Wetland Science Conference

2020 Wisconsin Wetlands ASSOCIATION

Abstracts & Presenter Biographies

A Clear Vision for Wetlands

25th Annual Wetland Science Conference

February 18-20, 2020

Elkhart Lake, WI

WEDNESDAY, February 19, 9:00 am - 9:30 pm

9:00 - 10:10 **Plenary Session (Grand Libelle Ballroom)** *Sponsored by Sterling*

Welcome & Opening comments

Conference Keynote: A Clear Path to Collaborative Wetland Restoration: Achieving Results at Scale

Joanne Marchetta, Executive Director, Tahoe Regional Planning Agency

10:10 - 10:40 **Break (Villa Gottfried Room & Foyer)** *Sponsored by Heartland Ecological Group*

10:40 - 12:00 **Concurrent Sessions**

	Location: Palm Garden Ballroom A Wetland Challenges Moderator: Jason Granberg	Location: Palm Garden Ballroom BC WWA in Action Moderator: Katie Beilfuss	Location: Palm Garden Ballroom DE Science-informed Policy Moderator: Tom Bernthal
10:40	Efficacy of non-native *Phragmites* treatment and impact on wetland plant communities in northeastern WI | **Webster**	Making every action count: Advancing a wetland conservation vision for Wisconsin | **O'Brien, E.**	Redefining WOTUS 1: A GIS-based model to predict the spatial extent of federally-protected waters and wetlands | **Robertson**
11:00	Wisconsin Purple Loosestrife Biocontrol Program updates | **Scherer**	Using wetlands to solve problems: Highlights & lessons from the field | **Magyera**	Redefining WOTUS 2: An assessment of potential impacts to Wisconsin wetlands and wetland services | **Miller**
11:20	Invasive cattail residence time affects plant communities and below-ground processes | **O'Brien, M ***	Legislative updates & new WWA initiatives | **Western Hauser**	
11:40	Are microsatellite markers useful in detection of invasive plant species? A case study with *Typha domingensis* | **Garcia ***	Panel discussion and Q&A with WWA staff re: vision, projects, and legislative initiatives	

12:00 - 1:30 **Lunch (provided - Grand Libelle Ballroom)** *Sponsored by Cardno*

1:30 - 3:10 **Concurrent Sessions**

	Location: Palm Garden Ballroom A Wetlands 101 Moderator: Dreux Watermolen	Location: Palm Garden Ballroom BC Wetlands & Water Management Moderator: Drew Fowler	Location: Palm Garden DE Special Sessions	Location: Palm Garden F Special Sessions
1:30	Swamp, bog, or fen? An introduction to wetland types of Wisconsin | **O'Connor**	Prioritization of wetland infrastructure: An agency's approach to strategically manage impounded wetlands | **Fleener**	Book Club with **Ben Goldfarb** Author of *Eager: The Secret Life of Beavers and Why They Matter*	
1:50	From wetlands with love: Wisconsin's Great Lakes coastal wetlands as important fish habitat | **Seilheimer**	Challenges and benefits of a large wetland restoration in an urban environment | **Kraszewski**		
2:10	Developing bioacoustic tools for wetland wildlife monitoring | **Casper**	Badger Mill Creek and its wetlands: A tale in watershed planning & implementation | **Lennie**		**Tribal Wetland Programs Working Group** Facilitated by Randy Poelma (by invitation only) *Sponsored by the Forest County Potawatomi Foundation*
2:30	WFQA 1: Floristic Quality Assessment for monitoring wetland plant community health: Theory, metrics, uses | **Bernthal**	Isotope tracers in nutrient source tracking (NST) of nitrate in surface and groundwater | **Ahearn**		
2:50	WFQA 2: How to use the WDNR timed-meander survey protocol and WFQA calculator | **Trochlell**	Wetland management through the lenses of the Wetland Review Process: What, why, and how | **Fowler**		

3:10 - 3:40 **Break (Villa Gottfried Room & Foyer)** *Sponsored by Ho-Chunk Nation*

3:40 - 5:00 **Concurrent Sessions**

	Location: Palm Garden Ballroom A Wetlands & People I Moderator: Sue Schumacher	Location: Palm Garden Ballroom BC Wetland Flora & Plant Communities Moderator: Nick Miller	Location: Palm Garden DE Special Sessions	Location: Palm Garden F Special Sessions
3:40	Connecting Milwaukee youth to urban wetlands | **Grill**	Climate-vulnerability of coastal wetlands in the Apostle Islands National Lakeshore | **Johnson**	**Wetland Review Working Group** Facilitated by Drew Fowler	**Working Group: In Lieu Fee Wetland Restoration Priority Planning** Facilitated by Thomas Pearce
4:00	How many people does it take to protect a Riverway? | **Mossman**	Calcareous fens in Northwest Minnesota | **Milburn**		
4:20	New video suite: Landowners caring for wetlands | **Beilfuss**	Influence of flooding and gap size on the fate of UMRS floodplain forest canopy gaps | **Oines ***		
4:40	Mary Linton wetland poetry session | **Highsmith**	Clear as muck: Wetland soil physiochemistry as a driver of wetland plant community condition across Wisconsin | **Marti**		

5:00 - 6:30 **Poster Session & Cash Bar (Villa Gottfried Ballroom, Villa Gottfried Foyer, and Grand Libelle Ballroom)** *Poster session sponsored by WCMP*

6:30 - 9:30 **Banquet & Presentation (Ticketed event - Grand Libelle Ballroom)** *Banquet sponsored by We Energies and WPS*

Banquet Presentation: Dam It: Seeing Beavers as Restoration Partners

Ben Goldfarb, Author, *Eager: The Surprising, Secret Life of Beavers and Why They Matter*

*** denotes presenter is participating in the student presentation competition**

THURSDAY, February 20, 8:30 am - 4:30 pm

8:30-9:20 **Plenary Session (Grand Libelle Ballroom)** *Sponsored by WDNR*

Welcome

Plenary Address: Telling the Wetlands Story in an Era of Information Overload

Matthew L. Miller, Director of Science Communications, The Nature Conservancy

9:30-10:30 **Concurrent Sessions**

	Location: Palm Garden Ballroom A Wetland Conservation in Agricultural Landscapes Moderator: Thomas Pearce	Location: Palm Garden Ballroom BC Effective Wetland Restoration & Management Techniques I Moderator: Matt Angerhofer	Location: Palm Garden DE Location: Palm Garden F Workshops
9:30	Minnesota's Small Wetland Program: Developing a wetland management program in the prairie region of Minnesota | **Malle**	Focusing management: Setting priorities when there's more needs than time | **Salas**	**Identification and Biology of Wisconsin's Aquatic Plants** ***Pre-registration required*** Instructor: Paul Skawinski **Story Time: Become an Effective Wetland Communicator** ***Pre-registration required*** Instructor: Matthew L. Miller
9:50	Identifying actually restorable wetlands in the Rock River Basin | **Taylor**	Web based GIS as a means to track spatial and temporal treatments of wetland invasive species | **Del Prete**	
10:10	Wetland creation and management: Planning and execution of degraded farm field restoration | **Gall**		

10:30 - 11:00 **Break (Villa Gottfried Room & Foyer)** *Sponsored by TRC Companies, Inc.*

11:00 - 12:00 **Concurrent Sessions**

	Location: Palm Garden Ballroom A Wetlands & People II Moderator: Travis Olson	Location: Palm Garden Ballroom BC Effective Wetland Restoration & Management Techniques II Moderator: Travis Schroeder	Location: Palm Garden DE Location: Palm Garden F Workshops (continued)
11:00	Wisconsin duck hunters and wetland conservation | **Bradshaw**	Five years of change: Insights from transect data on wetland hydrology and vegetation response at Deer Grove West | **Sulman**	**Identification and Biology of Wisconsin's Aquatic Plants,** *continued* **Story Time: Become an Effective Wetland Communicator,** *continued*
11:20	Community-based wetland monitoring: Year one in review | **Robson**	Sheboygan River AOC: Long-term planning for aquatic and wetland habitat restoration success | **Rice**	
11:40	Providing a clear vision for wetlands through practical project management strategies for practitioners | **Englund**		

12:00 - 1:30 **Lunch (provided – Grand Libelle Ballroom)** *Sponsored by Stantec*

1:30 **Working Groups, Workshop, and Field Trips**

Working Group and Workshops

Practitioners Working Group

Location: Palm Garden Ballroom A
1:30-4:30 pm

Facilitators: Dan Salas

Workshop: Amphibian Identification

Location: Palm Garden Ballroom BC
1:30-3:30 pm

Instructors: Rori Paloski, Josh Kapfer, and Rich Staffen

Pre-registration required

Workshop: Introduction to Common Wisconsin Sedges

Location: Palm Garden Ballroom DE
1:30-4:30 pm

Instructors: Pat Trochlell and Steve Eggers

Pre-registration required

Workshop: Scenario Modeling of the Impacts of Groundwater Withdrawal on Calcareous Fens

Location: Palm Garden Ballroom F
1:30-6:00 pm

Instructors: David Bart, Steven Loheide, Eric Booth, and Tom Bernthal

Pre-registration required

Field Trips, 1:30-4:30 *Pre-registration is required. Meet at the Conference Center Entrance at 1:20 to depart by bus.*

Explore a Wetland Gem©: Nichols Creek State Wildlife Area
Field Trip Leader: Josh Jackl

Sponsored by NES Ecological Services

Managing Cattails and Partnerships in the Sheboygan Marsh
Field Trip Leaders: Aaron Brault and Jon Gumtow

Sponsored by Merjent

Snowshoes and Wetlands: Traverse the Kettle Moraine
Field Trip Leaders: Jackie Scharfenburg and Dale Katsma

Sponsored by American Transmission Company

Green Shading = Pre-registration required

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Wetland Science Conference
2020 Wisconsin Wetlands Association

Ahearn, Sean, Beta Analytic, Inc.

Isotope tracers in nutrient source tracking (NST) of nitrate in surface and groundwater

Excess nitrogen as nitrate is an increasing problem worldwide. Anthropogenic activity continues to stress nutrient balance in shallow groundwater systems, estuaries, and wetlands, causing both short and long term environmental consequences. Here we present some of the leading techniques in isotopic tracers and their applications to Nutrient Source Tracking (NST) with a focus on nitrate isotopic fingerprinting. Stable isotope mass ratio values of water's oxygen and hydrogen atoms have been successful fingerprints used to determine the origins of water within the water cycle. Nitrate ions can be utilized in a similar way. Measuring the mass ratios of the stable isotopes of oxygen and nitrogen atoms of a nitrate ion, in concert with physical hydrologic and hydrogeochemical data, can reveal the source (e.g. agricultural, septic, precipitation) of contamination. These data aide in remediation by differentiating point source and nonpoint source infiltrations as well as giving insight into the fate of nitrate in a system. The fate of nitrate can vary from attenuation to denitrification depending on environmental conditions and can change as a result of restoration activities. This presentation will show how isotopic data can be used to reveal and reexamine wetland functions and environmental services. Highlighted is a case study from the Kankakee watershed in Indiana, where nitrate attenuation of a restored riparian wetland is compared to a native riparian wetland system using isotopic tracers. This study found that the natural wetland was more efficient at removing nitrate through denitrification.

