DEVELOPING A DATA MANAGEMENT STRATEGY: INFRASTRUCTURE FOR THE EMIQUON PARTNERSHIP
Karen S. Baker
University of Illinois at Urbana-Champaign

Site-based data management is a collaborative endeavor that supports observational field science. Participants in the Emiquon Partnership include a wide variety of individuals - resource managers, research scientists, students, and volunteers as well as technical, information, and curation specialists. Gathering data from a variety of sources represents a significant first step that highlights the need for coordinated planning. It begins the process of articulating and formalizing data practices. With data aggregation, particularly in the ecological sciences, the heterogeneity of data and data practices is immediately evident. Though often perceived as mundane, the everyday work of data management is complex with interwoven social, technical, and organizational dimensions. Day-to-day tasks include acquisition, organization, and documentation in addition to data processing and quality control. Decision-making about data packaging, description, and delivery is required in creating a local data environment. Given contemporary mandates for open access to scientific data, new kinds of work and new forms of sociality are emerging. The twin concepts of data management and infrastructure growth are presented as essential to site-based, data-rich partnerships.

PLANNING FOR DATA MANAGEMENT AT EMIQUON
Karen S. Baker
University of Illinois at Urbana-Champaign, karensbaker@gmail.com

Current practices and configurations are not sufficient to realize the vision of data as open, accessible, and reusable resources. In moving from investigations by individual researchers to collaborative scientific partnerships and projects with shared data, information infrastructure is undergoing transition. While data have been central to scientific publications and the production of knowledge, new kinds of data work are required to make field-oriented, environmental scientific data available for shared use. To provide insight into changing data practices and the growth of infrastructure over time, a two-stream model of data production and a reconceptualization of science-data management partnerships are presented.

ECOLOGICAL ALTERNATIVE DYNAMIC REGIMES, REGIME SHIFTS, AND COMMUNITY CHANGE IN A NEWLY RESTORED FLOODPLAIN LAKE
Logan Benedict and Michael Lemke
1Biology Department, University of Illinois Springfield, One University Plaza, Springfield, IL 62703
2Therkildsen Field Station at Emiquon, 11316 N. Prairie Road, Lewistown, IL 61542

Alternative dynamic regime theory, formally alternative stable state theory, of floodplain lakes is characterized by total system shifts between a turbid algae-dominated state and a clear aquatic vegetation-dominated state. While this theory has been rigorously tested elsewhere, restored lakes are largely ignored and even less focus have been given to an understanding of multiple ecological community-level shifts. I am interested in large community shifts and lake alternative dynamic regime theory in Thompson Lake at The Nature Conservancy’s Emiquon Preserve, Lewistown, IL since restoration. My research brings together five years of data collected by the investigators at UIS, the Illinois Natural History Survey, The Nature Conservancy, MiCorps and the Department of Environmental Quality in Michigan, and affiliates at the
University of Maringa, Brazil. These data will be analyzed to better understand changes in fish, zooplankton, phytoplankton, aquatic vegetation communities and correlations with the physical and chemical parameters will be completed. These data will be compared with a matching five-year data set from a non-restored lake, Lake Sweezezy, MI. Preliminary results reveal a sudden large scale shift across biotic communities in Thompson Lake potentially shifting the entire lakes dynamic. Further analysis will reveal the drivers that cause regime changes within Thompson Lake that will be used to create a predictive ecological model. This research will provide insight into future restoration efforts worldwide and further understanding of restored floodplain lake behavior.

SECONDARY PRODUCTION OF BENTHIC MACROINVERTEBRATES IN A NEWLY RESTORED LAKE
Melissa Benedict¹, Michael Lemke² and A. Maria Lemke³

¹Biology Department, University of Illinois Springfield, One University Plaza, Springfield, IL 62703
²Therkildsen Field Station at Emiquon, 11316 N. Prairie Road, Lewistown, IL 61542
³The Nature Conservancy, Illinois River Project Office at Emiquon, 11304 N. Prairie Rd., Lewistown, IL, 61542

Secondary production is the formation of living mass of heterotrophic populations over time. A large number of studies have quantified secondary production of benthic macroinvertebrates in streams and rivers. Few studies have attempted to measure this value in lakes and wetlands, while even fewer studies attempt to quantify this value for restored lakes. Measurement of secondary production in newly restored Thompson Lake on the Emiquon Preserve, Lewistown, IL was measured by sampling 15 sites every 3–4 weeks for one year for years 2004–2005, 2008–2009, and 2013–2014. These years represent pre-restoration, early restoration, and late restoration states respectively. Measurement of secondary production will be quantified through the use of regression equations that utilize head capsule width or total body length. Water quality parameters have been recorded and will be used to correlate with measured secondary production values. Largest values of secondary production are expected to be present in late restoration samples, and restoration should bring the return of ecologically important groups such as mussels and fingernail clams. The results of this study will provide a perspective on how benthic macroinvertebrates communities in lakes respond to restoration and their relative contribution to trophic dynamics.

