Wetland Science Conference

2017 Wisconsin Wetlands ASSOCIATION

# Abstracts & Presenter Biographies

*Wetland Connections*

22nd Annual Wetland Science Conference

February 28-March 2, 2017

Stevens Point, WI

# WEDNESDAY, March 1, 9:00 am - 9:30 pm

| | | | |
|---|---|---|---|
| **9:00 - 10:10** | **Plenary Session (Expo 3-4)** | *Sponsored by We Energies* | |
| **9:00** | **Welcome & Opening comments** | | |
| 9:20 | **Conference Keynote: Groundwater, wetlands, and geology: The invisible links**<br>Kenneth Bradbury, Director and State Geologist, Wisconsin Geological and Natural History Survey, University of Wisconsin-Extension | | |
| **10:10 - 10:40** | **Break (Expo 1-2)** | *Sponsored by the Wisconsin Coastal Management Program* | |
| **10:40 - 12:00** | **Concurrent Sessions** | | |
| | **Location: Spruce**<br>**SYMPOSIUM: Amphibians, Reptiles, & Wetlands: Current Status \| Moderator: Dreux Watermolen** | **Location: Evergreen**<br>**Wetland Connections \| Moderator: Randy Poelma** | **Location: Stonefield**<br>**Native Wetland Flora & Plant Communities \| Moderator: Patrice Eyers** |
| 10:40 | The Wisconsin Frog and Toad Survey: What's up, down, old, and new with a 35-year-old citizen science program \| **Bergeson** | Nature-based solutions to flood risk reduction \| **Lulloff** | "Pterrified" of Pteridophytes? An intro to wetland fern and fern ally identification \| **Noll** |
| 11:00 | HerpMapper.org: An innovative citizen science project for amphibian and reptile observations \| **Smith** | Bringing green back to the Bay: Identifying the restoration potential of a degraded aquatic ecosystem \| **Kupsky** | An ecological site classification system for wetland forests of Northern Wisconsin \| **Kotar** |
| 11:20 | Acoustic monitoring of state-endangered Blanchard's cricket frogs at different wetland sites \| **Peterson** | Mukwonago River headwater restoration via removal of two small dams: Reflecting on 8 years of lessons learned \| **Ziegler** | An assessment of aquatic vegetation in Duck Creek Delta before and after construction of the Cat Island Chain \| **Houghton** |
| 11:40 | The status of eastern massasauga rattlesnake populations in Wisconsin \| **Staffen** | Connections between human caused stress, wetland setting, and vegetation in the St. Louis River estuary \| **Danz** | Does plant species composition and diversity affect below-ground carbon dynamics in experimental wetlands? \| **Schultz** |
| **12:00 - 1:30** | **Lunch (provided - Expo 3-4)** | *Sponsored by ATC* | |
| **1:00 - 1:30** | **Legislative/Policy Updates (Woodland)** | | |
| **1:30 - 3:10** | **Concurrent Sessions** | | |
| | **Location: Spruce**<br>**SYMPOSIUM: Amphibians, Reptiles, & Wetlands: Emerging Threats \| Moderator: Josh Kapfer** | **Location: Evergreen**<br>**Wetland Restoration & Management Case Studies \| Moderator: Pat Trochlell** | **Location: Stonefield**<br>**Special Sessions** |
| 1:30 | A conservation program to address wood turtle recruitment on rivers in northern Wisconsin \| **Hay** | Wetland restoration in organic peat/muck soil: DOT mitigation site year 5 \| **Henderson** | Career Development & Continuing Education in Wetland Science |
| 1:50 | Amphibians shift wetland occupancy with hydrologic cycle \| **Lannoo** | Streambank stabilization, floodplain creation, and stream re-alignment of Pheasant Branch in Middleton, WI \| **Steber** | Moderated by **Susan Schumacher** |
| 2:10 | *Bsal:* An emerging threat to North American salamanders \| **Watermolen** | Twenty years of restoration and community-building at Pheasant Branch Conservancy \| **Bernthal** | Tribal Wetland Programs Working Group |
| 2:30 | Ranavirus in amphibians and reptiles \| **Adamovicz** | Results of storm water modeling pre- and post-restoration at Deer Grove East Preserve in Palatine, IL \| **Roth** | Moderated by **Randy Poelma**<br>(By invitation only) |
| 2:50 | Using water snakes to understand genetic patterns of reproductive and morphological development \| **Schulte** | Wetland restoration at Midewin National Tallgrass Prairie, Will County, IL \| **Feggestad** | |
| **3:10 - 3:40** | **Break (Expo 1-2)** | *Sponsored by Cardno* | |
| **3:40 - 5:00** | **Concurrent Sessions** | | |
| | **Location: Spruce**<br>**SYMPOSIUM: Amphibians, Reptiles, & Wetlands: Management Approaches \| Moderator: Dreux Watermolen** | **Location: Evergreen**<br>**Wetland Assessment \| Moderator: Tom Bernthal** | **Location: Stonefield**<br>**Wetlands and People \| Moderator: Travis Olson** |
| 3:40 | Reservoir waterdogs: Neotenic tiger salamanders of the former Badger Army Ammunition Plant \| **Mossman** | Developing a decision support tool to guide restoration and protection of Great Lakes coastal wetlands \| **Cooper** | Engaging municipalities and citizens in the battle against against *Phragmites* \| **Hagenow** |
| 4:00 | Turtle conservation: Road mortality prevention \| **Badje** | Development of soil indicators for assessment of wetland condition and disturbance \| **Rossi** | Making connections for rapid response to new wetland invasive plants \| **Putnam** |
| 4:20 | Survival of headstarted and non-headstarted hatchling Blanding's turtles in southern Wisconsin \| **Kapfer** | Connections between soil physicochemistry and wetland condition in Wisconsin's Southern Lake Michigan Basin \| **Marti** | Working from the ground up: Engaging families and communities in wetland conservation \| **Williamson** |
| 4:40 | Snake Conservation Society, Inc.: Using information, communication, and psychology to conserve snakes \| **Christoffel** | Performance standards for target hydrology at wetland compensatory mitigation sites \| **Eggers** | Wetland connections between science and poetry \| **Highsmith** |
| **5:00 - 6:30** | **Poster Session & Cash Bar (Expo 1-2)** | *Sponsored by UW-Stevens Point College of Natural Resources* | |
| **6:30 - 9:30** | Banquet & Presentation *(Ticketed event - Expo 4)* | *Sponsored by Stantec* | |
| **7:30** | Banquet Presentation: The Surly Surveyor: Connecting today's landscape with Wisconsin's past \| **Rob Nurre**, Landscape Historian | | |

# THURSDAY, March 2, 8:30 am - 4:30 pm

**8:30-9:20** **Plenary Session (Expo 3-4)** *Sponsored by Midwest Access Solutions*
**8:30** **Welcome**

**8:40** **Plenary Address:** Connecting history, wildlife, and wetlands: A story of the Mead Wildlife Area
Thomas I. Meier, Wetland and Wildlife Biologist, Land Management Solutions, LLC

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

| | Location: Spruce<br>Wetlands & Groundwater<br>Moderator: Rachel Schultz | Location: Evergreen<br>Wetland Wildlife I<br>Moderator: Paul Skawinski | Location: Stonefield<br>Wetland Invasive Species<br>Moderator: Kelly Kearns |
|---|---|---|---|
| 9:30 | Using geophysics to better understand wetland hydrogeology \| **Streiff** | Effects of drawdown history and vegetation type on aquatic invertebrate metrics in a managed wildlife area \| **Kamke** | What you can do to slow the spread of invasive plants in wetlands \| **Trochlell** |
| 9:50 | A multi-instrument stream survey through Mukwonago River Basin wetlands \| **Hart** | No more guessing: Perfecting frog detections in wetlands through automated acoustic monitoring \| **Casper** | Extinction by hybridization: A probable fate for a native cattail species \| **Geddes** |
| 10:10 | Missing the water before the well runs dry: The impacts of high capacity wells on Wisconsin calcareous fens \| **Bart** | Wood turtle conservation methods in Wisconsin \| **Bougie** | Facilitating natural succession in heavily invaded ecosystems \| **Miller-Adamany** |

**10:30 -11:00** **Break (Expo 1-2)** *Sponsored by GEI Consultants*
**11:00 -12:00** **Concurrent Sessions**

| | Location: Spruce<br>Wetland Mitigation<br>Moderator: Nick Miller | Location: Evergreen<br>Wetland Wildlife II<br>Moderator: Jacob Straub | Location: Stonefield<br>Special Session |
|---|---|---|---|
| 11:00 | The Wisconsin Wetland Conservation Trust: Strategies, partnerships, and lessons learned \| **Brown** | Plans with benefits: Fish & wildlife habitat recovery in the Milwaukee Estuary Area of Concern \| **Casper** | Toward More Effective Invasive Species Management: Feedback Cycles and Systems Approaches<br><br>Facilitated by Craig Annen |
| 11:20 | Successful compensatory wetland mitigation: Upper French Creek wetland mitigation site \| **Kraszewski** | Let's start here: Spatial decision making to prioritize management units for habitat management at Horicon NWR \| **Salas** | |
| 11:40 | "Set it and Forget it": Evaluating a forested wetland mitigation site 10 years after planting \| **Stamer** | Food webs representing wetland connections: The role of parasite diversity and land use change \| **Orlofske** | |

**12:00 - 1:30** **Lunch (provided - Expo 3-4)**

**1:30 - 4:30** **Working Groups, Workshops, and Field Trips**

**Working Groups**

**Location: Spruce**
**Practitioners Working Group**
**Moderator: Dan Salas**

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. The agenda will be set with the input of those who participated in similar working groups at recent WWA conferences. Topics covered will likely include what's new with state wetland policies, including how they have or will change the review and approval of wetland development permits and associated compensatory mitigation requirements.

**Location: Evergreen**
**Aerial Identification of Invasive Plants Workshop**
**Moderator: Jason Granberg**

Wetland invasive species are a common threat throughout Wisconsin. Early detection of these species using aerial imagery is a cost effective approach to discovering new populations, allowing for efficient, targeted searches within vast wetlands. This workshop will provide an introduction to aerial imagery identification of common wetland invasive species using freely accessible imagery and software. Participants should bring a laptop, tablet, or mobile device with GoogleEarth already installed.

**Location: Stonefield**
**What Would Aldo Say? A Reflective Discussion of the Land Ethic in Wetland Conservation**
**Moderators: Renee Wahlen, Debbie Hinchcliffe, and Jerry Sanders**

Aldo Leopold was known for his ability to weave reflections on history, social trends, and ethics into discussions of ecological issues. This session will include an introduction of Leopold's Land Ethic and a participatory reading of a Leopold essay, followed by a collective exploration and discussion of the ideas and perspectives gleaned from the reading.

**Field Trips**
All field trips will depart from the Holiday Inn Convention Center main entrance at 1:30. Sign up for field trips at the registration desk.

**Connecting Wetlands for Wildlife at Mead Wildlife Area**
**Field Trip Leader: Patrice Eyers**
Thank you to the Fund for Lake Michigan for their generous sponsorship of this trip.

**UW-Stevens Point Freckmann Herbarium and Museum of Natural History**
**Field Trip Leaders: Robert Freckmann and Ray Reser**
Thank you to Midwest Natural Resources for their generous sponsorship of this trip.

**Wetland Restoration in Schmeeckle Reserve, UW-Stevens Point**
**Field Trip Leaders: Jim Buchholz and Paul Skawinski**
Thank you to J. Koski Company for their generous sponsorship of this trip.

Wetland Science Conference
2017 Wisconsin Wetlands Association

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**Adamovicz, Laura**, University of Illinois

**Ranavirus in amphibians and reptiles**

Ranaviruses are significant pathogens of amphibians and reptiles, important inhabitants of Midwestern wetlands. These pathogens have been linked to mortality events in greater than 175 species of ectothermic vertebrates on six continents. Ranavirus is one of two amphibian diseases notifiable to the World Organization for Animal Health (OIE), and recent studies indicate that ranaviruses may pose a threat to amphibian species of conservation concern. This presentation will focus on the best characterized of the ranaviruses, frog virus 3 (FV3). FV3 distribution, host-pathogen ecology, pathology, and diagnosis will be concisely reviewed. Emphasis will be placed on the effects of FV3 in amphibian and reptile species present in Wisconsin wetlands. Effective biosecurity measures to prevent the spread of FV3 will be detailed for researchers working with reptiles and amphibians. Finally, unknowns and directions for future research will be outlined to promote thoughtful consideration of this pathogen in relation to wetlands research.

*Symposium: Amphibians, Reptiles & Wetlands: Emerging Threats, Wednesday, March 1, Spruce, 2:30-2:50pm*

**Arnold, Christopher**, UW-Stevens Point
Paul McGinley, UW-Stevens Point

**Understanding the other side of wetland treatment: The legacy of phosphorus storage**

Wetlands can provide an important benefit to downstream water resources by intercepting and incorporating phosphorus. While this reduction in phosphorus concentration can reduce downstream eutrophication in the short-term, it is important to understand the long-term implications of phosphorus storage in wetland systems. This study examined the concentration, distribution, and availability of phosphorus in a wetland adjacent to a barnyard. Phosphorus profiles were developed along transects from the barnyard to the wetland. Phosphorus concentrations were compared to other geochemical measurements to understand the attenuation mechanisms. Phosphorus sorption isotherms were used to determine how the long history of phosphorus loading changed equilibrium phosphorus concentrations. The results demonstrate the importance of understanding the extent and characteristics of a phosphorus reservoir that can result from phosphorus loading. We suggest that early recognition of the phosphorus removal mechanisms and contrasting those with estimates of phosphorus loading can be used to better understand the long-term consequences of treatment.

*Poster Session (P6), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Arnold, Kathi**, UW-Green Bay
Brianna Kupsky, UW-Green Bay
Shannon Stafslien, UW-Green Bay
Mathew E. Dornbush, UW-Green Bay

**Evaluating the seed bank of the Lower Bay of Green Bay to determine re-establishment potential**

Historic accounts of the Lower Bay of Green Bay describe wetlands supporting a diverse and abundant aquatic community. A 1934 study found 29 submergent and emergent macrophyte species, while recent surveys observed fewer than ten macrophyte species. Extensive eutrophication and degradation of aquatic habitats are suggested as the primary drivers of macrophyte loss in this system. In response, habitat restoration has focused primarily on improving water quality. However, reductions in nutrient and sediment loading alone often fail to result in predictable macrophyte re-establishment, suggesting that propagule limitation, or the absence of an *in situ* seed bank may delay recovery, irrespective of improvements in water quality. We evaluated the aquatic macrophyte seed bank of the Lower Bay of Green Bay by collecting sediment along two 1200 m transects originating from the historic and contemporary tributaries of Duck Creek (n =12 samples per transect). Sediment samples were transferred to the UW-Green Bay greenhouse, submerged to a water depth of 5 cm, and monitored for seedling growth for 30 days. Preliminary results found a total richness of seven species, and significantly higher mean seedling abundance in samples taken from the contemporary tributary than from the original tributary (42% more seedlings in main tributary sediment; $p < 0.055$), though mean species richness did not differ significantly between transects (mean richness per sample = 2.3). The results of this study suggest the existence of a low diversity yet viable seed bank in the Lower Bay of Green Bay, suggesting that additional restoration steps may be needed to restore a diverse macrophyte community in the Lower Bay of Green Bay

*Poster Session (P1), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Badje, Andrew**, WDNR

**Turtle conservation: Road mortality prevention**

In Wisconsin, eleven species of turtles reside throughout a diverse array of wetland and upland habitats. Turtles are an evolutionary masterpiece, having survived the age of dinosaurs, numerous ice ages, and even early human cultures. Unfortunately, they are having a much harder time coping with modern societies due to the increasing need for human transportation. The construction of roads, highways, and even railroads pose serious threats that turtles cannot avoid. Transportation corridors create habitat fragmentation and alteration of prime turtle habitat, and cause direct roadside mortality of turtles by collisions with vehicles. The Wisconsin Turtle Conservation Program was initiated to find and catalogue existing turtle crossing locations so that road agencies, maintenance crews, and citizen conservationists can work together to make passages safer for turtles and other wildlife. This presentation will describe the design and implementation of the program as well as show recent citizen science success stories. As this project is still in its infancy years, we'll show you where the WDNR plans to take the program in future years so that we can conserve turtles for future generations to enjoy.

