IL AFS 2026 ABSTRACTS

POSTERS

Monitoring What Slips Through the Net: Sampling Illinois' Fish Species of Greatest Conservation Need

Capon, Carley; Ryba, Megan; Cao, Yong

Information on the distribution and abundance of rare fishes is critical for permitting, consulting, and conservation planning. However, great-large river monitoring programs target sportfish or the whole assemblage, providing limited data on small-bodied Species of Greatest Conservation Need (SGCN), including the state and federally listed. This data gap compromises effective SGCN monitoring. To address this challenge, we assessed six sampling gears for detecting the 19 SGCNs recorded in the Mississippi River (MR) and Wabash River (WR) and characterizing fish assemblage. Replicate samples were collected at 15 MR and 10 WR sites with backpack electrofishing, boat electrofishing, benthic trawling, cast netting, minnow traps, and seining. The number of fish species and individuals were counted for each type of gear at each site. Boat electrofishing (BE) is most productive, contributing on average 49% and 34% of all species captured at each site. Trawling is highly complementary to BE, capturing most SGCN species and individuals, although it only contributed on average 18% of all species at a site in WR, 6% in MR. These two gears combined detected all 6 SGCN. In a 2D-NMDS plot, samples from each river are grouped largely based on gear type, particularly BE and trawling, instead of sites, indicating poor sample comparability among the different gears. We conclude that trawling is the most effective to capture SGCN while BE is the most effective to characterize the whole fish assemblage in the great-large rivers in Illinois. Joint use of two methods would meet most monitoring needs for biodiversity conservation.

Reproductive Biology of Emerald Bowfin (*Amia ocellicauda*) in the Emiquon Preserve

Fuhrer, Grace; McClendon, Corrine; Nepal, Vaskar; Hilsabeck, Rob; Holda, Toby

Emerald Bowfin (*Amia ocellicauda*) are native freshwater fish found throughout North America, traditionally regarded as “rough fish" with low economic value. The species has come under increased pressure from fishing as a source of caviar following the collapse of sturgeon populations. Additionally, recent reports indicate that Emerald Bowfin may live up to 33 years (nearly triple the previous estimate of 12 years); therefore, there is a critical need to better understand their biology to prevent overexploitation. We assessed the reproductive biology of Bowfin in the Emiquon Preserve during Spring 2024 and 2025. We collected fish using trap nets and estimated fecundity using the standard gravimetric method. For a given size, Emerald Bowfin collected from the Emiquon Preserve exhibited significantly lower fecundity than previously reported for other populations, suggesting low reproductive rates. Analysis of fish body condition revealed that this is likely the result of poor body condition of fish in the Emiquon Preserve compared with other populations. Improvement of Emerald Bowfin population health in the Emiquon Preserve will require improvement in habitat quality and control of the invasive Common Carp (*Cyprinus carpio*) from the Preserve. Our findings will enable us to characterize the population dynamics of the Emerald Bowfin, preventing overexploitation and ensuring the long-term health of Bowfin in the Emiquon Preserve.

Habitat Quality and Its Effects On The Stress Levels of Orangethroat and Johnny Darters in Macon County, Illinois

Gula, Hailey; Wilcoxen, Travis

In Macon County, 84% of the total land area is primarily agricultural fields, and 8.4% of the total area is urban and built-up land. A combined total of 92.4% of Macon County is being used for agricultural and urban land use. With urbanization and agriculture comes alterations in stream habitat qualities. This study focuses on two common and native darters of Illinois, the Orangethroat darter (*Etheostoma spectabile*) and Johnny darter (*Etheostoma nigrum*). These darters are found in rivers and streams with gravel or rocky bottoms, with little to no silt present. Fish were caught using a seine and were then individually sampled for their individual output of cortisol, a stress hormone. Using a quantitative ELISA, we found that darters sampled in streams with a slow flow rate tended to have higher cortisol levels. We also compared the cortisol levels between Orangethroat and Johnny darters and found that the overall Orangethroat darters had higher cortisol levels than Johnny darters, independent of habitat type. This research project highlights the effects of agriculture and urbanization and its effects on stream structure and how it impacts fish such as the Johnny and Orangethroat darters, which are great indicator species as they are both sensitive to habitat quality.

One-way passage: a mechanism to limit fish movement and optimize harvest

Hagloch, Cody; Roussin, Abigail; Acre, Matthew; Faulkner, Jacob; Catalano, Alexander; Barkowski, Nicholas; Brey, Marybeth; Jackson, P. Ryan; Lamer, James

Invasive Bighead Carp (*Hypophthalmichthys nobilis*) and Silver Carp (*H. molitrix*) are widespread throughout the Mississippi River Basin where they have negative ecological impacts at high densities. Current management relies on removal with gill nets and commercial seines, which exploit carp aggregation behavior in backwaters. Although effective, identifying when to best harvest large aggregates of carp can be difficult. To increase efficiency of harvest, a need exists to passively congregate and confine invasive carp into areas where mass harvest can occur at the convenience of fishers. Therefore, we are investigating the use of one-way passage structures that allow fish to enter but prevent escape, concentrating carp in targeted areas (e.g. river backwaters). Our objectives are: (1) evaluate fish interaction and movement through one-way passages, (2) determine retention of fish with one-way passage designs, and (3) evaluate driving factors that could be shaping species movement and community composition to these backwaters. We will evaluate and optimize the design's effectiveness in controlled ponds with 2D positioning of fish before installing at three backwater locations in the Illinois River where invasive carp congregate at various times of the year. This passive approach could sequester fish in backwater areas, thereby enhancing harvest efficiency, reducing carp densities at invasion fronts, and restricting access to spawning habitats, ultimately mitigating ecological impacts.

Armored Shorelines Reduce Habitat for Turtles

Happel, Austin; Hoinville, Elliot; Iniestra, Alain; Novak, Natalie

Urban rivers present unique challenges for basking turtles: shoreline hardening (bulkheads, riprap) often eliminates gradual slopes and natural structures, channelization increases water velocity and reduces complexity, and riparian vegetation removal eliminates thermal refugia and predation cover. Understanding which specific microhabitat features—such as basking structure availability, vegetative cover, and shoreline configuration—enable turtle populations to occupy modified urban waterways is essential for guiding restoration and management in increasingly urbanized landscapes. Using 34 visual encounter surveys conducted in a downtown section of the Chicago River we use occupancy modelling to address the question: Does the amount of shoreline armoring explain turtle habitat use better than natural habitat features like canopy cover? We find that shoreline armoring reduces turtle habitat and explains occupancy better than the positive effect of canopy cover. We also found that some unnatural structures like flipped boats and iron beams provide basking habitats and are used by turtles with more fidelity than natural items like logs and rocks, likely due to interplays with shoreline configuration and direction of solar exposure.

Eclipsing Behavior: Zooplankton Migration During a Total Solar Eclipse

Ingram, Austin; Thole Sage; Bremke, Thomas; Mruzek, Joseph L.; Garvey, James E

The rare event of a total eclipse of the sun allows for many questions about the role of natural day and night cycles on ecological systems. For example, it is known that zooplankton engage in daily diel vertical migrations, surfacing at night and descending during the day. There are many causes for this behavior, such as avoiding visual predators during the day, or light and temperature gradients. Vertical migration is part of a natural circadian rhythm, and which maintains a natural 24-28-hour cycle, even under controlled laboratory conditions. In spring of 2024 a total solar eclipse occurred in Carbondale, IL, with totality at 2PM. This provided an opportunity to observe any changes to vertical diel migration as a result of altered decreasing sunlight in the middle of an otherwise sunny day. We conducted observational study on Cedar Lake, a large, manmade reservoir. We measured light attenuation and standardized zooplankton samples at three depths: surface, three meters, and ten meters below the surface. A control study was conducted during a typical dawn-dusk photoperiod two weeks later, on a similarly clear and sunny day. We found that copepods exhibited a disrupted diel vertical migration, moving up during the midday, possibly triggered by the reduced light during the eclipse. Additionally, we observed that rotifers moved downwards during the eclipse, counter to their normal behavior. Our results clarify the causes of diel migration in a natural setting where it normally would not be possible to alter day and night cycles.

