Data management today often consists of data placed into a spreadsheet, and may include plans to migrate the data to a relational database. We describe a more nuanced view of data management for a scientific field station that takes into account the diversity of elements that comprise an information system useful to scientists and to the public. By considering the many kinds of data processes and information elements early in the design of an information system, we can pay attention to alignment with existing practices, and to developing an organization that is science-driven. Establishing an integrative information approach in concert with scientific activities ensures development efforts that emphasize local participation, continuing design, and sustainable growth.

**THE LOCAL ECONOMIC IMPACT OF THE EMIQUON PRESERVE**

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In 2000, The Nature Conservancy purchased land along the Illinois River in Fulton County, Illinois. Approximately 6,700 acres of this has become what is now known as the Emiquon Preserve, a wetland/floodplain restoration project of The Nature Conservancy. At the time of the purchase, much of the land was agricultural and had been used for row crops, livestock, and grazing. The proposed land use change attracted attention from neighbors, local officials, sportsmen, and conservationists who were interested in how the land use change would affect the local economy.

In this study we try to answer this question. Specifically, we try to determine how the local economic impact of the Emiquon preserve compares to that of a reasonable alternative land use, namely row-crop farming. To do this we develop two scenarios for the use of the property – a preserve scenario and a farm scenario. Our study finds that agricultural production generates higher economic impacts than current TNC operations and visitor use on the Emiquon property. Input-output analysis is a limited modeling tool because it does not value the nonmarket benefits that recreation and conservation provide, including scenic beauty, biodiversity, nitrogen filtering, and flood protection. It is possible that different methods could be used to place dollar amounts on those benefits, but this is beyond the scope of our current study.

**PRESENTATION CANCELLED**

EFFECTS OF MACROPHYTES, PHRAGMITES AUSTRALIS AND TYPHA ANGUSTIFOLIA, ON NITRATE REMOVAL IN HIGH NITROGEN, LOW DOC AGRICULTURAL WETLAND SEDIMENT

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Constructed wetlands have the potential to reduce nitrate loading to streams, particularly in agricultural watersheds. Macrophytes can increase nitrate removal in constructed wetlands but effects may not be positive under all conditions. We hypothesized that nitrate removal in unplanted and planted microcosms would be similar at low nitrate concentrations (<1 mg/L NO3-N) due to adequate DOC concentrations. Nitrate removal in high nitrate concentrations 15 mg/L NO3-N) with limited DOC might be lower in planted microcosms during the day due to elevated DO concentrations. Sediments from barren constructed wetlands were used in microcosms with no plants, Typha angustifolia, or Phragmites australis. Push-pull experiments using piezometers within the rhizosphere were completed to assess nitrate removal. Nitrate removal at low N did not differ significantly (P<0.05). Nitrate removal at high N was significantly lower in planted relative to unplanted microcosms. Preliminary nighttime nitrate removal rates were higher in planted compared to unplanted microcosms suggesting that DO concentrations offset DOC contributions to denitrifying bacteria. Preliminary data suggest nitrate removal in low DOC systems may be controlled by DO concentrations in the rhizosphere.

**EMIQUON CORPS OF DISCOVERY - THE ART OF RESTORATION**

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The Emiquon Corps of Discovery is a group of volunteers engaged with Emiquon in ways that go beyond the scientific documentation of the restoration. Created in partnership with The Nature Conservancy, Illinois Natural History Survey and Dickson Mounds Museum, the first Emiquon Corps of Discovery (ECD) group met throughout the winter and spring of 2005 with a second group meeting the summer of 2010. ECD members participated in skill-building workshops covering topics such as nature photography, sketching, watercolor painting and creative writing. Emerging from Emiquon Corps of Discovery members is an artistic record of the
restoration that is as intimate as it is thorough. Journal entries and essays speak of the hoarse cries of snow geese at twilight and painting and photos capture the beauty of morning light that turns the still waters of Thompson Lake to polished bronze. These are the personal stories of Emiquon told by people who are learning to see themselves connected to the land through their knowledge of its natural rhythms and their experience of its change.