Wetlands & Water Management, Wednesday, February 19, Palm Garden Ballroom BC, 2:30-2:50 pm

Beilfuss, Katie, Wisconsin Wetlands Association
Greg Kidd, USDA-NRCS

New video suite: Landowners caring for wetlands

Wisconsin Wetlands Association (WWA) and the USDA Natural Resources Conservation Service (NRCS) released a suite of videos this fall with the goal of reaching landowners who want to restore and care for wetlands. The videos tell the story of three different families in Wisconsin who have restored their wetlands in partnership with NRCS. A fourth video promotes how NRCS and WWA partner to help landowners care for their wetlands. The video series was launched in November 2019 on Facebook, through NRCS and WWA email newsletters, and via other electronic marketing with the goal of connecting landowners to resources and technical support available from NRCS and WWA. The videos are available for download and use by others in their outreach and programming to promote ways that private landowner can care for wetlands in Wisconsin at wisconsinwetlands.org/restore. Come see these new videos and contribute your ideas for other ways to help them reach a wide audience in Wisconsin.

Wetlands & People I, Wednesday, February 19, Palm Garden Ballroom A, 4:20-4:40

Bernthal, Tom, Friends of Pheasant Branch Conservancy
Pat Trochlell, The Prairie Enthusiasts

WFQA 1. Floristic Quality Assessment for monitoring wetland plant community health: Theory, metrics, uses

This presentation will summarize Wisconsin Floristic Quality Assessment (WFQA) as a foundation for a second presentation on using this technique in the field. We present the development of WFQA as a measure of wetland health/ biological integrity to supplement functional assessments and to include wetlands in Clean Water Act reporting on water body condition. We present the concept of "coefficient of conservatism" as an expert-assigned measure of each species' site fidelity and response to disturbance. We describe the use of WFQA site assessment metrics based on the aggregate conservatism of all species in an assessment area. We discuss guidelines for interpretation of metrics such as "weighted Mean C" in assessing differing wetland plant communities in the context of the ecoregion in which they occur. We also offer recommendations on appropriate uses of the WFQA methodology with some examples.

Wetlands 101, Wednesday, February 19, Palm Garden Ballroom A, 2:30-2:50 pm

Bethel, Adrian, Northland College
Samuel R. Tharpgeorge, Northland College
Peggy Burkman, Apostle Islands National Lakeshore, National Park Service
Sarah E. Johnson, Northland College

Population dynamics of the rare orchid *Neottia convallarioides* in the Apostle Islands National Lakeshore

Rare species can be used as indicators of ecosystem change. *Neottia (Listera) convallarioides* (broad-leaf twayblade orchid), a disjunct species from the Pacific Northwest, is on the edge of its range in Wisconsin and is listed as State Threatened. It occupies seepage habitats within deep, wet-mesic forest ravines, which experience intermittent flood disturbance. Natural resource managers at Apostle Islands National Lakeshore are concerned about this species due to a long-term drought in the late 1990s to 2013, recent extreme precipitation events, and other climate changes projected for the Lake Superior region. Forty-seven sites with orchids were censused at least once in the 1990s (1991, '92, '96) and resurveyed in 2014, 2017, and 2019. Across the Lakeshore, site occupancy has fluctuated and only 12.8% of sites had orchids in 2019. While the total number of occupied sites has declined across the Lakeshore, the number of sites with >1000 plants tripled in 2019. Among eight intensively surveyed monitoring sites, orchid counts decreased 77% from the 1990s to 2014, possibly reflecting impacts of the 15 -year drought or large precipitation events in 2014. Orchid numbers increased by 21.3% in 2019, possibly reflecting a wetter period or newly exposed habitat. While total orchid numbers appear promising, the significant contraction of populations is concerning. Sustained monitoring of *N. convallarioides* across all known sites is essential to learn about the dynamics of these populations and the impacts of ravine disturbances, especially given the projections for increased extreme storm events. Managers might consider active restoration of this threatened species to increase the number of populations at or near previously occupied sites.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Bradshaw, Lauren, WDNR
Taylor Finger, WDNR
Robert Holsman, WDNR
Jordan Petchenik, WDNR

Wisconsin duck hunters and wetland conservation

Hunters play an important role in supporting habitat management efforts for wildlife, but the benefits derived from habitat protection and restoration efforts go far beyond game species. WDNR uses revenue from license sales and excise taxes to purchase waterfowl habitat and/or direct funds towards wetland restoration efforts. Waterfowl population surveys are regularly done to estimate population growth and how these habitat protections may impact nesting and survival, but it is also important to understand how hunters utilize and benefit from these habitats. To that end, WDNR has regularly surveyed waterfowl hunters since 2007 to assess hunter behavior, harvest success, and support for season structures. Results from ten years of hunter surveys demonstrate higher harvest success for those using public lands and that hunters utilize public lands around the state in a multitude of ways. These results have implications for communications with hunters surrounding season expectations and may impact hunter retention and sustained support for wetland restoration efforts.

Wetlands & People II, Thursday, February 20, Palm Garden Ballroom A, 11:00-11:20 am

Casper, Gary, Great Lakes Ecological Services

Developing bioacoustic tools for wetland wildlife monitoring

Bioacoustics is the study of natural sounds. The recent development of weatherproof digital sound recording systems, coupled with new protocols for analysis of digital sound recordings, have opened new frontiers for wetland management and conservation. These systems can efficiently collect data to inform wetland wildlife research, inventory, and monitoring goals. This is especially timely in that it provides affordable methods to monitor changes in wildlife populations in the face of rapid climate change. I will discuss the practical considerations for utilizing these systems and protocols to survey for wetland wildlife. I will compare them to traditional survey methods, in particular for statistical power in understanding wildlife communities at particular sites and in improving statistical confidence in regional trend analyses. I will demonstrate the existing National Park Service amphibian monitoring program and review methods for acoustic monitoring of breeding and migratory birds and bats. Bioacoustic techniques are well suited for monitoring individual wetland restoration success, for assessing regional wildlife conservation status, and for better understanding large scale trends in wildlife distribution and population levels.

Wetlands 101, Wednesday, February 19, Palm Garden Ballroom A, 2:10-2:30 pm

Del Prete, Jeremy, Stantec
Melissa Curran, Stantec

Web based GIS as a means to track spatial and temporal treatments of wetland invasive species

Wetland invasive species such as *Phragmites* reduce biodiversity, which can lead an ecosystem to be much more susceptible to environmental stress. They can be introduced through human activities, like urban development, and spread quickly when unmanaged. This problem is already widespread throughout the state of Wisconsin, and small-scale uncoordinated treatments without a focus on monitoring have been ineffective. We at Stantec believe that gains can be made through greater collaboration of stakeholders enhanced with emerging GIS technologies that will allow us to tackle this issue at a much larger scale. Along with partners including WDNR, Lakeshore Natural Resource Partnership, local landowners, and many others, Stantec has created a management plan in which we are surveying and tracking treatments of invasive species throughout Manitowoc and Sheboygan Counties over multiple years. The first step was compiling spatial invasive species data from various sources, including data collected through past GLRI-funded projects. From there, ArcGIS Online Web Mapping Applications and Collector for ArcGIS have been utilized to help facilitate better communication between project managers and field teams; to collect and record field data such as additional invasive species stands and treatment records; and to simply visualize spatial and temporal progress. Over the past two years, we have done almost 3,500 treatments on the roughly 4,000 *Phragmites* and Japanese knotweed stands that we have mapped in the two counties. In our presentation we will share how we developed our management strategy, our progress and how we are disseminating that information to the public, and how we are moving forward.

Effective Wetland Restoration & Management Techniques I, Thursday, February 20, Palm Garden Ballroom BC, 9:50-10:10 am

Englund, Eric, Cardno

Providing a clear vision for wetlands through practical project management strategies for practitioners

From changing climactic factors and understanding inputs from adjacent land uses, down to finding just the right Chroma and value or attempting to key out an unknown "sedge," there are many challenges wetland scientists face. Further, the projects we work on involve multiple governing agencies, local conservation groups, and project teams made up of scientists from varying professions, many of whom change more frequently than the seasonality of the wetlands in which we work. Add onto this the changes to regulations such as the recent developments in the interpretation of the Waters of the United States definitions and the complexity exponentially increases. How we, as wetland scientists and managers, provide "A Clear Vision for Wetlands" hinges upon our consistent application of the existing methodology, practices, and understanding of their intent in light of changing conditions and our ability to apply them to new challenges that arise. Three key components provide us with that ability: knowledge of basics, continued education, and communication. This talk will address the importance of internal and external trainings, continued education through working groups, and the necessity of clear communication between scientists, practitioners, educators, and regulators to provide consistent management strategies. When taken on collectively as a group, these steps allow for us to easily accomplish the task of providing A Clear Vision for Wetlands. Cost efficient and accessible to all level of practitioners, these are steps that we can all take in our daily lives that will help to ensure consistent management going forward, address issues of the future, and serve as a base for the teams we build.

Wetlands & People II, Thursday, February 20, Palm Garden Ballroom A, 11:40 am-12:00 pm

Fleener, Jason, WDNR

Prioritization of wetland infrastructure: An agency's approach to strategically manage impounded wetlands

WDNR currently owns and/or manages more than 1,050 impounded wetlands across the state. WDNR defines impoundments as dammed waterways and other wetlands with infrastructure that retains or diverts surface water. It is becoming more challenging to manage all of the associated aging infrastructure with limited agency staff and resources. WDNR recognizes that the intended benefits of some of these impoundments may have been lost. Trade-offs in ecosystem services and wetland functions in some impounded wetlands means it may no longer be worth keeping some infrastructure on-line. This presentation will outline WDNR's comprehensive process to prioritize impounded wetlands and make management decisions about their future. I will discuss how WDNR will conduct cost-benefit analyses that will evaluate actual environmental and social values provided under the current management strategy relative to resources needed to manage these systems optimally. I will also discuss how WDNR will work with conservation partners and local communities to seek agreeable solutions for wetland and infrastructure management that balance cost-efficiency with environmental and social needs.

Wetlands & Water Management, Wednesday, February 19, Palm Garden Ballroom BC, 1:30-1:50 pm

Fowler, Drew, WDNR
Leigh Fredrickson, Wetland Management and Educational Services, Inc.
John Vradenburg, USFWS
Paul Tashjian, Audubon New Mexico

Wetland management through the lenses of the Wetland Review Process: What, why, and how

Wetland systems are diverse in ecosystem function as a result of variation in the physical landscape and abiotic processes (geomorphology, hydrology, soils) that occur at local, regional, and continental scales. In Wisconsin, public and private wetland landscapes are managed for a range of ecosystem services including wildlife habitat, water quality, and flood remediation as well as agriculture (i.e. commercial cranberry production and wild rice). Successful management for these ecosystem services requires a robust understanding of the abiotic processes influencing wetland function both in a historic and current day context. We describe the Wetland Review Process as a structured, collaborative approach to investigate wetland management in the context of physical setting and ecosystem function through peer-led, field-based discussion. We provide an overview of the Wetland Review framework, discuss topics covered, and review examples of outcomes, benefits, and deliverables from previous reviews held in Missouri, Texas, New Mexico, Colorado, Idaho, and Nevada. We also review the logistical details such as time investments and financial cost to coordinate and implement the review process. Ultimately, we believe the Wetland Review Process is a tool that can be readily adapted by diverse stakeholders across Wisconsin to improve technical understanding of wetlands and build relationships among biologists, hydrologists, managers, and other conservationists with a stake in wetland preservation, management, and restoration.

