13th Annual Emiquon Science Symposium

8th May 2019
Illinois State Museum at Dickson Mounds, Lewistown, IL

Abstracts for Oral Presentations
(abstracts are in order according to the schedule)

9:05 am - Illinois River History: A Summary of New Research
Michael Wiant
Illinois State Museum

Since the late 17th century, travelers, engineers, and geologists have considered the hydrology of the Illinois River. In this presentation, we couple a brief historical overview of river history with recent research that explores the late Ice Age origins of this river. Studies by Edwin Hajic and Alan Harn at Emiquon and Brandon Curry and his colleagues at the State Geological Survey refine our understanding of the origins of the distinctive hydraulic character of the Illinois River floodplain.

9:35 am - Water Level Management on the Upper Mississippi River - Restoring Variability to the System
Gretchen Benjamin[1], Teresa Newton[2], Kevin Kenow[3], Benjamin McGuire[4], David Busse[4], and Brenda Kelly[5]
[1]The Nature Conservancy
[2]USGS, Upper Midwest Environmental Sciences Center
[3]UMESC
[4]USACE, MVS
[5]WI-DNR, Mississippi River Program

For 25 years, natural resource partners have worked with the Corps of Engineers to operate Mississippi River dams slightly different to produce outcomes for navigation and the ecosystem. Specifically, seasonal variability in the form of lower water levels during the growing season to promote annual and perennial aquatic plants to regenerate along exposed mudflats in the river corridor. These plant communities form essential habitat for the full array of resident and migratory aquatic organisms that use the river during their life cycle. Twenty three of the last twenty five years some form of reduced water levels have been implemented along the impounded portion of the Upper Mississippi River. This presentation will focus on the implementation and information gained from a quarter century of improved management at these dams.

10:05 am - Illinois River Water Level Management Alternatives
Chuck Theiling
US Army Corps of Engineers - ERDC

Navigation dams maintain stable water levels on the Lower Illinois River but there are several strategies available to manage water levels independent of the dams. Moist soil wetland management is infrastructure and maintenance intensive. Increased river discharge also reduces performance because low levees are overtopped more frequently in an altered hydrologic environment.

Temporary drawdowns may be a viable alternative to permanent levees. They can be implemented in backwater lakes during low flow periods using temporary closures across single inlet lakes and using portable pumps to lower water levels similar to moist soil units. This action would have considerable uncertainty because it depends on stable growing season water levels, but it would be much lower cost than building levees and pumps which may allow for experimentation and adaptive management. A program that moves among suitable lakes every 5-10 years has been suggested.

Peoria Lake is a large over-connected permanent lake compared to its pre-dam seasonal wetland habitat. The lake experienced extreme sedimentation leading to loss of plants and biological productivity which is difficult to manage as a large contiguous lake. Barrier Island Management Areas (BIMA) are a measure proposed in the Peoria Lake Comprehensive Conservation Plan. BIMA are chains of islands connecting deltas to create independent management areas on the east side of Peoria Lake. They are configured to trap and manage sediment and reduce wind-generated waves that mobilize sediment into the water column where it blocks light needed by aquatic plants. They can also be closed with temporary barriers and drawn down with temporary pumps as proposed for backwater lakes. The barrier could then be opened at intervals along it length to allow fish movement into and out of the improved habitat area. Several BIMA units could be managed in rotation to provide wetland benefits in most years.

10:45 am - Water Level Management and a Three-year Drawdown at The Nature Conservancy's Emiquon Preserve
K. Douglas Blodgett and Sally McClure
The Nature Conservancy

