17th Annual Emiquon Science Symposium Abstracts

(Presenting author in **bold**)

SAV Session 1

Changing Wetland Vegetation Communities and Waterbird Use at Emiquon Preserve
Andrew Gilbert, Joshua M. Osborn, Christopher S. Hine, Aaron P. Yetter, and Auriel Fournier
Illinois Natural History Survey

We monitored the response of wetland vegetation and waterbird use to restoration efforts at Emiquon Preserve during 2007–2022 relative to desired key ecological attributes identified by The Nature Conservancy (TNC). We mapped the wetland vegetation of Thompson and Flag lakes during fall of each year to document changes in wetland area, plant species composition, and vegetation assemblages. Spatial extent of wetland vegetation and other cover types grew rapidly during early years of restoration, and vegetation communities developed without supplemental planting or little hydrological manipulation. However, changes in vegetation communities observed in 2015-2016 suggested that the emergent marsh at Emiquon was in a state of decline. Consequently, TNC initiated wetland drawdowns in 2016 to dry out the substrate and encourage regeneration of the marsh community. Since the drawdown, moist-soil vegetation has flourished, but emergent marsh communities have yet to return to a level seen during the initial restoration and submerged aquatic vegetation has declined. Additionally, during this timeframe we monitored waterbird use at Emiquon Preserve including aerial surveys for waterfowl abundance, waterbird brood surveys, and nest monitoring of secretive marshbirds. We will present responses of the major vegetation communities (i.e., aquatic bed, persistent emergent, hemi-marsh, non-persistent emergent, shrub-scrub, and open water) to restoration efforts and relate them to changes in waterbird communities at the Emiquon Preserve.

Submerged Vegetation at the Emiquon Preserve
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We have monitored submerged vegetation density and composition at the Emiquon Preserve since 2008. Vegetation monitoring originally followed the LTRM-style rake method until 2015. Since 2016 monitoring has utilized a box sampler, so that we can estimate dry mass (measured in the lab) per area (box sampler). Recent years of sampling may have over-represented within-ditch vegetation communities due to receding vegetation extent possibly due to drawdowns. We compare within-ditch to main basin vegetation communities and density in recent years (2016-2022).

Restoring the Tradition at Delta Marsh: Effects of carp exclusion on water clarity, submersed vegetation, and waterfowl

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Once introduced to shallow aquatic ecosystems, common carp (*Cyprinus carpio*) often degrade habitat, negatively impacting the waterbirds that rely on these systems. Following the introduction of carp, water clarity and extent of submersed aquatic vegetation (SAV) may decline. We excluded large carp (>70 mm maximum body width) access to a culturally and ecologically significant 18,500 ha freshwater coastal wetland located in Manitoba, Canada with the goal of restoring the marsh to historical conditions to support fall-migrating waterfowl. In winter 2012–2013, exclusion structures were built to limit access by large carp to Delta Marsh during the spring and summer. A monitoring program (2009–2018) compared marsh conditions and the response of ducks before and after carp exclusion. Water clarity improved following carp exclusion, largely driven by a reduction of inorganic suspended solids (ISS) rather than phytoplankton biomass, with the greatest change observed in sheltered areas of the marsh. SAV cover doubled through the 6 years of monitoring post-carp exclusion and SAV cover and species richness in the marsh was comparable to what was present in the early 1970s when there was also partial carp exclusion. Like water clarity, the increase in SAV cover was most significant in sheltered areas of the marsh. We found that fall-migrating duck numbers rebounded to historical levels (1970s). There was a 339% increase in diving duck density and a nearly 400% increase in dabbling duck density between the pre- (i.e., 2000s) and post-exclusion periods. Diving ducks were more likely to be observed associated with SAV within the marsh, whereas dabbling ducks responded to emergent vegetation extent and water levels. Overall, excluding large carp can successfully improve the quality of habitat for migrating ducks in large freshwater wetlands.

