and inform fall waterfowl management by proactively planning for future changes in duck distribution and abundance in fall and winter based on warming climates.

##### **The Howard Marsh Metropark Restoration: Wildlife Response Above and Beyond Expectations**

**Mark Shieldcastle, Black Swamp Bird Observatory**

Black Swamp Bird Observatory was first engaged by Metroparks Toledo to conduct pre-construction avian surveys in 2014 to document bird use of the agriculture lands before restoration. Two years of pre-construction surveys were completed to establish baseline bird use data. Post-construction surveys were conducted for three years in Phase I (2018-2020) and an additional three years of surveys were initiated in 2022 to coincide with the completion of Phase II and to gather data on the maturing Phase I. It was expected that there would be changes in bird use with a row crop monoculture changing to a variety of wetland habitat types. Speciation has increased in both migration periods, but the biggest changes have come during the breeding

season. Not only the actual breeding by a host of species that would not be welcome in an agricultural setting, but use of the area as a feeding area for breeders and other species was quickly evident. This unprecedented monitoring has provided valuable data to management agencies seeking funding for future restorations in the region. This presentation will review avian community changes as the marsh system matures, document unexpected breeding highlights, comment on the greater role of this restoration on the overall wetland landscape and contemplate future expectations.

## **Effects of a Highly Modified Landscape on Diversity of Anuran Communities in Northwestern Ohio**

**Brian Kron, Bowling Green State University**

Dr. Karen V. Root, Bowling Green State University

Anurans (Frogs/toads) are susceptible to habitat loss and human impact on their environment. As indicator species, they aid in evaluating effects of landscape change on the ecosystem. To effectively manage habitat for this important taxonomic group, and gain insight into highly modified landscapes in local ecosystems, we must study effects of landscape modification on Anuran diversity. We conducted auditory surveys from 2021-2023 at 45-51 sites across a landscape modification gradient from rural to urban, weekly for ten minutes. Calling species were digitally recorded and identified, and intensity of the call was graded (0-3). Environmental data including wind speed and air/water temperature were also recorded at each survey. Wider-scale habitat data, e.g., hydroperiod, forest cover, land cover type, and water body size were assessed in relation to biodiversity. Average number of species identified per visit differed across the landscape modification gradient (1.69 species per survey in rural, 0.92 suburban, 0.66 urban), while rural sites also showed significantly more species identified overall ( $p < 0.0001$ ). An outsized number of records of disturbance-tolerant species were in suburban/urban sites, compared to rural sites (32.4% of all records in rural areas, 59.2% suburban, 73.8% urban). Rural sites were identified as having less impervious surfaces, more diverse landscapes, and more plant cover. Additionally, Maxent identified landscape factors, e.g., land cover type and NDVI, as most highly associated with greater amphibian diversity. Our results highlight wetland habitat features that support declining diversity in Anuran communities in modified landscapes and the value of landscape-scale analysis in biodiversity conservation.

## **Microcystin and MBSP: A Beachgoer's Guide to Safety**

**Garrett Moots, The University of Toledo**

Chelsey Suffety, Kayla Kinzel, Von Sigler, Jason Huntley, Daryl Moorhead, and

Daryl Dwyer, The University of Toledo

The prevalence and persistence of microcystin (MC) in Lake Erie's foreshore beach sands, remain understudied. Our research, conducted during the 2022 recreational swim season (June-September), collected sand and water samples at Maumee Bay State Park Beach to examine MC concentrations in sand using Enzyme-Linked-Immunosorbent-Assay (ELISA). This study aimed

