



# Joint Annual Conference

Illinois Chapter of the American Fisheries Society

& Illinois Lake Management Association



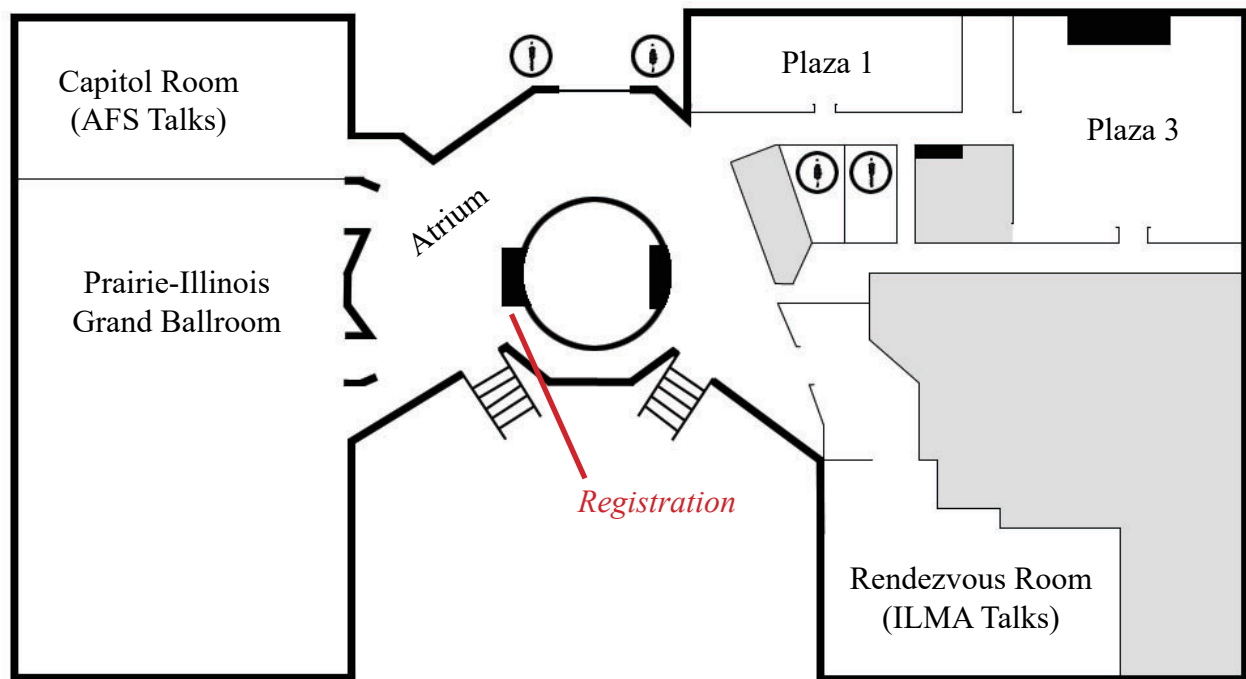
February 29<sup>th</sup> - March 2<sup>nd</sup>, 2016  
Wyndham City Centre  
Springfield, Illinois

## 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 on the mezzanine level. The AFS sessions will be in the Capitol Ballroom and the ILMA sessions will be in the Rendezvous Room. 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 between the session ballrooms.

## Mezzanine Layout



**Raffle Items:** An auction raffle will be held in the Prairie/Illinois grand ballroom Tuesday evening; items will be out all day Monday and Tuesday. Simply place as many tickets in the basket of the items you can’t bare 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 awards, so splurging is beneficial to the minds of the next generation of scientists. Tickets are available at the registration desk throughout Monday and Tuesday. Items will be separated by organization, be sure to pay attention to the color coding for raffle items.

**Photo Contest:** Don’t forget to cast your vote for the 2016 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 2017 conference program.

*Afterhours Entertainment: Following the dinners on Monday and Tuesday, the hospitality suite will be open from ~8pm to midnight in the overlook rooms (1&2) on the 29th floor. The suite will be open to all and is a BYOB event: coolers will be available for use to keep things cold. Come enjoy the social fare and networking opportunities!*

# 2016 Conference Agenda

## Monday February 29<sup>th</sup>

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

1:00-2:30	Concurrent Sessions .....	Rendezvous and Capitol
2:30-3:00	Break .....	Prairie-Illinois Grand Ballroom
3:00-4:30	Concurrent Sessions .....	Rendezvous and Capitol
4:45-6:30	AFS Annual Member Meeting .....	Plaza III
6:30-7:30	Dinner.....	Prairie-Illinois Grand Ballroom
7:30-9:00	ILMA Board of Directors Meeting .....	Plaza I
8:00-12:00	Open Social .....	29th Floor Overlook

