American Fisheries Society

North Central Division
Rivers and Streams Technical Committee
March 28-29, 2023

Time	Description	Speaker
13:00 – 13:15	**WELCOME/INTRODUCTIONS**	Brett Roberg Sara Schmuecker
	KEYNOTE SPEAKER	
13:15 – 13:45	A Long-Term Vision for an Ecologically Sound Platte River	Andy Cavan
14:00 – 14:15	Population Demographic Rates of Northern Pearl Dace in the Nebraska Sandhills Ecoregion	Joe Spooner
14:15 – 14:30	Differential vulnerability of native and non-native mollusks to predation by juvenile Black Carp	Jeremy Tiemann
14:30 – 14:45	Interactions of soil properties and land usage on the distributions of nitrates and neonicotinoids in Nebraska streams	Tom Heatherly
14:45 – 15:00	Mississippi River Lock and Dam 22 Fish Passage	Mark Cornish
15:00 – 15:15	Identifying suitable habitat for invasive carp spawning in the Big Sioux River using habitat suitability models	Britney Hall
15:15 – 15:30	Effects of Flow Release Volume and Timing on Freshwater Mussel Recruitment	Annika Richards
15:30 – 15:45	Reproductive Phenology of Native and Invasive Fishes in Northwestern Iowa Tributaries	Annika Preheim
15:45 – 16:00	Effects of Experimental Flows on Downstream Lotic Fish Reproduction	Erik Griffen
16:00 – 16:30	The Use of “Excess Flow” in Nebraska’s Waterways	Brett Roberg
16:30 – 17:00	**Open Discussion**	
17:00 – 17:45	Travel back to the hotel (in your own vehicles)	
17:45 – 18:00	Bus transport back to the Conservation Club	
18:00 – 22:00	Bernie Schonhoff Memorial Fish Fry and Evening Social	
22:00 – 22:30	Bus Transport back to hotels	

BUSINESS MEETING (DAY 2)

08:00	Call to order
	Treasurers Report
	Old Business
	New Business
	State Chapter Reports
09:45	Adjourn Meeting

09:45 – 10:00	**Break**	
10:00 - 10:15	Silver Carp Movement Dynamics within Upper Mississippi River Basin Tributaries	Brandt Boekhout
10:15 – 10:30	Invasion Highway or Ecological Trap? Use of Small Streams by Invasive Carp	Seth Renner
10:30 – 10:45	Conditions Associated with the Occupancy of Four Fishes of Greatest Conservation Need in Wadeable Streams and Rivers of Western Iowa	Eli Lagacy
10:45 – 11:00	Big Journeys for Little Fish: The Rapid Range Expansion of Tippecanoe Darter in Illinois	Josh Bruegge
11:00 – 11:15	Fish Community Response to a Stream Restoration in Kickapoo Creek	Alexis VandenBerg
11:15 – 11:30	An Assessment of Channel Catfish Population Demographics in the Lower Wabash River	Valerie Thompson
11:30 – 11:45	Assessment of Biotic Community Response to an Urban Stream Restoration	Sydney McAndrews
11:45 – 13:00	Lunch (leftovers)	