to understand the seasonal trends in MC concentrations in beach sands and adjacent waters. Generally, the MC levels mirrored a similar seasonal pattern as the MC levels in the water. Before July 28, sand porewater generally had lower MC concentrations compared to lake water. After July 28, sand porewater frequently exhibited higher MC concentrations than lake water, peaking at  $14.9 \text{ ng mL}^{-1}$  and  $18.9 \text{ ng mL}^{-1}$  on August 6 and 25, respectively. 5% of all collected water samples exceeded the EPA's no-contact threshold for MC in recreational waters ( $8 \text{ ng mL}^{-1}$ ). To investigate the dynamics of MC degradation in sands, microcosms of sand were spiked with MC and maintained under autoclaved ( $10^{\circ}\text{C}$ , 0% moisture) or non-autoclaved ( $30^{\circ}\text{C}$ , 10% moisture) conditions for 7 weeks. Nonautoclaved sands showed complete degradation of MC after 28 days, while 54% of the initial spiked MC remained in autoclaved sands. This study highlights the role of beach sands as short-term, recurring MC reservoirs during algal blooms, emphasizing the need for continuous monitoring of MC levels at recreational beaches.

## **New Endeavors in Conservation: An Overview of Current Pursuits in Ecological Research**

### **Jay Wright, Metroparks Toledo**

Managing habitat for the conservation of species requires knowing where those species occur and how they are responding to habitat management efforts. As we gain more knowledge of the impacts of management, we can change and adapt that management to better serve those species of conservation concern. In pursuit of these adaptive management goals, Metroparks Toledo has begun several new research and monitoring programs. These include year-round monitoring by staff and volunteers across the park district of migrating, wintering, and breeding birds; camera trap surveys throughout the Oak Openings region to monitor reptile and small mammal use of managed and recently restored areas; and grassland monitoring of areas being grazed by cattle, a new management technique for Metroparks. Since not all management techniques will achieve the same goals everywhere they are used, these new monitoring efforts will help determine when our habitat management is working and when it is not. This talk will also highlight several university-led research projects Metroparks is involved with that investigate the migration and movement of songbirds using a continental array of wildlife tracking towers.

## **Rare Insect Survey Updates and Habitat Associations in the Oak Openings Region**

### **David Cuthrell, Michigan Natural Features Inventory**

### **Logan Rowe, Michigan Natural Features Inventory**

The Michigan Natural Features Inventory in partnership with the Michigan Department of Natural Resources, The Nature Conservancy - Oak Openings Office, the Ohio Department of Natural Resources, and Metroparks Toledo, have conducted rare insect surveys and research in the Oak Openings Region of Ohio and Michigan since 2013. The Lakeplain Oak Openings Region of the Western Lake Erie Basin lies within a six-county region of Northwest Ohio (Fulton, Lucas, Henry, and Wood counties) and Southeast Michigan (Wayne and Monroe counties). The unique geology and hydrology of this region not only supports a number of rare habitat types, it also contains about 150 state or federally listed species. The insects are one such group that contains several rare species in this region of the country. The core purpose of this

project was to determine the distribution, site occupancy, and relative abundance of rare insects of the Lakeplain Oak Openings Region. This talk will provide highlights and additional information on the habitat associations and key insect species assemblages of these unique habitats including the bumble bees, Noctuid moths in the genus *Papaipema*, and a few other selected rare species.

## **Revealing a Rarity: Preservation of the Blue Creek Glade State Nature Preserve**

**Karen Menard, Metroparks Toledo**

Occurring directly on the edge of the Oak Openings Region, the Blue Creek limestone glade is considered a globally significant ecosystem and consists of approximately 11 acres of limestone prairie, sparsely vegetated sand barrens, and thin-soiled Chinquapin Oak savanna. This site, located at Blue Creek Metropark in Whitehouse, Ohio, is situated on top of Devonian-age, dolomitic limestone bedrock, and adjacent, Oak Openings glacial sand deposits, providing just the right amount of a unique environment for botanical rarities to thrive. This location contains the only Ohio population of Tall Cinquefoil (*Drymocallis arguta*), an endangered species, in addition to two other endangered plant species. Four threatened, and five potentially threatened species also have been documented here. In the Great Lakes Region, glade ecosystems are rare and mostly found on or near the north shores of Lake Michigan and Huron, west to the state of Wisconsin, and then at the eastern shoreline of Lake Ontario in New York. Exposed bedrock glade sites can also be found in Lower Michigan and a few areas near Lake Erie in northern Ohio.