## Tuesday March 1<sup>st</sup>

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

9:00-10:30	Concurrent Sessions .....	Rendezvous and Capitol
10:30-11:00	Break .....	Prairie-Illinois Grand Ballroom
11:00-12:30	Concurrent Sessions .....	Rendezvous and Capitol
12:30-2:00	Lunch .....	Prairie-Illinois Grand Ballroom
2:00-4:00	Joint Keynote Session .....	Rendezvous
4:00-5:00	ILMA Annual Member Meeting .....	Rendezvous
5:00-6:00	Exhibitors Reception & Poster Presentations .....	Mezzanine Atrium
6:00-7:00	Dinner.....	Prairie-Illinois Grand Ballroom
7:00-8:00	Raffles.....	Prairie-Illinois Grand Ballroom
8:00-12:00	Open Social .....	29th Floor Overlook

## Wednesday March 2<sup>nd</sup>

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

9:00-10:30	Concurrent Sessions .....	Rendezvous and Capitol
10:30-11:00	Break .....	Prairie-Illinois Grand Ballroom
11:00-12:30	Concurrent Sessions .....	Rendezvous and Capitol
12:30-1:00	Lunch .....	Prairie-Illinois Grand Ballroom
1:00-2:30	Closing Session .....	Rendezvous





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**Monday** Afternoon February 29th

**1:00-2:30** Concurrent Sessions [Session 1].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – Mike Hooe*

**1:00**

Sportfish Regulations in Illinois: Status, Success, and Compliance  
*Matt Diana, Illinois Natural History Survey*

**1:15**

Effect of Rearing Experience on the Survival, Growth, and Behavior of Hatchery Reared Largemouth Bass  
*Brett Diffin, Illinois Natural History Survey*

**1:30**

Fishery Management - Lessons Learned, Opportunities Lost  
*Jeremiah Haas, Exelon Corporation*

**1:45**

Effects of Tournament Angling on Nesting Largemouth Bass Recruitment in Ridge Lake, Illinois  
*Cody Salzmann, Illinois Natural History Survey*

**2:00**

Bluegill Size Structure and Angling Quality Improvements in Walnut Point Lake: Evaluation of Fishing Regulations  
*Michael Mounce, Illinois Department of Natural Resources*

**2:15**

Life-history Expression of three Popular Sportfish from three Distinct Habitats in the Illinois River Watershed  
*Rich Pendleton, Illinois Natural History Survey*

**Rendezvous Room [ILMA Session]**

*Moderator – Rich Bahr*

**1:00**

The Volunteer Lake Monitoring Program  
*Gregg Ratliff, Illinois Environmental Protection Agency*

**1:30**

There is no try, the do's and do not's of grant writing for lake and watershed projects: Effective grant application from the consultant's viewpoint  
*Gary Raines, HMG Engineers*

**2:00**

Implementing a Request for Proposal (RFP) to Achieve Aquatic Plant Management Goals.  
*Gerry Urbanozo, Lake County Health Department*

**3:00-4:30** Concurrent Sessions [Session 2].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – Mike McClelland*

**3:00**

Population Dynamics of Ancient Sport Fishes in the Middle Mississippi River

*Edward F. Culver, Illinois Natural History Survey*

**3:15**

Evaluating the Effect of Environmental Conditions and Gear on the Detection and Occupancy of Large River Fishes

*Dan Gibson-Reinemer, Illinois Natural History Survey*

**3:30**

Seasonal Habitat Use and Fine-Scale Movements of Channel Catfish in the Lower Wabash River

*Hanna Kruckman, Eastern Illinois University*

**3:45**

Population Status and Potential Impacts of Harvest Regulations on Three Exploited Species of Catfish in the Wabash River, IL

*Zack Mitchell, Eastern Illinois University*

**4:00**

Fish Population Monitoring on the Wabash River

*Cassi Moody-Carpenter, Eastern Illinois University*

**4:15**

Standardizing a Multi-Gear Approach for Sampling Ohio River Catfishes

*Devon Oliver, Southern Illinois University*

**Rendezvous Room [ILMA Session]**

*Moderator – Joe Bartletti*

**3:00**

Stormwater Science: A Watershed & Lakes Perspective

*Brian Valleskey, Illinois Lake Management Association*

**3:30**

Solving Stormwater Challenges through Coordination: The Calumet Stormwater Collaborative

*Danielle Gallet, Metropolitan Planning Council*

**4:00**

Lake Management Planning & Implementation

*Jeff Boeckler, Northwater Consulting*



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**Tuesday Morning March 1st**

**9:00-10:30** Concurrent Sessions [Session 3].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – Greg Whitedge*

**9:00**

The Physiological Effects of CO<sub>2</sub>, in the Context of a Non-physical Barrier to Fish Movement, on Freshwater Mussels  
*Kelly Hannan, University of Illinois*

**9:15**

The Impact of Elevated Carbon Dioxide (CO<sub>2</sub>) on Alarm Cue Behaviors in Fathead Minnows  
*John Tix, University of Illinois*