*Symposium: Amphibians, Reptiles & Wetlands: Management Approaches, Wednesday, March 1, Spruce, 4:00-4:20pm*

**Barger, Michael**, UW-Stevens Point
Jacob Straub, UW-Stevens Point
Shawn Crimmins, UW-Stevens Point
Robert Hanson, WDNR

**Implementing and analyzing replicated point counts as measures of abundance in Glacial Lake Grantsburg**

Crex Meadows State Wildlife Area (CMSWA) and Fish Lake State Wildlife Area, located in western Burnett County, are 12,140 and 5,666 hectares, respectively and contain some of the most diverse wetlands and associated wildlife in Wisconsin. Numerous species of waterfowl use these wetlands for important life-history functions such as migration stop-over, molting, and reproduction. Wetland managers at CMSWA are mindful of these events and in some areas, manage water levels in wetlands so birds can best meet their life-history needs. Brood counts are one measure of waterfowl productivity but have received little focus at CMSWA. I designed and implemented a point count survey to estimate waterfowl brood abundance and detection probability in wetland habitats open and closed to public use. Studies have shown that waterfowl species seek refuge areas during hunting seasons to avoid human pressure, but it is unknown if this behavior is exhibited throughout the year. Individual point counts are subject to high error rates and bias, so I used temporally repeated point counts that analyzed in a hierarchical framework. Habitat and survey covariates that may affect abundance and detection were analyzed, including wetland size, drawdown status, refuge status, and ambient temperature. Point counts were conducted from 20 June 2016 to 25 July 2016. Brood species included ring-necked ducks, mallards, wood ducks, and blue-winged teal. According to the best models, wetland size and temperature may have positively affected detection rates. These results will give WDNR staff in the management unit an example of variables to record in the future for predicting brood abundance and recruitment using replicated point counts.

*Poster Session (P14), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Bart, David**, UW-Madison
Steven Loheide II, UW-Madison
Eric Booth, UW-Madison
Thomas Bernthal, WDNR
Jennifer Breen, UW-Madison

**Missing the water before the well runs dry: The impacts of high capacity wells on Wisconsin calcareous fens**

As the number of high capacity well (HCW) applications rise in Wisconsin, managers and planners must understand their impacts on high-quality, groundwater-fed wetlands if wells are to be sited in an environmentally responsible manner. Calcareous fens are groundwater-dependent, high quality, and rare wetlands that are home to a large number of specialist and rare species and are likely to be impacted by nearby HCWs. Here we present preliminary results of a study comparing floristic quality in fens in areas recognized by hydrologists as within the cone of depression of one or more HCWs ("impacted") and non-impacted fens in the central sands region, near Madison, and in the interlobate, glaciated region of SE Wisconsin. Initial results suggest that impacts are not uniformly realized within or among fens. Overall, on a fen level, weighted Floristic Quality Index (WFQI), weighted mean Coefficient of Conservatism (WCC), and native-species richness were significantly lower in impacted compared to non-impacted fens, while weedy/invasive-species richness and the degree of invasion (DI) were higher in impacted fens. Most rare and specialist species were not found in impacted fens, even when recorded from the site prior to impact. On a plot level, indicators of consistent groundwater influence including saturated soils, upward groundwater hydraulic gradients, and high electrical conductivity, predicted higher WFQI, WCC, native-species richness, and the probability of occurrence of rare, specialist, and highly conservative species. Indicators of lower groundwater influence predicted higher DI and chance of finding several weedy and invasive species. While our study is ongoing, our data to date suggest that HCW-impacted fens are lower quality, less diverse, and more invasible than non-impacted fens.

*Wetlands & Groundwater, Thursday, March 2, Spruce, 10:10-10:30am*

**Bergeson, Tara**, WDNR
Rori Paloski, WDNR
Andrew Badje, WDNR

**The Wisconsin Frog and Toad Survey: What's up, down, old, and new with a 35-year-old citizen science program**

Long recognized as one of the longest running wetland monitoring programs in North America, the Wisconsin Frog and Toad Survey (WFTS) is now 35 years old. The program, coordinated by the WDNR, was initiated in 1981 in response to observed and suspected declines in several Wisconsin wetland species, particularly northern leopard frogs (*Lithobates pipiens*), Blanchard's cricket frogs (*Acris blanchardi*), pickerel frogs (*L. palustris*), and American bullfrogs (*L. catesbeianus*). The WFTS began annual statewide surveys in 1984 and relies on volunteers to conduct annual calling surveys around the state. The primary purpose of the WFTS is to determine the status, distribution, and long-term population trends of Wisconsin's 12 frog and toad species. In addition to the original calling survey routes, which consist of 10 stops along permanent roadside routes, newer phenology surveys have been added recently. These surveys are intended to provide additional information about shifts in the onset of spring and early summer calling that could be related to changes in the timing of the arrival of spring weather conditions in Wisconsin. WFTS volunteer participation was at an all-time high in 2015, with 130 citizen-scientists running 132 traditional survey routes. Species that appear to be on the down-swing in occurrence and abundance include the American Toad (*Anaxyrus americanus*), northern leopard frog, pickerel frog, and mink frog (*L. septentrionalis*). American bullfrogs, Blanchard's cricket frogs, and spring peepers (*Pseudacris crucifer*) continue their long-term upswing in occurrence and abundance with cricket frog observations at the highest levels since the beginning of the survey.

*Symposium: Amphibians, Reptiles & Wetlands: Current Status, Wednesday, March 1, Spruce, 10:40-11:00am*

**Bernthal, Tom**, Friends of Pheasant Branch/WDNR
Patricia Trochlell, WDNR
Janet Kane, Friends of Pheasant Branch

**Twenty years of restoration and community-building at Pheasant Branch Conservancy**

I will outline the history and lessons learned from 20 years of wetland restoration and management activities conducted by the Friends of Pheasant Branch in the wetlands of Pheasant Branch Conservancy, the connections with restoration of prairie and oak opening communities, and the story of making connections with the community of Middleton and the surrounding area. I will describe and critique wetland restoration and vegetation management techniques, treatment and reduction of runoff pollution, community support efforts, and wetland invasives control. I will use recent monitoring data to show the effectiveness of: invasive plant control and vegetation management in maintaining a sedge meadow plant community in the face of shrub invasion; reed canary grass (*Phalaris arundinacea*) reduction to increase species richness and floristic quality at the Frederick's Springs; water cress (*Nasturtium officinale*) removal to maintain a population of round-leaved monkey flower (*Mimulus glabratus*) in the springs area; and control of mixed cattail populations that are spreading through sedge meadow and marsh. I will offer observations and stories that sketch the dynamics of building and maintaining connections with the users of the Conservancy and the entities in the City of Middleton and Dane County responsible for its management.

*Wetland Restoration & Management Case Studies, Wednesday, March 1, Evergreen, 2:10-2:30pm*

**Bougie, Tiffany**, WDNR
Carly Lapin, WDNR
Jim Woodford, WDNR
Laura Jaskiewicz, WDNR

**Wood turtle conservation methods in Wisconsin**

Wood turtles (*Glyptemys insculpta*) are a long lived, low fecundity species facing threats that include road mortality, habitat degradation, and nest predation. More information is needed to identify effective conservation actions to prevent further population loss. We studied wood turtles (a state-listed threatened species) in four study areas in northern Wisconsin from spring 2014 through fall 2016. We captured and processed 149 wood turtles, 32 of which were located 2-3 times per week using radio telemetry and 13 of which were located more frequently using GPS technology to identify nest sites, movement patterns, and road crossings. We created or restored 10 nest sites between two study locations. We covered nests with wire mesh cages and installed electric fences around three nest sites to prevent predation. We identified 83 wood turtle nests between two study areas, 46 of which were protected with various methods. Of the 83 nests, 14 (17%) did not hatch, 26 (31%) were predated, 38 (46%) successfully hatched, and five (6%) had an unknown outcome. Predation rates for protected and unprotected nests were 24% and 44% respectively. Adult turtle survival for 2014-15 was 73% across 2 study areas and adult mortality was due to natural causes (n=8) or road mortality (n=4). Our mark recapture data revealed population sizes of 5 (min. count) and 105 (±32) for study area 1 and 4 (min. count) and 44 (±24) for study area 2. Our population sizes are similar to other wood turtle studies in the region. Average home range sizes for both study areas (95% adaptive kernel) ranged from 7.4 – 20.5 ha. Home range habitat varied with the most common features being forest edges and openings and common vegetation cover of mixed forest, alder, fern, and *Rubus*.

*Wetland Wildlife I, Thursday, March 2, Evergreen, 10:10-10:30am*

**Brown, Josh**, WDNR
Sally Jarosz, WDNR

**The Wisconsin Wetland Conservation Trust: Strategies, partnerships, and lessons learned**

Now in its third year, the Wisconsin Wetland Conservation Trust (WWCT) is a wetland mitigation in-lieu fee program sponsored by the WDNR. It generates funding for the restoration, enhancement, and preservation of wetlands across Wisconsin. This fall, program staff finished the first cycle of proposal reviews for service areas where advanced wetland mitigation credits were recently sold. When evaluating proposals, the WWCT uses a watershed approach that identifies strategic opportunities for restoration of needed ecosystem services in the impacted watershed. As with any program of this scale, challenges arose. Staff learned how best to balance regulatory timelines, project budgeting, and effective partner communication. Evaluation of WWCT success thus far has been limited as we are in the early stages of program implementation. The program is on track to implement several quality wetland restoration projects and to issue a second request for proposals. It is essential that the program's obligation to fulfill wetland credit requirements be prioritized while also completing ecologically-beneficial wetland restoration on the ground. Further, productive relationships between both agency partners and potential grant recipients are necessary to ensure the sustainability of the program and to complete high-quality projects. Going forward, the WWCT will continue to improve and expand in order to provide successful wetland restoration on the landscape that mitigate unavoidable wetland losses across the state.

*Wetland Mitigation, Thursday, March 2, Spruce, 11:00-11:20am*

**Carpenter, Crystal**, UW-River Falls
Kevyn Juneau, UW-River Falls

**The effects of invasive macrophytes on turtle community structure in the Kinnickinnic watershed**

Invasive macrophytes communities that contribute to turtle habitat in wetlands and population declines are often linked to land use changes. It is well known that invasive macrophytes alter water chemistry, compete with native vegetation, and alter habitat structure by changing hydrologic regimes, reducing water flow, and making the water column impassible for animals due to the dense buildup of vegetation. Eurasian watermilfoil and curly leaf pondweed have invaded many of Wisconsin's wetlands, including those in Kinnickinnic watershed, and have had a significant negative impact on the invaded wetlands. A consequence of watermilfoil and curlyleaf pondweed invasion is the reduction of quality habitat for native turtle populations. In this ongoing study conducted throughout the Kinnickinnic watershed, we examine the correlations between invasive macrophytes and 1) turtle species utilizing the wetlands and 2) turtle population sizes within these wetlands. We make wetland management recommendations to help conserve native Wisconsin turtle populations such as the common snapping turtle and painted turtles.

*Poster Session (P10), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Casper, Gary**, Great Lakes Ecological Svcs, LLC
Stefanie Nadeau, Nadeau Consulting
Ulf Gafvert, National Park Service
Mark Hart, National Park Service

**No more guessing: Perfecting frog detections in wetlands through automated acoustic monitoring**

Amphibians have been selected as a Vital Sign for environmental monitoring by the National Park Service in several regions, including the Western Great Lakes Inventory and Monitoring Network covering parks in Michigan, Indiana, Wisconsin, and Minnesota. In 2009 we began developing protocols for monitoring trends in amphibians, which are now being implemented. The program tracks occupancy trends in frogs and toads breeding in wetlands based on acoustic sampling using automated recording systems. Digital acoustic data are collected and archived annually. Data are analyzed using automated call recognition software with a manual proofing procedure that eliminates false presences, coupled with an independent manual survey of the same acoustic dataset. Resultant detection probabilities usually exceed 95% for the 14 species in the Network, returning high confidence in modeled absence. The large sample sizes achieved by this methodology ensure the program is scientifically meaningful, while remaining economically feasible. Annual summary reports are produced along with periodic multi-year trend analyses. The methodology is also excellent for wetland inventory studies, where all breeding frogs and toads can be detected with extremely high confidence.

*Wetland Wildlife I, Thursday, March 2, Evergreen, 9:50-10:10am*

**Casper, Gary**, UWM Field Station
Julia L. Robson, Milwaukee County Parks
Beth Mittermaier, EARTH Ltd
Kristina M. Kroening, Green Roots LLC
Ryne D. Rutherford, Biophilia LLC
Jason M. Dare, Dare Ecosystem Mgmt. LLC

**Plans with benefits: Fish & wildlife habitat recovery in the Milwaukee Estuary Area of Concern**

In 2014 we presented on a set of decision support tools for fish and wildlife habitat planning on local scales. Here we show how these tools are being applied and refined in the Milwaukee Estuary Area of Concern to identify projects and metrics for delisting fish and wildlife habitat and population impairments. We demonstrate how historical species occurrence data are collected and supplemented by field surveys, and how species are then ranked for local conservation status to identify impairments and conservation opportunities. Priority species are thus discovered and their critical habitat components identified. Spatial analyses then identify existing areas of high priority biodiversity, potential restoration projects that maximize benefits to high priority species, and opportunities to improve habitat connectivity. We provide some comparisons to other planning initiatives to demonstrate the effectiveness and added value of this approach. This methodology discovered several new species hitherto unknown from the study area and supported significant changes to species conservation status rankings.

*Wetland Wildlife II, Thursday, March 2, Evergreen, 11:00-11:20am*

**Christoffel, Rebecca**, Snake Conservation Society & Christoffel Conservation

**Snake Conservation Society, Inc.: Using information, communication, and psychology to conserve snakes**

Founded in 2013, Snake Conservation Society, Inc. aims to increase people's knowledge of, respect for, and appreciation of snakes; promote the biological and cultural importance of snakes; and promote responsible management and conservation of snakes. In other words, our goal is to better conserve snake populations by changing the image of snakes in the public's imagination. We use educational outreach techniques that are likely to change people's knowledge levels and attitudes about snakes. Our outreach efforts are based on the results of my doctoral research, which focused on using human dimensions insights to enhance conservation of venomous and non-venomous snakes in the Upper Midwest, USA. Snakes are important components of wetland community biodiversity that function as both prey and predators. In Wisconsin, harmless wetland-dependent snakes, such as common watersnakes (*Nerodia sipedon*), are often mistaken as venomous cottonmouths (also known in the local vernacular as water moccasins; *Agkistrodon piscivorus*) and killed by people. Research results highlight the differences in how people respond to a planned encounter with a snake versus a surprise encounter. I will present on the effectiveness of personal (face-to-face) educational outreach versus mass, indirect outreach techniques to change people's knowledge and attitudes about snakes. I will share outreach materials, based on greater than 20 years of presenting snakes to various audiences with interested audience members, to assist them in their wetland biodiversity conservation work.

*Symposium: Amphibians, Reptiles & Wetlands: Management Approaches, Wednesday, March 1, Spruce, 4:40-5:00pm*

**Chung-Gibson, Melissa**, WDNR
Thomas Berthal, WDNR

**A floristic quality calculator for Wisconsin wetland communities**

An Excel-based calculator is being developed and will be made available to the public by the Water Quality Monitoring Section at DNR specifically to assess the floristic quality of Wisconsin wetland plant communities. The calculator uses the most current Wisconsin flora in line with the Wisconsin State Herbarium and the Coefficients of Conservatism (C-Values) assigned to each species by Wisconsin botanists in 2001. The calculator is designed for use with Timed-Meander survey data; users enter a complete species list of the target assessment area and accompanying estimates of cover, and the calculator returns floristic quality metrics, including mean weighted C and weighted Floristic Quality Index (FQI). Eventually the calculator will result in the assignment of a community-specific condition category (i.e. excellent, fair, poor), for a given wetland plant community based on the results of the Wetland Condition Benchmark Study (currently in progress). The calculator is expected to be of most interest to those conducting wetland monitoring and mitigation, but because it contains the entire Wisconsin flora, it can also be used to monitor and assess upland plant communities.

*Poster Session (P4), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Cooper, Matthew**, Northland College
Todd Redder, LimnoTech
Valerie Brady, U. of Minnesota Duluth
Don Uzarski, Central Michigan University

**Developing a decision support tool to guide restoration and protection of Great Lakes coastal wetlands**

Coastal wetlands are important centers of biotic productivity, nutrient cycling, and various other ecosystem services. However, coastal wetlands throughout the Great Lakes have been impacted by many anthropogenic stressors, which necessitates both restoration of impaired wetlands and protection of well-functioning wetlands. The Great Lakes Coastal Wetland Monitoring Program developed a basin-scale strategy to assess status and trends in wetland condition, generate data to prioritize wetland protection and restoration investments, and track long-term outcomes of those investments. The monitoring program is now in its sixth year. Data generated by the program, including biological as well as chemical/physical conditions, have been incorporated into a new decision support tool, the Great Lakes Coastal Wetland Decision Support Tool (CWDST). The CWDST includes a web-based map interface for users to interact with data such as wetland Indices of Biotic Integrity, occurrence of particular species of interest, surrounding land use and cover, adjacent human population density, and various other datasets relevant to wetland condition. The CWDST also allows users to filter and rank wetlands based on user-selected attributes of interest, visualize results of these scenarios in a mapping environment, and download both the scenario results and source data. The tool is currently being used to prioritize restoration projects in a pilot geography extending from western Lake Erie to Saginaw Bay as part of the Upper Midwest and Great Lakes Landscape Conservation Cooperative's Landscape Conservation Design process. The CWDST has recently been expanded to coastal wetlands throughout the states of Michigan and Ohio, and along Wisconsin's Lake Michigan shoreline.

