WISCONSIN WETLANDS ASSOCIATION'S

21ST ANNUAL CONFERENCE

FEBRUARY 23-25, 2016 GREEN BAY, WI

Abstracts & Presenter Biographies

WEDNESDAY, FEBRUARY 24, 9:00 AM - 9:30 PM

9:00 - 10:10 Plenary Session (Turtle & Bear Clans Ballroom) — **Sponsored by We Energies**

9:00 **Welcome & Opening comments**

9:20 **Conference Keynote: Community Dynamics and Resiliency of Green Bay Coastal Marshes: A Forty Year Perspective**
H.J. "Bud" Harris, Professor Emeritus of Natural and Applied Sciences at the University of Wisconsin-Green Bay

10:10 - 10:40 Break (Wolf Clan Ballroom) — **Sponsored by ATC**

10:40 - 12:00 Concurrent Sessions

	Location: Turtle	SYMPOSIUM: Solutions for Improving the Health of Green Bay Wetlands *Moderators: Galbraith & Van Helden*	Location: Bear	Wetland Solutions *Moderator: Dreux Watermolen*	Location: Iroquois	Watershed Approaches *Moderator: Tom Bernthal*
10:40	**Galbraith**	A framework for improving the health of Green Bay wetlands	**Viernum**	Wetland and Wildlife avoidance and impact minimization in the Van Loon Bottoms	**Miller**	The Watershed Approach: A statewide decision support tool for restoring and protecting wetland services
11:00	**Howe**	What's so special about Green Bay wetlands?	**Halverson**	Wetland associated with linear utility projects	**Axler**	The Watershed Approach: From mapping to functional assessment - GIS tool development
11:20	**Forsythe**	The importance of wetland habitat to Great Lakes migratory fish	**Steber**	Tiedeman pond water quality and Trails Enhancement Project	**Cooper**	Developing a decision support tool for restoration and protection of Great Lakes coastal wetlands
11:40	**Lubner**	The role of wetlands in improving water quality	**Baker**	Constructed and restored wetlands' relationship to stream restoration using natural channel design	**Magyera**	Putting wetlands to work for your community: A model wetland conservation ordinance

12:00 - 1:30 Lunch (provided - Grand Council Ballroom) — **Sponsored by WCMP**

12:40 - 1:20 Career Development & Continuing Education in Wetland Science (Iroquois Ballroom)

1:00 - 1:30 Legislative updates (Turtle Clan Ballroom)

1:30 -3:10 Concurrent Sessions

	Location: Turtle	SYMPOSIUM: Solutions for Improving the Health of Green Bay Wetlands *Moderators: Galbraith & Van Helden*	Location: Bear	Applications of Wetland Science in Policy & Regulations *Moderator: Kelly Kearns*	Location: Iroquois	Wetland Assessment *Moderator: Nick Miller*
1:30	**Walter**	Restoration of the Cat Island Chain in lower Green Bay	**Walther**	Solving the wetland identification puzzle with effective off-site review	**McDavit**	The 2011 National Wetland Condition Assessment
1:50	**Robinson**	Opportunities for littoral wetland restoration within the wave shadow of the Cat Island barrier	**Nedland**	A proposed set of landform descriptors for wetland delineation purposes	**Marti**	The 2011-12 Wisconsin Intensification Study: Analyses of wetland condition in the Lake Michigan basin
2:10	**Webster**	Coastal wetlands of the east shore: The Point au Sable Nature Reserve in lower Green Bay	**Salas**	Priority refuge resources of concern as a bottom-up approach to surrogate species selection	**Granberg**	Using invasive species databases to guide wetland monitoring
2:30	**Larscheid**	Green Bay west shore Northern Pike habitat restoration project	**Trochlell**	Using floristic quality assessment benchmark survey data to improve wetland restoration plans	**Tribal Wetland Program Working Group**	
2:50	**Glenzinski**	Restoring the west shore of Green Bay	**Little**	Floristic quality and wetland indicator status considerations in northern Wisconsin ephemeral ponds		

3:10- 3:40 Break (Wolf Clan Ballroom) — **Sponsored by NES Ecological Services**

3:40-5:00 Concurrent Sessions

	Location: Turtle	SYMPOSIUM: Solutions for Improving the Health of Green Bay Wetlands *Moderators: Galbraith & Van Helden*	Location: Bear	Wetland Book Club: *Braiding Sweetgrass* *Special Guest: Robin Wall Kimmerer*	Location: Iroquois	Tools for Wetland Identification, Restoration, and Management *Moderator: Pat Trochlell*
3:40	**Snitgen**	Restoring the stream channel downstream of a restored wetland in the South Branch of the Suamico River	**Wetland Book Club: *Braiding Sweetgrass***		**Worsham**	USFWS National Wetlands Inventory mapping of five Wisconsin watersheds
4:00	**Hopfens-beger**	Tools for protecting Green Bay wetlands	Discuss this profound and moving book with its author, Robin Wall Kimmerer, whom Publishers Weekly has called "a mesmerizing storyteller with deep compassion and memorable prose."		**Noll**	Status of the Wisconsin Wetlands Inventory and use for locating specific wetland types for vegetation surveys
4:20	**Petrella**	Connecting the public to wetlands	Prior sign up required and attendees need to have read the book to attend.		**Braden**	Using LiDAR in wetland restoration and management
4:40	**Van Helden**	Panel: Lessons learned and future work to improve the health of Green Bay	**Moderators: Charlie Luthin, Curt Meine, & Alice Thompson**		**Thomsen**	WDNR's Surface Water Grant Program: Helping to restore and manage Wisconsin wetlands

5:00 - 6:30 Poster Session & Cash Bar (Wolf Clan Ballroom) — **Sponsored by UWGB Cofrin Center**

6:30 - 9:30 Banquet & Presentation (Ticketed event - Turtle Clan Ballroom) — **Sponsored by Cardno**

7:30 **Banquet Presentation: Reciprocity and Restoration: Finding Common Ground Between Scientific and Traditional Ecological Knowledge**
Robin Wall Kimmerer, Distinguished Teaching Professor and Director, Center for Native Peoples and the Environment, SUNY Syracuse

THURSDAY, FEBRUARY 25, 8:30 AM - 4:30 PM

8:30-9:20 Plenary Session (Turtle & Bear Clans Ballroom) — Sponsored by Stantec

8:30 Welcome

8:40 Plenary Address: Incorporating Hydrologic and Geomorphic Variability in the Restoration of Natural Processes: A Half Century of Land Management Experience Across North America

Leigh Fredrickson, Former Director of the Gaylord Laboratory, University of Missouri

9:20 - 9:30 Mini-Break

9:30 - 10:30 Concurrent Sessions

	Location: Turtle	Symposium: How Wetland Banking and Wisconsin's In-Lieu Fee Program Can Contribute Wetland Solutions ***Moderator: Rebecca Graser***	Location: Bear	Wetland Case Studies I ***Moderator: Pat Robinson***	Location: Iroquois	Wetlands and People I ***Moderator: Travis Olson***
9:30	**Walther**	Solutions to authorized wetland loss: Compensatory wetland mitigation	**Marek**	Wetland restoration in Milwaukee's Menomonee Valley: Lessons learned	**Kidd**	The Wetlands Reserve Easement Program in Wisconsin: Building on a legacy
9:50	**Day**	Everything you need to know about wetland banking and in-lieu fee programs	**Pfeiffer**	Engineered ecosystems: A cyborg approach to littoral wetland restoration of Grand Lake St. Marys	**Kies**	Assessing Wisconsin Extension educators' potential roles in community level wetland issues
10:10	**Key**	Wetland mitigation bank site selection: Advising prospective buyers	**Pfost**	Persistence & partnership benefit wetland for private and public neighbors	**Robson**	Implementing a citizen-based wetland monitoring program in the Milwaukee County Park System

10:30 - 11:00 Break (Wolf Clan Ballroom) — Sponsored by Ho-Chunk Nation

	Location: Turtle	Symposium: How Wetland Banking and Wisconsin's In-Lieu Fee Program Can Contribute Wetland Solutions ***Moderator: Rebecca Graser***	Location: Bear	Wetland Case Studies II ***Moderator: Jim Ruwaldt***	Location: Iroquois	Wetlands and People II ***Moderator: Travis Olson***
11:00	**Day**	In lieu fee programs and wetland banks: Similarities and differences in the review process	**Pranckus**	Wild rice restoration planning in the St. Louis River Estuary	**Thompson**	"This vee of sandhill cranes": Using poetry to express our human connection to wetlands
11:20	**Schense**	WDNR's role in wetland mitigation and the mitigation banking process	**Waupo-chick**	Miller Creek Wetland Restoration Project	**Williamson**	Working from the ground up: Engaging individuals and communities in wetland conservation
11:40	**Matrise**	The infrastructure behind watershed-based decisions of an in lieu fee program	**Bart**	A wetland and landscape restoration case study from the urbanized landscape of Northeastern Illinois	**Skawinski**	Fascinating species of Wisconsin wetlands to engage public interest

12:00 - 1:30 Lunch (provided - Grand Council Ballroom) — Sponsored by J.F. Brennan

1:30 - 4:30 Field Trips & Working Groups

Working Groups

Practitioners Working Group **Location: Turtle Clan Ballroom** ***Moderator: James Havel***	**Finding Solutions to Non-native *Phragmites*** **Location: Bear Clan Ballroom** ***Moderators: Brock Woods & Jason Granberg***	
This session offers an opportunity for wetland practitioners--including consultants, federal, state, and local regulators, land managers, and others--to discuss current issues relevant to their daily work.	This session is an opportunity for everyone concerned about non-native *Phragmites* in Wisconsin to ask questions and discuss how best to contain this troublesome subspecies.	

Field Trips

All field trips will depart from the Hotel Main Entrance

Prior sign up required; check at registration desk for remaining availability.

Unique Collections at UW-Green Bay's Cofrin Center for Biodiversity: The Richter Museum & Fewless Herbarium *Thank you to Wisconsin Public Service Foundation for their generous sponsorship of this trip.*	**Finding Solutions for a Critical Coastal Wetland: Point au Sable Nature Preserve** *Thank you to Hey & Associates for their generous sponsorship of this trip.*	**Restoration of an Oneida Headwater Wetland Complex: Coyote Run** *Thank you to Midwest Access Solutions for their generous sponsorship of this trip.*

WETLAND SOLUTIONS

We want your feedback!

Please complete the conference evaluation coming to your email inbox.

Thank you!

Axler, Matthew, WDNR
Christopher Smith, WDNR
John Wagner, The Nature Conservancy
Tom Bernthal, WDNR
Matt Matrise, WDNR
Joanne Kline, Conservation Strategies Group
Nick Miller, The Nature Conservancy
Michele Kille, The Nature Conservancy

The Watershed Approach: From mapping to functional assessment - GIS tool development

WDNR and The Nature Conservancy are collaborating to create a decision support tool—for all watersheds of Wisconsin—that prioritizes wetland restoration and preservation opportunities based on ecosystem service assessments. The first step in this ongoing process is to determine watershed service needs by moving the Wisconsin Wetland Inventory (WWI) to a landscape level functional assessment using National Wetlands Inventory Plus (NWI+) attributes. Two methods currently exist for deriving NWI+ attributes for Wisconsin wetlands. The first involves directly classifying wetland attributes using photo-interpretation of remotely-sensed imagery. This requires considerable staff time and individual expertise. The second involves performing a crosswalk between the WWI and the NWI, and supplementing the results with NWI+ attributes. While it is possible to automate this process, automation is prone to inaccuracy since it relies on multiple conversions between different classification systems. We aim to develop an automated approach that bypasses conversions and manual classification via a set of landscape models that use existing datasets including the Wisconsin 24K hydro database, the compound topographic index, the NRCS SSURGO soils layer, and best available elevation data. Through this process we will assign NWI+ attributes to both the WWI and the statewide Potentially Restorable Wetlands layers. While the resulting NWI+ layer will be used to determine watershed needs, upcoming GIS steps will involve prioritizing individual sites to meet those needs.

Watershed Approaches, Wednesday, February 24, Iroquois Ballroom, 11:00 - 11:20 am

Baker, S. Paige, Stantec
Sean Collins, Stantec

Constructed and restored wetlands' relationship to stream restoration using natural channel design

In 2003, the Silver Lake dam failed after a late spring flood in the Dead River watershed in Michigan's UP. The eroded dam material deposited downstream in the river corridor, filled in wetlands, and caused negative impacts to the channel. The dam was reconstructed and the Dead River Recovery project restored the river using Dave Rosgen's natural channel design methodology. The river restoration goal was to create a stable channel that maximizes the river's biological potential. To help achieve this, wetland solutions were developed to complement the river restoration. The location of wetlands varied based on the geomorphic stream type of the adjacent river section. The wetlands are located in either the flood prone area (the area just above the top of bank, but not higher than 2x the bank height) or the floodplain terrace (areas higher than 2x the bank height). In either case, a hydraulic connection was designed between the stream and the wetland to maximize the ability of the wetland to achieve hydrologic success criteria of 1) saturation in the root zone or 2) inundation for minimum of 12.5% of the growing season. Proposed wetlands were located by examining the river valley with respect to the proposed alignment of the new channel. Areas determined to be suitable for wetlands were surveyed and the measured depth to the water table was used to set an initial wetland grade. Once the channel bed profile was designed, the wetland grades were refined to establish a hydraulic connection between the river and wetland. The wetlands were monitored to determine that they met success criteria. The data show that wetlands in both locations met success criteria, but wetlands in the floodplain terrace met the criteria sooner.

Wetland Solutions, Wednesday, February 24, Bear Clan Ballroom, 11:40 am - 12:00 pm

Bart, David, Stantec
Joseph Roth, Openlands
Aaron Feggestad, Stantec
Linda Masters, Openlands

A wetland and landscape restoration case study from the urbanized landscape of Northeastern Illinois

Efforts to restore wetlands at the Jens Jensen / Deer Grove East Forest Preserve in the heavily urbanized landscape of Palatine, Illinois, have been ongoing since 2009. This 185-acre project site is situated in a preserve of rolling oak woodlands and morainic depressions of the northwestern suburbs of Chicago that was historically altered by agriculture and urban development. The urban setting and significant existing recreational infrastructure and public use of the site provided unique challenges to wetland restoration. Solutions focused on integration of wetlands, large wetland buffers, and existing recreational infrastructure in an overall watershed approach to maximize both restoration potential and functional capacity while minimizing off-site impacts. Such an approach was critical in an urban area where there are numerous competing interests for remaining green space and where few other opportunities exist for large-scale wetland restoration. The project has required a steady effort employing numerous stakeholders, public participation, and volunteer site stewardship. Funded by the USACE-Chicago District in-lieu fee program for wetland mitigation and sponsored by Openlands, this project has exceeded regulatory performance standards to create long-lasting positive impacts for the community, preserve users, water quality and flood water retention, urban biodiversity, and wildlife usage, most notably by wetland birds. Ongoing work is focusing on site stewardship, ecosystem enhancement, and development of a model to quantify hydrologic changes resulting from the restoration. Specific challenges and successes throughout the project planning and implementation will be highlighted.