**9:30**

Utility and Precision of Hard Structures used to Estimate Age for three Species of Gar  
*Sarah Huck, Illinois Natural History Survey*

**9:45**

Hydrodynamic Function of the Spiny Dorsal Fin of Bluegill Sunfish  
*Anabela Maia, Eastern Illinois University*

**10:00**

White Grub in Centrarchidae from the Ohio River Drainage  
*Evan Boone, Eastern Illinois University*

**10:15**

Genetic Population Structure and Diversity of Adult Channel and Blue Catfish in the Wabash and Ohio Rivers  
*Alex Sotola, Eastern Illinois University*

**Rendezvous Room [ILMA Session]**

*Moderator – Tim Pasternak*

**9:00**

Update on the Illinois Nutrient Loss Reduction Strategy  
*Marcia Willhite, Illinois Environmental Protection Agency*

**9:30**

Establishment of the Nutrient Monitoring Council  
*Gregg Good, Illinois Environmental Protection Agency*

**10:00**

Illinois Nutrient Super Gage Network  
*Paul Terrio, U.S. Geological Survey*

**11:00-12:30** Concurrent Sessions [Session 4].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – Jeremy Tiemann*

**11:00**

Fish Community Structure in a Restored Stream: What is Driving Dissimilarity?

*Carl Favata, Eastern Illinois University*

**11:15**

The Duality of Asian Carp Monitoring: Protecting the Great Lakes While Providing Insight into Fish Species Distribution and Abundance in the Chicago Area Waterway System (CAWS)

*Tristan Widloe, Illinois Department of Natural Resources*

**11:30**

Investigating the Relationship between Fish and Private Land Conservation Programs

*Brian Metzke, Illinois Natural History Survey*

**11:45**

Examining the Effects of Low-head Dams on River Ecosystems: from Habitat Quality to Population Genetics

*Shannon Smith, Eastern Illinois University*

**12:00**

The Relationship of the Fish Index of Biotic Integrity to the Qualitative Habitat Evaluation Index in Illinois Streams

*David Muir, Illinois Environmental Protection Agency*

**12:15**

Evaluation of the Blackberry Creek Dam removal on Stream Fish Assemblages

*Stephen Pescitelli, Illinois Department of Natural Resources*

**Rendezvous Room [ILMA Session]**

*Moderator – Ed Lochmayer*

**11:00**

E. coli, Giardia, and Chrypto, Oh My! Is it Safe to Swim at the Beach?

*Sandy Kubillus, Integrated Lakes Management*

**11:30**

Mysterious Brown Algae: A Fox River Phenomenon

*Karen Clementi, Deuchler Environmental*

**12:00**

Potential Predictors of the Cyanobacterial Toxin, Microcystin, in Illinois Lakes

*Kaitlin Hollenbeck, Illinois State University*



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**Tuesday** Afternoon March 1st

**2:00-4:00** Keynote Session ..... Rendezvous

**2:00** Conference Welcome: Leonard Dane & [AFS Rep] will provide a brief thanks for attending the conference and notations on the missions of ILMA and AFS.

**2:10** **John Chick, Illinois Natural History Survey-Prairie Research Institute**

Asian Carp, Sport Fish Declines, Major Floods and Climate Change: A Lighthearted Romantic Comedy



An analysis of 20 years of monitoring data from six reaches of the Upper Mississippi River System (UMRS) provides empirical evidence that silver carp have a negative influence on the abundance of adult sport fishes. Given that silver carp primarily consume phytoplankton and zooplankton, and few sport fish species consume these resources as adults, the mechanism for this negative influence is unlikely to be direct competition for prey resources. Instead, patterns in the abundance of young of the year and juvenile sport fishes interact with both water temperature and the abundance of silver carp, suggesting that silver carp may be constraining the recruitment of sport fishes. Over the past 20 years, all six reaches of the UMRS have shown similar increases in water temperature during the growing season (April – October), but recruitment of sport fish is only increasing in the upper three reaches of the UMRS where silver carp are not yet established. Another aspect of climate, flood frequency and magnitude, has been increasing through time in the lower reaches of the UMRS. Increased flooding may improve reproductive success of silver carp which spawn when river levels rise and have larvae that follow the edge of flood waters into floodplain habitats. One potential ray of hope for preventing the spread of Asian carp to the Great Lakes or other areas within the UMRS is the discovery that silver carp are very susceptible to spinal injury from pulsed DC-electrofishing. This raises the possibility that slight modifications of the electric barriers in the Chicago Area Waterway System could potentially increase their effectiveness at preventing silver carp from entering Lake Michigan.