PAST, PRESENT AND FUTURE OF THE EMIQUON PRESERVE: AN OVERVIEW
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The pristine Emiquon floodplain supported a phenomenal abundance and diversity of native plants and animals, contributing to the exceptional natural productivity of the Illinois River. Much of the former floodplain was isolated from the river in 1919 and converted primarily to agriculture, dramatically altering the area’s contributions to nature and people. In 2000, The Nature Conservancy purchased approximately 7600 acres at Emiquon with the goal of developing a science-based model for restoration and management of functional floodplain to contribute to the ecological health of the Illinois River. The Emiquon Science Advisory Council was established to help with planning and identified and delineated Key Ecological Attributes to guide restoration and management. Restoration began in 2007 when pumping stopped, and with normally high precipitation, nearly 5000 acres of surface water was restored by 2010. A viable seed bank combined with natural dispersal reestablished native plant communities including submersed and floating-leaved vegetation. Wildlife responded accordingly with peak waterfowl numbers approaching 200,000 and over 240 bird species documented including over 90% of Illinois’ wetland associated threatened and endangered bird species. The success of restoration was further validated in 2012 when the Emiquon Complex was designated a wetland of international importance under the Ramsar Convention. We look forward to continuing to work with partners to address current and future challenges including invasive species, water level management and financing, and to further develop, document and promote Emiquon for nature and people.

PHOSPHORUS AND NITROGEN LEVELS IN NEWLY RESTORED THOMPSON LAKE AND REFERENCE LAKE CHAUTAUQUA
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Thompson Lake (TL) and Lake Chautauqua (LC), Illinois River floodplain lakes, were drained for agriculture in the early 1900s. LC was re-flooded in the early 1930s and TL in 2008. The purposes of this study were to determine nitrogen and phosphorus levels in TL during restoration and compare these levels to reference LC. Field measurements and water samples were collected weekly (TL 2008-12; LC 2008 and 2012 only) and analyzed for soluble reactive phosphate (SRP) and total phosphorus (TP), as well as dissolved nitrate (NO3-) and total nitrogen (TN) using ion chromatography and spectrophotometry. In 2008, Secchi disk readings in TL reached the lake bottom and decreased to 1/5 the lake depth by 2009. Early 2008 SRP was 0.7 mg/L then fell to below detection limits in subsequent years due to a cyanobacteria bloom. TN remained constant (1.5–2.0 mg NO3-N/L) throughout 2008 in TL. In comparison, 2008 Secchi disk readings for LC were steady at about 1/5 of lake depth. An increase of TN was observed in late September 2008 in LC following a flood event from the Illinois River. TP was constant throughout 2008 in LC. These data show that the changing structure of a newly restored lake (TL) influences the phosphorus and nitrogen levels due to functional instability, while the concentrations in LC change due to the flood-pulse in the more established ecosystem. Data collected in 2012 will be used for final comparison of phosphorus and nitrogen levels between TL and reference LC.

CARBON SEQUESTRATION STATUE AND POTENTIAL IN RESTORED WETLANDS AT EMIQUON
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Terrestrial ecosystems can play important role in carbon (C) and nitrogen (N) cycle. The loss of wetlands for croplands results in a release of significant amount of C from soil organic matter into atmosphere. Wetland restoration from croplands has potential for C sequestration. In this study, the overall goal of this study was to estimate C sequestration statue and potential of soil organic matter in the restored wetlands at Emiquon and Spunky Bottoms in Illinois. The two wetlands were restored from croplands in 2007 and 1997, respectively. We have estimated soil organic C (SOC) storage in these two sites in 2010. In addition, we have examined SOC and total N storage in two Illinois natural Marsh and Sedge Meadow in 2011. The SOC storages in the two natural wetlands provide good references for C sequestration potential of soil organic matter in restored wetlands. The average SOC storage of restored wetland at Emiquon and Spunky Bottoms was 33.7 Mg/ha and 37.9 Mg/ha in 2010, respectively. The SOC storage of natural Marsh and Sedge Meadow was 75.2 Mg/ha and 128.6 Mg/ha in 2011, respectively. This suggests that both restored wetlands have potential to sequestrate more C in future. Using the annual SOC accumulated rate of 0.42 Mg C/ha/yr, Emiquon and Spunky Bottoms are expected to take another 99 yrs and 88 yrs or 226 yrs and 216 yrs to reach the SOC storage level observed in the natural Marsh or Sedge Meadow, respectively. This suggests that the SOC storage at these two restored wetlands will take centuries to reach the SOC storage level observed in natural Marsh or Sedge Meadow in Illinois.
MICROBIAL COMMUNITY RESPONSE TO VARIABLE HYDROLOGIC DISTURBANCE IN AN ILLINOIS WETLAND