Wetlands & Water Management, Wednesday, February 19, Palm Garden Ballroom BC, 2:50-3:10 pm

Gall, Nick, Mequon Nature Preserve

Wetland creation and management: Planning and execution of degraded farm field restoration

Mequon Nature Preserve is a 444–acre preserve located in Ozaukee County, ten minutes north of the city of Milwaukee. In 2017, Mequon Nature Preserve completed its largest restoration project in its 15-year existence. The project included the conversion of a 72-acre field into a 5-acre wetland surrounded by prairie and forest. The use of historic drain tile maps, along with soil maps, indicated the location of hydric soils that point to a history of water inundation. The wetland, situated high in the watershed, is used to catch rainwater and slowly release it rather than allowing the runoff to flow freely over the once-barren ground at lower elevations. The restoration of this wetland included the removal of drain tile and installation of a rock spillway on its lowest point. During wet times of the year, this wetland has a surface area of five acres and holds approximately 1,200,000 gallons of water. Before restoration, buildings downstream would flood during rain events and 300 tons of sediment were removed from basins downstream of the restoration site. Seeding of native vegetation allowed for perennial groundcover that will decrease erosion on the highly erodible topography of the project area. Restoration of the project area allows for excess nutrients and sediment to be held within the soil, preventing them from flowing downstream. Soil tests of the surrounding area indicate neither an increase nor decrease in soil phosphorous levels throughout the three years. Difficulties with this project include the presence of invasive species due to highly degraded soils and erosion control problems around the rock spillway due to above average precipitation in recent years.

Wetland Conservation in Agricultural Landscapes, Thursday, February 20, Palm Garden Ballroom A, 10:10-10:30 am

Garcia, Samantha, Northeastern Illinois University
Gloria Rios, Northeastern Illinois University
Pamela Geddes, Northeastern Illinois University

Are microsatellite markers useful in detection of invasive plant species? A case study with *Typha domingensis*

There are three common *Typha* species (cattails) in the Midwestern U.S.: native *Typha latifolia,* invasive *Typha angustifolia*, and an aggressive hybrid between the two, *Typha x glauca*. First-time sightings of southern cattail, *T. domingensis*, were recently reported in Wisconsin and Ohio, beyond its native range. Northward expansion can result in hybridization between *T. domingensis* and the Midwestern species creating aggressive hybrids that decrease native plant biodiversity, as has been documented for *Typha x glauca.* Additionally, these four *Typha* species are morphologically similar, making it difficult to identify them visually. An accurate species identification method is essential. The correct species ID provides wetland managers with the necessary information to take steps to prevent expansion of invasives and promote growth of the native plants. Recent studies suggest molecular analysis can accurately identify *Typha* species. Therefore, we hypothesized that microsatellites would provide a genetic signature unique to *T. domingensis*, allowing its differentiation from the Midwestern cattails. 11 *T. domingensis* samples collected from its native range in Florida were genetically tested using 35 previously developed markers. Only one of the 35 microsatellite markers tested was found to be diagnostic of *T. domingensis*, indicating that microsatellites are not an effective tool for identifying *T. domingensis*. Finding a molecular signature unique to *T. domingensis* is a priority to continue to monitor its presumable invasion and hybridization within the Midwest. The next step of this study is to use gene sequencing as a more precise tool to identify *T. domingensis* because it targets single nucleotide differences among species.

Wetland Challenges, Wednesday, February 19, Palm Garden Ballroom A, 11:40 am-12:00 pm

Grill, AJ, Schlitz Audubon Nature Center
Tess Stahler, Schlitz Audubon Nature Center

Connecting Milwaukee youth to urban wetlands

If we are to create a clear vision for wetlands, first we must define the stakeholders included in this vision. The fishermen, the conservationists, and policy makers are first to come to mind. But what about our inner city youth who live in and around wetlands, and who may someday take part in decision making for the wetlands of tomorrow? Experiencing and understanding wetlands is just as important for these groups – perhaps more so. Meaningful programming for students in these underserved communities can change the mindset of Milwaukee's youth of wetlands as "swamps full of disease" to valuable habitats and natural nurseries. Schlitz Audubon Nature Center welcomes just over 3,000 students a year from underserved communities. These field trip opportunities are often the only time these students get to experience the natural world. While at Schlitz Audubon, students transform into citizen scientists and are empowered with the knowledge that their discoveries can actually make a difference. Some of these discoveries include high breeding populations of blue-spotted salamanders which are uncommon in Milwaukee, and prairie crayfish and Blanding's turtles utilizing our ponds. The information that is collected by our student citizen scientists currently contributes to the Center's baseline wetland data. Individual species discoveries impact land management decisions on site and are reported to county wide studies that are also shared with WDNR. When middle and high school students arrive at Schlitz Audubon, they are often reluctant and afraid, but with a few short hours of discovery, stewardship, and hands on interaction, they learn to care for and value wetlands. They leave with a renewed and clear vision for wetlands.

Wetlands & People I, Wednesday, February 19, Palm Garden Ballroom A, 3:40-4:00 pm

Haines, Anna, UW-Stevens Point
Casey Olson, UW-Stevens Point
Hannah Keckheisen, UW-Stevens Point
Micheal Mills, UW-Stevens Point

County government approaches to protecting, restoring, and managing wetlands

In the United States, counties use many formal and informal mechanisms to govern wetlands within their jurisdiction. Wetlands play a major role in the world's economic, cultural, and ecological systems. They are among one of the many threatened natural resources world-wide and Wisconsin is no exception. Several studies have examined wetland governance at state and local government levels, particularly in the US Northeast. In general, these studies find that local level management can be superior to a national or federal strategy alone. Governance has been defined in multiple ways. One definition of governance is the "process by which the repertoire of rules, norms, and strategies that guide behavior within a given realm of policy interactions are formed, applied, interpreted, and reformed" (McGinnis, 2011). While we have some understanding of the formal institutions used by local governments, we have yet to understand the full range of formal and informal institutions (unwritten rules or processes) used at the local level. In our survey we ask about strategies county staff use with landowners; visiting wetland sites and coordinating with land trusts are two examples of informal institutions. Informal institutions can play a large role in regulating wetlands and can go unnoticed if only the formal institutions are examined. We aim to understand both the formal and informal institutions and the interaction between the two in creating a wetland governance system and how it differs across localities. Understanding wetland governance at the local level can help managers and policy makers develop and implement policies that efficiently and effectively manage natural resources. We are conducting a survey of county governments to understand the range of approaches to protecting, restoring, and managing wetlands.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Hennen, Sadie, Lawrence University, Eastern Kentucky University
Johnathan Malzone, Eastern Kentucky University

Hydrostratigraphy of natural and constructed wetlands in Cumberland District, Daniel Boone National Forest, KY

Hundreds of wetlands have been constructed on the ridgetops of Daniel Boone National Forest (DBNF) in the past 30 years to increase critical habitat, but recent studies have found these constructed ecosystems are perennially inundated and act as conduits for invasive species. There are also many naturally occurring ephemeral, perched groundwater wetlands in the area, but their variable hydrology is not well understood. The U.S. Forest Service intends to begin restoring the constructed wetlands to function more like their natural ridgetop counterparts. However, to begin "deconstructing" these constructed wetlands, more knowledge is needed about the constructed and natural wetlands' geologic properties. This study investigated and compared the geologic controls of water flow in constructed and natural ridgetop wetlands by quantifying hydraulic conductivity and exploring natural wetlands' belowground hydrostratigraphic structure. Five constructed and six natural wetlands in the Cumberland Ranger District of DBNF were evaluated. Hydraulic conductivity was measured using a permeameter, an infiltrometer, and Bauwer-Rice slug tests. Bulk density and soil texture were determined for soils, and three natural wetlands were hydrostratigraphicly mapped by completing a manual transect of soil cores to bedrock. The constructed wetlands' hydraulic conductivity was lower and had more variation between wetlands than did the natural wetlands. Constructed soils had higher bulk densities and higher clay content. These trends are residual effects from construction methods and are the determining factors in hydraulic behavior. The natural wetlands had a thin clay layer and possible bedrock topography that could be controlling their hydrology.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Highsmith, Tod, WWA Board
Mike Mossman, WDNR (retired)

Mary Linton wetland poetry session

What began as a one-time reading of wetland poetry—initiated by wetland scientist, poet, and former WWA Board Chair Mary Linton—has become an annual tradition at this conference. Take a break from data-filled presentations to hear how a variety of poets speak to the wetland ecosystems we value and love, but more commonly seek to understand through science.

Wetlands & People I, Wednesday, February 19, Palm Garden Ballroom A, 4:40-5:00 pm

Johnson, Sarah, Northland College
Matthew Cooper, Northland College
Olivia Anderson, Northland College
Shelly Ray, Northland College

Climate-vulnerability of coastal wetlands in the Apostle Islands National Lakeshore

Apostle Islands National Lakeshore supports several types of coastal wetlands including lagoons, bogs, freshwater estuaries, marshes, and peatlands that provide many important ecological functions. We investigated wetland hydrology, geomorphology, vegetation, macroinvertebrates, and fish to identify communities or wetland types that are most at risk of climate-related impacts. The interaction between Lake Superior water levels and hydrologic connectivity between the wetlands and the lake influence how these wetlands will respond to changing conditions. For example, the hydrology of wetlands located behind semi-permanent sand barriers responds quickly to intense rain events whereas wetlands with open connections to Lake Superior are influenced more by storm- and seiche-driven fluctuations than by heavy precipitation events. Floral and faunal communities inhabiting the park's coastal wetlands must be adapted to these different water level patterns. Because various climate-related drivers (e.g., storm and seiche intensity vs. intense precipitation events) are at play, the park's wetlands will likely respond in differing ways. For example, as lake levels shifted from a 15-year below-average period (1998-2013) to above-average depths in 2014, the plant community response was more dynamic among coastal wetland types lacking a sphagnum peat mat. The Lakeshore's peatlands have so far exhibited resilience to changes in hydrology, but sustained monitoring may capture a time lag in peatland response. The relatively remote location of Apostle Island wetlands makes them important reference systems, though climate-related factors are likely to alter these systems in unique ways.

Wetland Flora & Plant Communities, Wednesday, February 19, Palm Garden Ballroom BC, 3:40-4:00 pm

Kraszewski, Sarah, Stantec
Jennifer Grimes, WDOT

Challenges and benefits of a large wetland restoration in an urban environment

Wetland mitigations are frequently built in rural agricultural landscapes due to lower cost of large parcels that are often more easily restored compared to parcels in urbanized landscapes. However, restoration of large functional wetlands in urban areas is feasible and provides for critical wetland services that directly benefit densely populated areas. WDOT is restoring wetlands on the east side of the City of Madison to compensate for unavoidable wetland losses from highway projects within the region. The 200-acre World Dairy Center Wetland Mitigation Bank, comprising restored wet meadow-shallow marsh complexes on organic soils, is constrained by Interstate 39/90 and residential/ commercial developments. The challenges of restoring this site will be discussed, including navigating multiple utility easements, public visibility and interactions, hydrologic restoration, invasive species pressure, and minimizing impacts of prescribed burning on human activities. This restoration is on track to compensate for wetland losses with expectations of providing enhanced water quality and retention, floristic diversity, wildlife habitat, and human use values that are otherwise locally infrequent in this portion of the Yahara River Watershed. This project illustrates how, with comprehensive planning and management, urban wetland restoration should be a component of our vision for wetlands.