**3:00** **Wanda Haschek, College of Veterinary Medicine- University of Illinois & Val R. Beasley, Pennsylvania State University**

Health Effects of Freshwater Harmful Algal Blooms: People, Pets, and Livestock

In the Midwest, harmful algal blooms occur in lakes, reservoirs and stagnant rivers, and toxin production is promoted by high temperatures and concentrations of nutrients, especially phosphates and nitrates. People, pets, livestock and wildlife, including birds and fish, have been harmed by algal blooms after skin contact, ingestion, and inhalation. In the Midwest, cyanobacteria that produce microcystins and anatoxins are most often involved. Microcystin contamination recently caused Toledo, Ohio, to shut down its public water supply for several days. Microcystins mainly target the liver. Clinical signs include vomiting, diarrhea, and death. Kidney patients on dialysis in Brazil died when microcystin-contaminated water was used. Microcystin poisoning also causes chronic liver failure and possibly cancer. Anatoxins affect the nervous system and cause deaths from respiratory failure within minutes or hours. Because other types of toxins are sometimes produced, clinical signs from harmful algal blooms may also involve skin and eye irritation or damage. Apart from the problems in Brazil, relatively small numbers of human deaths from freshwater harmful algal blooms have been reported, but animal deaths are more common and occur sporadically in Illinois and other states. If exposure to algal toxins is suspected, water samples should be collected for possible toxin analysis and medical or veterinary care sought. In event of death, postmortem studies should be performed as soon as possible to rule out other causes of disease and determine if the findings are consistent with algal toxicity.



**3:30** **Philip Willink, Shedd Aquarium**

Sharks and Sea Monsters in Lake Michigan? Wouldn't It Be Awesome if This Were True?



There have been several reports of sightings of sharks and sea monsters in Lake Michigan over the past century. We will examine the scientific evidence around the possibility of such events. We will also describe what creatures are known to inhabit the dark depths of Lake Michigan. The impact of the record ice cover during the winter of 2014 on Great Lakes fishes and some rarely seen deepwater species will be discussed. There is still much to learn about our aquatic neighbors and many mysteries yet to be solved.



5:00-6:00

Exhibitors Reception & Poster Presentations ..... Atrium

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**Wednesday Morning March 2nd**

**9:00-10:30** Concurrent Sessions [Session 5].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – Kevin Irons*

**9:00**

Biotic Response to the Establishment and Expansion of Asian Carp in the Illinois River

*Jason DeBoer, Illinois Natural History Survey*

**9:15**

Exploitative Effects of Bighead Carp: Alterations to Organic Matter Exchanges within and between Ecosystems

*Scott Collins, Illinois Natural History Survey*

**9:30**

Juvenile Asian Carp Predation on the La Grange Reach, Illinois River

*Eli Lampo, Western Illinois University*

**9:45**

Influence of a Gated Dam on the Seasonal Movements and Upstream Passage of Asian Carp in the Illinois River

*Matt Lubejko, U.S. Geological Survey*

**10:00**

Direct and Indirect Effects of Invasive Asian Carp on Native Communities

*Elizabeth Tristano, Southern Illinois University*

**10:15**

Zooplankton Response to Asian Carp Harvesting in Illinois River Backwater

*Brian Zalay, Illinois Natural History Survey*

**Rendezvous Room [ILMA Session]**

*Moderator – Alana Bartolai*

**9:00**

Comprehensive Public Outreach Efforts for Invasive Species in Illinois

*Sarah Zack, Illinois-Indiana Sea Grant*

**9:30**

Trophic Interactions and the Efficacy of Milfoil Weevils for Biocontrol of Eurasian Water-milfoil in Wisconsin Lakes

*Kristopher Maxson, Missouri State University*

**10:00**

Using Aeration to Improve Water Quality and Enhance Aquatic Habitat

*Tim Gardner, Clarke*

11:00-12:30 Concurrent Sessions [Session 6].....Rendezvous and Capitol

Capitol Room [AFS Session]

Moderator – Brian Metzke

11:00

Underestimation of Microzooplankton in the Great Lakes is a Macro-problem

Sara Creque, Illinois Natural History Survey

11:15

Evaluating Yellow Perch Spawning Habitat using Side Scan Sonar

Josh Dub, Illinois Natural History Survey

11:30

Yellow Perch Angling Effort and Harvest Dynamics in Lake Michigan, and the Value of a New Biological Metric

Charles Roswell, Illinois Natural History Survey

11:45

Efficiently Sampling Fish Assemblages in the Tributaries of Large Rivers with Boat-Mounted Electrofishing

Jerrod Parker, Illinois Natural History Survey

12:00

Does Prey Community Composition Effect the Way Different Behavioral Types Interact with their Environment?

