&

Illinois AFS

Illinois Chapter of the American Fisheries Society

Joint Annual Conference

March 16th - 18th, 2022

I-Hotel & Conference Center
Champaign, Illinois

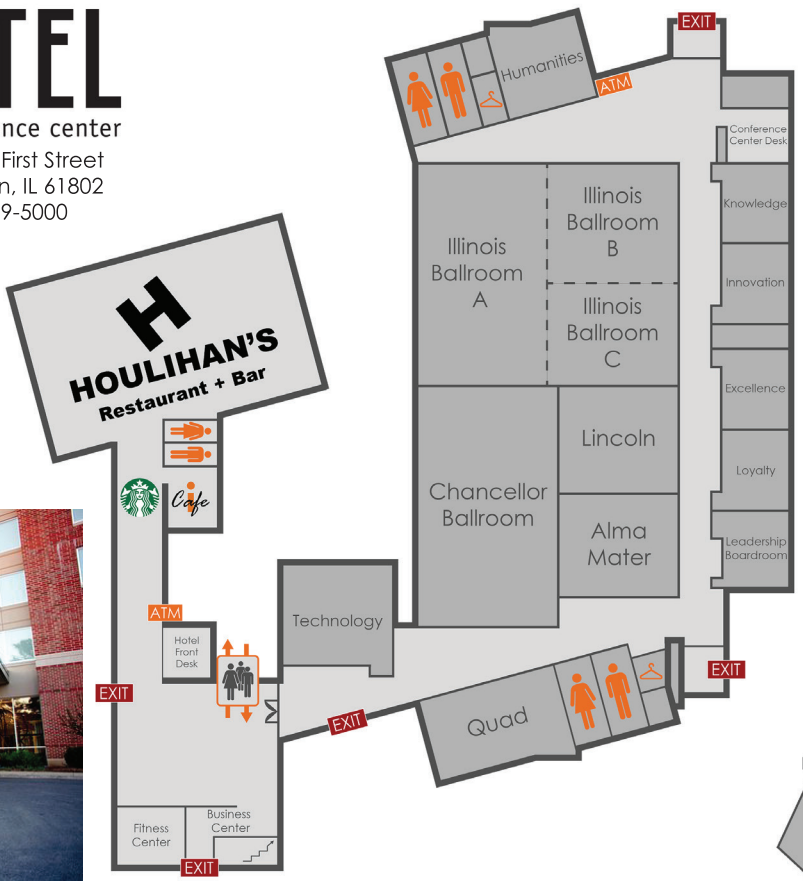
Notes & Reminders

Nametags: Be sure to wear your nametag during the conference. Your nametag is both a 'ticket' for conference meals and events, and helpful for sparking conversations with faces you don't know. Should you lose your nametag simply visit the registration desk and we'll be happy to print off a new one.

Events: If you found the registration desk, you should be set for the day. Day activities (sessions, breaks, and meals) will be held in the Illinois Ballroom. The breakout sessions will be in the Lincoln and Alma Mater Ballrooms. Be sure to visit with the exhibitors to discuss aquatic plant management, water quality enhancement, laboratory testing, monitoring equipment, and much more during the breaks. The poster session will be held in the main atrium.

Conference Layout

HOTEL
and conference center
1900 South First Street
Champaign, IL 61802
(217) 819-5000



Raffle Items: An auction raffle will be held in the Illinois Ballroom; items will be out all day Wednesday and Thursday. Simply place as many tickets in the basket of the items you can't bear leave the conference without. It only takes one ticket to win, but your odds only get better with more tickets! All proceeds go towards the ILMA scholarship fund, and the AFS Student Travel Grants and Student Scholarship Awards, so splurging is beneficial to the minds of the next generation of scientists. Tickets are available at the registration desk throughout Wednesday and Thursday.

Photo Contest: Don't forget to cast your vote for the 2022 ILMA photograph of the year. Photos are on display in near the raffle items. The ballots and ballot box are located with the display. The winner will receive $50 and will be featured on the 2023 conference program.

2022 Conference Agenda

Wednesday March 16th

Registration is open from 10:00am – 5:00pm

12:45-2:00	Opening Remarks and Keynote Session	Illinois Ballroom
2:00-2:30	Break	Illinois Ballroom
2:30-4:00	Concurrent Sessions	Lincoln and Alma Mater
4:00-5:00	AFS Annual Member Meeting	Illinois Ballroom
5:00-6:00	ILMA Annual Membership Meeting	Lincoln Ballroom
7:00-9:00	Student Mentorship Event	Illinois Ballroom

Thursday March 17th

Registration is open from 8:00am – 5:00pm

8:30-10:00	Concurrent Sessions	Lincoln and Alma Mater
10:00-10:30	Break	Illinois Ballroom
10:30-12:00	Concurrent Sessions	Lincoln and Alma Mater
12:00-1:30	Lunch	Illinois Ballroom
1:30-2:30	2nd Keynote Session	Illinois Ballroom
2:30-3:00	Break	Illinois Ballroom
3:00-4:30	Concurrent Sessions	Lincoln and Alma Mater
4:30-6:30	Exhibitors Reception & Poster Presentations	Illinois Ballroom
6:30-9:30	Dinner & Raffles	Illinois Ballroom

Friday March 18th

Registration is open from 8:00am – 12:00pm

8:30-10:00	Concurrent Sessions	Lincoln and Alma Mater
10:00-10:30	Break	Illinois Ballroom
10:30-12:00	Concurrent Sessions	Lincoln and Alma Mater
12:00-1:30	Lunch	Illinois Ballroom
1:30-4:00	Workshops	Lincoln and Alma Mater

Wednesday Afternoon March 17th

1:00-2:00 Joint Keynote [**First Keynote**] ..... Illinois

Cory Suski
University of Illinois

Development of a novel technology to deter the movements of invasive fishes – a new CO2-L?

Invasive species are a hot button topic in fisheries, resource, conservation, stewardship, and public outreach arenas; and rightly so. One of the biggest questions is what can we do to prevent the spread? With regards to the invasive bigheaded carp species that continue to wreak havoc on our Midwest waters, our research group has taken our experience with physiological responses of fishes and used it to develop a novel technology to deter movements. We will discuss this project design, implementation, and some data. We will also discuss the most important part; what it means for our ecosystem now and moving forward in the future.

2:30-4:00 Concurrent [**Session 1**]..... Lincoln and Alma Mater

Room - Lincoln
Theme - Fish Ecology
Moderator – Quentin Jordan

2:30
Using Active Tracking to Assess Diurnal and Seasonal Habitat Use of Bigheaded Carp in the Wabash and White River
Dahlia Martinez, Eastern Illinois University

2:50
Bigmouth Buffalo Movement and Habitat Overlap with Paddlefish and Bigheaded Carp
Bryan Sea, University of Illinois

3:10
Status of Ohio River Crappie Population Vital Rates and Relationships Between Environmental Variables and Year-Class Strength
Joseph Rector, Southern Illinois University

3:30
Catfish and Smallmouth Buffalo Populations in Commercially Versus Non-Commercially Harvested Pools of the Illinois River
Sam Shaick, Illinois Natural History Survey

Room - Alma Mater
Theme - Methods
Moderator – Tim Holt

2:30
Field Data Collection Tools
Kirsten James, Hey and Associates, Inc. & The Conservation Foundation

2:50
Integrated Data Collection Acround the United States
Mark Lynch, YSI/Xylem Inc.

3:10
Statistically Valid Surveys of Lakes and Reservoirs in the United States
Diane Tancl, Illinois Environmental Protection Agency

3:30
Cost-Effective Monitoring Networks: Reducing Field Visits While Maintaining Reliable Data
Miles Corcoran, OTT Hydromet

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Thursday Morning March 17th

8:30-10:00 Concurrent [Session 2]..... Lincoln and Alma Mater

Room - Lincoln
Theme - Watersheds
Moderator – Leonard Dane

8:30
Lake Management Plans 101
Alana Bartolai, Lake County Health Department

8:50
Precision Conservation Managmement Program Summary
Shane Sinclair, Precision Conservation Management

9:10
What is a NARP?
Brian Valleskey, Geosyntec

9:30
Illinois Farm Bureau's efforts toward implementing the Illinois Nutrient Loss Reduction Strategy
Austin Omer, Illinois Farm Bureau

Room - Alma Mater
Theme - Restoration
Moderator – Rob Bryson

8:30
Restoring Aquatic Connectivity in an Illinois River: Changes in Functional Groups of Fishes
Joshua Bruegge, Eastern Illinois University

8:50
Impacts of an Instream Restoration on Fish Communities and Abundance in a Midwestern Stream
Alexis VandenBerg, Eastern Illinois University

9:10
Lake Shoreline Restoration
Keith Gray, Integrated Lakes Management

9:30
Effects of Environmental Pool Management on 25 year of fish in backwaters of Upper Mississippi River Pool 26
Amanda Carter, Illinois Natural History Survey

10:30-12:00 Concurrent [Session 3]..... Lincoln and Alma Mater

Room - Lincoln
Theme - Water Quality
Moderator – Lisa Woolford

10:30
Legacy phosphorus and bank erosion: overlooked contributors to phosphorus loading of Illinois surface waters?
Andrew Margenot, University of Illinois

10:50
Internal loading: yes that monitoring data is useful, here's why, and how to use it
Javan Minor, Northwater Consulting

11:10
Illinois River Turbidity Response to Reduced Vessel Traffic
Taylor Bookout, Illinois Natural History Survey