Wetlands & Water Management, Wednesday, February 19, Palm Garden Ballroom BC, 1:50-2:10 pm

Lauscher, Taylor, Marian University
John Morris, Marian University

Phosphorus determination in the West Fond du Lac River

We studied the total phosphorus concentration in the West Fond du Lac River to determine if surrounding land development and rain events impact the level of phosphorus. It is likely that runoff from rain events will increase phosphorus, but natural landscapes may limit runoff. We collected samples from eight points along the river that varied in surrounding land development. The first point was in the Eldorado Marsh. Two points were predominantly surrounded by farms, therefore classified as agricultural. Two points were in towns outside of the city, therefore classified as suburb. The last three locations were classified as city. The total phosphorus concentration was determined by a persulfate digestion followed by a spectrophotometric analysis. We analyzed three sets of samples. The date of samples and the amount of rain prior to collection were recorded. Samples were collected October 13th, October 27th, and November 21st. The amount of rain was 1.62, 0.86, and 1.37 cm respectively. Phosphorus concentration was lower for the October 27th samples than for the other two dates for all locations except the marsh. The phosphorus concentration at the marsh point was lowest for the November sample. The trend of the data shows that increased rainfall may increase phosphorus levels. More data are required to conclude if land development impacts phosphorus concentration because different locations spike for each collection. Monitoring the West Fond du Lac river allows for determination of phosphorus input into lake Winnebago from this portion of its watershed. Since the river includes the Eldorado Marsh, it also allows us to monitor fluctuations in phosphorus concentration flowing from the marsh and how those fluctuations compare to those of developed areas.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Lennie, Brian, Stantec

Badger Mill Creek and its wetlands: A tale in watershed planning & implementation

Implementation of the final piece of the City of Madison's large-scale watershed planning project for Badger Mill Creek presents a wide variety of challenges to the project team. This presentation will examine how the last piece of the puzzle fits into the federal, state, and local regulations surrounding the waterway and adjacent wetlands to restore healthy water quality and hydrology to Badger Mill Creek and complete the City's "Greenway Project." Specifically, the project involves a navigable stream where there is no active channel in a farmed wetland setting. Along this stretch of the stream, the floodplain needs to be "lowered" and the channel design must match upstream and downstream hydrologic conditions as a part of the City of Madison's FEMA-regulated floodplain. The City "Greenway Project" has included multiple channel projects on the waterway over the past twenty years and the degraded wetlands within this portion of the waterway provide a restoration opportunity. The project includes wetland and waterway delineation, permitting, restoration, floodplain analysis, channel assessment, natural channel design, and regulatory coordination (WDNR, ACOE, Madison, FEMA). Project construction is planned for 2020.

Wetlands & Water Management, Wednesday, February 19, Palm Garden Ballroom BC, 2:10-2:30 pm

Li, Yu, UW-Madison
Anita Thompson, UW-Madison
Edward Boswell, UW-Madison

Relationships between stream nutrient concentrations and wetlands in the Yahara River watershed

Understanding the relationships between wetlands and stream nutrient concentrations is important for urban planning and water quality. In-stream nutrient concentrations at 17 sampling sites in the Yahara River Watershed (YRW) were measured by a citizen-monitoring program. We evaluated wetland area within each sub-watershed using three metrics: (1) area percentage in different land extents (e.g., in the entire watershed and in riparian zones with widths from 20-ft to 700-ft), (2) area factor, the ratio of wetland area in the riparian zone to agricultural area in the rest of watershed, which indicates the buffering capacity of wetlands in the riparian zone, and (3) inversed-distance-weighted (IDW) wetland area percentage with proximity to sub-watershed outlet and to stream, which characterizes spatial arrangement of wetlands in the watershed by assigning higher weight to wetland patches closer to the outlet or stream and lower weight to those farther away. We found that nitrate-nitrite concentrations were highly correlated to area factor for all riparian zone widths; as area factor decreased, nitrate-nitrite concentrations increased. Wetland area percentage in the entire watershed and IDW wetland area percentage with proximity to stream were negatively correlated to stream nitrate-nitrite concentrations. Compared to the simple area percentage metric, area factor and IDW wetland area percentage with proximity to stream were better indicators of stream nitrate-nitrite concentrations. Results from this study can inform future wetland restoration in the YRW and indicate that, in addition to a simple land use area percentage, spatial distribution of wetlands should be considered in the planning process.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Magyera, Kyle, WWA

Using wetlands to solve problems: Highlights & lessons from the field

Wetlands can help communities across Wisconsin solve their water-related problems. However, many communities are not yet thinking about wetlands as solutions and do not yet have the resources or expertise to evaluate, prioritize, or design these wetland projects. In this presentation, I will highlight how WWA seeks to develop partnership and project models that make these connections and that can be exported to other communities. Currently, WWA is serving as a convener and technical service provider for local projects in the Village of Plover and Ashland County to help these communities engage in watershed-scale hydrologic assessments and restoration. Our approach involves listening and sharing information, convening stakeholders, and providing guidance and leadership. We help leverage funding, diversify and maintain partnerships, support landowner outreach, and secure technical assistance, all in ways that are responsive to locally-defined goals and priorities. We collaborate with diverse partners, including producers, landowners, local governments, and institutions such as regional planning commissions and state and federal emergency management agencies. The goal of our work is to inspire and increase cross-sector investment in on-the-ground actions, targeting the underlying drivers of common watershed degradation and demonstrating the benefits of techniques that reconnect floodplains and restore wetland storage capacity. This presentation will use two current projects as examples, sharing lessons learned and emphasizing the importance of building trust and relationships that will be critical in scaling initiatives to heal our watersheds and create climate-resilient communities.

WWA in Action, Wednesday, February 19, Palm Garden Ballroom BC, 11:00-11:20 am

Maile, John, MN DNR

Minnesota's Small Wetland Program: Developing a wetland management program in the prairie region of Minnesota

The mission of the Minnesota Department of Natural Resources (MN DNR) Small Wetland Management Program (SWMP) is to bring management to wetlands o <50 acres in the prairie region of Minnesota. The SWMP will mirror the MN DNR's successful Shallow Lakes Program, which protects and enhances littoral habitats on wetlands > 50 acres. The SWMP includes initial surveys of wetlands in predetermined landscapes that will be used to assess the overall habitat conditions of a wetland or wetland complex. These surveys will provide baseline information about existing problems and steps to address them. By gathering data on wetland conditions before and after treatment, we will be able to determine the success of management activities. Three basic variables will be collected during a wetland survey: aquatic vegetation, water depth, and water clarity. Other data collected include water level, waterfowl and wildlife species, presence or absence of fish populations, and any special conditions on the wetland. Two wetland specialists and a lead worker will initiate this new program. Their duties will be to complete the field assessments, provide technical support to field managers, recommend policy considerations to the fish and wildlife division's management team, and represent the division on wetland management issues involving the public and other agencies. The SWMP will be funded by the Outdoor Heritage Fund a dedicated sales tax approved by the citizens of MN in 2008 to raise funds for the environment and arts. Currently $110,000,000 is generated annually for habitat work, which allows these specialists to work exclusively within this program.

Wetland Conservation in Agricultural Landscapes, Thursday, February 20, Palm Garden Ballroom A, 9:30-9:50 am

Marti, Aaron, WDNR
Jason Nemecek, USDA-NRCS

Clear as muck: Wetland soil physicochemistry as a driver of wetland plant community condition across Wisconsin

Wetlands have been described as "nature's kidneys" for decades. However, whether anthropogenic reliance on nutrient retention and other water quality improvement functions of wetlands potentially leads to degradation of wetland ecosystem integrity (ability to continue those functions and/or degrading other ecosystem functions/ structure) is largely untested. We collected surface soil samples (0-15 cm), conducted plant surveys using the WDNR Timed Meander Survey Method, and assessed current/historical disturbance using the WDNR Disturbance Factors Checklist at 350 wetland sites of various wetland plant community types spanning four main Omernik Level III Ecoregions across Wisconsin. We examined relationships among disturbance, soil physicochemistry, and wetland plant community condition as measured by the Wisconsin Floristic Quality Assessment (FQA) method. The USDA-NRCS National Soil Survey Lab analyzed soil samples for standard physicochemistry and numerous dissolved phosphorus retention tests. Wetland floristic quality (condition), specifically mean coefficient of conservatism, was inversely correlated with % exchangeable phosphorus (P), which we propose as a metric representing the proportion of redox-sensitive P present in wetland surface soils ([Oxalate Extractable P]: [Total P]) and a proxy for wetland eutrophication. However, magnitude of plant community response varied based on ecoregion, wetland vegetation type (forested/shrub/herbaceous) and soil type (organic vs. mineral/mucky mineral). While further data analyses are needed to quantify the relationship between disturbance and % exchangeable P, we propose % exchangeable P as a soil-based metric that can be used for wetland monitoring and risk assessment.

Wetland Flora & Plant Communities, Wednesday, February 19, Palm Garden Ballroom BC, 4:40-5:00 pm

Milburn, Scott, Midwest Natural Resources

Calcareous fens in Northwest Minnesota

The presentation will discuss the unique calcareous fen communities of northwest Minnesota. These systems, associated with the beach ridges of Glacial Lake Agassiz, are considerably different from other fen systems found in Minnesota and Wisconsin. The talk will include a brief summary regarding legal protection, the classification process in Minnesota, and threats. The presentation will also include a look at key species in this community, including several species that make these fens different than those found elsewhere in Minnesota and Wisconsin.

Wetland Flora & Plant Communities, Wednesday, February 19, Palm Garden Ballroom BC, 4:00-4:20 pm

Miller, Nick, The Nature Conservancy
John Wagner, The Nature Conservancy
Joanne Kline
Tom Bernthal, WDNR (retired)

Redefining WOTUS 2: An assessment of potential impacts to Wisconsin wetlands and wetland services

The Clean Water Act (CWA) has improved water quality in the nation's waterways since 1972. However, the definition of our "nation's waterways"—which streams and wetlands are considered "Waters of the US" and receive federal protection—has been debated in courts and subject to change. WOTUS changes proposed in 2019 limit CWA wetland jurisdiction to sites directly connected by surface flows to relatively permanent waters, eliminating regulatory protections for many wetlands and wetland services. As part of its public comments, The Nature Conservancy assessed the likelihood of Wisconsin wetlands losing CWA protections using a statewide ecosystem service dataset, Wetlands by Design, which includes wetland hydrologic inputs, outputs, and association with waterbodies and water flow paths. According to this analysis, up to 4.5 million acres (71%) of Wisconsin's remaining wetlands could lose federal protection. Wetland loss in watersheds already highly impacted may be of particular concern. For example, the Plum and Kankapot watersheds of the Lower Fox River have already lost 88% of historical wetland coverage. Of the remaining wetland acres, only 35% may retain federal protection (4.2% of historical wetland coverage). In these two watersheds, which receive federal funds to reduce phosphorus and sediment loads, about 80% of the wetlands that are highly-ranked for phosphorus and sediment reduction would be put at risk. Given the degree of change estimated in this rapid analysis, further modeling coupled with field investigations is warranted—in Wisconsin and nationally—to more fully understand the consequences of redefining WOTUS.

