19th Annual Emiquon Science Symposium

Format:

The presentations are divided into three sessions:

Session 1: 9:00 AM
Session 2: 10:00 AM
Session 3: 11:45 AM

At the conclusion of each presentation, there will be 3 minutes for questions. **Please post questions in the chat.** At the conclusion of each session, there will be an additional **Question and Answer period,** during which time questions may be asked of any of that session's presenters. At the conclusion of the additional Q&A there will be a short break.

Session 1: 9:00 AM

25 Years of Emiquon and Illinois River Program Updates

Randy Smith
The Nature Conservancy

2025 marks 25 years since the property that now makes up the Emiquon Preserve was acquired, and a variety of milestones have been reached during that time. To celebrate the 25th anniversary, TNC and partners have a variety of events planned throughout the year. We will briefly cover milestones, upcoming events, stewardship and other management activities from 2024, and management plans for 2025. These include invasive species management, carp, fire, water level and an update on construction at Spunky Bottoms Preserve.

Key Ecological Attributes and Research Objectives for Merwin Preserve at Spunky Bottoms

Maria Lemke, Doug Blodgett, Sally McClure, Denim Perry, and Randy Smith
The Nature Conservancy

Historic flooding in 2013 resulted in a levee breach at The Nature Conservancy's Spunky Bottoms Preserve along the Illinois River. Since that time, water levels at the floodplain site have been controlled by river water levels with subsequent ecological degradation of the site. Levee repair and construction of a new water control structure at Spunky Bottoms is slated for completion in 2025. In anticipation of increased capacity to manage hydrology at the site, we are in the process of adapting Emiquon Key Ecological Attributes (KEAs) to assess restoration progress and provide feedback for adaptive management at Spunky Bottoms. Emiquon KEAs have provided the framework for strategic monitoring and assessment of the Emiquon Preserve since restoration began in 2007. We have identified around 60 Emiquon KEA indicators that might be adapted for Spunky, however, given the remoteness of the location and capacity considerations, we are assessing monitoring methodologies that are attainable, applicable, and

sustainable over the long term. With the potential for frequent connections between the Illinois River and the Spunky Bottoms floodplain, we have drafted two research objectives related to floodplain restoration and management: (1) Identify, monitor, and evaluate KEAs to assess restoration actions and address management questions related to balancing prioritization of different conservation targets; and (2) Develop, implement, and evaluate site-specific strategies for reestablishing and maintaining healthy aquatic plant communities. KEA monitoring efforts will be key to addressing these objectives with the larger goal of integrating findings into the development of strategies with partners for improved management of the larger river system.

Session 2: 10:00 AM

Landscape Management Challenges & Nature-Based Solutions in a Changing Climate

Trent Ford
Illinois State Climatologist, Illinois State Water Survey

Climate change has significant acute and chronic impacts on ecologically, economically, and culturally important plant and animal species in Illinois. Through more frequent and intense rainfall, extreme heat, and shifts in seasons, our changing climate presents many complex challenges for natural resource management. However, many solutions are effective for both landscape adaptation to climate change and mitigation of its impacts. Furthermore, many nature-based solutions rely on effective management to ensure the ecosystem services needed for climate resilience. We'll discuss climate change in Illinois, its impacts to landscape management, and the nature-based solutions that can make a healthy and productive future in Illinois.

Ecosystem Enhancement Planning for the Lower Wabash River

Carrie Parmenter
The Nature Conservancy

TNC is creating a 5 year implementation plan for the Lower Wabash that creates a whole-systems approach to improve habitat and water quality. This planning effort includes hosting landowner meetings to gather input from various stakeholders in the Lower Wabash region to provide information on multi-benefit opportunities for ecosystem enhancement and solicit stakeholder feedback. This effort also includes technical analyses that will serve as the basis of the comprehensive plan. TNC is assessing various agricultural best management practices (BMPs) for their potential to achieve TNC’s goals for the lower Wabash River. Additionally, key parcels are being identified along the Lower Wabash River using the EcoFIP (Ecological Floodplain Inundation Potential) tool. These analyses, along with feedback from stakeholders and data derived from the Freshwater Resilient and Connected Network are being used to develop the comprehensive plan to enhance the aquatic and riparian ecosystems of the Lower Wabash River corridor with consideration of land use BMPs within the greater Wabash River Watershed.