Marsh restoration, degradation, regeneration, and recovery: a tale of Common Carp at the Dixon Waterfowl Refuge in Hennepin, IL

Gary Sullivan
The Wetlands Initiative

There are myriad examples of how common carp (*Cyprinus carpio*) have degraded or destroyed shallow lake and marsh systems throughout North America and other parts of the world. However, there are few examples of how these systems can recover and thrive once carp have become well established. The Dixon Waterfowl Refuge is a 3,000-acre wetland, prairie, and savanna restoration that began in 2001 on a former floodplain of the Illinois River. Despite a determined effort to rid the 1,250-acre lake and marsh system of common carp with the application of the piscicide Rotenone in the initial project year, the carp proved tenacious and began impacting an otherwise highly successful wetland restoration in just a few years. By 2006, the carp had significantly degraded the diverse macrophyte community, which in turn led to a downward spiral in habitat quality that was reflected in the numbers of migratory waterfowl visiting the site each fall. After several unsuccessful efforts to remove carp, a second Rotenone application was conducted early in 2010 that led to rapid improvements in water quality, clarity, macrophyte cover, and a positive response in waterfowl visitation numbers. However, this effort

ultimately proved unsuccessful due to the carp's ability to find pockets of refuge and escape the piscicide. By 2011, the lake and marsh were crashing again, which led to a third application of Rotenone in 2012, coupled with an effort to deny the carp their pockets of safety. This final carp treatment was not only successful, but it was followed a year later by a dramatic recovery in lake vegetation and the largest waterfowl migration recorded at the site. Ten years later and despite small numbers of carp identified again in 2016, the lake so far remains fully vegetated, with clear water and heavy use by migratory waterfowl.

SAV Session 2

Evidence for herbivory contributing to declining submersed aquatic vegetation at Emiquon
Randy Smith, Doug Blodgett, and Sally McClure
The Nature Conservancy

Wetland succession leads to changes in vegetation community, but vegetation changes at The Emiquon Preserve appear to outpace succession alone. Avian aquatic herbivores such as American coots (*Fulica americana*), gadwalls (*Mareca strepera*), trumpeter swans (*Cygnus buccinator*) and mute swans (*Cygnus olor*) may deplete submersed aquatic vegetation (SAV) and are common at Emiquon. Of these species, only mute swan is common during the summer growing period. Previous research evaluating mute swan herbivory on SAV in the Illinois River valley showed minimal impacts, perhaps because of densely vegetated study sites and a low density of mute swans. As spatial extent and density of SAV declines at Emiquon, herbivores may have a disproportionate impact on remaining SAV patches. During 2022, a pilot project using small exclosures at Emiquon provided some evidence that growing season herbivory may be having substantial impacts on SAV, potentially exacerbating existing declines.

Investigating causes for changes in submersed aquatic plant communities at Emiquon
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In and especially along the Illinois River, aquatic plant communities once contributed diverse and abundant primary production to the river ecosystem and provided important habitats for a broad variety of animals, aquatic and terrestrial, resident and migratory; however, they have been in relatively short supply and high demand since their virtual demise by the 1950s. Floodplain plant communities including submersed aquatic vegetation (SAV) were identified as a conservation target for the Conservancy's Illinois River Site Conservation Plan in 1998 and during planning from 2001 through 2006 for restoration and long-term management of the Emiquon Preserve. Recent analyses of vegetation monitoring data collected at Emiquon since restoration began in 2007 combined with observations by numerous biologists have catalyzed growing concerns about declines and the sustainability of the once robust SAV communities at Emiquon. Potential causes for these declines are likely complicated as they may be manifold, interrelated, and disparate temporally and spatially. Additional monitoring data that show changes in hydrology combined with increasing trends in turbidity, common carp densities, and

swans may help explain recent changes in SAV. Further analyses of existing data sets likely combined with new focused research are urgently needed to better understand causative mechanisms and their interrelationships that can then facilitate development, implementation, evaluation, and refinement of management measures to insure the long-term health of SAV and its contributions to Emiquon and the river.

