2023 PA Botany Symposium Saturday Presentation Abstracts

Partnering to Conserve PA Native Species. *Tanisha Williams, PhD, Presenter.* Pennsylvania's unique geologic history, including substrates such as serpentinite and limestone, has given rise to impressive levels of plant diversity. Sixty percent of the native species recognized by Pennsylvania's Department of Conservation and Natural Resources are classified as rare, threatened, or endangered. These statuses are often exacerbated by urban development, invasive species, deer browsing, and climate change. To conserve native species and combat population declines, a natural partnership emerged between Bucknell University, the Pennsylvania Natural Heritage Program, and the Western Pennsylvania Conservancy. The Natural Heritage Program and Western Pennsylvania Conservancy are the boots on the ground: collecting materials, ground-truthing sites, and working with landowners. Bucknell University is the laboratory partner: working mainly with genomics processing and data analyses. Both parties are working together to update the conservation status of rare plants and conserve unique habitats. Through this partnership, the state legislator is using scientifically-informed knowledge to revise the conservation status of this endangered species and address policies to protect its unique habitat.

The Plant Conservation Alliance: Changes, Progress, and Plants! *Cheyenne Moore, Presenter.* The Pennsylvania Plant Conservation Alliance started several years ago as a part of the PA Natural Heritage Program. After a brief hiatus, in 2022 the program was restarted with a focus on rare plant conservation, particularly Pennsylvania's globally rare, threatened, and endangered species (G1-G3). This presentation will give an update on species with ongoing work including propagation, population genetics, intensive monitoring, and other research. We'll review some case studies to learn about the PPCA's approach to plant conservation and see some of the progress made. All of this work is done in collaboration with botanic gardens, universities, research institutions, and other partners in conservation. We'll discuss examples of this work and goals for future PPCA work.

Does Herd Immunity Work for Trees? Lessons learned from selective treatment of white ash trees for emerald ash borer on the Allegheny National Forest. ***Jason Kilgore, PhD, Presenter.*** The non-native and invasive emerald ash borer (EAB, *Agrilus planipennis*) has decimated ash (*Fraxinus* spp.) across eastern hardwood forests of North America in two decades, and ash are rapidly approaching functional extirpation throughout the range of EAB invasion. Loss of ash can change the composition and structure of some forests and could lead to a trophic cascade of population crashes by insects dependent on ash. Systemic pesticides can save individual trees; this approach is utilized in urban/suburban areas. These treatments require recurring, costly applications making their use in forest landscapes cost-prohibitive. Infectious disease dynamics, however, point to an alternative wherein selective treatment ("inoculation") of a portion of the ash population may provide a level of herd immunity against EAB to ash trees throughout the landscape. Results thus far from our ongoing study on the Allegheny National Forest suggest that treatment of several hundred white ash trees can preserve most of the genetic diversity and lead to associational protection of untreated ash trees. The long-term effects of *in situ* conservation of ash through judicious application of insecticide, including prevention of ash extinction and conservation of associated insects and functional resource dynamics, are still unfolding.

Pennsylvania's Ramps: What are they, where do they grow, and should we be concerned? ***Sarah Nilson, PhD and Eric Burkhart, PhD, Presenters.*** Ramps (*Allium* spp.) are non-timber forest

species traditionally harvested and consumed as a wild food in Pennsylvania. Conservation concerns for ramps have been raised recently due to the growing popularity of ramp foraging and consumption. Previous studies have shown ramp populations recover slowly from extensive harvesting and this has led to bans on ramp digging in some areas. Over the past few years, we have been studying the status of ramp populations across Pennsylvania and have confirmed that at least two ramp species are present in the state, *Allium tricoccum* and *Allium burdickii*. We will discuss key differences in the traits, biology, ranges, habitats, and genetics of these two species. Additionally, we will discuss trends in ramp harvesting and consumption, conservation concerns, and best practices for sustainable ramp harvests.

Native Americans, Smokey the Bear and the rise and fall of eastern US fire ecosystems. ***Marc Abrams, PhD, Presenter.*** A diverse array of fire-adapted plant communities once covered the eastern United States largely due to millennia o Native American active fire management. European settlement greatly altered fire regimes, often increasing fire occurrence (e.g., in northern hardwoods) or substantially decreasing it (e.g., in tallgrass prairies). Notwithstanding these changes, fire suppression policies, beginning around the 1920s, greatly reduced fire throughout the East, with profound ecological consequences. Fire-maintained open lands converted to closed-canopy forests. As a result of shading, shade-tolerant, fire-sensitive plants began to replace heliophytic (sun-loving), fire-tolerant plants. A positive feedback cycle—which "mesophication"—ensued, whereby microenvironmental conditions (cool, damp, and shaded conditions; less flammable fuel beds) continually improve for shade-tolerant mesophytic species and deteriorate for shade-intolerant, fire-adapted species. Plant communities are undergoing rapid compositional and structural changes, some with no ecological antecedent. Stand-level species richness is declining, and will decline further, as numerous fire-adapted plants are replaced by a limited set of shade-tolerant, fire-sensitive species. As this process continues, the effort and cost required to restore fire-adapted ecosystems escalate rapidly.

Cool Finds Slide Show. ***Curated & Narrated by Roger Latham, PhD***. Every year plant devotees make fascinating (and occasionally alarming) botanical discoveries in the hills and valleys, forests and grasslands, wetlands and barrens, lakes and rivers, mountaintops and beaches, and even urban environments across the Keystone State. It's a Pennsylvania Botany Symposium tradition to invite all to submit photos and descriptions of "Cool Finds" anywhere in the Commonwealth, mainly within the preceding two years. This presentation will review the latest reports and describe each within the ecological, biogeographical, historical, geological, or cultural context that makes it noteworthy.

Orchids, Fungi, and the Surrounding Plant Community—the wood wide web may be even bigger than we thought. ***Melissa McCormick, PhD***. Orchids include some of our most prized native plants. All naturally occurring orchids rely on associations with particular mycorrhizal fungi to grow from seeds and for nutrition throughout their lives. This requirement means that orchids can only grow where the specific fungi they need are abundant and available, and it may make them very sensitive to disturbance and environmental change. Knowing what those fungi need to grow is a major key to orchid conservation. We conducted a study of fourteen orchid species in Tioga County, PA in summer 2022. Our aim was to determine whether surrounding plants might be supporting the orchid mycorrhizal fungi that these orchids needed as root endophytes. We used DNA metabarcoding to determine what fungi were present in orchid roots and surrounding plant roots. We found that for over half of the orchids we sampled, their orchid mycorrhizal fungi were also present in the roots of surrounding plants. This suggests a previously unsuspected role for the surrounding plant community in supporting orchids.