ABSTRACTS

A Long-Term Vision for an Ecologically Sound Platte River

Andrew J. Caven, International Crane Foundation
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The Platte River Valley is a continentally significant ecosystem that serves as a major stopover for migratory waterbirds. It also supports a great diversity of grassland breeding birds, native stream fish, vascular plants, herpetofauna, mammals, pollinators, and aquatic macroinvertebrates. Despite ongoing conservation efforts since the mid-1970s the ecosystem remains largely conservation dependent and an increasing number of species across taxa are being considered at risk of regional extirpation. We convened a working group of >18 individuals representing >9 organizations including representatives from non-profit conservation organizations, universities, and state and federal natural resource agencies to develop a long-term vision for an ecologically sound Platte River Valley (PRV). We met in groups of varying size for >170 hours throughout a more than 3-year period and developed conservation priorities and objectives using a landscape design process. Landscape design is an interdisciplinary conservation planning process that incorporates components of landscape ecology and social dimensions of natural resources with the explicit intention of improving conservation implementation. Our working group defined broad "future desired conditions" associated with hydrology and habitat conservation including increasing the extent, connectivity, and resilience of seasonal and temporary wetlands, warm-water slough wetlands, lowland tallgrass prairies, and ecologically functional braided river habitats as well as improving water quality and hydrological functionality within the riparian ecosystem. We clearly defined "processes" that maintain ecological diversity within the PRV landscape as well as "drivers" which are human influences that impede desirable ecological processes. We also proposed "needed actions" to mitigate the undesirable drivers as well as related "quantitative goals" related to flow and habitat conservation, engineering solutions, research objectives, management aims, funding targets, and outreach efforts. We specified >40 groups as "key audiences" to engage with to achieve our conservation goals, including several community-based organizations. We used the best available science to set our goals, but reasonable uncertainty often remained as to the ultimate impacts of achieving our goals, highlighting the need for continued regional research regarding a diversity of taxa and ecosystem processes. Conservation efforts that are ecosystem- rather than species-centric will likely improve long-term outcomes and be more resilient to future stressors. Restoring hydro-geomorphological processes and improving habitat connectivity are essential to advancing ecosystem function. Finally, sustainable conservation efforts will need to consider the desires of the human community and actively engage partners whose interests align with conservation aims. Success in this river system could indicate a path forward for ecosystems facing similar challenges.

POPULATION DEMOGRAPHIC RATES OF NORTHERN PEARL DACE IN THE NEBRASKA SANDHILLS ECOREGION

Joe Spooner and Jonathan Spurgeon, Nebraska Cooperative Fish and Wildlife Research Unit; School of Natural Resources, University of Nebraska-Lincoln; and Nebraska Game and Parks Commission
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Capture-Mark-Recapture (CMR) studies are used to estimate demographic parameters including survival, movement, and population size. Some CMR study designs require unique identification of individuals, and their use has been limited for small-bodied fishes (i.e., < 150 mm TL) given constraints on tag size and survivability of individuals post tagging. As such, information regarding changes in demographic parameter in response to environmental perturbations remains elusive for a large number of freshwater fishes. Anthropogenic alteration including stream channelization is extensive in headwater streams of the Sandhills Ecoregion, Nebraska. Through reduction in habitat heterogeneity, it is hypothesized that channelization will negatively influence demographic parameters of small-bodied fishes in the Sandhills Ecoregion, Nebraska. The Northern Pearl Dace *Margariscus nachtriebi* is a Tier II species at-risk in Nebraska generally found in headwater streams of the Sandhills Ecoregion, Nebraska. Currently limited evidence exists regarding their demographic status. Therefore, a CMR robust study design was applied through use of novel p-Chip Microtransponder tags to determine demographic rates of Northern Pearl Dace in headwater streams with and without channelized reaches. The results of this study will inform managers of the effects of channelization on demographic rates for Northern Pearl Dace while giving insight to potential habitat enhancement projects.

DIFFERENTIAL VULNERABILITY OF NATIVE AND NON-NATIVE MOLLUSKS TO PREDATION BY JUVENILE BLACK CARP

Jeremy Tieman, Anthony P. Porreca, Andrew Runyon, Steven E. Butler, and Joseph J. Parkos III University of Illinois Urbana-Champaign, Illinois Natural History Survey
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The Black Carp (*Mylopharyngodon piceus*), a molluscivorous xenocypridin native to east Asia, has become established in the Mississippi River basin. However, the vulnerability of North American snails and bivalves to Black Carp predation remains unknown, especially as it relates to the juvenile life stage when these predators transition to mollusk prey. To address this knowledge gap, we conducted a series of feeding experiments to assess the vulnerability of native and non-native mollusks to predation by age-0 and age-1 Black Carp. In the first experiment, age-0 Black Carp were tested with native unionid *Hamiota perovalis*, native pleurocerid *Elimia livescens*, and native physid *Physella* sp., while Age-1 Black Carp were tested with *Elimia*, native unionids *Lampsilis cardium* and *Lampsilis cariosa*, native sphaeriid *Sphaerium* sp., and non-native cyrenid *Corbicula fluminea*. Juvenile Black Carp readily attacked and consumed shelled prey. Age-1 Black Carp displayed a wider range of feeding capabilities