Science-informed Wetland Policy, Wednesday, February 19, Palm Garden Ballroom DE, 11:00-11:20 am

Mohammadi, Rose, Loyola University Chicago

Constructing a habitat suitability model for invasive European frogbit (*Hydrocharis morsus-ranae*)

The floating aquatic invasive plant *Hydrocharis morsus-ranae* (European frogbit; EFB) can have profound ecological and economic impacts on invaded regions. Newly discovered populations of EFB have been identified across the upper Great Lakes region, raising questions about its potential future distribution. To predict the current and future distribution of a species, managers can utilize habitat suitability models (HSMs), which use algorithms to determine the relationships between species observation data and environmental conditions. This study built an HSM for EFB in the Alpena Wildlife Sanctuary near Thunder Bay, Michigan, using thirteen abiotic variables (Cl-, F-, NO3-, PO43-, SO42-, DO, water temperature, pH, ORP, turbidity, soil organic matter depth, water depth, and above water detritus) and macrophyte community composition data (cover of each plant species and biomass of *Typha* × *glauca*). We measured these variables in fifty randomly distributed 1x1 meter plots through five vegetation classes. Data were analyzed based on EFB presence/absence using logistic regression analysis. EFB presence was positively associated with F-, SO42-, water temperature, and above water detritus and negatively associated with Cl-, NO3-, DO, and water depth. These results indicate that EFB may alter environmental conditions by using up available nitrogen and depleting dissolved oxygen. These results also suggest that EFB requires structure as it occurs more often in areas with more detritus and less frequently in deeper waters that have fewer macrophytes and a stronger flow. These data on the habitat preferences of EFB can be used to design surveys for new EFB populations and to inform spatial prioritization of management decisions.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Mossman, Michael, WDNR (retired)
Mark Cupp, Lower Wisconsin Riverway Board

How many people does it take to protect a riverway?

People have nurtured the 92-mile-long Lower Wisconsin riverway and its adjacent wetlands and uplands for millennia. This long history was highlighted by State Riverway designation in 1989 and by the subsequent management of both private and public lands under the purview of a citizen Riverway Board. WDNR has produced two riverway master plans since the designation. Citizens and landowners participate in the riverway's management and use—as individuals and through town and county governments, the Ho-Chunk Nation, hunting and fishing organizations, advocacy groups such as the Friends of the Lower Wisconsin Riverway, public meetings, and citizen science activities. Dozens of professional and amateur scientists, conservation biologists, land managers, historians, archeologists, teachers, interpreters, and land use and recreation specialists contribute to planning, management, and educational efforts. This presentation will weave these components into an enlightening story of how people have brought their varied talents and perspectives into the ongoing and evolving process of ensuring a bright future for this unique and magnificent landscape.

Wetlands & People I, Wednesday, February 19, Palm Garden Ballroom A, 4:00-4:20 pm

Mossman, Michael, WDNR (retired)
Jean Unmuth, WDNR (retired)
Katie Beilfuss, WWA

Lower Wisconsin Riverway: A new Ramsar Wetland of International Importance?

The Lower Wisconsin Riverway stretches 92 miles from the Prairie du Sac Dam to its confluence with the Mississippi River. A vital, wild, recreational and educational resource, it also harbors important cultural sites and is one of the nation's most significant riverine systems. Most critical are its wide variety of wetland, riverine, and upland plant-animal communities, which are joined by intact natural ecotones into a large and functioning ecosystem. In this poster we summarize the important ecological and cultural features of the riverway, how they warranted its nomination for designation as an internationally important wetland, and some of the threats to its future. We will be there to discuss the riverway and to swap river stories.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Noll, Christopher, WDNR
Zachary Kron, WDNR
Melissa Gibson, WDNR
Aaron Marti, WDNR

Floristic composition of major wetland community types across four Omernik Level 3 Ecoregions

From 2012 to 2018, the WDNR Monitoring Section Wetland Team coordinated more than 1,000 surveys of non-restored natural wetland communities spanning four Omernik Level 3 Ecoregions. Surveyors collected detailed floristic data using the Timed-Meander survey protocol in low to high quality examples of natural wetland community types as described by the WDNR Natural Heritage Inventory. While the main objective for these data was to create regional benchmarks of floristic condition for natural community types based on ranges of weighted mean Coefficients of Conservatism, many applications of these data remain unexplored. In this poster, WDNR staff will present species lists for several different community types summarizing the native plant diversity found in a subset of sites representing good to excellent quality (minimally disturbed) wetland communities as determined during a post-field season review process. Accompanying this poster will be draft species lists summarizing the results. Our hope is that these species lists will serve as a primary resource to inform which species should and should not be included in wetland restorations to aid land managers in restoring cohesive, recognizable examples of Wisconsin's natural wetland communities.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

O'Brien, Erin, WWA

Making every action count: Advancing a wetland conservation vision for Wisconsin

Wisconsin Wetlands Association envisions a state where wetlands are healthy and plentiful and support ecological and societal needs. But what does that look like? How do we get there? And who needs to be involved? These are the questions Wisconsin Wetlands Association's Board of Directors and staff considered when developing our most recent strategic plan and that we revisit often to inform our program priorities and policy positions. In this session, we'll present our "Theory of Change," the conceptual framework that we use to ensure our wetland conservation actions achieve the desired outcomes and have the greatest possible positive impact on the wetland resources of the state. Topics we'll address include the role of science in WWA's work; key audiences we target in our outreach work and why; goals of our partnership and place-based programs; and the use of pilot projects to make the case for public and private investments in wetlands conservation. We'll wrap up with a discussion of the importance of a watershed approach, the challenge of "getting to-scale," and the importance of the wetland professional community to achieving a shared vision for wetland conservation in Wisconsin.

WWA in Action, Wednesday, February 19, Palm Garden Ballroom BC, 10:40-11:00 am

O'Brien, Maggie, Loyola University Chicago
Andrew Monks, Loyola University Chicago
Shane Lishawa, Loyola University Chicago

Invasive cattail residence time affects plant communities and below-ground processes

Invasive species like hybrid cattail (*Typha* × *glauca*) threaten biodiversity in Great Lakes coastal wetlands by outcompeting native plants, and they are associated with higher biomass and soil nutrient content, likely impacting belowground conditions and processes. My research tests the hypothesis that soil seed bank and microbial diversity decrease along a gradient of time-since-invasion by *Typha.* I collected soil samples from Sand Island Marsh, a coastal wetland located in the St. Marys River in northern Michigan. We determined stand age by mapping *Typha* extent at three points over the last 20 years. To evaluate the viable seed bank in areas with differing ages of *Typha* invasion, seeds from the soil samples were allowed to germinate and grow until they could be identified, and we measured species richness and diversity of the seed bank. While extant plant community was significantly different in areas invaded for more than 20 years compared to areas invaded in the past 5 years, I found no reduction in seed bank plant diversity. Hydrology can impact movement of seeds into and out of a site and the ability of those seeds to germinate, so these results would likely differ in other types of wetlands. The results from this marsh indicate that removing *Typha* from sites invaded for less than 20 years could result in passive native plant community regeneration without the need for additional planting. I plan to extract and sequence microbial DNA from soil samples to determine bacterial diversity, and I expect microbial community data to indicate a similar shift in community after 20 years of invasion. Taken together, these results inform restoration efforts by showing how the age of invasion affects wetland belowground processes.

Wetland Challenges, Wednesday, February 19, Palm Garden Ballroom A, 11:20-11:40 am

O'Connor, Ryan, WDNR

Swamp, bog or fen? An introduction to wetland types of Wisconsin

Wetland conservation, management, and research in Wisconsin is predicated on an understanding of the different types of wetlands that occur in the state. While many experienced practitioners have a strong working knowledge of wetland communities, others who are newer to the field may be less familiar with them. This session will provide a brief introduction to the wetland natural communities of Wisconsin, key ecological and vegetative characteristics, distribution in the state, how to know what type you are in, and helpful resources for deeper learning. Crosswalks between different classification systems (e.g., WDNR, Eggers and Reed, etc.) will be provided to enhance understanding and preparedness for professionals in any setting.

Wetlands 101, Wednesday, February 19, Palm Garden Ballroom A, 1:30-1:50 pm

Oines, Alexandra, UW-La Crosse
Andrew Meier, USACE
Meredith Thomsen, UW-La Crosse
Nathan De Jager, USGS

Influence of flooding and gap size on the fate of UMRS floodplain forest canopy gaps

Canopy gaps often serve as locations for new tree seedlings to grow. However, adverse environmental conditions (e.g. altered flood regime, invasive species) may inhibit typical successional patterns and prevent canopy gaps from closing. New plant community types may then become established, which leads to a loss of forest cover over time. The Upper Mississippi River System (UMRS) floodplain forest is showing trends of insufficient natural regeneration. Our goal is to determine how the factors of gap size and flood regime interact to influence the fate of canopy gaps by collecting data across a variety of sites that will be monitored long-term. We used a spatial dataset developed by collaborators at USGS that identified canopy gaps in the UMRS using LIDAR imagery and aimed to conduct field surveys of 27 canopy gaps in summer 2019. A high flood year limited our sample size to 20 gaps. Preliminary analyses have not found statistically significant connections between tree seedling presence and gap size x flood interactions. However, across all surveyed gaps, presence of tree seedlings declined as presence of reed canarygrass increased. Tree seedling numbers were highest in small gaps and higher in the forest cover than within the gap interior. This suggests that propagule supply is an important factor in successful regeneration. Shade may also inhibit reed canarygrass invasion. Through further analyses and future sampling, we hope to gain increased understanding of drivers of forest regeneration success or failure within the UMRS floodplain forest. This insight may be used to select project areas that are suitable for forest management and for the design of management plans to most effectively conserve our forests.

Wetland Flora & Plant Communities, Wednesday, February 19, Palm Garden Ballroom BC, 4:20-4:40 pm

Pociask, Geoff, Illinois State Geological Survey/ University of Illinois
Danielle Nelson, Illinois State Geological Survey/ University of Illinois

Differentiating hydrologic conditions to support coastal wetland functional assessments in Illinois

The remaining coastal wetlands in Illinois are mostly relegated to the Lake Michigan plain within Illinois Beach State Park and Spring Bluff Nature Preserve in Lake County. This coastal wetland complex comprises the only remaining dune and swale habitat in Illinois, expansive wet prairies, and globally rare panne habitats—alkaline interdunal wetlands formed by fluctuating Great Lakes water levels. This area currently receives runoff from mixed urban and agricultural watersheds that ultimately drain to Lake Michigan. Throughput of pollution derived largely from road salt and fertilizer affects the condition of wetlands and the near-shore lake environment. Although the coastal wetland complex has the capacity to attenuate pollutants, there is likely a tradeoff in the ability of certain wetlands to provide high quality habitat with increases in pollutant levels. Our study will explore thresholds for the provision of these wetland services by differentiating hydrologic characteristics and evaluating pollution and carbon storage gradients within the lake plain wetland complex. Further, we will relate wetland function to lake level cycles by comparing data from this study during historical high lake levels to previous work done during historical low lake levels. This study will enhance ongoing wetland mapping and functional assessment efforts and thereby better inform management decisions and potentially expedite implementation of restoration and management efforts. Monitoring will begin in Spring 2020 and the project will continue into March 2021. Therefore, we present our proposed methods, preliminary data, and previous studies to preview the project, facilitate discussion, and garner feedback.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Rice, Kelly, GEI Consultants
Stacy Hron, WDNR
Brennan Dow, WDNR

Sheboygan River AOC: Long-term planning for aquatic and wetland habitat restoration success

The Sheboygan River was designated as an Area of Concern (AOC) in 1987 due to the presence of contaminated sediments that resulted in many impairments to aquatic and wetland habitats as well as the degradation of fish and wildlife populations. In 2010, the Sheboygan River AOC Fish and Wildlife Technical Advisory Committee (TAC) began developing an AOC-wide plan for improvement. As a result, the comprehensive Fish and Wildlife Restoration Plan for the Sheboygan River Area of Concern was developed and multiple restoration projects were undertaken. Because of the assessment and baseline monitoring done prior to 2011, the TAC was able to identify strategic restoration sites, secure funding and agreements, and improve the sites in a manner that would benefit the region as a whole. The TAC identified seven (Tier One) aquatic and wetland restoration projects that integrated eight overarching conservation goal categories. These categories comprised targeted habitats and species groups that included migratory bird stopover habitat, shorebird stopover and breeding habitat, resident breeding bird habitat, warmwater fisheries habitat, herptile habitat, riparian emergent wetlands, riparian forested floodplains, and coldwater fisheries habitat. In 2018-2019, we documented habitat improvements, completion of project site -specific goals, and attainment of conservation goals through both a review of restoration plans and biotic monitoring results as well as completion of post-restoration field assessments. This presentation will share the results of the post-restoration assessment and demonstrate how advanced, but adaptive, planning efforts can lead to the successful attainment of aquatic and wetland habitat restoration goals.