As ideas and attitudes regarding land use evolved in the last 150 years, the glade has undergone much transformation. Historically, parts of it were quarried, filled, and farmed. Present day restoration efforts that included extensive trash and invasive plant removal have revealed hidden rarities which led to its recent ODNR dedication as the 145<sup>th</sup> state nature preserve. This talk will highlight this special site's unique history and the botanical rarities that now thrive as a result of Metroparks commitment to habitat preservation.

## **A New Generation of Conservation Champions: A Model to Foster Diversity, Equity, and Inclusion Among High School Students Interested in Wildlife-related STEM Careers**

**Christine Mominee, Toledo Zoo**

Matt Cross, Toledo Zoo

Cari Ritzenthaler, Bowling Green State University

A major goal for the science, technology, art, engineering, and mathematics (STEM) disciplines has been to attract students from diverse social and cultural backgrounds. To pursue a career in the STEM field, individuals must gain real-world experience through field-based internships or technician positions. However, some of these pre-career STEM positions may limit accessibility to underrepresented groups through unintentional barriers such as cost, scheduling, and specialized equipment. To address this issue in our community, we initiated a conservation internship program, which developed a framework to identify and overcome barriers to increasing inclusion

and diversity in field conservation. We collaborated with Toledo-area high school teachers to identify six individuals interested in pursuing a career in conservation, or a related field, and made them part of our field teams conducting surveys for Blanding's Turtles (*Emydoidea blandingii*). The goal for this program was to increase diversity in conservation biology by providing a valuable work experience. We also evaluated the program's effectiveness through pre- and post-internship surveys, aimed at assessing conservation knowledge, feelings of inclusions, and influencing career choices. After the program, students generally showed an increase in confidence, knowledge of job-related skills, and feelings of belonging/inclusion. This talk will focus on implementation, preliminary results from the first field season, and ways to duplicate this program in other communities.

## **Coordinating Ecological Restoration Among Organizational Partners in Ohio**

**LaRae Sprow, Metroparks Toledo**

**Peter Blank, The Nature Conservancy**

Coordinating effective ecological restoration at regional scales often necessitates close collaboration among organizational partners. The Nature Conservancy in Ohio and Metroparks Toledo have been collaborating on ecological restoration in the Oak Openings Region of Ohio for over two decades. In this session, we'll share insights about building effective partnerships, determining regional priority conservation areas and strategies, obtaining joint grant funding for restoration, and sharing best management practices. We'll also highlight our recent restoration projects and the plants and animals in the Oak Openings Region that will benefit from this collaborative work.

## **Poster Presentations**

### **Propagation Techniques for Conservative Plants in the Oak Openings Region**

**Paige Anspach, The University of Toledo**

Todd Crail, The University of Toledo

The Oak Openings region supports a wide range of globally rare plant communities and species requiring conservation efforts. Propagation techniques of various species native to the Oak Openings region were examined to generate recommendations for the future use of the species. Special emphasis was placed on tall green milkweed (*Asclepias hirtella*) concerning the collection time of seed pods and their impact on the germination rate. I found that while the green collection method on average was higher than other treatments, only the burn treatment was significantly lower than the rest ( $p < 0.01$ ). I used a similar methodology for each of the remaining species through stratification and germination procedures utilizing different soil media and climate treatments in both outside nursery and greenhouse locations. For example, media type was significant for *Asclepias tuberosa* ( $p < 0.01$ ) while there was no difference for *Asclepias incarnata* ( $p = 0.15$ ). Following the conclusion of experimentation, I will construct a

guide with recommendations for media type, weight of seed, and best climate regime for each species, which will be shared with local planting groups.