than age-0, easily consuming *Elimia* along with *Lampsilis* and *Sphaerium* sp. The only prey taxon that age-1 Black Carp struggled to crush and consume was *Corbicula*, which had the thickest and widest shells relative to predator gape of all prey tested. In the second experiment, we quantified size-specific vulnerability of native (*Physella* sp., *Elimia livescens*, and *Sphaerium* sp.) and non-native (*Dreissena polymorpha*, *Corbicula fluminea*, and *Cipangopaludina chinensis*) mollusks to predation by juvenile Black Carp. Results from this experiment showed that *Physella* sp. was vulnerable across all tested sizes, byssal thread attachment by *Dreissena* reduced vulnerability, and interspecific differences in size-specific vulnerability were associated with shell thickness and shape. Our experiments support the contention that small mollusks are susceptible to predation by juvenile Black Carp but highlights how prey-specific physical properties, such as shell size and strength, could drive differential predation pressure on mollusk populations as the invaded range of Black Carp expands.

INTERACTIONS OF SOIL PROPERTIES AND LAND USAGE ON THE DISTRIBUTIONS OF NITRATES AND NEONICOTINOIDS IN NEBRASKA STREAMS

Tom Heatherly, Nebraska Department of Environment and Energy

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Rivers are exposed to a large variety of potential stressors. In this talk I will discuss how agriculture and soil structure have interacted to influence legacy nitrate concentrations in Nebraska streams. In particular, row crop cultivation on soils with high infiltration appear to have resulted in stream water nitrates at exceptionally high concentrations that continue to increase. I will also discuss the occurrence and potential toxicity of neonicotinoids, fungicides, and other pesticides in Nebraska stream water and sediments. Early results suggest that the neonicotinoids clothianidin and imidacloprid occurred at concentrations exceeding lethal concentrations to invertebrates in stream water and that the pyrethroid insecticide bifenthrin can occur at lethal concentrations in stream sediments.

MISSISSIPPI RIVER LOCK AND DAM 22 FISH PASSAGE

Mark Cornish, Technical Specialist, U.S. Army Corps of Engineers

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The Lock and Dam 22 Fish Passage Project is the first of a series of projects to restore longitudinal habitat connectivity for the many species of native migratory fishes in the Mississippi River. The Corps of Engineers is designing a 200’ wide rock ramp fishway through the Navigation and Ecosystem Sustainably Program authority. Lock and Dam 22 is located at river mile (RM) 301.2 near Saverton, Missouri. The project will increase the opportunity for upriver fish passage and serve as the platform to evaluate, learn from, and adapt future fish passage projects using lessons learned from this initial project. Topics covered include fishway design and monitoring, highlighting the collaborative efforts between State and Federal natural resource agencies to advance this project.

IDENTIFYING SUITABLE HABITAT FOR INVASIVE CARP SPAWNING IN THE BIG SIOUX RIVER USING HABITAT SUITABILITY MODELS

Britney M Hall and Michael J Weber, Iowa State University

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Invasion of nonindigenous species is one of the leading threats affecting the decline of native species in the United States. Two of the most recent and detrimental aquatic invaders are Bighead Carp (*Hypophthalmichthys nobilis*) and Silver Carp (*Hypophthalmichthys molitrix*), collectively known as invasive carp. Understanding where invasive carp reproduce could be useful for predicting population expansion and developing targeted management efforts. Thus, our objectives were to 1) estimate the spawning habitat suitability of invasive carp in the Big Sioux River using suitability models based on habitat preferences of river length, sinuosity, presence of turbulent hardpoints, and water flow and 2) use larval data collected from the Big Sioux River to ground truth our models by back calculating spawning dates to identify where reproduction likely occurred. We modelled the Big Sioux River by importing the 2021 National Agriculture Imagery Program (NAIP) color infrared imagery into Geographic Information Systems (GIS) to extract the main channel of the river. We divided the river into nine 25 km segments to represent the minimum length required for eggs to drift before hatching and used the imagery as a reference when digitizing turbulent hardpoints and calculating sinuosity and gradient. Our model resulted in an overall suitability score ranging between the lowest segment having <1% suitable habitat and the highest rated segment having 87% suitable habitat for reproduction. We collected invasive carp larvae in the Big Sioux River downstream of a bridge in the middle of segment six suggesting they were spawned upstream in segment three that we identified as 43% suitable reproductive habitat. We did not capture invasive carp larvae downstream of the two other sampling sites on the Big Sioux River that our model identified as 87% suitable and <1% suitable. Our results demonstrate invasive carp spawning habitat is highly variable throughout the entirety of the Big Sioux River due to differences in geomorphic and hydrological characteristics in each segment. Future work will expand to model habitat suitability for invasive carp reproduction throughout Iowa.