Hydrology is a key driver for restoring and sustaining a high-quality functional floodplain wetland complex at The Nature Conservancy's Emiquon Preserve along the Illinois River in west-central Illinois. After nearly 10 years of restoration with minimal water control, the completion of the water control structure in 2016 provided a critically important tool for managing hydrology. To effect a more natural hydrology, we used the structure to drain water from the preserve into the adjacent Illinois River by gravity flow in 2016 and 2017 and by pumping in 2018. Volumes drained varied: 4.6 billion gallons in 2016, 3.1 billion gallons in 2017, and 3.4 billion gallons in 2018. Combined with evapotranspiration and partially offset by precipitation, water levels in the preserve were lowered 1.8 ft in 2016, 3.4 feet in 2017, and 3.7 feet in 2018, exposing 412 acres, 1,727 acres, and 2,389 acres respectively. Unfortunately, during the first two years, stable low river levels needed to facilitate gravity flow did not occur

until well into the growing season, 8 July 2016 and 14 August 2017, resulting in unnaturally late drawdowns and relatively marginal responses from moist soil plants. In 2018, even though river levels were still high, we began pumping 20 May, thereby providing a longer, more natural growing season for plants on most of the exposed areas, and resulting moist soil plant responses were more dramatic. Effects of these drawdowns on plant and animal communities are still being elucidated, and future water level management will be based in part on lessons learned.

11:05 am - Preliminary Effects of Drawdown on the Wetland Vegetation Communities at Emiquon Preserve

Chris Hine[1], Aaron Yetter[1], and Heath Hagy[2]
[1]Illinois Natural History Survey, Forbes Biological Station
[2]U.S. Fish and Wildlife Service

We monitored the response of wetland vegetation to restoration efforts at Emiquon Preserve during 2007-2018 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 recent years suggested that the emergent marsh at Emiquon was in a state of decline. Consequently, TNC initiated a drawdown in 2016, and removed approximately 6 feet of water by July, 2018 to dry out the substrate and encourage regeneration of the marsh community. We will present preliminary responses of the major vegetation communities (i.e., aquatic bed, persistent emergent, hemi-marsh, non-persistent emergent, and open water), soil characteristics, and invasive plant species to drawdown and relate our data to future management of Emiquon Preserve.

11:25 am - Operational Impacts of a Water Management Structure on the Surrounding Fish Communities in the Lower Illinois River

Andrya L. Whitten, Olivea M. Mendenhall, Levi E. Solomon, and Andrew F. Casper
Illinois Natural History Survey

Water management structures (WMS) are commonly used to regulate water levels in restored backwaters of large rivers and impacts to the surrounding ecosystem vary depending on their design and operation. These managed connections can offer a balance between maintaining quality habitat in restored areas and providing benefits to floodplain river systems. From 2016-2018, we quantified the response of the fish communities (i.e., changes in abundance and composition) to the WMS operation at the Emiquon Preserve, a 6700-acre restored floodplain lake adjacent to the La Grange Reach of the lower Illinois River. Fish communities were evaluated using boat electrofishing and environmental conditions were assessed on both sides of the WMS (i.e., Emiquon and Illinois River) when it was closed, gravity feeding, and mechanically pumping water into the Illinois River. Multivariate analyses indicated changes in the abundance of fishes surrounding the WMS when it was operational: specifically, a statistical difference was detected in the Illinois River when the WMS was pumping water. Species-specific changes were identified by an increase in the abundance of dominate fish species in both

the Illinois River (i.e., gizzard shad, silver carp, white bass, and emerald shiners) and Emiquon (i.e., gizzard shad, largemouth bass, bluegill, and bowfin) when the WMS was operational. Environmental parameters indicated that the flow of water created by the WMS changes the surrounding habitat by providing a microhabitat of increased flow and highly productive water. This study suggests that managed connections between restored backwater habitats provide a benefit to large river ecosystems.

11:45 am - Pulling the Drain Plug: Reflecting on Changes of Species Composition and Abundance

Olivea M. Mendenhall, Levi E. Solomon, and James T. Lamer
Illinois Natural History Survey, Illinois River Biological Survey