*Wetland Assessment, Wednesday, March 1, Evergreen, 3:40-4:00pm*

**Danz, Nicholas**, UW-Superior

**Connections between human caused stress, wetland setting, and vegetation in the St. Louis River estuary**

The extensive wetland complexes lining the meandering river channel and occurring in numerous protected shallow areas are perhaps the most important ecological features in the lower portion of the St. Louis River estuary. These wetlands provide habitat for fish and invertebrates, support several rare species, increase hydraulic residence time, and reduce sediment and nutrient inputs into Lake Superior. Yet, there has been minimal published scientific work to evaluate status and spatial patterns of wetland plant composition and floristic quality throughout the estuary. In this project, our research team combined georeferenced vegetation data on over 6000 survey plots from 15 projects that took place between 2001-2015 in the estuary to create a system-wide synthesis of wetland floristic quality. We calculated Mean Coefficient of Conservatism (Mean C) values as a measure of floristic quality and related this measure to wetland hydrogeomorphic setting, a watershed-based index of human stress, and plant community composition. Our findings show that, whereas plant community composition was strongly influenced by water depth, floristic quality was weakly related to water depth. We found a moderately strong relationship between floristic quality and human disturbance factors. We used this relationship to define reference sites, which had Mean C cutoff of approximately 5.0. Our analysis also showed the plant species that typify reference sites. These results are being used to prioritize and monitor remediation and restoration activities in the estuary.

*Wetland Connections, Wednesday, March 1, Evergreen, 11:40am-12:00pm*

**Dugan, Hilary**, UW-Madison
Greta Helmueller, UW-Madison
John J Magnuson, UW-Madison

**Ice formation and the risk of chloride toxicity in shallow wetlands**

Across Midwest and northeast North America, chloride concentrations are increasing in freshwater streams, lakes, and groundwater as a result of runoff from road salt application. We examine the process of ice formation in shallow water bodies as an additional threat of chloride toxicity in systems already impacted by excess chloride loading. Our focal system was the 1918 Marsh, a small, shallow (< 1 m) wetland situated in an urban setting on the shore of Lake Mendota in Madison, WI. At three open -water sites, and at a storm sewer inlet, chloride concentrations were measured bi-weekly over the winter of 2014-2015 (See Helmueller et al. this conference). Changes in ice thickness were correlated strongly with changes in chloride concentration. To understand the role of ice formation and ion exclusion in the 1918 Marsh, we constructed a simple numerical model to predict concentrations beneath the ice. We found that in a shallow water body with long water residence time, ice thickening can double chloride concentrations from chloride exclusion as the water freezes. In the 1918 Marsh, and many urban water bodies, where chloride levels already are elevated above background levels from road salt runoff, ice formation can push concentrations beyond toxicity thresholds for much of the winter. The compounding effects of road salt runoff and ice thickening should be considered in the management of water quality and ecosystem health in shallow urban water bodies.

*Poster Session (P7), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Eggers, Steve,** Senior Ecologist, USACE

**Performance standards for target hydrology at wetland compensatory mitigation sites**

Hydrology drives wetland systems. Therefore, an essential component of measuring the success or failure of wetland compensatory mitigation is evaluating the hydrology established at compensation sites. Regulatory agencies use performance standards—observable, measurable and enforceable attributes—for this purpose. Previously, performance standards often specified the minimum criteria for wetland hydrology per the USACE wetland delineation manual/regional supplements: ≥14 consecutive days of inundation and/or a water table ≤12 inches below the soil surface during the growing season in most years (≥50% probability). This **minimum**, however, is not the **optimum** for establishing many targeted wetland plant communities. It is much too dry for wetland restorations and associated plant communities on organic soils, for example. To rectify this situation, the St. Paul District developed target hydrology performance standards matched to target plant communities. I will be presenting the background, components and rationale for the target hydrology performance standards currently applied by the St. Paul District.

*Wetland Assessment, Wednesday, March 1, Evergreen, 4:40-5:00pm*

**Feggestad, Aaron**, Stantec Consulting Svcs, Inc.
Joseph Roth, Openlands
William Glass, USFS

**Wetland restoration at Midewin National Tallgrass Prairie, Will County, Illinois**

Midewin National Tallgrass Prairie (MNTP) was established in 1996 with transfer of lands from the U.S. Army to the U.S. Department of Agriculture – Forest Service (USFS) through the Illinois Land Conservation Act. This National Grassland reserve, located 60 miles southwest of downtown Chicago, has undergone wetland and prairie restoration since 2002. Wetland restoration is currently underway on more than 350 acres through an ongoing partnership between the USFS and Openlands, a Chicago-based conservation organization. Drummond South, a 205-acre parcel funded under the USACE-Chicago District in-lieu fee program, is the focus of this presentation. The Drummond South parcel had a long history of disturbance from agriculture and industrial development prior to the start of restoration in 2009. We will focus on the challenges associated with coordinating various site interests, including managing for potential impacts on utilities, legacy infrastructure and land use, adjoining private parcels, nearby industries, and remnant wet dolomite prairie. We will also discuss successes and lessons-learned from various phases of the project, including wetland hydrology planning, stakeholder outreach, adaptive management and site monitoring, and novel techniques for control of emergent invasive species.

*Wetland Restoration & Management Case Studies, Wednesday, March 1, Evergreen, 2:50-3:10pm*

**Geddes, Pamela**, Northeastern Illinois University

**Extinction by hybridization: A probable fate for a native cattail species**

Wetlands provide important ecosystem services but invasive plant species can greatly compromise these services. In the midwestern US, two wetland plant species—native *Typha latifolia* and exotic *T. angustifolia*—hybridize to form *T. x glauca.* The exotic parent *T. angustifolia* and the hybrid are very aggressive, forming dense monocultures and reducing plant biodiversity. Due to variable morphology and hybridization, *Typha* species are difficult to identify in the field. In addition, the extent of hybridization across the Midwest is not well documented. Our goal was to use molecular tools that discriminate between the parent taxa and hybrids to quantify hybridization rates in cattail populations across the Midwest. After sampling plants from 39 populations in 7 states, we found that approximately 11% of populations sampled contained pure *T. latifolia*, while approximately 5% contained pure *T. angustifolia*. We also found not only first-generation hybrids (i.e., *T. x glauca*) but also advanced-generation hybrids, suggesting *T. x glauca* backcrosses to either parent or with other hybrids. We also found that morphological traits are likely to lead to high error rates when identifying *Typha* species in the field because visual identification of those traits cannot pick up small differences among species and even less so for hybrids. Our data suggest that hybrids are replacing both parental species within the Midwestern region, and that hybridization could lead to extinction of native *Typha latifolia*. Implications for cattail species management may thus require efforts to preserve the native parental species through seed banking and/or other approaches.

*Wetland Invasive Species, Thursday, March 2, Stonefield, 9:50-10:10am*

**Hagenow, Kari**, The Nature Conservancy
Krista Lutzke, Door Co. Soil & Water Cons. Dpt.

**Engaging municipalities and citizens in the battle against *Phragmites***

In 2012, the Door County Soil & Water Conservation Department and Door County Invasive Species Team (DCIST) began four years of control work that resulted in the inventory and chemical treatment of non-native *Phragmites* on more than 250 miles of shoreline and hundreds of acres within wetlands and right-of-ways. As funding for these treatments diminished, a new blueprint for maintaining the work though landowner outreach and municipal engagement emerged. DCIST is now working with towns to pass local weed ordinances that include *Phragmites*. The partnership is also working with local landowner associations to train volunteers on inventory and control methods they can utilize. Most of the previously treated *Phragmites* infestations are at a size and density that it is either manageable for a team of association members (certified in pesticide application) to treat or much less expensive to hire a contractor to follow up on. The project focus is about educating and empowering those at a local level to keep their shorelines *Phragmites*-free when large-scale control efforts are not taking place. We'll share the steps we have taken to do this.

*Wetlands and People, Wednesday, March 1, Stonefield, 3:40-4:00pm*

**Hamerla, Chris**, Golden Sands RC&D Council

**Wisconsin trappers: Invasive species partners on land, in water, and at all points in between**

Trappers typically cover many miles, reusing equipment in numerous waterbodies and properties. Trappers have a good knowledge of habitat and can be very useful eyes on the landscape. While many are aware of invasive species, they may not think or be aware of steps they can take to prevent the spread of invasives. This poster shows how we can reach out to trappers to encourage them to prevent the spread of invasive species by cleaning equipment before moving to a new location. And while this poster is directed toward trappers, the same message pertains to waterfowl hunters and anyone enjoying wetlands: clean your equipment and footwear before going to a new place. The poster shows the benefits of healthy wetland interactions through important roles of diverse, native plant and animal communities: reducing runoff and flooding while creating improved shelter, food, and water quality. Invasive species can negatively affect healthy interactions by displacing native species and introducing viruses and disease and helping them spread. Finally, educators will find this poster useful as a checklist of things to cover when engaging the trapping community/ wetland visitors and potentially open doors to new partnerships and volunteers.

*Poster Session (P11), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Hart, David**, WI Geological & Natural History Survey
Sarah Gatzke, The Nature Conservancy
Daniel Feinstein, USGS
Charles Dunning USGS

**A multi-instrument stream survey through Mukwonago River Basin wetlands**

Healthy calcareous fens depend on high quality groundwater discharge. For this reason, we are developing a groundwater flow model to determine groundwater recharge areas for the fens of the Mukwonago River basin. Those areas can then be part of land use planning to maintain the quality and quantity of groundwater discharge to the fens. To support the groundwater model, we collected multi-instrument data in the Mukwonago River where it passes through wetlands. These data and more traditional hydrogeologic data collected from wells installed in the wetlands were collected to improve representation of the stream and wetlands in the model. On two surveys down the Mukwonago River, we collected temperature, pH, fluid conductivity, video, stream depth, stream bed sediment type, and stream stage. Stream discharge was measured at multiple locations along the Mukwonago River. The instrumentation was deployed from canoes and kayaks to allow access to the shallowest stream sections. Analysis shows that water clarity and vegetation can be linked to stream reaches of cooler and warmer water with different chemistries. We will extend the data acquisition to include geophysics and depth finders to continuously characterize the thickness, electrical conductivity, and hardness of the stream bed and a sonde to continuously collect pH, temperature, conductivity, dissolved oxygen, and nitrate concentrations in the stream. We hope to link the stream data with the wetland observations so that we can identify links between groundwater, the wetlands, and the river. The motivation for this and future efforts is to better characterize groundwater/surface-water interactions in streams and wetlands.

*Wetlands & Groundwater , Thursday, March 2, Spruce, 9:50-10:10am*

**Hay, Robert**, Turtles For Tomorrow
Joshua Kapfer, UW-Whitewater

**A conservation program to address wood turtle recruitment on rivers in Northern Wisconsin**

Wisconsin's turtles have experienced an increase in nest predation rates in recent decades related to the growth of mid-sized mammalian predators, especially raccoons. As a result, the wood turtle (*Glyptemys insculpta*), a Wisconsin threatened species, has been impacted by low hatchling production. Surveys and nest site evaluations funded by the American Transmission Company from 2006 to 2009 found that nest predation rates for wood turtles were extremely high, while also identifying a significant shortage of natural nesting sites resulting from natural succession. This has caused many female Wood Turtles to nest at bridge crossings, along roads that closely parallel rivers, or along ATV trails. This nesting behavior results in easy nest detection and predation by mammals. In addition, adult female mortality associated with road nesting can be heavy, and in some cases is likely unsustainable. To address these threats, Turtles for Tomorrow, with funding support from We Energies, has initiated a nest-site creation and restoration program to provide more suitable nesting habitats for turtles away from roads. Visual monitoring of these sites had indicated only a slight increase in hatch rates until we began to install electric fences around these sites. A camera monitoring program was initiated with UW-Whitewater in 2015 to document predation rates on fenced vs. non-fenced sites. To date, 19 nesting sites have been created or restored involving 11 rivers across northern Wisconsin. Fourteen of the 19 sites have electric fences. Results to date have been very encouraging, with no detected mammalian predation at 11 of 14 electric fenced sites. Four electric fenced sites were monitored in 2015 and 2016 yielding 234 hatchlings.

*Symposium: Amphibians, Reptiles & Wetlands: Emerging Threats, Wednesday, March 1, Spruce, 1:30-1:50pm*

**Helmueller, Greta**, UW-Madison
Hilary Dugan, UW-Madison
John Magnuson, UW-Madison

**High chloride concentrations in and around a shallow wetland: Seasonality and sources**

The Class of 1918 Marsh is a wetland on the UW-Madison campus. Chloride seeps into the marsh from adjacent streets, parking lots, and an excess-snow storage site. We regularly sampled surface waters in and around the marsh from 2012 to 2015. Chloride was measured with ion exchange chromatography by the long-term ecological research chemistry laboratory. Findings were: 1) toxic levels of chloride occurred on some dates in winter, spring, summer and fall; 2) levels differed among years and seasons; and 3) legacy concentrations occurred in the non-snow seasons even after the snow storage pile had fully melted. Chloride concentrations at the storm sewer inlet actually increased during the non-snow seasons, but at the outlet to Lake Mendota they declined slowly, although not quite to base levels, in the non-snow seasons. Concentrations in the open waters of the marsh were influenced by extrusion of chloride from the waters as the ice thickened (see Dugan et al. this conference) and from inflow of ground waters ranging from high from the snow pile area to low from a large area of the watershed without major sources of chloride.

*Poster Session (P8), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Henderson, Richard**, WDNR
Pat Trochlell, WDNR
Ken Wade, consulting hydro-geologist

**Wetland restoration in organic peat/muck soil: DOT mitigation site year 5**

In 2012, a wetland mitigation restoration was begun on a 5-acre deposit of peat/muck substrate in the Driftless Area of southwest Wisconsin. The site is supplied by high pH groundwater under artesian pressure. Approximately 85% of the peat deposit had been tile-drained in 1950 (or earlier) and was cropped until 1980, when tile failure began to occur. Since then, much of the upper soil layer has remained dry for extended periods, facilitating oxidation over time. In 2011, six ground-water monitoring wells and a vegetation sampling grid were established across the site. In March 2012, the tiles were removed. As the tiles were pulled, the trenches quickly filled with water. Within hours, all low areas had standing water. Within 12 months, the soil was completely re-hydrated. In April 2012, the site was planted with 118 pounds of seed (54 species), and 1,070 root-plugs (16 species). By 2016 (5 years out), the number of native species detected within the quadrats went from 28 to 65, and the site's mean non-weighted Coefficient of Conservatism (CC) value of all species went from 3.03 to 3.90. The weighted mean CC improved from 2.29 to 3.98. Reed canary-grass is the greatest challenge to recovery. It is declining (Importance Values (IV) went from 19% to 7%), but it is still the second most prevalent species. On the upside, the IVs of all sedges combined went from 3% to 12%, and the IVs of oxidation disturbance indicators (stinging nettle and giant ragweed), went down from 8% to 1%. Starting in the first year, and each year since, 6 species of dragonflies, 8 species of toads & frogs, 4 species of waterfowl, 6 species of shorebirds, and a pair of sandhill cranes have made use of the site.

*Wetland Restoration & Management Case Studies, Wednesday, March 1, Evergreen, 1:30-1:50pm*

**Highsmith, Tod**, Wisconsin Wetlands Association
Mike Mossman, WDNR (retired)
Alice Thompson, Thompson & Assoc.

**Wetland connections between science and poetry**

What started off as a one-time reading of wetland poetry, initiated by wetland scientist and poet Mary Linton, has become an annual addition at this conference. We recognize the unique connections we make to wetlands and their watery environment that are captured by poetry. Take a moment during this conference to listen to how poets speak to the ecosystem that we more commonly seek to understand through science. Handouts with wetland poetry will be available.