Mike Nannini, Illinois Natural History Survey

12:15

A Quick Tour of the IDNR Aquatic Impact Review Program and Your Role as Managers and Researchers

Nathan Grider, Illinois Department of Natural Resources

Rendezvous Room [ILMA Session]

Moderator – Bob Dill

11:00

The Design Funding and Creation of a School Raingarden

Nancy Schumm, Schumm Consulting

11:30

The Lake Springfield Watershed Project

Barb Mendenhall, Sangamon County Soil and Water Conservation District

12:00

Determining the Available Wetland Area for Waterfowl, Shorebirds and Marsh Birds in Illinois

John R. O’Connell, Southern Illinois University



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**Wednesday** Afternoon March 2nd

**1:00-2:30** Closing Session [Session 5].....Rendezvous and Capitol

**Capitol Room [AFS Session]**

*Moderator – No Session Presentations*

**Rendezvous Room [ILMA Session]**

*Moderator – Karen Clementi*

**1:00**

Vermilion River Mussel Projects – from Reintroductions to Dam Removal

*Jeremy S. Tiemann, Illinois Natural History Survey*

**1:30**

Greater Redhorse (*Moxostoma valenciennesi*) and River Redhorse (*Moxostoma carinatum*) Status and Distribution in the Fox River near Aurora, Illinois

*Leonard Dane, Deuchler Environmental, Inc.*

**2:00**

Seasonal Shift in Sex Ratios via Maternally Derived Estrogens in a Turtle Species

*Amanda Carter, Illinois State University*







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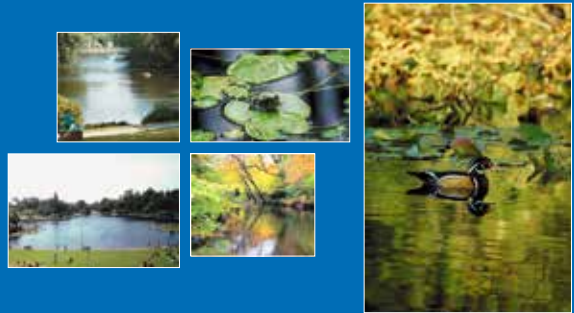


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## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 1 (Monday 1:00-2:30)**

**Matthew J. Diana, Illinois Natural History Survey [Matthew J. Diana, Scott F. Collins and David H. Wahl]**  
Sportfish Regulations in Illinois: Status, Success, and Compliance

*Managers often use regulations to protect sport fish populations from over harvest or to alter size structure. However the success of a regulation is often not evaluated making it difficult to determine the utility or success of regulations. We identified regulations utilized in Illinois lakes for Largemouth Bass and Crappie and examined the resulting size structure for these fish. Lakes with slot limit and raised length limits had the highest abundance of adult largemouth bass over 14-inches, preferred, and memorable sizes. The more restrictive largemouth bass regulations resulted in the lowest catch per unit effort and lowest recruitment. A large majority of lakes in Illinois had unregulated crappie populations and size structure did not vary significantly among regulation types nor did they differ from unregulated populations. Many factors can influence the success of a regulation including the choice of regulation, the magnitude of harvest, and angler support and compliance with a regulation. We evaluated how angler opinions and compliance to a regulation was related to the success of an experimental bluegill regulation implemented on 16 lakes. The regulation did not result in improved size structure on stunted lakes and anglers showed reduced support for the regulation on these lakes. Angler opinion also changed through time as the quality of the fishery shifted. Angler compliance was lowest in stunted lakes, but increased with conservation officer presence. We recommend considering angler compliance and attitudes and monitoring regulation success when implementing or changing regulations.*

**Brett J. Diffin, Illinois Natural History Survey [Brett J. Diffin, Lisa M. Einfalt, Matthew J. Diana, and David H. Wahl]**  
Effect of Rearing Experience on the Survival, Growth, and Behavior of Hatchery Reared Largemouth Bass

*Largemouth bass (*Micropterus salmoides*) are commonly stocked throughout their range, but survival of stocked fish is variable and often low. Stocked fish can have difficulty switching to natural forage and providing feeding experience with natural prey in the rearing environment could result in greater growth and survival of largemouth bass once stocked. We conducted pond experiments to evaluate differences in growth and survival of largemouth bass reared on pellets, bluegill (*Lepomis macrochirus*), or fathead minnows (*Pimephales promelas*). Bass reared on pellets, bluegill, or fathead minnows were stocked into ponds and were allowed to naturally forage for two months. Largemouth bass that were pellet reared were significantly smaller than both minnow reared and bluegill reared fish. Minnow and bluegill reared fish were of similar sizes. Minnow reared largemouth had lower survival than bluegill reared fish, but no other differences in survival were observed. We also conducted laboratory behavior experiments to determine possible mechanisms influencing differential growth and survival. Feeding experience of fingerling largemouth bass influenced their ability to capture prey. Largemouth bass raised on pellets had longer times to initially capture a prey item compared to bluegill or minnow reared fish and both bluegill and minnow-reared fish had higher capture efficiencies than did pellet-reared fish. We recommend that hatchery managers consider alternative rearing techniques that acclimate largemouth bass to natural prey and that future research should be expanded to test for growth and survival differences in lakes.*