Water management structures are necessary to regulate water levels in restored floodplains. Isolated or disconnected floodplains are less likely than contiguous backwaters to be affected by increases in sedimentation rates, invasive species, and water quality decline. Since 2016, Emiquon Preserve has used drawdowns to reduce water levels to allow for soil compaction and to restore the seed bank. During this time, The Illinois River Biological Station conducted surveys to monitor submersed aquatic vegetation (SAV) and fish using standardized monitoring. Visual estimates of SAV and biomass were obtained from 2016-2018 using the box sampler method. Standardized fish surveys were conducted monthly from April-October using pulsed DC electroshocking, ~24 hr minifyke, and fyke net sets. During the years of drawdown, overall native species declined 82% to 78% but increased to 92% of the biomass. Longleaf pondweed (*Potamogeton nodosus*) and sago pondweed (*Stuckenia pectinate)* declined whereas Coontail (*Ceratophyllum demersum*) and southern naiad (*Najas guadalupensis*) increased. Eurasian watermilfoil (*Myriophyllum spicatum)* decreased over the sampling season. The total number of fish collected during the drawdown increased from~2,000 to ~13,000 fish. Most native fish species had increased capture rates except for pumpkinseed (*Lepomis gibbosus*). Non-native common carp (*Cyprinus carpio*) numbers also increased. The increase capture rates can likely be contributed to the concentration of fish by reduced water levels. Reduction of water levels could impact flora and fauna positively and negatively depending on the timing and duration of reductions. The late season or fluctuating drawdowns appear to have little impact on aquatic vegetation abundance. However, steady seasonal drawdown with little impact of precipitation resulted in a reduction of Eurasian watermilfoil. The reduced water levels concentrated fish which increase capture rate except for pumpkinseeds which saw a decrease of overall abundance since water level managements began.

1:15 pm - An Overview of the Restoration and Management of a Floodplain Fish Community at The Nature Conservancy's Emiquon Preserve

Sally McClure and K. Douglas Blodgett
The Nature Conservancy

In 2007, we signed a Cooperative Fisheries Management Agreement with the Illinois Department of Natural Resources (IDNR) and restoration of a native backwater fish community began at The Nature Conservancy's Emiquon Preserve along the Illinois River. A century earlier, this floodplain wetland complex supported phenomenal natural abundance and diversity

before isolation from the river by a levee and conversion to agriculture. To start restoration of the fishery, we used pumps to lower water in ditches and IDNR applied rotenone to eradicate the existing fish community, which was dominated by rough fish including common and grass carp. Over the ensuing 5 years, 1.7 million fish (fingerlings and brood stock) of 33 native species were stocked into waters that accumulated primarily from direct precipitation. In 2009, public fishing opened on a portion of the preserve with a conservative harvest limit on largemouth bass (18-inch minimum and 1/day) based on a goal of maintaining a robust piscivore population to help control carp; within a few years the site was deemed one of the best bass fisheries in Illinois by many of over 1200 visitors who fished here annually. With the levee intact, the site remained isolated from overland flow from the river until 2013, when record flooding overtopped 1800 feet of levee for 6 days. Subsequent floods in 2015 and 2016 also overtopped a short section of the levee for briefer periods. Annual monitoring by IDNR and Illinois Natural History Survey and ancillary sampling by the Conservancy has documented 22 of the 33 stocked species and an additional 22 species (including 5 nonnatives) that were not stocked. While species diversity has been less than reported for some other backwaters, bass catch rates have been comparable. From 2016-2018, an estimated 69 million fish have been stocked from Emiquon into the Illinois River.

1:35 pm - Progression of the Fish Community at the Nature Conservancy's Merwin Preserve

Levi Solomon, Kristopher Maxson, Olivea Mendenhall, and Andrew Casper
Illinois Natural History Survey