*Wetlands and People, Wednesday, March 1, Stonefield, 4:40-5:00pm*

**Houghton, Christopher**, UW-Green Bay
Patrick Robinson, UW-Green Bay
Brian Glenzinski, Ducks Unlimited
Matt Dornbush UW-Green Bay
Brie Kupsky UW-Green Bay
Collin Moratz, UW-Green Bay

**An assessment of aquatic vegetation in Duck Creek delta before and after construction of the Cat Island Chain**

One of the goals for the restoration of the Cat Island Chain in lower Green Bay, Wisconsin, is to rehabilitate wetland complexes around the Duck Creek delta and Peats Lake. These wetlands were historically much larger than they are today and contained diverse emergent and submergent aquatic vegetation that are important fish and wildlife habitat. The Cat Island Chain, completed in 2013, was anticipated to act as a wave barrier that would decrease the effective wave fetch, allowing for regrowth of aquatic vegetation. Surveys were conducted in the summers of 2013, 2014, and 2016 using a point intercept method to determine if aquatic vegetation is returning to the study area. A paired survey was conducted at Dead Horse Bay near Long Tail Point to control for yearly variations in weather conditions and water depth. We report on an apparent increase in aquatic vegetation species presence within the study area as well as an increase in areal extent and density of aquatic vegetation. However, the areal extent of vegetation within Dead Horse Bay in 2016 also increased, confounding efforts to assess the effect of the Cat Island Chain on aquatic vegetation.

*Native Wetland Flora & Plant Communities, Wednesday, March 1, Stonefield, 11:20-11:40am*

**Ibach, Andrew**, UW-Whitewater
Joshua Kapfer, UW-Whitewater
Joseph Mozuch, UW-Whitewater
Nicholas Rudolph UW-Whitewater
Lisa Mitchem, UW-Whitewater
Karl Rutzen, UW-Whitewater
Katie Hausmann, UW-Whitewater
Samantha Foster, Turtles for Tomorrow
Robert Hay, Turtles for Tomorrow

**Spatial ecology and habitat use of headstarted Blanding's turtles in southern Wisconsin**

Blanding's turtle (*Emydoidea blandingii*) populations in Wisconsin have declined due to habitat destruction and high nest or juvenile predation. Headstarting (rearing of eggs/juveniles in captivity to reduce predation rates) is a conservation tool often used to offset turtle mortality in young age classes, but little is known about the habitat selection and spatial ecology of headstarted Blanding's turtles after they are released. Our goal was to obtain this information by tracking turtle movements and habitat selection with radio telemetry. We collected eggs from wild-caught females in 2012. These 19 eggs/juveniles were raised in captivity and then tracked with radio–telemetry equipment after their release the following summer. Released turtles were located once/week with radio telemetry during the active season through fall of 2016. In the summers of 2015 and 2016 we also collected eggs from multiple females, which we incubated and hatched in captivity. These hatchlings were immediately released without additional headstarting measures and tracked for the remainder of each summer (4–8 weeks/ year) to assess the same parameters as with the headstarted turtles. We then compared movement and habitat used by headstarted vs non-headstarted turtles. We frequently found turtles in permanent wetlands dominated by sedge/reed canary grass. Tracked headstarted turtles had an average home range size of 16.32 Ha while non headstarted hatchling turtles were found to have an average home range of 1.31 Ha. This difference is likely due to the larger body size of the headstarted turtles and the differences in tracking periods. Overall, headstarted Blanding's turtles seem to possess larger homeranges than non-headstarted hatchlings.

*Poster Session (P15), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Kamke, Kaira**, UW-Stevens Point

**Effects of drawdown history and vegetation type on aquatic invertebrate metrics in a managed wildlife area**

Aquatic invertebrates constitute a base level of the food web and can also be used to measure biological activity of water bodies such as lake and wetland habitats. As a primary food source for ducks and other waterfowl, these organisms provide a key source of protein during breeding and migration seasons. This study examined the abundance, diversity, and biomass of aquatic invertebrates sampled in managed flowages at George W. Mead Wildlife Area in Milladore, Wisconsin. Samples were taken from four flowages with different drawdown years between 2012 and 2015 in shallow areas of emergent, floating, and submersed vegetation communities to determine the effects of hydroperiod history and vegetative type on invertebrate metrics. Samples were taken using a fixed-volume cylinder and net sweeps with three replicates of each vegetation community within each flowage. This presentation will focus on samples from North Townline flowage, which was drawn down in 2013. Preliminary data show that the highest abundance of invertebrates is present in areas with floating vegetation or a combination of floating and emergent vegetation. Further data analysis and replication will help determine definitive trends in the effect of hydroperiod history on macroinvertebrate communities. Final results of optimal vegetation types and drawdown cycles could have implications for management strategies across the Midwest to provide ideal invertebrate habitat, which will increase waterfowl usage of migratory and nesting habitats.

*Wetland Wildlife I, Thursday, March 2, Evergreen, 9:30-9:50am*

**Kapfer, Josh**, UW-Whitewater
Andrew Ibach, UW-Whitewater
Joseph Mozuch UW-Whitewater
Nicholas Rudolph, WDNR
Lisa Mitchem, University of Illinois
Karl Rutzen, UW-Whitewater
Katie Hausmann, UW-Madison
Samantha Foster, Turtles for Tomorrow
Robert Hay, Turtles for Tomorrow

**Survival of headstarted and non–headstarted hatchling Blanding's turtles in Southern Wisconsin**

Blanding's turtle (*Emydoidea blandingii*) populations in Wisconsin have likely declined due to habitat destruction and high nest or juvenile predation. Headstarting (captive rearing of eggs/juveniles) protects against egg predation and increases turtle size, presumably making the juveniles more difficult for predators to consume. However, limited research has assessed the behavior and survival of headstarted Blanding's turtles post-release. We addressed knowledge gaps through a long-term radio telemetry study of headstarted Blanding's turtles. We collected Blanding's turtle eggs in 2012 and captive reared hatchlings for ca 10 months. In summer 2013, we affixed 19 with transmitters and released them on-site. We located turtles once per week during the active seasons from 2013 to present. Since the release, 10 of 19 turtles died (52.6% mortality) while 8 were lost due to equipment failure or inaccessibility. Sources of mortality ranged from predation to apparent winterkill. For comparison, we tracked behavior and survival of hatchling turtles that were not headstarted post-hatch. In 2015 and 2016, 7-10 eggs were collected from females at the same location and hatched in captivity. These were immediately released and tracked via telemetry for 4-8 weeks. With the exception of one turtle, all tracked hatchlings in both years survived at least four weeks despite undertaking long movements from the release point and experiencing mild drought conditions. After four weeks, some turtles lost their transmitters, but remaining individuals were still alive at eight weeks post-release. These results provide insight into the application of headstarting vs. nest protection measures to help offset Blanding's turtle mortality in young age classes.

*Symposium: Amphibians, Reptiles & Wetlands: Management Approaches, Wednesday, March 1, Spruce, 4:20-4:40pm*

**Kotar, John**, UW-Madison

**An ecological site classification system for wetland forests of Northern Wisconsin**

A site classification system for upland forests, based on floristic composition (forest habitat types), has been available to natural resource managers in Wisconsin for many years. A similar system has recently been completed for wetland forests of northern Wisconsin. In its application, the system uses dichotomous keys on plant species present to identify site types. The types are depicted on graphs as clusters of sample plots ordinated along the soil moisture and available nutrient axes. Ecological interpretations and management implications for individual types are provided. The system offers a tool for evaluating and categorizing successes and failures of common management practices in wetland communities, up until now categorized simply as “swamp conifers” and “swamp hardwoods”. The system also shows promise for prioritizing and directing management activities in wetland forests in light of rapidly advancing threat of emerald ash borer infestation and other forest health threats. This new tool will be available online for forest resource managers to use in making management decisions.

*Native Wetland Flora & Plant Communities, Wednesday, March 1, Stonefield, 11:00-11:20am*

**Kraszewski, Sarah**, Stantec Consulting Svcs, Inc.
Jeff Kraemer, Stantec Consulting Svcs, Inc.

**Successful compensatory wetland mitigation: Upper French Creek wetland mitigation site**

The expansion of a manufacturing facility in southwestern Wisconsin permanently impacted wetlands. Wetland mitigation was necessary to compensate for these wetland impacts. We will discuss the challenges and successes of the restored wetland complex that has resulted from this project. Stantec worked with the client, WDNR, and USACE to identify a suitable property for wetland mitigation. The Upper French Creek Mitigation Site located in the Town of Ettrick, Trempealeau County, consisted of previously drained agricultural cropland and was selected as the most suitable site for compensatory mitigation. Site preparation, construction, and plant installation occurred from 2005-2008. 2017 is the final year of performance based management and monitoring per the ten-year performance period for this site. This property has been transformed from drained agricultural lands and cow pasture into naturalized wet meadow, sedge meadow, (trending) southern lowland forest, and mesic prairie that provide critical wetland function to the area, provide wetland connection and buffer to the Upper French Creek, and can be passively managed following project closeout. We will discuss the factors that have contributed to the success of this mitigation site; specifically site selection, design and planning, hydrologic restoration, implementation and installation of site-appropriate wetland and upland buffer plant communities, vegetation management, and monitoring.

*Wetland Mitigation, Thursday, March 2, Spruce, 11:20-11:40am*

**Kupsky, Brianna**, UW-Green Bay
Patrick Robinson, UW-Green Bay
Brian Glenzinski, Ducks Unlimited
Mathew Dornbush, UW-Green Bay

**Bringing green back to the Bay: Identifying the restoration potential of a degraded aquatic ecosystem**

The eutrophication of aquatic habitats is a primary driver of ecosystem degradation, often culminating in a switch from a macrophyte-dominated clear water state to a phytoplankton-dominated turbid water state. While numerous studies have documented the ecological implications of this switch, subsequent reductions in terrestrial nutrient and sediment loading do not consistently result in predictable reversals back to macrophyte dominance. Active re-introduction of aquatic macrophytes at appropriate scales may disrupt these feedbacks, though our current understanding of the ways by which planting scale, species combinations, and habitat conditions interact to drive restoration success is insufficient to initiate large-scale restoration projects with confidence. We evaluated the potential for restoration of *Vallisneria americana* (wild celery) in the Lower Bay of Green Bay in 2015 and 2016 by altering restoration size and the incorporation of the facilitating species *Schoenoplectus acutus* (hardstem bulrush). While we found no significant effect of restoration size or interspecific facilitation on *V. americana* survival in either year, mean *V. americana* survival among all restoration sites exceeded 90% in 2015, and 110% in 2016. Interestingly, subsurface light levels were found to contradictorily influence *V. americana* survival between the establishment and second year. Our results provide insight into the factors limiting the re-establishment of submersed aquatic vegetation in altered systems such as the Bay of Green Bay, suggesting a more limited role of light and greater role of propagule limitation than previously recognized.

*Wetland Connections, Wednesday, March 1, Evergreen, 11:00-11:20am*

**Lannoo, Michael**, Indiana University

**Amphibians shift wetland occupancy with hydrologic cycle**

We explore the idea that spring- and summer-breeding amphibian guilds, as well as the fish guild, occupy different wetland types depending on hydrologic cycle. In 2014, we sampled the same 130 restored prairie pothole wetlands using the same methods as those sampled and employed by Stiles and colleagues in 2012. The difference was that the winters of 2012–2013 and 2013–2014 were dry and cold, harsh conditions for overwintering summer-breeding amphibian larvae and fishes. Comparing 2014 to 2012 data, we found that: 1) northern leopard frogs (*Lithobates pipiens*) occupied fewer (50 vs. 80) but larger wetlands; 2) eastern tiger salamanders (*Ambystoma tigrinum*) occupied an equal number of wetlands (41 vs. 42), but shifted occupancy to larger wetlands; 3) American bullfrogs (*L. catesbeianus*) occupied far fewer wetlands (3 vs. 19); and 4) fishes occupied far fewer wetlands (10 vs. 44). Neither bullfrogs nor fishes shifted wetland type. We confirm the hypothesis that occupancy of wetlands by aquatic vertebrate guilds varies by hydrologic cycle. We suggest that short-term studies of amphibian occupancy may generate incorrect conclusions and reinforce the idea that pond-breeding amphibians require a variety of wetland types to sustain breeding across a range of environmental conditions.

*Symposium: Amphibians, Reptiles & Wetlands: Emerging Threats, Wednesday, March 1, Spruce, 1:50-2:10pm*

**Little, Amanda**, UW-Stout

**Ephemeral pond plant communities: Unique and worthy of conservation**

Ephemeral ponds (EPs) are small wetlands that typically dry annually and are frequently valued for their ability to support amphibians and unique macroinvertebrates. Wisconsin EP vegetation is understudied. We compared permanent wetland (PW) vegetation to that of EPs in order to describe 1) important organizing environmental gradients, 2) functional group structure, and 3) diversity patterns including shared species. We studied the vegetation and environment of 57 wetlands (32 EP, 25 PW) in the Chippewa Moraine region. Wetlands fell into three groups: EPs (n = 32), sedge meadows (SM, n =11), and lacustrine fringe wetlands (LF, n = 14). EPs had high nutrient levels, small area, and lower water temperatures compared to PWs. Both EPs and PWs were variable in water depth, pH, peat depth, and tree basal area. EPs had a higher proportion of woody indicator species (50%) compared to PWs (9.1%). Both PW types had a large proportion of graminoid cover, while EPs had higher proportions of annual, fern, and woody vegetation. Species richness guild structure was similar between the PWs but EPs had a significantly higher proportion of woody plants species. Both EPs and LFs had significantly lower site-level diversity than SMs. EPs had significantly higher among-wetland diversity than LFs or SMs. A large proportion of the dissimilarity was due to different species and not simply loss of species. The mean proportion of EP species that were also found in permanent wetlands was relatively low (~30%). EPs shared roughly the same proportion of species with SMs as they did with LFs. Although EP plant species in the glaciated Upper Midwest may not be highly specialized or endemic, the EP plant community is relatively distinct from PW types and therefore worthy of conservation.

*Poster Session (P22), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Lulloff, Alan**, Assoc. of State Floodplain Managers
Nathan Woiwode, The Nature Conservancy
Karl Schrass, National Wildlife Foundation

**Nature-based solutions to flood risk reduction**

The mission of the Association of State Floodplain Managers (ASFPM) is to promote education, policies and activities that mitigate current and future flood losses, and to protect the natural and beneficial functions of floodplains. ASFPM recently has been involved in some noteworthy projects focused on nature-based solutions to flood risk reduction. 1) Natural Defenses in Action: Harnessing Nature to Protect Our Communities—The National Wildlife Federation in collaboration with ASFPM has published a report that highlights the important role that natural and nature-based approaches play in reducing the mounting risks from natural hazards. The report profiles a dozen case studies that highlight examples of how natural defenses are being put to use to avoid or reduce hazard risks. 2) The Naturally Resilient Communities project aims to provide county and municipal leaders—elected and professional staff— with web-based tools to envision how natural or nature-based flood reduction strategies can work in their community. The project is a partnership between The Nature Conservancy, The American Planning Association, ASFPM, and The National Association of Counties to help communities determine the role nature can play in reducing flood risk. The tools include an online siting guide and catalogue of case studies that allow users to learn about the benefits of nature-based solutions, explore which solutions might address their particular flooding concerns, and provide some initial guidance on implementation and next steps. This session will highlight some of the best practices identified and include a demonstration of the on-line siting guide.

*Wetland Connections, Wednesday, March 1, Evergreen, 10:40-11:00am*

**Marti, Aaron**, WDNR
Thomas Bernthal, WDNR

**Connections between soil physicochemistry and wetland condition in Wisconsin's Southern Lake Michigan Basin**

Inverse relationships between the condition of natural wetlands and various metrics of landscape-level and within-site human disturbance (e.g. land use intensity, agricultural and urban development) have been observed in previous studies in Wisconsin and the Upper Midwest. However, human disturbance metrics are arguably a broad surrogate measure of change in quantifiable in-wetland physicochemical variables that may directly affect wetland condition. Few studies have fully addressed these disturbance-physicochemistry-condition relationships using condition metrics commonly quantified by wetland ecosystem managers (e.g. Floristic Quality Assessment). To begin addressing this knowledge gap, WDNR completed an "Intensification Study" of the 2011 USEPA National Wetland Condition Assessment using the same site selection methods, field methods, and lab analyses as the national study. This allowed for statistically-valid and spatially-representative estimates of the extent of wetland condition and ecosystem stressors within the study area (Wisconsin's Southern Lake Michigan Basin), and provided opportunity for exploration of how quantifiable in-field soil physicochemical variables may affect wetland condition. We briefly review the baseline of wetland condition established using the Wisconsin Floristic Quality Assessment Method and focus more specifically on soil physicochemical drivers of wetland condition within the study area. We will discuss further WDNR research to explore these patterns, as well as the potential for greater application and incorporation of soil physicochemistry analysis as part of wetland practice.