11:30
In-Lake Phosphorus Mitigation for the Restoration of Impaired Lakes
Pamela Dugan, EutroPHIX

Room - Alma Mater
Theme - Fish Habitat
Moderator – Blake Ruebush

10:30
Fish and prey resources in reservoir coves with and without offshore artificial habitat structures
Dakota Radford, Kaskaskia Biological Station

10:50
Evaluation of artificial nest structures and in-stream habitat of Flathead Catfish in the Rock River using radio telemetry
Spencer Phillips, Illinois Natural History Survey

11:10
Behavioral response of three sportfish species to artificial habitats
Michael Nannini, Illinois Natural History Survey

11:30
Ecosystem Response to a Whole-reservoir Coarse Woody Habitat Addition
Carly Fenstermacher, University of Illinois

Thursday Afternoon March 17th

1:30-2:30 Joint Keynote [**Second Keynote**] .....Illinois

Megan Gunn

Illinois-Indiana Sea Grant and the Department of Forestry and Natural Resources at Purdue University

Engaging Non-Traditional Audiences

Megan will share her path into natural resources and fisheries and why she is on a mission to show youth of color that there are people that look like them in the natural resources field through ***The Familiar Faces Project****, a program designed to increase the interest in natural resource science careers by bridging the gap between underrepresented minority youth communities and professionals in the field.*

3:00-4:30 Concurrent [**Session 4**]..... Lincoln and Alma Mater

Room - Lincoln
Theme - Social Science of AIS & Fisheries
Moderator – Alana Bartolai

3:00
Overcoming barriers to invasive species prevention behaviors through values-framed outreach messages
Elizabeth Golebie, University of Illinois

3:20
Online Boater Led Check-In/Check-Out Alternative to In-Person Inspections: A COVID-19 Response Pilot
Edgar Rudberg, CD3 General Benefit Corporation

3:40
Trust, values and behavior regarding the spread of aquatic invasive species among recreational boaters in Illinois
North Joffe-Nelson, Unversity of Illinois

4:00
Testing How Social and Ecological Factors Influence Preference and Satisfaction for Panfish Angling Groups
Thompson Hill, Illinois Natural History Survey

Room - Alma Mater
Theme - Mussels & Invasive Carp
Moderator – Brian Valleskey

3:00
Spatial autocorrelation of assemblage composition reveals scale of mussel metacommunities
Brian Metzke, Illinois Department of Natural Resources

3:20
Evaluation of a quantitative PCR screening procedure for rapid ID of invasive carp eggs and larvae in ichthyoplankton samples
Steven Butler, Illinois Natural History Survey

3:40
Trial applications of Earth Tec QZ molluscide for the control of zebra mussel populations in ambient waterways
James Bland, EPS Inc.

4:00
An Experimental Assessment of Size-Specific Mollusk Vulnerability to Juvenile Black Carp (Mylopharyngodon piceus) Predation
Andrew Runyon, University of Illinois

Friday Morning March 18th

8:30-10:00 Concurrent [Session 5]..... Lincoln and Alma Mater

Room - Lincoln
Theme - AIS & Nuisance Species
Moderator – Brian Valleskey

8:30
Canada Goose Management
Vanessa Williams, Wild Goose Chase, Inc.

8:50
Investigating Bigheaded Carp Ichthyoplankton Presence in Tributaries of the Illinois River
Adam Landry, Eastern Illinois University

9:10
Determining how invasive Silver Carp influence trophic structure of native species in the Ohio River
Justin Kowalski, Southern Illinois University

9:30
Diver Assisted Suction Harvesting - New Applications for Managing Starry Stonewort
Keith Gray, Integrated Lakes Management

Room - Alma Mater
Theme - Fish Resiliency
Moderator – Clairie Snyder

8:30
Decreases in wastewater pollutants increased fish diversity of Chicago's waterways
Austin Happel, John G. Shedd Aquarium

8:50
The COVID Pandemic Revealed How Angling for Nesting Bass Impacts Annual Recruitment in a Population
David Philipp, Fisheries Conservation Foundation

9:10
2020 Richland Creek Fish Kill - An overview and a site revisit 1 year later
Ben Lubinski, Illinois Department of Natural Resources

9:30
Fish community Responses to Water Level Fluctuations in Buttonland Swamp, Illinois
Hannah Holmquist, Southern Illinois University

10:30-12:00 Concurrent [Session 6]..... Lincoln and Alma Mater

Room - Lincoln
Theme - Fish Population Ecology
Moderator – Joe Parkos

10:30
Drivers of Fish Growth and Recruitment in Largemouth Bass, Bluegill, and Black Crappie in the Emiquon Preserve
Amber Blackhert, Illinois Natural History Survey

10:50
Resource Use of Bluegill along a Longitudinal Gradient in Five Reaches of the Mississippi River
Shaley Valentine, Southern Illinois University

11:10
Evaluating pectoral spine microchemistry for identifying stocked Channel Catfish (Ictalurus punctatus) and inferring fish size
Morgan Winstead, Southern Illinois University

11:30
Analysis of the effect of habitat type/extent on sampling design parameter estimates
George Balto, Universty of Illinois

Room - Alma Mater
Theme - Species of Concern & Climate Change
Moderator – Nathan Grider

10:30
Vitalogy: The Study of Life in the Vermilion River Basin
Jeremy Tiemann, Illinois Natural History Survey

10:50
Waterway Restoration and Climate Resiliency
David Kraft, Hey & Associates, Inc.

11:10
Assessments of impacts from climate change and agricultural disturbances on fish biodiversity in the Kaskaskia
Qihong Dai, University of Illinois

11:30
Assessing population viability and habitat preference of Eastern Sand Darter in Illinois Running Waters
Sara Ashcroft, Universty of Illinois

1:30-4:00 Workshops ..... Lincoln and Alma Mater

Workshop #1:
Lake and Reservoir Habitat Enhancements: Management, Ecology and Considerations for Implementation

Presented by Anthony Porreca (Kaskaskia Biological Station, Illinois Natural History Survey, University of Illinois at Urbana-Champaign) & Mike Mounce (Former Reservoir Fisheries Biologist, Illinois Department of Natural Resources)

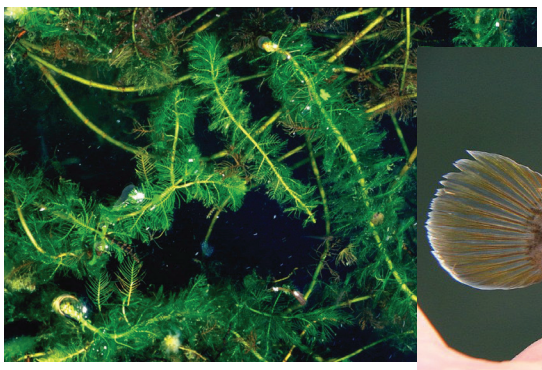
This workshop will provide an introduction to the development and implementation of fish habitat enhancements in lakes and reservoirs. Participants will gain an understanding of the range of considerations that go into the creation and deployment of fish habitat enhancement structures among different ecosystem sizes and ecological contexts, from small ponds to large reservoirs. The workshop will review information on key considerations such as funding opportunities, public involvement, site selection, design of different structures, maintenance of added and existing habitats, and the expected outcomes of habitat enhancements under multiple ecological contexts. Completed and ongoing habitat enhancement projects within Illinois lakes and reservoirs will be used to illustrate these key considerations.

Workshop #2:
Invasive Species

University of Illinois and Illinois Natural History Survey

This workshop will overview the current situation of invasive plants, mollusks and fishes in Illinois lakes and streams. An expert in each type of invasive will share how to identify them and then discuss things that can be done to help manage invasives when they are present and mitigate the spread to other areas. Participants will also be pointed to resources that they can use to further their knowledge. The speakers supporting this workshop are;

- Invasive Fish - Joe Parkos, Ph.D.
- Invasive Mollusks - Sarah Douglass, Jeremy S Tiemann, and/or Rachel Vinsel
- Invasive Plants - Greg Spyreas, and/or Paul Marcum, and/or Valerie Sivicek



Session 1a (Lincoln Room, Wednesday 2:30-4:00)

Dahlia Martinez, Eastern Illinois University
Using Active Tracking to Assess Diurnal and Seasonal Habitat Use of Bigheaded Carp in the Wabash and White River
The prevalence of invasive species is an ever-growing issue in the Midwest. The objective of this study was to assess the seasonal and diurnal movement and habitat use of Silver Carp (Hypophthalmichthys molitrix) in the Wabash River and White River. We hypothesized there would be diurnal and seasonal differences between ranges of Silver Carp in the Wabash and White Rivers. We also predicted there would be selectivity for logjam habitats in Silver Carp as well as diurnal and seasonal variations in macro and micro-habitat use. Monthly macro & micro active tracks were conducted using acoustic telemetry throughout the study reaches. The location, habitat type, and habitat conditions of tagged fish were recorded. Analysis of variance tests were used to analyze trends in habitat selectivity by sex, season, and time of day. Eighty-three total detections were recorded for the summer, fall, and winter periods. Habitat use of Silver Carp did vary seasonally and diurnally as predicted. Most notably, Silver Carp were predominantly located in logjam microhabitats during the summer sampling and in the thalweg during fall sampling. Fish were also predominantly detected in outside bend habitats throughout both summer and fall.