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Soil microbes are responsible for much of the earths nutrient cycling. Communities of these microbes carry out ecological processes such as the transformation of nitrogen and carbon. Hydrology affects these processes, but it is unknown how microbial communities adapt to changing fluctuations in water level, and subsequently soil redox conditions. To study the resilience of these communities and the stability of microbial ecosystem processes, floodplain soil from the La Grange Wetland Mitigation Bank in central Illinois was subjected to artificial water level manipulations. Soil samples collected from distinct regions (i.e., upland or bottomland soils) were transferred to mesocosms in a greenhouse. A representative portion of each soil sample was subjected to prolonged disturbance such as saturation or drying out, or repeated cycles of saturation and drying to simulate altered hydrological regimes. Potential rates of denitrification, nitrification, and methanogenesis were quantified before and after the experiment, and we monitored changes that occurred in microbial community composition. Communities were defined as resilient if the community structure remained constant, and no change was observed in nutrient cycling. To some degree, we found that soils accustomed to frequent flooding showed relatively stable nutrient cycling rates. The variability in community response may be better explained if correlated with changes in both the composition and relative abundance of microbial functional groups involved. Global climate change is expected to alter precipitation frequency and amount. Understanding how microbial communities respond to this change has great implications for the future of water quality and greenhouse gas production from soils.

AN UNUSUAL PIT FEATURE AT THE MORTON VILLAGE SITE

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The Morton Village site (11F2) in Fulton County, Illinois, is an extensive habitation area (over 2 ha) adjacent to the well-known Oneota cemetery at the Norris Farms #36 site. Investigations from 2008-2012 have produced evidence that both Mississippian and Oneota people resided in a multicultural community. Feature 224 illustrates the complex cultural negotiations between the two groups. The main artifact-bearing zones contained over 5 kg of faunal remains, large sections of several Mississippian vessels as well as small segments of nearly 20 other vessels, a celt, a 3.3-kg slab of hematite, and an antler tool with an embedded beaver incisor. The contents suggest a mixture of deliberately buried items, feasting remains, and incidental trash. Top strata, however, contained Oneota artifacts.

DIET COMPOSITION OF RIVER OTTERS (LONTRA CANADENSIS) AT THE EMIQUON COMPLEX

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River otters frequently visit latrines where they deposit urine, feces, and anal secretions as olfactory signals. River otter scat was collected from latrines at the Emiquon Preserve and the Emiquon National Wildlife Refuge to identify prey. Prey tissues dissected from scat were compared to osteological resources to taxonomically identify the remains. Fish were present in 85.4% of the dissected samples. Common carp was the dominant fish preyed upon during the study occurring in 69.8% of all samples dissected. Crayfish were present in 77.1% of dissected samples. Amphibians, insects, filamentous algae, green-winged teal or blue-winged teal, and muskrat were also consumed. The minimum number of individuals consumed was also determined based on the prey remains present. The results of a two-tailed Fishers exact test demonstrated that the number of scat samples containing fish and containing crayfish differed significantly between Emiquon and a similar study conducted in Whiteside County, Illinois. However, there were no statistically significant differences between the sites in the frequency of amphibians, insects, mammals, or birds in the scat examined.

IDENTIFYING REINTRODUCTION TARGETS FOR ALLIGATOR GAR (Atractosteus spatula) IN ILLINOIS USING ArcGIS10

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Alligator gar (Atractosteus spatula) are at risk of extinction throughout their geographic range and classified as extirpated in Illinois. Their decline is attributed to overexploitation and loss of essential backwater habitat. The Illinois Department of Natural Resources (IDNR) has begun reintroduction efforts; however, finding suitable backwater lakes is challenging. The objective of this research was to use geographic information system (GIS) to identify less than 100 suitable targets for reintroduction in Illinois within the gars approximate historic range. We used the Ducks Unlimited wetland layer buffered one mile to a major rivers polyline layer to establish backwater lakes. Targets were narrowed to those greater than 100 ha and containing either historic alligator gar records or indicator
species, shortnose gar (*Lepisosteus platostomus*) and Spotted Gar (*L. oculatus*). An Illinois geographic range was proposed for alligator gar with a northern boundary approximately 160 km upstream of the furthest north historic occurrence in Beardstown, IL. The proposed range also encompasses all reintroduced populations by IDNR. The modeling resulted in 39 targets identified with most located in the Illinois River floodplain due to its abundant backwater habitats. Other targets were located at the confluence of the Mississippi River and Illinois River, lower Kaskaskia River, and Southern Illinois in the Mississippi River floodplain. Ground truthing is needed to determine if these lakes provide the habitat necessary for alligator gar to thrive, such as depth for overwintering, aquatic vegetation for spawning, and adequate prey fish. This study also demonstrates the value of GIS in conservation biology.