**Jeremiah Haas, Exelon Corpotation**

Fishery Management - Lessons Learned, Opportunities Lost

*Young fisheries biologists enter this career field wide eyed and ready to tackle the world coming out of college. The reality is that being a biologist is a lifetime of learning and observation. In the new era of electronic communication, a disconnect is seemingly happening between young and older biologist. Coupled with that is the age disparity with the retirement of the baby boom generation. Illinois is fortunate to have some of the best teachers, biologists, and scientists anywhere in the country. Losing those lines of communication is critical to knowledge transfer. This presentation will discuss some of the issues being observed and some techniques and/or suggestions for young and old biologist to eliminate the issue.*

**Cody J. Salzmann, Illinois Natural History Survey [Cody J. Salzmann, Matthew J. Diana, and David H. Wahl]****Effects of Tournament Angling on Nesting Largemouth Bass Recruitment in Ridge Lake, Illinois**

*Competitive tournament angling for Largemouth Bass (*Micropterus salmoides*) has continually increased in popularity and tournaments are often conducted while Largemouth Bass are spawning. Individual Largemouth Bass have been shown to abandon the nest when subjected to tournaments. Nest abandonment results in loss of the nest and brood, but it is unknown how this effects recruitment on a lake-wide level. We examined the effects of springtime Largemouth Bass tournaments on recruitment in Ridge Lake, Illinois by conducting tournaments in April and May in alternating years (4 years total) and comparing recruitment to years with no tournaments (6 years total) from 2006 to 2015. Anglers targeted Largemouth Bass, kept all angled fish in livewells, and a weigh-in was conducted at a centralized location. Fish were exposed to air, weighed, and measured for total length and held for 2 hours before release. Recruitment was measured as the relative CPUE from fall electrofishing samples and mean density of young-of-year collected in seines. Anglers fished an average of 8.5 tournaments per year lasting approximately 3.72 hours per tournament for a total of 11 angler hours per acre and a mean catch of 240 bass per year. There was no significant difference between tournament and non-tournament years for total Largemouth Bass CPUE ( $F = 1.17$ ;  $P = 0.32$ ) or young-of-year Largemouth Bass in seines ( $F = 0.76$ ;  $P = 0.41$ ). Results thus far suggest no effect of spring tournaments on Largemouth Bass populations, but we will continue to evaluate and conduct this experiment.*

**Michael Mounce, Illinois Department of Natural Resources****Bluegill Size Structure and Angling Quality Improvements in Walnut Point Lake: Evaluation of Fishing Regulations**

*Historically, standard management efforts in developing a quality bluegill (*Lepomis macrochirus*) fishery had mixed success on Walnut Point Lake - 52 acres. In 1999, a 10-fish/day harvest limit and 203 mm (8-inch) minimum length limit were applied as part of a statewide bluegill management study. These regulations quickly provided positive benefits to the size and age structure of the bluegill fishery. However, as is common in fish populations with good spawning success and average growth under minimum length limits, bluegill began stockpiling below the length limit. This resulted in reduced recruitment to even 190 mm (7.5-inch), negating any previous benefits. In 2007, a maximum length limit was implemented with a harvest limit of 15 bluegill/day, of which only 5 could be 203 mm (8-inch) or longer. Size structure improvements were realized very quickly. A marked increase in older age groups in the population supported previous assumptions of excessive angling mortality. A small reduction in mean length at age for age 4+ and age 5+ bluegill, and in relative weight for bluegill 150–199 mm prompted liberalization of the harvest limit to 20 fish/day in 2013 to reduce densities of bluegill <203 mm, still allowing only 5 fish 203 mm or longer. Implementation and modification of the maximum length and harvest limits has demonstrated the ability to achieve the desired biological and social expectations of improving the size structure of the bluegill fishery and attracting greater number of anglers for more than eight consecutive years.*

**Rich Pendleton, Illinois River Biological Station- Illinois Natural History Survey****[Rich Pendleton, Jason DeBoer, Andrea Fritts, Mark Fritts, Levi Solomon, and T.D. VanMiddlesworth]****Life-history Expression of Three Popular Sportfish from Three Distinct Habitats in the Illinois River Watershed**

*Understanding how a fish's environment affects life-history expression throughout its geographic range is important for effectively managing and conserving important resources. Largemouth bass, black crappie, and bluegill are popular sportfish in the Midwest, making their management and conservation a priority for many natural resource agencies. During Spring 2015, we collected largemouth bass, black crappie, and bluegill from three distinct habitats in the Illinois River Watershed (the Upper Illinois River/Lower Des Plaines River, LaGrange reach of the Lower Illinois River, and The Nature Conservancy's Emiquon Preserve, a large restored disconnected floodplain backwater) to better understand the effect of environmental differences on sportfish life-history expression. These habitats vary in many aspects, including location, contaminant load, bathymetry, water turbidity, and macrophyte abundance. We weighed and measured fishes, categorized visible parasite presence or absence, and extracted otoliths (to estimate fish age), gonads (to determine sex, estimate fecundity, and calculate GSI), and livers (to calculate HSI). Many life-history traits differed among habitats, though the results were often sex- and species-specific. Environmental factors appear to affect fish life-history expression, but more research is needed on additional factors involved (e.g., biotic interactions) and the mechanisms of effect.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 2 (Monday 3:00-4:30)**