EFFECTS OF FLOW RELEASE VOLUME AND TIMING ON FRESHWATER MUSSEL RECRUITMENT

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Stream hydrology is one of many factors responsible for the abundance and diversity of organisms in freshwater ecosystems. Impoundments can alter these seasonal flows which can be detrimental to the ecology of the stream. Freshwater mussels are sensitive to variation in flows and habitat where the timing and volume of peak flows can affect recruitment. This study aims to determine any differences in age-class structure between free-flowing and impounded systems as well as to assess the effects of flow volume and timing on freshwater mussel recruitment. We

collected *Lampsilis cardium* from the Des Moines River upstream (n=105) and downstream (n=108) of Red Rock Dam, which is a medium-sized dam with a hydroelectric facility managed by the U.S. Army Corps of Engineers. We then thin-sectioned shells and estimated ages to assess historical variation in recruitment over time. Moving forward, recruitment and age-class structure above and below Red Rock Dam will be analyzed along with historical flow data from monitoring stations on the Des Moines River to assess any differences between free-flowing and impounded reaches and the effects of flow volume and timing on recruitment. A multiple linear regression will be used to determine what aspects of flow volume and release timing affect recruitment as well as how they specifically influence freshwater mussel populations. We hypothesize recruitment will be higher during years with extended periods of high-flow throughout the spring and summer which is a critical period in the reproductive process of *Lampsilis cardium*. We also hypothesize recruitment variability will be higher below Red Rock Dam than above the dam due to disruption in seasonal flows downstream of the impoundment. Our results will provide guidance on the management of flow release volume and timing for the benefit of freshwater mussel recruitment.

REPRODUCTIVE PHENOLOGY OF NATIVE AND INVASIVE FISHES IN NORTHWESTERN IOWA TRIBUTARIES

Annika E. Preheim and Dr. Michael J. Weber, Iowa State University

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Anthropogenic modification of rivers in the Midwestern United States can favor tolerant native species and adaptable invaders such as invasive carps (*Hypophthalmichthys nobilis, H. molitrix,* and *Ctenopharyngodon idella*). It is not known if these assemblage shifts are due to reproductive limitations. Understanding the effects of habitat degradation on fish reproduction is vital for prioritizing restoration efforts. We sampled ichthyoplankton in four Missouri River tributaries (Big Sioux, Floyd, Little Sioux, and Boyer rivers) from April to August 2022 to assess the extent of native and invasive fish reproduction across a range of habitats. We collected 5,172 larvae, primarily invasive carp and native Cyprinidae, Catostomidae, and Percidae. We detected larvae in all rivers on all sampling dates, in flow between 0.30 m^3/sec and 149.50 m^3/sec and temperatures between 12.7 and 31.0°C. Native fish communities were homogenous among rivers but varied longitudinally within each river; *Cyprinidae* was associated with lower reaches, *Catostomidae* with middle reaches, and *Percidae* with upper reaches. We captured invasive carp larvae in the middle reach of the Big Sioux River on June 15th and the upper Little Sioux and lower Boyer river reaches on July 14th. Invasive carp larval densities varied by three orders of magnitude among these three detections, from 4 to 6,300 fish/100 m^3. Our findings indicate northwestern Iowa rivers are suitable spawning grounds for invasive carp and are being used as such. We did not detect invasive carp in the Floyd River, potentially due to habitat or water quality limitations; however, the Floyd still supported spawning populations of four native fish families. The presence of native taxa at all sites indicates native fish reproduction may be more plastic than that of invasive carp and confirms the resilience of many prairie stream fishes in the face of disturbed habitat.