*Wetland Assessment, Wednesday, March 1, Evergreen, 4:20-4:40pm*

**Marti, Aaron**, WDNR
Thomas Bernthal, WDNR

**Bridging connections among *Phalaris arundinacea*, Plant communities, and soil Physicochemsitry**

Reed canary grass (*Phalaris arundinacea*; PA) is a pervasive invasive plant species of wetlands throughout Wisconsin and the Upper Midwest. Studies throughout past decades have focused on the physiology, drivers of abundance/spread, and potential ecological implications (e.g. plant community diversity, wildlife habitat degradation, loss or alteration of ecosystem services, etc.) of PA, and some provide an underlying assertion that PA alone acts as a driver of change in wetland ecosystem structure and function. However, fewer studies have examined whether the drivers of PA establishment, abundance, and spread are in fact mutual drivers of decline in wetland (floristic) condition, which would suggest that PA acts more as a co-driver/passenger to the effects of other forms of ecosystem degradation (e.g. wetland hydrologic/ physicochemical changes from land use practices/conversion). This presentation will focus on results of the 2011-2012 Wisconsin Intensification Study, a WDNR project that established a baseline of wetland condition and investigated potential soil physicochemical drivers of condition and PA abundance in Wisconsin's Southern Lake Michigan Basin using USEPA National Wetland Condition Assessment methods. Condition (floristic quality) was inversely correlated to PA abundance and oxalate-extractable soil phosphorus concentrations/metrics. However, the relationship between condition and PA abundance had greater observed variability (particularly at low PA abundances) than oxalate-extractable soil phosphorus concentrations/ metrics, and PA abundance was only weakly correlated with these soil metrics. This complex synergism refutes the simple underlying PA "lone ranger" paradigm commonly found in the literature and warrants further exploration.

*Poster Session (P9), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Martinez-Soto, Kayla**, Northeastern Illinois U.
Pamela Geddes, Northeastern Illinois U.

**The use of microsatellites to genetically identify a potential invader, *Typha domingensis,* in the Midwest**

There has been speculation that *T. domingensis* is moving north from its native habitat to areas in the midwestern United States, presumably by human transport and increased global warming. The presence of *T. domingensis* can be a threat to the native cattail species of the midwest region, *T. latifolia*, because *T. domingensis* could hybridize with the native, or the other midwestern species, exotic *T. angustifolia.* It is difficult to accurately identify cattail species morphologically due to hybridization that causes similar phenotypes. In order to determine whether *T. domingensis* has indeed migrated and established in the Midwest, we used molecular tools (microsatellites) to address if this technique was useful in distinguishing *T. domingensis* from the other *Typha* species. We tested 6 microsatellite primers that have been previously used by our lab to distinguish among the 3 *Typha* species on 11 *T. domingensis* samples. Our preliminary results showed that out of the six primers used, all 6 amplified *T. domingensis* DNA. However, only 4 primers provided possible "unique" molecular signals for *T. domingensis*; the other 2 primer's molecular signals overlapped with those of *T. angustifolia* and *T. latifolia.* Further testing is needed to accurately conclude if the primers are specific enough to distinguish *T. domingensis* from the other three cattail species. By using microsatellites, conservationists could accurately identify certain species rather than mistaking them for native or invading species that may have been incorrectly identified morphologically.

*Poster Session (P12), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**McClenon, Marci**, Beloit College
Tawnya Cary, Beloit College

**Land-usage as a predictor for *Ribeiroia ondatrae* infection in amphibians through intermediate host prevalence**

Infection by the trematode *Ribeiroia ondatrae* has been identified as an emerging parasitic infection affecting anuran communities in the Northern USA, especially in areas with high agricultural run-off. Snails of the Planorbidae family are intermediate hosts for the trematode, and increased snail prevalence has been linked with higher incidence of *R. ondatrae* infection. To study the potential risk of *R. ondatrae* infection in frogs of southern Wisconsin, we tested the application of Geographic Information Systems (GIS) as a tool to find ponds with increased Planorbidae snails. To do this, we identified ponds with watersheds covering a range of agricultural land-use, and then conducted a survey of water quality and snail populations in those ponds (Avon Bottoms Natural Area, Wisconsin). We found that snail abundance was positively correlated with water PO43- concentration (P=0.060, R2=0.231). The proportion of the total snail population belonging to Planorbidae was also positively correlated with water PO43- concentration (P=0.038). Although GIS analysis identified a range of 0–60% agricultural influence on the ponds surveyed, the model failed to detect significant differences in snail abundance among ponds (P=0.258). There was a positive correlation between pond watershed area and PO43- (P=0.034). GIS modeling may become more successful by including more data on land and fertilizer use. These results suggest that conservation efforts should aim to decrease PO43- input into waterways to minimize snail abundance, significantly affecting Planorbidae populations, and therefore trematode exposure to frogs, and that GIS may be a useful tool in predicting the movement of PO43- into habitats based on watershed characteristics.

*Poster Session (P18), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Miller-Adamany, Amber A.**, UW-La Crosse
Meredith Thomsen, UW-La Crosse

**Facilitating natural succession in heavily invaded ecosystems**

Heavily invaded ecosystems can reach alternative stable states, static points at which successional factors disturbance, colonization, and species performance no longer function. Floodplain forests of the Upper Mississippi River are one such ecosystem: reed canarygrass (*Phalaris arundinacea*, hereafter RCG) prevents native tree regeneration in canopy gaps, resists control efforts, and renders successional pathways non-functional. By restoring small areas that facilitate high native recruitment and expand over time, we may achieve native plant dominance and the restoration of successional pathways. Our objective was to determine the relative importance of successional factors in overcoming stasis in heavily invaded ecosystems. Using a fully randomized, factorial study design, we tested two plot preparation methods: 1) Rodeo® (glyphosate), 5% solution and 2) forestry mulching (Fecon) with Oust® (sulfometuron methyl), 0.5oz/acre in combination with three native planting strategies: 1) low seedling density without seeds, 2) low seedling density with seeds, and 3) high seedling density with seeds. A variety of native tree/shrub seedlings and seeds were planted. Herbicides were applied in October 2014 and 2015. Plots were monitored during the 2015 and 2016 growing seasons. Preliminary results show RCG mean percent cover was lower in Rodeo® plots than in Fecon+Oust® plots in June-August 2015. Overall tree seedling survival across species and plot type was 85.6% in August 2015. If this strategy results in overall effective restoration in a site dominated by RCG, it would have the potential to restore other habitats with this particular invader and provide insight into breaking the static state of other invaded ecosystems.

*Wetland Invasive Species, Thursday, March 2, Stonefield, 10:10-10:30am*

**Mossman, Michael**, WDNR (retired)
Amy Runck, Winona State University
Noah Anderson, UW-Baraboo
Gary Casper, UWM Field Station
Michael J. Lannoo, Indiana University
Tamara Thomsen, Wisconsin Historical Society
Angus Mossman, Yale University
Lisa Hartman
John Janzen

**Reservoir waterdogs: Neotenic tiger salamanders of the former Badger Army Ammunition Plant**

A six million gallon, concrete water reservoir at this former industrial site contains a unique, fishless aquatic ecosystem characterized by ground water input, forest detritus, aquatic insect larvae, and a population of ca.1,200 eastern tiger salamanders (*Ambystoma tigrinum*). The salamanders are neotenic, i.e., never leaving the water for their normal adult life-phase, but becoming sexually mature while retaining aquatic, larval characteristics such as external gills. The population was first documented in 1993, and now a second population is developing in an adjacent, formerly chlorinated reservoir. No other large and apparently self-sustaining neotenic populations have been recorded for this typically wetland species. The population has educational and interpretive value while presenting opportunities for the study of wetland ecology, gene expression, amphibian diseases, and the nature and role of neoteny in current, historical and future landscape-scale ecosystems. It also presents challenges as conservationists and land managers wrestle with issues of wildlife disease, reservoir maintenance, liability, and alternate uses of the site. This presentation features some compelling underwater photographs and video.

*Symposium: Amphibians, Reptiles & Wetlands: Management Approaches, Wednesday, March 1, Spruce, 3:40-4:00pm*

**Murphy, Lynnette**, Northeastern Illinois Univ.
Pamela Geddes, Northeastern Illinois Univ.

**Estimating hybridization rates of native *Typha latifolia* in Volo Bog, Illinois**

Volo Bog State Natural Area, located in the northwest suburbs of Chicago, was designated an Illinois Nature Preserve in 1970 and a National Natural Landmark in 1973. This protected environment, host to ~25 state threatened and endangered species, remains the southernmost open-water quaking bog in North America. *Typha*, a wetland plant genus commonly known as cattail, is ubiquitous in North American wetlands as an invader and is classified into three species: native *Typha latifolia*, exotic *Typha angustifolia*, and a hybrid between native and exotic cattail called *Typha x glauca*. Both exotic and hybrid cattails are invasive and aggressively overtake the native flora. Through observations and morphological identification at Volo Bog, we found native *Typha latifolia* occurring closer to the bog center, while the exotic and/or hybrid appear around the perimeter. Therefore, we hypothesized that lower levels of hybridization may have occurred in native *Typha latifolia* individuals located toward the bog center. We are testing our hypothesis in ten populations using molecular tools and techniques, including DNA microsatellites, which can detect instances of hybridization that morphological identification can miss. Preliminary results are showing some hybridization throughout all ten populations. Our previous research demonstrated that the native cattail, *Typha latifolia*, may be at risk of extinction via hybridization. If a lower rate of hybridization is located at the bog center, initiatives to preserve *Typha latifolia* seed may be in order if this species is experiencing an extinction. These results can identify areas of focus that managers can monitor to prevent encroachment of native flora in the bog.

*Poster Session (P2), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Noll, Christopher**, WDNR
Robert Freckmann, UW-Stevens Point
Evelyn Williams, Chicago Botanic Garden

**"Pterrified" of Pteridophytes? An introduction to wetland fern and fern ally identification**

Most wetlands in Wisconsin are home to at least one species of fern or fern ally (horsetail, club moss, spike moss, and quillworts). But for many, identifying these species remains difficult due to the lack of obvious features like flowers or an aversion to dichotomous keys. This presentation will provide an overview of the most common species, show how they are identified, and list the habitats where they are likely to be found. Attendees will receive a checklist of species found in Wisconsin wetlands and a cheat sheet of field characters to help them begin learning this confusing group of species.

*Native Wetland Flora & Plant Communities, Wednesday, March 1, Stonefield, 10:40-11:00am*

**Noll, Christopher**, WDNR

**Mapping seventy-two years of change in the Lower Wisconsin River**

How has the Lower Wisconsin River changed since 1937-38 when the first aerial imagery survey of Wisconsin was conducted? While the Lower Wisconsin River is typically viewed as a 92 miles of untamed, free-flowing river, clear changes have occurred downstream of the Prairie Du Sac dam. To detect these changes, the Lower Wisconsin River's channel and islands were mapped with GIS on scanned & georeferenced 1937-38 aerial imagery and on 2010 aerial imagery. The resulting overlay of both time periods, combined with spatial analysis of 1 km sections of river, shows the geomorphic response of different reaches of the Lower Wisconsin River in terms of river channel area, vegetated island area, and channel width.

*Poster Session (P23), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Orlofske, Sarah**, Northeastern Illinois University
Olivia Choi, Northeastern Illinois University
Jessica Orlofske, UW-Parkside
Christopher Tyrrell, Milwaukee Pub. Museum
Robert C. Jadin, Northeastern Illinois Univ.

**Food webs representing wetland connections: The role of parasite diversity and land use change**

Ecologists seek to determine how human disturbance affects the function and stability of ecosystems. Food web analysis can be used to effectively link field observations and predictions of environmental change. Our research objective is to measure the abundance, distribution, and diversity of aquatic and semi-aquatic organisms in wetlands to create food webs across a land use gradient. For three summers (2014-2016), we have extensively surveyed aquatic communities in two cattail marshes that differ in surrounding land use. One site in northeastern Illinois is part of a nature preserve surrounded by restored upland habitat, while the second site in southeastern Wisconsin is in a mix of agricultural and suburban habitat. Importantly, our research includes surveys of flatworm parasites (trematodes and cestodes). By including parasites that are transmitted by consumption to their hosts, we gain information about predator-prey interactions that may be difficult to directly observe or quantify from gut contents. The wetland in the more intact ecosystem had a total of 36 free-living and 4 parasite taxa connected by 615 interactions, while the wetland in the more disturbed habitat had 31 free-living and 4 parasite taxa connected by 389 interactions. The species interactions at the sites also differed in terms of how species connect to one another and the relative importance of species in interactions based on several standard metrics: graph density (0.78 vs. 0.65), alpha centrality (0.31 vs. -2.26), and betweenness centrality (16.12 vs. 15.22). Management implications include understanding not only the presence but also the interactions of species contributing to stability and resilience to disturbance such as land use change.

*Wetland Wildlife II, Thursday, March 2, Evergreen, 11:40am-12:00pm*

**Peterson, John**, UW-Platteville
Allison Wells, UW-Platteville
Samantha Hofmann, UW-Platteville
Gary Casper, UW-Milwaukee Field Station

**Acoustic monitoring of state-endangered Blanchard's cricket frogs at different wetland sites**

Blanchard's cricket frogs (*Acris blanchardi*) are endangered in Wisconsin. Current monitoring of this species is limited to manual calling surveys (MCS) in which a surveyor travels to a wetland site and quantifies male reproductive vocalizations. Several recent studies have documented the benefits of using automated recording systems (ARS) to monitor frog populations. Our goal was to determine if the use of ARS could improve the conservation of cricket frogs in Wisconsin. We tested the effectiveness of MCS and ARS for monitoring cricket frogs and concurrently calling anurans at five wetlands in southwestern Wisconsin in 2014 and 2015. We found both MCS and ARS to have strengths and weaknesses. MCS were effective at inexpensively monitoring a large number of sites within a short time period. ARS were effective at (1) detecting the presence of frogs at sites with infrequent vocalizations, (2) providing a permanent record of vocalizations, and (3) allowing us to investigate timing of vocalizations and how they correlate with environmental factors such as temperature, humidity, and vocalizations of other species. We suggest that ARS could benefit cricket frog conservation by improving detection at wetland sites where incidental take of this species may occur and by helping us better understand the biology of this organism.

*Symposium: Amphibians, Reptiles & Wetlands: Current Status, Wednesday, March 1, Spruce, 11:20-11:40am*

**Putnam, Michael**, WDNR
Jill Hapner, SE WI Invasive Species Consor.
Mark Verhagen, Wehr Nature Center
Kelly Kearns, WDNR

**Making connections for rapid response to new wetland invasive plants.**

WDNR uses two grant programs to foster control of invasive plants. The Weed Management Area Private Forest Private Forest Grant Program (WMA-PFGP) funds new and ongoing WMAs to build local capacity for controlling invasive plants. Suppression grants fund efforts to eradicate invasive plants listed as prohibited in Wisconsin's invasive species rule (NR 40). This talk uses two recent invaders (lesser celandine and giant hogweed) to illustrate these efforts. First, we summarize the WMA-PFGP and efforts to support weed management groups. Second, we explain what NR40 prohibited species are (those not yey found in Wisconsin or those that have small populations, and that landowners are not allowed to posses) and how suppression grants aid landowners in removal of prohibited species. Third, we provide two examples of efforts to control prohibited invasive plants. In 2016, Southeastern Wisconsin Invasive Species Consortium (SEWISC) and a private cooperator received grants: one to start control of lesser celandine in Milwaukee and one to conduct a modern survey of Lake Geneva to update older herbarium records. We summarize control efforts for lesser celandine in the four localities in which it occurs. Finally, we summarize efforts by SEWISC to control giant hogweed in two locations in Sheboygan County with support of suppression grants.

*Wetlands and People, Wednesday, March 1, Stonefield, 4:00-4:20pm*

**Rossi, Ann**, USEPA
Gregg Serenbetz, USEPA

**Development of soil indicators for assessment of wetland condition and disturbance**

To assess the ecological condition of wetland resources across the conterminous United States, the US EPA and its federal, state, and tribal partners conducted the first National Wetland Condition Assessment (NWCA) in 2011. A goal of NWCA was to identify and develop indicators of ecological condition and disturbance or stress. NWCA sites were selected using a probability based design such that the sites selected and results reflect the full range of wetlands in the target population. Field crews sampled 1,138 wetland sites across the U.S., collecting data on vegetation, soils, water chemistry, algae, hydrology, and the wetland buffer. This study builds upon the work of NWCA 2011, examining relationships between soil parameters, ecological condition, and land use activities. The objective is to identify properties associated with soil health that could be used as indicators of condition or stress in wetlands. So far, our efforts have focused on organic carbon storage and soil nutrient ratios (C:N:P). In general, less disturbed wetlands tended to have greater carbon storage. Lower C:N, C:P, and N:P ratios were observed in wetlands located in urban and agriculture dominated watersheds relative to wetlands in watershed with predominantly natural cover, suggesting potential nutrient loading to wetlands. This presentation will cover these proposed indicators of stress to wetland ecosystems and evaluate the potential impact of they have on vegetative communities and water chemistry. Wetland soil quality indicators may be a useful assessment tool in future iterations of NWCA, as well as in state and regional wetland monitoring and assessment efforts.