Wetland Case Studies II, Thursday, February 25, Bear Clan Ballroom, 11:40 am - 12:00 pm

Braden, Brandon, WDNR

Using LiDAR in wetland restoration and management

While not a new technology, LiDAR is a relatively unfamiliar and arguably underutilized method of data acquisition that can be extremely useful in natural resource management. LiDAR data are being used by WDNR to look for areas of wetland restoration potential as well as to manage existing wetlands along the lower Wolf River in an area known as the Lower Wolf River Bottomlands Natural Resources Area. WDNR is using this technology to look at changes in elevation, look for ditches, and discover other items of interest that may be useful when planning wetland-related activities. LiDAR is proving to be a valuable tool, but it currently is not available everywhere; availability will also be discussed.

Tools for wetland identification, restoration, and management, Wednesday, February 24, Iroquois Ballroom, 4:20 -4:40 pm

Church, James, La Salle University
Mandy Little, UW-Stout

Amphibian dynamics in forested ephemeral wetlands of Western Wisconsin

Ephemeral wetlands are known to be important breeding habitats for amphibians. Due to the relatively short duration of their saturation, these wetlands lack many predators of amphibians found in permanent wetlands. However the hydroperiod length is often unpredictable and amphibians adapted to these conditions must complete the larval period of their life cycles before the wetlands dry. While it is well known that amphibians can be abundant in these wetlands, seasonal variability in populations remains poorly understood. We present preliminary results of a study of amphibian populations in 55 wetlands in the Chippewa Moraine region of Wisconsin conducted over a three year period. We assessed amphibian abundance through standard frog-calling surveys in early spring and larval surveys in late spring and early summer. We related presence-absence and abundance of amphibian species to local environmental conditions including wetland area, ponding duration, water temperature, pH, canopy cover, and primary production of phytoplankton. Common amphibian species using these wetlands for breeding include the Wood Frog (*Lithobates sylvaticus*), Spring Peeper (*Pseudacris crucifer*), Chorus Frog (*Pseudacris triseriata*), and the Blue-Spotted Salamander (*Ambystoma laterale*). We also made note of the presence of Eastern Newts (*Notophthalmus viridescens*), Gray Tree frog (*Hyla versicolor*), and Green Frog (*Rana clamitans*) in these wetlands. Results presented here aid in the development of testable hypotheses regarding amphibian population structure as well as the importance of these wetlands in maintaining amphibian populations across the landscape.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Cooper, Matthew, Northland College
Donald Uzarski, Central Michigan University
Valerie Brady, University of Minnesota-Duluth

Developing a decision support tool for restoration and protection of Great Lakes coastal wetlands

Coastal wetlands represent a critical component of the Great Lakes ecosystem, though their areal extent and ecological functioning have both been significantly reduced throughout much of the Great Lakes basin. In response, large investments of public funds for restoration, protection, and enhancement are occurring and will likely occur well into the future. For these investments to achieve their intended goals and to ensure the highest possible return on investment, a data-driven decision-making framework is necessary to prioritize among potential projects. We are developing a web -based tool that will allow users to aggregate and visualize many diverse data types and use these data to prioritize wetlands for restoration, protection, and enhancement projects. Results from a USEPA-funded Great Lakes coastal wetland monitoring program serves as the data backbone of the system and provides information on ecosystem health, biotic community structure, and water quality. A prototype decision support tool is currently being developed for wetlands along the shore of western Lake Erie, through the Huron-Erie Corridor, and north through Saginaw Bay. After sufficient testing and refinement of the prototype, our goal is to expand the system to other regions in order to provide wetland managers and other decision-makers an additional tool for selecting among potential projects.

Watershed Approaches, Wednesday, February 24, Iroquois Ballroom, 11:20 - 11:40 am

Curran, Melissa, Stantec

The Ridges Sanctuary Orchid Conservation Project

Since 2012, Stantec has been leading a research initiative to develop procedures and methodology for successfully reintroducing several rare terrestrial orchid species at The Ridges Sanctuary, a 1,050 acre State Natural Area in the Door Peninsula eco‐region of northeastern Wisconsin. Stantec's main objectives are to gain a better understanding of the unique biological requirements of several rare orchid species by implementing trial outplantings and monitoring the success of these reintroduced populations. As a result of the complicated germination requirements of native orchid species, our methods for reintroductions require selective pollination and tissue culture laboratory techniques to germinate seedlings for outplanting. The general sequence of events includes: selective pollination, seed capsule collection, germination, outplanting to native habitat or nursery beds (for later outplanting), and then intensive monitoring to assess survivability. This first large outplanting event took place in spring 2015. The poster presentation will focus on the outplanting's methods, results, and lessons learned to aid other organizations seeking similar conservation objectives.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Day, Leslie, USACE

Everything you need to know about wetland banking and in-lieu fee programs

The 2008 mitigation rule nationally defines the general terms and premises behind providing compensatory mitigation. It distinguishes between the different methods of providing compensatory mitigation. This presentation will focus on in-lieu fee programs (ILFPs) and banks, discussing the types of work eligible for compensatory mitigation credit and agency preferences and the science behind them. The rule clearly identifies the roles and responsibilities of the Interagency Review Team during the review process for ILFPs and banks. This presentation provides an overview of the distinctions between ILFPs and banking, general information to consider when thinking about establishing a site, and the rationale behind having a formal review and approval process.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 9:50 - 10:10 am

Day, Leslie, USACE

In lieu fee programs and wetland banks: Similarities and differences in the review process

In 2008, the USACE and the USEPA issued a final rule regarding compensatory mitigation. The rule outlines a clear preference hierarchy between compensatory mitigation banks, in-lieu fee programs (ILFPs), and permittee-responsible mitigation for when compensatory mitigation is required. The rule also describes a four-phased review process for bank and ILFP development. While the overall review process for the establishment and modification of ILFPs and mitigation banks are the same, there are differences in the information required at each phase in the review process and in their instruments. This presentation will discuss how ILFPs and banks are similar and how they differ in terms of information requirements during the review process, review process for new and modified instruments, operation and implementation, preference hierarchy for use, the generation and use of credits, and reporting. It will also go over programmatic issues that we have encountered regarding bank genesis and how they were solved.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 11:00 - 11:20 am

Forsythe, Patrick, UW-Green Bay
Rachel Van Dam, UW-Green Bay
Solomon David, Shedd Aquarium

The importance of wetland habitat to Great Lakes migratory fish

Wetland habitat is critical to Great Lakes migratory fish, including northern pike, suckers, bowfin and shortnose gar. Unfortunately, extensive areas of nearshore, riparian, and wetland habitat have been lost in Green Bay, negatively affecting many migratory fishes that require these habitats for spawning, foraging, and nursery. Several groups have undertaken initiatives to restore critical wetland habitat in recent years. While some monitoring has been done to determine the role that restored habitats play in the life history of migratory fishes, inter-annual variation in usage and the reproductive success at restored sites is not yet well understood. The objective of this presentation is to review the diversity of fishes that utilize Green Bay wetland microhabitats and how monitoring data can help guide future restoration activities. Using recently collected data on northern pike as an example, we will compare indices of larval production and spawning site differences. We will discuss the onset of migration and show models that draw associations with wetland abiotic conditions. We will review locations that harbor high levels of reproductive activity and quantify the residency times of fish in wetlands at the time of spawning. We will also show data that suggest that wetlands with short travel distances, easy access to the Bay, moderate habitat area, and consistent water levels are critical for life history events including spawning and egg development. Finally, we will discuss the multispecies benefits of wetlands to other migratory fishes and how future assessments can improve wetland restoration designs.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 11:20 - 11:40 am

Galbraith, Betsy, USFWS
Nicole Van Helden, The Nature Conservancy

A framework for improving the health of Green Bay wetlands

The Lower Fox River begins at the north end of Lake Winnebago, where it begins its 40-mile course towards Green Bay, emptying into Lake Michigan. The Lower Fox River Basin is 641 square miles and part of the larger Green Bay watershed encompassing approximately 16,563 square miles. Lower Green Bay and the last seven miles of the Fox River are designated as an Area of Concern (AOC) due to multiple impairments. Wetlands and waterways within this system have been degraded by excessive phosphorus and sediment loading, contaminants, poor habitat, and invasive species. Impaired water quality also results in other system-wide impacts such as nuisance algae growth, oxygen depletion, turbidity, reduced submerged aquatic vegetation, and water clarity problems. Conservation partners and community stakeholders are working together to implement innovative projects to tackle these challenges. Wetland restoration and protection, water quality improvement projects, invasive species control, large-scale contaminant remediation, and community engagement offer solutions for improving wetlands. The recent formation of the Green Bay Conservation Partners group provides conservation practitioners with opportunities for information sharing, collaboration, and networking. A project to develop a Green Bay Landscape Conservation Design (LCD) was recently launched to strengthen, coordinate, and improve partner efforts within the watershed. These collective actions all contribute to the goal of restoring the health and vitality of a freshwater resource that is integral to our economy, culture, and way of life.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 10:40 - 11:00 am

Giese, Erin, Cofrin Center for Biodiversity, UW-Green Bay
Robert Howe, UW-Green Bay
Nicholas Walton, UW-Green Bay
Gerald Niemi, University of Minnesota-Duluth
Douglas C. Tozer, Bird Studies Canada
Willson B. Gaul, UW-Green Bay
Annie Bracey, University of Minnesota-Duluth
Jeremiah Shrovnal, Cofrin Center for Biodiversity

Assessing wetland health using breeding birds as indicators

Wetlands in the Laurentian Great Lakes region are affected by many environmental stressors that affect different organisms in different ways. We introduce an objective, quantitative Index of Ecological Condition (IEC), which uses the occurrences of sensitive species as indicators of ecosystem health. The relationship between species occurrences and environmental stressors are expressed by quantitative biotic response (BR) functions derived from field data. We estimated BR functions from field observations of breeding birds at coastal wetlands sampled during 2011-15 as part of the comprehensive, multi taxa Great Lakes Coastal Wetland Monitoring (CWM) project. We evaluated bird responses to three stressors: agricultural intensity, non-agricultural development, and wetland size. The IEC approach uses BR functions and newly collected data to estimate the most likely ecological condition (IEC), ranging from 0 (highly degraded) to 10 (minimally degraded). This method is flexible and can be applied to any ecosystem using any taxa. It can also be used as a Habitat Suitability Index for the USFWS's Habitat Evaluation Procedure for measuring wildlife habitat quality. The IEC approach has been applied successfully to inland lakes, northern forests, and freshwater wetlands. We are now exploring ways to improve the IEC method and its application to the protection and restoration of Great Lakes coastal wetlands. From 2016 to 2020, we will continue sampling birds and other taxa for the CWM project, collect more local wetland variables (e.g., % invasive plants), and sample across a wider gradient of wetland quality, which should improve BR functions and ultimately provide better estimates of wetland health.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Glenzinski, Brian, Ducks Unlimited
John Huff, WDNR
Dave Halfman , WDNR
Tammie Paoli, WDNR
Mike Mushinski, Brown County
Matt Kriese, Brown County

Restoring the west shore of Green Bay

This presentation examines recently completed or on-going restorations to help guide future actions along the west shore of Green Bay. Ducks Unlimited has joined with a wide variety of partners to restore the west shore of Green Bay. Each project has come with challenges, opportunities, and varying levels of success. The Green Bay west shore has a long history of wetland restoration and has seen an evolution of the concepts surrounding these restorations. Exploring restorations along the west shore provides examples for cross collaboration and considerations for future restorations in a landscape context. The Sensiba Unit of Green Bay West Shores Wildlife Area, Barkhausen Waterfowl Preserve, and Winegar Pond are excellent examples of projects with multifaceted objectives and outcomes that will be featured projects in this presentation.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 2:50 - 3:10 pm

Graham, Grace, Wisconsin Geological & Natural History Survey, UW Extension
Susan Swanson, Beloit College
Kenneth Bradbury, Wisconsin Geological & Natural History Survey
David Hart, Wisconsin Geological & Natural History Survey

A new statewide inventory of springs in Wisconsin

The Wisconsin Geological and Natural History Survey, UW-Extension, is conducting a new statewide inventory of springs. Although historical records of springs were compiled into a single database in 2007, this project is the first field effort to comprehensively document spring resources at the statewide level since the Wisconsin Conservation Department conducted surveys over 50 years ago. The new inventory consists of county-level surveys of springs with flow rates of 0.25cfs and higher, and semi-annual surveys of six reference springs selected from representative geological, hydrological, and ecological regions of Wisconsin. Progress for the first year was focused in southern, central, and western Wisconsin, where there is the greatest demand for new high-capacity wells. As of November 2015, detailed descriptions of 150 springs in 26 counties have been recorded. The new spring database contains information on location, flow rate, geologic setting, geomorphic setting, and water quality. The mean flow rate of surveyed springs is 0.96cfs; values range from 0.17cfs to 8.69cfs. Spring sites vary in levels of disturbance. Over 50% of the highly disturbed springs are located in areas of residential or agricultural land use, and over 80% of undisturbed to lightly disturbed springs are located in forests and wetlands. As regions of the state are surveyed, patterns in spring distribution and type are emerging. Studying these patterns should be helpful in understanding the geologic conditions controlling groundwater flow. This spring inventory will aid in evaluating the potential impacts of new high-capacity wells on Wisconsin water resources and provide a snapshot in time of the state of Wisconsin's springs.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Granberg, Jason, WDNR
Brock Woods, WDNR & UWEX

Using invasive species databases to guide wetland monitoring

Independent developments of online databases such as the Global Invasive Species Information Network (GISIN), Early Detection & Distribution Mapping System (EDDMapS), and Great Lakes Early Detection Network (GLEDN) have created a wealth of wetland invasive species (WIS) records. However, these types of records have not identified potential threats to wetlands in a spatially explicit sense. Current efforts by WDNR have combined agency records with external WIS records, creating regional lists indicating the relative abundance of WIS within a county and adjacent counties. This product will help identify which WIS will most likely occur within an area and will influence ecological restoration efforts. The list will direct education and outreach to citizen scientists and the public about invasives in their area using spatial data to show WIS colonization across the landscape. Species records will help prioritize sites for additional reconnaissance for early detection and rapid response control efforts. Finally, this invasive species database interacts with other models developed by WDNR including the Priority Areas for Invasive Species Management (PAISM) model. The PAISM model examines the ecological importance, ecosystem service values, and potential for invasive species spread for wetland and aquatic ecosystems throughout Wisconsin.

Wetland Assessment, Wednesday, February 24, Iroquois Ballroom, 2:10 - 2:30 pm

Granberg, Jason, WDNR
Brock Woods, WDNR & UWEX
Pat Trochlell, WDNR

***Glyceria maxima* identification & distribution**

Glyceria maxima, or Reed mannagrass, has been identified as an invasive species of concern in the Great Lakes and Mississippi River Interbasin Study (GLMRIS). WDNR is conducting initial reconnaissance for this species, mapping its location, and developing strategies for later treatment. However, the *Glyceria* genus has several species that share many diagnostic characteristics, making it difficult to identify native versus non-native *Glyceria.* This poster will discuss the various diagnostic characters to help identify *Glyceria maxima* and distinguish it from other native species. This poster will be especially useful for wetland practitioners who are working in the more populous areas of Southeastern Wisconsin.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Halverson, Dana, Alliant Energy/WI Power & Light Co.
Deb Frosch, Alliant Energy/WI Power & Light Co.