Effective Wetland Restoration & Management Techniques II, Thursday, February 20, Palm Garden Ballroom BC, 11:20-11:40 am

Robertson, Andrew, Saint Mary's University of Minnesota

Redefining WOTUS 1: A GIS-based model to predict the spatial extent of federally-protected waters and wetlands

In February of 2017, the Trump administration directed the Administrator of the Environmental Protection Agency and the Assistant Secretary of the Army for Civil Works to revise the definition of Waters of the U.S. (WOTUS). This definition is used to determine which streams, rivers, lakes, coastlines, and wetlands are protected from draining and filling under the Clean Water Act. Due to a combination of subsequent rule makings and court challenges, two definitions were previously used in the United States. The new 2019 WOTUS definition removes Clean Water Act protection from many waters and wetlands that were previously protected by both the 2015 and 1986 WOTUS definitions. There is a clear need for analytical materials that demonstrate which waters and wetlands are protected and which are not protected under various scenarios. Such a resource could help elected officials, policy makers, and the public understand what waters are currently protected, as well as the extent and impact of the changes proposed by the current administration. Saint Mary's University of Minnesota's GeoSpatial Services created a geospatial model that predicts the spatial extent of federally protected wetlands and waterways. This comparative analysis was completed for three geographically diverse case study watersheds using GIS technology and publicly available digital spatial data. The assessment methods and communication of results were guided by a project advisory committee made up of science and legal professionals. The results of the analyses in case study watersheds show that narrowing the scope of federally protected waters significantly reduces (anywhere from 30–60%) the number of streams miles and wetland acreage protected by the Clean Water Act. This has the potential to result in the loss of benefits provided by these resources no longer protected under the Act. The methods and results of this work are available through a web-based Story Map built using ESRI ArcGIS Online technology.

Science-informed Wetland Policy, Wednesday, February 19, Palm Garden Ballroom DE, 10:40-11:00 am

Robson, Julia, Waukesha County Parks and Land Use
Erica Gerlosk, Waukesha County Parks and Land Use

Community-based wetland monitoring: Year one in review

The Waukesha County Park System is home to more than 9,000 acres of public parkland nestled within a landscape that is mottled with unique glacial features and a fascinating blend of Wisconsin's vegetative communities. Engaging the community in the conservation of some of the park system's most ecologically diverse resources is of the utmost importance in effectively preserving them for generations to come. In 2019, the Waukesha County Park System launched a community-based monitoring program with a multi-taxa focus for the entire county, including wetland monitoring on both public and private lands. Volunteers were trained and equipped to take on the tasks of setting and checking funnel traps, identifying species, recording wildlife data, and surveying for frog calls. This presentation will give an overview of notable results from year one, lessons learned, and the implications of the data collected in managing the park system's natural areas. This framework provides tools that can be readily applied by other organizations in southeastern Wisconsin that are looking to expand their own wetland monitoring initiatives through the use of citizen science.

Wetlands & People II, Thursday, February 20, Palm Garden Ballroom A, 11:20-11:40 am

Salas, Dan, Cardno
Sadie O'Dell, USFWS

Focusing management: Setting priorities when there's more needs than time

Managing wetlands often involves having more to do than time or resources allow. Making decisions about what to focus on, and where to direct those efforts, often involves defining objectives and trade-offs involved. USFWS and Cardno used a structured decision-making approach to set priorities for targeting management across dozens of management sites. When combined with their primary conservation needs and management objectives, this planning effort helped the USFWS team focus their management of 13,500 acres. In this session, we will highlight how the Leopold Wetland Management District set priorities for managing the 57 Waterfowl Production Areas it is responsible for throughout 17 counties in southern and eastern Wisconsin. Using this example, we will share considerations that can be applied to other land managers and wetland restoration efforts.

Effective Wetland Restoration & Management Techniques I, Thursday, February 20, Palm Garden Ballroom BC, 9:30-9:50 am

Scherer, Jeanne, UW Madison-Div of Extension,
Natural Resources Institute, WDNR

Wisconsin Purple Loosestrife Biocontrol Program updates

The Wisconsin Purple Loosestrife Biocontrol program celebrated its 25th anniversary in 2019 and the release of more than thirty million loosestrife chomping beetles under the leadership of Brock Woods. With Brock's retirement, Jeanne Scherer will now coordinate the program. During 2019, volunteers and WDNR staff noticed an increase in purple loosestrife populations, especially in far northwestern and eastern counties in wetlands, along roadsides, and in riparian areas. High water levels and multiple late season cold weather events have potentially reduced beetle populations in areas that had been well-managed, making 2020 a year to reassess sites and restock beetles at locations where resurgences have occurred. Wetlands managers and volunteers can be instrumental in helping us locate these areas, so I will present monitoring and reporting guidelines. We will review the program progress to date, review biocontrol techniques, catch up on program updates, and discuss Integrated Pest Management options for those with small populations of purple loosestrife to manage. You're encourage to attend whether you've just started noticing purple loosestrife in your area and are wondering what you can do about it or have been doing the biocontrol program for years. This is also an opportunity to provide feedback to the new coordinator.

Wetland Challenges, Wednesday, February 19, Palm Garden Ballroom A, 11:00-11:20

Seilheimer, Titus, Wisconsin Sea Grant

From wetlands with love: Wisconsin's Great Lakes coastal wetlands as important fish habitat

There are many types of wetlands in Wisconsin, but the wetlands along the Great Lakes coast are unique habitats at the transition between watersheds and the larger lake. Coastal wetlands are diverse in form and serve many functions, including shoreline protection and nutrient and sediment filtration. These wetlands also provide important spawning and nursery habitat for many fish species. Great Lakes coastal wetlands have been estimated to contribute in some way to the life history of more than 70% of Great Lakes fish species. Identifying fish habitat in these wetlands requires an integrated approach of assessment of water quality, aquatic vegetation, and fish assemblages. Physical habitat in coastal wetlands is greatly influenced by changing water levels, from short term changes that are driven by wind to the longer term trends in water level caused by regional climate patterns. The combination of natural variation and human-caused disturbances have dynamic and complex influences on the fish habitat of Great Lakes coastal wetlands. A clear vision to restore and protect these valuable habitats will benefit the fisheries of Wisconsin now and into the future.

Wetlands 101, Wednesday, February 19, Palm Garden Ballroom A, 1:50-2:10 pm

St. John, Logan, Loyola University Chicago

Combined impacts of invasive hybrid cattail and European frogbit on Great Lakes wetlands

Ranges of invasive species are expanding as climate changes, especially in wetlands. With expanded ranges, the cooccurrence of multiple invaders will become more frequent and new plant interactions may create novel ecosystems. Invasive wetland plants disrupt native ecosystems by altering habitat structure, reducing biodiversity, and modifying food webs. In the Great Lakes, the introduction of invasive cattail (*Typha spp*.), a robust invasive emergent macrophyte, alters submersed vegetation structure, opening the opportunity for secondary invasion by European frogbit (*Hydrocharis morsus-ranae*; EFB), a floating macrophyte. I hypothesize EFB provides vegetation structure in degraded wetlands and increases biodiversity in aquatic macroinvertebrate species. I propose to test this hypothesis by comparing the abundance and biodiversity of invertebrates between uninvaded, *Typha* dominated, and *Typha* and EFB codominant wetlands in northern Michigan. Second, I will sort invertebrates into functional feeding groups to quantify how the invertebrate community has shifted. I hypothesize that the presence of invasive *Typha* will H1) result in differences in the structure of functional feeding groups compared to wetlands without Typha. The presence of EFB in *Typha* dominated wetlands will H2) provide submersed vegetative habitat and retain functional feeding groups similar to native wetlands; H2alt1) create a novel ecosystem composed of unique functional feeding groups unlike native or *Typha*-dominated wetlands; H2alt2) compound impacts, resulting in an overall decrease in the total abundance and biodiversity of invertebrates as a result of poor habitat structure, reduced dissolved oxygen, increased shading, and reduced food availability.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Staffen, Amy, WDNR
Danielle Shannon, Northern Institute of Applied Climate Science
Sarah Johnson, Northland College
Joshua Sulman, Stantec

Climate change adaptation at two wetland sites

Individuals who manage natural areas are confronted with many questions relating to climate change: How will climate change affect my site? Are my goals still feasible with a changing climate? Should I resist change, accept change while promoting resiliency, or transform my site into something new? How can I achieve my objectives and assess if my actions are working? The Wisconsin Initiative on Climate Change Impacts (WICCI) Plants and Natural Communities Working Group, in partnership with the Northern Institute of Applied Climate Science (NIACS), worked through the"Adaptation Workbook" (adaptationworkbook.org) process with managers and stakeholders for two wetland sites in 2019: Bohn Farms and Spur Lake State Natural Area. Bohn Farms is a WDNR In Lieu Fee Mitigation site in Winnebago County, while Spur Lake is a wilderness lake in Oneida County. Adaptation approaches for Bohn Farms involve site engineering, seed mixes, and vegetation management, e.g., grading to create microtopography and withstand extreme rain events, increase species diversity, and preserve shaded ephemeral ponds as refugia. Spur Lake adaptation aims to support the wild rice population by restoring hydrology, monitoring water quality, and controlling competition. This poster compares climate adaptation approaches for the two sites, and illustrates how the Adaptation Workbook can accommodate diverse project locations, ecosystems, goals, and sizes. The new "Adaptation Strategies and Approaches: Non-Forested Wetland Conservation and Management" (aka "Wetland Adaptation Menu") was used to identify adaptation approaches. For information on the two wetland adaptation sites and the wetland adaptation menu, see: https://forestadaptation.org/focus/wetlands.