**THE REINTRODUCTION OF ALLIGATOR GAR (*Atractosteus spatula*) AT MERWIN PRESERVE**

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Apex predator conservation is important in restoring ecosystem function by providing population management and invasive species control. Alligator gar (*Atractosteus spatula*) once occupied this position in the Mississippi River basin until overexploitation and habitat loss resulted in extirpation throughout much of their range. Nonetheless, demand by fishermen have recently increased. The Illinois Department of Natural Resources joined efforts with ten other states to restore populations in 2009. The purpose of this study was to measure growth rates, fitness, and diets of stock-sized alligator gar (n = 100) tagged with passive integrated transponders and released in The Nature Conservancy’s Merwin Preserve wetland September 29, 2011. Gars averaged 538 mm and 886 g upon release at 151 days old. Monthly surveys were conducted May - October 2012 to recapture alligator gar and sample the fish community using fyke nets, mini fyke nets, DC electrofishing, experimental gill nets, and modified gill nets (3” bar mesh, dyed black). Seventeen alligator gar were collected and growth rate averaged 1.8 mm and 7.3 g per day during the sample period. The largest individual grew from egg to 959 mm and 3,646 g in only 17 months. Stomach contents were 53% empty, 29% gizzard shad (*Dorosoma cepedianum*), and 18% unidentifiable. Feeding behavior was opportunistic, further supporting their potential use as a management tool in aquatic ecosystem restoration. This is the first study on life-history and ecology of a reintroduced population in Illinois.

**THE EFFECTS OF RESTORATION ON WATERBIRDS, INVERTEBRATES, AND WETLAND VEGETATION AT EMIQUON PRESERVE**

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We monitored the response of wetland vegetation, invertebrates, and waterbirds to restoration efforts at Emiquon Preserve relative to The Nature Conservancy’s key ecological attributes from 2007–2012. We conducted weekly aerial surveys during fall and winter and ground counts during spring of waterfowl and other waterbirds. We used abundance estimates to estimate use-days to quantify overall waterbird use of Emiquon which can be related to energetic requirements. Additionally, we conducted behavioral observations using scan sampling to evaluate the functional response of ducks to wetland restoration during spring of each year. We monitored waterbird production at Emiquon through passive brood observations bi-weekly between mid-May and early August. We quantified abundance of nektonic invertebrates along the margins of Thompson Lake three times during summer to track changes in the invertebrate community. To determine potential food production for waterfowl, we collected soil cores in areas where moist-soil vegetation grew and calculated energetic carrying capacity for waterfowl, expressed as energetic use-days. We also 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. In fall 2012, we monitored distribution and behavior of waterfowl, wading birds, and other waterbirds in response to potential disturbances from hunting at Emiquon Preserve to assess the extent of disturbances from human activities and quantify refugia. We will present results from each of these monitoring objectives and relate our data to future management of Emiquon Preserve.

**FIVE DECADES AT THE SCRAPE: OBSERVATIONS ON VARIATION IN WHITETAIL DEER BREEDING PATTERNS IN ILLINOIS**

Alan D. Harn

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Data relative to the breeding patterns of 1,379 adult and yearling male whitetail deer were collected during nearly 6,800 hours over a 50-year observation period on a mixed forest landscape now largely subsumed by Emiquon. These patterns are discussed and quantified with a flow chart that documents phase and synchronization in whitetail breeding ritual.

**NON-NATIVE FISHES SPECIES INVASION AND ECOLOGICAL CONSERVATION IN THE UPPER PARANÁ RIVER FLOODPLAIN**
The introduction of fish species in the Upper Paraná River floodplain started in the 1980’s. The closure of Itaipu Dam flooded a geographical barrier, the Sete Quedas Falls, and more than 30 fish species were introduced in the Upper Paraná River floodplain. In addition, three species of Cichla (peacock bass) from the Amazon basin were introduced, as well as many species from Europe, Asia and Africa like tilapias, carps and the African catfish (Clarias gariepinus). These introductions created a strong impact on the native fish fauna by depleting native populations.