The Nature Conservancy's (TNC) Merwin Preserve at Spunky Bottoms is approximately 500 hectares of restored backwater habitat of the Illinois River located near Meredosia IL, just east of the Meredosia National Wildlife Refuge. Restoration of the Merwin Preserve began in the late 1990's, and following those efforts the Illinois River Biological Station (IRBS), in conjunction with TNC staff, started sampling the fish community to monitor progression from an agricultural field/drainage ditch habitat to an isolated backwater/wetland complex and the subsequent changes over time. Annual fixed site sampling began in 2000 and persisted through extreme drought conditions that dried out the wetlands in 2005, 2007, 2012, and 2013 and the breaching of the south levee by record flooding in the spring of 2013. Over the course of the study, 15,034 fish comprising 43 species from 11 families have been collected, with catches dominated by gizzard shad, common carp, bigmouth buffalo, bluegill, and largemouth bass. The fish community has undergone several shifts in composition; originally a sport fish dominated system proceeded to a non-sport fish species community. These shifts in the fish community coincide with the fluctuation of water levels, with sport fish declining following extreme drought events and non-sport fish increasing. After high CPUE numbers during 2002-2005 (peaking at 111 fish/hour in 2005), a total of 28 largemouth bass were collected from 2013-2018 following the breaching of the south levee and subsequent drought of 2013. Also, following the breach, 23 new fish species have been collected in monitoring efforts. Results suggest that water level management is key to restoring and maintaining backwater restoration sites.

1:55 pm - Energetic Carrying Capacity of Submersed Aquatic Vegetation in Semi-permanent Wetlands in the Upper Midwest

Joseph D. Lancaster, Maggie C. Gross, John W. Simpson, Brendan T. Shirkey, Sarah E. McClain, Christopher N. Jacques, J. Brian Davis, and Heath M. Hagy
Illinois Natural History Survey

The Midwest, USA contains many wetlands that provide important resources for waterfowl and other wetland-dependent species of migratory birds. However, intensive land use practices have resulted in extensive wetland loss and significant declines of submersed aquatic vegetation (SAV) from many wetlands across the region. Limited by a lack of biomass and energy estimates for wetlands containing SAV, conservation planners currently are unable to accurately account for their energetic contribution in bioenergetics models. Therefore, we estimated energetic carrying capacity of 21 semi-permanent wetlands containing SAV identified as important stopover locations for migrating waterfowl and other waterbirds in the Midwest. Energy density of SAV (x # = 598 ± 138 EUD/ha) was generally less than many other wetland types in the region, varied by National Wetland Inventory class, and had a great degree of annual (98-2,917 #EUD/ha) and spatial variation (8-3,395 EUD/ha). We developed a visual rapid assessment index (R2m = 0.43) that will allow wetland managers or researchers to quickly estimate energy density from SAV. Energetic carrying capacity estimates of wetlands containing SAV will allow conservation planners to more precisely estimate energy supply on the landscape for waterfowl and wetland managers to evaluate trade-offs among alternative management strategies.

2:15 pm - Ducks, Geese, Coots, and Nesting Waterbirds, Oh My! A 12-yr Summary of Emiquon and the Illinois River Valley

Aaron P. Yetter, Chris S. Hine, Andy D. Gilbert, Joe D. Lancaster, and Sam T. Klimas
Illinois Natural History Survey, Forbes Biological Station

The Illinois River Valley (IRV) has historically been important to migrating, and more recently, wintering waterfowl. Prior to 2007, Chautauqua NWR was generally the most important migratory waterfowl refuge in the IRV; however, the distribution of migratory waterfowl and waterbirds shifted following restoration of the Emiquon Preserve and Emiquon NWR. These sites, collectively called Emiquon, currently outrank the other waterfowl sanctuaries aerially surveyed by the INHS (n = 24 in the IRV) in terms of migratory waterfowl use days. Emiquon on average hosts nearly 20% to the total duck use days during fall migration and nearly 70% of the American coot numbers from 2007–2018. When managed cooperatively, Emiquon Preserve, Emiquon NWR, and Chautauqua NWR provide ~11,200 acres of diverse, emergent marsh that give us a glimpse of what the historic Illinois Valley was like prior to prior to European settlement.