*Wetland Assessment, Wednesday, March 1, Evergreen, 4:00-4:20pm*

**Roth, Joseph**, Openlands
Aaron Feggestad, Stantec Consulting

**Results of storm water modeling pre and post restoration at Deer Grove East Preserve in Palatine, IL**

Openlands in conjunction with the Forest Preserves of Cook County partnered with two engineering firms to determine if and what existing stormwater models and/or protocols could be used to assess the stormwater impact of hydrologic and native plant community restoration over 184 plus acres at Deer Grove East Preserve. This effort identified and utilized the USEPA's Storm Water Management Model (SWMM) to assess storm water run-off volumes before and after hydrologic and landscape restoration at Deer Grove East Preserve in 2014 and 2015. The presentation will review the results of the storm water modeling before and after restoration for the two calendar years and what lessons regarding restoration were gained through the modeling.

*Wetland Restoration & Management Case Studies, Wednesday, March 1, Evergreen, 2:30-2:50pm*

**Salas, Dan**, Cardno
Sadie O'Dell, USFWS

**Let's start here: Spatial decision making to prioritize management units for habitat management at Horicon NWR**

Horicon National Wildlife Refuge (NWR) protects a well-known and critical wetland area for wildlife breeding and migration. Recently, the refuge worked with Cardno to develop a habitat management plan that defines the direction of management for the next 15 years. As part of this plan, the refuge defined not only which resources are priority for management, but where to prioritize management. In undertaking this step, the refuge can help spend its conservation dollars more efficiently and hopefully make a greater impact in its habitat management efforts. Using elements of structured decision making, the planning team defined its need to prioritize management units, then developed evaluation factors based on the prioritization factors and objectives identified. Factors included relative value or contribution of habitats to priority wildlife resources, patch size, and comparison of management capability for each unit. These factors were evaluated alongside the patch size and conservation values of particular habitats at the refuge. Combined, these factors helped define the areas of highest conservation benefit for the lowest "cost." Doing so across the 19,000 acres managed by the USFWS helped identify priority units for management. Completing this analysis now allows refuge staff to consider where and how to apply its conservation efforts across Horicon NWR. In this session, we will describe the need for defining prioritized management units, how the team developed the evaluation criteria, and reviewed the outcomes. In doing so, we hope conservation planners and land managers can use this as an example of how conservation objectives can be targeted on the landscape and help hone land management actions.

*Wetland Wildlife II, Thursday, March 2, Evergreen, 11:20-11:40am*

**Salas, Dan**, Cardno
Sadie O'Dell, USFWS

**Managing Horicon for the future: Defining the direction and priorities for future management of Horicon NWR**

Horicon National Wildlife Refuge, located 15 miles east of Waupun, WI, helps protect the expansive Horicon Marsh. At approximately 32,000 acres, it is recognized as the largest freshwater cattail marsh in the United States. The USFWS manages more than 19,000 acres of wetland and more than 2,000 acres of adjacent uplands. As a vast expanse of emergent marsh in the middle of the Mississippi flyway, the refuge sees more than 50 percent of the flyway's Canada goose migration during the fall season along with many other waterfowl, wading birds, and shorebirds. Among the acknowledgements the marsh has received, it was named a "Wetland of International Importance" by the Ramsar Convention in 1991, an Important Bird Area by the American Bird Conservancy in 1997, and Wisconsin an Important Bird Area in 2004, and a Wetland Gem® in 2009. In 2015-2016, the refuge worked with Cardno to develop a habitat management plan that defines the direction of management for the next 15 years. During this process, the planning team identified key elements of the refuge habitat management and developed priorities to help guide management. The process of identifying key resources and defining priorities helped foster team cohesion and build a framework within which future refuge management can be guided consistently. In this session, we will describe the need for such planning, the key elements used to define management focus, and steps taken to prioritize aspects of management. The objective of this presentation is to help other land managers and biologists to learn from our experience and use Horicon NWRs habitat management plan as a case study for similar planning efforts.

*Poster Session (P24), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Sande, Bill**, USACE
Jonathan Bakken, USACE

**Target hydrology in wet meadow wetlands in the Lake Superior clay plain**

It is well known that hydrology is a major driving factor that influences wetland community type. However, experience has shown that wetland mitigation sites in the Lake Superior clay plain may support the technical standard for wetland hydrology but appear to exhibit hydrologic conditions that are either too wet or too dry and struggle to meet required vegetation performance standards for percent cover of native/non-invasive plant species. In an effort to better understand hydrologic requirements for target wetland community types, we installed shallow monitoring wells to evaluate the hydrologic regime at two representative wetland mitigation bank sites in the Lake Superior clay plain. The hydrology monitoring revealed that a water table within 6 inches of the soil surface for~100 days supported robust wet meadow/northern sedge meadow plant communities with few non-native and/or invasive species present. Conversely, non-native and/or invasive species were dominant at most monitoring well locations that exhibited a water table deeper than 6 inches, or any prolonged inundation. The results of this effort may help guide he success of future wetland restoration in the Lake Superior clay plain by determining the optimum hydrology for targeted wetland plant communities.

*Poster Session (P21), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Scherer, Jeanne,** WDNR
Kitchel, Lisie, WDNR

**Play your part in slowing the spread of aquatic invasive species: Equipment**

The focus of outreach regarding slowing the spread of aquatic invasive species (AIS) has been recreational water users. However, there are components of the construction, farming, and landscape maintenance industries that should also be instructed in best management practices to avoid moving AIS from infested locations to un-infested areas. Equipment used for bridge repair, road construction, and restoration efforts on lakeshores, in wetlands, and in stream corridors are possible vectors for the spread of invasive species, both aquatic and terrestrial. Consider the movement of non-native *Phragmites* found along roadways that takes place because a mower cuts through an existing patch and carries stem and rhizome fragments as well as seed to unaffected stretches of right of ways. Case study: Non-native *Phragmites* made its first appearance in a state wildlife area within three years of hydrologic and restoration work done to restore the former muck farm to a hunting and birding area. Coincidence? While cases of invasive species movement are difficult to prove, the circumstantial evidence is there. This poster provides information about the best management practices for those working in areas at high risk of new invasions of AIS as well as those areas already impacted that need to be contained. Such information is important to equipment owners/users as well as those who may hire them.

*Poster Session (P3), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Schulte, Collin**, UW-Stout
Austin Abendroth, UW-Stout

**Schulte, James**, Beloit College

**Patterns in water tigers (Dytiscidae) and phantom midge (Chaoboridae) abundance in Wisconsin ephemeral ponds**

The purpose of this study was to investigate patterns of wetland larval occupancy in two taxa with differing adult habitat requirements. Water tigers (Dytiscidae) have an aquatic adult stage (predaceous diving beetles) while glassworms (Chaoboridae, phantom midge adult stage) do not. We investigated differences in ephemeral pond (EP) and permanent wetland (PW) occupancy and determined whether proximity to permanent wetlands affected abundance. We hypothesized that dytiscids would be more abundant in EPs located close to PWs, while chaoborids would be unaffected by PW proximity. The 57 study sites (23 permanent and 34 ephemeral) were in the Chippewa Moraine region in Chippewa County, Wisconsin. Collection was done three times throughout the field season using surface-associated activity traps. Dytiscid larval abundance was not significantly different between PWs and EPs ($P = 0.328$). The water tiger adults tended to inhabit PWs ($P = 0.118$). Chaoborid larvae were significantly more abundant in the EPs ($P = 0.009$). EP dytiscid larvae had no relationship with distance from PWs ($P = 0.500$), while chaoborids had higher abundance in EPs located closer to PWs ($P = 0.116$). Dytiscids may be less dispersal-limited than previously thought, while chaoborids may show a stronger proximity relationship with PWs due to possible predation from PW-associated amphibians and macroinvertebrates.

*Poster Session (P16), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Using water snakes to understand genetic patterns of reproductive and morphological development**

Snakes in the subfamily Natricinae include some of our most common Wisconsin wetland species such as the northern watersnake (*Nerodia sipedon*), gartersnakes (*Thamnophis spp.*), red-bellied snake (*Storeria occipitomaculata*), and DeKay's brown snake (*S. dekayi*). All members of this group have live birth rather than egg laying, yet each are ecologically distinct in their habits. Modern genetic analyses allow us to define virtually complete gene expression patterns from any tissue at any point during an organism's development. Our ongoing work will use these techniques to accomplish several goals. Among natricine snake species, we will identify the genetic basis of variation in embryonic development to discover genes involved in shaping the morphology (i.e. physical characteristics) associated with differences in snake ecology. This will be an attempt to identify genes and their timing of expression involved in differentiating an aquatic lifestyle from a terrestrial one. We also will use our genetic analyses to investigate the evolutionary transition from lizards to snakes, as well as the transition from egg–laying to live birth in lizards and snakes. Understanding these genetic differences will aid conservation of these wetland species.

*Symposium: Amphibians, Reptiles & Wetlands: Emerging Threats, Wednesday, March 1, Spruce, 2:50-3:10pm*

**Schultz, Rachel**, UW-Stevens Point
Lindsey Pett, SUNY Plattsburgh

**Does plant species composition and diversity affect below-ground carbon dynamics in experimental wetlands?**

Wetland restoration often relies on establishing a plant community; however, we still lack understanding about how species composition and diversity affect certain wetland ecosystem functions. Our objective was to investigate the link between the plant community and belowground processes such as root biomass and methane production. We hypothesized that more diverse mixtures would emit less methane due to increased root surface area and aeration. We chose three plant functional groups common to the Great Lakes region represented by two species each: ferns (*Onoclea sensilblis* and *Osmunda cinnamomea*), rushes (*Eleocharis palustris* and *Juncus effusus*), and tussocks (*Carex crinita* and *Scirpus cyperinus*). In a mesocosm experiment located in northern NY (similar climate as central WI), we represented four levels of functional diversity (0, 1, 2, and 3 functional groups) and every combination of functional groups. Root biomass and surface area increased with functional diversity; however, there were no differences among functional group compositions. Through relative yield analysis, we found that when rushes were present, fern biomass increased while tussock biomass decreased. Relative yields of mixtures containing rushes and ferns also increased over time. Methane fluxes were greater from unplanted controls; however, we did not find a trend with functional group diversity or differences among mixtures. Our results indicate that planting a diversity of functional groups in dense clumps during restoration could increase belowground biomass and rhizosphere area, which are critical for carbon storage and nutrient cycling. Furthermore, rushes may maintain greater levels of plant diversity under variable water level conditions.

*Native Wetland Flora & Plant Communities, Wednesday, March 1, Stonefield, 11:40am-12:00pm*

**Smith, Christopher**, HerpMapper, Inc.
Don Becker, HerpMapper, Inc.
Mike Pingleton, HerpMapper, Inc.

**HerpMapper.org: An innovative citizen science project for amphibian and reptile observations**

A basic need of wetland conservation and research organizations is access to high-quality data for where species occur in space and time. Amphibians and reptiles are no exception, and fortunately there are many 'field herpers' and others who are willing to record their field observations. These observations, whether from targeted searches or incidental encounters, can provide valuable insight into species' distributions, habitats occupied, and phenology. Launched in September 2013, the volunteer-driven HerpMapper project provides consistent methods for recording and sharing amphibian and reptile observations on a global scale. The HerpMapper toolset allows users to create real-time records while in the field using a mobile device, and to document past observations via a web browser. Recorded observations are added to a secure central database. In just over three years, the project has accumulated more than 165,000 records, including many from Midwest wetlands, and has established relationships with more than 40 organizations including federal and state agencies, university research and education projects, and various state amphibian and reptile atlases. This presentation will provide an overview of HerpMapper and its unique approach to citizen science.

*Symposium: Amphibians, Reptiles & Wetlands: Current Status, Wednesday, March 1, Spruce, 11:00-11:20am*

**Staffen, Richard**, WDNR
Rori Paloski, WDNR

## The status of eastern massasauga rattlesnake populations in Wisconsin

The eastern massasauga rattlesnake (*Sistrurus catenatus*) was first listed as an endangered species in Wisconsin in 1976 and more recently as a federally threatened species in October 2016. Massasaugas require wetland habitats for many of their most critical life functions including overwintering, basking, and foraging. In 2014, the Wisconsin Natural Heritage Inventory determined there were eight extant massasauga populations in Wisconsin. In that same year, surveys were undertaken at two of these populations as part of a multi-state effort to inventory and monitor snake Species of Greatest Conservation Need for signs of snake fungal disease. Shortly thereafter, the USFWS began assessing the potential to federally list the massasauga as a threatened species. To aid this assessment, the WDNR's Bureau of Natural Heritage Conservation made it a priority to assess the remaining six extant massasauga populations, as the populations had not been studied in recent years. Efforts to determine their current status were undertaken using the USFWS recommended standard survey protocol (Casper et al. 2016). After three field seasons of survey effort, some interesting findings have been discovered and will be presented.

*Symposium: Amphibians, Reptiles & Wetlands: Current Status, Wednesday, March 1, Spruce, 11:40am-12:00pm*

**Stamer, Reid**, EarthView Environmental

## "Set it and forget it": Evaluating a forested wetland mitigation site 10 years after planting

Until recently, most forested wetland mitigation sites only required monitoring of tree plantings for five years and long-term maintenance was generally not required. But what happens to planted trees when left to fend for themselves? What survival rate can be expected in the absence of management? How large can planted tree species be expected to grow when competing with more opportunistic species? We will examine a case study to address these questions. In 2004, a five acre wetland mitigation site was constructed on the banks of Clear Creek, in Coralville, Iowa, consisting of a complex of emergent and forested wetlands. To satisfy permit requirements, a total of 139 trees and shrubs were required to be viable by the end of the fifth year of monitoring. Between 2006 and 2008, a total of 423 trees and shrubs were planted within the forested wetland. By the fifth year of monitoring in 2009, 129 trees and shrubs were surveyed as viable (30% survival rate). The high mortality rate can be attributed to drought conditions in 2006, followed by two consecutive years of flooding in 2007-2008. Because permit requirements were not met by the fifth year of monitoring, an additional 15 trees were planted during a compulsory 6th year of monitoring in 2010, after which the permit was signed off. Since then the site has not been monitored and no maintenance activities have taken place. A cursory tree survey indicates that many trees and shrubs planted between 2006 and 2010 are well established. A more thorough survey will be completed in early 2017 to address the questions above.

*Wetland Mitigation, Thursday, March 2, Spruce, 11:40am-12:00pm*

**Steber, Aaron**, Cardno
Aaron Steber, Cardno

**Streambank stabilization, floodplain creation, and stream re-alignment of Pheasant Branch in Middleton, WI**

In 2015, Cardno relocated approximately 480 linear feet of stream channel away from eroding streambanks and a steep eroded slope by creating 480 linear feet of new channel in order to mitigate erosion created as a result of high stormwater inputs into Pheasant Branch in the City of Middleton. The relocated stream channel was designed with bankfull and floodplain benches to increase flood flow capacity at the site, allowing flood flows to rise up out of the bankfull channel and spread out over the created floodplain areas, dissipating stream energy and increasing the connection between the stream and adjacent banks. Moving the main channel of Pheasant Branch away from the steep eroding slope also provided increased protection at the toe of the slope above which a new multi-million dollar addition to the Middleton Kromrey Middle School was built. In addition to the newly created floodplains, two back-water wetland features were created adding additional habitat away from the main channel in this area. The back-water wetland areas were designed with a connection to the main channel and had multiple basking woody debris structures installed within them suitable for reptiles and amphibians looking for a place away from the main flow of the stream. The entire site was seeded with wetland and prairie forbs and grass species native to southern Wisconsin.

*Wetland Restoration & Management Case Studies, Wednesday, March 1, Evergreen, 1:50-2:10pm*

**Stein, Shelly**, UW-Stevens Point
Kyle Herrman, UW-Stevens Point
Shelly Stein, UW-Stevens Point
Jonathan Hill, UW-Stevens Point
Kaira Kamke, 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 to development and agriculture. This has led to a interest in recent years to mitigate and restore wetlands to their pristine state. 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 two baseline assessments to evaluate the quality of the site and recommend 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 2017.