PEOPLE AT EMIQUON: RECREATION AND EDUCATION
Jason Beverlin¹, Mike Wiant², and Mike Lemke³

¹The Nature Conservancy, ²Dickson Mounds Museum, ³Therkildsen Field Station at Emiquon

Why are people important to floodplain restoration and what are the methods Emiquon uses to engage them? One of the objectives at Emiquon is to build support for functional floodplain management by sharing science and restoration techniques that will lead to the replication of floodplain restoration projects along the Illinois and Mississippi Rivers and rivers around the world. Support is built by demonstrating to target audiences how restored floodplains provide habitat for native plants and animals, contribute to a more natural hydrology by storing storm waters, provide improved water quality and manage sediments and nutrients, while providing excellent recreational opportunities and driving local and regional economic development. The Conservancy has worked with partners in determining target audiences and the most effective delivery and marketing opportunities for those audiences. Current demonstration efforts include an observation area with interpretive materials, museum exhibits, websites, education and outreach programs, special events, symposiums, hunting and boating and fishing. These efforts have seen significant public
response with approximately 270 vehicles per week in observation areas and 1600 boating and fishing permits distributed annually. Since restoration began in 2007 we have seen attendance at our hunter selection drawings double with 2012 having 1100 attend the drawings and more than 800 hunter use-days. Additionally Dickson Mounds Museum has seen attendance increases, bucking national museum attendance trends and the University of Illinois Springfield Therkildsen Field Station at Emiquon is seeing increases in facility use and educational programming requests.

ECOLOGICAL RESPONSE OF FLOODPLAIN RESTORATION TO FLOODING DISTURBANCE: A COMPARISON OF THE EFFECTS OF HEAVY AND LIGHT FLOODING
Andrew F. Casper¹, Heath M. Hagy², Michael Lemke³, TD VanMiddlesworth¹, Jeffery Walk⁴, Douglas Blodgett⁴, and Keenan Dungey³
¹Illinois River Biological Station, ²Forbes Biological Station, ³University of Illinois Springfield -Therkildsen Field Station at Emiquon, ⁴The Nature Conservancy

Major floods elicit calls for more comprehensive and multi-faceted approaches to flood management. In the future, adding floodways and flood storage areas to traditional structural strategies (e.g. dams and levees) may be a viable strategy. Beyond reducing flood damages, there is growing societal interest in floodplain services, including nutrient processing and supporting fisheries and wildlife habitat. In April 2013, a record flood on the Illinois River created a natural floodplain management experiment within two restored, but disconnected floodplains. With the benefit of extensive pre-flood data at both sites, we evaluated the biological response to a minor (levee overtopping) and a major (levee failure) flooding event. Our intent was to test the ecological resilience of restored floodplains to these two alternative management scenarios. We hypothesized that a minor flood event would have little effect on ecosystem structure, whereas the major flood event would result in lower production and diversity of zooplankton; increase invasive vegetation and decrease desirable submerged and emergent aquatic vegetation; and decrease overall waterbird use. Case studies such as this are critically needed to inform policy-makers and managers of the trade-offs between alternative floodplain connectivity regimes on ecological services.

VEGETATION RESPONSE TO RESTORATION AND MANAGEMENT OF EMQUION PRESERVE, 2007–2012
Andrew N. Casper¹, Heath M. Hagy², T.D. Van Middlesworth¹, Nerissa M. Michaels³, Christopher S. Hine², Aaron P. Yetter², Michelle M. Horar², Randolph V. Smith², and Joshua D. Stafford²
¹Illinois River Biological Station, ²Forbes Biological Station, ³Illinois Department of Natural Resources

Emiquon Preserve is a unique 1,820-ha wetland complex along the Illinois River that was farmed for almost 80 years. We monitored restoration of this floodplain from 2007–2012 relative to The Nature Conservancy’s key ecological attributes (KEA). During each summer and fall, we mapped vegetation communities and documented more than 100 species of plants. Native submersed and floating-leaved vegetation (i.e., aquatic bed) typically comprises more than 50% of the wetland area at Emiquon, an important community because it has been largely eliminated in the Illinois River valley. However, aquatic bed communities have declined since 2009 concurrent with an increase in the area of open water and a decrease in light penetration of the water column. Similarly, hemi-marsh communities have declined since 2008 and appear to have been replaced by persistent emergent vegetation, mainly cattails. Extent of nonpersistent emergent vegetation (e.g., annual plants including “moist-soil” vegetation) is highly variable, but generally is a small percentage of the overall wetland plant community at Emiquon. Similarly, seed production of moist-soil plants has
ranged from 200 kg/ha to >1100 kg/ha, but is generally less than other areas intensively managed to produce moist-soil vegetation. Non-native species remain a small component of the overall plant communities, but Eurasian watermilfoil has recently increased to nearly 20% of the aquatic bed community. Continual monitoring of plant communities should be part of an integrated plan based on KEAs and used to guide adaptive management of hydrology and vegetation communities to produce desirable outcomes.