2:45 pm - A Pesticide Survey of Local Water Systems

Stephen R. Johnson, Hillary G. Rikli, and Thomas Rothfus
University of Illinois-Springfield

There is nothing in history that has had a larger impact on human society than the creation of agriculture. In the last 5,000 years, agriculture has molded and shaped our culture to provide an

explosive rate of growth for both the individual as well as the population as a whole. This success has relied heavily on the use of manufactured chemicals since the 1950's, i.e. pesticides. One unintended result of that reliance is the residues of chemicals and metabolites that persist in the environment long after their application. After collecting random water samples from Lake Thompson (Emiquon) and surrounding supporting water systems and analyzing them using high definition mass spectrometry, residues of Triazine herbicides were found to be significantly higher than current water quality standards. In any environmental impact assessment, the presence of controllable factors that negatively affect the ecosystem demand a priority in their consideration. We contend that these findings will provide data that can be assimilated into long term studies to help explain and plan for future restorative attempts while maintaining the value of the agricultural systems that support our society.

3:05 pm - Investigating Riverine Sediment Removal at a Large Restored Floodplain Wetland, La Grange Wetland Bank Site, Brown County, Illinois

Keith W. Carr, Geoffrey E. Pociask, and Richard A. Cahill
Wetlands Geology Section, Illinois State Geological Survey

Restoring wetlands in formerly leveed floodplains requires understanding of the effects of free access of floodwaters to backwater areas. Negative consequences for wetland vegetation communities and lake ecology must be weighed against the positive implications for the river itself of reducing flood peaks, turbidity, nutrients and excessive channel sedimentation. We evaluated sediment deposition rates at a 1,600-acre restored Illinois River floodplain wetland, which had formerly been leveed and pumped for agriculture from about 1915 to 2002. On-site wetland hydrology restoration included ditch filling, tile de-activation, and the re-introduction of the river via natural levee degradation.

Historical sedimentation rates were determined by measuring 137 Cs (Cesium-137) activity in vibracores. The depth at which maximum Cs activity occurs will yield a marker bed coinciding with the accepted peak year of fallout from atmospheric testing of nuclear weapons (1963).

The radiometric data showed agreement from three separate cores establishing an average sedimentation rate of 0.61 cm/yr for the period from 1963 to 2004. If this rate is extended backwards to the early 1900s and compared to grain-size data from the cores, a change in sediment character to a slightly finer-grained depositional regime seems to occur in about 1914. This corresponds to the period when a drainage district was organized and levees were being built on site, presumably reducing the delivery of coarser-grained, higher-energy sediments from the river.

From 2002 forward to the present, sedimentation rates were directly measured via a network of concreted steel stakes to determine if the sedimentation rate changed after levee removal. These measurements have shown that a single large flood can deposit a mean depth of sediment site wide of over 2.3 cm and depths of as much as 5-6 cm in some locations. Over longer periods, average annual rates 0.54 cm/yr (2002-2009) and 0.61 cm/yr (2011-2017) were measured.

3:25 pm - Seroprevalence of Pasteurella multocida, the Causative Agent of Avian Cholera, Among Birds in Central Illinois

Travis E. Wilcoxen[1], Meredith Artime[1], Jacques Nuzzo[2], and Jane Seitz[2]
[1]Millkin University
[2]Illinois Raptor Center

Wild birds are exposed to many pathogens in their natural habitats, including the bacterium Pasteurella multocida. P. multocida is the causative agent of avian cholera. Although much research has been conducted on avian cholera in waterfowl, little to none has been conducted on other birds, such as songbirds, wading birds, and raptors. Some songbirds and wading birds share habitats with waterfowl and some raptors share habitats and feed on waterfowl, which may expose them to pathogenic levels of P. multocida. We hypothesized that waterfowl would have antibodies against P. multocida at a rate much greater than other bird species due to their frequent exposure to contaminated water. We collected blood samples from 290 birds, including birds of prey, songbirds, and waterfowl, and completed enzyme-linked immunosorbent assays to determine if IgY antibodies specific to P. multocida were present. Of the 290 birds, 52 birds possessed IgY specific to avian cholera. Waterfowl had a seroprevalence of 25%, and 30.5% of wading birds were seropositive. Only four songbirds (4.5%) were positive for IgY to the pathogen. Among raptors, 13.5% tested positive for the P. multocida. The highest prevalence was in the Columbiformes (doves and pigeons), at 31.1%. Clearly there is a risk of avian cholera across taxonomic groups; however, and while waterfowl may be the most common spreader of the pathogen via their migratory behaviors, they do not appear to be the most commonly infected.