EFFECTS OF EXPERIMENTAL FLOWS ON DOWNSTREAM LOTIC FISH REPRODUCTION

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Large rivers have been extensively altered to accommodate anthropogenic uses. Dam construction on large rivers remodels flow and temperature regimes that are important for lotic fish reproduction. Some reservoirs have begun implementing experimental flows to provide adequate discharge to assist fish reproductive success. Our objective was to evaluate how environmental factors, such as water temperature and discharge, influence larval *Catostomidae* and *Scianeidae* production in response to water releases downstream of a reservoir. We sampled ichthyoplankton every two to seven days from April through June on Des Moines and Iowa rivers during 2014, 2015, 2021, and 2022. Peak May discharge across years ranged from 57 to 594 m^3/s. Peak *Sciaenidae* abundance occurred between late May and mid-June with water temperatures 18-26°C and discharge 100-733 m^3/s. *Sciaenidae* catches were highest at the furthest upstream and downstream sites. Across the four years, *Catostomidae* larval abundances were highest in 2022 with abundances peaking from mid-May through late-June with water temperatures 16-25°C and discharge 87-412 m^3/s. Across the four sampling years, *Sciaenidae* and *Catostomidae* abundances were highest in 2022 with higher average discharge and lowest in 2014 with lower average discharge. *Catostomidae* catches were highest at further downstream sites on the Des Moines River, but highest at sites furthest upstream on the Iowa River. Water temperature in conjunction with discharge may influence *Catostomidae* and *Sciaenidae* reproductive success as the highest catches occur during years with higher average river discharge coupled with adequate spawning temperatures. Conversely, years with lower average discharge yielded lower catches and limited reproduction. Our results provide valuable information regarding the timing and magnitude of water releases to benefit downstream fish reproduction.

THE USE OF "EXCESS FLOW" IN NEBRASKA'S WATERWAYS

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Streams and rivers throughout the country go through periods of flooding and desiccation as part of their natural cycle. Collectively, these patterns help to maintain high quality habitats that support a wide variety of biodiversity, while also allowing these ecosystems to have greater ecological resilience against future threats. However, with growing concerns related to climate change, urbanization, water demands for agriculture, etc. these natural patterns become manipulated to promote a more stable water supply. In this presentation, we will share a case study of a proposed trans-basin diversion project in Nebraska, where water managers aim to divert "excess flows" from the Platte to the Republican River Basin. While these river basins have never been linked before, this proposed action may be a tool that water managers across the

country begin to investigate in order to meet growing water demands. In addition, the provided information will be used to set the stage for the Open Discussion session to spark conversation and feedback from RSTC participants about trans-basin diversions and the use of "excess flows."

SILVER CARP MOVEMENT DYNAMICS WITHIN UPPER MISSISSIPPI RIVER BASIN TRIBUTARIES

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Rivers are important movement corridors for fishes that allow for population connectivity. Within Iowa, Silver Carp (*Hypothalmichthys molitrix*) have been documented in tributaries of the Upper Mississippi River (UMR) including the Des Moines, Iowa, and Cedar rivers. However, the spatial and temporal extent Silver Carp use these systems is largely unknown, with implications for metapopulation dynamics and control strategies. Our objectives were to 1) identify individual-based movement patterns, 2) analyze population structure within the study area, and 3) identify trends in spatial and temporal use of tributaries. Between Fall 2021 and Spring 2022, we deployed 32 acoustic receivers and implanted 142 Silver Carp with acoustic transmitters throughout the Des Moines, Iowa, and Cedar rivers. In the Des Moines River, 46% of the individuals downstream of Ottumwa Dam moved downstream to the Mississippi River confluence. Of these fish, 44% transitioned back upstream to Ottumwa Dam and then downstream to the confluence a second time within 13 months. Conversely, only 8% of Silver Carp tagged upstream of Ottumwa Dam moved downstream passed the dam to the Mississippi River confluence. In the Iowa River, only 19% of Silver Carp transitioned to the Mississippi River confluence while 42% of Silver Carp in the Cedar River transitioned to the Mississippi River confluence. Downstream movement events occurred in the Des Moines River during late October - early November 2021, followed by upstream movement events in late March - early April and late April - early May 2022. In the Cedar River, a downstream movement event occurred between late August - early September 2022. All movements were associated with an increase in discharge. Our results demonstrate spatial and temporal variation in Silver Carp tributary movements and fidelity that will help improve control strategies in the Upper Mississippi River basin.