### **Inoculation Techniques for Legumes in the Oak Openings Region**

**Raven Patrick, The University of Toledo**

Todd Crail, The University of Toledo

Legumes play a crucial ecological role in the Oak Openings Region by enriching soil nitrogen levels and supporting diverse ecological communities. Environmental productivity is increased due to the symbiotic relationship between legumes and nitrogen-fixing bacteria (rhizobium). In my study I examined the effects of rhizobial inoculation on *Tephrosia virginiana* (Goat's Rue), *Lespedeza capitata* (Round-headed Bush Clover), *Chamaecrista fasciculata* (Partridge Pea), and *Lupinus perennis* (Wild Blue Lupine). Genus-specific, commercial, and local rhizobial inoculum strains were utilized to examine the efficiency of consequent inoculation. Results of a several-sample test on *L. perennis* indicate a significant difference among treatments for "Mean Sides with Nodules" ( $p = 0.04$ ) and "Mean Stems per Cell" ( $p = 0.05$ ).

### **Shaping Policy for the Environment: A Pathway to Clear Municipal Codes for Native Plantings**

**Zaynab Alghouleh, The University of Toledo**

Todd Crail, The University of Toledo

In recent years, the states of Illinois and Florida have championed citizens' rights to garden with native plantings through legislation that better defines acceptable landscaping practices. On a more local scale, the city of Sylvania, Ohio, offered the opportunity to propose a civic-minded approach to gardening. My objective is to provide comprehensive guidance on inclusive landscaping practices to the city of Sylvania by proposing revisions to the B-1 district municipal codes emphasizing safety, regardless of landscaping method and including native plantings. My study explores specific guidelines and considerations for front yard setbacks, building height limits, native plantings, safety standards, and adaptable gardening practices. I aim to offer comprehensive guidance on inclusive landscaping practices to the city of Sylvania and other local municipalities.

### **Utilizing Social Media to Augment Classroom Experiences: A Case Study in Greening UToledo Thru Service (GUTS)**

**Nick Weaver, The University of Toledo**

Todd Crail, The University of Toledo

Social media can be utilized as a tool to supplement collegiate environmental education. In my study, I will measure engagement utilizing Facebook Reactions and Instagram Insights to make determinations about interactions via posts made through GUTS (Greening UToledo Through Service Learning). At the beginning of the Spring 2024 semester, students in UToledo

Environmental Classes will be surveyed about their personal background and knowledge of environmental topics. After completing the survey, GUTS social media pages will be shared with students. Students will be made aware of environmental activities and the potential for continuing engagement in the Department of Environmental Sciences. Based on data conducted in Fall 2023, there was no noticeable effect between posting on Facebook vs. Instagram. Posts received similar levels of engagement on both platforms and varied depending on post type.

## **Lake Erie Watershed Investigations by Community Science Participants**

**Megan Ginther, The University of Toledo**

Trisha Spanbauer, The University of Toledo

Alyssa Armstrong, The University of Toledo

Community driven science is a powerful form of scientific research that combines resources of both academic research and the local community. As water quality has declined in Western Basin Lake Erie, we have developed an environmental DNA biomonitoring program, which targets recreational areas throughout the watershed. Using community driven science, academic researchers can increase data collection over a broader area at a more efficient rate. By creating a diverse network of community partners, we have been able to educate the public on water quality issues pertaining to human health and sustainability. Additionally, we can gain a better understanding of the microbial communities within the Western Basin Lake Erie watershed. In the long term, we hope the research from this program will raise awareness for water quality as it pertains to human health and freshwater stewardship.