Poster Presentations

(Abstracts are alphabetical by first authors last name)

Ecosystem Response to Bigheaded Carp Harvest: Zooplankton Recovery Following the 2016 and 2017 Unified Method in the HMS Pits

Amber Blackert, Samuel Leberg, McKayla Susen, Elizabeth Dix, Ashley Stanley, Kristopher Maxon, Alison Hinz, Andrew Casper
Illinois Natural History Survey

Bigheaded carps (Hypophthalmichthys molitrix and H. nobilis) populations have been increasing in the Illinois River since the 2000s and have caused trophic level effects on the river ecosystem. Previous studies have shown dramatic declines in zooplankton abundance following bigheaded carp invasion. Due to their short generation times, zooplankton could potentially serve as an indicator of bigheaded carp harvest success. In 2016 and 2017 a rigorous multi-agency harvest effort, called the Unified Method, contracted commercial fishermen to coordinate a large scale harvest at the Hanson Material Services (HMS) Sand and Gravel Pits near Morris, Illinois. The West pit is a semi-closed system connected to the East pit by a culvert. Meanwhile, the East pit is fully connected to the Illinois River. The Unified Method harvest occurred in the West pit but not in the East pit. We sampled zooplankton at multiple sites within each pit once before and three times after the Unified Method harvest. The zooplankton response was variable between years and dependent on the taxa being analyzed. The effect of harvest on zooplankton abundance

was significant for naupliar and adult copepods in both years, and significant for rotifers in 2017, while sample month was significant for all taxa. Our results suggest that the zooplankton taxa with shorter reproduction cycles (rotifers) may respond more quickly to harvest than those with longer reproductive cycles (cladocerans).

Effects of White Grub Parasite on Illinois River Sportfish From Three Distinct Habitats
Mason Deja
Illinois River Biological Station

Differences in habitat quality can influence fish life-history expression, affecting growth, longevity, and body condition, and often affecting fish health. Posthodiplostomum spp. is a group of trematode parasites that infect the visceral tissue of freshwater fishes, and are commonly found in centrarchids. These parasites, commonly referred to as white grubs, utilize a three-host life cycle that includes mollusks, fish, and piscivorous birds. During the fish-host life stage, the parasite is in the metacercariae stage. In this study, we collected largemouth bass, black crappie, and bluegill from three different locations of the Illinois River: the upper river, lower river, and the Emiquon Preserve. We selected these species because they are economically important sportfishes found throughout the Illinois River. We selected these locations because of differences in geomorphology, water quality, and aquatic vegetation among the locations. We removed a 0.05-gram sample from the anterior, middle, and posterior portion of each fish liver, and pressed it between two microscope slides. We then counted white grub metacercariae using a dissecting microscope. White grub metacercariae abundance was generally greater in bluegill than in largemouth bass and black crappie, and also generally greater in Emiquon than in the upper and lower Illinois River. We believe species-specific differences in parasite abundance are associated with diet and habitat preferences of the three species, and location-specific differences in parasite abundance are associated with abundance of aquatic vegetation, which is a result of differences in geomorphology and water quality.

Understanding the Social Dimensions of Plastic Pollution in Inland Freshwater Systems
Anne-Marie Hanson and Thomas Rothfus
University of Illinois-Springfield

There is a quickly growing and global concern surrounding plastics in aquatic environments. Plastic is now ubiquitous to most bodies and water bodies. While there is no shortage of alarming plastic statistics at the global scale, the social impacts related to freshwater plastic pollution in inland areas are poorly understood. This presentation will discuss the preliminary results of an interdisciplinary study of freshwater plastic pollution in Central Illinois conducted in 2017-2019 at three sites: Lake Springfield; Emiquon National Wildlife Refuge; and Anderson Lake. Stakeholder interviews, participatory clean-up events, and shoreline macro-plastic surveys were a few of the methods we engaged to explore the relations between the physical presence of macro-plastic pollution, watershed attributes, site management decisions, and diverse perspectives on littering, consumption, risk, and governance of plastics near inland freshwater systems. Importantly, the presentation highlights research and educational activities carried out by UIS faculty and students that integrate social and natural science methods to understand how freshwater plastic pollution causes social and/or physical harm, to whom, and through what mechanisms.