Wetlands associated with linear utility projects

This presentation will outline the steps a local utility took to assess habitat, delineate wetlands, and make decisions regarding mitigation, avoidance, installation methods, and permitting issues involved with installing an 8-inch gas main along a 13-mile route in Central Wisconsin. We will take you through the planning, construction, and restoration phases of the potential wetland impacts along the way. While complete wetland avoidance was not considered feasible, a number of steps were taken to minimize impacts. We will discuss construction and restoration challenges and conclude with lessons learned to streamline the process for future work.

Wetland Solutions, Wednesday, February 24, Bear Clan Ballroom, 11:00 - 11:20 am

Herrick, Brad, UW-Madison Arboretum
Elizabeth Buschert, UW-Madison Arboretum
James Doherty, Stanford Online High School
Erik Olson, Northland College

Differential persistence among native species planted in a stormwater retention pond

Native wetland species are often planted in and around stormwater treatment facilities to create or restore habitat, however few plantings are monitored thereafter. In 2009, a 1.6 ha (4 ac.) retention pond was constructed at the UW-Madison Arboretum to treat an average of forty-four million gallons of stormwater annually. This provided an opportunity to test the disturbance tolerance and competitive ability of eight native emergent macrophyte species. In the spring of 2010, ninety-six 6x1.5-meter plots within the pond's emergent zone were planted with either, 1, 3, or 6 species. Species richness and cover were subsequently recorded in the fall of 2010 and again in 2015. While native species richness increased from 1.8 per plot in 2010 to 2.2 per plot in 2015, native species richness also shifted over time as non-native *Typha sp.* rapidly colonized areas of shallow, open water. By 2015, *Typha sp.* had invaded all plots with a mean cover of 94%. However, with the exception of *Sparganium eurycarpum*, all planted native species were still present in 2015. *Pontederia cordata* and *Scirpus spp.* spread throughout the site, reaching frequencies of 92% and 82%, respectively, but with mean cover of just 12% and 7%, respectively. Although *Typha sp.* likely reduced the establishment and cover of planted native species, *Pontederia cordata* and *Scirpus spp.* performed the best relative to other planted species. These species are tolerant of turbid, nutrient-rich stormwater as well as provide habitat structure, food sources for wildlife, and visual aesthetics. They also appear able to co-exist or even compete with non-native *Typha sp.*, suggesting that they may be good options to increase native diversity in these constructed treatment ponds.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Hopfensperger, Kari, Northeast Wisconsin Land Trust

Tools for protecting Green Bay wetlands

Northeast Wisconsin Land Trust is a non-profit, member-supported land conservation organization that works with families in 12 counties to preserve their land for future generations. We have collaborated with The Nature Conservancy to identify high priority wetlands and shorelines along the west shore of Green Bay and are engaged in targeted outreach to private landowners about the importance of wetlands and options for their protection and restoration. This presentation will provide details about the land protection approaches we are using along the west shore of Green Bay in order to protect critical wetland resources. The Land Trust can create permanent conservation agreements with landowners, purchase land, or accept donations of land. Properties owned by Northeast Wisconsin Land Trust are usually open for public recreation and outdoor educational opportunities. It is important to the Land Trust to find a balance between wetland preservation and connecting people with nature. Northeast Wisconsin Land Trust also collaborates with Wisconsin Wetlands Association to offer materials and workshops for wetland landowners along the west shore of Green Bay.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 4:00 - 4:20 pm

Howe, Robert, UW-Green Bay
Amy Wolf, UW-Green Bay
Erin Giese, UW-Green Bay
Gerald Niemi, University of Minnesota-Duluth

What's so special about Green Bay wetlands?

More than 1000 coastal wetlands are connected to the Laurentian Great Lakes of the U.S. and Canada. These important habitats, however, are very unevenly distributed; some areas like portions of northern Lake Superior have almost no coastal wetlands, while others like Green Bay, Saginaw Bay, western Lake Superior, western Lake Erie, and eastern Lake Ontario have extensive wetlands. In most cases, the extents of these coastal wetlands fluctuate with lake levels, sometimes changing dramatically from year to year. In this presentation, we suggest that geographic and historical factors combine to make Green Bay coastal wetlands especially important in Lake Michigan and perhaps in the entire Great Lakes basin. We use results from three comprehensive studies of Great Lakes coastal wetlands between 2000 and 2015 to establish a context for assessing the significance of Green Bay wetlands and their biota. Given their strategic importance, losses of wetlands in the Green Bay coastal zone are especially tragic and, likewise, restoration efforts today are especially significant.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 11:00 -11:20 am

Ingebritsen, Jeff, Lynxnet
Luke Worsham, Five Rivers Services
Rusty Griffin, USFWS

USFWS National Wetlands Inventory mapping of five Wisconsin watersheds

The USFWS National Standards and Support Team (NSST), located in Madison, WI, administers and manages the National Wetlands Layer of the National Spatial Data Infrastructure. As part of a wetland mapping training exercise, five pilot Wisconsin watersheds representing a total of 340,000 acres were selected and mapped by NSST following the Federal Wetlands Mapping Standards and the Federal Wetland Classification System (Cowardin et al. 1979). These watersheds included the Lower Branch Manitowoc River near Manitowoc, Mill Creek near Stevens Point, and three watersheds comprising the greater Madison area: Upper Yahara, Lake Mendota, and Lake Monona. Wetland delineations were performed using 2013 color-infrared base imagery obtained from the publicly available National Agriculture Imagery Program (NAIP), supplemented by publicly available ancillary datasets, including hydric soils, topography, additional leaf-off orthophotography, and previous delineations by the Wisconsin Wetlands Inventory. Site visits were conducted to select areas for additional ground-truthing. Updated delineations in these five watersheds resulted in a total of 56,000 acres of mapped wetland and deepwater habitat. We will present a series of maps that detail the mapped project areas and provide breakdowns of classified wetland and deepwater areas. Following external and internal review and approval, these updated wetlands datasets will be incorporated into the National Wetlands Layer and served on the USFWS Wetlands Mapper.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Kamke, Kaira, UW-Stevens Point
Ethan Robers, UW-Stevens Point

Developing a baseline assessment undergraduate study for effects of a fire regime on invasive wetland flora

Wisconsin has lost nearly half of its original wetland environments, primarily for development and agriculture. This has led to a revival in recent years to mitigate and restore wetlands. A wetland located west of Stevens Point, Wisconsin, was converted to an agriculture field nearly a century ago and has recently been restored to a wetland environment. The Students for Wetland Awareness, Management and Protection (SWAMP) organization from UW-Stevens Point conducted a baseline assessment to evaluate the quality of the site and provide recommended actions that could improve the area. Parameters included a soil survey, hydrologic analysis, vegetation assessment, macroinvertebrate collection, and water chemistry analysis. Due to a high percentage of invasive wetland plants, the group determined that the best option of control is to implement a fire regime, which is anticipated to begin in spring of 2016.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Kamke, Kaira, UW-Stevens Point

Characterizations of aquatic macroinvertebrate communities in four Central Wisconsin wetlands

Macroinvertebrates are widely accepted as quality indicators of aquatic environments and are utilized in many studies to evaluate effects on ecosystem health. Macroinvertebrates have been used as indicators in stream riffle habitats, however no macroinvertebrate metric has been established for use as an indicator across all wetland types. A study was conducted on four different wetlands around the Stevens Point community in Central Wisconsin to compare environmental quality to sampled invertebrate species. Samples were taken at each site by sweeping a box net through shallow vegetated locations. The specimens were field picked and then identified to the lowest possible taxonomic level. A variety of comparative metrics were used to assess each wetland site. These findings, in combination with other preliminary research, can begin to establish an overall index to be used on multiple wetland types.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Kearns, Kelly, WDNR
Bernadette Williams, WDNR

Wisconsin's regulated wetland invasive plants

Since 2004, WDNR has been working with partners and stakeholders to create and revise the state's invasive species rule, NR40. This comprehensive rule regulates invasive plants, animals, and disease-causing organisms. The rule went into effect in 2009 and was revised in 2015. It is seen as a model rule by many other states. In developing the rule, the invasiveness of each species being considered for regulation was assessed based on known occurrences and impacts. Decisions regarding how to regulate each species took into account additional considerations, such as the ability of regulation to limit the spread and potential economic impacts of listing the species. This poster will present the wetland species regulated under NR40 and provide readers with information on what the regulation means and how the state is enforcing it.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Key, Ann, Wetlands and Waterways, LLC

Wetland mitigation bank site selection: Advising prospective buyers

Although mitigation banking is not a new concept in Wisconsin, many landowners are just beginning to hear the buzz. When landowners and prospective bankers inquire about mitigation banking, professionals in the industry can quickly help landowners evaluate their site as a potential mitigation bank. The process is complex but begins with the most important piece of the puzzle: selecting the proper site. Using a watershed-based approach is best for siting mitigation banks, although siting is often driven by availability and interest by landowners who realize their property may have potential as a mitigation site. Prospective bankers need to be able to quickly assess the viability of their property. Discussions with the landowner about the site history, whether or not the site has been drained by ditching or tiling, their trials of cropping the land, etc. provides valuable information. Review of historic aerial photos and available resources on the WDNR Surface Water Data Viewer can provide hints of potential restorable wetlands. If the site appears viable as a mitigation bank upon initial review, further discussions can then occur with WDNR mitigation bank coordinator regarding the need for sites within a specific watershed. The process is not simple, but we can help prospective bankers better understand the process, determine if their land is a good fit, and ultimately join with them to help restore Wisconsin's wetlands.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 10:10 - 10:30 am

Kidd, Gregory, USDA-NRCS

The Wetlands Reserve Easement Program in Wisconsin: Building on a legacy

The 2014 Farm Bill combined USDA easement programs under one umbrella: the Agricultural Conservation Easement Program. The two components are the Agricultural Land Easements (ALE) (formally the Farm and Ranch Lands Protection Program) and Wetland Reserve Easements (WRE) (formally the Wetlands Reserve Program (WRP)). WRP began in 1992 and has restored over 50,000 acres of wetlands and associated uplands. WRE/WRP easement accomplishments, current and future funding, opportunities, and highlights will be discussed.

Wetlands and People I, Thursday, February 25, Iroquois Ballroom, 9:30 - 9:50 am

Kies, Kim, UW Environmental Resources Center
Patrick Robinson, UW Environmental Resources Center
Erin O'Brien, Wisconsin Wetlands Association
Anna Haines, UW Center for Land Use Education
Rebecca Roberts, UW Center for Land Use Education
Jenna Klink, UW Environmental Resources Center

Assessing Wisconsin Extension educators' potential roles in community level wetland issues

An EPA-funded collaboration including the Center for Land Use Education at UW-Stevens Point, the Wisconsin Wetlands Association, and UW Environmental Resources Center came together to pilot and evaluate a statewide land use and wetlands training program aimed at supporting local decision-making processes about wetlands. One of the main goals was to understand the potential roles of UWEX educators relative to wetlands issues and related outreach programming across the state. To achieve this goal, the team solicited feedback from 338 UWEX educators via an assessment survey in March, 2015. The assessment had three objectives: 1) to better understand how wetlands education fits into UWEX outreach; 2) to define the perceived barriers to wetlands education; and 3) to help the team formulate next steps to support local decision-making processes about wetlands. This presentation will explore the results and potential change with the team's next steps to help build capacity to deliver and/or support wetland outreach and projects.

Wetlands and People I, Thursday, February 25, Iroquois Ballroom, 9:50 - 10:10 am

Kupsky, Brianna, UW-Green Bay
Patrick Robinson, UWEX & UW-Green Bay
Brian Glenzinski, Ducks Unlimited
H.J. Harris, UW-Green Bay
Mathew E. Dornbush, UW-Green Bay

Identifying establishment and restoration potential of *Vallisneria americana* in the Lower Bay of Green Bay, WI

Aquatic eutrophication resulting from terrestrial nutrient and sediment inputs is a primary driver of habitat degradation, altering species compositions and biogeochemical function of nearshore aquatic ecosystems. Eutrophication often results in sudden changes from macrophyte to phytoplankton dominance in aquatic plant communities. However, subsequent reductions in nutrient and sediment loading does not result in predictable reversals back to macrophyte dominance, leading to suggestions that these systems now exist in an alternate turbid water stable state. We evaluated the potential for the restoration of the aquatic macrophyte *Vallisneria americana* (wild celery) in the Lower Bay of Green Bay by altering restoration location (protected pockets, exposed bays, flowing channels), restoration size (9m, 36m), and the effect of interspecific facilitation (with or without *Schoenoplectus acutus* or hardstem bulrush). To account for differences in water clarity, we used water depth (shallow, medium, deep) as a covariate in our models. Preliminary results after the first field season found no significant effect of restoration size or interspecific facilitation, though strong effects were found for restoration location and water depth ($p < 0.05$ for restoration location, water depth, restoration location by water depth). Our results provide insight into the factors limiting the establishment of *Vallisneria americana* in altered systems, suggesting a greater role for restoration location and associated nuanced responses to depth than were previously recognized.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Larscheid, Charles, Brown County Land and Water Conservation Department

Green Bay West Shore Northern Pike Habitat Restoration Project

The Northern Pike (*Esox lucius*) is Wisconsin's second largest native predator fish and is an important part of the Green Bay ecosystem and fish community. Green Bay's Northern Pike migrate up streams and ditches in early spring to spawn in vegetated wetlands. But more than 70% of wetland habitat along the west shore of Green Bay has been lost, including many of the areas historically used by Northern Pike for spawning. In addition to losing suitable spawning habitat, fish encounter passage obstacles when leaving Green Bay to find spawning marshes or when their young of the year fry migrate back to Green Bay. With federal and local funding, Brown County developed a Northern Pike Habitat Restoration Program. It has selected wetland areas along intermittent and perennial streams on Green Bay's west shore that have high potential for Northern Pike habitat. The County then removed fish migration impediments, established riparian buffers, restored or enhanced the quality of wetlands, and reconnected wetlands to waterways. We found that Northern Pike prefer vegetated wetlands that have at least a slight flow of non-silty water but are shallow enough to warm from the sun. Successful restored sites are Brown County's Mercier Project on Brown Rd and the Revolinski Project on Veteran's Ave, both in Suamico. We also learned that water levels in the spawning marshes must be maintained to prevent egg desiccation. In 2014, we refocused our efforts to locate spawning corridors Northern Pike are using in Fox River tributaries to seek out restorable wetlands. We used Fyke nets to locate adult fish in urban streams, especially Willow and Bower Creeks. No fry were observed so we will determine if impediments or the lack of wetlands are the cause.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 2:30 - 2:50 pm

Little, Amanda, UW-Stout
James Church, LaSalle University

Floristic quality and wetland indicator status considerations in northern Wisconsin ephemeral ponds

Northern Wisconsin is rich in ephemeral ponds (EPs). These ponds are critical habitat for amphibians and unique macroinvertebrates, but little is known about their vegetation. Knowing the range of floristic quality in both natural and disturbed conditions is important for evaluating EPs. Since ephemeral ponds have such a wide range of hydrologic conditions compared to permanent wetlands, lower floristic quality might be expected. We investigated several measures of floristic quality, comparing 28 EPs to 29 permanent wetlands in northwestern Wisconsin's Chippewa Moraine. We also suspected that hydrophytic vegetation indicator status in EPs may be toward the drier end of the spectrum. We asked whether the vegetation in EPs was "wet" enough to be classified as hydrophytic and compared it to a variety of other wetland types in the area. EP vegetation floristic quality (wCofC = 5.18, SE = 0.22) in this relatively undisturbed study area was lower than that of more permanent palustrine sedge meadows (wCofC = 6.05, SE = 0.18), but significantly higher than in lacustrine fringe wetlands (wCofC = 3.35, SE = 0.39). Mean vegetation indicator status of all plots in ephemeral ponds (2.13, SE = 0.11) was significantly higher than both sedge meadows and lacustrine fringe wetlands, but was still below the USACE threshold of 3.0. However, two of our 28 EPs did have a mean indicator status greater than 3.0. Additional results related to proportion of plots achieving hydrophytic vegetation status will be shared. Preliminary results indicate that the floristic quality of EPs can be quite high and that at least portions of each pond have sufficient hydrophytic vegetation to meet the delineation threshold.