DEVELOPMENT OF METHODS TO MEASURE ANTIBIOTIC RESISTANCE IN BACTERIA DURING ECOLOGICAL RESTORATION.
_Amanda Cummins, Kristin Davidson, Michael Lemke, and Richard Pamenter_
University of Illinois Springfield, Biology Department, One University Plaza, Springfield, IL 62703

Antibiotics have been in use by physicians since the 1930’s to fight against infections and by agriculture to increase animal growth and prevent disease. No concern was given to environmental side effects. Recently, antibiotic resistant bacteria have evolved, making infections harder to fight. These bacteria are more widely found in our environment than originally thought, and not always related to direct antibiotic use by humans. Researchers have reported reasons for antibiotic resistant genes (ARGs) being found in bacteria. ARGs may develop from areas of high antibiotic use, such as hospitals, pharmaceutical plants, and farms. Little is known about the emergence of ARGs in the environment and less is known if they can be decreased or removed through restoration and decreased human activity. When the antibiotic that a bacterial organism is resistant to is removed in this way, it is assumed that the bacterial population will lower its resistance. An important question is whether ARG prevalence will decrease if ecological restoration is undertaken. This project will look at samples of water from Thompson Lake collected over the last 5 years. After the flow of the Illinois River into the lake at Emiquon was halted, the lake should have begun to recover from all human pollution and the antibiotic resistant bacteria population should change. To test this, polymerase chain reactions (PCR), will be used to identify if genes conveying resistance to common antibiotics are present in the collected bacteria. Hypothetically, the bacteria will show a decrease in antibiotic resistance genes.

ECOLOGICAL FACTORS AFFECTING ANNUAL PRODUCTION OF LARGEMOUTH BASS AND BLUEGILL
_Jason A. DeBoer and Mark W. Fritts II_
Illinois Natural History Survey, Illinois River Biological Station, Havana, IL

Effective management of fisheries requires understanding the ecological factors that regulate fish recruitment. First-year survival, and therefore recruitment, is generally less consistent in systems characterized by greater seasonal and annual environmental stochasticity. Fishes in the lower Illinois River are subject to extreme seasonal and annual variation in abiotic factors (e.g., discharge, temperature), as well as a variety of biotic factors (e.g., resource competition, nest predation), which can pose a substantial challenge to recruitment. We developed species-specific models using a 24-year data set compiled from the LTEF program and state and federal agencies to investigate variables that regulate the annual production of largemouth bass (Micropterus salmoides) and bluegill (Lepomis macrochirus) in the Peoria reach of the Illinois River. The candidate model sets for both species included both biotic and abiotic factors. Our findings improve the understanding of the recruitment of fishes in the lower Illinois River and the relative control of biotic and abiotic factors in explaining the trends observed in our long-term data set.
ASSESSING HISTORIC CHANGES IN GROWTH PATTERNS OF FRESHWATER MUSSELS IN THE ILLINOIS RIVER
Andrea K. Fritts, Mark W. Fritts, Justin R. Widloe, and Andy F. Casper
Illinois Natural History Survey, Illinois River Biological Station, Havana, IL

The Illinois River has undergone substantial modification and degradation over the last century with the installation of dams, levees, and the Chicago Shipping and Sanitation Canal. These structures have created a channelized river that is largely disconnected from its backwaters and floodplains, locations that have historically been important sources of habitat and allochthonous nutrients. With its historic museum collections, the Illinois Natural History Survey is uniquely suited to study how dynamics of riverine ecosystems have changed over the past century. We are conducting a historical analysis using the calcified shells of freshwater mussels as chronological records of the species’ age-and-growth patterns. These data can be used to gain insight into resource utilization, the quality of given habitats, and life history attributes of native unionids. We have thin-sectioned two mussel species, the Threeridge, Amblema plicata (n = 101) and Mapleleaf, Quadrula quadrula (n = 41) collected at Havana, IL in the years 1894, 1897, 1909, 1912, 1966, and 2013 for age-and-growth analyses. Length-at-age models for each mussel species were fit using the von Bertalanffy growth equation and the annual growth estimates were used to evaluate the relationship between growth rates of individuals collected over the past 120 years. This analysis of historic museum collections may help resource managers improve their understanding of the impacts of policy decisions, such as the Clean Water Act, and the introduction of invasive species, including zebra mussels and Asian carp.

RESPONSE OF WATERBIRDS TO WETLAND RESTORATION IN THE ILLINOIS RIVER VALLEY: A CASE STUDY AT EMQUON PRESERVE
Heath M. Hagy, Christopher S. Hine, Aaron P. Yetter, Michelle M. Horath, Randolph V. Smith, and Joshua D. Stafford
Forbes Biological Station, Prairie Research Institute, University of Illinois, Havana, IL