## **2023 Ohio Bumble Bee Diversity Survey**

**Bradley Cordle**

Bumble bees (*Bombus*) are crucial for the pollination of many agricultural crops and wildflower species worldwide. Many bumble bee species have experienced significant declines globally in the past few decades. The objective of this survey was to determine what bumble bee species are present within survey locations; determine the abundance of bumble bee species within survey locations; determine flora host selection among bumble bee species, which factors impact bumble bee species diversity and abundance (i.e., nectar abundance; abiotic factors; and habitat components). The study was conducted at 18 locations in various Nature Preserves, Metroparks, and Universities within northwestern and southern Ohio. Surveyors walked four 10-meter plot transects documenting presence and abundance of bumble bee species; caste; nectar sources utilized by bumble bees; and habitat conditions. Nine bumble bee species were detected from the duration of these survey efforts with a total of 1216 bumble bees observed. Eastern common bumble bees (*B. impatiens*) were the only *Bombus* species observed at all 18 locations and had the highest abundance across survey locations. Several rare and declining bumble bee species such as American bumble bee (*B. pensylvanicus*) was observed, but detection of these species was low and scattered. Locations that had higher diversity and abundance of native nectar sources yielded greater bumble bee diversity and abundance. Therefore, it is important to promote the preservation of diverse native nectar sources on a landscape to ensure greater

foraging options which in return promotes more diversity of bumble bees and other pollinator species.

### **Great Lakes Mallard (*Anas platyrhynchos*) Genetics and Movement Ecology**

Ben Luukkonen, Michigan State University

Scott Winterstein, Michigan State University

Daniel Hayes, Michigan State University

Phillip Lavretsky, University of Texas at El Paso

Drew Fowler, Louisiana Cooperative Fish and Wildlife Research Unit

### **Brendan Shirkey\*, Winous Point Marsh Conservancy, \*Corresponding Author**

John Simpson, Winous Point Marsh Conservancy

Mallards (*Anas platyrhynchos*) nesting in the northern Great Lakes states have declined over 30% since the early 2000's. Great Lakes mallards comprise over half of the regional mallard harvest, and identifying factors limiting this population is a priority for waterfowl and wetland managers. Our objectives were to estimate hen mallard resource selection and breeding season fidelity to inform population modeling and management. During 2021-2022, we captured and marked 435 hen mallards with GPS-GSM transmitters in Michigan, Wisconsin, Ohio, Indiana, and Illinois. Using blood and feather samples from marked mallards, we sequenced several thousand ddRAD-seq loci to infer mallard genotypes and estimated natal or molting origins via stable-hydrogen isotope ( $\delta^2\text{H}$ ) analysis. We examined local and migratory movement characteristics with general linear models and land cover type selection using step-selection function analysis. Genetic results indicated 52% of marked birds were pure wild mallards and 48% were domestic game farm x wild mallard hybrids. Spatial assignment probabilities suggested most mallards originated from the Great Lakes region and 98% of surviving hens remained in or returned to the region during the subsequent breeding period. Mean daily net-squared displacement and migration probability of hybrids were significantly lower than for wild mallards. Hybrid mallards were 1.3 times more likely to select urban developed land cover than wild mallards. Selection of urban areas and sedentary behavior raises concern regarding ecological fitness of hybrid mallards and their impact on the regional population. Future analyses will examine the influence of genotype on mallard demographic rates to inform population modeling.

### **The Wiregrass Odonata Monitoring Project**

#### **Ron Boudouris, Rick Barricklow and Karen Menard, Metroparks Toledo**

Lucas County is home to approximately 95 species of *Odonata* (dragonflies and damselflies). Ohio actually boasts more than 150 species, with interesting names like "Dragonhunter," "Dasher," "Darner," and "Clubtail." Reaching speeds of 30 mph, these insects can hover, dive, pivot 360 degrees, and fly backwards and upside down. Lightning fast speed, impressive flight



skills, and voracious appetites combine to make adult dragonflies valuable predators to crop pests and other harmful insects. As indicators of clean water, dragonfly larvae are typically found in healthy environments, and protected habitat is critical for their survival in northwest Ohio.