Integrating environmental DNA into stream fish recovery monitoring.

Klumker, Shaley; Skowronski, Ryan; Thomas, Trent; Roth, Daniel; Colombo, Robert; Effert-Fanta, Eden

The frequency of mass mortality events caused by acute, anthropogenic stream disturbances is on the rise, yet contemporary literature on this phenomenon is lacking. This gap in research demands innovations in fish-kill investigations, particularly immediate post-recovery assessments, an approach rarely implemented due to the challenges of mobilizing resources before ecological evidence dissipates. This study examined the ecological impact and recovery of a stream in north-central Illinois following a 20,000-gallon Urea Ammonium Nitrate (UAN) fertilizer spill that caused a 32 km fish kill in March 2024. Traditional sampling methods (i.e. seine electrofishing) beginning 2 months post-spill yielded very low fish counts (n = 10 across 3 sites) with significant increases between July and August. Environmental DNA (eDNA) sampling at 6 months and 1 year post-spill was used as a minimally invasive method of fish biodiversity assessment to aid in the detection of sensitive or elusive taxa that traditional electrofishing methods may miss. While a significant increase in fish species richness was observed during recovery, several species historically present were not collected via electrofishing in 2024. Community composition by the end of the 2024 sampling season was dominated primarily by species abundant across historical sites, but not all previously abundant species were observed. However, preliminary eDNA results indicate the presence of fish species not detected using traditional methods in 2024. Understanding patterns of stream recovery over time and utilizing novel methods, such as eDNA, is necessary to enhance our ability to respond to pollution events in vulnerable, anthropogenically influenced systems.

Impact of hook size and morphology on post-release welfare in channel catfish *Ictalurus punctatus*

Miner, Olivia; Crouse, Austin; Gabel, Paisley; Louison, Michael

Catch-and-release angling is a common conservation practice involving the release of captured fish back into their water body of origin. This practice has been tremendously valuable in conserving fish populations however the practice does ultimately rely on the survival of fish following release. Previous research has shown that handling practices (i.e. excess air exposure) and/or injury to fish from gear can greatly impact the likelihood of fish successfully surviving following release. In this study, we assessed the effects of two hook morphologies (J-Hooks and Circle Hooks) in one of two sizes (large size 2/0 or small size 4) on hooking depth, injury, and subsequent mortality in channel catfish *Ictalurus punctatus*. A total of 79 channel catfish were caught using conventional bottom-rig angling techniques from Baldwin Lake in Southern Illinois, and assessed for hooking depth, bleeding, gashing, and eye injury before being held overnight in floating live-well totes. The following morning we returned to the site and assessed all captured fish for mortality, reflex responsiveness, and blood glucose and lactate. Our results showed that hook size played little role in driving negative outcomes, while hook morphology (specifically J-Hooks) led to greater rates of deep hooking, gashing, and eye injury. Mortality in channel catfish was rare (2 out of 81 fish) and only occurred in fish that were deep-hooked. Together, these results show the importance of gear choice for anglers interested in fish welfare, with circle hooks outperforming J-Hooks in all measures of catfish post-release health.

Evaluating the Status of Environmentally Sensitive Aquatic Insects in Conservation Reserve Enhancement Program (CREP) Streams in Illinois

Nixon, Billy; Molinaro, Sarah; Cao, Yong

The Illinois Conservation Reserve Enhancement Program (CREP) is a private lands conservation program that aims to reduce sediment and nutrient runoff, improve water quality, and create and enhance critical habitat for fish and wildlife in the Illinois and Kaskaskia river basins. In exchange for voluntarily removing frequently flooded and environmentally sensitive cropland from production, landowners receive compensation to implement conservation practices. The CREP Aquatic Life Monitoring Project conducts wadable stream surveys to monitor progress towards CREP's aquatic life goal of increasing native fish species and environmentally sensitive aquatic insects, specifically Ephemeroptera, Plecoptera, and Trichoptera (EPT), on average by 15 percent in stream reaches associated with CREP compared to similar stream reaches surrounded by agricultural land. To evaluate if CREP enhances benthic macroinvertebrate and EPT richness, we sampled macroinvertebrates from paired 100-m stream reaches: one reach in a CREP parcel ("CREP site"), and the second upstream reach surrounded by agricultural land ("AG site"). Samples were collected with a D-frame net using a multi-habitat 20-jab protocol. From 2021-2024, 34 complete pairs of samples were collected and processed from streams in the Illinois and Kaskaskia river basins. Operational taxonomic units (OTUs) were delineated, and rarefied EPT OTU richness was compared for each pair to assess progress towards CREP's EPT goal.

Evaluation of external attachment designs for GPS tagged invasive carp

Roussin, Abigail; Hagloch, Cody; Mathis, Andrew; Acre, Matthew; Szott, Emily; Davila Jr., Rafael; Tinoco, Rafael; Lamer, James

Silver Carp (*Hypophthalmichthys molitrix*) are highly invasive within the Mississippi River Basin. Harvest is the primary management strategy, however, especially in low to medium density populations, efficient harvest can be challenging. Although passive acoustic telemetry systems can help guide management efforts, telemetry applications are typically spatially and temporally limited, whereas GPS satellite transmitters offer real-time positioning to increase efficiency and effectiveness of harvest. Currently there is no agreed upon external attachment for Silver Carp, therefore our objectives are to evaluate designs for GPS transmitter attachments to optimize retention, swimming ability and health of the fish. First, we measured the frictional drag of different shape transmitters at varying depths and velocities. Next, we will assess the long-term effectiveness of multiple external attachment designs on Silver Carp in a controlled pond setting. Lastly, tagged Silver Carp will be observed in a large flume to record swimming behavior and schooling interactions. By optimizing an external attachment for Silver Carp, we will be able to effectively deploy GPS satellite transmitters that may lead to more efficient monitoring and management practices of Silver Carp in the Upper Mississippi River and Illinois River.

Grass carp trophic ecology in two large rivers: Impact on resource competition with other invasive carps in the absence of aquatic vegetation

Salrin, Olivia; Harris, Brandon; Spear, Michael; Solomon, Levi; Nepal, Vaskar; Lamer, James

The trophic ecology of grass carp (*Ctenopharyngodon idella*) – a large-bodied invasive species in the Upper Mississippi River Basin – is largely understudied in their invasive range. This trophic relationship is intriguing where grass carp populations persist in habitats that are devoid of their preferred food source (submerged aquatic vegetation), such as sections of the Illinois and Mississippi Rivers where it is lacking. When vegetation is scarce, studies have shown that grass carp consume items such as detritus/organic material, invertebrates, and zooplankton. However, consumption of non-plant material is mostly thought to be incidental while consuming vegetation. To differentiate trophic niches of grass carp across distinct vegetated and unvegetated habitats, we used stable isotope analysis (fish tissue) of carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and sulfur ($\delta^{34}S$) from vegetated pools of the Illinois (Starved Rock) and Mississippi rivers (Pool 19) and unvegetated pools (La Grange and Pool 26, respectively). We also assessed trophic overlap of grass carp with silver carp (*Hypophthalmichthys molitrix*), a prominent invasive planktivore in the basin, to determine how resource competition may vary. Tissue samples were collected from a total of 80 grass carp and 75 silver carp across both rivers from August-October, 2025. An isotopic baseline was included for pools that included both pelagic (Unionid mussels) and benthic (snails) energy sources to permit intra- and inter-river comparisons of trophic niches between species. Results of this study will disentangle the trophic ecology of grass carp across this important biotic gradient and provide information on the potential for resource competition with silver carp.