Bryan Sea, University of Illinois Urbana-Champaign
Bigmouth Buffalo Movement and Habitat Overlap with Paddlefish and Bigheaded Carp
In the Upper Mississippi River (UMR), dams can impede the longitudinal movement of native fishes. Although passage is feasible at most UMR dams under the right conditions, pinch-point dams rarely experience open river conditions and often restrict all passage to the lock chamber, restricting access to upstream habitats. We tagged 180 bigmouth buffalo and 150 bigheaded carps with acoustic transmitters in pools 15-19 in the UMR to 1) determine the passage frequency and movements of bigmouth buffalo across UMR dams and 2) determine the habitat use and overlap between bigmouth buffalo, paddlefish, and bigheaded carps. Due to the low number of bigmouth buffalo passages at the pinch point dam, residency in the downstream approach will be analyzed to show how the fish are interacting around the dam and the environmental conditions associated with their presence or absence. Bigmouth buffalo linear home ranges ranged from 0.29-40.72 km with a mean of 7.72 km. Habitat overlap occurred between all three species and they all occupied side channels or channel borders, and this may result in competition where these species inhabit the same areas. We observed a low number of passages which is likely due to the low water levels in 2020.

Joseph Rector, Southern Illinois University
Status of Ohio River Crappie Population Vital Rates and Relationships Between Environmental Variables and Year-Class Strength
Though demographics and vital rates of black crappie and white crappie populations in lakes and reservoirs have historically been well researched, published information on crappie population dynamics in large river systems is deficient. Embayments at the confluences of tributaries and large rivers and their associated backwaters can serve as important low current, structure rich habitat for crappies, especially in systems like the Ohio River that lack extensive natural backwater areas due to a geologically constrained river valley and human modifications. As a result, crappie population densities are often much higher in tributary embayments than in the mainstem river. The objectives of this study were to estimate recruitment, growth, and mortality rates using aged otoliths and length/weight data for crappies sampled from the Ohio River and associated tributaries during 2020 and 2021. Patterns of year-class strength were identified using catch curve residuals and were used to model relationships between recruitment and environmental variables. Results of this study provide useful baseline information for management of black and white crappie populations in large river-tributary systems.

Sam Shaick, Illinois Natural History Survey
Catfish and Smallmouth Buffalo Populations in Commercially Versus Non-Commercially Harvested Pools of the Illinois River
Buffalo (Ictiobus spp.) and catfish (Ictalurid) are the two most commercially harvested groups of native fishes in the Illinois River. Further, Channel Catfish, Flathead Catfish, and Smallmouth Buffalo are the most abundant species of these groups. Within the Illinois River, commercial fishers are allowed unregulated buffalo harvest and unlimited harvest of catfishes over 15 inches. Aside from invasive carps, commercial harvest above Route 89 near Spring Valley, IL is prohibited due to increased contaminants in the Upper Illinois River. We investigated the potential effects that these different regulations may have on Channel Catfish, Flathead Catfish, and Smallmouth Buffalo relative abundance, size structure, and condition. Because the Route 89 bridge is within the Peoria Pool of the Illinois River, this pool was used as a buffer between the lower, commercially harvestable pools (Alton and La Grange) and the upper, non-commercially harvestable pools (Marseilles and Starved Rock). From June-October of 2019 and 2020, the aforementioned species were sampled using paired small and large hoop nets baited with soybean cake. Fishes were measured to the 10mm bin from June-September 15. From September 16-October 31, fishes were measured to the nearest millimeter and weighed to the nearest gram. Relative abundance was calculated using catch per unit effort (CPUE) as fish per hoop net set. Also, we used relative weight (Wr) to compare condition and proportional size distribution (PSD) to examine size structure.

Session 1b (Alma Mater Room, Wednesday 2:30-4:00)

Kirsten James, Hey and Associates, Inc. & The Conservation Foundation
Field Data Collection Tools
Focusing on GIS tools deployed as part of the Upper Salt Creek Watershed-based Plan, learn how affordable technology can save valuable resources. Understand how reporting interfaces were developed to crowdsource valuable site-specific information from local authorities and how GPS-driven field applications were designed to conduct large-scale field data collection. Explore how other GIS applications, as well as remote sensing, sonars, and remote water level loggers can save time and money, while collecting high quality data to make better decisions.

Mark Lynch, YSI/Xylem Inc.
Integrated Data Collection Acround the United States
In this presentation, we'll look at existing monitoring capabilities within watersheds and how those can now be used to do amazing things like alerting the correct people if something changes in a natural system or water facility, predicting how the water chemistry will change after a rain event, or optimizing water treatment processes in real time to reduce input costs. If we want to protect our water resources, we need to be aware of what is going on with them AND be in a position to do something about it. Though different groups have been working on different segments of watersheds for a long time, we can now step back and more easily integrate many tools in one place to go from reactive management to proactive nurturing of our most precious resources.

Diane Tancl, Illinois Environmental Protection Agency
Statistically Valid Surveys of Lakes and Reservoirs in the United States
The United States Environmental Protection Agency (US EPA) initiated a collaborative effort between EPA, states, and tribes to monitor the surface waters in the nation. These National Aquatic Resource Surveys (NARS) include wetlands, rivers, streams, reservoirs, lakes, and coastal waters. These statistical surveys are designed to answer questions about water quality in the US. The National Lake Assessment Surveys (NLA), first conducted in 2007, provide statistically valid national and regional condition of lakes and reservoirs in the US. These surveys address the biological, chemical, physical, and recreational condition of lakes. Environmental stressors most associated with lake degradation can be determined, as well as the changes in lake condition over time. The surveys are conducted every 5 years. These surveys provide for enhancement opportunities in monitoring design for states and tribes. Tools and reports are developed for education and outreach, such as the Lake Context Tool. Illinois EPA participates in planning for the NLA surveys and is part of the committees for the Region 5 Monitoring Networks for long-term reference monitoring and bioindicator development. These surveys provide for unique opportunities to field test new monitoring techniques, pilot sampling new analytes, and answering state or region-specific questions about lake condition. This presentation covers the biological, trophic state and water quality, human use, and physical habitat indicators of lake health developed and utilized for the NLA surveys. One of IL EPA future monitoring objectives is to utilize the NARS surveys for statewide condition assessment and improvement of our monitoring programs.

Miles Corcoran, OTT Hydromet
Cost-Effective Monitoring Networks: Reducing Field Visits While Maintaining Reliable Data
Monitoring environmental waters is critical for urban flood warning, recreational management, promoting sustainable development, and various other program goals. Stakeholders often need to be immediately notified of potential threats to inform timely decision making. Continuous monitoring stations have the potential of providing managers with real-time access to high resolution data, but they can require large amounts of time and money to maintain. Neglecting to maintain continuous monitoring stations can result in inaccurate data or damaged equipment. Many modern field sensors are capable of being deployed for extended periods of time, yet this type of equipment installed in situ will always face challenges associated with biofouling, sensor drift, flooding/ debris, and changing conditions. Many sensors and Data Collection Platforms (DCP's) can provide output parameters that assist technicians and network managers in assessing measurement quality and station status. Establishing automated alerts based on user defined value limits, rate of change limits, and alarm groups should be done using both sensor-specific diagnostic data (e.g. lamp intensity, transducer humidity, sensor position, etc.) and environmental parameters (e.g. water level, temperature, conductivity, etc.). Furthermore, DCP's equipped with two-way communication allow for remote configuration and troubleshooting. This presentation will focus on how to reduce labor costs associated with on-site maintenance visits and will provide 2-3 examples of monitoring programs that incorporated these practices to more effectively manage their networks.

Session 2a (Lincoln Room, Thursday 8:30-10:00)

Alana Bartolai, Lake County Health Department
Lake Management Plans 101
Developing a Lake Management Plan for your lake is important in helping guide lake management decisions. The lake management planning process is a way for stakeholders to come together with a common interest in improving and protecting their lake. The lake management plan then acts as a document with specific goals, objectives, and actions that help make the lake management process easier and guides how time and resources are spent. This presentation will discuss the importance of lake management plans and resources available to help and empower anyone responsible for making lake management decisions such as homeowner associations, municipalities, park districts and more.

Shane Sinclair, Precision Conservation Management
Precision Conservation Managmement Program Summary
In this presentation, we summarize 6-years of data from the Precision Conservation Management program (PCM). PCM is a farmer service program led by IL Corn Growers Association and IL Soybean Association along with NRCS, IL Soil and Water Conservation Districts, and more than 30 other local and national partners. PCM's objective is to work 1-on-1 with farmers across Illinois, Kentucky, and Nebraska as they make financially-based conservation decisions on their farms that impact water quality. Attend this presentation to learn more about how conservation practices like reduced- and no-till, cover crops, and nitrogen management impact corn and soybean production, profitability, and water quality.

Brian Valleskey, Geosyntec
What is a NARP
Illinois EPA had proposed a total phosphorus effluent standard of 1.0 milligrams per liter (mg/L) for major POTWs. Environmental non-governmental organizations (ENGOs) were concerned that this standard of 1 mg/L would not address phosphorus-related impairments or protect local waterways and instead proposed an effluent standard of 0.1 mg/L. The Illinois Association of Wastewater Agencies (IAWA) was concerned that the ENGOs' proposed 0.1 mg/L would impose significant financial burdens on ratepayers and would not necessarily achieve measurable water quality benefits due to site-specific conditions. This disagreement created a substantial permitting backlog in Illinois. Illinois EPA, IAWA, ENGOs negotiated the NARP requirement in 2018 to overcome the permitting backlog and make progress towards reducing phosphorus loads at POTWs.