At Wiregrass Lake, Metroparks volunteers have facilitated a dragonfly and damselfly survey since 2019. This important park in the Oak Openings Region, offers wetland, pond/shoreline, forest and prairie and is home to approximately 40 species that use the site for feeding and breeding. The last two years have seen an increase in the overall number of individuals, continued fluctuations in the number of species, a recent significant increase in individuals for many species, as well as a decline in the number of individuals for a few species. Continued removal of invasive species and installations of native plantings in the adjacent wet prairies and along the banks has provided improved habitat for these insects to successfully complete their lifecycle in the water and on land. This monitoring data not only contributes to Metroparks Toledo's long-term dataset, but also the statewide, Ohio Dragonfly Survey through the Ohio Odonata Society.

## **Lark Sparrows in the Oak Openings: Populations and Management**

### **Valerie Hornyak and Karen Menard, Metroparks Toledo**

Over the last ten 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 and the Oak Openings corridor. The current monitoring focused mostly on original Lark Sparrow sites studied by researchers during 1993-2002. This earlier study established species requirements and investigated best management practices in those breeding areas of Oak Openings Preserve.

Our study (from 2013- 2023) suggests the Lark Sparrow population may fluctuate due to several factors but is particularly impacted by changes in preferred habitat. From 2018 - 2020, a decline in lark sparrow numbers in and outside the park was noted. This decline could be caused by several issues, and the effects caused by changing grassland vegetation are being researched. The birds have responded well (and quickly) to Metropark management practices that improved the established sites (burns, scrapes, brush clearing, use restrictions, signage). Improvements to key sites from 2021 - 2023 also resulted in a return of nesting pairs (see chart). Continued management of these sites and possibly creation of new ones will be critical to increase nest success and add additional territory options. However, numbers would most likely increase if new sites were opened up and larger grassland sites were connected. Additionally, the species has also been observed breeding at another site east of SR 295, adjacent to the south end of the park, as well as near the airport.

## **Long-term Butterfly Monitoring in the Metroparks**

### **Dean Babcock and Karen Menard, Metroparks Toledo**

Long-term butterfly monitoring on Metroparks Toledo 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. Long-term data can provide important information regarding fluctuations in numbers, as well as colonization of species as habitats undergo changes. 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 many of the biodiverse ecoregions of northwest Ohio, where natural area restoration and land corridor connections are occurring.

Metroparks volunteers have been gathering data from the following, five fixed transects: Monclova Transect (Oak Openings Corridor, since 2012), Campbell/Mary's Savanna Transect (Oak Openings Preserve, since 1999), Swan Creek Preserve Transect (since 2014), Wiregrass Lake Transect (since 2020) and Wildwood Transect (Wildwood Preserve, since 2008). Each transect has been routed to include a diverse arrangement of habitats. The information presented summarizes species diversity and abundance with a focus on increases and decreases in relation to long-term monarch butterfly counts, the most populated/preferred habitat sections along each transect, and the most abundant butterfly species found in a variety of Metropark habitats. Species such as the Spicebush Swallowtail, Great-spangled Fritillary, Viceroy, Pearl Crescent, Little Wood Satyr and Cabbage White rank among the top species found residing along these Metropark transects. Butterfly abundance is a reflection of available host plant and nectar sources found within each habitat.

## **State-listed Plant Monitoring in the Metroparks**

### **Penny Niday and Karen Menard, Metroparks Toledo**

Plant monitoring at Metroparks Toledo sites began in 1988 with a focus on occurrence inventories, as well as the documentation of new populations according to current State of Ohio rare species heritage lists. There are a total of 93 Ohio listed species monitored on Metroparks properties currently (33 Endangered; 32 Threatened; and 28 Potentially Threatened) with over 900 total populations. According to Ohio DNAP, there are 161 state-listed species in Ohio. Metroparks Toledo has continued to monitor state-listed rare species for these reasons: To assist the Ohio natural heritage database in keeping accurate records of populations; to document increases and decreases; to document deer impact and other threats on populations/certain species; as well as find and add new species/populations on newly acquired properties, as well as existing parklands.