Long-term Monitoring Provides Insights on Population Status of Rare Fishes in the Illinois Waterway

VandenBerg, Alexis; Harris, Brandon; Spear, Michael; Mathis, Andrew; Myers, Madison; Salrin, Olivia; Maxson, Kristopher; Solomon, Levi; Whitten-Harris, Andrya; Hine, Eric; Williams, Jesse; Barkowski, Nicholas; Catalano, Alexander; Lamer, James

Long-term fisheries monitoring is essential to assess spatial and temporal trends in communities and population dynamics. By providing baseline trends in the fish community, these data can assist both the planning and assessment of management decisions. Beginning in 2019, the Multi-Agency Monitoring (MAM) program has collected fish community data annually from over 500 river kilometers of the Illinois Waterway (IWW) – spanning Lockport Pool near Lake Michigan to the confluence with the Mississippi River – using a standardized, multi-gear, and stratified random sampling approach. Although the purpose of this ongoing project is to monitor invasive carp abundance to inform management decisions and to assess resulting impacts on the native fish community – these data also can provide critical insights on rare and/or imperiled native fishes. The Pallid Shiner Hybopsis amnis, Shoal Chub Macrohybopsis hyostoma, Blacknose Shiner Notropis heterolepis, and Trout Perch Percopsis omiscomaycus are species that declined in both abundance and distribution in the last century, resulting in three of these species being listed as threatened or endangered by the state of Illinois. Through leveraging monitoring data collected by MAM, we redefine the ranges of these species within the IWW and assess their current status. These results emphasize the importance of long-term monitoring and utilizing a multi-gear approach when assessing riverine communities.

Building communication strategies for lapsed recreational anglers in IL: A message framing experiment to support recruitment, retention, and reactivation

Xue, Shi; VanRiper, Carena

Declines in recreational fishing participation pose challenges for both conservation funding and aquatic ecosystem management in the United States. While recruitment, retention, and reactivation (R3) campaigns are widely used by state agencies, limited empirical evidence exists regarding how strategic communication can effectively motivate anglers who have lapsed in purchasing fishing licenses. This study examines whether message framing aligned with fundamental psychological needs can enhance intentions to reengage in recreational fishing among previously licensed anglers in Illinois. Drawing on Prospect Theory and Self-Determination Theory, we designed a between-subjects experiment that evaluates gain- and loss-framed messages aligned with three basic psychological needs: autonomy, competence, and relatedness. A statewide online survey was administered to a randomly selected sample of adult anglers who had lapsed in license purchases between 2022 and 2024. Participants were randomly assigned to one of seven experimental conditions (control, or gain/loss frames for each psychological need), and intentions to purchase a fishing license were measured before and after message exposure. We assess changes in behavioral intention using pre–post difference scores and analyze treatment effects using analysis of variance and multiple regression models that account for sociodemographic characteristics, fishing experience, motivational orientations, and message processing mechanisms such as elaboration and involvement. By integrating psychological needs into message framing, this study advances communication theory in natural resource management and offers actionable insights for agencies seeking to strategically enhance angler reactivation through targeted, evidence-based outreach.

Assessing of strontium isotope ratio ($^{87}Sr/^{86}Sr$) as a natural marker for distinguishing large rivers and tributaries in fish calcified structure chemistry studies

Zeitzheim, Jack; Whitledge, Greg; Tappa, Michael

Naturally occurring chemical markers in calcified structures (otoliths, bones) have proven useful for reconstructing fish environmental history in a variety of environments, including large rivers and their tributaries in the Midwest. Such studies in these systems to date have primarily used Sr:Ca and Ba:Ca ratios. Although Sr:Ca and Ba:Ca can distinguish several rivers and tributaries, some locations are indistinguishable using just these two markers. Several published calcified structure chemistry studies on freshwater and anadromous fishes have used strontium isotope ratio (87Sr/86Sr); this marker exhibits limited biological fractionation, resulting in a 1:1 relationship between 87Sr/86Sr of water and calcified structure. However, the potential utility of this marker in Midwestern rivers has not been evaluated; published 87Sr/86Sr for lakes and rivers in this region are very limited. The objective of this study is to determine whether water 87Sr/86Sr differs among large Midwestern rivers (Mississippi, Missouri, Illinois, Ohio) and between these rivers and their tributaries. Approximately 60 water samples were collected in 2025 from these four rivers and several tributaries of the Ohio and Mississippi rivers. Water samples were filtered, strontium was extracted from the samples, and 87Sr/86Sr was analyzed using thermal ionization mass spectrometry. Results to date indicate that several rivers and tributaries can be distinguished from one another using 87Sr/86Sr, including locations that are indistinguishable using Sr:Ca and Ba:Ca. Analysis of 87Sr/86Sr, in addition to Sr:Ca and Ba:Ca, in calcified structures will substantially improve resolution for reconstructing environmental history of fishes in large river systems, especially for highly migratory species.

PLATFORM

Effect of Low-Head Dam Removals on the Macroinvertebrate Community of the Vermilion and North Fork Vermilion Rivers

Bovard, Jeanette; Bonnstetter, Abbie; Roth, Daniel; Colombo, Robert; Effert-Fanta, Eden

Impoundments can lead to decreased abundance and biodiversity of macroinvertebrate communities. To reverse negative impacts caused by impoundments, dam removal may be utilized to restore natural flow regimes and rebalance aquatic ecosystems. In Illinois, two low-head dams were removed from the Vermilion River (Danville Dam; 2018) and North Fork Vermilion River (Ellsworth Dam; 2019), reconnecting over a thousand stream miles within the Vermilion River Basin and restoring connectivity to the Wabash River. To assess macroinvertebrate communities, pre- and post-dam removal, macroinvertebrates were sampled using the EPA 20-jab method and Qualitative Habitat Evaluation Index (QHEI) metrics were recorded. Surveys were conducted at twelve 100-meter sites, in the fall of 2014-2015 with 4 sites upstream and 2 sites downstream of the dam locations. Post dam removal, the same sites were sampled in the fall of 2022, 2023 (only North Fork sites), and 2025. Preliminary results show an increase in QHEI scores, increased diversity and abundance, increased percent EPT (Ephemeroptera, Plecoptera, and Trichoptera) taxa, and increased abundance of Collector-Filterers, Shredders, and Predators post-dam removal. This increase in taxonomic and functional diversity in tandem with increases in proportion of sensitive taxa collectively demonstrate the improvement observed to macroinvertebrate communities in rivers following dam removals. Macroinvertebrates provide valuable information on the health and quality of the stream as they are bioindicators occupying every consumer level in lotic systems with different functional feeding groups and tolerance values. Thus, it is critical to monitor these communities to understand holistic impacts of stream restoration efforts like dam removals.

Zooplankton as assessment metrics for bigheaded carp control efforts

Butler, Steven E.; Radford, Dakota S; Nannini, Michael A.; Porreca, Anthony P.; Parkos, Joseph J. III; Maxson, Kristopher A.; Spear, Michael J.; Lamer, James T.; Mruzek, Joseph L.; Davis, Cameron L.; Garvey, James E.