Using Green Chemistry to Produce Supported Iron Nanoparticles from Oak Leaf Extract and Biochar

Natalie Kerr and Keenan E. Dungey
University of Illinois-Springfield

Zero Valent Iron Nanoparticles (nZVI) have recently received attention for their ability to be used for environmental remediation of contaminated water and soils. While these nanoparticles can remove toxic chemicals from the environment (e.g. nitrate), the environmental impact of their production needs to be considered in order to truly assess the degree of environmental remediation. Here, we combine two methods of creating nZVI to apply principles of green chemistry to the synthesis of nZVI. 1) Oak leaf extract has been used as the reducing and capping agent in synthesizing nZVI (OL-nZVI). This is done by boiling oak leaves (Quercus alba) in water and mixing the resulting extract with iron (III) citrate solution. 2) nZVI has been previously made in our lab by supporting nZVI on biochar (BC-nZVI). Here, the biochar is created from milo seed (Sorghum bicolor) via pyrolytic carbonization and gasification; carbothermal reduction of iron (III) citrate then results in the production of nZVI. By supporting iron (III) citrate on biochar and then reducing it using the oak leaf extract, OL-BC-nZVI was successfully made as shown by TEM imaging. PXRD showed that sodium borohydride, ascorbic acid, and OLE produced amorphous nanoparticles while products of thermal reduction were crystalline. We expect that the biochar support and OLE phenolic capping effect will lead to improved chemical stability by shielding the nZVI from oxidation and active/basic media. Future studies will look at lethality of the nZVI to denitrifying bacteria and will quantify the denitrification potential of OL-BC-nZVI.

Evaluating Dynamics of Habitat Resource Availability for Lesser Scaup at Pools 13 and 19 of the Mississippi River

Lauren D. Larson[1], Michael J. Anteau[2], Heath M. Hagy[3], Joseph D. Lancaster[4], Aaron P. Yetter[4], and Christopher N. Jacques[1]
[1]Western Illinois University
[2]U.S. Geological Survey
[3]U.S. Fish and Wildlife Service
[4]Illinois Natural History Survey

The Lesser scaup (Aythya affinis; hereafter, scaup) is an omnivorous diving duck species listed as a focal species of concern in the Midwest. Since the 1970s, the continental scaup population has declined notably, with numbers well below the 6.3 million goal set forth by the North American Waterfowl Management Plan. Several factors have been implicated in the scaup decline, including a decrease in available food sources during migration and specifically available nutrition at key staging areas of the Upper Mississippi River System (UMRS). Navigational Pool 19 of the UMRS is a crucial stopover site for migratory waterfowl, as there are few mid-latitude habitats with similar resources. Pool 19 itself has experienced changes in hydrology, traffic, and sedimentation since the installation of the Keokuk lock and dam system in 1913. Unlike other navigational pools of the UMRS, few aquatic invertebrate and vegetation evaluations have been conducted on Pool 19 in relation to environmental factors. Our research will seek to create a spatial and temporal habitat assessment of Navigational Pools 13 and 19

using historical and current data. We will use aquatic surveys to characterize distribution and density of vegetation and macroinvertebrates. We will use aerial survey data to evaluate Lesser Scaup abundance in relation to habitat factors. Lastly, we will conduct true metabolizable energy (TME) trials using wild-caught scaup to establish energy values for common diet items. This information will be used to determine energetic carrying capacity of those areas in response to current and future environmental change. Findings may also contribute to the geographical prioritization of conservation efforts and the development of habitat enhancement strategies.