The Illinois River valley (IRV) is a critically-important region for migrating wetland birds during fall and spring; however, extensive wetland drainage for agriculture has dramatically reduced the availability of habitats. Emiquon Preserve is a unique 1,820-ha wetland complex along the Illinois River that was recently restored following almost 80 years of agriculture. Waterfowl and other wetland birds have extensively used Emiquon each fall, spring, and summer since restoration began in 2007. We have counted more than 4.8 million birds totaling more than 49 million use days (UDs) during fall and spring. American coots and dabbling ducks (90% of UDs) use Emiquon more than any other wetland or lake in the Illinois River valley (IRV), especially mallard, American green-winged teal, and northern pintail during fall and lesser snow geese, northern shoveler, and ruddy ducks during spring. During the springs 2008–2013, Emiquon was used extensively by diving ducks (50% of UDs), snow geese (3.1 UDs), and American coots (3.6 million UDs). During summers 2008–2012, numbers of waterbird broods have dramatically declined, while those of wood ducks and mallards have increased or remained stable. Compatibility of uses of Emiquon continues to be an object of interest for many stakeholders; increased human use in fall of 2012 coincided with a dramatic decline in proportional use by dabbling ducks. Continual monitoring of waterbird communities should be part of an integrated management plan that addresses ecological indicators through adaptive management.
WATERBIRD RESPONSE TO A RESTORED ILLINOIS RIVER FLOODPLAIN WETLAND
Christopher S. Hine, Randolph V. Smith, Aaron P. Yetter, Michelle M. Horath, Joshua D. Stafford, and Heath M. Hagy.
Forbes Biological Station, Prairie Research Institute, University of Illinois, Havana, IL

During the early 1900s, drainage and levee districts were formed throughout the Illinois River valley (IRV). Wetlands were separated from the river by levees and drained for agriculture. Thompson, Flag, and Siebs lakes were drained in 1923 and farmed for more than 80 years until The Nature Conservancy purchased the property and named it the Emiquon Preserve (Emiquon). Habitat restoration began in 2007 when drainage pumps were turned off and groundwater naturally filled the historic lake beds. Emiquon remained separated from the Illinois River by levees. We monitored the response of wetland vegetation and waterbirds to restoration efforts at Emiquon during 2007–2011. Duck abundance at Emiquon during fall represented nearly 25% and 44% of all ducks in the IRV and La Grange Pool of the Illinois River, respectively. Diving duck abundance represented 29% of diving ducks in the IRV and 37% in La Grange Pool. American coot abundance at Emiquon represented 83% of coots in La Grange Pool and 76% of coots in the IRV. Peak use-days of American coots, northern pintail, American green-winged teal, blue-winged teal, and gadwall were the greatest since the inception of aerial inventories in Illinois (1948). Total ducks spent most of their time feeding in fall (53.9%) and spring (44.8%), whereas diving ducks were observed resting (43.6%) the most. We documented reproduction of 11 waterbird species; including 2 Illinois endangered species, black-crowned night heron and common gallinule. Wetland area at Emiquon ranged from 252–1,921 ha and averaged 1,372 ha annually. The dominant habitat type was aquatic bed (52%). Aquatic bed and floating-leaved vegetation declined significantly in the IRV during 1938–2006. Loss of aquatic vegetation in the IRV stresses the importance of Emiquon to waterbirds dependent on these habitats. Floodplain wetlands isolated from the deleterious effects (i.e., sedimentation, invasive species, and altered hydrology) of the Illinois River have the potential to restore habitats that were once common in the Illinois Valley and benefit a multitude of avian species.

RESPONSE OF ZOOPLANKTON COMMUNITIES TO RESTORATION OF A SHALLOW FLOODPLAIN LAKE AT EMIQUON PRESERVE, ILLINOIS
A. Maria Lemke¹, Mike Lemke², and John Beaver³
¹The Nature Conservancy, ²Therkildsen Field Station at Emiquon, ³BSA Environmental Services, Inc.

The 6,400-acre floodplain area of The Nature Conservancy’s Emiquon Preserve encompasses two shallow alluvial lakes, Thompson Lake and Flag Lake. The Illinois River was separated from much of its floodplain by levees in 1919 as floodplain areas were converted into farmland. Systems were installed to drain the land that consisted of underground pipes to transport water from fields into a series of drainage ditches and excess water was pumped into the Illinois River. Emiquon pumps were turned off in 2007 and the historic backwater lakes were re inundated over the next several years. Our objective was to quantify pre- and post-restoration zooplankton diversity, biomass and secondary production in the larger of the two lakes, Thompson Lake. Monthly zooplankton samples were collected from 15 pre-restoration agricultural ditch sites (2004) and post-restoration transect sites (2008, 2011). Preliminary analyses indicate that the pre-restoration zooplankton community displayed overall lower biomass with dominance by small-bodied microcrustaceans (Diaphanosoma, Sida, nauplii, rotifers) while the post-restoration zooplankton communities had significantly higher biomass with increased importance of large-bodied microcrustaceans (Daphnia spp.). Pre-restoration copepod communities were modest but post-restoration copepod communities displayed larger-bodied species (Acanthocyclops robustus, Leptodiaptomus siciloides). This
shift from community structure dominated small-bodied zooplankton in the pre-restoration period to one dominated by larger-bodied suspension filter-feeders in the post restoration period should be reflected in higher secondary production in Thompson Lake after reinundation compared to that of pre-restoration conditions. Further analyses will include 2011 data and relate community structure changes to water quality.