Applications of Wetland Science in Policy & Regulations, Wednesday, February 24, Bear Clan Ballroom, 2:50 -3:10 pm

Lubner, Victoria, The Nature Conservancy

The role of wetlands in improving water quality: A review of current literature

In addition to being important for biodiversity, flood protection, and habitat for rare and endangered species, wetlands are known as the kidneys of ecosystems, filtering unwanted nutrients and other contaminants from waterways. This project investigates the effectiveness of wetlands to reduce nitrogen and phosphorus from surface and subsurface runoff. Denitrification is the main process by which nitrate is removed from a wetland. The three dominant mechanisms that retain phosphorus in a wetland are 1) uptake by vegetation, 2) adsorption to soil, and 3) the formation of new soils through sedimentation. Nutrient retention in a wetland is dependent on numerous factors including the presence of organic carbon, temperature, hydraulic loading, residence time, rate of deposition, chemical adsorption and precipitation, size of wetland compared to watershed, and type of vegetation. A project undertaken by The Nature Conservancy seeks to quantify the nutrient reduction potential of wetlands based on different wetland characteristics through reviewing current literature and applying lessons from research to local conservation efforts, including a project underway in the Lower Fox watershed. Results from this investigation will be used to determine how wetlands could be credited in water and nutrient management policies and programs while also comparing the potential nutrient reduction of wetlands to other Best Management Practices.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 11:40 am - 12:00 pm

Magyera, Kyle, Wisconsin Wetlands Association

Putting wetlands to work for your community: A model wetland conservation ordinance

The amount, location, and condition of local wetlands affect the public health, safety, and welfare of virtually every Wisconsin community. While state and federal laws discourage wetland development, wetland regulatory decisions often occur on a case-by-case basis and without adequate consideration of local plans or priorities. Through planning, zoning, and conservation, local governments have many opportunities to improve the wetland landscape to meet local needs, but they have not always had the tools or training to develop and implement wetland policies or priorities. To help county, tribal, and municipal governments exercise more control over activities that can destroy local wetlands and alter wetland hydrology and habitat, the Wisconsin Wetlands Association (WWA) has developed and released a model Wetland Conservation Ordinance (WCO). The talk will explain the benefits of enacting a WCO and describe how WWA is working to support locally-led wetland protection efforts.

Watershed Approaches, Wednesday, February 24, Iroquois Ballroom, 11:40 am - 12:00 pm

Marek, Mike, Marek Landscaping, LLC

Wetland restoration in Milwaukee's Menomonee Valley: Lessons learned

For the Menomonee Valley Industrial Center & Stormwater Infiltration Park, in Milwaukee, WI, Marek Landscaping, LLC provided wetland restoration services that included plant community design, installation, and maintenance plan development. The goal of the project, completed in 2007, was to develop a comprehensive infiltration system to treat stormwater coming from the surrounding industrial properties. The system flows into a series of constructed wetlands before entering the Menomonee River. Understanding of site hydrology, site climate conditions, and soils as well as experience at other highly urbanized sites informed the species lists and method for the wetland restoration work. The core strategy was five years of preventative vegetation maintenance and monitoring. Minimal maintenance has been done since the contracted maintenance period ended three years ago. Despite the lack of formal maintenance, the strength of the plant communities has held in most areas. The lessons learned: stormwater-driven wetlands are particularly challenging from a design perspective. Differences between expected and actual hydrological regimes are common and can significantly impact species recruitment. Additionally, the difference between wet and dry years is magnified in stormwater-driven wetlands and creates an environment where many nonnative plants can thrive. Partners for this project: City of Milwaukee Redevelopment Authority, Menomonee Valley Partners, Wenk Associates, and Milwaukee Transportation Partners. The site has been nationally recognized for urban revitalization, green infrastructure, and brownfield development.

Wetland Case Studies I, Thursday, February 25, Bear Clan Ballroom, 9:30 - 9:50 am

Marti, Aaron, WDNR
Elizabeth Haber, Utrecht University
Thomas Bernthal, WDNR

The 2011-2012 Wisconsin Intensification Study: Analyses of wetland condition in the Lake Michigan basin

The 2011 EPA National Wetland Condition Assessment (NWCA) marked the first survey of wetland condition across the US and encompassed a wide range of physical, chemical, and biological variables for ecological assessment. In addition to sampling for the NWCA, WDNR received further EPA support to complete a local condition assessment of Lake Michigan basin wetlands throughout eastern Wisconsin, otherwise known as the 2011 Wisconsin Intensification Study. Using NWCA methods, WDNR sampled soil, water, plants, and algae and recorded detailed observations of hydrology and potential ecological stressors at 50 sites in the Lake Michigan basin. In addition to briefly recapping and clarifying preliminary results provided at the 2015 Wisconsin Wetlands Association Conference, this presentation will highlight recent results from analyses of soil, plant community, and diatom community data. Results will elucidate the current ecological state of wetlands in the Lake Michigan basin and provide insight for future wetland research, monitoring, and assessment efforts in Wisconsin.

Wetland Assessment, Wednesday, February 24, Iroquois Ballroom, 1:50 -2:10 pm

Matrise, Matt, WDNR

The infrastructure behind watershed-based decisions of an in lieu fee program

The Wisconsin Wetland Conservation Trust in lieu fee program has generated significant funding for the preservation, enhancement, and restoration of wetlands in its first year of operation. How will the program utilize this generated revenue to strategically provide lost wetland functions? Learn how the composition of a Compensation Planning Framework prepared through a watershed lens guides the where, what, and how projects are prioritized to fulfill the program's mitigation obligations. Find out how projects will be monitored to ensure they meet performance standards in order to provide wetland functions. Through the analysis of Potentially Restorable Wetlands and historical wetland context, the program will seek sustainable projects to chip away at the replacement of historically lost wetlands. Hear how the program is positioning itself to dive deeper into unveiling watershed needs and identifying the project areas best suited to provide them. Discover how this new program is structured to take on a new, yet familiar, perspective on wetland mitigation to see where it overlaps and diverges from other mitigation methods.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 11:40 am - 12:00 pm

McDavit, Michael, USEPA
Gregg Serenbetz, USEPA
Chris Faulkner, USEPA

The 2011 National Wetland Condition Assessment: Breaking new ground on the quality of the nation's wetlands

The National Wetland Condition Assessment (NWCA) 2011 was designed to assess 1,179 randomly selected wetland sites found within four distinct eco-regions (West, Coastal Plains, Eastern Mountains and Upper Midwest, and Interior Plains) across the nation. More than 50 crews sampled vegetation, soils, algae, water chemistry, and potential stressors across highly variable wetland conditions using standardized field protocols. A Biological Condition rating of poor, fair, or good was assigned to each site based on a Vegetation Multi-metric Index. Several physical, chemical and biological stressors were measured within each site and also within a 100-meter buffer area around the site. NWCA 2011 found that, nationally, 48% of the wetland area is in good condition, 20% is in fair condition, and the remaining 32% of the area is in poor condition. Of the 4 major ecoregions, the West has the lowest percentage of wetland area, 21%, in good condition. The Coastal Plains, Eastern Mountains and Upper Midwest, and Interior Plains have a range of 44% to 52% wetland area in good condition. The NWCA 2011 indicates that wetlands with high levels of vegetation removal and surface hardening stress within the assessment area and buffer area are about twice as likely to have poor biological condition as those with low or moderate levels of these stressors. Further analysis of attributable risk suggests a possible 20% reduction in wetland area with poor biological condition if the stressor level changed from high to moderate or low. The draft NWCA 2011 report provides information about several wide-spread stressors influencing wetland condition and potential improvements in condition that might be seen nationally by reducing these stressors.

Wetland Assessment, Wednesday, February 24, Iroquois Ballroom, 1:30 - 1:50 pm

McGinley, Paul, UW-Stevens Point

A hydrodynamic framework to evaluate the importance of stream corridor topography and wetlands

Understanding the movement of water into and within stream corridors is fundamental to understanding how land management change improves or degrades the provision of ecosystem services. This research is examining the development of a hydrodynamic framework to evaluate how wetlands influence spatial and temporal variations in stream flow and solute concentrations. The research combines short time-step watershed modeling linked to a hydrodynamic stream model. This poster will provide background on the approach, modeling tools explored, and field measurements of flood peak movement and stream concentrations that are being used to inform the model development.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

McIntyre, Susan, Illinois Natural History Survey
Paul Marcum, Illinois Natural History Survey

Succession and colonization on a roadside dolomite prairie restoration project and comparison to three remnant sites

As part of the federal mandate to protect water quality, the Illinois Department of Transportation is implementing a unique habitat restoration project in northern Illinois. The restoration site is two interstate interchanges underlain by dolomite, a calcareous bedrock that supports unique natural communities and rare taxa. The site has large areas of bare rock with excavated swales and is surrounded by buffers of original soil seeded with prairie grasses. Remnant dolomite prairies at the neighboring Midewin National Tallgrass Prairie and Des Plaines Wildlife Conservation Area may provide a natural seed source. Some additional planting and invasive species management may also occur. The IDOT restoration provides an opportunity to study the processes of colonization and plant community development of recreated dolomite prairie communities. Using vegetation sampling transects within different hydrologic gradients on the site, we will compare the site to neighboring remnant sites and monitor changes in vegetation composition as the restoration site develops over its first three years. Initial surveys found 227 vascular plant species at the restoration site, of which 60% were native. Many native species were not planted, indicating that they may have been present in the seedbank. 71 species occurred in all four sites, and 59 species were unique to the restoration site. Dominant species were summer annual grasses in the uplands and cattails, *Phragmites*, and halophytes in the swales. Bare rock areas were colonized by algal mats, *Phragmites* runners, and weedy non-natives in the vertical joints of the dolomite. Future surveys will record how these early colonizers influence vegetative succession.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Miller, Nick, The Nature Conservancy
Thomas Bernthal, WDNR
Matt Matrise, WDNR
Joanne Kline, Conservation Strategies Group
John Wagner, The Nature Conservancy
Christopher Smith, WDNR
Matthew Axler, WDNR
Michele Kille, The Nature Conservancy

The Watershed Approach: A statewide decision support tool for restoring and protecting wetland services

Wetlands play key roles in maintaining biodiversity and ecological integrity, and they provide an array of services, functioning as natural infrastructure to support people and communities. Because wetlands multi-task so well, their preservation and restoration is relevant to a diversity of stakeholders—far beyond those who typically invest in wetland conservation. WDNR and The Nature Conservancy are working together to create an ecosystem service-based decision support tool for all Wisconsin watersheds. In addition to assessing service needs within watersheds, the project prioritizes potentially restorable and existing wetlands based on their relative potential to meet those needs. While this tool is being developed to support wetland mitigation siting decisions, the intent is for it to also fuel voluntary wetland conservation efforts. Intended users range from municipalities interested in flood abatement to cities aiming to improve water quality to outdoor enthusiasts conserving fish and wildlife habitat. Through the lens of ecosystem services, we aim to focus the collective efforts of disparate groups on the top tier of opportunities within watersheds, and ultimately to broaden the constituency for wetland conservation. This project is based on analyses of spatial data in a GIS and is built on an array of previous pilot efforts. Field work is being conducted in three watersheds (Milwaukee River, Amnicon/Brule, and Lower Trempealeau) to validate and improve results. Ecosystem services assessed include: flood abatement, water quality (sediment capture, phosphorus reduction, and nitrate removal), shoreline protection, carbon storage, floristic quality, baseflow support, fish and aquatic habitat, and wildlife habitat.

Watershed Approaches, Wednesday, February 24, Iroquois Ballroom, 10:40 - 11:00 am

Moen, Shawn, UW-Stout
Amanda Little, UW-Stout
James Church, LaSalle University

Effects of environment, dispersal, and competition on two *Bidens* species in ephemeral pond communities

Due to their fluctuating water levels, ephemeral ponds can be dominated by annual species. Determining the relative influence of environmental conditions, seed dispersal, and interspecific competition on the abundance of the annual species *Bidens frondosa* and *Bidens connata* is important because it allows us to gain a better understanding of ephemeral pond metacommunities (communities linked to each other by dispersal). We determined which environmental variables affected *B. frondosa* and *B. connata* abundance in 40 ephemeral ponds in western Wisconsin. In order to determine which environmental variables affect *B. frondosa* and *B. connata* abundance, we collected and evaluated a broad suite of environmental variables. *B. connata* was found in wetlands with significantly higher peat depths, perhaps because peat provides a better seed bed. Both *B. frondosa* and *B. connata* preferred wetlands with significantly lower seasonal water depth ranges, because large fluctuations in water depth may swamp the plants. Finally, *B. frondosa* alone was found in wetlands with higher chlorophyll-a, an indication of higher light levels. Sites with neither species tended to have high phosphorus and specific conductivity levels due to clay substrates. We found little evidence for environmentally-mediated competition. Sites that had both species in them were not significantly different than sites with one species. We are testing hypotheses about dispersal and competition in these two species in a field experiment in 2016. Preliminary results suggest that the two *Bidens* species are either environmentally or dispersal-limited, but that competition does not play a large role.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Nedland, Tom, WDNR

A proposed set of landform descriptors for wetland delineation purposes

In Wisconsin, the jurisdictional limits for implementing state and federal wetland regulations are determined through use of the three parameter approach described in the 1987 USACE Wetlands Delineation Manual and applicable regional supplements. Specifically, when an area is dominated by hydrophytes, has hydric soils, and supports sufficient wetland hydrology indicators, it fulfills the three parameter approach and is subject to state and federal wetland regulations. Fulfillment of all three wetland parameters tends to occur on specific landforms. Having a knowledge of the landforms that typically support all three wetland parameters is one of the most important skills for efficiently and accurately delineating wetlands. A standardized set of landform descriptors for wetland delineation purposes has not been developed. The lack of a standard set of landform descriptors for wetland delineation purposes has resulted in the use of ambiguous terms that are not beneficial to wetland delineators or the reviewing agencies, and often leads to the misapplication of principals fundamental to the 1987 USACE Wetlands Delineation Manual and applicable regional supplements. This presentation suggests a proposed set of landform descriptors that the author believes will result in a shared understanding across practitioners and regulators that will result in a better understanding of how topographic and landform changes can be used to efficiently and accurately aid in wetland delineation.