Austin Omer, Illinois Farm Bureau
Illinois Farm Bureau's efforts toward implementing the Illinois Nutrient Loss Reduction Strategy
The Illinois Nutrient Loss Reduction Strategy (NLRS) aims to reduce 45% of nitrogen and phosphorus loss to receiving waters in Illinois, with an interim goal of reducing 25% of phosphorus loadings and 15% of nitrogen loadings by 2025. Nutrient losses come from many sources, including point sources, urban stormwater, and the majority from agricultural and nonpoint sources. The NLRS tracks progress through tracking measures in the number of resources, amount of outreach, the land and facilities, and water quality. As part of implementing the NLRS, Illinois Farm Bureau's (IFB) efforts focus in four priority areas: 1) education and outreach to farmers, landowners and the general public; 2) supporting research of best management practices to reduce nutrient loss from agricultural fields; 3) supporting farmer implementation efforts across the state; and 4) demonstrating progress toward the long-term goals of the NLRS. Highlights include overseeing the IFB Nutrient Stewardship Grant Program, supporting watershed planning efforts in priority watersheds across Illinois, engaging in partnerships to implement and research edge-of-field conservation practices, and collaborating with wastewater and drinking water facilities to research and demonstrate conservation practices. During this session, Dr. Omer will provide the details of IFB's work to improve water quality, as well as an overview of the lakes and watersheds in which IFB is working and lessons learned in the process. He will also offer suggestions for working effectively with the agricultural community in your area to promote voluntary adoption of best management practices.

Session 2b (Alma Mater Room, Thursday 8:30-10:00)

Joshua D. Bruegge, Eastern Illinois University
Restoring Aquatic Connectivity in an Illinois River: Changes in Functional Groups of Fishes
Low-head dams serve as intermittent barriers to aquatic connectivity and alter habitats in the impounded reach directly upstream. In 2018 and 2019, two low-head dams on the Vermilion River and North Fork Vermilion River in eastern Illinois were removed. These removals restored lotic habitats and allowed fish passage to an additional 1,115 miles of upstream habitat within the basin. The Vermilion River basin is a diverse system inhabited by over 80 fish species with 28 of those species identified as Species in Greatest Need of Conservation. To assess the impacts of these dam removals, we conducted fish community surveys at 12 fixed stations both above and below two dam sites on the Vermilion and North Fork Vermilion rivers. Since 2012, we completed fish community surveys twice annually in the spring and fall using DC electrofishing. Fish collected were assigned a priori into functional groups using trait-based guilds. This trait-based approach allowed us to characterize the ecological processes of fish assemblages in the Vermilion and North Fork Vermilion Rivers. We analyzed fish and hydrologic data to assess changes in biotic diversity and functional organization of fish assemblages related to the dam removals. Cluster analysis and diversity metrics suggest that fish assemblages in the formerly impounded reaches are increasing in similarity to downstream assemblages after barriers were removed and the rivers return to a more lotic state. These findings can be applied to other systems to better understand the ecological impacts of improving habitat and connectivity.

Alexis VandenBerg, Eastern Illinois University
Impacts of an Instream Restoration on Fish Communities and Abundance in a Midwestern Stream
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, abundance, and habitat quality. From 2009-2015, and again in 2021 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), and fish diversity was compared among sites using Index of Biotic Integrity (IBI). 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 did not reach a maximum until six years post-restoration. Preliminary data from our most-recent survey in 2021 suggests the stream restoration continues to have positive effects on fish community integrity and habitat quality. Due to the previous delayed increase seen with fish community structure and abundance, researchers may find it beneficial to return to restored sites periodically. This will help them to better understand and monitor how the instream restorations affect the stream's biotic communities on a long-term basis.

Keith Gray, Integrated Lakes Management, Inc.
Lake Shoreline Restoration
When managing lakes or ponds, special attention needs to be given to space along the periphery of the shoreline. Called shoreline buffers, these vegetated areas can look beautiful while also providing important ecosystem services like soil stabilization and water filtration. We will discuss the benefits of using native plants compared to rock armoring, or rip rap, and explore site-specific native plant selections that will leave you with a breathtaking shoreline buffer.

Amanda Carter, Illinois Natural History Survey
Effects of Environmental Pool Management on 25 year of fish in backwaters of Upper Mississippi River Pool 26
Monitoring and restoration of biological diversity in the Upper Mississippi River has been a focus of the US Army Corps of Engineer's Environmental Pool Management (EPM) program. We analyzed a 25-year fish species abundance dataset maintained by the Illinois Natural History Survey to examine trends in fish community structure in backwaters of the navigation pool near Alton, IL (Pool 26), with particular focus on potential effects of changes in water level management as well as invasive Asian carp. We selected four backwaters that differ in their distance from Melvin Price Locks and Dam that forms Pool 26. Fish data were standardized to prevent taxa with high catches from dominating the data set. The catch of each taxa for each year was divided by the maximum catch of that taxa over all 25 years. All taxa resulted in numbers from 0 to 1. We could detect no systematic effect of Asian carp abundance on fish community structure in these backwaters. However, EPM showed significant effect on fish community structure within the two middle backwaters treated separately and when all backwaters were treated as one community.

Session 3a (Lincoln Room, Thursday 10:30-12:00)

Andrew Margenot, University of Illinois
Legacy phosphorus and bank erosion: overlooked contributors to phosphorus loading of Illinois surface waters?
Non-point phosphorus (P) loss is a major contributor to Illinois surface waters, but its assessment and management are complicated by legacy P and bank erosion. Legacy P (i) in soils accrued from historical inputs and (ii) in stream channels from past sediment deposition can entail substantial lag times between implementation of P loss mitigation practices and reductions in P loads from non-point sources. Additionally, (iii) the non-agricultural source of bank erosion can contribute a significant portion of non-point P loads. Quantifying legacy P and its lag times as well as P loading via bank erosion is needed for accurate and resource-efficient P loss reduction practices and targets. To address these challenges, we draw upon agronomic P balances, soil testing trends, long-term (145 year) field experiments, historical soil archives and meta-analysis to estimate magnitudes and distribution of legacy P in soils and water bodies in Illinois. Preliminary results suggest that legacy P in soils can vary substantially at fine spatial scales, though state-wide P balances raise the possibility of legacy P contributing to P losses. Legacy P in streambanks is more challenging to quantify, though its relationship to bank erosion offers a coarse means to bound potential magnitudes. Key areas for future research are determining residence times of legacy P and magnitudes of bank erosion.

Javan Miner, Northwater Consulting
Internal loading: yes that monitoring data is useful, here's why, and how to use it
Internal loading of phosphorus and nitrogen is an often overlooked but important component of a lake's nutrient balance, especially in managed reservoirs of the Midwest. As it is impractical to directly measure, numerous methods have been developed to estimate it. These methods rely on various types of monitoring data and allow for some flexibility in developing estimates based on what is available. However, the old modeling adage: "garbage in is garbage out" applies. The more comprehensive the data is in time and space, the better the estimate can be. The better the estimate is, the easier it is to allocate limited budgets and resources toward mitigation strategies or other sources of loading. The goals of this presentation are a) familiarize you with the methods of estimating internal loading so it's clear how certain types of data could be used and what limitations we face when data is missing or shoddy, b) convince you that some of the data being collected is actually useful and what to focus on, and c) present case studies of internal loading in Illinois and the effectiveness of mitigation strategies

Taylor Bookout, Illinois Natural History Survey
Illinois River Turbidity Response to Reduced Vessel Traffic
The Illinois River waterway is an important avenue for commercial vessel traffic between the Great Lakes and the Mississippi River. Vessel traffic has been shown to negatively impact phytoplankton and aquatic macrophyte production and foraging success in fishes through sediment suspension and shoreline erosion. From July 1- October 1, 2020, five Illinois River locks (Dresden, Marseilles, Starved Rock, Peoria, and La Grange) were simultaneously closed for repairs, substantially reducing vessel use. This offered a unique opportunity to observe a systemwide turbidity response to reduced vessel disturbance. Turbidity was measured at randomly-generated fish sampling locations in 2019 (pre-closure, n=893) and 2020 (n=1698) throughout the length of the river and across habitat strata (main-channel, side-channel, backwater). In general, turbidity increases downstream with changes in geomorphic properties of the river and increases laterally with higher turbidity occurring in backwaters than the main channel. A reduction in turbidity corresponded with a reduction in vessel traffic due to the 2020 lock closure for all reaches where traffic was limited. This reduction in turbidity was corroborated by three USGS stations that collect main channel turbidity data (Joliet, Seneca, and Florence) when accounting for differences in discharge between years.

Pamela Dugan, PhD, EutroPHIX
In-Lake Phosphorus Mitigation for the Restoration of Impaired Lakes
Water Quality in the United States is significantly impaired driving increasing frequency and severity of harmful algae blooms (HABs). Approximately 48,000 lakes in the United States are impaired for phosphorus pollution, the primary cause of HAB events. As the primary limiting nutrient for productivity of freshwater systems, a single pound of phosphorus can drive the growth of up to 500 pounds of algae. HABs can cause acute water quality issues, toxin production, taste and odor issues, aesthetic impacts, as well as impacts to recreational uses and property values. Harmful algal toxins can have significant acute impacts to pets, wildlife, and human health. The Clean Water Act has worked to improve the condition of lakes since it was enacted in 1972 and has significantly reduced point source pollution over the last 50 years. Additional efforts are improving watersheds and curtailing non-point source pollution. A relatively small effort has been made for in-lake water quality improvement. Given the investment needed to restore watersheds and the time required for implementation and positive water quality impacts at the lake level – additional in-lake management should be considered to accelerate water quality improvement. Phosphorus internal-load mitigation and external-load filtration technologies are viable management strategies to restore waterbodies and improve designated uses.