WATER QUALITY AND BACTERIA COMMUNITY CHANGES IN NEWLY RESTORED THOMPSON LAKE, EMQUION PRESERVE, IL
Mike J. Lemke¹, Keenan Dungey¹, Angela Kent², Felipe Velho³, Luzia Cleide Rodrigues³, Doyn Kellerhals¹, and Sara Paver²
¹University of Illinois Springfield - Therkildsen Field Station at Emiquon, ²University of Illinois Champaign-Urbana, ³University of Maringa, Brazil

Early restoration of Thompson Lake on the Emiquon Preserve, Lewistown, IL after decades of agriculture, represents an altered natural ecosystem going through rapid stages of change in structure and function. Just as monitoring water quality tracks rapid changes in the abiotic environment, bacterial communities serve as a responsive indicator of biotic change. The objectives of this study were to measure and relate water quality characteristics and change in bacterial community composition over five years of early restoration of a floodplain lake not yet connected to its flood pulse river source. Lake water was sampled weekly (n=3; 2008-2012) and physical (e.g., light, temperature) and chemical (TN, TP, pH) parameters were measured. ARISA community fingerprinting characterized bacterial community composition. In 2008, Thompson Lake had remarkable water clarity with Secchi disk readings reaching the bottom (~200 cm). These readings soon decreased to 1/5 of the lake depth (2010-2011) as dissolved phosphate (SRP) rapidly increased to 0.7 mg/L in 2008 then fell to below detection limits. The observed increase in SRP was likely triggered by low dissolved oxygen (late June, 2008) near the lake bottom. These events, coupled with low dissolved nitrogen led to an extensive cyanobacterial bloom of the heterocystous cyanobacteria, Aphanizomenon flos-aquae that dominated in 2008 and 2009. Microbial community change was directional with time throughout the five-year study. During this early stage of restoration, analysis of these data indicates that the lake has gone through an early, transitional and late phase of change.

STRATEGIC WATERSHED-SCALE OUTREACH AND THE EFFECTIVENESS ON AWARENESS AND IMPLEMENTATION OF CONSERVATION PRACTICES BY PRODUCERS IN THE MACKINAW RIVER WATERSHED, ILLINOIS
K. G. Kirkham¹, A. R. Maybanks¹, K. L. Bohnhoff², J. Kraft³, R. M. Twait⁴, K. Chapman⁵, A. M. Lemke¹
¹The Nature Conservancy, Peoria, IL; ²McLean County USDA/Natural Resources Conservation Service, Normal, IL; ³McLean County Soil and Water Conservation District, Normal, IL; ⁴City of Bloomington, Water Department, Bloomington, IL; ⁵Environmental Defense Fund, Washington, DC

To achieve long-term conservation goals in agricultural watersheds, it is important to understand producers’ perspectives on what practices are effective, practical, and economically attainable. We conducted a series of surveys with farmers in two agricultural subwatersheds of the Mackinaw River in central Illinois to better understand how outreach influenced their views on adoption of conservation practices. In a separate paired watershed study, we evaluated if focused outreach could increase implementation of conservation practices. Results from both studies showed that directed outreach efforts, such as one-on-one landowner visits, localized workshops, and tours can increase adoption of conservation practices. Results also highlighted the need for outreach that increases awareness and implementation of conservation practices specific to reducing agricultural runoff from tile-drained sources. Drawing from those results, we have
recently coordinated an integrated outreach team comprised of stakeholders and local conservation agencies to combine targeted and broad-scale outreach to landowners for nutrient management, cover crops, and constructed wetlands in subwatersheds of the Mackinaw River. Outreach efforts are documented to include the number of producer contacts, time spent conducting outreach, outreach maps, materials, and tours, producer responses, and specific concerns and needs of producers. These records will be used to evaluate and further refine methods into an effective outreach program that can be transferable to other agricultural watersheds. Outreach information will be combined with efficiency data from these conservation practices to determine the potential for nutrient reduction and the economic cost-benefit from using a watershed conservation approach to treat nonpoint source runoff.

SHOULD WE EMBRACE OR REJECT FLORISTIC QUALITY INDICES AS WE WORK TO RESTORE TALLGRASS PRAIRIES?

Amy B. McEuen, Emily Staley, Christy Troxell-Thomas, Dylan McIntosh, and Kyle Peecher
Biology Department, University of Illinois Springfield, One University Plaza, Springfield, IL

As conservationists we work to maintain and restore ecosystems so that biodiversity can persist despite mounting pressures from a variety of global changes. Indices such as the FQI (Floristic Quality Index) have the potential to aid us in these endeavors but also pose risks if we become too reliant on them to assess progress. FQI increases as the average C value (Coefficient of Conservatism) of plants at a site increases and as native species richness at a site increases. Given species-area relationships, this index should be highly sensitive to sampling effort. FQI was calculated using both plot data and full-site surveys for two Emiquon tallgrass prairie restoration units (17 and 22). Along with native richness, FQI for both sites increased from 2008 to 2012. We also found that FQI was highly sensitive to sample size, increasing as number of plots sampled increased in size from 15 to 30 1m² plots (p<0.01). Consistent with this, full-site surveys gave the very highest estimates of FQI. Our results suggest care must be taken to standardize effort when using these indices to monitor floristic quality of a site or compare quality across sites. Because FQI only assesses the plant community, it should not be used in isolation to assess progress. Research is needed on how other taxonomic groups and ecological processes are responding to the restoration. Determining how indices such as FQI relate or fail to relate to more complex changes in the ecology of prairies is also an important area for future study.