Mitigating the ecological impacts of invasive species is a desirable management goal when eradication is not feasible. Implementation of specific, measurable, and ecologically relevant targets can aid in assessing whether management actions are producing tangible benefits. Bigheaded carp are well known for causing declines in abundance and shifts in zooplankton community structure. Intensive harvest of invasive carp from the Illinois River is intended to limit further advances of these fishes towards Lake Michigan, but these removals may also reverse some of the impacts that bigheaded carp have had on this system. We used 12 years of zooplankton collections from the Illinois River to evaluate how changes in bigheaded carp density, native planktivore abundance, and environmental conditions have influenced densities of key zooplankton taxa. We first identified individual zooplankton taxa in each month that contributed the most to dissimilarity among navigation pools and years. We then modelled these candidate zooplankton metrics as functions of environmental variables and pool-scale estimates of bigheaded carp density or native planktivore relative abundance. Monthly zooplankton metrics were considered potentially informative performance indicators if the most-supported model for each metric included bigheaded carp density as a significant explanatory factor with at least a medium effect size. The most informative metric (June Bosmina density) indicates that most pools of the Illinois River continue to show persistent, severe impacts of bigheaded carp planktivory, but there is evidence of diminished impacts from bigheaded carp in the Marseilles and Dresden Island pools in recent years.

Swimming metabolism of blue catfish, *Ictalurus furcatus*: Implications for fish passage design on the Mississippi River

Campbell, Kelly B.; Moore, John; Urbanczyk, Aaron; Stell, Ehlana; McClendon, Anthony; Woodley, Christa; Smith, David; Suski, Cory

Dams have significantly altered freshwater landscapes and aquatic ecosystems across the United States by fragmenting habitats, impeding fish migration, and altering water flows and sediment movement. The Upper Mississippi River and Illinois Waterway house 37 locks and dams and nearly an equal number of migratory fish species (34), representing a fragmented system inherently at odds with some of its most mobile inhabitants. Fish passageways are a potential tool to address this issue. However, most fish passageway designs have historically targeted philopatric salmonids and bear little biological relevance to the non-salmonids moving throughout the Mississippi. An informed design for these species is precluded by knowledge gaps in fish movement and behavior, and how fish passageway design elements impact swimming energetics and fish passage. We aimed to inform fish passageway design on the Mississippi River by defining the energetic cost of swimming for blue catfish (*Ictalurus furcatus*), a species of significant ecological and socio-economic value, across water velocities and in the presence or absence of in-stream structures at two ecologically relevant temperatures (12 and 22 °C; n = 7 fish per group). First, we used accelerometry and respirometry to relate swimming energetic cost to fish acceleration in a 185-L swim tunnel. Next, we conducted swim trials in a ~125,000-L flume to quantify impacts of in-stream structures on swimming energetics at different flow velocities. Together, outputs from these studies will help define swimming energetics for an important migratory species and identify fishway design elements which will aid in its successful fish passage.

A Tale of Two Rivers: Is the Invasive Silver Carp Niche Evolving or Just Filling Up?

Feng, Yixuan; Garvey, James; Brown, Jason

Silver Carp are established invaders in the Mississippi River Basin despite they are facing population declines in their native Yangtze River range. Predictive models often assume that invasive species will tolerate the same environmental conditions as their native ancestors. However, recent genetic studies suggest the United States population is rapidly evolving. We investigated whether this genetic divergence has resulted in a shift in their ecological niche. We compared occurrence data from China and the United States using the Humboldt modeling framework to test for niche overlap. Our analysis incorporated key environmental variables including temperature, precipitation, river flow, and slope.

We found that the realized niches of the native and invasive populations are not equivalent. The native population occupies a broad range of habitats, thriving in both flat floodplains and steeper upstream rivers. In contrast, the invasive population has specialized heavily in low slope agricultural river reaches. Our results suggest this difference is likely due to the invasive population exploiting the most accessible habitat first rather than having a physiological limitation. Silver Carp in the United States have not yet colonized the steeper upland habitats that their native ancestors successfully occupy. These findings imply that current risk assessments may underestimate the potential for Silver Carp to expand further into uninvaded upper tributaries in North America.

A Comparison of Environmental Drivers on Reproductive Phenology: How Annual Variability Affects Invasive Carp and Native Riverine Fish Species

Gerber, Alexis; Roth, Daniel; Colombo, Robert; Parkos, Joesph; Effert-Fanta, Eden

Environmental variables and fish reproductive phenology are influenced by climatic changes in temperate freshwater ecosystems. Understanding how invasive and native fish species respond to these environmental shifts across diverse river systems is critical for predicting invasion success and native species impacts. Seasonal spawning patterns of riverine fish are impacted by environmental parameters (temperature and discharge). Shifts in intensity and timing of environmental cues may differentially affect spawning initiation, duration and magnitude between species groups and mainstem and tributary river systems. Additionally, bigheaded carp may exploit these altered environmental conditions to facilitate successful invasion. This study aims to 1) evaluate how spatiotemporal shifts in environmental variables affect annual reproductive phenology of invasive carp and native fish and 2) determine environmental variables driving ichthyoplankton densities across mainstem and tributary rivers. Sampling occurred from April to September (2021-2025) at three tributary-mainstem confluence sites on the free-flowing lower Wabash River and the impounded LaGrange Pool of the Illinois River. Results show shifts in reproductive duration of native and invasive species with bigheaded carp exhibiting the longest reproductive duration, likely due to multiple spawning events in a single reproductive season. Peak reproductive timing differed between mainstem and tributary sites, with tributaries supporting earlier spawning activity. Limited research has examined reproductive phenology and ichthyoplankton dynamics of native fishes within comparable river systems. Understanding how annual shifts in environmental variables influence reproductive phenology offers key insights into native fish reproduction while also informing management agencies on potential shifts in the magnitude of bigheaded carp reproduction within these productive systems.

Habitat mosaics in a large-river floodplain ecosystem: Uncovering physical-biological relationships across multiple taxa

Hampton, Julia R.; DeBoer, Jason A.; De Jager, Nathan R.; Larson, Danelle M.; Kaemingk, Mark A.

Large-river floodplain ecosystems are highly diverse due to their age, watershed size, and hydrodynamic and habitat variability. These systems exhibit habitat mosaics, which encompass multiple ecosystem types, creating biodiversity hotspots. To understand these abiotic-biotic complexities, most studies take a species- or community-centric view, asking ‘what factors influence the distribution and abundance of a given species or community?’. We took a fundamentally different approach by applying a habitat-centric lens to understand the physical-biological relationships of multiple taxa within the Upper Mississippi River System (UMRS). Our objectives were to 1) compare differences in water quality, aquatic vegetation, mussels, and fish across habitats within several navigation pools of the UMRS, and 2) assess which habitats are most similar or different among these abiotic and biotic components. We used multivariate techniques to assess relationships between UMRS Aquatic Areas (i.e., detailed GIS habitat classifications) and water quality, aquatic vegetation, mussels, and fish for Pools 8 and 13 from 2017-2021. The habitats included were contiguous floodplain lake, contiguous impounded, side channel, structured channel border, tertiary channel, and unstructured channel border. Overall, most habitats were distinct from one another, leading to habitat-level differentiation among components. However, some similarity existed between habitats and associated abiotic and biotic components. For example, pairwise comparisons uncovered overall mussel community differentiation was driven by variation in three habitats rather than differences between all six habitats. Our study helps strengthen the recognition of habitat associations and aquatic-dependent species requirements to better align management and ecosystem restoration of the UMRS and large rivers worldwide.