Modeling Changing Winter Duck Distribution in the Great Lakes Region

Andrea Spurck[1], Robert Gates[1], and Brendan Shirkey[2]
[1]The Ohio State University
[2]Winous Point Marsh Conservancy

Warming winter temperatures have affected duck distributions across the United States. Previous studies have reported or predicted delayed autumn migration and northward shifts in wintering ranges. This research has been conducted mostly on a continental scale, with less focus on smaller geographic areas. Ohio and other midwestern states are important to consider in this context because of their proximity to the Great Lakes. Increased abundance of wintering ducks in this area could place greater demand on food and habitat, limiting resources available during spring migration. For my first objective, I conducted a retrospective analysis of Christmas Bird Count trends in duck distribution and relative abundance from 1966-2021 in the Upper Mississippi and Great Lakes Region Joint Venture (UMGLJV). I modeled Weather Severity Index (WSI) variables through time with percent change per year in duck abundance across the region. Wetland obligate dabbling ducks were increasing across the UMGLJV, especially in the southwest region, but were not detected in northern latitudes. Mallard (*Anas platyrhynchos*) and American black duck (*Anas rubripes*) percent change per year varied across the UMGLJV but were generally increasing more in the northwest region. For my second objective, I predicted future winter duck distribution and relative abundance based on different emissions scenarios for 2050 and 2100 in the UMGLJV. I calculated future WSI values for emissions scenarios A2, which represents more extreme temperature increases, and B1, which represents less extreme temperature change. Future temperature increases could shift the WSI threshold for wetland obligates into areas they did not historically occupy. This research has potential management implications for proactively addressing wetland conservation aimed at providing additional overwintering and spring migratory habitat to support future increases in waterfowl. This research could also help inform future waterfowl hunting regulations and viewing opportunities to match shifting fall migratory patterns and winter distributions.

Session 3: 11:45AM

Optimizing Biodiversity Monitoring with Environmental DNA

Kara Andres
Illinois State University

Accurate biodiversity assessments are essential for effective conservation, yet traditional surveys may be limited by cost, efficiency, taxonomic expertise, and selection biases. Environmental DNA (eDNA) sampling offers a powerful alternative by identifying species presence through the genetic material they shed into the environment. However, understanding the strengths and limitations of this novel approach, as well as identifying how eDNA may be used to complement traditional sampling approaches, is crucial. In my research, I compared the fish biodiversity detected with eDNA metabarcoding to four traditional sampling methods (electrofishing, fyke netting, gillnetting, and seining) to determine the most effective strategy for fish species detections in large temperate lakes. Our results showed that eDNA metabarcoding detected more

species than any other method, including 11 species undetected in all four traditional sampling surveys. Optimization modeling revealed that the most efficient biodiversity monitoring strategy in this system results from combining eDNA sampling with smaller amounts of targeted seining and fyke netting. These findings have direct applications for wetlands monitoring and conservation, including at the Emiquon Preserve and other floodplain restoration sites in the Midwest. By integrating eDNA sampling into monitoring programs, we might be able to more efficiently detect threatened, endangered or invasive species, track changes in species diversity, and enhance our ability to assess the effectiveness of various habitat restoration strategies.

Current Status of Fisheries and Aquatic Vegetation Communities at the Emiquon Preserve

Toby Holda
Illinois River Biological Station

The Illinois River Biological Station (IRBS) has monitored the fish and aquatic vegetation communities at The Nature Conservancy's Emiquon Preserve since 2007. Fisheries monitoring has been monthly from April-October (with a few exceptions) and has followed the U.S. Geological Survey's Upper Mississippi River Restoration Program's Long Term Resource Monitoring (LTRM) methods for backwaters (fyke nets, minifyke nets, and daytime electrofishing). Aquatic vegetation monitoring has always included surveys during the peak growing season and followed two methods over the years: 1) the LTRM rake method (2008-2015, 2023-2024) and 2) a box sampling method (2016-2024). Fisheries and aquatic vegetation communities at Emiquon showed substantial recovery in initial years. Sportfish condition and abundance, native backwater fish presence, and native vegetation presence were all substantially greater than connected backwaters. Recent years have seen declines in water clarity and vegetation coverage, as well as condition and catch of some piscivores. Current threats include increased turbidity and presence of non-native species.

Evaluating the Use of Artificial Intelligence for Creating Vegetation Maps

Sally McClure
The Nature Conservancy

We are evaluating the use of artificial intelligence (AI) to automate aerial imagery analysis for mapping of vegetation/cover at our Emiquon and Spunky Bottoms Preserves, with the potential to use developed methodologies elsewhere in the Illinois River floodplain and beyond. Vegetation communities are crucial for primary production, supporting wetland dependent species, and meeting Key Ecological Attribute goals. However, current mapping methods face challenges, such as, the personnel time required, and as a result, timing of results desired for management decisions. Additionally, digitizing decisions are necessarily subjective when vegetation communities are complex.

The project explores processing imagery collected by satellite, drone, and fixed-wing aircraft, over the last 18 years, and with the help of previously created cover maps, training AI software to create detailed vegetation/cover maps. The introduction of AI is proposed to address several issues by providing more timely quantitative and objective assessments, reducing variability, and freeing up personnel resources for additional high-priority monitoring and research. While previous mapping efforts have been invaluable for tracking vegetation assemblages and

informing decision making, AI-based mapping provides a potential opportunity to complete this work more quickly, for less cost, with high detail while making limited personnel time available for additional high-priority monitoring and research.