COMPARING ASIAN CARP BETWEEN THE MAIN CHANNEL AND TRIBUTARIES OF THE LAGRANGE REACH, ILLINOIS RIVER

Clinton Morgeson¹, Ryan Hastings¹, Levi Solomon², David Wahl² and Robert Colombo¹
¹ Biological Sciences Department, Eastern Illinois University, 600 Lincoln Ave. Charleston, IL 61920
² Illinois Natural History Survey, 1816 S. Oak St. Champaign, IL 61820

Invasive bighead (Hypophthalmichthys nobilis) and silver carps (H. molitrix), are among the most abundant fishes in the Illinois River system and pose an immediate threat of invasion to the Great Lakes. Asian carp have been heavily studied in the Illinois River; however, little work has been conducted in tributaries of this river. This study compared the size structures and sex ratios of Asian carp between the main channel and three primary tributaries of the LaGrange Reach of the Illinois River. The tributaries sampled were the Sangamon, Spoon, and Mackinaw Rivers. Asian carp were collected monthly from June-October from two sites per tributary (upstream and downstream) and from the main channel in October and November. Adult individuals were sampled using pulsed-DC electrofishing at all sites. All tributaries differed in length distribution (p < 0.05) and sex ratios, but there were no differences in length distribution or sex ratios between the combined tributaries and the main channel. We found differences in length distributions (p <
Taking Stock Before the Flood

0.001) and sex dominance (df = 2, p < 0.001) between downstream and upstream sites of the tributaries. This preliminary data shows that the size of river does not seem to influence the size and sex structures of local Asian carp populations, putting us one step closer to ultimately determining the size of waterway necessary to sustain an entire Asian carp’s life cycle.

ACOUSTIC BAT SURVEYS: CHAUTAUQUA NWR & SAND RIDGE STATE FOREST
Jacob G. Randa, USFWS, Jessica N. Potter, Illinois College, Jacksonville IL

Bats have become one of the most imperiled groups of animals in North America. The combined effects of habitat loss and white-nose syndrome (WNS) have devastated bat populations across much of Eastern North America, and with Illinois becoming the 20th state to confirm the presences of WNS (IL DNR, 2013), it has become imperative to gather baseline population levels and monitor local bat populations. In this study’s first year we used both active and passive acoustic survey techniques to inventory the species present as well as determine preferred habitats. We confirmed the presence of nine species of bat, including the federally endangered Indiana Bat (Myotis sodalis) and soon to be listed Northern Long-eared Bat (Myotis septentrionalis). Additionally we had one possible occurrence of the federally endangered Gray Bat (Myotis grisescens). This study, conducted during and following a record flood, will be continued in subsequent years to assess the distribution of bats when habitat conditions are more favorable (i.e. not flooded) for forest dwelling bats.

SUCCESS OF THE HACKING TECHNIQUE AS A MEANS TO ESTABLISH BREEDING POPULATIONS OF OSPREYS (PANDION HALIAETUS) AND RESULTS FROM THE FIRST YEAR OF AN OSPREY HACKING PROJECT IN ILLINOIS
April Sinnor¹, Tih-Fen Ting¹, Patrick McDonald², and Joseph Kath²
¹Environmental Studies Department, University of Illinois Springfield, ²Illinois Department of Natural Resources

Hacking is a common release technique in restoring osprey populations (Pandion haliaetus) to areas where they had previously been extirpated. Of the 19 states that have established hacking programs, ospreys have been downgraded or completely removed from the state threatened or state endangered lists in 10 states. Ospreys remain listed as state threatened or state endangered in four states that have established hacking programs. It is suggested in technical reports and other literature that hacked ospreys establish their first successful nest five years after initial hacking. In 2013, the first osprey reintroduction program in Illinois successfully hacked and released five osprey chicks at Anderson Lake State Fish and Wildlife Area in Fulton County. Birds between 28-35 days old were translocated from Langley Air Force Base, Virginia, and placed in a hacking tower until their release on July 29, 2013. On average, the birds fledged at 60 days old. We used Very High Frequency telemetry equipment to recover the predated carcasses of two birds a day after fledging. We lost the signal of a third osprey a week after fledging because it either flew out of range or its transmitter defected. On Sept. 24 and Sept. 29, 2013, the last two birds began their migration at approximately 102 and 117 days old, respectively. This year, we expect to hack 10 osprey chicks: five at Anderson Lake State Fish and Wildlife Area and five chicks at a new site, Lake Shelbyville Fish and Wildlife Management Area in Moultrie County.
PROGRESSION OF THE FISH COMMUNITY AT THE NATURE CONSERVANCY’S MERWIN PRESERVE.
Levi E. Solomon, Richard M. Pendleton, and Andrew F. Casper
Illinois River Biological Station, Illinois Natural History Survey, University of Illinois

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 to an isolated backwater/wetland complex and the subsequent changes over time. Annual fixed site sampling began in 1999 and persisted through extreme drought conditions that dried out the wetlands in 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, 7780 fish comprising 23 species from 10 families have been collected, with catches dominated by gizzard shad, common carp, bigmouth buffalo and largemouth bass. The fish community has undergone several shifts in composition; originally a sport fish dominated system proceeded to a non-sport and non-native 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), no largemouth bass were collected for the first time in the history of monitoring following the breaching of the south levee and subsequent drought of 2013.