Session 3b (Alma Mater Room, Thursday 10:30-12:00)

Dakota R. Radford, Kaskaskia Biological Station

Fish and prey resources in reservoir coves with and without offshore artificial habitat structures

Artificial habitat structures are used to mitigate habitat loss across aquatic ecosystems and increase angler catch rates, but the potential trophic outcomes of concentrating fish abundance at structure additions are rarely evaluated. In this study, we compared fish and fish prey assemblages between reservoir coves with and without newly added offshore habitat structures. Further, we assessed whether there were spillover effects of offshore habitat additions by contrasting fish assemblage and abundance in littoral habitats. Coves with offshore structures contained higher concentrations of fish that differed in assemblage structure; Pomoxis and Lepomis species were the most abundant taxa at offshore sites with added structures. Neither zooplankton nor benthic macroinvertebrates were reduced or enhanced because of the addition of habitat structures. Lack of a response of lower trophic organisms may be due to limited effects of predators or be an emergent pattern arising from a balance between increased prey production or immigration and predator attraction at the offshore structures. Overall, our results indicate that artificial structures effectively concentrate fish but increases in fish density may be partitioned among newly available structure in offshore habitats and existing structure within littoral habitats.

Spencer J. Phillips, Illinois Natural History Survey

Evaluation of artificial nest structures and in-stream habitat of Flathead Catfish in the Rock River using radio telemetry

Pylodictus olivaris (Flathead Catfish), is a large piscivorous Ictalurid found in rivers and reservoirs in North America. Flathead Catfish reproduce in cavities, typically when water temperatures reach 19-24ºC. Although aquatic artificial structures can serve as refuge and aggregate fishes, their use to promote reproduction in cavity nesting species is less understood. The Rock River experienced an ethanol spill that resulted in the death of many sportfish, such as Flathead Catfish. In response IDNR installed 20 artificial nesting structures within the Dixon Reach of the Rock River to promote reproduction and recruitment. The aim of our study was to evaluate if the nest structures are being used by Flathead Catfish and identify other habitat and nest use throughout the reach. Flathead Catfish (n=238) were tagged with VHF transmitters and manually tracked during the breeding season (May-August 2021) We located 65% (n=155) of tags in the 2021 tracking period. An interagency effort utilizing divers monitored by Aris sonar equipment supported that it is unlikely untagged fish are using the nesting structures. However, our results show that these fish heavily utilize the existing in-stream habitat within the river in the form of near-shore coarse woody debris and revetment. No tagged or untagged fish have been detected or observed using the structures, indicating a redesign of the nest structures coupled with additional monitoring may be needed.

Michael A Nannini, Illinois Natural History Survey

Behavioral Response of Three Sportfish Species to Artificial Habitats

The ecological effects of artificial habitats deployed to enhance fisheries depends in part on fish attraction to and activity patterns in association with added habitat. Despite the importance of behavioral responses to artificial habitats, far more is known about marine fish than freshwater species. We used three 0.40 ha ponds to quantify the activity patterns of three sportfish species typically targeted by artificial habitat enhancements around two types of artificial structure. Each pond contained one Mossback Tree and one Shelbyville cube, and a PIT-tagged fish assemblage of 22 adult Bluegill, 15 adult Black Crappie, and 5 adult Largemouth Bass. Each habitat type was encircled with an antenna array, and fish association with artificial habitats was recorded. Fish behavior was monitored in each pond every three weeks for 12 months. All three species were most active at artificial structures during warm months and exhibited distinct diel patterns of activity. Black Crappie showed a strong crepuscular pattern of activity at both structure types. Bluegill activity was similar to Black Crappie, except they had more distinct diel variation in activity at Mossback Trees than Shelbyville Cubes. Largemouth Bass showed the largest differences in activity patterns between the structure types, associating with Shelbyville Cubes primarily during daylight hours, while being active around Mossback Trees primarily during crepuscular times. Interspecific variation in behavioral responses to artificial habitats highlights how the effects of habitat enhancements on sportfish distribution and vulnerability to angling could vary among target species in the community.

Carly C. Fenstermacher, University of Illinois Urbana-Champaign

Ecosystem Response to a Whole-reservoir Coarse Woody Habitat Addition

Habitat enhancements are a common management tool used to mitigate the loss of natural physical structure in aging reservoirs. Coarse woody habitat (CWH) additions can concentrate fish and improve angler success, however, the benefits of CWH additions are poorly understood at an ecosystem level. We monitored the results of a whole-lake habitat manipulation to test whether large-scale CWH addition has a positive, bottom-up effect on the reservoir ecosystems. We measured Lepomis reproductive intensity (i.e., peak density of larvae), relative abundance and size structure of Bluegill and Largemouth Bass using a Before-After-Control-Impact design that encompassed 4 years of pre- and 4 years of post-manipulation monitoring in the treated reservoir and two unmanipulated reference systems. CWH addition did not affect peak density of larval Lepomis. Bluegill and largemouth Bass relative abundance was not affected by the CWH addition; however, proportional size distribution of bluegill and largemouth bass significantly increased. Our study suggests that the size structure of bluegill and largemouth bass increased due to the CWH addition. Whether or not the growth benefits were due to increased production of prey resources will be assessed from our ongoing measurements of invertebrate prey biomass (zooplankton and benthic macroinvertebrates).

Session 4a (Lincoln Room, Thursday 3:00-4:30)

Elizabeth Golebie, University of Illinois Urbana-Champaign
Overcoming Barriers to Invasive Species Prevention Behaviors through Values-framed Outreach Messages
Aquatic invasive species (AIS) pose negative threats to ecosystems and society on a global scale. Given that humans are responsible for transporting AIS on watercraft and equipment moved from one body of water to another, outreach campaigns to encourage recreational water users to stop the spread of invasive species have been ongoing. However, behavior change has been minimal. Thus, managers seek new research-based strategies to enhance outreach campaigns, including targeting deeper psychological processes such as values. The role of value-based messages in stimulating behavior change is a novel area of study that may allow for improved message design in AIS outreach. Therefore, we addressed the following research question: what is the efficacy of values-framed messages in forming recreational water user beliefs regarding AIS? We conducted an online survey of self-identified anglers and boaters across the state of Illinois. We asked respondents to evaluate experimental outreach messages, which reflected values that were self-focused (i.e., egoistic) or centered on other people or the environment (i.e., self-transcendent), alongside a brief control message. Participant evaluations of all three message types were positive and not significantly different. However, the self-transcendent message treatment indicated a stronger link between values and in-depth thinking about the messages concerning AIS - that is, participants with strong self-transcendent values were more likely to review the message closely when it was aligned with their values.

Edgar A. Rudberg, Ph.D, CD3, General Benefit Corporation
Online Boater Led Check-In/Check-Out Alternative to In-Person Inspections: A COVID-19 Response Pilot
Due to the high cost of high pressure, heated water decontamination, reducing the spread of aquatic invasive species (AIS) often relies upon the adoption of best management practices at the individual level. This is especially needed during a pandemic. This presentation will outline a pilot project in Minnesota in adopting a digital alternative to in-person inspections. In addition, the presentation will go over the biological efficacy for doing so.

North Joffe-Nelson, University of Illinois Urbana-Champaign
Trust, Values and Behavior Regarding the Spread of Aquatic Invasive Species among Recreational Boaters in Illinois
Illinois waters are at risk of degradation from aquatic invasive species (AIS). These water bodies represent a valuable natural resource for recreational water users, who experience the negative effects caused by AIS but are also responsible for their inadvertent spread. Past work has shown that recreational water user decisions to avoid spreading AIS are due to long-term stable predictor variables, such as values, as well as short-term variables such as trust in regulatory and scientific communities. However, the interaction between these variables, specifically the moderating effects of trust on the value-behavior relationship, is understudied. Therefore, we conducted a state-wide survey of recreational boaters in Illinois and estimated a structural equation model to evaluate the relationships between values and behaviors. We also tested how those relationships were moderated by reported levels of trust in the IDNR and the scientific community. Our results suggest that biospheric and eudaimonic values both positively predict behavioral intentions, while altruistic negatively predicts those intentions, but we found no significant relationships regarding the moderating role of trust. We also provide insight on the demographic composition of self-identified boaters across the state; however, these findings raise questions about how standard sampling methods that rely on registration data miss a wide swathe of recreationists who are liable to inadvertently contribute to the spread of AIS. These findings underscore the importance of considering a range of factors in explaining the behavioral patterns of boat activities that pose risks for causing biological invasions in Illinois waterways.

Thompson Hill, Illinois State Natural History Survey
Testing How Social and Ecological Factors Influence Preference and Satisfaction for Panfish Angling Groups
Panfish (e.g., Lepomis and Pomoxis species) are one of the most sought-after and exploited fisheries in the United States, yet little research has been published deciphering motivations and behaviors of this angling group. The objectives of this study were (1) develop an angler topology to compare characteristics of anglers that target panfish to anglers that focus their effort on other taxa and (2) determine how angler preference and satisfaction relate to social and ecological factors for varying levels of panfish angling commitment. Intercept creel surveys were conducted April through October 2021 at 10 lakes in central Illinois, with interviewed anglers also invited to participate in a follow-up supplementary survey. A total of 869 anglers were interviewed during intercept surveys, with 161 of those individuals also participating in the supplemental survey. Five components explained 68% of the total variation in angler topology. Panfish focused anglers scored significantly higher than other groups when asked the importance of harvesting fish to eat. Panfish-focused anglers also significantly favored strict Bluegill bag limits. Four components explained 66% of the total variation in satisfaction. Strict regulations leading to sizeable panfish was significantly more satisfying to panfish-focused anglers. The variables and relationships investigated in this study could facilitate the development of management plans targeting specific fisheries by highlighting how ecological conditions and management interventions affect satisfaction and behavior of different angling communities. This creel survey design also provides an easy to follow template to assess other unique fishing communities.