**Edward F Culver, Illinois Natural History Survey**

Population Dynamics of Ancient Sport Fishes in the Middle Mississippi River

*As part of the Long-Term Survey and Assessment of Large-River Fishes in Illinois, we have examined potential monitoring designs for ancient sport fishes (e.g. Shovelnose Sturgeon, Paddlefish) as well as main-channel fishes (e.g. Blue Catfish). We examined different combinations of two-, three-, and five-inch square mesh gill nets. Presently, we have collected data from 575 Shovelnose Sturgeon, including length and weight measurements as well as pectoral fin ray samples for aging analysis. Preliminary analysis of the catch per net-night data for the last three sampling seasons shows that Shovelnose Sturgeon CPUE in two-inch mesh gill nets was consistently the highest of the three mesh sizes. The mean length of sturgeon collected across all sampling types for the last three sampling seasons was 597mm. Age analysis of Shovelnose Sturgeon revealed age ranges between three and 22 years. The average age of fish collected was similar across the three sampling seasons. Additional analysis will be conducted to compare the population dynamics of our study to previous studies conducted prior to the closure of commercial fishing for Shovelnose Sturgeon in the Middle Mississippi River. Further study is required to determine more long-term population dynamics of these fishes.*

**Daniel K. Gibson-Reinemer, Illinois Natural History Survey**

**[Daniel K. Gibson-Reinemer, David R. Stewart, Andrew F. Casper, Mark W. Fritts, and Jason A. DeBoer]**

Evaluating the Effect of Environmental Conditions and Gear on the Detection and Occupancy of Large River Fishes

*Sampling in non-wadeable rivers presents methodological challenges for monitoring fish species. Changing environmental conditions may affect the ability to accurately capture species (i.e., detection) and consequently lead to inappropriate inferences on occupancy rates. We used data from a multi-year sampling program on the Kankakee River to estimate detection and occupancy for 41 species using hierarchical Bayesian multi-season mixture models. Fish were sampled using AC boat electrofishing and shoreline seining across seven years. Few species had high detection probabilities, although some centrarchids (e.g., Smallmouth Bass) were efficiently sampled by boat electrofishing. Moderate changes in environmental conditions, such as water velocity and temperature, produced moderate changes in detection and occupancy. Our results suggest that samples collected with relatively moderate environmental fluctuations and under similar conditions may be unlikely to introduce large bias in estimates of detection and occupancy among years for sportfish species compared to species that are highly mobile with fluctuating population sizes.*

**Hanna G. Kruckman, Eastern Illinois University**

**[Hanna G. Kruckman, Les Frankland, Scott J. Meiners, Robert E. Columbo]**

Seasonal Habitat Use and Fine-Scale Movements of Channel Catfish in the Lower Wabash River

*Channel Catfish (*Ictalurus punctatus*) are one of the most sought after commercial and sport fish species throughout the Mississippi River Basin. Understanding seasonal habitat use and movement behavior is essential to properly manage Channel Catfish in lotic systems. Since September 2014, we tagged 28 Channel Catfish with acoustic transmitters within a 16-km reach of the lower Wabash River. To locate fish we conducted seasonal 24-hour active tracking supplemented with site specific tracking. Habitat parameters were recorded at each fish location to assess usage. Of the 28 tagged fish, three individuals have been harvested and 16 individuals (59%) have been located at least once for a total of 420 observations. All Channel Catfish were found within a 3-km reach of the 16-km study site with the majority of fish locations occurring along rip rap banks. Other habitats occupied included clay banks, sand bars, log jams, tributary mouths, backwater areas, and the main channel. Across all four seasons, distance moved per hour ranged from 0 – 486 m and the minimum area occupied ranged from 238 – 90,993 m<sup>2</sup>. The mean distance moved per hour was significantly higher during winter compared to spring and summer. Nocturnal (sunset-sunrise) mean hourly movements were greater than diurnal (sunrise-sunset) movements with nocturnal movements being greatest during the winter. Mean hourly movements increased with decreasing temperature. Assessing seasonal movement patterns and habitat usage will help managers determine at which scale these fish should be managed to maintain a sustainable, healthy, and economically productive fishery.*



**Zachary A Mitchell, Eastern Illinois University [Zachary A Mitchell, Cassi J. Moody-Carpenter]****Population Status and Potential Impacts of Harvest Regulations on Three Exploited Species of Catfish in the Wabash River, IL**