**WATER QUALITY CHANGES OF THOMPSON LAKE OVER THE LAST FIVE YEARS**

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Floodplain lakes are changed chemically and physically when hydrologically disconnected from the river, which then causes different nutrient concentrations in the disconnected floodplain lake water. The changes in nutrient composition can also alter biotic communities. In newly restored floodplain lakes, such as Thompson Lake (TL), water quality can be used as an indicator for chemical and communal changes. TL, located on the floodplain of the Illinois River, was historically connected to the river, but is now isolated since the beginning of its restoration from row crop agriculture beginning in 2007. The objectives of this study were to compare the water quality of TL over a five year period and to compare the TL water quality at Lake Chautauqua (LC), a reference floodplain lake. Changes in TL water chemistry were measured weekly (n=3) and the results compared to the Illinois River and LC. An increase in nutrient concentrations (TN and TP) negatively correlated with a decrease in TL depth (p<0.05). The N:P ratio was examined; the ratio for TL was lower than the Redfield N:P ratio (16:1) for all five years of the study, except for 2009 that had a ratio of 25.5:1 indicating that nitrogen was the limiting factor in 2008, but phosphorus was the limiting factor in 2012. These results suggest that a newly restored lake undergoes linked chemical and biotic shifts that can be recorded through water quality analyses.

**COMPARISON OF MICROBIAL COMMUNITY DYNAMICS IN WATER AND SEDIMENTS FROM TWO ILLINOIS RIVER FLOODPLAIN LAKES DIFERING IN RESTORATION STATUS**

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The drainage of lakes disrupts the hydrologic connection between existing lakes and the Illinois River decreasing floodplain ecosystem services. This disruption likely alters microbial community composition and activity. The first objective of this study was to compare water and sediment microbial communities in an established reference floodplain, floodpulsed lake (Lake Chautauqua [LC] area 1416 ha) to a newly restored floodplain lake not yet connected to its flood pulse river source (Thompson Lake [TL] area 809 ha). The newly restored lake, TL, was converted from row crop agriculture in 2007, between-lake comparison was done early in restoration (2008) and five years later (2012). The second objective was to compare microbial community change in TL over the five year restoration period. Surface sediment and water were sampled weekly and chemical and physical parameters (e.g., light, temperature, TN, TP, pH) were monitored. Bacterial community composition was assessed by ARISA, and multivariate analyses were used to evaluate spatial and temporal patterns. Microbial community assemblages were distinctly different between TL and LC (ANOSIM R = 0.87, p<0.001) but not among years in TL (ANOSIM R = 0.37, p<0.001), though there seems to be trend towards change in microbial communities from both habitats. Community differences between lakes appear to be affected by hydrological connectivity due to seasonal flood pulses that occur in the reference system, while changes within TL reflect ecological instability that accompanies a newly restored ecosystem.

**BIOMANIPULATION OF THE LARGEMOUTH BASS MICROPTERUS SALMOIDES POPULATION TO CONTROL EUTROPHICATION AND INVASIVE SPECIES AT THE NATURE CONSERVANCY’S EMQUION PRESERVE**

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A large piscivore population was immediately established at The Nature Conservancy’s (TNC) Emiquon Preserve following initial aquatic restoration to reduce the effects of two common ecosystem stressors: eutrophication and common carp Cyprinus carpio. I tested the potential of the largemouth bass Micropterus salmoides population to control eutrophication through trophic cascading interactions and common carp populations through diet analyses and bioenergetics modeling over the first two years of restoration, 2008–2009. Largemouth bass showed a shift in prey use from less profitable prey types to highly profitable prey types in early July.
2008-2009. There was evidence to suggest density dependence occurring in 2008, but an increase in lake surface area reduced prey fish consumption (no/ha) in 2009. Secchi disc transparencies significantly decreased from 2008-2010. Additionally, no common carp were collected in largemouth bass diets. Further, I conducted a comparative diet study on largemouth bass inhabiting backwater lakes with varying levels of connectivity to the Illinois River (contiguous, seasonally isolated, isolated) and used bioenergetics modeling to predict the response of the Emiquon Preserve largemouth bass population to various reconnectivity scenarios. Largemouth bass prey use in seasonally isolated lakes was similar to contiguous and isolated lakes, while prey use was dissimilar in contiguous and isolated lakes. Largemouth bass inhabiting seasonally isolated lakes consumed more prey fish (W) and consumed fish of greater diversity than the other habitats. The potential for eutrophication and common carp control was estimated to be highest in a seasonally isolated reconnectivity scenario at low water levels or high piscivore densities.