*Poster Session (P13), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Streiff, Carolyn**, WI Geo. & Natural History Survey
David Hart, WI Geo. & Natural History Survey

**Using geophysics to better understand wetland hydrogeology**

Conducting field work in wetland settings poses challenges not encountered in typical hydrogeologic investigations in other environments. Vehicle, equipment, and even personnel access to the field site are often limited. Wetland settings often require alternative methods for interpreting subsurface geology and hydrology. Geophysics can often provide those alternatives. We have applied ground conductivity measurements, electrical resistivity imaging, passive seismic measurements, and ground-penetrating radar during projects at several different wetlands in Wisconsin. These tools were used to determine depth to bedrock and thickness of peat beneath the wetland areas. When possible, the geophysical estimates were confirmed by cores collected with a Russian peat corer, pushing a steel rod to refusal or during hand installation of a piezometer. In general, there is good agreement between the geophysical data, assuming a two-layer resistivity model of marl or clay sediment over bedrock, and the push and coring methods. Even in those locations where the vertical variation was not easily interpreted, we saw correlation between changes in vegetation as seen in air photos and changes in the subsurface as indicated by the geophysics. These results can be incorporated into groundwater flow models of the wetlands to improve our understanding of these complex systems. We found electrical resistivity imaging and ground conductivity measurements were the most easily applied and interpreted. The end result is a better understanding of the hydrogeology of wetlands and improved management of these sensitive habitats.

*Wetlands & Groundwater, Thursday, March 2, Spruce, 9:30-9:50am*

**Trochlell, Patricia**, WDNR
Kelly Kearns, WDNR
Jason Granberg, WDNR

**What you can do to slow the spread of invasive plants in wetlands**

Invasive plants dominate thousands of acres of wetland, significantly impacting native floristic integrity, fish and wildlife habitat and other ecosystem services. Some species, like reed canary grass, are well-established but others are just becoming established or have not been found here yet. We will describe new invasive species, their preferred habitat, known distribution, and how to identify them. The use of the Invasive Species Archive will be covered as a tool that can be used to help determine species that have been reported in your area. We will address what to do if you find a new species and how you can help reduce the spread of new invasives. We will cover many species, including those species which appear to be spreading rapidly, such as tall manna grass (*Glyceria maxima)* and marsh thistle (*Cirsium palustre*) and species which have not yet been documented, such as Japanese stilt grass (*Microstegium vimineum*) and Japanese chaff flower (*Achyranthes bidentata var. japonica*).

*Wetland Invasive Species, Thursday, March 2, Stonefield, 9:30-9:50am*

**Waechter, Zach**, Cardno, Inc.
Neil Molstad, WDNR

**Wetland delineations in riparian environments: Using additional data sources for hydrologic analysis**

This presentation will outline methods and case studies in which LiDAR and civil survey data, in conjunction with publically available data, may be used to perform a hydrologic analysis in difficult to delineate riparian environments. Publically available data (i.e., daily lake level data, managed lake target elevations, historical flood and ordinary high water mark data) can be overlain on detailed topographic surveys or maps. Combining these sources may provide a high resolution analysis of the riparian area which highlights microtopographic differences and explains site hydrology. These differences can be used to justify and confirm field delineated wetland boundaries. Use of these readily available resources increases delineation accuracy for even the most experienced wetland delineator. Use of additional information may help us better protect wetlands and the valuable functions they provide.

*Poster Session (P20), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Watermolen, Dreux**, WDNR

***Bsal*: An emerging threat to North American salamanders**

The fungal disease chytridiomycosis has been implicated in amphibian population declines worldwide, affecting more than 500 species of frogs, salamanders, and caecilians in various types of wetlands and related habitats. *B. dendrobatidis* has been found to be one of the most common pathogens related to diseases in captive amphibians. Scientists recently described a second chytrid, *B. salamandrivorans* (*Bsal*). Currently, the only reported wild hosts to exhibit disease symptoms from *Bsal* infections are three European salamander species. However, 41 of 44 Western Palearctic salamanders rapidly died following experimental infections, substantial mortality occurred in over half of salamander species tested in laboratory studies, and mass mortality has been observed in captive collections. *Bsal* has not been detected in the United States, but only a small fraction of North American salamander species have been tested and it is unknown if alternative hosts may aid *Bsal*'s persistence and dispersal. Based on its close phylogenetic relationship with *B. dendrobatidis*, apparently wide host range, and high pathogenicity, Bsal introductions could pose a threat to North American salamander populations. Federal agencies are leading efforts to address this emerging threat to wetland biodiversity. Steps have been taken to ban the import and interstate transport of salamanders under the Lacey Act and the pet industry has initiated a voluntary moratorium on imports of several species. A *Bsal* Task Force has formed to help prevent and manage cases that might occur in North America. A "*Bsal* Strategic Action Plan" and emergency response plans are being developed. Several recent scientific advances will aid in responding more effectively.

*Symposium: Amphibians, Reptiles & Wetlands: Emerging Threats, Wednesday, March 1, Spruce, 2:10-2:30pm*

**Wiley, Chandra**, UW-Stout
Lizzy Duncanson, UW-Stout
Amanda Little, UW-Stout
Jim Church, La Salle University

**Effects of macroinvertebrate biodiversity on the size of wood frog (*Lithobates sylvaticus*) larvae**

Many macroinvertebrate species are a main food source for developing amphibian larvae; however certain species also prey on tadpoles. This study was intended to assess the predator-prey relationship between amphibians and aquatic macroinvertebrates. We suspect wetlands with high levels of macroinvertebrate taxa richness and abundance will have a positive correlation with tadpole snout-to-vent length (SVL) due to diversified resources. However because tadpoles are an important food source for predators in the Dytiscidae (predaceous diving beetle) and Belostomatidae (giant water bug) families, we expect mean SVL to decrease as predator abundance increases. Sampling was done in the Chippewa Moraine region of west-central Wisconsin. Minnow traps were placed in twenty-two permanent and ephemeral wetlands, with the intent of sampling wood frog tadpoles. Aquatic macroinvertebrates were sampled for biodiversity in the same locations using surface associated activity traps (SATs). Preliminary results suggest there is no correlation between Dytiscidae and Belostomatidae abundance and tadpole SVL. There was a nonsignificant trend of larger tadpoles inhabiting wetlands with greater macroinvertebrate richness. As amphibian populations continue to decline, understanding factors associated with wood frog abundance is vital for amphibian conservation efforts.

*Poster Session (P19), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Williamson, Caitlin**, Nat. Res. Foundation of WI

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

Our mission at the Natural Resources Foundation of Wisconsin is to connect people to Wisconsin's natural heritage, including our state's millions of acres of wetlands. From bogs to fens, and marshes to swamps, Wisconsin is full of wetlands; and by providing people with the hands-on experience of visiting and learning about these wetlands, we are instilling an appreciation for these critical ecosystems in Wisconsin's communities and making a meaningful impact on wetlands. Our signature field trip program offers over a hundred trips each year, engaging thousands of people in wetland education and with the opportunity to visit places like Quincy Bluff and Wetland, Terrell's Island, and the Penokee Hills. Additionally, we work closely with the WDNR and local non-profit organizations to support management of these important wetlands, and 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, the Foundation 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, the Natural Resources Foundation 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. By sharing stories and demonstrating measurable impact, this presentation will highlight how the Natural Resources Foundation is working to create change for wetland conservation across Wisconsin.

*Wetlands and People, Wednesday, March 1, Stonefield, 4:20-4:40pm*

**Willman, Allison**, WDNR
Allison Willman, WDNR
Patricia Trochlell, WDNR
Tom Bernthal, WDNR

**Comparing floristic quality resulting from contrasting wetland restoration techniques**

The practice of restoring wetlands has been an ongoing endeavor for the past several decades with the goal of providing compensatory mitigation for permitted wetland fills and to restore land for wildlife habitat, primarily for waterfowl. However, frustrations amongst restoration practitioners are prevalent due to the difficulty of restoring wetland systems to replicate the quality and function of natural wetlands. Few studies have focused on the specific, common techniques utilized by practitioners in this field. In this 2-year study we have selected numerous wetland restorations of varying age and completed by various practitioners both public and private throughout the state of Wisconsin. We compared three contrasting hydrologic restoration techniques in order to determine which technique resulted in higher floristic quality of the restored wetland vegetation community. We compared filling agricultural drainage ditches to plugging or blocking the flow of water; breaking former drain tiles and leaving them in place to completely removing them from the site; and excavating wetland scrapes as opposed to restoring former wetlands by removing colluvium to expose buried hydric soils. Our first year results have only shown a significant difference between completely removing drain tiles as opposed to breaking them and filling ditches as opposed to blocking their flow. It should be noted that sample size was low across all variables. However, these results are preliminary and the second year of the study will include additional sites to improve statistical power.

*Poster Session (P5), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

**Ziegler, Jerry**, The Nature Conservancy

**Mukwonago River headwater restoration via removal of two small dams: Reflecting on 8 years of lessons learned**

In 2008, mid-sections of 700- and 500-foot earthen dams were removed at The Nature Conservancy's (TNC) Crooked Creek Preserve in Walworth County in Southeast Wisconsin. The dams disturbed wetland hydrology, were structurally unsound, warmed water flowing from them into a cold-water stream, and blocked fish passage. The dam removal was designed to correct those problems and also eliminate the threat of a breach and downstream silting, while restoring the historical flow from springs and reducing maintenance. TNC's goal was to collaborate with agencies and neighbors and to create a template for small dam removal. TNC had anticipated increased reed canarygrass because breaching the dams exposed about 10 acres that had been underwater. A contractor was hired to manage the reed canarygrass. But if we did it again today, TNC would create an aggressive plan to prevent willows from moving into the exposed wetland. We would also better anticipate the ongoing disruption from beavers and humans. The narrow outlet for water after the removal of one of the dams has been blocked repeatedly by beavers. The outlet at the second dam frequently has been dammed by humans using rip-rap from the outlet to create a dry pathway. If we did the same project today, we would excavate more of the dams to increase the wetland footprint, develop a strategy to deter beavers, install signs explaining to humans the importance of maintaining water flow and use TNC's recently developed Stewardship Calculator tool. That tool would help us account for long-term management costs, contingencies, and staffing needs. TNC will share that tool and our experiences to help design and anticipate long-term maintenance needs beyond the initial construction phase.

*Wetland Connections, Wednesday, March 1, Evergreen, 11:20-11:40am*

**Zillen, Zak**, Northeastern Illinois University
Jennifer Slate, Northeastern Illinois U.
Laura Briscoe, Field Museum of Natural History

**Using diatom algae to infer environmental change in sphagnum bogs**

The floating mat of sphagnum moss surrounding quaking bogs imports a unique character to these wetlands that awes visitors. However, the extent of anthropogenic impact to sphagnum bogs of Wisconsin and nearby states is largely unknown. Diatom algae, which have glass-like cell walls made of silica, are resistant to degradation and thus have potential to reveal how these wetlands have changed over time. We compared diatom algae growing epiphytically on live sphagnum to the diatoms preserved on museum specimens collected over one hundred years ago. Live sphagnum plants were collected from Beulah Bog in southeastern Wisconsin, Volo Bog in northeastern Illinois, and Pinhook Bog in northwestern Indiana. Preserved pphagnum specimens were provided by the Field Museum of Natural History. The epiphytic diatom community on both the modern, live sphagnum samples and the museum specimens were dominated by a few species (*Eunotia nymanniana, Eunotia paludosa*, and *Pinnularia hilseana*). These species thrive in the acidic, low nutrient environment that occurs with sphagnum. The lack of change in the dominant diatom species over time is encouraging, and suggests that current efforts to protect these bogs should be continued.

*Poster Session (P17), Wednesday, March 1, Expo 1-2, 5:00-6:30pm*

# PRESENTER BIOGRAPHIES

**Adamovicz, Laura** (adamovi2@illinois.edu) obtained her DVM from the Virginia-Maryland Regional College of Veterinary Medicine in 2012. She is now pursuing a PhD in epidemiology at the University of Illinois. Her research involves modeling health in sympatric reptile and amphibian species to identify markers for population wellness and inform effective conservation strategies.

**Arnold, Christopher** (christopher.arnold@co.columbia.wi.us) is a water resource specialist in the Department of Land and Water Conservation in Columbia County and completing his master's in natural resources from the UW-Stevens Point.

**Arnold, Kathi** (ARNOKL09@uwgb.edu) is an undergraduate senior at the UW-Green Bay majoring in environmental science and minoring in biology. She is currently working as a field technician for the Cat Island Revegetation Project.

**Badje, Andrew** (Andrew.Badje@wisconsin.gov) is a conservation biologist with the WDNR - Bureau of Natural Heritage Conservation. Andrew received his bachelor's degree in biological aspects of conservation and Geographic Information Systems certificate at the UW-Madison. His current work involves citizen science, inventory, monitoring, and management of Wisconsin's bats and herptiles.

**Barger, Michael** (mbarg393@uwsp.edu) is a senior at the UW-Stevens Point studying wildlife ecology: research and management. He has held internship positions with the USFWS in New Richmond, Wisconsin as well as with the WDNR in Grantsburg, Wisconsin. His past work and research experiences have been centered on wetlands and waterfowl in Wisconsin.

**Bart, David** (dbart@wisc.edu) received a PhD in ecology and evolution from Rutgers University. He is currently an Associate Professor of landscape architecture at UW-Madison, researching the invasibility of high quality wetlands.

**Bergeson, Tara** (tara.bergeson@wisconsin.gov) is a conservation biologist with the WDNR. Her work includes amphibian inventory and monitoring projects, Wildlife Action Plan implementation, and integrating climate change adaptation into conservation actions. She received her master's degree in wildlife ecology (2001) and bachelor's degree (1995) in natural resources from the UW-Madison.

**Bernthal, Tom** (thomas.bernthal@wisconsin.gov) has been a board member, president, and restoration & management committee member with the Friends of Pheasant Branch Conservancy. He helps restore and maintain healthy wetland and upland communities in the Conservancy. As a wetland ecologist for WDNR, Tom develops methods to assess wetland health and function on a wide range of scales from sites to watersheds.

**Bougie, Tiffany** (Tiffany.Bougie@Wisconsin.gov) is a conservation biologist and research scientist with the WDNR. She began working at the WDNR in the summer of 2014 as an intern. After completing her undergraduate degree at UW-Madison, she returned to the WDNR and continued working on the wood turtle project among other responsibilities.

**Brown, Josh** (joshuaa.brown@wi.gov) is the In-Lieu Fee (ILF) Coordinator for WDNR. In that position, he completes the day-to-day coordination of the program through managing project budgets, implementing policy, and communicating with agency and project partners. Josh has been the ILF Coordinator since November 2016.

**Carpenter, Crystal** (crystal.carpenter@my.uwrf.edu) is an undergraduate research assistant with the invasive plant ecology lab at the UW-River Falls where she is also majoring in field biology. She is passionate about turtle conservation and hopes to pursue a career in conservation and restoration ecology where she can help improve turtle habitat.

**Casper, Gary** (gc@greatlakeseco.com) is an Associate Scientist at the UW-Milwaukee Field Station and an associate editor for the Natural Areas Journal and Herpetological Conservation and Biology. He researches wildlife conservation, inventory and monitoring throughout the Great Lakes Region.

**Christoffel, Rebecca** is the President of Snake Conservation Society Inc. (SCS) and sole proprietor of Christoffel Conservation (CC). She earned her bachelor's and master's degrees in wildlife ecology from UW-Madison, and her PhD in fisheries and wildlife from Michigan State University. Prior to founding SCS and CC, she was a faculty member and Extension Wildlife Biologist at Iowa State University.

# PRESENTER BIOGRAPHIES

**Chung-Gibson, Melissa** (Melissa.Gibson@wisconsin.gov) received her master's degree in botany from the UW-Madison. She has since worked as an environmental consultant in the Chicago region, surveyed a wet prairie community at the UW Arboretum, and most recently has been surveying wetlands throughout Wisconsin to assess floristic quality as part of the Wetland Floristic Benchmark Project for WDNR.

**Cooper, Matthew** (mcooper@northland.edu) is a research scientist at the Mary Griggs Burke Center for Freshwater Innovation at Northland College. Matt received bachelor's and master's degrees at Grand Valley State University and a PhD from the University of Notre Dame. Matt's research focuses largely on coastal wetlands throughout the Great Lakes.

**Danz, Nicholas** (ndanz@uwsuper.edu) is an associate professor of biology at the UW-Superior, where he teaches about biology, ecology, and plants. His research interests involve coastal wetlands of the North American Great Lakes as well as inland wetlands, dunes, and forests of northern Wisconsin.

**Dugan, Hilary** (hdugan@wisc.edu) is a limnologist and postdoctoral fellow at the UW-Madison. She received bachelor's and master's degrees in physical geography from Queen's University in Kingston, Ontario, and a PhD in earth sciences from the University of Illinois at Chicago. Her research interests lie in linking landscape and atmospheric changes to ecological processes in inland waters. Her work routinely combines long term observational data with national or global datasets to understand ecosystem and limnological processes.

**Eggers, Steve** (steve.d.eggers@usace.army.mil) is a senior ecologist and professional wetland scientist with the USACE, St. Paul District. He is a member of the National Advisory Team for Wetland Delineation and the National Technical Committee for Wetland Vegetation. Steve has a bachelor's degree in biology from UW-La Crosse. He is a co-author of Wetland Plants and Plant Communities of Minnesota and Wisconsin, now in its third edition.