Applications of Wetland Science in Policy & Regulations, Wednesday, February 24, Bear Clan Ballroom, 1:50 - 2:10 pm

Nieset, Julie, Illinois Natural History Survey
Brian Wilm, Illinois Natural History Survey
Dennis Skultety, Illinois Natural History Survey
Laura Sass, Illinois Natural History Survey

Wetland delineation and monitoring in Illinois: A compilation of 28 years of data…and counting

The Illinois Natural History Survey Wetland Science Program (WSP) assists the Illinois Department of Transportation in identifying wetlands throughout the state. The WSP staff complete wetland delineations, conduct mitigation monitoring studies, and perform plant surveys. Due to the long-term nature of our program, we realized that, in order to fully utilize our data, we needed to create a database of our findings. We have recently updated field-collected data from 1987 to 2015 in a wetland delineation database and are close to having a separate mitigation monitoring database updated. We have collectively investigated over 18,000 potential wetlands sites and delineated over 12,000 wetland sites. We have over 20,000 data points that include information secured for compliance with state and federal wetland regulations, site community characteristics, floristic quality information, plant life history characteristics, and other botanical metrics. The database interface can sort and summarize field-collected data and link these data to geospatial data. While some of our data have previously been used in various research studies, we are starting to use our data to look at temporal changes in Illinois wetland plant communities. Currently, we are focusing on exotic species, reed canarygrass (*Phalaris arundinacea*) in particular. In addition to its changing prevalence over time, we are looking at potential impacts on plant community composition, specifically which associated plant species may be experiencing decreased abundance. We anticipate that utilizing this dataset will allow us to better understand changes in wetland plant population dynamics and community structure in Midwestern wetlands.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Noll, Christopher, WDNR
Calvin Lawrence, WDNR
Lois Simon, WDNR
Tom Bernthal, WDNR

Status of the Wisconsin Wetlands Inventory and use for locating specific wetland types for vegetation surveys

This presentation will provide an update on recent progress to complete the current version of the Wisconsin Wetlands Inventory (WWI) and on the availability of the WWI. We will provide a brief tutorial on data interpretation with a focus on breaking down the classification scheme, helping users make sense of the codes, and connecting the most common codes with their real-world community types. The presentation will also cover examples of how the WWI can be used to locate target wetland types in the field, including a discussion of the strengths and limitations of the wetland inventory and of additional datasets that may improve the likelihood of finding what you're looking for.

Tools for wetland identification, restoration, and management, Wednesday, February 24, Iroquois Ballroom, 4:00 - 4:20 pm

Petrella, Jason, L.H. Barkhausen Waterfowl Preserve

Connecting the public to wetlands

L.H. Barkhausen Waterfowl Preserve is an excellent example of working to accomplish Wisconsin Wetlands Association's mission, having a strong history of wetland preservation, management, and education. Located on the west shore of Green Bay, the Preserve boasts 920 acres of land, including several large water impoundments and marshes that are managed for waterfowl and fish spawning habitat. Outdoor education programs have been offered since the 1980s and play an important role in educating students and the public on a wide variety of topics. With these programs, our goal isn't just to educate but also to help create lasting memories for visitors and to help these people develop a personal connection to wetlands that they will take home with them. By doing this, we can help current and future generations see the value and importance of wetland areas and potentially play important roles in their preservation, management, and education.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 4:20 - 4:40 pm

Pfeiffer, Joseph, KCI Technologies Inc.

Engineered ecosystems: A cyborg approach to littoral wetland restoration at Grand Lake St. Marys

Grand Lake St. Marys (GLSM) is a 21-square-mile lake supported by a 52-square mile watershed in northwestern OH that historically supported 2,500 acres of littoral fringe wetlands. The lake has felt the drastic cumulative effects of nutrient loading from the contributing watersheds, creating hypertrophic conditions that contributed to the loss of the entire littoral wetland system by 1973. Engineered ecosystems were established to target water quality degradation which was identified as the primary limiting factor to the restoration of the littoral wetland system. These systems remove nutrients via a series of interlinked engineered, bio-technical, and natural treatment systems, improving water clarity and reducing algal blooms. Within one year of implementation, natural re-establishment of littoral vegetation in 65% of the embayment and constructed littoral wetland system provided direct evidence of the effectiveness of this approach. The improvement in water quality provided the conditions needed for natural regeneration of littoral wetlands. Continued expansion of the littoral wetland system beyond the influence of the engineered system has been documented.

Wetland Case Studies I, Thursday, February 25, Bear Clan Ballroom, 9:50 - 10:10 am

Pfost, Mark, USFWS
John Field, USDA-NRCS

Persistence & partnership benefit wetland for private and public neighbors

Sometimes the way to restore a wetland is to wait, since a wetland that cannot be restored today may be restored tomorrow. The USDA-NRCS had been interested in restoring land owned by John Duwe since 2008, but a project had not come together. In 2013, NRCS staff contacted the Partners for Fish & Wildlife biologist (Partners) at Necedah National Wildlife Refuge, as the Duwe property abuts the southwest corner of the Refuge. Coordination between Duwe, NRCS, Partners, and the Refuge resulted in a multi-faceted restoration project. A shared ditch along the Duwe-Refuge property line had blown a hole through a berm, allowing water to escape from wetlands on both the Duwe property and the Refuge. Refuge staff and volunteers, using Refuge equipment, rebuilt the berm, extending it on to the Refuge and connecting it with another berm. Two ditches were plugged using spoils from multiple scrapes. Other areas were improved to facilitate future management activities. A water control structure, incorporated into the berm on Refuge property, allows Refuge staff to manipulate water levels to benefit habitat on both the Duwe property and the Refuge. Before construction, the site was dominated by reed canary grass (*Phalaris arundinacea*). Construction activities removed vegetation from project areas. We planted eleven wetland species, including cool and warm season grasses and forbs, to compete with reed canary grass. Following project completion, NRCS protected the site in perpetuity through the Wetland Reserve Program, which in turn protects the Refuge boundary from future development.

Wetland Case Studies I, Thursday, February 25, Bear Clan Ballroom, 10:10 - 10:30 am

Pranckus, Mark, Cardno

Wild rice restoration planning in the St. Louis River Estuary

Wild rice (*Zizania palustris*) was historically abundant in the St. Louis River estuary and was an important cultural resource for tribal members and local residents as well as an ecological resource for fish and wildlife populations. Over the past 50 to 125 years, wild rice stands have been reduced to a few remnant stands. As water quality in the estuary has improved over the past 30 years, wild rice has not rebounded, indicating that additional actions may be required to restore wild rice. The Minnesota DNR and partners completed an implementation plan for wild rice restoration in the estuary. The goal is to restore at least 275 acres of wild rice over the next 10 years. A geospatial model was developed using existing data sets available for the estuary along with field data collected in 2014 to show where restoration could occur. Site level information such as water depth, substrate composition, and existing plant community were used to classify an area's restoration potential and provide information on the necessary restoration actions. The implementation plan provides details on site preparation, seeding, exclosures to limit herbivory, and permitting requirements based on activities associated with restoration. Currently, partners are implementing the plan and focusing on high potential areas using a combination of seeding and herbivore exclosures. Long term wild rice restoration success will also depend on partnerships in the estuary to implement an adaptive management program and incorporate knowledge gained into improving restoration methods and management.

Wetland Case Studies II, Thursday, February 25, Bear Clan Ballroom, 11:00 - 11:20 am

Reif, Roberta, UW-Green Bay

Assessment of *Phragmites australis* treatment at Point au Sable Natural Area using aerial imagery

This assessment of Point au Sable Natural Area of Green Bay, WI uses aerial imagery to compare management techniques used for the removal of the invasive *Phragmites australis* since 2012. *Phragmites* colonization has rapidly become a severe problem for the wetlands of Wisconsin. Because of its aggressiveness, it can quickly choke out native plants crucial for wetland functions. Point au Sable is no stranger to the takeover of this invasive species. Until around 2012, no management strategies had been put in place to reduce the spread of *Phragmites*. It was then that UW-Green Bay began making initial steps towards managing the invasive reed grass. There are many different removal strategies for the invasive *Phragmites*. This study compares the effectiveness of treatments such as herbicide applications, burning, mowing, and flooding by looking at area covered in each treatment. The effectiveness will be analyzed through a Normalized Difference Vegetation Index analysis. This assessment covers the work done from 2012 to 2015.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Robinson, Patrick, UWEX / UW-Green Bay
Matt Dornbush, UW-Green Bay
Tim Flood
Patrick Forsythe, UW-Green Bay
Brian Glenzinkski, Ducks Unlimited
Mike Grimm, The Nature Conservancy
Bud Harris, UW-Green Bay
Brie Kupsky, UW-Green Bay

Opportunities for littoral wetland restoration within the wave shadow of the Cat Island barrier

Barrier islands can be important to sustaining littoral wetland communities in lacustrine systems. The islands can shelter protected wetlands from high-energy storm impacts and ice damage, and also reduce wave-induced sediment resuspension. The Cat Island barrier islands provided these functions within the lower Green Bay system for a period lasting over 125 years. Loss of the Cat Island barrier islands in the early 1970s contributed to a substantial reduction in the extensive littoral wetland communities that existed on the landward side of the islands. The 2012 construction of a four -kilometer wave barrier within the footprint of the lost barrier islands is intended to protect 495 hectares of aquatic habitat occurring leeward of the barrier and to support re-establishment of littoral wetlands. This presentation will summarize results from our research and management efforts from 2013 to present related to understanding the potential for littoral wetland restoration behind the constructed wave barrier. Findings from our research indicate that aquatic vegetation abundance in the area is currently very low and that the area is likely propagule-limited. We also found that the barrier increased survivability of transplanted emergent and submergent vegetation. Current research is looking at the potential to introduce and/or expand wild rice, wild celery, and hard-stem bulrush within the lower bay. In addition, we are investigating the effect of plot size and species assemblage on restoration potential. Promising results to date include germination of wild rice, which represents the first time wild rice has grown within the lower bay in over 70 years.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 1:50 - 2:10 pm

Robson, Julia, Milwaukee County Department of Parks, Recreation & Culture
Brian Russart, Milwaukee County Department of Parks, Recreation & Culture

Implementing a citizen-based wetland monitoring program in the Milwaukee County Park System

From 2008-2011, the Milwaukee County Department of Parks, Recreation and Culture's (DPRC) Natural Areas Program worked to verify the presence of over 430 ephemeral wetland ecosystems within the Park System's 10,000 acres of natural areas. These temporary wetlands serve as crucial breeding habitat for various species of unique, and often rare, wetland wildlife including salamanders, frogs, and primary burrowing crayfish. With limited staff time and resources, the DPRC employed citizen -science in order to gain a better understanding of what wildlife species were utilizing these ephemeral wetlands. In 2014, the DPRC created a citizen-based wetland monitoring program that trained over 40 volunteers to use standardized survey protocols for amphibian egg mass surveys and aquatic funnel trapping to monitor wetlands within the Park System. Their efforts resulted in the discovery of several rare amphibian populations as well as one of the rarest crayfish in the state of Wisconsin. Join us for a discussion on how Milwaukee County Park's award-winning Natural Areas Program utilized citizen-science to monitor wetland wildlife. Learn more about our unique findings and how these valuable data will be used to guide current and future habitat management decisions.

Wetlands and People I, Thursday, February 25, Iroquois Ballroom, 10:10 - 10:30 am

Salas, Dan, Cardno
Patricia Heglund, USFWS
Mark Pranckus, Cardno
Kathy Carlisle, USFWS

Priority refuge resources of concern as a bottom-up approach to surrogate species selection

Over the past few years, the USFWS, working through the Landscape Conservation Cooperatives (LCC), has developed lists of surrogate species for conservation efforts within their geographic coverage, including wetlands and riparian habitats. Surrogate species are intended to improve effectiveness of landscape conservation design and strategic habitat conservation. The Eastern Tallgrass Prairie Big Rivers LCC selected 21 surrogate species. The Upper Midwest Great Lakes LCC selected a list of 36 species. For each geography, a suite of species for each broad habitat type (forests, wetlands, rivers) was selected to represent components within each system with similar threats and limiting factors. In a similar manner, refuges managed as part of the National Wildlife Refuge System are required to identify and select priority resources of concern to act as focal (or surrogate) species when planning habitat management. Selection of refuge-scale priority resources of concern mirrors aspects of the surrogate species selection processes. Because of the similarity in approaches being conducted at different scales, we were interested to see if the results of each selection mirrored or differed from each other (e.g. regional "top-down" approach from LCC's, and local "bottom-up" approach from refuges). This session will describe these approaches, compare results for a representative series of refuges with a focus on wetland habitats and species, and discuss what the similarities and differences tell us about surrogate or focal species selection.

Applications of Wetland Science in Policy & Regulations, Wednesday, February 24, Bear Clan Ballroom, 2:10 - 2:30 pm

Schense, Pam, WDNR

WDNR's role in wetland mitigation and the mitigation banking process

Compensatory wetland mitigation is an important component of Wisconsin's wetland regulatory program. This presentation will focus on the state's role in wetland mitigation in both wetland permitting and mitigation bank reviews. It will discuss what has changed over the years and what is required today. It will also explain the importance of wetland mitigation banks and WDNR's role on the Interagency Review Team, the group of agencies tasked with the review and approval of mitigation banks in Wisconsin. The status of the banking system, including the number and locations of banks and credit availability, as well as the thought process for determining the appropriate mitigation option to compensate for lost wetland functions. Finally, I will discuss the requirements for a conservation easement and financial assurances such as irrevocable escrow accounts and performance bonds for new mitigation banks.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 11:20 - 11:40 am

Skawinski, Paul, UWEX Lakes Program

Fascinating species of Wisconsin wetlands

Often, an appreciation of wetlands starts with a simple introduction to some of their inhabitants. Wisconsin's wetlands are full of fascinating species if people slow down to take a look. But many people new to wetlands need a jump-start on their introduction to wetlands. Paul will be your guide on a photographic journey to explore some of these interesting plants and creatures that call our water-logged environments home. He will also discuss how he uses these species to engage landowners, teachers, and youth to develop a greater appreciation of wetlands.

Wetlands and People II, Thursday, February 25, Iroquois Ballroom, 11:40 am - 12:00 pm

Skawinski, Paul, UWEX Lakes Program

Aquatic plants under the ice: Who's down there?