Seasonal Changes in Diet Composition of Blue Catfish across five western Illinois lakes

Hilsabeck, Sorin; Nepal, Vaskar; Hilsabeck, Rob; Bushman, Blake; Ruebush, Blake

Blue Catfish (*Ictalurus furcatus*) are highly valued by recreational fishers in the Midwest due to their large size and aggression while on the line. With increased stocking efforts in the region in recent years, the drivers of success of such introductions have come into question. Understanding diet will be essential to this species' establishment and eventual natural reproduction in stocked areas. During 2025, we surveyed five western Illinois lakes to collect the length, weight, and diet content of Blue Catfish caught using pulsed-DC electrofishing across three seasons (spring, summer, and fall). We included lakes across population ages to indicate differences in diet due to establishment time. These population ages are pre-established population lakes (Canton), in-progress lakes (Schuy-Rush, Carthage, and Spring), and newly stocked lakes (Vermont). Prey items were identified into broad groups: aquatic vegetation, invertebrates (Order/Family), and fish (Species). Preliminary analysis shows fish in established populations preying on fish and larger invertebrate types. Fish in smaller, shallower lakes were also found to prey on vegetation and smaller invertebrates. A larger variety of prey items was found in lakes with higher fish species diversity. We also identify and compare patterns in stomach fullness and diet diversity among size classes and across the seasons and lakes. Our results can help identify the drivers and trophic impacts of Blue Catfish establishment success in Midwestern lakes.

Plenty of Fish in the Sea: How the (un)Popularity of Fishing is Influenced by Social Media

Joffe-Nelson, North; van Riper, Carena

The (un)popularity of recreational fishing among younger cohorts bears heavily upon the conservation of aquatic ecosystems and is widely recognized as a pertinent knowledge gap given generational changes in society. Social media offers a relevant context for understanding decreases in recreational fishing participation because these forums host social discourse that indicates what is popular among younger generations. Dating applications have a particularly interesting signal for what is (un)popular and may be influencing recreational fishing participation. We therefore conducted an experiment to evaluate how young anglers and hikers were appraised by users of online dating applications across the United States. We designed a 2x2x3 full-factorial experiment in which respondents' evaluations of hypothetical dating profiles featuring either fishing, hiking or no environmental activity were compared. Our results showed that the depiction of engagement in environmental activities in dating profiles affected the attractiveness and perceived compatibility of potential partners. Respondents were then segmented into subgroups defined by their gender and place of residence. We found that profile evaluations differed by men versus women and between the urban-rural divide. These findings offer novel insights into the social science patterns behind angling participation that are highly relevant for fisheries management agencies to consider. In particular, we illustrate how social influence can affect fishing participation and offer a possible explanation for why outdoor activities like fishing have waned in popularity among younger generations.

Relationships Between Female Size and Egg Characteristics Across the Range of Paddlefish

Kamara, Shasta; Busby, Joelle; Leal, Sandra; Suski, Cory

American Paddlefish have important commercial and recreational fisheries throughout their range, which covers a wide latitudinal gradient. This large range has led to the expression of compressed life history strategies in the southern reaches compared to the longer-lived, later-maturing fish in the northern extent of their range. This difference in life history, paired with the commercial importance of paddlefish in the caviar industry, means that larger, older, and potentially more fecund female paddlefish are disproportionately removed from the population relative to smaller females. This could result in recruitment issues if smaller females with lower-quality eggs are left to spawn. Quantifying latitudinal trends in paddlefish life history through gamete characteristics can aid in the management of stocks and in predicting how paddlefish life history may shift with climate warming. Therefore, the goal of this study is to quantify size-based variation in paddlefish egg characteristics throughout their range. To accomplish this goal, we collected egg samples from 130 females in two ways. First, we obtained eggs from wild-caught hatchery broodstock in Louisiana, Missouri, and South Dakota. Second, we collected eggs via direct collections or angler donations in Oklahoma, Missouri, Illinois, and Montana. Eggs were assessed for characteristics related to offspring nutrition and development, and compared across sizes within a latitude, as well as across latitudes, to quantify reproductive strategies across the continent. This information will aid paddlefish managers in determining which females in a population are more likely to produce offspring that will successfully recruit and, therefore, are important to conserve.

Stream fish and macroinvertebrate community recovery trends post-fertilizer spill into an Illinois stream

Klumker, Shaley; Skowronski, Ryan; Bovard, Jeanette; Thomas, Trent; Roth, Daniel; Colombo, Robert; Effert-Fanta, Eden

Many small streams traverse the agriculturally dominated Midwest, playing an important role in irrigation and drainage. However, these agricultural practices are major drivers of stream degradation. This study investigates the ecological impact and recovery of Rooks Creek, a 3rd order stream located in North-Central Illinois, following a 20,000-gallon (75,708 L) spill of 28 Urea Ammonium Nitrate (UAN) fertilizer in late March 2024, which caused a large-scale fish kill extending approximately 32 km from the spill site. In the 2-6 months post-spill, short-term fish recovery was monitored using monthly electrofishing surveys in both the impacted stream and a nearby, unimpacted stream within the same basin as a control. Habitat quality assessments and macroinvertebrate surveys were also conducted to further evaluate stream ecosystem recovery over time. Sampling was repeated once more in 2025 to assess recovery status the year after the spill occurred. Data from IDNR and IEPA intensive basin surveys, occurring approximately every 5 years since 1990, served as the basis for historical comparison. Primary findings from 2024 surveys included significant increases in fish CPUE, species richness, and index of biotic integrity (IBI) over time, however several species historically found in Rooks Creek were not observed. Several fish species absent or in uncharacteristically low abundance in 2024 were present in 2025 samples and Plecoptera, absent in all 2024 samples and rarely observed in historical data, appeared in the macroinvertebrate community in 2025. These findings show resilience of stream communities following acute water quality disturbance in an agriculturally influenced system.

The Impacts of Temperature on the Physiological Performance of Paddlefish (*Polyodon spathula*)

Leal, Sandra; Kamara, Shasta; Busby, Joelle; Suski, Cory

American paddlefish are an iconic fish species with dedicated fisheries across their broad latitudinal range. Despite their commercial and recreational significance, their thermal tolerance and performance across temperatures are not well understood. This knowledge gap prevents us from predicting how paddlefish populations may respond to continued warming from climate change. Quantifying traits associated with the adaptive capacity of paddlefish across their latitudinal range will help bridge this knowledge gap and allow for the implementation of thermally informed management strategies. The objective of this study was to quantify the thermal tolerance and performance of paddlefish across a range of temperatures. To accomplish this, 160 juvenile paddlefish were transported from a hatchery in South Dakota to a partnering hatchery in Illinois and acclimated to experimental temperatures of 13, 17, and 23° C. Fish from each temperature were subjected to four different challenges to identify responses to thermal regimes 1) upper/lower thermal tolerance via critical thermal minimum/maximum trials, 2) static respirometry to quantify metabolic rates, 3) swim performance using a swim tunnel, and 4) thermal preference with a shuttlebox. Results indicate that juvenile paddlefish have a wide thermal tolerance breadth, consistent swim performance across temperatures, and show limited changes in metabolic scope across temperatures. Together, these data suggest that juvenile paddlefish from this location appear to be resilient to impending climatic changes. These results are further discussed in the context of the adaptive capacity of the species and what managers can expect for potential shifts in populations due to changing thermal regimes.