PRESENTATION CANCELLED
SATISFACTION AND HARVEST SUCCESS AMONG PUBLIC DUCK HUNTERS AT EMQUION PRESERVE
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We conducted an intercept survey of duck hunters using public blinds at the Emiquon Preserve in Havana, IL. Survey questions included duck harvest by species and sex, perceptions of crowding, expectations for and satisfaction with that day’s hunt. Hunters harvested 1,236 ducks and 47 coots. Average ducks harvested/hunter/day = 1.67 ducks; 47% of hunters harvested 0 ducks while hunting, 17% harvested 1 duck, and 13% of hunters harvested 6 ducks when they hunted. Ducks harvested/hunter/day was negatively correlated with the stake number at which hunters hunted (r = -.39, P < .01); hunters at stake 1 (n = 63) harvested 1.06 ducks/hunter/day, whereas hunters at stake 13 (n = 49) harvested .86 ducks/hunter/day. Ducks most frequently harvested were Gadwall (n = 315), Mallard (n = 284), Northern Shoveler (n = 271), and Green-winged Teal (n = 175). Hunters downed but did not retrieve 203 ducks, or .29 ducks/hunter/day. Overall, hunters did not perceive to be crowded while hunting at Emiquon (M = 26.61, 1= Not at all crowded, 7 = Extremely crowded). Twenty-nine percent of hunters reported seeing other hunters “skybust,” and those hunters reported being significantly more crowded (M = 3.63) than hunters who did not report skybusting (M = 2.11, t = 9.73, df = 281, P < .01). Hunters hunted over an average of 35 decoys (Range = 3 – 140), and duck harvest per hunter per day was not correlated (P = .27) with number of decoys. Numbers of ducks hunters saw, harvested, and the species and sex of ducks harvested were below hunters’ expectations for Emiquon. Duck harvest was positively correlated for the four factors; thus, hunters who harvested more ducks reported a higher quality experience at Emiquon. Species and number of ducks harvested produced the greatest correlation (r = .74) with hunters enjoying their experience. Emiquon hunters spent an average of $29.29 the day of the hunt and contributed a total of $20,000 dollars to the local economy for the 25 hunts.

SMALL MAMMAL POPULATION MONITORING IN THE TALLGRASS PRAIRIE AT EMQUION PRESERVE
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The nation’s tallgrass prairies have been rapidly declining and restoration projects such as the Emiquon Preserve in Fulton County, Illinois have been created in response. Examining small mammals in tallgrass prairie restoration projects allows researchers to evaluate the overall success of the restoration and the health of the ecosystem since small mammals are indicators of habitat availability and quality. Small mammal populations were studied at Emiquon Preserves tallgrass prairie at two different sites through the use of sherman live traps for a total of 1,280 trap nights. Traps were placed at 10 m intervals along each transect with two transects per site. A total of 40 trap locations, with 20 locations on each transect, were monitored from May 26 to August 4 2012 at Nature Conservancy sites 17 and 22. A mark recapture study was conducted to estimate small mammal population sizes. Individuals were marked using ear tags at the initial capture and ear-tag numbers recorded on recapture. Site 17 did not contain a water source, while Site 22 did. These sites were compared to see if a water source increased the habitat value for small mammals. The meadow vole (Microtus pennslyvanicus), prairie vole (M. ochogaster), prairie deer mouse (Peromyscus maniculatus), and the white-footed mouse (P. leucopus) were found at both sites, while the long-tailed weasel (Mustela frenata) was only found at Site 17 along with the capture of a cottontail rabbit (Sylvilagus floridanus).