Poster Session, Wednesday, February 19, Villa Gottfried Foyer, 5:00-6:30 pm

Sulman, Joshua, Stantec
Joshua Arrigoni, Stantec
David Bart, Stantec

Five years of change: Insights from transect data on wetland hydrology and vegetation response at Deer Grove West

Deer Grove West Nature Preserve is a priority landscape for restoration in the Forest Preserves of Cook County, IL. We assessed the response of vegetation and hydrology over five years across four distinct wetland basins as part of ecosystem restoration on a 240-acre project area. Baseline assessments in 2015 identified wetlands, streams, hydrologic impairments, and vegetation types. We established point-intercept transects across four wetland basins. Understory thinning and woody invasive species removal began in late 2015. Hydrologic restoration (channel stabilization; semi-porous weirs) occurred in 2018. We hypothesized that hydrologic modifications at three of the four wetland basins' outlets would result in (1) expansion of wetland extent; and (2) increase in wetland hydroperiod, with the fourth wetland acting as a control. We did not monitor hydrology directly, but rather used wetland indicator status data from vegetation transects as a proxy for wetland hydrology and hydroperiod. Transect data show contrasts among baseline conditions, varying trajectories in vegetation change, and distinct changes in hydrology over 2015 - 2019. Following vegetation clearing but prior to hydrology modification, none of the wetlands showed expansion in hydrophytic vegetation extent. Following hydrology modification, hydrophytic vegetation extent increased in two wetlands but not in the control. Changes in floristic quality, non-native cover, and hydrophytic vegetation varied and likely are influenced by factors including baseline vegetation and hydrology and the magnitude of changes implemented in each basin.

Effective Wetland Restoration & Management Techniques II, Thursday, February 20, Palm Garden Ballroom BC, 11:00-11:20 am

Taylor, Scott, Rock River Coalition, Inc.

Identifying actually restorable wetlands in the Rock River Basin

Most sub-watersheds of the Rock River Basin, which covers approximately 3,800 square miles of southcentral Wisconsin, are dominated by agricultural land use. As a result, tributary waters of the Rock River suffer from nutrient and sediment-laden agricultural runoff. While improved tillage and livestock management are the ultimate solutions to polluted agricultural runoff, the sediment and nutrient retention capacity of restored wetlands can be harnessed to cleanse runoff as well. Using soil and land cover maps, WDNR created the Potentially Restorable Wetland map for the Rock River Basin to identify wetland restoration sites. Nonetheless, many PRWs are difficult to restore since they are large and span multiple properties. The primary objective of this project was to overlay property boundaries onto the PRW map in a Geographic Information System in order to find PRWs that were mostly contained within single properties. The secondary objective was to field-inspect a small subset of PRWs identified in the first stage. During the process, we sharpened our ability to interpret landscape data to assess the actual restorability of PRWs. Based on our field observations of landscape positions of PRWs, we found that many were probably not hydrologically restorable. Others were not restorable because they were just artifacts of the GIS analysis. We created a web-based, interactive GIS tool—the Rock River Basin Restorable Wetland Viewer—to display single-ownership PRWs together with other map layers essential for assessment of wetland restoration sites and their surrounding landscapes. Our GIS tool was created using publically available, statewide data. Therefore, it can be replicated in any watershed in Wisconsin. We hope the website will serve as a one-stop tool for wetland restorationists, watershed managers, and anyone seeking to explore wetlands and watersheds in the Rock River Basin.

Wetland Conservation in Agricultural Landscapes, Thursday, February 20, Palm Garden Ballroom A, 9:50-11:10 am

Trochlell, Pat, The Prairie Enthusiasts
Tom Bernthal, WDNR (retired)

WFQA 2. How to use the WDNR timed-meander survey protocol and WFQA calculator

WDNR developed a timed-meander protocol to rapidly monitor wetlands to develop benchmarks for plant community health. This method has potential for other applications. We will describe how to conduct timed-meander surveys and discuss the pros and cons of this method as compared to plot-based methods. We will describe and demonstrate use of the Wisconsin Floristic Quality Assessment Calculator. We will show examples of how timed-meander surveys and floristic quality assessment data have been used to track plant community trends for pre-project baseline surveys and post-project monitoring. We will show examples where these methods were used for Aquatic Invasive Species grant projects, compensatory mitigation sites, and voluntary restoration sites. We will show how these data have been used to evaluate wetland plant community health by comparing plant community metrics to benchmark data. We will discuss management implications as to how specific maintenance (e.g., prescribed fire, invasive species control) is affecting the overall plant community health.

Wetlands 101, Wednesday, February 19, Palm Garden Ballroom A, 2:50-3:10 pm

Webster, Bobbie, UW-Green Bay
Lisa Grubisha, UW-Green Bay
Robert Howe, UW-Green Bay

Efficacy of non-native *Phragmites* treatment and impact on wetland plant communities in northeastern WI

Non-native populations of the common reed, *Phragmites australis*, have invaded shorelines and wetlands across the Great Lakes, including in northeast Wisconsin. Dense stands of *Phragmites* negatively affect ecological function and habitat value of wetlands, impair the recreational use of wetlands and shorelines, decrease property values, and increase fire risk. Effectively managing invasive species such as *Phragmites* is a high priority for habitat and wetland restoration. UW-Green Bay is working to increase scientific understanding of *Phragmites australis* population control and, in collaboration with the *Phragmites* Adaptive Management Framework, promote an adaptive management approach to the restoration of *Phragmites*-invaded wetlands in northeast Wisconsin. We surveyed plant communities in several wetland types with varying *Phragmites* treatment histories across northeast Wisconsin during 2017 and 2018. Preliminary review of data indicates non-native *Phragmites australis* is significantly associated with the most intensely treated sites, as are other non-native grasses. Higher quality sedges and richness of species with high coefficient of conservatism values are significantly associated with untreated wetlands. The focus of this session will be discussion and interpretation of the 2017 and 2018 wetland monitoring protocol and results. The session will also review a small scale aerial imagery analysis and introduce a project story map with downloadable treatment and monitoring data.

Wetland Challenges, Wednesday, February 19, Palm Garden Ballroom A, 10:40-11:00

Western Hauser, Jennifer, WWA

Legislative updates & new WWA initiatives

It's been a big year for wetlands and WWA in the state capitol. In this session, we'll revisit WWA's 2019-2020 policy priorities and report on our recent government relations work. This will include descriptions and outcomes from legislator education activities and updates and action items on bills we helped conceive to promote the restoration of wetlands, streams, and floodplains to solve problems. We'll highlight how WWA members, including wetland practitioners, supported this work and provide insights on wetlands related components of the Speaker's Water Quality Task Force and the Governor's Year of Clean Drinking Water. The session will wrap up with an overview of efforts underway to strengthen relationships with key agencies and policy-makers, develop and launch new pro-active policy campaigns, support the engagement of the wetland professional community in the wetland policy-development process, and increase demand for the services of wetland restoration practitioners.

WWA in Action, Wednesday, February 19, Palm Garden Ballroom BC, 11:20-11:40am

PRESENTER BIOGRAPHIES

Sean Ahearn (SAhearn@betalabservices.com) works as a Project Manager at Beta Analytic, a world leader in geochemical testing. He has developed cutting edge techniques to better understand water quality through the use of stable isotopes. He is a graduate of the Rosenstiel School of Marine and Atmospheric Science division of Marine Geology, where he focused on using geochemical techniques to evaluate and model water sources.

Katie Beilfuss (katie.beilfuss@wisconsinwetlands.org) coordinates WWA's communications and works on many outreach projects, including the annual Wetland Science Conference, video production, private wetland landowner education, and WWA's Ramsar initiative. She has a master's degree in Land Resources from UW-Madison's Gaylord Nelson Institute for Environmental Studies and more than twenty years' experience in nonprofit conservation.

Tom Bernthal (tombernthal@sbcglobal.net) recently retired from WDNR as the Wetland Monitoring and Assessment Coordinator. In that position, he helped develop the Wisconsin Floristic Quality Assessment and the Wetlands Explorer (with TNC). He currently splits his wetland conservation and education efforts between the Friends of Pheasant Branch Conservancy, Dane County Parks, and several other groups, often collaborating with Pat Trochlell.

Adrian Bethel (bethea133@myemail.northland.edu) is majoring in natural resources and forestry at Northland College. As a student researcher in the NC Plant Ecology Lab, he assisted with the monitoring of 25+ rare species in the Apostle Islands National Lakeshore in summer 2019. He is also conducting dendrochronology research for a joint project between Northland College and the Great Lakes Inventory and Monitoring Network.

Lauren Bradshaw (lauren.bradshaw@wisconsin.gov) is a graduate of the University of Michigan and UW-Madison with degrees in ecology and resource management. Currently she is employed with WDNR as a resource sociologist and has worked on a variety of research projects related to how both the hunting and non-hunting public utilize public lands and natural resources in the state.

Gary Casper (gc@greatlakeseco.com) is an associate scientist at the UW-Milwaukee Field Station, an adjunct of the graduate faculty at UW-Green Bay, and an associate editor for the Natural Areas Journal and Herpetological Conservation and Biology. He researches wildlife conservation and conducts inventory and monitoring throughout the Great Lakes Region.

Jeremy Del Prete (Jeremy.Delprete@Stantec.com) is a GIS Analyst with Stantec. He has a degree in geography from Northern Illinois University, where received the Burton W. Ray Scholarship Award in Soil Science. Last year, he was recognized as a Geographic Information Systems Professional by the GIS Certification Institute.

Eric Englund (eric.englund@cardno.com) ensures environmental regulatory compliance on energy and infrastructure projects. He conducts wetland assessments and sensitive species surveys and facilitates permitting of construction activities. He also is involved with stream surveys, pre/post-construction monitoring of soils and vegetation, pollinator habitat assessments, and spill prevention planning for storage facilities.

Jason Fleener (jason.fleener@wisconsin.gov) is the Wetland Habitat Specialist in WDNR's Bureau of Wildlife Management. His core responsibilities involve administration of programs that restore and manage wetlands for waterfowl and wildlife habitat, such as the State Waterfowl Stamp Program and WDNR's wild rice conservation program. He obtained a bachelor's degree in wildlife management and biology from UW-Stevens Point.

Drew Fowler (drew.fowler@wisconsin.gov) PhD, is a research scientist at WDNR focusing on waterfowl and wetland ecology. Drew has guest-lectured in wetland management courses at Louisiana State University and the University of Missouri. He has also taught wetland management principles in China in coordination with USGS, USFWS, and the International Crane Foundation.

Nick Gall (ngall@mequonnaturepreserve.org) received a bachelor's in wildlife ecology and management from UW-Stevens Point. He has been employed for three years with Mequon Nature Preserve, Inc., where he conducts restoration and research projects on the 444-acre preserve with a goal of restoring the preserve to a mosaic of mesic hardwood forests, wetlands, and prairies.

Samantha Garcia (smgarcia26@neiu.edu) is a junior at Northeastern Illinois University. With a passion for protecting the environment, she is pursuing a bachelor's degree in environmental science with a biology minor. She works as an environmental science tutor and a member of the biology department laboratory prep staff at Northeastern. Her research has focused on molecular identification of southern cattail.

AJ Grill (agrill@schlitzaudubon.org) has a bachelor's in environmental education and interpretation from UW-Stevens Point. He has worked as an educator for the Iowa DNR, Isle Royale National Park, and the Central Wisconsin Environmental Station. As a Schlitz Audubon employee, AJ regularly leads programs for all ages from kindergarteners to adults.