Impact of Microplastic Exposure on Behavior, Swimming Performance, and Metabolic Rate in hybrid bluegill (*Lepomis macrochirus x cyanellus*)

Louison, Michael; Hernandez, David; Dell, Anthony

Previous studies have demonstrated the presence of microplastics in both terrestrial and aquatic environments, as well as in the bodies of organisms leading to physiological and behavioral impairment. In an effort to further understand the effects of microplastics on aquatic organisms, we conducted a study exposing fish to different morphologies of microplastics infused into their daily diet. Specifically, 76 hybrid bluegill (Lepomis macrochirus x cyanellus) were acquired from a hatchery and kept in aquaria at the National Great Rivers Research and Education Center in East Alton, IL. Following 2 weeks of exposure to either microplastic fibers (acrylic yarn), films (polyethylene stretch wrap), fragments (polyethylene terephthalate bottle pieces), or food only (controls), fish were assessed for behavior in an open-field arena. During the trial, periodic loom stimuli (a sudden flashing light on a computer screen adjacent to the arena) were provided to assess if microplastic exposure inhibited the ability to respond to sudden threats quickly. Following this trial, fish were placed individually into a racetrack-style swim tunnel to assess swimming performance before being loaded into individual respirometry chambers for assessment of metabolic parameters. Following this testing, fish were humanely euthanized and the abundance of microplastic in their gastrointestinal tracts was qualitatively assessed. Our results add to a rapidly growing body of research examining the effects of microplastic pollution on the ecology and physiology of animals, with an eye towards identifying taxa that may be more or less susceptible to disturbance as a result of exposure.

Evaluation of Channel Catfish Population Demographics and Management in the Wabash River Basin

Maynard, Ryan; Roth, Daniel; Effert-Fanta, Eden; Pyron, Mark; Colombo, Robert

Large-river catfishes including Channel Catfish (*Ictalurus punctatus*) and Flathead Catfish (*Pylodictis olivaris*) are valuable species in Indiana's Wabash River Basin for both recreational and commercial anglers. Concerns have risen regarding the health of these catfish populations and impacts of harvest regulation changes implemented in 2015. These included a 13-inch (330 mm) minimum length limit with no daily creel limit and a trophy minimum length limit with a one-fish daily creel limit. This study evaluates the abundance, condition, recruitment, growth, and mortality of these populations to assess the sustainability of current harvest regulations with the goal of informing and improving catfish management strategies in the Wabash River basin. In the summers of 2024 and 2025, both commercially harvested and non-commercially harvested reaches of the Wabash and White rivers were sampled using hoop nets and boat electrofishing. Previous studies have shown Channel Catfish populations are variable in abundance and condition, and Flathead Catfish show signs of growth-overfishing. Analyses of the 2024 and 2025 data suggest that Channel Catfish were more abundant, had greater lengths, and lower conditions in non-commercial reaches. Flathead Catfish condition was high throughout the basin, and abundance was highest in commercial reaches. However, there is a low proportion of harvestable-size individuals in our multi-gear dataset, and trophy abundance has been declining since 2015 as well. We observed important differences in catfish population levels and dynamics that suggest species-specific management strategies could be beneficial for long-term sustainability of these populations.

Completeness and coverage of fish occurrence records differ between museum collections and monitoring programs

Metzke, Brian

Status and trend assessments of fish species and communities often are limited by characteristics of records used to perform those assessments. We evaluate fish records (i.e., species occurrence at a locale in a year) from museums and monitoring programs by employing concepts of completeness and coverage to characterize utility in common conservation frameworks, like species distribution estimates, trend analysis, bioassessment, and community characterization. Approximately 537,000 records were reviewed to evaluate coarse patterns of completeness and coverage across time, space, water categories, and species characteristics.

FishTrends: An online tool to detect annual changes and long-term trends of fisheries metrics

Mooney, Robert; Spear, Michael; Ickes, Brian; DeBoer, Jason; Whitten Harris, Andrya; Glover, David; Lamer, James

Informed decision making in fisheries management hinges on data accessibility. Understanding how populations and communities of fishes change annually and over extended periods of time can help managers identify and prioritize intervention efforts. To help inform fisheries management in the Mississippi and Illinois Rivers, we created an online tool (FishTrends) that uses data from several long-term monitoring programs and provides quick access to annual changes and long-term trends of fisheries metrics (relative abundance, relative weight, and proportional stock density) for a wide range of species. We combined data from the Long-Term Electrofishing program (LTEF), Illinois DNR, Iowa DNR, the Multi-Agency Monitoring program (MAM), and the Long-Term Resource Monitoring program (LTRM) that were collected using the same gear type via random sampling to ensure that the data were comparable and representative of each individual pool/reach. Using those data, we calculated annual means and variance terms for each metric, species, and pool combination, and applied Cochran's equation to ensure that sample sizes were sufficient to detect specific annual changes. Within the tool, a user can select which river, pool/reach, gear type, and species combination they are interested in, and select a threshold for detecting an annual change in a metric (e.g., detect a 20% decline in annual relative abundance for bluegill in Pool 16 of the Mississippi River). Overall, the online tool is meant to provide managers with easily accessible long-term trends of important fisheries metrics and detect annual declines in metrics with statistical confidence that may warrant immediate management intervention.

Silver Carp are increasing in size in the Illinois River

Mruzek, Joseph; Davis, Cameron; Silva, Octavio; Garvey, James

Silver Carp (*Hypophthalmichthys molitrix*) are a highly invasive species in the Illinois River. Using a 13-year hydroacoustic dataset supported by standardized community sampling (i.e., electrofishing), we found consistent increases in Silver Carp total length across all river pools. This pattern suggests a growing proportion of mature individuals throughout the system. Additionally, total length comparisons among navigational pools show that Silver Carp in the upper river are larger than those in the lower pools, potentially due to density dependent competition in pools with higher carp abundance. This interpretation is further supported by data from the Wabash River, where Silver Carp occur at lower densities and reach larger sizes than those in the Illinois River. In contrast, we found limited evidence of increasing body size in other invasive carp species—Bighead Carp (*H. nobilis*), Grass Carp (*Ctenopharyngodon idella*), and Common Carp (*Cyprinus carpio*). These patterns may reflect low population sizes, and therefore reduced competition.

Taxonomic and Functional Changes of Fish Assemblages in the Spoon River Over Five Decades

Nusbaumer, Gunter; Nepal, Vaskar; Hilsabeck, Rob

To understand how ecosystems change over time, it is essential to study fish communities through both their species composition and their functional traits. Trait based approaches are increasingly valuable because they show how species' biological features relate to ecological processes and environmental constraints at any given time. In the Spoon River Basin, a system influenced by agricultural land use, channel modification, and water quality management, the past five decades provide a window into how fish assemblages have changed taxonomically and functionally. This study combines historical and modern survey data with a functional trait database covering life history, trophic, and habitat use traits and measurements. These data will be used to quantify temporal trends in species richness, community composition, functional trait richness, and Index of Biotic Integrity (IBI) scores. Although analyses are ongoing, I hypothesize that IBI scores will show gradual improvement through time, reflecting regional water quality gains and habitat stabilization, consistent with patterns observed in other recovering freshwater systems. I also expect functional trait structure to shift toward greater evenness and increased representation of sensitive or specialist taxa, as seen in long term studies of demersal and small bodied freshwater fishes. This research will provide one of the most comprehensive assessments of ecological change in the Spoon River Basin and will contribute to general efforts to understand how freshwater fish communities adjust under sustained environmental pressure.