POTENTIAL BENEFITS FROM SIDE CHANNEL RESTORATION IN LARGE RIVERS: LESSONS IN PERCEPTION, EXPECTATION AND COMMUNICATION GAINED FROM A MULTI-DISCIPLINARY CONCEPTUAL MODEL
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River restoration science has begun to move from a structural ‘build it and they will come’ focus to an approach that also examines the ecological processes and functions that contribute to the whole river perspective. While this new emphasis still incorporates many traditional management of physical and habitat attributes like water level, it can also answer questions about what any restoration project like Emiquon contributes to the river system and gives a truer accounting of all the benefits of restoration. We assembled a multi-disciplinary workshop of 37 regional river science professionals and divided them into 3 sub-teams charged to create a conceptual model for a floodplain and side channel restoration. We expected similar products because of the focus on the same type of habitat and ecosystem and the similarities in experience of the workshop attendees. Instead, divergent models were produced. While none are ‘correct’ in the sense of being comprehensive descriptions or predictive, each communicates a different ecosystem aspect or benefit gained restoring side channel habitat. Integrating these views with the traditional habitat-species approach is not easy. Clear definition and communication of shared concepts across disciplines and agencies is difficult, but the conceptual model development process accomplished precisely this - both within the project planning process and between planners and public officials/agency gatekeepers. Thus the development process is just as important to restoration success as the resulting model products themselves.

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A FLOOD OF BENEFITS: MANAGING FLOODPLAINS TO BENEFIT PEOPLE, FROM THE MEKONG TO THE MISSISSIPPI

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Jeff Opperman has been working to protect rivers and lakes for nearly 15 years. He has provided strategic and scientific support to freshwater conservation projects across the United States as well as in China, Africa and Latin America. At The Nature Conservancy, Jeff leads a team of scientists and conservation practitioners who provide technical and strategic guidance to the eight river basins within the Great Rivers Partnership. He is a member of the governing board of the Low Impact Hydropower Institute (LIHI), which certifies “environmentally preferable” hydropower, and recently served on an Independent Review Panel that provided recommendations for floodplain management to California’s Department of Water Resources. Jeff earned his B.S. in Biology from Duke University and a Ph.D. in Ecosystem Science from the University of California, Berkeley. He then studied floodplain ecology during a post-doctoral fellowship at the University of California, Davis. His scientific and policy research has been published in journals such as Science, BioScience and Ecological Applications. Jeff strives to communicate the challenges and opportunities of protecting fresh water through blogs and articles for general audiences, including The New York Times, The Guardian and Outside Magazine and on the environmental blogs Grist and Care2.

EMIQUON: A PLACE TO ADVANCE ECOLOGICAL SCIENCE AND THE PRACTICE OF ENVIRONMENTAL RESTORATION

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It seems preposterous at first to think a former corn field could be a place to advance our basic understanding of complex, dynamic ecosystems. Was the opportunity for basic research foreclosed in 1924 when two of the most biologically productive lakes in one of the most productive rivers in North America were drained for agriculture? In 1894 one of the foremost ecologists in the country, Stephen Forbes, Chief of the Illinois Natural History Survey, had founded a basic research program in the area that includes Emiquon. The research focused on “…the effect on the aquatic plant and animal life of a region produced by the periodical overflow and gradual recession of the waters of great rivers, phenomena of which the Illinois and Mississippi rivers afford excellent and strongly marked examples.” Sadly, with the greatly increased introduction of raw sewage from Chicago after 1900, and the leveeing of approximately half the floodplain through the 1920s, the research shifted to documentation of human effects on the river. Were he alive today, Forbes would welcome the new beginning afforded by the Emiquon Preserve. When gates in the levee are completed, Emiquon will be one of the few places in the world where carefully-managed reconnection of the river and its floodplain could advance both basic science and restoration practice. The Nature Conservancy has contracted with scientists to address management questions (will native piscivores control nuisance carp?) and individual scientists have conducted their own research projects at Emiquon. The challenge now is to develop an integrated program to address big questions, including those first posed by Forbes. (Note: the thoughts expressed in this abstract are my own and do not necessarily reflect official positions of the Science Advisory Committee or The Nature Conservancy.)

CHANGE IN TALLGRASS PRAIRIE PLANT DIVERSITY FROM 2008 TO 2012 AT EMIQUON PRESERVE

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In Illinois, tallgrass prairies previously covered an estimated 8,900,000 hectares. However, only 930 hectares remained by 1994, a 99.9% decline. As restoration ecology has become a more developed field of study, ecologists are working to better understand the restoration process including developing techniques for evaluating restored sites. In 2007, the Nature Conservancys (TNC) Emiquon
preserve in Fulton County, Illinois began the process of restoring agricultural lands back to natural tallgrass prairie and wetland ecosystems. We examined tallgrass prairie plants along four 200m N-S transects at TNC sites 22 and 17. One meter square plots were sampled every 10 meters along each transect. Plant species and grass/forb cover were documented at each plot with surveys conducted from May 26th through August 9th 2012. The species documented are being compared to a previous study performed in 2008 on the same sites and approximately the same transects. This will allow us to determine the change in species composition that has occurred over the past four years. Preliminary results show a shift in species composition with an increase in native species. Many nonnatives documented in 2008 were not seen in 2012 such as Shepherds Dock (Silphium terebinthinaceum) and Prairie Spiderwort (Tradescantia bracteata). This study will give us a better understanding of succession of tallgrass prairie plants during restoration.