It's easy to gaze across a frozen lake or marsh and forget about all of the activity that continues underneath the ice sheet. By drilling holes in the ice and lowering camera equipment and rakes, we sampled wintertime aquatic plant communities in multiple lakes throughout the winter months (Dec-Mar). A total of 30 species have been found green under the winter ice to date. The majority of species were found in areas less than 4 feet deep, although some species, primarily macro-algae of the *Characeae* family, were found as deep as 21 feet. We observed these winter-persistent species providing habitat for many aquatic animals, including fishes, insects, scuds, isopods, copepods, *Hydra*, *Daphnia*, and periphyton. At this harsh time of year, these plants are providing crucial services to aquatic animal life, and also likely contribute a small amount of oxygen to the water as they continue to slowly photosynthesize.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Skawinski, Paul, UWEX Lakes Program
Robin Sleith, New York Botanical Garden
Kenneth Karol, New York Botanical Garden

Chara brittonii: A rare species of Wisconsin fens

A relative of the familiar muskgrasses and stoneworts (*Chara*, *Nitella*, and others), *Chara brittonii* is a rare member of the *Characeae* family in North America. Historically, six populations have been documented in North America, but several of those populations have declined to below detectable levels. Five additional populations have recently been confirmed in Wisconsin fens; three of them have been discovered in just the last few years. Here we describe the North American distribution and apparent habitat preference of *C. brittonii*.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Snitgen, Jim, Oneida Environmental, Health and Safety Division

Restoring the stream channel downstream of a restored wetland in the South Branch of the Suamico River

This project, completed in early October, 2015, meandered two reaches of the South Branch of the Suamico River to the east and west of Olson Road within the Oneida Reservation. The project also expanded the floodplain and habitat for northern pike spawning. A native prairie seed mix was planted in the newly created floodplain. Benefits of the project included reduced peak flows, extended base flow, enhanced habitat for northern pike and other aquatic organisms, and creation of a wildlife corridor along the stream. Previously, a large headwater wetland restoration project was completed upstream of this project in 2006. That project included a basin to pre-treat runoff from the agricultural watershed before it flowed into the large restored wetland. The result of these projects is cleaner water and increased base flow being delivered into the stream.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 3:40 - 4:00 pm

Steber, Aaron, Cardno

Tiedeman pond water quality and trails enhancement project

Cardno designed and constructed a two-acre forebay/wetland complex to help control stormwater runoff pollution while increasing available habit near Tiedeman Pond in the City of Middleton. This stormwater forebay/wetland complex was constructed in an area that was dominated by cattails and reed canary grass. Fill material removed during the excavation of the forebays was used on-site to raise low spots in a public use trail that connects to the forebays and goes around Tiedeman Pond, reducing overall construction costs. The wetland complex is designed to maximize available habitat as well as aid in the removal of pollutants through plant uptake, microbial breakdown, retention, settling, and adsorption; helping to control weed growth and algal blooms in Tiedeman Pond and ultimately Lake Mendota.

Wetland Solutions, Wednesday, February 24, Bear Clan Ballroom, 11:20 - 11:40 am

Teber, Tarek, UW-Milwaukee
Peng Lin, UW-Milwaukee
Laodong Guo, UW-Milwaukee

Speciation, seasonal variations and export fluxes of nutrients from the urbanized lower Milwaukee River

To better understand the variations in abundance, chemical speciation, and export fluxes of nutrients (N and P) from the Milwaukee River, the influence of hydrology and anthropogenic activities on nutrient dynamics in river waters, and the impact of nutrient composition and fluxes on water and coastal ecosystem quality in Lake Michigan, monthly water samples were collected from the lower Milwaukee River basin between February 2014 and April 2015, we measured water quality parameters and nutrient species including total dissolved nitrogen (TDN), nitrate (NO_3^-), dissolved organic nitrogen (DON), total dissolved phosphorous (TDP), phosphate, dissolved organic phosphorous (DOP), and total particulate phosphorous (TPP) including particulate inorganic (PIP) and organic P (POP). Concentrations of TDN varied from 92.2 µM during summer to 375 µM during fall and winter with an average of 179±123 µM and an annual export flux of 1.47×108 mol-N. Nitrate was the predominant N species while DON contributed up to 30% of the TDN transported in the river. Concentrations of TDP varied from 0.46 µM during ice formation to 5.47 µM in June-July period with an average of 2.08±1.39 µM and an annual flux of 1.71×106 mol-P. Within the TDP pool, almost 50% were organic P and the other 50% were phosphate. TPP varied from 0.34 to 4.69 µM with an average of 1.35±1.05 µM and an annual flux of 1.11×106 mol-P and was positively correlated with river discharge. Particulate P contributed only 40% while dissolved P comprised ~60% of the total P pool exported to Lake Michigan. The average N/P ratios in inorganic or organic nutrient pools ranged from 50-85, indicating a N-enriched but P-depleted ecosystem in the lower Milwaukee River.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Thompson, Alice, Thompson & Assoc. Wetland Services
Tod Highsmith, Wisconsin Wetlands Association
Mike Mossman, WDNR

"This vee of sandhill cranes": Using poetry to express our human connection to wetlands

"Today I unearth the turtle nest/above the big spring whose outflow/ splits this marsh in two". Wetland poetry reflects our connection with wetlands and water in ways that science cannot adequately define. Poetry can express our heart leap as the great blue heron lifts off the water, the spring sound of a thousand frog calls, or the secret worlds hidden under a water lily leaf. We will present poetry by various authors including original material. Authors may include Mary Oliver, Lorine Niedecker, Wendell Barry, Mary Linton, Basho, Liu Zongyan and others. "The tans and chocolates and bronzes/ripple in the light breeze as a woman's/ housedress will when she hangs laundry/ under clear skies like the ones holding/this vee of sandhill cranes." from "Dear Cicci" by Mary Linton.

Wetlands and People II, Thursday, February 25, Iroquois Ballroom, 11:00 - 11:20 am

Thomsen, Shelly, WDNR

WDNR's Surface Water Grant Program: Helping to restore and manage Wisconsin wetlands

WDNR's Surface Water Grant Program provides cost share to help communities protect and improve water quality and aquatic habitat and prevent and manage aquatic invasive species. Funding is available to address: 1) the planning needs of lakes, rivers, and watersheds (including wetlands), 2) land easement acquisition, 3) wetland restoration, and 4) controlling aquatic invasive species. A few examples of past grants awarded include wetland assessment and restoration projects, as well as control grants for *Phragmites*, Japanese Knotweed, and reed canarygrass. Come learn about wetland funding opportunities and upcoming changes to the surface water grant program.

Tools for wetland identification, restoration, and management, Wednesday, February 24, Iroquois Ballroom, 4:40 - 5:00 pm

Trochlell, Patricia, WDNR
Melissa Gibson, WDNR
Tom Bernthal, WDNR

Using FQA benchmark survey data to improve wetland restoration plans

Wetland restoration takes place to compensate for permitted wetland losses, resolve enforcement cases and voluntarily, typically to enhance wildlife habitat. Often, restoration plans are developed without adequate consideration of site conditions. Many restored wetland projects fail to reestablish native plant communities. How can we develop better restoration plans that are more likely to lead to successful projects? Data from the Floristic Quality Assessment (FQA) Benchmark Survey Project were analyzed to determine dominant plant species for a range of wetland plant communities. Other metrics, such as weighted Mean C, % of native perennials, and total native species richness were also evaluated for use as vegetative performance standards for restoration projects. Target plant communities can be selected for restoration using reference wetlands with similar physical and biological site factors. The results of the FQA study can then be applied to specific restoration sites to determine appropriate species to plant and target plant metrics.

Applications of Wetland Science in Policy & Regulations, Wednesday, February 24, Bear Clan Ballroom, 2:30 - 2:50 pm

Van Helden, Nicole, The Nature Conservancy
Betsy M. Galbraith, UWFWS

Lessons learned and future work to improve the health of Green Bay

The Green Bay-themed symposium wraps up with a panel session with a forward-looking theme. The moderator and audience members can ask panelists questions about advice they wish they knew before completing their projects, plans for future large-scale projects, and challenges still looming. Panelists have experience improving fish and wildlife habitat, tackling water quality impairments, bringing together funding sources to support wetland restoration and protection, and engaging partners in conservation planning. Bring your tough questions and get ready to engage in the discussion.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 4:40 - 5:00 pm

Viernum, Sara, Stantec

Avoiding and minimizing wetland and wildlife impacts in the Van Loon Bottoms during powerline construction

Natural resources mitigation, including wetland and sensitive wildlife species mitigation, is an important component for infrastructure development, maintenance, and operation in the U.S. and in Wisconsin. Dairyland Power Company (DPC) recently rebuilt a 161 kV transmission line within the Black River floodplain in La Crosse County, Wisconsin. A large portion of the line crossed through the Van Loon Wildlife Area. In order to minimize impacts to floodplain wetlands and waterways, as well as the state-threatened wood turtle (*Glyptemys insculpta*) and state-endangered and federally-proposed eastern massasauga rattlesnake (*Sistrurus catenatus*), DPC, AECOM, and Stantec, in cooperation with USFWS and WDNR, designed a project-specific mitigation and conservation plan in support of an application for a state Incidental Take Permit. This presentation provides background on the project, a summary of the agency coordination, and a discussion of the unique impact avoidance measures implemented. Avoidance measures included use of low pressure amphibious utility vehicles and small helicopters to transport personnel and light equipment; large heavy-lift air crane helicopter to transport and set the utility structures; and onsite Stantec species-permitted biological monitors and an environmental inspector. After two months of construction, the project was successfully finished with minimal impacts to wetlands and waterways and no known direct impacts to either protected reptile species.

Wetland Solutions, Wednesday, February 24, Bear Clan Ballroom, 10:40 - 11:00 am

Vujanovic, Michael, Northeastern Illinois University
Naida Zulovic, Northeastern Illinois University
Omar Morales Luna, Northeastern Illinois University
Annie Harris, Northeastern Illinois University
Jennifer Slate, Northeastern Illinois University

Paleolimnological indicators infer 6,300 years of change in Volo Bog, a *Sphagnum* wetland

Volo Bog Nature Preserve, the only quaking bog in Illinois, has a floating mat of *Sphagnum* moss and naturally acidic water. To determine how the wetland's acidity may have developed, we analyzed sediment deposited in the bog over time. We collected an 8.5-m core of sediment underlying the bog, which radiocarbon dating revealed spanned the past 6300 years. We identified the microscopic remains of chrysophyte and diatom algae that thrive in acidic conditions, and determined percent organic content through loss-on-ignition (drying the sediment and then combusting organics at 550°C). Acidophilic diatoms (e.g. *Eunotia*) and ten morphotypes of chrysophyte cysts were identified. Percent organic content was consistently high (75-93%) above 7 m, but decreased to <53% below 7.5 m. Further attention needs to be given to this transition, because the increased organic content may indicate when the *Sphagnum* mat, which induced the water acidity, developed. The diversity and excellent preservation of chrysophyte cysts suggests their potential to infer changes in pH, especially for time periods in which diatoms dissolved.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Waechter, Zachary, Cardno

Misapplications of hydrologic indicators using the Midwest and Northcentral Northeast Regional Supplements

This poster presentation will identify how and when wetland hydrology indictors should be used when conducting wetland delineations using the Midwest and Northcentral Northeast Regional Supplements. The goal is to present indicators that are commonly misapplied or not applied at all. For the selected indicators the poster will present the proper use of each indicator, how it should be used, when it should be used, as well as other indictors it should be used in conjunction with. The following wetland hydrology indicators will be highlighted: B4, Algal Mat or Crust; B7, inundation Visible on Aerial Imagery; B9, Water Stained Leaves; C2, Dry-season Water Table; C3, Oxidized Rhizospheres Along Living Roots; C4, Presence of Reduced Iron; C9, Saturation Visible on Aerial Imagery; and D1, Stunted or Stressed plants. This information can be used by wetland delineators to better identify wetlands in disturbed areas and/or difficult situations where—if indicators were be misapplied or not applied at all—wetlands may not be delineated. Having a better understanding of the above indicators may help in better protecting wetlands and valuable functions they provide.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Walter, Mark, Brown County

Restoration of the Cat Island Chain in lower Green Bay

The Cat Island Chain of islands historically protected extensive coastal wetlands in the lower Green Bay from high energy wave and storm effects. Surveys in the 1990s documented that Cat Islands provided habitat for 13 species of colonial nesting waterfowl. Extremely high water levels in the mid-1970s and a series of severe storms during ice breakup resulted in catastrophic erosion and ice damage to the islands. While remnant islands and wetland habitat remain, most of this habitat has been lost or degraded. The Cat Island Chain restoration project developed from the 1988 Lower Green Bay Remedial Action Plan. The project will reconstruct the Cat Islands protecting and restoring 1,225 acres of shallow water and wetland habitat. The three islands total 272 acres and will restore island habitat and reestablish aquatic plant beds in the lower bay. Restoring the islands will lead to recovery of lower bay habitat and benefit fisheries, colonial nesting birds, shorebirds, waterfowl, marsh nesting birds, amphibians, turtles, invertebrates, and furbearing mammals. The wave barrier will provide long term protection to the barrier islands and wetlands from storm and ice damage. Originally estimated at $35 million, the final cost estimate is just over $17 million with Brown County providing 35% or about $6 million as a match for the construction phases that have been completed by the USACE. The project is a partnership between the Port of Green Bay, Brown County, USACE, USEPA, USFWS, Wisconsin Department of Transportation, WDNR, Lower Fox River/Green Bay Natural Resources Trustee Council, UW Sea-Grant, UW-Green Bay and 14 Port terminal operators.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 1:30 - 1:50 pm

Walther, Barbara, USACE

Solving the wetland identification puzzle with effective off-site review

Protecting wetlands starts with identifying and delineating the resources. Identifying and delineating the resources begin with off-site review, including use of historic and recent aerial photography, web soil survey, wetland inventories, and so forth. Incomplete, ineffective, or incorrect off-site review prior to conducting delineation field work can mean that precious resources are neither identified nor, consequently, protected. Solving this problem requires that wetland delineators sharpen their off-site review skills and update their wetland identification paradigm. This talk will focus on the necessary tools for off-site review, especially for disturbed sites such as agricultural lands, and highlight some of the wetland signatures that are commonly missed. The presentation will provide practitioners with an off-site review refresher for use in solving the field season challenges in 2016 and beyond.

Applications of Wetland Science in Policy & Regulations, Wednesday, February 24, Bear Clan Ballroom, 1:30 - 1:50 pm

Walther, Barbara, USACE

Solutions to authorized wetland loss: Compensatory wetland mitigation

This presentation will serve as an introduction to the Mitigation Symposium and will focus on the recognized need for compensatory mitigation under the Clean Water Act. We will address the main requirement for acceptable compensation as spelled out in the Federal Mitigation Rule, which is to offset the loss of function being provided by the impacted resource. The presentation will introduce the three types of mitigation established under the Rule: mitigation banks, in-lieu-fee programs, and permittee-responsible mitigation, which each serve to provide a solution to authorized wetland losses. We'll discuss USACE's evaluation of proposed compensatory mitigation, addressing the issues of temporal loss, translocation of replacement and determination of lost functions. Factors considered for acceptable compensation include in-advance replacement (to address any temporal loss), in-place replacement (to address the watershed approach), and in-kind replacement (where plant communities are used as surrogates to match functions lost). As with any solution that addresses a significant problem, the Federal Mitigation Rule is comprehensive in scope while allowing for appropriate application at the local (watershed) level.