EMIQUON FISH COMMUNITY RESPONSE TO RESTORATION, 2007-2013
T.D. VanMiddleswort1, Nerissa N. McClelland2, and Andrew F. Casper1
1Illinois River Biological Station, Illinois Natural History Survey, University of Illinois, 2Illinois Department of Natural Resources

Restoration of The Nature Conservancy’s Emiquon Preserve has led to both ecological and societal benefits. The restored floodplain sustains a diverse (10 species) and abundant native submersed aquatic vegetation (SAV) community that is otherwise difficult to find within the Illinois River Valley today. As the diversity and plant density increased since restoration, so has the species richness and biomass of native fishes. The excellent quality of the Emiquon Preserve’s SAV and fish communities provides excellent recreational opportunities to the public including fishing, hunting, and wildlife viewing, as well as new research questions for scientists. For example, 70% of the Largemouth Bass Micropterus salmoides population, 14% of the Black Crappie Pomoxis nigromaculatus population, and 16% of the Bluegill Lepomis macrochirus collected were considered to be at preferred, memorable, or trophy sizes in 2013. Another societal benefit is seen in the improved understanding of predator-prey interactions and potential invasive species control. Research on the diet analysis of piscivorous fish at the Emiquon Preserve, Tennessee’s Reelfoot Lake, and four southeastern Wisconsin lakes may suggest that healthy piscivorous fish populations may contribute to the suppression of invasive fish species such as Common Carp Cyprinus carpio. The ecological and societal opportunities that have emerged from restoration of the aquatic vegetation and fish communities at The Nature Conservancy’s Emiquon Preserve will continually serve useful for future floodplain restoration efforts.
Taking Stock Before the Flood

THE FEEDING HABITS AND RELATIVE ABUNDANCES OF BOWFIN, SPOTTED GAR, AND LARGEMOUTH BASS: CAN NATIVE PISCIVORES CONTROL INVASIVE COMMON CARP?

T.D. VanMiddlesworth1, Greg Sass2, Timothy Spier3, and Bradley Ray4

1Illinois Natural History Survey, 2Wisconsin Department of Natural Resources, 3Western Illinois University, 4University of Tennessee At Martin

During 2011-2012, we sampled Reelfoot Lake, TN to better understand why it is not dominated by Common Carp Cyprinus carpio. Reelfoot Lake is similar to The Nature Conservancy’s Emiquon Preserve, IL in that they are both shallow, disconnected backwater lakes containing Bowfin Amia calva, Spotted Gar Lepisosteus oculatus, Largemouth Bass Micropterus salmoides, and Common Carp. However, these lakes differ in that Reelfoot Lake is over 100 years old, while the Emiquon Preserve is only six years old. We used standardized pulsed-DC electrofishing at random and fixed sites to assess the fish communities and the stomach contents of Bowfin, Spotted Gar, and Largemouth Bass in both lakes to test for young-of-year and/or juvenile Common Carp predation. Our catch per unit effort data suggests that the Largemouth Bass relative abundance at Reelfoot Lake was lower than that of the Emiquon Preserve. Bowfin and Spotted Gar relative abundances at Reelfoot Lake were higher than those of the Emiquon Preserve. The relative abundance of Common Carp was similar to those of Bowfin and Spotted Gar at Reelfoot Lake in 2011 and lower in 2012, whereas the relative abundance of Common Carp was greater than those of Bowfin and Spotted Gar at the Emiquon Preserve. Our Bowfin, Spotted Gar, and Largemouth Bass diet analyses suggest that they may not be preying upon young-of-year and/or juvenile Common Carp. So these species may not be directly influencing Common Carp via predation but perhaps indirectly through other pathways.

AN ASSESSMENT OF AQUATIC INVASIVE PLANTS IN THE ILLINOIS RIVER: WATER HYACINTH SURVEILLANCE, MAPPING, PERSISTENCE, AND POTENTIAL SEED DISPERSAL

Jay A. VonBank1, Andrew F. Casper1, Heath M. Hagy2, Aaron P. Yetter2

1Illinois Natural History Survey, Illinois River Biological Station, 2Forbes Biological Station Prairie Research Institute, University of Illinois, Havana, IL

In the summer and fall of 2013, we conducted aerial surveillance, ground surveillance, seed bank and vector sampling to lay the foundation for an effective surveillance and control program of water hyacinth. We collected sediment core samples from historically and currently infested areas in the upper Illinois River area to investigate the potential for water hyacinth seed to be present and/or viable in the seed bank. We found water hyacinth seed to be present in 61% of sediment core samples taken from historically infested areas, and present in 100% of sediment core samples taken from currently infested areas. We also found water hyacinth plants in 3 disjunct water bodies, and in at least 3 reaches of the Illinois River. We will continue surveillance and sample collection will continue in 2014 and evaluate an aerial survey technique for detection of water hyacinth beds, occurrence in diets of fishes and free-floating in the water column, and test the viability of seeds recovered from core samples and fish.
EMIQUON: OVERVIEW OF A LARGE-SCALE FLOODPLAIN RESTORATION