TAKING A LOOK BACK: DO WETLAND MITIGATION SITES CONTINUE TO SATISFY ORIGINAL COMPLIANCE STANDARDS?

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The USACE facilitates a permitting process that requires wetland creation or restoration to compensate for wetland destruction. Compensatory wetlands must achieve standards that are established on a case-by-case basis and that are usually based on vegetation, soils, and hydrology. These sites are typically monitored for compliance with performance standards for up to 3-5 years. However, there is scant information regarding mitigation wetland performance beyond the brief, required monitoring period. With wetlands offering many ecosystem services, and because environmental conditions can change at a site on a yearly basis, it is important to know if the achieved short term goals yield similar long term results. To explore this question we, (1) re-visited 30 Illinois Department of Transportation mitigation wetlands ranging in age from 8-20 years; (2) surveyed adjacent reference wetlands when they were available; (3) are comparing our findings with each sites original compliance standard guidelines to gauge whether the re-surveyed sites meet their originally set goals; and (4) are using records describing the sites condition at the end of its monitoring period to gauge the subsequent changes in the wetland. We will evaluate the appropriateness of the original performance standards and assess whether short-term compliance is indicative of long-term sustainability.

THE NATURE CONSERVANCYS EMIQUON PRESERVE: IMPORTANCE OF AQUATIC RESTORATION TO NATURE AND PEOPLE.

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Restoration of The Nature Conservancy's Emiquon Preserve has led to both ecological and societal benefits. The restored floodplain sustains a diverse (9 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 Preserves 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, 54% of the largemouth bass Micropterus salmoides population, 11% of the black crappie Pomoxis nigromaculatus population, and 14% of the bluegill Lepomis macrochirus population was considered to be at preferred, memorable, or trophy sizes in 2012. 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 invasives like 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.

RELATIVE ABUNDANCE AND FEEDING HABITS OF BOWFIN, SPOTTED GAR, AND LARGEMOUTH BASS AT THE NATURE CONSERVANCYS EMIQUON PRESERVE AND REELFOOT LAKE: CAN NATIVE FISH CONTROL COMMON CARP?

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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 in that they are both shallow, disconnected floodplain 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 6 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 prey selection and 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 selecting for young-of-year and/or juvenile common carp as a prey type. So these species may not be directly influencing common carp via predation but perhaps indirectly through other pathways.

INTEGRATING THE EMQUION COMPLEX ECOSYSTEM INTO AN EDUSYSTEM
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Emiquon's ecosystem continues to draw the attention of scientists and resource managers and a growing number of educators and citizens. In the end, our view of restoration success is propagating a renewed sense of ecosystem stewardship and a public constituency that draws on Emiquon's edusystem.

ECOLOGY OF FALL-MIGRATING MALLARDS IN THE ILLINOIS RIVER VALLEY
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The Illinois River valley (IRV) provides important stopover habitat to spring- and fall-migrating waterfowl. Based on midwinter inventories, 20.6% of mallards (Anas platyrhynchos) wintering in the Mississippi Flyway spent at least one day in the IRV during 1955–1996 (Havera 1999:229). Unfortunately, 53% of the natural wetlands in the IRV have been lost, primarily to agriculture (Havera 1999), and the quality of many remaining wetlands has declined. Investigations of migrating and wintering waterfowl in Illinois are critical to guide conservation planning, habitat restoration, and harvest management. Therefore, we used radio telemetry to investigate stopover ecology of fall-migrating mallards in La Grange Pool of the IRV to better understand stopover duration, refuge use, distances traveled among stopover wetlands, daily movement patterns, and survival in this important mid-migration region. Additionally, we will describe wetland habitat use by mallards at the Emiquon Preserve, and show how mallards captured at the Emiquon complex distributed throughout La Grange Pool and provided hunter harvest opportunities in the region.