A field comparison of different boat electrofishers with comments on standardization

Porreca, Anthony; Broadway, Kyle; Radford, Dakota; Yff, David; Wahl, David; Parkos, Joseph

As standardized boat electrofishing methods are adopted, integrating changes in electrofishing equipment at an agency-wide scale is an expensive and protracted process. As a result, many agency offices use a variety of electrofishing control boxes among different boats or interchangeably. We conducted a field-based assessment of the catch data produced by two configurations of a Smith Root Type VI-A electrofisher (low voltage/high pulse width and high voltage/low pulse width) and one configuration of an ETS MBS-1D electrofisher (standardized to a power goal based on water conditions) to provide guidance on interchanging between control boxes, and the continued use of out-of-production control boxes for which standardizing outputs is difficult. Fish assemblages sampled and catch rates of most species were similar among the three electrofishing configurations, but fish < 220 mm were consistently underrepresented when electrofishing with the Type VI-A at the lower voltage range. No differences were detected between data collected by the standardized MBS and Type VI-A at higher voltage; however, mapped voltage gradients supported that the Type VI-A configuration required 34% more voltage and current than the MBS configuration for comparable fish capture. Our results show how the inherent differences in settings and characteristics of the waveforms outputted by different electrofishers can complicate methods for standardizing power or current outputs required for consistent and safe fish immobilization. While calibration among different control boxes is possible, our data suggest that parabolic pulse shapes require higher peak power outputs than rectangular pulse shapes to produce effectively similar fish catches.

Connecting Urban Lakes: Effects of Physical and Hydrological Conditions on Fish Passage

Rick, Abigail; Parkos, Joseph; Porreca, Anthony

A hydrological reconnection project completed in 2023 restored surface flow between Powderhorn Lake and Wolf Lake in the Calumet Region of Illinois through a series of culverts, pools, and an engineered stream channel designed to enhance wetland function, biodiversity, and flood resilience. We evaluated how fish used this newly established corridor by quantifying the directionality of movement, assessing taxonomic and trait-based biases among movers, and identifying environmental drivers of movement probability. From 2020–2025, we PIT-tagged 1,150 individuals representing 26 species across both lakes and the connecting stream, and monitored movement using fixed pass-by antennas. Movement was strongly seasonal, peaking in spring, and dominated by transitions between Wolf Lake and the engineered stream rather than reciprocal movement between lakes. Several species—including bluegill, redear sunfish, warmouth, black crappie, channel catfish, and yellow perch—successfully traversed the full corridor and reached the Powderhorn Lake inlet, yet no individuals were detected completing entry into Powderhorn Lake, and movement from Powderhorn Lake toward Wolf Lake was extremely rare. Movement tendencies varied across fish families and size classes, with mid-sized individuals and mobile generalist taxa exhibiting the highest movement rates. Monthly temperature and dissolved oxygen were the strongest predictors of movement probability, while water level and nutrient conditions played secondary roles. Collectively, these results indicate that the reconnection is partially functional, enabling upstream exploration but not full passage into Powderhorn Lake, and highlight the importance of evaluating endpoint permeability when assessing connectivity-based restoration in urban freshwater systems.

Assessment of Flathead Catfish Population Demographics and Evaluation of Management Strategies in the Wabash River Basin

Roth, Daniel; Maynard, Ryan; Effert-Fanta, Eden; Colombo, Robert

The Wabash River is a unique system in the Midwest as it is primarily free-flowing and supports a diversity of quality in-stream habitats and aquatic biota. A variety of sportfish species that are vulnerable to various levels of recreational and commercial harvest among river reaches exist in the system. The most valued group of these species is the large-river catfishes, with the Flathead Catfish (*Pylodictis olivaris*) being the second most popular commercial catfish species in the basin. In 2015, management agencies applied congruent regulations for Flathead Catfish (13” minimum size, 1 fish >35” daily) where the river forms the border of Illinois and Indiana. After implementation, several studies showed the size and age structure of Flatheads in the Wabash River skewed toward small, younger individuals. Recent data showed similar trends at a larger scale, including the adjacent White River system. These data suggest low proportion of legal sized fish within the population and hint at signs of potential overharvest and growth overfishing. We sought to gain a better understanding of Flathead Catfish population demographics in the Lower Wabash River through several long-term datasets dating back to the 1970’s. Our analysis showed a large proportion of sub-stock size individuals, and a steady decline in the abundance of larger size classes relative to current data. This is consistent with recent studies and suggests the need for species-specific management strategies. It is important to identify potential factors involved in potential growth and recruitment issues to ensure long-term sustainability of this important resource.

First year summary of statewide surveys of mussel species of greatest conservation need

Ruellan, Hugo; Stodola, Alison; Douglass, Sarah

Thirty-six species of freshwater mussels, approximately 55% of extant species, have been identified as Illinois species of greatest conservation need. Despite the number of imperiled species, there is no coordinated survey program to monitor their status, and most species distribution and abundance information were collected over a decade ago. The Illinois Natural History Survey (INHS) and Illinois Department of Natural Resources (IDNR) have begun a three-year statewide survey project of mussels to update species distribution and abundance information (T-148-R-1). Five species were chosen as target species for surveys, specifically Rainbow (*Cambarunio iris*), Spike (*Eurynia dilatata*), Flutedshell (*Lasmigona costata*), Purple Lilliput (*Toxolasma lividum*), and Pistolgrip (*Tritogonia verrucosa*). Survey locations were chosen where previous surveys were conducted and target species were collected, as well as in streams not previously surveyed but where target species are known to or are likely to occur. We surveyed 54 sites in the first year of our statewide surveys and target species were present at 24 sites. Our first-year survey results indicate changes in distributions of several target species, particularly Rainbow, Flutedshell, and Pistolgrip. Field surveys, in conjunction with laboratory thermal threshold trials, will be used to inform species status assessments and a general mussel conservation guidance document.

Evaluating Artificial Spawning Habitat and Recruitment of Channel Catfish in Illinois Impoundments

Shubat, Danielle; Roth, Daniel; Colombo, Robert; Effert-Fanta, Eden

Channel Catfish (*Ictalurus punctatus*) are a highly valued sportfish throughout the United States; however, populations in many impoundments are heavily dependent on fingerling stockings due to intense angling pressure and limited natural recruitment. In Illinois, the lack of standardized sampling protocols for adult and young-of-year (YOY) catfish has constrained assessments of stocking success and population dynamics. This study looked at demographic variation among Channel Catfish populations in three Illinois reservoirs, evaluated the potential of artificial spawning structures to enhance natural reproduction, and tested sampling methods for detecting YOY individuals. Population assessments and pectoral spine microchemistry analyses revealed that these reservoirs are largely composed of stocked individuals, indicating low natural recruitment and possible spawning habitat limitations. To mitigate this constraint, artificial nest boxes were installed in each reservoir and monitored throughout the spawning season. Evidence of successful spawning within boxes suggests that habitat enhancement may facilitate natural reproduction. However, determining whether larvae survive and recruit into the population depends on effective YOY sampling. To address this need, fall sampling was conducted using hoop nets, benthic trawls, and mini fyke nets to evaluate YOY detection across reservoirs. If nest boxes ultimately enhance recruitment, they may represent a cost-effective management strategy for sustaining Channel Catfish populations while reducing reliance on hatchery stocking.