Preliminary Findings of Herpetofauna at Two Wetland Preserves in Illinois

Olivea M. Mendenhall[1,2], James T. Lamer[1,2], and Andrew F. Casper[1]
[1]Illinois Natural History Survey, Illinois River Biological Survey
[2]Western Illinois University

Floodplain habitats of large rivers play an important role in the life cycle of amphibian and reptiles. Despite their importance, reptile and amphibian communities have been often understudied in river backwater complexes. Therefore, in 2018, we conducted a baseline inventory of the herpetofauna abundance and species inventory at two wetland preserves, one located La Grange Reach and one located in the Alton Reach of the Illinois River. The Emiquon Preserve (Emiquon) in Fulton County and Merwin Preserve (Merwin) in Brown County, Illinois. Emiquon is made up of two restored floodplain lakes (Thompson and Flag lakes) with a managed connection to the river used to regulate water levels in the preserve. Merwin also is a restored floodplain lake area (Elbow and Long lakes) that has an open connection through a notch in the levee. The time scale of restoration, habitat differences, and variation in water connection to the river could drive differences in herpetofauna presence at the two areas. Herpetofauna were evaluated at both sites using: cover boards arrays of metal and wood, drift fence with pitfall traps, nocturnal call surveys, larval dip netting, visual encounter surveys, and turtle traps. Preliminary analysis indicates minimal differences in species composition differences with slight differences in abundances. Future research will be performed to increase the sample size to obtain better population estimates of species to understand the population abundance and composition.

Effects of Food Resource Quality on Trematode Parasitism in Larval Frogs

Kiernan Robinson and John Marino
Bradley University

Amphibian populations worldwide are experiencing declines, and some declines could be due partly to parasitic infections, as studies have shown a link between infection levels and mortality. Food resource levels play a major role in larval amphibian growth, development, and survival, and also likely affects susceptibility to parasites. To examine the combined effects of parasite exposure and food resource quality, green frog tadpoles were fed diets differing in protein content (high, medium, or low) and then exposed to different levels of trematode parasites (absent or present). The high protein diet increased final mass and survivorship of tadpoles when parasites where absent but decreased final mass and survivorship when parasites were present. Diet did not significantly affect infection levels. These findings suggest that diet can affect organisms‚Äô resistance to parasitic infections, and tradeoffs may exist between allocating

resources to growth or defenses against parasitism. These findings have potential implications for conserving amphibians in the face of disease and changing nutrient regimes in their habitats.

Using Artificial Intelligence and Citizen Science to Aid in Classifying Camera Trap Images
Thomas Rothfus, Yanhui Guo, Lei Si, and Tih-Fen Ting
University of Illinois-Springfield

Remote camera traps provide an effective, inexpensive and non-invasive way of collecting data on a range of species. UIS's Therkildsen Field Station at Emiquon (TFSE) has an on-going camera trapping project in the Nature Conservancy's Emiquon Preserve monitoring the animals which make use of the wetland restoration. While camera traps assist greatly in wildlife monitoring, they generate an incredibly large amount of data which must be processed by researchers (i.e the images need to be sorted and identified). The constraints surrounding how many images can be processed limits the duration of the study, the spatial spread of the study, and the density at which traps can be deployed.

We are employing two methods to overcome this constraint. The first is a fully automatic wildlife monitoring system with animal detection and species classification. This system is based on a novel artificial intelligence model, varied channels region proposal and classification network (VCRPCN) based on deep convolutional neural network (DCNN). The second employs citizen scientists to assist with the classification of camera trap images. This project, which is named "Candid Emiquon" is built on the zooniverse platform (zooniverse.org) which has successfully utilized citizen science in a range of research projects.

Transformations from Farm to Wetland
Jane Ward, Liz Cheek, Roberta Clifton, Michelle Quinones
Emiquon Corps of Discovery

The mission of the Emiquon Corps of Discovery is to tell the story of Emiquon through the observation and creative documentation of the changes in its landscape, "analyzing with the mind of a scientist, seeing with the eyes of an artist, and speaking with the words of a poet" and by sharing that documentation with others.

This poster is a summary of our fourteen years of documenting the transformation.