Symposium: Mitigation, Thursday, February 25, Turtle Clan Ballroom, 9:30 - 9:50 am

Waupochick, Angela, Stockbridge-Munsee Community
Gary Raasch R.A. Smith National

Miller Creek Wetland Restoration Project

The Stockbridge-Munsee Reservation covers 23,740 acres of diverse terrain and complex ecosystems, with over 12,000 acres of valuable wetlands providing fish and wildlife habitat, diverse plant cover, and large tracts of undeveloped land within the Wolf River Basin of Northeast Wisconsin. A railway was constructed through seven miles of the reservation's undeveloped forest over 100 years ago, dividing an entire line of wetlands and streams. Abandonment of the railroad in 2011 opened the door for the Stockbridge-Munsee Community to purchase rail bed property and right-of-way after removal of the rails and ties. The goals of the project design are to restore and enhance the aquatic habitat by returning Miller Creek to its original channel and to improve native wetland communities by returning connectivity between 258 acres of wetland and 2 miles of stream habitat. This presentation describes the project background and setting, discusses the impacts of the railroad through the environmentally sensitive area, summarizes the design considerations and resulting improvements, and describes the construction process.

Wetland Case Studies II, Thursday, February 25, Bear Clan Ballroom, 11:20 - 11:40 am

Webster, Bobbie, UW-Green Bay

Coastal wetlands of the east shore: The Point au Sable Nature Reserve in lower Green Bay

Point au Sable is a prominent peninsula located on the east shore of lower Green Bay in Brown County, Wisconsin, approximately four miles north of the UW-Green Bay campus. The preserve was created over the course of a decade by a series of acquisitions made possible through partnerships with local landowners, The Nature Conservancy of Wisconsin and Fox River Green Bay Natural Resource Trustee Council. The UW system-owned natural area now consists of 181 acres of wetland, woodland, and shoreline habitats. An estuarine wetland mosaic extends inland from the mouth of Wequiock Creek, which flows through the reserve. Together these tracts encompass the largest coastal wetland along the eastern shore of Green Bay and one of the few undeveloped estuarine wetlands in the entire Lake Michigan ecosystem. Point au Sable is a part of many ecological monitoring efforts including: the Great Lakes Coastal Wetland Monitoring Program and the Natural Resource Damage Assessment's ecological condition assessments. Other research includes an extensive fish survey of lower Wequiock Creek, a long-term bird monitoring program, and numerous student research projects. The coastal wetlands and shoreline at the Point au Sable Nature Preserve also provide outstanding opportunities for ecological restoration in lower Green Bay. Most recently, restoration efforts have included management of water levels with a water control structure and large capacity pump, *Phragmites* treatments, and woody invasive treatment. Current and future monitoring efforts will continue to inform ongoing restoration at Point au Sable. Both the monitoring and restoration efforts will continue to be part of the educational experience of many UW-Green Bay students.

Symposium: Green Bay, Wednesday, February 24, Turtle Clan Ballroom, 2:10 - 2:30 pm

Wiley, Chandra, UW-Stout
Jim Church, LaSalle University
Amanda Little, UW-Stout

Environmental characteristics' effect on forested ephemeral wetland diversity

Ecological factors structuring biological communities have long been of interest. Taxonomic diversity is highly variable in forested ephemeral wetlands, and community composition is believed to be driven by environmental conditions. However, little research has directly investigated the role of biotic interactions such as interspecific competition. Here we present the results of an exploratory study investigating how both classical and contemporary perspectives on the ecological niche regulate zooplankton community assembly in forested ephemeral wetlands. We carried out a mesocosm study within five wetlands in the Chippewa Moraine in West -Central Wisconsin. In each wetland, we had three levels: *Daphnia* only, *Simocephalus* only, and a mixture of both *Daphnia* and *Simocephalus*. We had differential responses of the zooplankton communities to treatment. Results from this preliminary study indicate that outcomes of the interspecific interactions are not constant among the wetlands, and are thus modulated by local environmental conditions.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Williamson, Caitlin, Natural Resources Foundation of Wisconsin

Working from the ground up: Engaging individuals and communities in wetland conservation

The Natural Resources Foundation of Wisconsin (NRF) provides services that individuals and organizations working on wetland conservation can utilize to help protect these important ecosystems. Our mission at NRF is to connect people to Wisconsin's natural heritage, including our wetlands. By providing people with the hands-on experience of visiting and learning about wetlands, we are instilling an appreciation for these critical ecosystems in Wisconsin's communities. Our signature field trip program offers over a hundred trips each year, engaging thousands of people in wetland education and providing them the opportunity to visit places like Quincy Bluff and Wetland, Terrell's Island, and the Penokee Hills. Additionally, we work closely with WDNR and local non-profit organizations to support management of these important wetlands. We use these partnerships, as well as marketing and communications media including newsletters, social media, and community presentations, to share inspiring stories of protecting wetlands across the state. Through our Wisconsin Conservation Endowment, NRF offers the opportunity for individuals and organizations to create endowment funds to provide a source of support in perpetuity for specific places and wildlife – including wetlands. Currently, NRF holds multiple endowments that benefit wetland sites, including Horicon Marsh, Cedarburg Bog, and Cherokee Marsh. Sharing the stories of hope that we have for these remarkable places inspires others to act to protect their local wetlands. This presentation describes how you can support wetlands via NRF's small grants program, field trip program, Wisconsin Conservation Endowment, and our joint promotion of wetland projects.

Wetlands and People II, Thursday, February 25, Iroquois Ballroom, 11:20 - 11:40 am

Winfield, Anna, UW-Stout
Amanda Little, UW-Stout
James Church, LaSalle University

Drivers of hydroperiod in ephemeral and permanent wetlands

Wetlands serve as a habitat for many different plant and animal species that rely on various hydroperiods to survive. Understanding the influences on hydroperiod may help to compensate for any future loss or changes in hydroperiod due to environmental change. We related aspects of wetland hydroperiod (min/max depth, seasonal range, mean hourly fluctuation, and maximum hourly fluctuation) to explanatory geomorphic variables (surface area to volume ratio, watershed size, wetland area, and elevation). We also compared permanent wetland (PW) and ephemeral pond (EP) hydroperiod characteristics for wetlands in Chippewa County, Wisconsin. HOBO-loggers were placed in paired PWs and EPs to collect water level data. In EPs, canopy cover was negatively related to maximum depth, because trees decrease water levels through interception and/or transpiration. Seasonal range was positively correlated with EP area and negatively correlated to peat depth, possibly due to the water-holding properties of peat. Larger EPs may have had a larger seasonal range because they both captured and evaporated more water. EPs in larger watersheds had both higher mean and maximum hourly fluctuations, because more runoff comes off of larger basins following precipitation. Range and maximum fluctuation were significantly higher in EPs than in PWs. Mean hourly fluctuation was not significantly different because PWs were both filling up and evaporating whereas EPs were mostly evaporating with occasionally dramatic increases due to precipitation. PWs that were smaller and lower in elevation with smaller watersheds tended to have more variable hydroperiods than larger PWs due to a lack of water storage in the watershed.

Poster Session, Wednesday, February 24, Wolf Clan Ballroom, 5:00 - 6:30 pm

Worsham, Luke, Five Rivers Services
Jeff Ingebritsen, Lynxnet

USFWS National Wetlands Inventory mapping of five Wisconsin watersheds

The USFWS National Standards and Support Team (NSST), located in Madison, WI, administers and manages the National Wetlands Layer of the National Spatial Data Infrastructure. As part of a wetland mapping training exercise, five pilot Wisconsin watersheds representing a total of 340,000 acres were selected and mapped by NSST following the Federal Wetlands Mapping Standards and the Federal Wetland Classification System (Cowardin et al. 1979). These watersheds included the Lower Branch Manitowoc River near Manitowoc, Mill Creek near Stevens Point, and three watersheds comprising the greater Madison area: Upper Yahara, Lake Mendota, and Lake Monona. Wetland delineations were performed in a heads-up GIS environment using 2013 color-infrared base digital imagery obtained from the publicly available National Agriculture Imagery Program (NAIP), supplemented by publicly available ancillary datasets including hydric soils, topography, additional leaf-off orthophotography, and previous delineations by the Wisconsin Wetlands Inventory. Site visits were conducted to select areas for additional ground-truthing. Updated delineations in these five watersheds resulted in a total of 56,000 acres of mapped wetland and deepwater habitat. We will present summary results from previous and current mapping efforts for these watersheds. Following external and internal review and approval, these updated wetlands datasets will be incorporated into the National Wetlands Layer and served on the USFWS Wetlands Mapper.

Tools for wetland identification, restoration, and management, Wednesday, February 24, Iroquois Ballroom, 3:40 - 4:00 pm

PRESENTER BIOGRAPHIES

Matthew (Max) Axler (matthew.axler@wisconsin.gov) is a recent graduate of the UW-Madison Conservation Biology and Sustainability MS program and a current WDNR employee. His work includes GIS and web development for the wetlands section, including the creation of a web tool designed to prioritize wetland restoration opportunities based on a statewide functional assessment.

S. Paige Baker (paige.baker@stantec.com) of Stantec in Green Bay, WI, provides expertise on watershed planning, stream restoration, best management practices, water quality modeling, and other water resources-focused efforts. She has completed many successful projects, putting watershed and other types of management plans to work, in many parts of the United States. Paige has a BS in civil engineering from Texas A&M University.

Brandon Braden (brandon.braden@wisconsin.gov) works in wildlife management for the WDNR out of the Navarino Field Station. A major portion of his job involves restoration and management of wetlands along the Lower Wolf River Bottomlands Natural Resources Area. Brandon has a BS in natural resource management from Northland College and an MS in biology from the University of Southern Maine.

James Church (church@lasalle.edu) received his PhD in ecology and evolutionary biology from Iowa State University, where he studied salamander community structure and biogeographical limits. He then worked as a lecturer at UW-Stout where he studied community ecology of aquatic invertebrates and amphibians in west-central Wisconsin. He is now an assistant professor at La Salle University.

Matthew Cooper (mcooper@northland.edu) is an aquatic ecologist at the new Mary Griggs Burke Center for Freshwater Innovation at Northland College in Ashland, WI. Much of Matt's current research focuses on coastal habitats of the Great Lakes, including studies of nutrient cycling, fish and invertebrate community assembly, coastal wetland monitoring, and development of decision support tools.

Melissa Curran (melissa.curran@stantec.com) is a professional botanist working with Stantec. Melissa received her BS in forest ecology from UW-Madison. Melissa specializes in vascular plant identification, ecological and botanical assessments and characterizations; and natural resource inventories including rare, threatened, and endangered species surveys.

Leslie Day (leslie.e.day@usace.army.mil) is the district bank coordinator managing the mitigation program in Minnesota & Wisconsin. She provides support to project managers during the bank review process, manages the Minnesota BWSR ILFP, acts as the District's RIBITS program manager, addresses programmatic mitigation issues, develops/updates District policy & guidance, and acts as the chair of the Programmatic IRT for Minnesota.

Patrick Forsythe (forsythp@uwgb.edu) is an assistant professor of biology in the Department of Natural and Applied Sciences at UW-Green Bay. Dr. Forsythe is PI of the Aquatic Ecology and Fisheries Laboratory and is faculty advisor for the UW-Green Bay student subunit of the American Fisheries Society.

Betsy Galbraith (betsy_galbraith@fws.gov) is a biologist for the USFWS in Green Bay. One of her primary duties is serving as trustee council coordinator for the Fox River Natural Resource Damage Assessment.

Erin Giese (giesee@uwgb.edu) is the biodiversity research specialist at UW-Green Bay's Cofrin Center for Biodiversity. She manages the Center's data collections, coordinates field work, and conducts research on using birds as indicators of wetland and northern forest health. She earned a BS in mathematics at the College of William and Mary and an MS in environmental science and policy at UW-Green Bay.

Brian Glenzinski (bglenzinski@ducks.org) joined Ducks Unlimited in 2012 as regional biologist. He is responsible for delivering all conservation programs in Wisconsin, including wetland & associated upland restoration, acquisition, public policy, and technical assistance. His previous work at WDNR focused on wetland, grassland, and savanna restoration. He graduated from UW-Stevens Point with a BS in wildlife and biology.

Grace Graham (grace.graham@wgnhs.uwex.edu) received a BS in environmental geology from Beloit College. She is currently an associate research specialist at the Wisconsin Geological and Natural History Survey, where she is working on a statewide inventory of springs.

Jason Granberg (Jason.Granberg@Wisconsin.Gov) is a water resources management specialist at WDNR. He is focusing on wetland invasive species identification, distribution, ecological modeling, and ecological restoration.

Dana Halverson (danahalverson@alliantenergy.com) has worked as an environmental specialist for Alliant Energy since 2000. She has a BS in chemistry from UW-Superior.

PRESENTER BIOGRAPHIES

Brad Herrick (Bradley.Herrick@wisc.edu) received a BA in biology from Luther College and an MS in environmental science and policy-ecosystem studies from UW-Green Bay. He is the ecologist and research program manager at the UW-Madison Arboretum, where his responsibilities include facilitating and conducting research and assisting in the development of land management priorities.

Kari Hopfensperger (karih@newlt.org) has been with Northeast Wisconsin Land Trust for about five years. Kari has a BA in environmental policy and planning from UW-Green Bay and an Associate's degree in sustainable development from the College of Menominee Nation.

Robert Howe (hower@uwgb.edu) has taught a wide variety of courses and mentored more than 100 graduate or undergraduate researchers during 31 years at UW-Green Bay. He and co-authors have published more than 70 scientific articles on topics ranging from natural history to theoretical models. He received his BS degree in biology from the University of Notre Dame and his MS and PhD from UW-Madison.

Jeff Ingebritsen (jingebritsen@usgs.gov) earned a BA in anthropology and a GIS Certificate from UW-Madison and is a GIS contractor for USFWS. Jeff also makes maps with Guerilla Cartography.

Kaira Kamke (Kaira.L.Kamke@uwsp.edu) is an undergraduate water resources student at UW-Stevens Point. She has spent over a year working in the Aquatic Biomonitoring Laboratory and was recently promoted to assistant supervisor under Jeffrey Dimick. She began to develop taxonomic skills for aquatic macroinvertebrates by undertaking a wetland-focused independent research project in 2015. She is the president of the SWAMP organization at UW-Stevens Point, a group focused on promoting awareness of wetland science and conservation.

Kelly Kearns (kelly.kearns@wi.gov) is the invasive plant coordinator for WDNR's Natural Heritage Conservation program. Kelly has a BS in horticulture from Purdue and an MS in restoration ecology from the UW-Madison. She has worked with a team since 2004 to develop and implement the comprehensive invasive species rule, NR 40.