Session 4b (Alma Mater Room, Thursday 3:00-4:30)

Brian A. Metzke, Illinois Department of Natural Resources
Spatial Autocorrelation of Assemblage Composition Reveals Scale of Mussel Metacommunities
Spatial autocorrelation of community composition often is viewed as a statistical nuisance but can be used to identify scale of local and regional metacommunity processes and their underlying mechanisms. The hierarchical and branching structure of dendritic systems, like streams, imposes unique constraints upon obligate communities by limiting dispersal pathways, compelling flow-directed dispersal, and exhibiting rapid increase in complexity of environmental setting over small spatial scales. We evaluate spatial autocorrelation of mussel assemblages by measuring similarity decay over Euclidean, watercourse, and flow-connected distance. We conduct a separate evaluation of similarity decay in headwater relative to mainstem streams. Patterns of mussel assemblage spatial autocorrelation are compared to those of fish assemblages. Results elucidate validity of extrapolating existing assemblage composition data to fill information gaps and the scale at which local assembly and metacommunity processes occur.

Steven E. Butler, Illinois Natural History Survey
Evaluation of a Quantitative PCR Screening Procedure for Rapid ID of Invasive Carp Eggs and Larvae in Ichthyoplankton Samples
Monitoring for reproduction of invasive carps often involves collection of large numbers of ichthyoplankton samples. Sorting and identification of eggs and larvae from samples entails considerable labor costs and may delay detection of spawning events for weeks to months. A quantitative PCR (qPCR) screening procedure has been developed to allow for more rapid identification of the presence of invasive carp eggs and larvae from ichthyoplankton samples. To assess the performance of this method when applied to an existing monitoring program, we used multiplexed qPCR screening to simultaneously assay for four invasive carp taxa and prioritize processing of samples collected in 2020 and 2021 from the Illinois Waterway. The number of DNA copies from invasive carp taxa was found to be a significant predictor of the presence of eggs or larvae in a sample. The quantity of organic matter in a sample, which could potentially bind to DNA and affect detections, was not found to alter this relationship. Classification accuracy of the qPCR procedure was high (92.6%), but specificity (96.6%) was higher than sensitivity (61.5%), suggesting that the risk of false negatives is higher than that of false positives. Continued assessment is needed to identify and control potential sources of error, but the qPCR procedure demonstrates potential for detecting invasive carp spawning events more rapidly than is possible with traditional processing methods. The species-specific information provided by the multiplex assays may allow for early detection of reproduction by individual species at the leading edge of their invasion fronts.

James K. Bland, EPS Inc., Highland Lake Management Committee
Trial Applications of Earth Tec QZ Molluscide for the Control of Zebra Mussel Populations in Ambient Waterways
There are over thirty lakes in Lake County that have been "infested" by zebra mussels (Dreissena polymorpha) ZMs. The ZMs interface with other lake problems including blue-green algae outbreaks, lake productivity, shifts in zooplankton and phytoplankton populations, and shifts in fisheries populations. The Lake County Zebra Mussel Project involves four programmatic elements: monitoring, trial applications of a commercial molluscicide, internship program for high school and college students and limnology education. At the present time there is no proven treatment for ZMs in ambient waterways. ZM monitoring (2019, 2020, 2021) and control applications (2020, 2021) were undertaken on Highland Lake. These trial applications were intended to establish efficacy and performance data for a new molluscicide, Earth Tec QZ. Goals of the application have been spatial control , not eradication. Methods included the setting of colonization plates, assessing cage mortality for adult mussels, gauging veliger populations with zooplankton tows and cross polarized microscopy, evaluation of expressed toxicity with the use of the Biotic Ligand model, and detailed tracking of copper concentrations. In general, the results have been positive and adult zebra mussels and veligers have come under control "spatially". While no formal risk assessment has been performed efforts have been made to determine impacts on nontarget species.

Andrew Runyon, University of Illinois Urbana-Champaign
An Experimental Assessment of Size-Specific Mollusk Vulnerability to Juvenile Black Carp (Mylopharyngodon piceus) Predation
The ongoing expansion of Black Carp (Mylopharyngodon piceus) populations throughout the Mississippi River basin adds urgency to our need to assess the vulnerability of mollusk communities within the expanding range of this invasive molluscivore. In particular, the feeding capabilities and subsequent ecological effects of juvenile Black Carp are not well known. We undertook a series of feeding experiments to quantify how shell size relative to Black Carp mouth gape affects the vulnerability of various native and non-native mollusks to predation from juvenile Black Carp. Prey species consisted of native bivalves (Sphaerium sp.) and non-native bivalves (Corbicula fluminea and Dreissena polymorpha), as well as native snails (Elimia livescens and Physidae sp.) and non-native snails (Cipangopaludina chinensis). Black Carp were given 48 hours to consume different-sized individuals of a single prey species, with Dreissena trials having either attached or unattached individuals to assess the relative effectiveness of byssal thread attachment as a defense. We found that Corbicula had a narrow range of sizes vulnerable to juvenile Black Carp compared to the other bivalves, and unattached Dreissena were more vulnerable to predation than attached Dreissena. All snail species examined were relatively vulnerable, with Elimia less vulnerable than Cipangopaludina, and Physidae vulnerable at all sizes tested. These size-specific and interspecific differences in vulnerability provide information on which mollusk species may be facing increased predation from juvenile Black Carp and thus guide plans for mitigating the impacts of Black Carp on invaded aquatic communities.

Session 5a (Lincoln Room, Friday 8:30-10:00)

Vanessa Williams, Wild Goose Chase, Inc.
Canada Goose Management
Once thought to be in danger of extinction, Canada geese are now a significant nuisance in many parts of the US. With risks to human health and safety, risks to poultry farms, damage to turf and other plants, and the large mess they leave behind, controlling goose populations is a vital service. However, because Canada geese are a protected species and because they are a very intelligent and adaptive species, management can be complicated and must incorporate many facets to provide safe, humane, legal, and effective solutions including harassment, population management, and chemical and structural deterrents.

Adam Landry, Eastern Illinois University
Investigating Bigheaded Carp Ichthyoplankton Presence in Tributaries of the Illinois River
Bigheaded carp (Hypophthalmichthys sp.) are a genus of invasive Asian carps that have spread throughout the Illinois River and its tributaries. They threaten the health of native ecosystems by competing with native species for resources and restructuring planktonic communities. Bigheaded carp can migrate long distances prior to spawning, and many of the tributaries of the Illinois River provide suitable spawning conditions for the bigheaded carp metapopulation. We have been monitoring for the presence of bigheaded carp larvae and eggs in three tributaries of the Illinois River since 2016. In addition, we have collected data on abiotic parameters such as temperature, water transparency, and dissolved oxygen. Our objectives are to compare the relative density of bigheaded carp larvae and eggs among the tributaries. Additionally, we will assess larval and egg densities across time to look for synchronous patterns among tributaries. We will also investigate the relationship between bigheaded carp larvae and egg densities with river conditions such as discharge. Previous results suggest that increased discharge, and greater watershed area correlate with higher abundances of eggs and larvae. Researching bigheaded carp reproduction in tributaries of the Illinois River is a necessary step in gaining a comprehensive understanding of the Illinois River carp metapopulation. This information may be useful to fisheries managers in determining which tributaries of the Illinois are most likely to provide alternate spawning habitat for Illinois River bigheaded carp.

Justin Kowalski, Southern Illinois University
Determining how Invasive Silver Carp Influence Trophic Structure of Native Species in the Ohio River
Invasive Silver Carp (Hypophthalmichthys molitrix) occur in a large portion of the Mississippi River basin and are threatening to expand their range. Understanding how this species affects the communities it invades will help managers mitigate negative impacts and predict how uninvaded communities may be affected. We determined how Silver Carp affect the isotopic niche and body condition of native fish at varying trophic levels along a Silver Carp invasion gradient throughout the Ohio River. Three Ohio River tributaries were selected per invasion category: establishment, invasion, presence, absence. In each tributary, stable isotope ratios of carbon and nitrogen were used to determine isotopic niche breadth and trophic position of native fishes. Additionally, relative weight was used as a proxy for body condition to evaluate the effects of Silver Carp on native species. Metrics evaluating population niche breadth were calculated to determine shifts in isotopic niche with increased Silver Carp abundances. Largemouth Bass and Gizzard Shad both had lower trophic position and relative weight, and larger niche breadth in the presence of higher abundances of Silver Carp. There was no difference for Smallmouth Buffalo and Bluegill populations. Silver Carp feed on plankton which is also an important part of the food chain for both Gizzard Shad and young Largemouth Bass and could explain why both species were negatively affected by higher abundances of Silver Carp. Our results suggest that Silver Carp may exert negative competitive effects and provide insight into abundances of Silver Carp that result in negative effects on native fisheries.