**Feggestad, Aaron** (aaron.feggestad@stantec.com) is a senior ecologist and professional wetland scientist at Stantec where he conducts ecosystem restoration design, implementation, and monitoring. He leads a diverse team of dedicated experts to implement restoration projects throughout the upper Midwest. Aaron holds an master's degree from UW-Madison and has been working on restoration projects for 15 years.

**Geddes, Pamela** (p-geddes@neiu.edu) completed the bachelor's and master's degrees at Florida International University and the PhD. degree at University of Chicago. She then became an NSF Minority Post-doctoral Fellow at Loyola University Chicago. She is currently an associate professor in the Department of Biology and the Environmental Science Program at Northeastern Illinois University, where she teaches ten different courses.

**Hagenow, Kari** (khagenow@tnc.org) works in the Northeast Wisconsin Field Office of The Nature Conservancy where she oversees land management on four TNC Preserves and serves as the Coordinator for the Door County Invasive Species Team. Kari received her bachelor's degree in environmental science and biology and her master's degree in environmental science and policy from UW- Green Bay.

**Hamerla, Chris** (chris.hamerla@goldensandsrcd.org) a former Wisconsin water guard and conservation warden, currently is a regional aquatic invasive species (AIS) coordinator for Golden Sands Resource Conservation & Development Council, Inc. Hamerla monitors for AIS and educates volunteers how to identify and control invasive species. Hamerla enjoys traditional outdoor recreation, photography and cooking.

**Hart, David** (dave.hart@wgnhs.uwex.edu) is a hydrogeologist and geophysicist at the Wisconsin Geological and Natural History Survey. He has worked in the Cedarburg Bog and is currently working in the Mukwonago Basin. His interests include applying geophysics to wetland and hydrogeologic studies.

**Hay, Robert** (racs@tds.net) earned a bachelor's degree in natural resource management from UW-Stevens Point in 1973. Three careers later he was hired by the WDNR in 1990 as a cold-blooded species manager for the Bureau of Endangered Resources. After retiring, Bob founded the non-profit, Turtles For Tomorrow, where he focuses on Wisconsin rare turtle conservation.

**Helmueller, Greta** (gjhelmueller@gmail.com) graduated with a bachelor's degree in biology and economics from the UW-Madison in the spring of 2016. She began studying chloride in a local wetland starting in 2014, and was awarded the 2015 Lakeshore Nature Preserve Student Engagement Grant. Greta is currently getting her master's degree in marine science from the University of South Florida.

# PRESENTER BIOGRAPHIES

**Henderson, Richard** (richard.henderson@wisconsin.gov) received bachelor's and master's degrees in biological conservation from UW-Madison. From 1983 to present he has been a research ecologist with the WDNR Bur. of Science Services. He has 41 years of experience in natural area inventory, assessment, and management, and has been an active volunteer with The Prairie Enthusiasts since 1992. He has served on the boards of Wisconsin Chapter of TNC and TPE.

**Highsmith, Tod** (todhighsmith@me.com) is a writer and editor in the conservation sciences. His career includes stints as an environmental educator, ornithological researcher, and staff journalist for an international bird conservation organization.

**Houghton, Christopher** (houghtoc@uwgb.edu) received his master's degree and PhD in biological sciences from the UW-Milwaukee and his bachelor's degree in biology from the UW-Stevens Point. He mainly focuses on the ecology of Great Lakes fishes and assessments of aquatic habitats.

**Ibach, Andrew** (ibachaj02@uww.edu) is a senior at the UW-Whitewater, majoring in biology with an emphasis in field ecology. He has worked for 2 years on various projects with Dr. Joshua Kapfer including the tracking of headstarted blanding's turtles (*Emydoidea blandingii*) via radio-telemetry.

**Kamke, Kaira** (Kaira.L.Kamke@uwsp.edu) is an undergraduate water resources student at UW-Stevens Point and a junior taxonomist in the Aquatic Biomonitoring Laboratory. She has combined her passions of aquatic invertebrates and wetlands through independent research projects, and will be graduating in May 2017 with plans to pursue graduate school in the field of aquatic ecology.

**Kapfer, Josh** (kapferj@uww.edu) is an Associate Professor and Certified Wildlife Biologist During his career Josh has held professional positions in natural resource regulation, environmental consulting, and academia. He has been in the Deptartment of Biological Sciences at UW-Whitewater since 2011. Josh has more than 30 peer-reviewed publications and his current research focuses on the ecology and conservation of reptiles in Wisconsin.

**Kotar, John** (jkotar@wisc.edu) is emeritus professor of UW-Madison. During his twenty years in the Department of Forest Ecology and Management he developed an ecological forest site classification systems, known as forest habitat types, for Wisconsin, Michigan and parts of Minnesota. He has bachelor's degree in conservation from UW-Stevens Point, master's degree in forestry from University of Minnesota and PhD in forest ecology from University of Washington.

**Kraszewski, Sarah** (sarah.kraszewski@stantec.com) is an environmental scientist and professional wetland scientist at Stantec where she works on ecological restoration and wetland mitigation projects. She specializes in the development of site-specific restoration plans, invasive species control, restoration crew leadership, vegetation monitoring, hydrology analysis, wetland delineation, and reporting.

**Kupsky, Brianna** (kupsbg15@uwgb.edu) is a master's candidate at the UW-Green Bay who is researching methods of restoring coastal habitat in the Lower Bay of Green Bay & Fox River AOC.

**Lannoo, Michael** (mlannoo@iupui.edu) has been on the faculty at Indiana University School of Medicine since 1991. He has authored more than 100 papers and 8 books on various topics related to amphibian and fish anatomy, ecology, and conservation biology.

**Little, Amanda** (littlea@uwstout.edu) is an Associate Professor at UW-Stout in Menomonie, Wisconsin. She currently researches ephemeral ponds, but has also studied peatlands, trout stream restorations, and invasive plant species. She is working to build the UW-Stout Herbarium and teaches wetland, plant and ecology courses.

**Lulloff, Alan** (alan@floods.org) is Chief Scientist at the Association of State Floodplain Managers Flood Science Center. Before joining ASFPM in 2004, Mr. Lulloff spent 32 years with the WDNR in floodplain managment, dam safety, water supply, groundwater and water quality. Mr. Lulloff holds an environmental engineering degree from the UW-Milwaukee, is a registered professional engineer in Wisconsin, and a Certified Floodplain Manager.

# PRESENTER BIOGRAPHIES

**Marti, Aaron** (aaron.marti@wisconsin.gov) is a wetland assessment research scientist with the WDNR Wetland Monitoring and Assessment Program. His research interests focus on bridging wetland and aquatic ecosystem ecology (specifically biogeochemistry) and soil science with wetland management and assessment. Aaron received his bachelor's degree in water resources from UW-Stevens Point and his master's degree in biology from Ball State University.

**Martinez-Soto, Kayla** (ksmartin@neiu.edu) is a student at Northeastern Illinois University majoring in environmental science. She is an undergraduate research assistant in the lab of Dr. Pamela Geddes. She is also a Hispanic Association of Colleges and Universities (HACU) Federal Internship Alumni. She wants to move forward to graduate school to study coral reef conservation or wetland conservation.

**McClenon, Marci** (mcclenonmb@beloit.edu) is an ecological, evolutionary, behavioral biology major at Beloit College. She was awarded a Biomedical Scholars Fellowship for conducting her research project. She is originally from Austin, Texas, and has primary interests in forestry, botany and symbiosis. She is anticipating graduation in May 2017.

**Miller-Adamany, Amber A.** (miller.amb2@uwlax.edu) is a graduate student in the Biology Department at the UW-La Crosse and a Graduate Research Fellow of the National Science Foundation. She is interested in continuing to pursue research related to invasive species abatement and ecological restoration, particularly in the forested wetlands of Wisconsin.

**Mossman, Michael** (mikemossman@wildblue.net) is an ecologist retired from WDNR, with special interest in the history of animal populations, landscapes, and the ecological effects of human land use. He has studied the human history, management and wildlife of the former Badger Army Ammunition Plant since 1997.

**Murphy, Lynnette** (lmurphy1@neiu.edu) is an undergraduate student at Northeastern Illinois University pursuing a degree in environmental science. Over the summer she participated in NEIU's summer research program that allowed her to present research on the wetland plant genus *Typha*, commonly called cattail, at their 8th Annual Student Center for Science Engagement Research Symposium.

**Noll, Christopher** (christopher.noll@wisconsin.gov) is a wetland botanist and wetland mapper for the WDNR. On the side, he is also working on a field guide to ferns and fern allies in Wisconsin and has spent the last two field seasons conducting floristic quality surveys throughout the state.

**Orlofske, Sarah** (s-orlofske@neiu.edu) received her PhD in ecology and evolutionary biology from the University of Colorado Boulder in 2008, where she studied disease ecology and parasitology. Her primary research interests include the interactions between parasites and their hosts within aquatic food webs, amphibian conservation, and wetland restoration.

**Peterson, John** (petersonjoh@uwplatt.edu) has wanted to be a herpetologist since he was a kid. He studied newt parasitology during his bachelor's degree at Michigan State University and frog metamorphosis, disease, and stress physiology during his PhD at Auburn University and his post-doc at Washington State University. He currently studies frog vocalization and conservation as an assistant professor at UW-Platteville.

**Putnam, Michael** (michael.putnam@wisconsin.gov) is the invasive plant program specialist in the Forestry Division of the WDNR. He works on outreach to loggers, foresters, and land owners on best management practices to prevent the spread of invasive plants. Also, he manages two grants related to invasive plant control. Previously with the Department, Mike worked on aquatic invasive species for WDNR.

**Rossi, Ann** (rossi.ann@epa.gov) is a soil scientist in EPA's Wetlands Division. She works on state and tribal wetland monitoring and assessment programs, including the National Wetland Condition Assessment, and issues pertaining to wetland soils. Annie has a PhD in Environmental Science and Technology from the University of Maryland, where her dissertation research focused on wetland soil formation and development, carbon cycling, and hydric soil identification on Mid-Atlantic barrier islands.

**Roth, Joseph** (jroth@openlands.org) has managed Openlands' wetland restoration relationship with the Chicago District of the USACE since 1995 and in that time has been involved with restoration projects covering several thousand acres. Openlands is one of the oldest and most accomplished conservation NPO's in northeastern Illinois.

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**Salas, Dan** (dan.salas@cardno.com) has worked in the fields of natural resource management and ecological restoration for 19 years. He is a senior consultant with Cardno based in their Fitchburg office. Dan is also certified as a senior ecologist by the Ecological Society of America.

**Sande, Bill** (william.m.sande@usace.army.mil) is a biologist and regulatory project manager with the St. Paul District, USACE. Bill works with permit applicants and wetland mitigation bankers on numerous wetland mitigation sites across the northern part of the state. He has been with the USACE since 1998 and currently works out of the Hayward field office.

**Scherer, Jeanne** (Jeanne.Scherer@wisconsin.gov) has worked for WDNR since 2013. As a Water Resources Management Specialist, her work includes water quality monitoring, aquatic plant inventories on lakes, and monitoring and responding to aquatic invasive species (AIS) in the South Central Region. She has bachelor's degrees from Carthage College and UW-Whitewater and elementary education teacher certification through Barat College.

**Schulte, James** (schultej@beloit.edu) received a bachelor's degree at Southeast Missouri State and PhD. at Washington University. He was a NSF postdoctoral researcher at the National Museum of Natural History until his first faculty position at Clarkson University. Jim recently moved to Beloit College as an Associate Professor of Biology. He has worked in Argentina, Chile, and Australia studying reptile diversity and evolution.

**Schulte, Collin** is a junior in the environmental science program at UW-Stout with a focus in aquatic biology. He grew up in Mound, Minnesota west of the Twin Cities. Collin hopes to pursue a career in GIS or Marine biology in the future.

**Schultz, Rachel** (raschult@uwsp.edu) is a research scientist and lecturer at UW-Stevens Point. She received her PhD at The Ohio State University and was most recently an assistant professor of Environmental Science at the State University of New York at Plattsburgh. Her research interests include biodiversity and ecosystem functioning in wetlands, invasive species, and restoration ecology.

**Smith, Christopher** (Christopher.Smith@herpmapper.org) is a wildlife biologist and serves as a Project Administrator for HerpMapper. Chris' work focuses on amphibian, reptile, and terrestrial invertebrate conservation and research. Chris sits on the Board of Directors for The Center for North American Herpetology and is an active Midwest Partners in Amphibian and Reptile Conservation and Minnesota Minnesota Herpetological Society organization member.

**Staffen, Richard** (Richard.Staffen@wisconsin.gov) has been a Conservation Biologist for the WDNR's Natural Heritage Conservation program since 2002. He helps coordinate and performs inventory and monitoring projects across the state focused on rare vertebrate animals. Richard has lead efforts to better understand the extent of snake fungal disease in Wisconsin and assess the status several rare reptiles in the state.

**Stamer, Reid** (Reid@eveinc.consulting) is a certified professional wetland scientist and restoration ecologist with a focus on successful wetland mitigation through invasive species management, habitat restoration, woodland management, and up-to-date conservation practices.

**Steber, Aaron** (Aaron.Steber@cardno.com) is a stream restoration specialist managing streambank and shoreline stabilization and habitat enhancement projects, including project planning, grant administration, permitting, design, and construction oversight. He has more than 14 years of experience working with streams in the Midwest and Northwestern United States, as well as in Finland and Costa Rica.

**Stein, Shelly** (sstei263@uwsp.edu) is a member of SWAMP. The SWAMP organization at UW-Stevens Point is focused on promoting awareness of wetland science and conservation, and strives to provide education to students and community members about the importance of wetland environments. The organization collaborated with the Wetlands Conservation League in 2015 to conduct an assessment on a restored wetland site with plans for future monitoring annually.

**Streiff, Carolyn** (carolyn.streiff@uwex.edu) is a geophysicist at the Wisconsin Geological and Natural History Survey. She is responsible for creation of improved field geophysical data collection. She has conducted numerous geophysical surveys across Wisconsin, including the Central Sands and Kewaunee County.

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**Trochlell, Patricia** (patricia.trochlell@wi.gov) works as a wetland ecologist for the WDNR and is a board member of the Invasive Plants Association of Wisconsin. She has worked on wetland issues related to policy, monitoring, management, restoration and education. As a volunteer, she helps manage prairie, oak savanna and wetland sites in southern Wisconsin.

**Waechter, Zach** (zachary.waechter@cardno.com) manages a variety of environmental projects. He conducts wetland delineations, state and federal environmental permitting, T/E species surveys, and provides wetland mitigation assistance. He holds B.S degrees in soil and land management and resource management from UW-Stevens Point. In his five years of experience he has completed wetland work in eleven states throughout the Midwest and southern U.S.

**Watermolen, Dreux** (dreux.watermolen@wisconsin.gov) is an ecologist/zoologist who currently serves as the chief of social science research for the WDNR. He earned his bachelor degree at St. Norbert College and attended graduate school at UW-Green Bay. He is interested in the zoogeography, life history, and taxonomy of Wisconsin's rich biological diversity.

**Wiley, Chandra** (chandra236@hotmail.com) is a senior in environmental science with minors in GIS and plant science at UW-Stout. She has been involved in the Chippewa Moraine Ephemeral Ponds Project for the past three years. Chandra is interested in wildlife population dynamics and hopes to attend graduate school to study mammals.

**Williamson, Caitlin** (caitlin.williamson@wisconsin.gov) directs the Natural Resources Foundation's conservation programs, which provide critical support for Wisconsin's public lands, threatened wildlife species, and environmental education. She received her master's degree in environmental conservation from the UW-Madison's Nelson Institute for Environmental Studies and is a founding member of the Wisconsin Chapter of the Society for Conservation Biology.

**Willman, Allison** (Allison.Willman@wisconsin.gov) graduated with a bachelor's degrees in soils and land management in May of 2013 from UW-Stevens Point. She has studied wetlands with the Lake County Stormwater Management Commission and has conducting wetland delineations, assessments, and vegetation surveys as a consultant for regulatory purposes. Currently she is with the WDNR continuing her research of wetlands.

**Ziegler, Jerry** (jziegler@tnc.org) has been on the staff of the Wisconsin Chapter of The Nature Conservancy for eight years. He manages approximately 1,800 acres of land in Southeastern Wisconsin and is part of TNC's prescribed fire team in Wisconsin. He is also a trustee on the board of Wisconsin Lakes and former president of the Southeastern Wisconsin Invasive Species Consortium.

**Zillen, Zak** (radium86@gmail.com) is senior biology major at Northeastern Illinois University. While conducting his undergraduate research project, he particularly enjoyed the field work and operating the scanning electron microscope. Zak plans to pursue a career in environmental education and management.

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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 |
| TNC | The Nature Conservancy |