Jeff Walk¹, Doug Blodgett¹, Maria Lemke¹, Richard Sparks², Jim Herkert³

¹The Nature Conservancy, ²University of Illinois - Prairie Research Institute, ³Illinois Department of Natural Resources

The Illinois River suffered many alterations during the 20th century – agricultural drainage and urbanization of the majority of the watershed, diversion of water from Chicago and Lake Michigan into the system, construction and operation of the lock and dam navigation system, extensive leveeing and isolation of floodplains from the river, and hydroclimatic change – essentially arresting the seasonal flood-pulse essential to the productivity and ecological function of the river. Yet, the Illinois has been repeatedly identified as a river with high floodplain restoration potential, and several such floodplain restoration efforts have been launched in recent decades. The largest is The Nature Conservancy’s Emiquon Preserve, which with the Emiquon and Chautauqua National Wildlife Refuges comprise a 6,500-ha bluff-to-bluff floodplain complex recognized as a Ramsar Wetland of International Importance in 2012. With historic data from this location prior to agricultural conversion in the 1920s, a local campus of research institutions, including the Illinois Natural History Survey’s Illinois River Biological Station Forbes Biological Station, the University of Illinois Therkildsen Field Station, and Dickson Mounds Museum, and a robust commitment of resources to science and monitoring, Emiquon is likely among the world’s most thoroughly documented floodplain restoration efforts. Long-term maintenance of Emiquon will balance the needs of a restored functional floodplain with the limitations imposed by the altered hydrology, high sediment loads, and invasive species present in the Illinois River.

THE USE OF NATURAL HISTORY COLLECTIONS TO INFORM BASELINE ECOLOGICAL CONDITIONS: CASE STUDIES FROM PALEONTOLOGY, ARCHAEOLOGY, AND HISTORICAL ZOOLOGY

Chris Widga¹, Meredith Mahoney¹, Eric Grimm¹, Alan Harn², Dennis Lawler¹, Terry Martin¹, Bonnie Styles¹, Robert Warren¹, Mike Wiant²

¹Illinois State Museum, Research and Collections Center, 1011 E. Ash St., Springfield, IL, ²Illinois State Museum, Dickson Mounds, Lewistown, IL

Natural history collections and their associated specimen data are under-utilized for ecological baseline reconstruction in conservation biology. These collections have the potential to answer ecological questions in ways that cannot be addressed through historical or archival sources. We present the results of research on paleontological, archaeological, and historic zoological collections that have the potential to substantively inform conservation decisions. The insights provided by these studies are especially relevant in situations where historical documentary evidence is non-existent or anomalous with broader ecological trends observed during the Holocene. Case studies include: 1) evidence that pre-modern bison in the Midwest filled a browsing niche, 2) historic and prehistoric distribution of large carnivores (Wolves, Puma) in Illinois, 3) relatively high resilience of white-tail deer to limb trauma under pre-modern conditions, 4) establishing a pre-modern baseline for Illinois River fisheries, and 5) using archaeological data to model pre-modern freshwater mussel communities in the Illinois River Basin. Natural history collections can provide data about animal and plant distributions in greater detail and at deeper time scales than historical records, thereby expanding the ecological framework for conservation and restoration planning and assessment.
THE STATUS AND TRENDS OF BLUEGILL IN THE LA GRANGE REACH OF THE ILLINOIS RIVER WITH COMPARISONS TO A RESTORED, DISCONNECTED FLOODPLAIN
Madeleine M. Young¹, Levi E. Solomon¹, Richard M. Pendleton¹, T.D. VanMiddlesworth¹,², and Andrew F. Casper¹
¹Illinois River Biological Station, Havana, IL 62644. ²Western Illinois University, Macomb, IL 61455.

Since its establishment in 1989, the Illinois River Biological Station (IRBS) has monitored fish populations of the La Grange Reach of the Illinois River as a component of the Long-Term Resource Monitoring Program (LTRMP) in order to better evaluate the ecology and management of large river ecosystems. The Nature Conservancy’s (TNC) Emiquon Preserve, a restored disconnected backwater of the Illinois River with sufficient fish stocks and quality habitat, may also provide a comparative reference for assessing changes in condition of various sportfish as a consequence of environmental factors or management actions. In this example, we utilized electrofishing and fyke net data collected by LTRMP (1993-2013) and Emiquon ecologists (2008-2013) in order to evaluate the abundance, size structure and condition of Bluegill Lepomis macrochirus, focusing on river trends with comparisons to a floodplain restoration. Otoliths from 182 Bluegill captured by LTRMP in 2012 (n=80) and 2013 (n=102) were also aged to develop growth curves as well as calculate total annual mortality. Age analysis indicated a population primarily composed of year-1 and year-2 individuals. Mean catch for both gears in the river demonstrated variability with an overall decline across all years. Length-frequency histograms of riverine Bluegill displayed higher proportions of smaller size classes and lower stock densities of preferred-length fishes (200-249 mm) when compared to Emiquon. However, similar relative weights were observed between habitats. These overall trends suggest that the river sustains young populations of Bluegill in lower size classes that are capable of maintaining healthy body condition.