PRESENTER BIOGRAPHIES

Anna Haines (ahaines@uwsp.edu) is a professor at UW-Stevens Point and directs the Center for Land Use Education. She teaches natural resources planning, analyzing natural, human, and built environments. Her outreach has focused on game development to introduce adults to land use planning concepts. Her research examines social, institutional, and ecological systems at multiple scales to inform land policy and management.

Sadie Hennen (hennens@lawrence.edu) is a junior at Lawrence University majoring in environmental studies and geoscience. She spent this past summer as a student researcher in Dr. Johnathan Malzone's lab at Eastern Kentucky University as part of the NSF's REU program. An avid outdoorswoman, Sadie is passionate about conservation and science education and now has a burgeoning enthusiasm for wetlands!

Tod Highsmith (todhighsmith@me.com) is a retired writer and editor in the conservation sciences and a member of the WWA Board of Directors. His career includes stints as an environmental educator, ornithological researcher, and staff journalist for an international bird conservation organization. He holds a PhD in zoology from the University of Massachusetts at Amherst.

Sarah Johnson (sjohnson@northland.edu) is an associate professor of natural resources at Northland College. She received a PhD in Botany from UW-Madison. She researches the signatures and causes of ecological change of plant communities in the upper Midwest and Great Lakes region and serves on the WICCI Plants and Natural Communities Working Group. She enjoys getting her undergraduate students out into the field often.

Sarah Kraszewski (sarah.kraszewski@stantec.com) is a professional wetland scientist and senior ecologist at Stantec. Sarah has spent the last 13 years focusing on prairie, savanna, and wetland restoration in the Midwest. She enjoys planning, implementing, and assessing large wetland mitigation projects that contribute to enhanced ecological functions within watersheds.

Taylor Lauscher (tmlauscher96@marianuniversity.edu) is a senior chemistry major with minors in environmental science and math at Marian University. She discovered a love for chemistry after taking her first chemistry class in high school. She wants to pair this love for chemistry with her passion for making environmental change and hopes to pursue a career in environmental chemistry, ideally in water treatment.

Brian Lennie (brian.lennie@stantec.com) received his bachelor's in 1992 from UW-Madison and has been a wetland ecologist with Stantec since 1994. Brian assists clients with early identification of environmental issues, developing alternatives to minimize impacts, coordinating with regulatory agencies, and preparing permit applications. Brian has completed the ACOE and the WDNR/SEWRPC/LaCrosse wetland delineation training programs.

Yu Li (li728@wisc.edu) graduated from Wuhan University, majoring in hydrology and water resources engineering in 2016 and participated in the water resources management program at UW-Madison, starting research on wetlands. She joined the biological systems engineering master's degree program and is now pursuing her PhD at UW-Madison.

Kyle Magyera (kyle.magyera@wisconsinwetlands.org) coordinates WWA's Superior Basin flood hazards work and provides technical assistance to professional staff, local officials, citizens, and other groups. He has masters' degrees in urban and regional planning and water resources management from UW-Madison and more than ten years' experience working on wetland conservation and water policy issues with WWA and WDNR.

John Maile (john.maile@state.mn.us) received his bachelor's in field biology from St. Cloud State University. Currently John is a wildlife wetlands specialist and assistant wildlife manager for MN DNR. John's primary role for MN DNR is developing a wetland program to assess wetland condition and actively manage wetlands primarily for waterfowl on state-owned lands.

Aaron Marti (aaron.marti@wisconsin.gov) is a wetland assessment research scientist and healthy watersheds monitoring specialist with the WDNR Water Quality Bureau. His research focuses on bridging wetland/aquatic ecosystem ecology (especially biogeochemistry) and soil science with wetland management, monitoring, and assessment. He received his bachelor's in water resources from UW-Stevens Point and his master's in biology from Ball State University.

Scott Milburn (scott.milburn@mnrinc.us) is a senior botanist with Minnesota-based Midwest Natural Resources. He has 20 years of field experience conducting rare plant surveys, ecological assessments, and wetland surveys in the upper Midwest. He is also the lead author of the Floristic Quality Assessment (FQA) for Minnesota Wetlands as well as the lead on the first of three regionalized FQA projects in Minnesota.

Nick Miller (nmiller@tnc.org) is the director of science and strategy for The Nature Conservancy in Wisconsin, where he helps integrate science into conservation policy, strategies, and tools. His recent wetland-related work includes developing wetland functional assessments, assessing wetland-based watershed needs, creating online decision support tools, and promoting wetlands as natural infrastructure for climate adaptation.

PRESENTER BIOGRAPHIES

Rose Mohammadi (rmohammadi1@luc.edu) is a senior environmental science and economics major at Loyola University Chicago. Over the summer of 2019, she worked with Loyola's "Team Typha" in northern Michigan studying the impacts of invasive *Typha x glauca*. She is currently conducting an independent study on the habitat preferences of invasive *Hydrocharis morsus-ranae* using data she collected over the summer.

Michael Mossman is a retired WDNR ecologist who has worked on and enjoyed the Lower Wisconsin River for decades, contributing to its Important Bird Area status and to its WDNR master plan. He received a "River Champion" award from the Friends of the Lower Wisconsin Riverway. He and his collaborators Mark Cupp and Jean Unmuth helped to nominate the riverway for designation as a Ramsar site.

Christopher Noll (christopher.noll@wisconsin.gov) is an ecologist with WDNR's Wisconsin Wetland Conservation Trust program, which oversees In Lieu Fee wetland restoration projects.

Erin O'Brien (erin.obrien@wisconsinwetlands.org) oversees WWA's strategic policy initiatives and helps WWA develop and implement new programs and partnerships. Erin has a master's in land resources from UW-Madison and more than twenty years' experience managing projects for non-profit organizations.

Maggie O'Brien (mobrien11@luc.edu) is a junior undergraduate student at Loyola University Chicago studying conservation and restoration ecology. She works as a research assistant for "Team Typha" in Michigan. Her research interests include plant microbial ecology of invaded Great Lakes wetlands.

Ryan O'Connor (ryan.oconnor@wisconsin.gov) is an ecologist and coordinates and conducts surveys of natural communities for WDNR's Natural Heritage Conservation program. His professional interests include providing land managers with high-quality data to make better decisions, developing adaptation resources, and hunting for rare and invasive plants.

Alexandra Oines (alexandraoines@gmail.com) received her bachelor's in biology and psychology from UW-Superior and is currently a second-year graduate student at UW-La Crosse. She is pursuing her master's in biology with a concentration in environmental sciences.

Geoff Pociask (pociask@illinois.edu) is an associate geologist at the Illinois State Geological Survey. His work has included characterizing the hydrogeology and geomorphology of potential restoration sites and evaluating the performance of wetland restoration and mitigation projects. Favorite wetlands: All of them, but especially up north cedar swamps near trout streams!

Kelly Rice (krice@geiconsultants.com) is a senior ecologist who specializes in wetland assessments, habitat assessments, restoration design, wildlife and protected species surveys, technical report development, regulatory compliance, and large-scale project management. Kelly has more than 30 years' experience with natural resource projects across the country. She has a bachelor's in zoology from UW-Madison.

Andrew Robertson (aroberts@smumn.edu) is currently executive director of GeoSpatial Services (GSS) at Saint Mary's University of Minnesota. In this role, Andy is responsible for oversight and management of all GSS projects, activities, and staff. GSS is engaged in a wide variety of projects across the lower 48 and Alaska including NWI mapping, NHD updates, spatial data development, and natural resource condition assessments.

Julia Robson (jrobson@waukeshacounty.gov) has more than 10 years' experience working in the natural resource management field. She has worked throughout the Midwest on various projects including multi-taxa biodiversity assessments, habitat restoration, environmental education and community engagement, and environmental planning projects.

Dan Salas (dan.salas@cardno.com) helps people solve difficult conservation and regulatory challenges. Dan works for Cardno and has more than 20 years' experience in environmental regulations, conservation planning, ecological restoration, and decision analysis. He is certified as a Senior Ecologist through the Ecological Society of America.

Jeanne Scherer (jeanne.scherer@wisc.edu) graduated from UW-Whitewater in 2012 and worked for The Rock River Coalition. She joined WDNR in 2013 as a water resources specialist. She is now an AIS outreach specialist and Purple Loosestrife Biocontrol Program coordinator in the AIS program with UW Madison-Division of Extension, Natural Resources Institute contracted with WDNR.

Titus Seilheimer (tseilheimer@aqua.wisc.edu) is a fisheries specialist with Wisconsin Sea Grant. He has worked on all five Great Lakes during his 18 years' experience working in coastal wetlands. He is based in Manitowoc and enjoys spending time surveying the fish species in the Little Manitowoc River marsh.

PRESENTER BIOGRAPHIES

Logan St. John (lstjohn1@luc.edu) received his bachelor's in environmental studies in 2019 from Alma College (Michigan). After graduating, Logan received a graduate teaching assistantship from the Institute of Environmental Sustainability at Loyola University Chicago, where he is currently working toward a master's in environmental science and sustainability.

Amy Staffen (amy.staffen@wisconsin.gov) is an ecologist with WDNR's Natural Heritage Conservation program in Madison. She has a master's degree in landscape architecture from UW-Madison. In addition to tracking rare species and natural communities, Amy promotes landscaping with native plants and develops climate adaptation resources for land managers.

Joshua Sulman (joshua.sulman@stantec.com) grew up in Madison and has bachelor's and master's degrees in botany from UW-Madison. He started working as a field tech on a Wisconsin River floodplain research project in 1999 and has worked in botany, ecological restoration, and wetland science ever since. He's been an environmental scientist at Stantec since 2013.

Scott Taylor (sotaylor@taylorconservation.com) is a consulting ecologist and forester. He has owned and operated Taylor Conservation LLC since 2003. Taylor specializes in wetland services, but he has expertise in all facets of ecological land management and planning. He received a master's degree in forest ecology from UW-Madison.

Pat Trochlell (ptrochlell@gmail.com) is an ecologist working in wetland, prairie, and oak ecosystems. She retired from WDNR after 30+ years working on wetland regulation, restoration, monitoring, and training. She currently does plant community inventories and assessments, teaches natural resource courses, and is on the local chapter board of The Prairie Enthusiasts. She is a state licensed hydrologist and soil scientist.

Bobbie Webster (websterb@uwgb.edu) manages and coordinates ecological restoration of natural areas owned by UW-Green Bay. She has previously worked in ecological restoration for The Door County Land Trust, The Nature Conservancy, Applied Ecological Services, and WDNR. She received her master's in natural resources and bachelors' in public administration & policy analysis and resource management from UW-Stevens Point.

Jennifer Western Hauser (jennifer.westernhauser@wisconsinwetlands.org) is WWA's Policy Liaison. She supports the growth of WWA's policy program and manages WWA's government relations and wetland policy-improvement campaigns. Jennifer's fourteen years' experience in state government gives her broad-based knowledge of agency and legislative processes. Jennifer has a bachelor's in secondary education from UW-Madison.

INDEX OF AUTHORS

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Key to Common Agency Abbreviations Used in Abstracts and Bios

USACE	U.S. Army Corps of Engineers
USDA-NRCS	United States Department of Agriculture-Natural Resources Conservation Service
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
UW	University of Wisconsin
WDNR	Wisconsin Department of Natural Resources