Establishing metrics to reduce the stocking of lake trout in the Illinois waters of Lake Michigan

Stacy-Duffy, William

Rehabilitation of the lake trout (*Salvelinus namaycush*) population in Lake Michigan has been ongoing since the mid-1970s. The stocking of hatchery-reared fish, refuges from commercial harvest, and control of invasive sea lamprey have resulted in a successful recreational fishery and progress towards a self-sustaining population. Substantive natural reproduction was first detected in the Illinois waters of the lake and Illinois remains the putative epicenter of wild fish production, naturally leading fishery managers to seek the ideal timing to reduce or cease the stocking of hatchery-reared fish. Management of Great Lakes fisheries is conducted collaboratively among state, provincial, and tribal management agencies with jurisdiction in each lake using a process guided by the Joint Strategic Plan. Under this guidance, lake-specific technical committees in Lakes Superior and Huron have developed strategies with specific criteria to determine when lake trout rehabilitation has reached a level that would warrant the cessation of stocking. This presentation will detail the application of these criteria to the lake trout population in Illinois waters of Lake Michigan, provide an update on progress toward rehabilitation metrics, and review pertinent issues facing decision-makers.

Short-term mussel response to the Carpentersville dam removal on the Fox River

Stodola, Alison; Fox River Study Group

Freshwater mussel populations in the Fox River have experienced long term declines driven by channel alterations, water quality degradation, and widespread disruption of natural flow by dams. The fifteen dams constructed along the Illinois portion of the Fox River have degraded mussel habitat by obstructing host fish movement and altering substrate conditions, and historical museum records reflect substantial losses in mussel diversity near these structures. Due to ecological impacts and safety concerns, several dams in the watershed have been removed or prioritized for removal. In anticipation of the removal of the Carpentersville Dam, the Illinois Natural History Survey conducted baseline mussel surveys in 2021 at three sites—Carpentersville, Algonquin, and an unimpounded reference reach at West Dundee—and repeated surveys in 2025 following demolition of the structure in 2024. Semi quantitative transects and qualitative timed searches were used to document species richness and mussel density. Across all surveys, live mussel richness and abundance were consistently lower at the dam affected sites compared to the free flowing reference site. Short-term post-removal results indicated modest mussel presence upstream of the former Carpentersville Dam; however, the diverse mussel bed at West Dundee and the continued presence of live mussels at the former dam site support the potential for future recolonization. Continued long term monitoring is essential for evaluating mussel recovery and ecological responses to restored connectivity in the Fox River.

Assessing Macroinvertebrate Communities as Indicators of Ecological Recovery in Urban and Agricultural Streams

Tarquin, Taryn; Skowronski, Ryan; Roth, Daniel; Colombo, Rob; Effert-Fanta, Eden

Urbanization and agricultural activities have significantly altered freshwater ecosystems, resulting in biodiversity loss and impaired ecosystem functions. To address these issues, stream restoration projects were completed in Saline Branch and Kickapoo Creek, two streams located within East-Central Illinois. Restoration efforts included riffle structures, riparian vegetation enhancements, and pool scouring keys to support aquatic biodiversity. This study examined both the short-term and long-term ecological responses to various restoration efforts using macroinvertebrates as bioindicators. Both sites have had varying post-restoration time frames, allowing for comparisons of ecological responses over time. Metrics such as Qualitative Habitat Evaluation Index (QHEI), taxonomic richness, and Macroinvertebrate Index of Biotic Integrity (mIBI) were analyzed.

Across both sites, QHEI scores generally improved post-restoration, but variations across macroinvertebrate responses were observed. At Saline Branch, non-metric multidimensional scaling (NMDS) indicated shifts in community composition and changes in functional feeding groups. Kickapoo Creek showed a short-term increase in sensitive taxa following restoration, but this shift was not sustained long-term. These findings highlight the challenges of stream restoration, especially the immediate impacts of construction-related disturbances. Although we did not observe improvements in sensitive taxa (e.g., %EPT) and diversity, the results emphasize the importance of long-term monitoring to capture delayed ecological responses. Further, site-specific factors such as land use and restoration age may influence biological integrity. Understanding the mechanisms driving community changes is vital for advancing stream restoration and improving habitat heterogeneity, biodiversity, and ecosystem function in watersheds impacted by agriculture and urbanization.

Invasive silver carp growth chronologies: evaluation of harvest success and drivers of annual growth

Vinavich, Kaiden; Lamer, James, Solomon, Levi, Williams, Jesse, Roberts, Madison, Prostko, Rachel, Harris, Brandon, Lenaerts, Allison, Tripp, Sara, Sterling, Edward, Sullivan, Christopher, Weber, Michael

Invasive carp, specifically silver carp (*Hypopthalmichthys molitrix*), have negatively impacted the food webs and native biota of the Mississippi River Basin since their introduction in the early 1970s. Harvest is the primary management strategy to reduce silver carp populations, however, due to their complicated life history (e.g., long-range movements and sporadic production and recruitment) and absence of robust population estimates, additional assessment tools are needed to help evaluate the effectiveness of harvest. Therefore, I am exploring variation in silver carp annual growth as a surrogate for density in response to management and removal efforts. This will be accomplished through two main objectives: 1) characterize silver carp annual growth within discrete, spatially-explicit management units across a spectrum of invasion densities in the Mississippi River Basin and 2) quantify how intrinsic and extrinsic factors influence silver carp growth, with an emphasis on how growth responds to management (harvest). I will evaluate growth through incremental lapillus otolith measurements from silver carp across reaches of the Mississippi River, Illinois River, Missouri River, Ohio River, and select tributaries collected from 2014-2024 (n=50 per species-reach-year combination). Mixed effects modeling will be used to estimate annual growth in response to management and external drivers, while adjusting for allometric and individual-specific growth intraclass variation. This work will yield silver carp master chronologies across their invaded range, capturing several stages of their invasion throughout the Mississippi River Basin and hopefully serve as a baseline for future collections and a tool to help evaluate management success.

Assessing the Long-Term Temporal Trends of the Wabash River Fish Assemblage

Wertman, Olivia; Roth, Daniel; Effert-Fanta, Eden; Colombo, Robert

The Long-Term Survey and Assessment of Large River Fishes, LTEF, assesses fish populations in the large rivers of Illinois. Programs like this are vital for understanding changes occurring in our rivers due to threats such as dams, channelization, fertilizer and pollutant runoff, and invasive species. In this study we aimed to assess how the fish community of the Lower Wabash River changed from 2010-2025. We followed LTEF protocol and performed annual direct current boat electrofishing surveys during three, six-week time periods from June to October collecting fish from the lower 322 km of the Wabash River, separated into five reaches and 114 random sites. We identified and measured the collected fishes. We described functional changes to the fish community by separating the collected fishes into trophic guilds that were defined using the USGS Fish Traits Database. In previous analysis, we found an overall decreasing trend in the Wabash River fish community, which was significant in the benthic invertivore and omnivore guilds. Several important fish species in the Wabash River showed significant decreasing trends, including Channel Catfish (*Ictalurus punctatus*), a major recreational and commercial sportfish in the river. The native planktivore Gizzard Shad (*Dorosoma cepedianum*) were also significantly decreasing, possibly due to increases in invasive planktivores. The only significantly increasing trend was found in Longnose Gar (*Lepisosteus osseus*). Data like this are important for understanding the state of large river fish communities, assisting with conservation and management efforts, and show the need for continued monitoring of our rivers.

Comparison of sampling techniques for small fish stress physiology

Wilcoxen, Travis; Vignos, Alyssa; Abell, Katie; Travis, Chase

While overall population density and viability assessment is important for determining the status of fish populations, assessing non-lethal impacts of environmental conditions on fish physiology is also an important tool in conservation research. Many traditional sampling methods for small fish are lethal, which works in opposition to the goal of conserving the species. We have used different mildly invasive (anesthesia and blood sampling) and non-invasive (water-borne hormone assessment) techniques with multiple species over the past 6 years to assess stress physiology in small stream-dwelling fish. This presentation will explore the pros and cons of each of using these methods.