INVASION HIGHWAY OR ECOLOGICAL TRAP? USE OF SMALL STREAMS BY INVASIVE SPECIES

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Small tributaries of river systems can serve as invasion corridors for fishes due to their lack of impoundments and high connectivity with various aquatic systems. However, movement within these systems may be limited due to the dynamic flow regimes and extreme environmental

conditions that can be exhibited on a seasonal basis, resulting in ecological traps for fishes that use these systems. Silver and Bighead Carp are two highly mobile invasive fishes that have expanded their ranges to aquatic systems of various sizes by using adaptive movement behaviors and extreme environmental tolerances. Our objectives were to 1) assess the seasonal use of small tributaries in the Little Sioux River Basin and 2) evaluate the effects of environmental variables on tributary residency on a system-by-system basis. We deployed an array of 26 acoustic receivers and tagged 67 Silver Carp and 14 Bighead Carp with acoustic transmitters in Spring 2022 to evaluate the effects of temporal, environmental, and biological variables on their movement patterns. The percentage of tagged individuals detected within Little Sioux tributaries was highest during June and July (51%). Additionally, residency time of individuals in a majority of the tributaries increased throughout Summer and Fall 2022 when water levels were low, suggesting movement between tributaries and the Little Sioux River may be limited due to the reduction in habitat connectivity amongst these systems on a seasonal basis. Our results will provide critical information regarding the contribution of small tributaries to invasive carp range expansion and their potential to form ecological traps during various temporal periods. This information will help guide future containment efforts by directing attention to aquatic systems that are vulnerable to invasion.

CONDITIONS ASSOCIATED WITH THE OCCUPANCY OF FOUR FISHES OF GREATEST CONSERVATION NEED IN WADEABLE STREAMS AND RIVERS OF WESTERN IOWA

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Stream fishes in the Missouri River basin of western Iowa have been exposed to significant levels of habitat degradation through channel modifications and land-use changes. These changes have resulted in population declines of many stream fishes with several being listed as Species of Greatest Conservation Need (SGCN). These species are rare and oftentimes cryptic, making them hard to study and limiting inference on where and under what conditions they occur, particularly given imperfect detection. Knowing how sampling methodologies and environmental variables affect detection and occupancy of these species is important for the subsequent management of these imperiled stream fishes. Between May – October 2022, we sampled 36 2nd – 5th order stream sites in the Missouri River basin, Iowa using backpack electrofishing and seining. We captured 36,403 individuals of 43 species, including four SGCN's: Suckermouth Minnow (Phenacobius mirabilis), Southern Redbelly Dace (Chrosomus erythrogaster), Blackside Darter (Percina maculata), and Hybognathus spp. We collected a total of 279 SGCNs at 11 sampling sites. Occupancy (ψ) models indicated detection (p) was higher for SGCN fishes using electrofishing ($p = 0.629$) compared to seining ($p = 0.317$). Suckermouth Minnow occupancy probability increased with increasing stream order and decreasing stream depth indicating they were found more often in larger streams with available shallow habitat. Limited detection events hampered robust modeling for other species. However, preliminary models suggest Blackside Darter occupancy and detection may increase with increasing stream width and Southern Redbelly Dace detection may

decrease with increasing turbidity. We plan to collect more data at additional sites in 2023 to obtain more robust occupancy estimates. Our results suggest electrofishing may be more efficient at detecting rare and/or cryptic fishes in western Iowa rivers than seining and identified possible habitat associations of imperiled fishes.

BIG JOURNEYS FOR LITTLE FISH: THE RAPID RANGE EXPANSION OF TIPPECANOE DARTER IN ILLINOIS

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The Tippecanoe Darter *Nothonotus tippecanoe* was discovered in the Vermilion River (Wabash River drainage) of Illinois in 2020, representing the first verified occurrence within the state. During regular biannual fish community sampling in the Vermilion River in 2021 and 2022, we noticed a substantial increase in *N. tippecanoe* detections. In October 2022, we conducted targeted sampling for *N. tippecanoe* in riffles of the Vermilion River as well as its major tributaries to determine the extent of their range and population expansion. We examined the spatial gradient of darter densities throughout their Illinois range, as well as patterns of microhabitat use. Throughout the species' distribution, *N. tippecanoe* has expanded its range due to improvements in water quality. The Vermilion expansion is likely a result of improving physicochemical conditions and connectivity following two low-head dam removals in the basin.