General Session

Emiquon Preserve Visitor Use Evaluation for Managerial Outcomes

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More than 20 years ago, The Nature Conservancy's (TNC) Emiquon Preserve floodplain restoration project was conceived and launched at a time when the role of public use and community partnerships were often subsumed by a focus on the conservation of land, water, and archeological survey work. In 2009, Emiquon opened for recreational activities, including canoeing, fishing, and wildlife viewing. These initial recreational opportunities were quickly expanded, and in 2011, the dedication of a public use area, comprised of new facilities and amenities along with new interpretive signage, helped to serve a wider array of day use visitors from across the state and country. While the initial operative hypothesis was that investment in public use infrastructure and access would build constituency and result in several beneficial conservation outcomes, that hypothesis has not been evaluated.

The goal of our multi-year evaluation and research project (2022 through 2024) is to provide Emiquon with a scientific approach to visitor program evaluation and management that will, in turn, create a better opportunity for increasing visitor support for conservation and restoration activities. A deeper understanding of visitors will allow Emiquon to qualify and quantify how its ecosystems benefit the community and how conservation activities can connect visitors, the local community, and Emiquon in a symbiotic relationship. This presentation will provide an overview of our research protocol and six project aims, including our findings from Aim 1, and discuss why the development and implementation of a visitor use evaluation program is critical to providing the data to support TNC's outcomes-focused decision making at Emiquon and other preserves. A comprehensive visitor evaluation strategy is needed to help integrate the interconnected social dynamics of onsite visitor use, including the recreational benefits, with conservation and restoration activities.

Evaluating the Spring Migratory Behavior of Sora and Virginia Rail in Central Illinois using the Motus Tracking Network

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Detailed information about the spring migratory behavior of Sora (*Porzana carolina*) and Virginia Rail (*Rallus limcola*) is lacking. Much of the wetland habitat required by these secretive marsh birds during migration has been lost across the Midwest. Therefore, it is important to understand the migratory behavior of rails to assess conservation priorities. Stopover sites are critical for birds to rest and refuel during migration. In the spring, breeding success may be influenced by the impact of resource availability at stopover sites. Our goals are to describe migration timing, migratory connectivity, and stopover duration of Sora and Virginia Rail stopping over in Central Illinois and investigate factors influencing departure behavior using the Motus Tracking Network. This research will provide information to improve wetland management for rails.

The Effects of Potassium Chloride on Zebra Mussels
Patrick Menke
Bradley University

Zebra mussels, *Dreissena polymorpha*, are an invasive mollusk species that have invaded waterways throughout North America since their arrival in the late 1980s. This species of mussel spreads rapidly and has the potential to cause great damage both economically and to the ecosystems they invade. These mussels can survive periods of aerial exposure, which enables them to travel between bodies of water and establish new populations in previously isolated areas. There have been many attempts at controlling the spread of this species, including the use of lethal chemicals like potassium chloride (KCl). To better understand this interaction, mussels were put through a variety of exposures in order to determine if this was a potential solution. These exposures were aimed to determine the lethal concentration (in air and water), the effects of different aerial conditions, how other important species may be impacted, and how these exposures can impact key cellular makers showing oxidative and metabolic stress. Although further research is needed, these preliminary findings suggest that potassium chloride could be an effective means of controlling the aerial spread of zebra mussels, and potentially reducing existing populations.

Avian Influenza: Status and Updates
Ben Williams
Illinois Department of Natural Resources

The current H5N1 strain of avian influenza has greatly impacted both wild and domestic birds since being introduced in North America. While avian influenza itself is not a new disease, this strain has been particularly challenging for wildlife managers, disease experts, and commercial poultry operations. While Illinois and other states and provinces continue to monitor and respond to outbreaks, there are still many questions to be answered.

Management planning for Emiquon and Spunky Bottoms Preserves

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

Water level management at Emiquon impacts habitats, fish and wildlife, researchers and other partners, and recreational users. We will provide an update on current water management plans for 2023 and 2024, anticipated benefits and challenges and other anticipated management actions. At Spunky Bottoms, planning, engineering, and initial preparations for construction continue. We will provide on an update on current plans, challenges to date and anticipated future issues, and tentative plans for initial management once rehabilitation is complete.