Ann Key (ann@wetlandsandwater.com) is a WDNR professionally assured delineator and has many years of experience with wetland delineation and restoration projects throughout Wisconsin. Through development and management of two mitigation banks, the Wolf River Basin and Chequamegon Mitigation Banks, as well as design of the Willow Drive Bank in progress, she has gained valuable knowledge of the mitigation banking process.

Gregory Kidd (greg.kidd@wi.usda.gov) has an MS and spent 8 years as a wildlife technician and 14 years as a biologist with NRCS in Wisconsin. In 2011, he joined the NRCS Easement Program Division in Washington, DC, developing monitoring policies for the new farm bill. In 2015, he returned to Wisconsin as the assistant state conservationist for easements.

Kim Kies (kim.kies@wisc.edu), MA, MPH, PhD, is an evaluation associate at the UWEX Environmental Resources Center. She thrives in helping others reach their full potential through processes that educate, clarify, and increase their capacity to achieve their desired outcomes. Her background includes evaluating informal education programs, a skill informed by her interdisciplinary background.

Brianna Kupsky (kupsbg15@uwgb.edu) is a graduate student pursuing an MS in environmental science and policy at UW-Green Bay. Brianna's thesis is being conducted in the Lower Bay of Green Bay AOC and focuses on evaluating the potential to incorporate ecological theory into the restoration of aquatic macrophytes.

Charles Larscheid (larscheid_cj@co.brown.wi.us) is Brown County's west shore pike project manager. He spent the greater part of his career as the Brown County port and solid waste director from 1990-2011. He worked toward the restoration of the Cat Island Chain and pioneered prairie grass/wildflower plantings on closed landfill sites. He graduated from UW-Eau Claire with a BS in biology and chemistry.

Amanda Little (littlea@uwstout.edu) teaches about and researches wetlands as an associate professor at UW-Stout in Menomonie, WI. Current research focuses on ephemeral pond plant communities, and she is working to build the aquatic plant collection for UW-Stout's herbarium.

Victoria Lubner (victoria.lubner@tnc.org) is the natural infrastructure fellow for The Nature Conservancy in Wisconsin, researching the role of natural infrastructure in nutrient management. Victoria graduated from Saint Louis University with a BS in environmental science and geology. She received her MS from the UW-Milwaukee School of Freshwater Sciences, where her thesis research focused on international water policy.

PRESENTER BIOGRAPHIES

Kyle Magyera (kyle.magyera@wisconsinwetlands.org) is a local government outreach specialist with the Wisconsin Wetlands Association (WWA). Kyle primarily coordinates WWA's Local Government Outreach Program and provides technical assistance to professional staff, local officials, citizens, and other groups with interest in or questions and concerns regarding wetland protection, restoration, and management.

Mike Marek (mike@mareklandscaping.com) has 20 years of experience working as an ecological landscape designer/builder and urban forester. Marek Landscaping, LLC was founded on Mike's commitment to providing sustainable design/build services using low impact development techniques in Milwaukee and beyond. The firm now comprises 20 employees, including landscape architects, watershed planners, and restoration ecologists.

Aaron Marti (aaron.marti@wisconsin.gov) received his BS in water resources and German from UW-Stevens Point in 2012, followed by his MS in biology from Ball State University (Muncie, IN) in July 2015. He has worked as a wetland assessment research scientist with WDNR Bureau of Water Quality since May 2015. His research interests focus on bridging wetland and aquatic ecosystem ecology (specifically biogeochemistry) with management.

Matt Matrise (matthew.matrise@wisconsin.gov) is the wetland ILF coordinator for WDNR's Bureau of Watershed Management. He worked with USACE, EPA, and many stakeholders to create WI's first in lieu fee mitigation program, the WI Wetland Conservation Trust. He has a diverse 14-year professional career in various environmental positions in both the public and private sectors.

Michael McDavit (mcdavit.michael@epa.gov) is the chief of the Wetlands Strategies and State Programs Branch, USEPA. He administers support programs for State and Tribal wetland programs and oversees the National Wetland Condition Assessment. Mike holds a BS in environmental science from UW-Green Bay and an MPA from the George Washington University.

Paul McGinley (paul.mcginley@uwsp.edu) is a professor of water resources in the College of Natural Resources at UW-Stevens Point and a UWEX water quality specialist in the Center for Watershed Science and Education. His teaching and research examines the intersection of hydrology and water quality.

Susan McIntyre (sdmcinty@illinois.edu) is a wetland plant ecologist at the Illinois Natural History Survey in Champaign, Illinois. She has an MS in natural resources from North Carolina State University. Her current research interests include ecological restoration, invasive species management, and temporal changes in impacted plant communities.

Nick Miller (nmiller@tnc.org) integrates science into conservation policy, strategies, and tools as science director for The Nature Conservancy in Wisconsin. His recent wetland projects include creating decision support tools to prioritize sites based on watershed needs (wildlife habitat, water quality, flood abatement, and other services) and exploring valuation of wetland services.

Shawn Moen (moens@my.uwstout.edu) is an undergraduate student at UW-Stout majoring in environmental science with an emphasis in land resources. He has been working on the Chippewa Moraine Ephemeral Ponds for over a year. In the future he plans to attend graduate school and continue to help conserve and restore our wetlands.

Tom Nedland (thomas.nedland@wisconsin.gov) is the wetland identification coordinator with WDNR. His responsibilities include reviewing wetland delineation reports, conducting wetland determinations and delineations, providing internal and external training opportunities on wetland delineation protocols, and helping administer WDNR's Assured Wetland Delineator program.

Julie Nieset (jenieset@illinois.edu) is a wetland plant ecologist with the Illinois Natural History Survey at University of Illinois Urbana-Champaign.

Christopher Noll (christopher.noll@wisconsin.gov) is a botanist & GIS professional who has worked on numerous projects in his four years with WDNR, with the last two years spent working through the WWI's backlog of data. He also has a background in restoration ecology, having spent four years working as a field tech on various projects across Southern Wisconsin. He has a BS in soil science and GIS certificate from UW-Madison.

Jason Petrella (petrella_jw@co.brown.wi.us) was born in New Jersey and came to Wisconsin in 1995. He attended UW-Stevens Point, graduating in 2005 with a BS in wildlife and bology. After working as a landscaper for a year, he worked as an LTE naturalist intern at Barkhausen Waterfowl Preserve in Green Bay and became a park ranger for Brown County Parks in 2008.

Joseph Pfeiffer (Joe.Pfeiffer@kci.com) is KCI's ecosystem dynamics practice leader with 26 years of experience in environmental/engineering planning. His expertise includes watershed planning, ecological restoration, and mitigation design and construction management. He holds an MA in physical geography and environmental planning and a BS in natural science.

PRESENTER BIOGRAPHIES

Mark Pfost (mark_pfost@fws.gov) has been the "Partners" biologist at Necedah NWR since July, 2010. His first position involving wetland conservation began in 1998 and has worked for Madison Audubon Society, Horicon NWR, the USFWS Private Lands Office in Wisconsin, the Savanna District (IL) of the Upper Mississippi National Wildlife and Fish Refuge, and the Rainwater Basin Wetland Management District (NE).

Mark Pranckus (mark.pranckus@cardno.com) is a senior consultant with Cardno with over 15 years of experience in natural resource management working on ecological restoration planning and implementation. He received his BS in biology from Indiana University and his MS in environmental biology from the University of Minnesota-Duluth.

Roberta Reif (reifrp11@uwgb.edu) is a senior at UW-Green Bay majoring in Biology, with a double emphasis in animal biology and ecology and conservation, along with a minor in environmental science. She aspires to have a career in wildlife management. Currently, Roberta is working at the Cofrin Center for Biodiversity as a natural areas intern.

Patrick Robinson (patrick.robinson@uwex.edu) is a co-director and specialist for the Environmental Resources Center, which is a center jointly administered by UWEX and UW-Madison. He is also an adjunct faculty member with the Environmental Science and Policy Graduate Program at UW-Green Bay.

Julia Robson (julia.robson@milwaukeecountywi.gov) has been working with the Milwaukee County Parks Natural Areas Program as the assistant natural areas coordinator since 2011 after she graduated from UW-Milwaukee with a BS in conservation and environmental sciences. Julia assists with the oversight and management of the Park System's 10,000-acres of natural areas, focusing on wildlife monitoring and habitat restoration.

Joseph Roth (jroth@openlands.org) is the restoration program manager for Openlands, a private not for profit conservation organization based in northeastern Illinois. Mr. Roth has over 20 years experience in conservation, specifically with land acquisition, conservation easements, conservation planning, and wetland/natural area restoration.

Dan Salas (dan.salas@cardno.com) is a senior consultant with Cardno and a senior ecologist certified by the Ecological Society of America with more than 18 years of experience. He acts as a project manager and technical advisor on many projects involving conservation planning, regulatory compliance, endangered species management, vegetation management, and stream and wetland restoration.

Pam Schense (pamela.schense@wi.gov) has been WDNR's wetland mitigation coordinator since 2012, working on mitigation policy issues, bank reviews, and mitigation requirements for wetland permits across the state. She started at WDNR in 2001 as a water management specialist, prior to which she worked on a variety wetland and amphibian research projects.

Paul Skawinski (pskawins@uwsp.edu) is the statewide coordinator of Wisconsin's Citizen Lake Monitoring Network, which trains citizens to monitor many aspects of water quality on their lakes. He is also the author of Aquatic Plants of the Upper Midwest and teaches aquatic plant biology at UW-Stevens Point. Paul is vice president of the Botanical Club of Wisconsin and holds BS and MS degrees from UW-Stevens Point.

Jim Snitgen (jsnitgen@oneidanation.org) has been with the Oneida Environmental, Health and Safety Division since 1999. Jim and his team have successfully implemented a number of stream restoration projects in the Green Bay watershed, including the removal of the Duck Creek Dams and fish passage and habitat restoration projects involving in Trout Creek, Lancaster Brook, Silver Creek, and the South Branch of the Suamico River.

Aaron Steber (Aaron.Steber@cardno.com) is a stream restoration specialist managing streambank/shoreline stabilization and habitat enhancement projects including project planning, design, grant administration, permitting, and construction oversight. He has more than 17 years of experience working with streams.

Tarek Teber (tateber@uwm.edu) is a graduate student in the School of Freshwater Sciences at UW-Milwaukee studying the biogeochemical cycling of nutrients and natural organic matter in river, estuarine, and coastal waters of Lake Michigan. Teber earned his BS in chemistry from UW-Milwaukee and an associate degree in chemical technology from Milwaukee Area Technical College.

Alice Thompson (thompson.alice@gmail.com), Mike Mossman, and Tod Highsmith find poetry a respite from their busy lives. Thompson is a wetland consultant, Mossman is a forestry community biologist and scientist with WDNR, and Highsmith is a writer, editor and long-term board member of the Wisconsin Wetlands Association.

Shelly Thomsen (shelly.thomsen@wisconsin.gov) is the lakes and rivers team leader for WDNR. She manages WDNR's surface water grant program and leads the statewide lakes & rivers management team. Shelly holds an MEM from Yale University and a BS from the University of California, Santa Barbara.

PRESENTER BIOGRAPHIES

Patricia Trochlell (patricia.trochlell@wisconsin.gov) is a wetland ecologist with WDNR. She works on wetland issues related to delineation, restoration, compensatory mitigation, assessment, monitoring, regulations, and ecology.

Nicole Van Helden (nvanhelden@tnc.org) works for The Nature Conservancy as the director of conservation for the Green Bay watershed. She manages projects focused on rehabilitating streams and wetlands in Green Bay.

Sara Viernum (sara.viernum@stantec.com) is a wildlife biologist and herpetologist with the environmental company Stantec in Cottage Grove, WI. Her professional experience includes habitat assessments, fauna surveys, and onsite species construction monitoring, with a focus on sensitive species. She has over ten years of experience conducting fieldwork in various ecosystems throughout the US.

Michael Vujanovic (m-vujanovic@neiu.edu) conducted research in Volo Bog as part of his undergraduate research project at Northeastern Illinois University. Mike has a strong interest in aquatic ecology and in studying sediment contamination.

Zachary Waechter (zachary.waechter@cardno.com) conducts environmental surveys and reporting for wetland delineations, site characterizations, land cover classifications, threatened and endangered species, invasive species, and wetland mitigation sites. He holds BS in soil and land management and resource management from UW-Stevens Point. In his four years of experience, he has completed wetland work in 11 states in the Midwest and Southern U.S.

Mark Walter (walter_ma@co.brown.wi.us) is business development manager for the Brown County Port & Resource Recovery Department. He manages the county's household hazardous waste, food waste, and recycling programs as well as Port habitat restoration projects. He has a background in GIS, environmental and land use analysis, and community planning. He served for 22 years with Bay-Lake Regional Planning Commission. Mark has a BS in artography from UW-Madison.

Barbara Walther (barbara.l.walther@usace.army.mil) began delineating in New England in 1985 and has continued this work throughout Minnesota and Wisconsin. Barbara has administered wetlands protection at the local, county, and state level and spent time as a wetlands consultant, learning the reality of "billable hours." Barbara now serves the public as senior ecologist for USACE, where she provides wetland technical assistance and training.

Angela Waupochick (angela.waupochick@Mohican-nsn.gov) is the tribal hydrologist for the Stockbridge-Munsee Community Band of Mohican Indians. She served as the project lead for the Miller Creek Restoration Project.

Bobbie Webster (websterb@uwgb.edu) is the natural areas ecologist for the Cofrin Center for Biodiversity at UW-Green Bay, where she has responsibility for managing 5 natural areas, all of which include wetlands. She has previously worked with The Door County Land Trust, The Nature Conservancy, and WDNR. She received her MS in natural resources and her BS in resource management from UW-Stevens Point.

Chandra Wiley (wileyc0863@my.uwstout.edu) is an undergraduate student at UW-Stout. She is currently in her junior year studying environmental science. Chandra has been working on research with the Chippewa Moraine Ephemeral Ponds Project with Dr. Amanda Little and Dr. Jim Church for a year now. In the future, she would like to attend graduate school to study wildlife biology.

Caitlin Williamson (caitlin.williamson@wisconsin.gov) is the program & development coordinator with the Natural Resources Foundation of Wisconsin, where she manages the Foundation's grant programs and endowment. Her work focuses on building partnerships and evaluating conservation impact. She received her MS in environmental conservation from the UW-Madison's Nelson Institute for Environmental Studies.

Anna Winfield (winfielda0355@my.uwstout.edu) will graduate this May from UW-Stout with degrees in applied science (biotechnology) and environmental science (environmental health). After graduation she hopes to go to graduate school for microbiology.

Luke Worsham (lworsham@usgs.gov) is a graduate of the Warnell School of Forestry and Natural Resources at the University of Georgia, and previously worked as an air quality specialist at WDNR.

INDEX OF AUTHORS

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Key to Common Agency Abbreviations Used in Abstracts and Bios

USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UWEX	University of Wisconsin - Extension
USFWS	U.S. Fish and Wildlife Service
UW	University of Wisconsin
WDNR	Wisconsin Department of Natural Resources