In 2023, approximately 42 rare plant species and 218 populations (Endangered, Threatened, Potentially Threatened, and Under Review) were monitored by a team of volunteers in the following Metroparks: Oak Openings Preserve, Oak Openings Corridor, Pearson, Secor, Wiregrass Lake, and Wildwood Preserve. Highlights from this season include: 12 populations of fringed gentian (*Gentianopsis crinita* (P) with one population encompassing over 350

individuals and one over 650 individuals; 6 populations of hay sedge (*Carex siccata* (E), two with over 1,000 clumps; 2 new populations of giant st. john's-wort (*Hypericum ascyron* (T), 12 populations of prairie rattlesnake-root (*Nabalus racemosus* (P) and the discovery of Canada Plum (*Prunus nigra* (E). Additionally, certain plant populations continue to increase as natural resource management and invasive species removal occurs.

## **Macroinvertebrate Monitoring on the Maumee**

### **Patrick Bronson, Metroparks Toledo**

At over 6354 square miles and providing 5% of the water to Lake Erie, the Maumee River watershed is one of the largest in the entirety of the Great Lakes. Of that area, 787 square miles are listed as an area of concern by the US EPA. For decades, the Maumee had been ecologically degraded by industrial development, unregulated wastewater disposal, and dredged material. Additionally, northwest Ohio has lost 90% of its historic wetlands which has removed much of the ability of these aquatic systems to adequately filter water.

Long-term conservation projects such as macroinvertebrate surveys can help wildlife agencies and regulators respond to changes and challenges, ensuring that the Maumee River and Lake Erie remain healthy and productive ecosystems. For this reason, Metroparks staff and volunteers have embarked on a macroinvertebrate sampling program within a variety of northwest Ohio microhabitats during the months of May through September. Through this effort, water quality is then assessed by sampling three groups of taxa, scoring the results, and placing them into one of four cumulative index values (excellent, good, fair, and poor). Group one is sensitive to pollution, group two has some tolerance to pollution, and group three is highly tolerant of pollution. The scores for each group are weighted, favoring those taxa with greater sensitivity. Of the 20 taxa sampled for this local section of the Maumee can regularly produce 12-14 of them. Additionally, this important data contributes to the Ohio Department of Natural Resources (ODNR) larger stream quality monitoring dataset.

## **Forest Resistance Breeding Research Updates for Ash, American Beech, and Eastern Hemlock**

### **Rachel Kappler, Holden Forests and Gardens (HFG)**

Danny Dlugos, Chelsea Obrebski, Mary Pitts, Julia Wolf, Aletta Doran, David Burke, HFG

David Carey, Mary Mason, Kathleen Knight, Toby Petrice, Julia Zick, Jennifer Koch, US Forest Service (FS)

Joseph Taylor, Michigan State University

The Great Lakes Basin Forest Health Collaborative connects efforts across federal agencies, conservation groups, researchers, and members of the public who are working together to save our trees. By finding trees resistant to invasive pests and diseases, we can breed progeny with increased resistance to help ensure the sustainability of our future forests. Here we share research

updates from Holden Forests and Gardens and the US Forest Service (FS) in Ohio related to pest and disease resistance breeding in ash, American beech, and eastern hemlock. Our current work, in ash, is focused on using lingering ash (trees that survive the initial EAB mortality) as parents to create seed orchards to produce seed resistant enough to EAB for reforestation. Currently we have collected the first seed from a planting that may become a seed orchard and are working to assess seed quality and germination rate. In the Oak Openings area, where a large cluster of lingering ash has been identified, recent samples have been collected to see how well EAB parasitoids have established. We are also researching American beech in a beech bark disease aftermath forest to quantify beech leaf disease (BLD) symptoms, growth and mortality while also searching for and evaluating if there are beech resistant to BLD. Finally, in hemlock, we are testing various propagation methods, including grafting and rooting cuttings, so we will have hemlock clones to develop future hemlock woolly adelgid (HWA) resistance testing.