FISH COMMUNITY RESPONSE TO A STREAM RESTORATION IN KICKAPOO CREEK

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In the midwestern United States, streams are affected by a variety of anthropogenic disturbances which alter the structure and function of instream biotic communities. To mitigate these disturbances, stream restorations are implemented to increase habitat quality and ultimately improve the biotic integrity of stream ecosystems. The objectives of our study were to examine the long-term effects of an instream restoration of Kickapoo Creek (Coles County, IL) on fish community structure and habitat quality. From 2009-2015 we sampled Kickapoo Creek using two different gears, the AC-electric seine and the pulsed-DC barge. In 2021 and 2022 we sampled fish communities in both restored and control reaches of the Kickapoo Creek using pulsed-DC barge electrofishing. Habitat quality was assessed at each site using the Qualitative Habitat Evaluation Index (QHEI) following Illinois Environmental Protection Agency (IEPA) guidelines. Although habitat heterogeneity and quality increased immediately following restoration, it took several years to see a shift in fish community structure and abundance, and IBI scores did not reach a maximum until six years post-restoration. Preliminary data from our long-term assessment of Kickapoo Creek suggests the stream restoration continues to have positive effects on fish communities and

habitat quality. Due to the delayed response of fish communities throughout several other post-restoration monitoring studies and the Kickapoo Creek study, researchers may find it beneficial to return to restored sites periodically.

AN ASSESSMENT OF CHANNEL CATFISH POPULATION DEMOGRAPHICS IN THE LOWER WABASH RIVER

Valerie Thompson, Eastern Illinois University

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Channel Catfish *Ictalurus punctatus* are recreationally and commercially important in the Midwest, and management in large rivers promotes self-sustaining populations to provide quality fishing opportunities. This research focuses on Channel Catfish in the Wabash River. The lower 322 kilometers form the boundary between Illinois and Indiana, and in 2015 the two jurisdictions updated catfish harvest regulations to employ congruent management strategies. Since the regulations were changed, no study specifically targeting Channel Catfish on the Wabash has occurred. Data collected by Eastern Illinois University as part of the Long-Term Survey and Assessment of Large River Fishes in Illinois (LTEF) program over the past decade show declines in CPUE and mean length of Channel Catfish in the Wabash. These trends could be an indicator of larger environmental or ecological shifts and thus warrant further investigation. Therefore, the purpose of this study is to investigate current Channel Catfish population dynamics in the Wabash River, including relative abundance, size and age structure, condition, and growth/mortality rates. We used a multiple-gear approach consisting of hoop-netting and boat electrofishing to sample catfish during the spring, summer, and fall of 2022. Preliminary results show increases in mean CPUE and mean length compared to previous studies, but the age structure shows several weak or missing age classes. This could be due to gear inefficiencies, or indicate larger problems within the population due to changing environmental conditions. Ultimately, we will use findings from this project to collaborate with the Illinois Department of Natural Resources and determine if current management strategies are sufficient to maintain the population.

ASSESSMENT OF BIOTIC COMMUNITY RESPONSE TO AN URBAN STREAM RESTORATION

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Urban streams are subject to habitat degradation due to their proximity to human activity, including release of hazardous chemicals into the environment that threaten the health of both human and natural biota. Toxic levels of ammonia were discharged into the Saline Branch in Urbana, Illinois, in 2002, leading to a 16-kilometer fish kill. The injury to natural resources on the Saline Branch resulted in compensation funds for stream restoration. Fish surveys were conducted

in the tentative treatment zones beginning in 2013 and repeated five times in the years before restoration construction. Habitat monitoring and aquatic macroinvertebrate surveys were also conducted in three separate years before restoration. Construction of instream rock structures, bank stabilization, and vegetation enhancements were completed in 2020. Fish, aquatic invertebrate, and habitat surveys were conducted during 2021, 2022, and will be conducted in 2023. The purpose of this study is to understand the impacts of habitat restoration in an urban stream on the biotic diversity and assemblage of fish and invertebrates. Species richness and diversity indices were calculated to assess stream community changes before and after restoration in the Saline Branch as a metric of restoration success. In addition, fish and macroinvertebrates were classified into trophic guilds and functional feeding groups to understand how restoration has altered trophic structure using non-metric multi-dimensional scaling plots. Monitoring aquatic restoration is critical to our collective understanding of effective stream enhancement. Findings from this project will be used to collaborate with the Illinois Department of Natural Resources to understand how urban stream restoration projects modify habitat heterogeneity, biodiversity, and aquatic ecosystems.