Keith Gray, Integrated Lakes Management, Inc.
Diver Assisted Suction Harvesting - New Applications for Managing Starry Stonewort
Managing invasive aquatic plants is not a new challenge for lake managers. But the invasive macrophyte Starry Stonewort (Nitellopsis obtusa) is a relatively new invader that is spreading quickly throughout our waters and taking root. Quite literally. Diver Assisted Suction Harvesting, called DASH, is a chemical free method of removing invasive plants and algae by the roots, providing lost-lasting results. This presentation will focus on how DASH works, with a special emphasis on a proprietary process that contains the reproductive bulbils produced by Starry Stonewort during the DASH removal process, thus preventing further spread of the species.

Session 5b (Alma Mater Room, Friday 8:30-10:00)

Austin Happel, John G. Shedd Aquarium

Decreases in Wastewater Pollutants Increased Fish Diversity of Chicago's Waterways

Throughout much of the globe, rivers are used to dispatch treated and untreated wastewater to the detriment of receiving ecosystems. Chicago represents one such city, within which sits a series of waterways whose flows are primarily controlled by effluent discharges from three large wastewater treatment plants. Random forest regressions were used to construct models which predict changes in fish species richness within the Chicago Area Waterways over a period of 35 years from data on water quality and weather. The average number of species found at any one location across the Chicago Area Waterway system increased from ~5 to ~12 between 1985 and 2019. The species additions were of species native to area, rather than new introductions. Decreases in wastewater effluents (i.e., phenols, fecal coliforms, and nitrogenous compounds), as well as wastewater storage capacity were identified as highly informative variables, allowing increases in species richness to be predicted with high accuracy. Weather variables were only important predictors in a section of waterway which does not receive wastewater effluent, although increases in annual rainfall and chloride concentrations within the waterways were noted. Increased rainfall events and harsher winter conditions (induces greater chloride runoff) threaten the progress made to lessen the effects of wastewater on the region. Improvements to how wastewater is treated, and subsequent reductions to harmful constituents of effluents, have improved the aquatic ecosystem and are likely responsible for the increased species richness over the 35-year timeframe studied.

David Philipp, Fisheries Conservation Foundation

The COVID Pandemic Revealed How Angling for Nesting Bass Impacts Annual Recruitment in a Population

In Opinicon Lake, Ontario during 2019 (pre-pandemic) the hook-wounding rates from recreational angling observed among nesting male largemouth bass Micropterus salmoides (LMB) and smallmouth bass M. dolomieu (SMB) were 61% and 69%, respectively. That level of illegal, preseason angling resulted in only 17% of LMB nesting males and 29% of SMB nesting males being successful at raising their broods to independence, rates comparable to those observed in this lake in previous years. In 2020, amid the COVID-19 Pandemic, however, access to fishing in Ontario was severely limited during the bass spawning season, which serendipitously provided a natural "whole-lake bass spawning sanctuary" to study. Not surprisingly, the 2020 hook-wounding rates for nesting LMB and SMB in Opinicon Lake were only 5% and 13%, respectively, resulting in 76% of nesting male LMB and 77% of nesting male SMB being successful at raising their broods to independence. Furthermore, comparing 2019 (pre-COVID, with a high level of fishing for nesting bass) with 2020 (during COVID, with a very low level of fishing for nesting bass), we observed over a three-fold increase in free-swimming LMB fry and almost a two-fold increase for SMB fry. Those increases then translated into a 7-fold increase and an 11-fold increase in recruitment of 1+ individuals for LMB and SMB, respectively. This unanticipated, COVID-driven experiment revealed that using bass spawning sanctuaries would be more efficient than closed seasons as a management strategy to conserve levels of black bass annual recruitment.

Ben Lubinski, Illinois Department of Natural Resources

2020 Richland Creek Fish Kill - An Overview and a Site Revisit 1 Year Later

In September 2020 a substantial fish kill occurred on Richland Creek in St Clair County within the city limits of Belleville, IL. IDNR Fisheries biologists along with IEPA investigated this fish kill. The fish kill spanned approximately 2.3 miles of Richland Creek and resulted in an estimated 11,000 fish killed. A year later IDNR biologists returned to one of the stations and conducted a fish survey to re-evaluate the site of the fish kill.

Hannah Holmquist, Southern Illinois University

Fish Community Responses to Water Level Fluctuations in Buttonland Swamp, Illinois

Buttonland Swamp is located within the Lower Cache River watershed in Illinois that is inundated year-round. Human alterations to the watershed have substantially altered hydrology, including direction, timing, and volume of water flow through the riverine swamp. Diehl Dam, managed by Illinois DNR, was constructed to restore and control water levels in Buttonland Swamp. Duration and timing of inundation can influence fish movement and behavior. Infrequent fish sampling since 1992 limits understanding of fish-habitat relationships. To further understand how water level is affecting the fish community we are evaluating fish assemblage composition relative to habitat characteristics. Four macrohabitats were surveyed monthly from 2020-2021 using electrofishing, fyke, and mini-fyke nets. Microhabitats within these macrohabitats included open water, offshore vegetated, and nearshore vegetated habitats. Habitat attributes recorded include depth, substrate type, aquatic habitat refugia type, and vegetation type. Isolated ponds near the swamp were surveyed with mini-fykes to compare the assemblage structure with the swamp. Non-metric multidimensional scaling and analysis of similarities were used to evaluate changes in assemblage structure of fishes across habitat conditions and ponds. Indicator species analysis was used to identify prominent species driving spatial and temporal trends. Differences in assemblage structure and abundance between the ponds and swamp were evident as well as differences in Silver Carp, Shortnose Gar, Gizzard Shad, Bluegill, and Taillight Shiner among microhabitat types. Invasive species were associated with water depth more than native species. Results will inform management and facilitate further assessments of how hydrologic management regimes may affect the fish community.

Session 6a (Lincoln Room, Friday 10:30-12:00)

Amber Blackert, Illinois Natural History Survey
Drivers of Fish Growth and Recruitment in Largemouth Bass, Bluegill, and Black Crappie in the Emiquon Preserve
The Emiquon preserve is a restored backwater of the Illinois River owned and managed by the Nature Conservancy, known for its recreational fishing, aquatic vegetation, and abundant migratory birds. Despite regular water level management to promote waterfowl and aquatic vegetation, its effect on sportfish growth and recruitment is not well understood. Little is known about how water level management and associated biological predictors affect fish growth and recruitment in the Emiquon preserve. Therefore, the aim of my study was to determine how annual growth, mortality, and year-class strength of bluegill, largemouth bass, and black crappie are affected by water level management and food abundance at the Emiquon preserve. Age and yearly incremental growth were determined from sagittae otoliths (bluegill = ~361, black crappie = ~355, largemouth bass = ~376) collected in 2010, 2015, 2016, 2020, and 2021 to build a master chronology from the date of initial lake restoration. Linear mixed effect models were used assess annual growth and annual mortality and year-class strength were estimated from catch-curve and catch-curve residuals. Hopefully this data can help identify and inform management practices conducive to the growth and recruitment of Emiquon sportfish.

Shaley Valentine, Southern Illinois University
Resource Use of Bluegill along a Longitudinal Gradient in Five Reaches of the Mississippi River
In rivers, modifications such as dams alter the availability of resources (habitats and prey) through differentially affecting community structure and availability of habitat patches along longitudinal gradients. Specifically, among the Mississippi River Pools monitored by the Long-Term Resource Monitoring element of the Upper Mississippi River Restoration Program, the availability and identity of habitats and structuring of communities vary indicating that resource use of species may also vary longitudinally. Stable isotope analyses may be able to determine differences in resource use. Stable isotopes of carbon (C) and nitrogen (N) can vary spatially across a river's habitats and across prey sources by both trophic position and the environment prey inhabit. Thus, differences in stable isotopic ratios may indicate differential habitat and prey use. This study will use stable isotope ratios of C and N to determine the breadth of resources used within a reach and how that differs longitudinally in Bluegill in five reaches of the Mississippi River. Muscle samples from twenty Bluegill in each reach will be analyzed for C and N stable isotope ratios. Bayesian ellipses around the resulting ratios of δ13C and δ15N will determine the isotopic niche space as a measure of resource use and will be compared among reaches.

Morgan Winstead, Southern Illinois University
Evaluating Pectoral Spine Microchemistry for Identifying Stocked Channel Catfish (Ictalurus punctatus) and Inferring Fish Size
Channel Catfish are broadly distributed in the U.S. and are important commercially and recreationally in many rivers, lakes, reservoirs, and streams. Since they are a popular sportfish, many state-owned lakes are stocked with a variety of sizes to enhance population sizes and provide angling opportunities. The goals of this study were to determine the contributions of stocked Channel Catfish to populations in stocked lakes, and to assess the relative contributions of Channel Catfish stocked as fingerlings versus fish stocked at catchable size. Fish and water samples were obtained from three hatcheries and three lakes with natural differences in water strontium:calcium ratios (Sr:Ca). Sectioned pectoral spines were analyzed for Sr:Ca using laser ablation-ICPMS to determine whether location-specific water Sr:Ca signatures were reflected in spine samples and to assess the accuracy with which fish could be assigned to their collection location using spine Sr:Ca. Fin spine Sr:Ca data were also used to identify stocked fish and determine size at stocking for hatchery-origin fish sampled from each of the three lakes. Spine microchemistry represents a non-lethal approach to identify stocked catfish and infer size at stocking, which will better inform allocation of hatchery-produced fish.

George C. Balto, University of Illinois Urbana-Champaign
Analysis of the Effect of Habitat Type/Extent on Sampling Design Parameter Estimates
In order for fishery management practices to be successful, a thorough understanding of the current status of the populations in question is essential. This understanding comes from a systematic assessment of fish populations, typically using fixed and randomized designs. Fixed designs often do not take variables such as habitat availability into account. Not all habitat types are essential for the survival of certain species, and the habitat needs of any given fish can change as they age. Given this, there is the possibility for bias to be introduced into fixed designs. The goal of this study is to simulate the performance of various sampling designs to determine the effect of habitat factors such as substrate, vegetation, and depth at sample sites on the accuracy and precision of commonly used population indicators. Additionally, simulations will be used to optimize sampling effort needed to determine accurate and precise estimates of the population parameters used to manage sport fish communities. We used side scan sonar to determine depth, substrate type, and the extent of submerged aquatic structure in four midwestern impoundments. We surveyed the entire shoreline of each focal area for fish populations, using the data to obtain estimates for catch per unit effort, proportional size distribution, and size structure indices. This information serves as a baseline for which we can compare the estimates that we obtain from simulations to, and assess the effort needed to obtain the statistic that is within an acceptable confidence interval for any given research question.

Session 6b (Alma Mater Room, Friday 10:30-12:00)

Jeremy Tiemann, Illinois Natural History Survey
Vitalogy: The Study of Life in the Vermilion River Basin
The Vermilion River basin encompasses nearly 4,000 km2 of eastern Illinois and western Indiana. It is one of the highest quality stream ecosystems in the Midwest in terms of aquatic biodiversity, with more than 100 fish species present. The basin experienced several anthropo¬genic disturbances in the late 1800s and early 1900s, including domestic sewage, industrial and agricultural pollution, impoundments, siltation, and channelization/dredging. However, those disturbances have subsided and the physicochemical conditions in the Vermilion River basin have improved, and subsequently, many portions are now considered 'Highly Valued Aquatic Resources.' As a result of these improved conditions, the fish assemblage appears to be recovering, including the range expansion of several rare taxa. This casual presentation will highlight recent projects occurring in the Vermilion River basin, including studying the spawning schedule of the state-threated Bigeye Chub and conducting a status assessment of the state-threatened Gravel Chub, which has an affinity for deep, swift flowing water and is often difficult to collect with traditional sampling methods.

David Kraft, PE, CFM, Hey and Associates, Inc.
Waterway Restoration and Climate Resiliency
Climate change and urbanization are forcing us to look at watershed and waterway restoration in more creative and resilient manners. Increased runoff and associated erosion and changes to our suburban and urban waterways must be addressed to avoid watershed issues, as well as address growing water quality concerns. Creative and innovative design and regulatory approaches are key to staying in front of this problem, while also seeking to restore resources and improve function. Many of our local communities have recently adopted the updated Illinois State Water Survey Bulletin 75, increasing design rainfall values by more than 30 percent for many storms. Beyond this empirical confirmation of increased discreet runoff events, we will also highlight the issues caused by the overall increase in rainfall depth on an annual basis. Through a series of project examples including large and smalls scale suburban and urban stream stabilization and restoration projects, Lake Michigan ravine and bluff remediation, and lake and pond shoreline restoration, we will highlight the impacts of climate change on these waterways. We will present and discuss innovative stabilization approaches focused on biotechnical restoration, new products, and new implementation of tried and true favorites.

Qihong Dai, University of Illinois Urbana-Champaign
Assessments of Impacts from Climate Change and Agricultural Disturbances on Fish Biodiversity in the Kaskaskia
Global climate change and regional agricultural disturbance are two key drivers of freshwater community changes, particularly in the Midwestern US. Regional efforts of agricultural conservation practices have been implemented for conservation and restoration purpose, However, their effectiveness has not been thoroughly investigated. To effectively conserve and restore freshwater community, trait-based approaches to study functional organization provides mechanistic explanations and predictions of community changes. In this study, we used the Kaskaskia River Watershed, Illinois as an example to evaluate how water quality and environmental variables influence 1) historical species richness (SR) and 2) functional dispersion (FDis), where FDis was based on 1) life history and 2) physiology. The best random forest models showed that upstream watershed area, flow (mean, max, and sd), temperature (max and sd), and nitrate (min) were among the top predictors of historical community variations. We then used the best fitting models to predict impacts of climate changes on SR and FDis under 32 global circulation models. Our models predicted decreasing trends for SR and FDis, up to 22% and 4% by 2100, respectively, implying the homogenization of local freshwater communities. When potential agricultural conservation practices were combined with climate change, the decreasing trends of SR and FDis were not reversed, showing climate change outweighed potential agriculture conservation efforts.

Sara Ashcraft, University of Illinois Urbana-Champaign
Assessing Population Viability and Habitat Preference of Eastern Sand Darter in Illinois Running Waters
Routine monitoring of fish communities provides inadequate information about habitat, abundance, and distribution of Species in Greatest Need of Conservation (SGNC). This knowledge gap limits the management options for protecting and restoring SGNC. In the present study, we built habitat-suitability models for Eastern Sand Darters (ESD) in Illinois streams. ESD prefer natural sand-bottom streams and thus could be stressed by sediment loading and flow alteration. We used seines to sample ESD in a watershed that is known to have a relatively strong population, the Embarras River. We sampled the darter community in areas where ESD were previously recorded, had not been detected, and presence was unknown. We included habitat and water quality measurements. Over two field seasons, 2018 and 2019, we surveyed 35 sites and recorded 368 ESD individuals. The habitat data was used to construct ESD habitat-suitability models. Random forest models at the reach level show our habitat data explained 23.61% of the variance in ESD abundance. Bedrock depth of 50 to 100ft in the total watershed, length of reach, and local watershed area were variables of importance at this scale. At the site level our habitat data explained 36.61% of the variance in ESD abundance. Cover type and amount of shallows in slow water, and percent riffle channel morphology were predictor variables of importance. The final models will be used to infer the distribution of the species in un-sampled streams and the stressors to ESD populations in the state and contribute to a conservation management or recovery plan

Poster Session (Thursday 5:00-6:00)

Taylor Mogavero, James Garvey, Alison Coulter, David Coulter - Southern Illinois University Carbondale
Factors affecting the movement of Silver Carp (Hypophthalmichthys molitrix) in the Illinois River

Michael J. Louison, Nathan R. Brand, Emma M. Knoebel, Riley M. Ross, and Robb D. VanPutte - McKendree University
The impact of capture and air exposure on blood physiology and reflex responsiveness in angled channel catfish Ictalurus punctatus

Andrew T. Mathis, Brandon S. Harris, Kris A. Maxson, Levi E. Solomon, James T. Lamer - Illinois Natural History Survey
Habitat use and gear selectivity of grass carp in three pools of the Upper Mississippi River System

Valerie J. Thompson, Cassi J. Moody-Carpenter, Daniel R. Roth, and Robert E. Colombo - Eastern Illinois University
Population trends of Channel Catfish Ictalurus punctatus in the Wabash River observed through standardized long-term monitoring

Valerie Kuppek, Paul Stafford, Jason DeBoer, Andrya Whitten, James Lamer - Illinois Natural History Survey
Is a fish in a river better than a canary in a coal mine?

Carley Capon, Amber Blackert, Taylor Bookout, Mason Deja, Elizabeth Myers, Bradley Novak, Devlon Sutton, Kristopher Maxson, Levi - Illinois Natural History Survey
Investigating the differences in fish assemblages associated with a unique main channel border habitat

Mitchell Rosandich, Eden Effert-Fanta, Daniel Roth, and Robert E. Colombo - Eastern Illinois University
Establishing a Standardized Sampling Method for Channel Catfish in Medium to Small Illinois Impoundments

Octavio J. Silva, Alison A. Coulter, David P. Coulter, and James E. Garvey1 - Southern Illinois University and South Dakota State University
Effects of three types of anesthesia on Silver Carp

Lara Seek, Elizabeth Hamilton, and Hayden Wennerdahl - Illinois State Water Survey, University of Illinois
High Water Marks: A comparison of annual runoff, sediment, and nutrient yields in small watersheds within the Illinois and Kaskaskia River basins

Jennifer Davis - University of Illinois Springfield
Lake Macoupin Water Quality Study

John F. Bieber, Luc Larochelle , Steven J. Cooke , Cory D. Suski, and Michael J. Louison - University of Illinois
Post-release swimming activity of ice-angled Northern Pike

Alison Siever, Elizabeth Golebie, Gregory Hitzroth, Amanda Huegelmann, North Joffe-Nelson, Carena van Riper - University of Illinois
Analyzing presence and population density as spatial determinants of human behaviors that prevent the spread of aquatic invasive

Kara Phelps, Kris Maxson, Jim Lamer, Kevin Ions - Illinois Natural History Survey
Zooplankton production in a restored Illinois River backwater and its contribution to mainstem river zooplankton

Clark Dennis III; Cory Suski - University of Illinois
Can CO2 enhance the effectiveness of a bubble curtain to deter invasive carp?

Hannah Holmquist, Greg Whitledge, and Jim Garvey - Southern Illinois University
Evaluating Relationships Between Buttonland Swamp Hydrology and Fish Recruitment

Estelle E Keigher, Josh D Bruegge, Alexis L VandenBerg - Eastern Illinois University
Instream Restoration and the Impact on Two Riffle Habitat Specialists

Patrick W. Padilla, Gregory W. Whitledge - Southern Illinois University
Determining Potential Range Expansion of Black Carp in the Midwestern United States Through Otolith Microchemistry

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