*Catfish (Ictaluridae) are both commercially and recreationally important in North America. Catfish account for the majority of harvest by weight within many Midwestern states including Illinois and Indiana. The Wabash River supports a substantial commercial and recreational fishery for three species of catfish: Channel Catfish (*Ictalurus punctatus*), Flathead Catfish (*Pylodictis olivaris*), and Blue Catfish (*Ictalurus furcatus*). It is imperative to understand the dynamics of these riverine fish under various levels of fishing exploitation in order to maintain sustainable levels of harvest of these species. This study characterizes the population demographics of three exploited species of catfish and the effects of harvest regulations within the Wabash River. Catfish were collected throughout the lower 322-km of the Wabash River from 2014-2015. A multiple-gear approach was used to sample for Catfish in order to accurately describe the demographics of the populations. A total of 1,110 catfish were collected comprising of 467 Channel catfish, 568 Flathead catfish, and 75 Blue catfish. Lengths for Blue catfish were significantly larger ( $P < 0.001$ ) when compared to Flathead catfish and Channel catfish. Additionally, length frequency distributions differed across the three different species and gear types ( $P < 0.05$ ). Condition as measured by relative weight varied between species and gear types ( $P < 0.05$ ). Blue Catfish, Channel Catfish, and Flathead Catfish showed significantly different age structure ( $P < 0.001$ ). Total annual mortality and growth were significantly different between species and year ( $P < 0.05$ ). This study will provide updated base-line catfish population information and provide insight for future regulation implementation for the Wabash River.*

**Cassi J. Moody-Carpenter, Eastern Illinois University****[Cassi J. Moody-Carpenter, Alex Sotola, Evan Boone, Eric K. Bollinger, Scott Meiners, Leslie D Frankland, and Robert E. Colombo]****Fish Population Monitoring on the Wabash River**

*The Wabash River is a very unique system because a large portion of it is free flowing; therefore makes it a good representative of a more "natural" large river ecosystem. Furthermore, it also provides an important sport and commercial fishery for both Indiana and Illinois. To effectively monitor and assess fish populations, shoreline DC-electrofishing and electrified trawls were completed during 2014-2015. Each fish sampled was measured to total length (mm) and weighed (g). A total of 30.6 hours of DC electrofishing and 17.85 hours of trawling have been completed during project. Electrofishing collected 68 species, while trawling only collected 42 species. However, species assemblage and size classes collected were different between gears. Future assessments of fish populations in Wabash River may need to incorporate electrified trawl sampling in order to collect necessary individuals or size classes.*

**Devon Oliver, Southern Illinois University [Devon Oliver, Troy Laughlin, Neil Rude and Gregory Whitledge]****Standardizing a Multi-Gear Approach for Sampling Ohio River Catfishes**

*Standardized sampling methods to assess catfish populations are well developed for lentic systems. However, they are not as well developed in lotic systems and development of standardized sampling methods in lotic systems are necessary to accurately analyze population characteristics. Many gear types have been used to sample the populations of catfish in riverine systems; catchability is not constant throughout the age distribution within an individual gear type, and a multi-gear approach may be essential to representatively sample catfish populations. Electrofishing, trotlines and hoop nets have been found to sample several different size classes illustrating size selectivity in channel and flathead catfish in other studies. The objective of this portion of our study was to develop standardized sampling protocols for channel, flathead, and blue catfishes in the Illinois section of the Ohio River. Catfishes were sampled from May-October 2012-2015 using electrofishing, trot lines, and hoop nets. We found that trot lining was among the most effective gears for sampling blue and channel catfish  $>300$  mm total length (TL). DC electrofishing at 15 pps was most effective for sampling small catfish  $<300$  mm TL, whereas 60 pps was most effective for channel catfish 300-600 mm TL. Hoop nets and low-pulse DC electrofishing both collected broad size ranges of flathead catfish.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 3 (Tuesday 9:00-10:30)**

**Kelly D. Hannan, University of Illinois, Urbana-Champaign**

**[Kelly D. Hannan, Jennifer D. Jeffrey, Caleb T. Hasler, Cory D. Suski]**

The Physiological Effects of CO<sub>2</sub> in the Context of a Non-physical Barrier to Fish Movement, on Freshwater Mussels

*The movement and spread of invasive fish species is a topic of recent concern. In the Midwestern US, Asian carp are an invader of particular concern due to the recent expansion of their populations. Gas barriers aimed at deterring fish movement, such as CO<sub>2</sub>, are gaining in popularity as areas of elevated CO<sub>2</sub> have been shown to be effective at deterring fish movement. However, little research has investigated potential consequences of these barriers on non-target species, such as mussels. Freshwater mussels are one of the most imperiled animals worldwide, and have some of their highest diversity in North America, and zones of high CO<sub>2</sub> have potential to impact these organisms. The goal of the current study was to quantify the impacts of short-term and chronic exposures to elevated CO<sub>2</sub>, and subsequent recovery, on freshwater mussels. Hemolymph ions such as, Ca<sup>2+</sup>, Cl<sup>-</sup>, Mg<sup>2+</sup>, and Na<sup>+</sup> were measured along with hemolymph glucose and body condition indices. Results from these studies indicate that freshwater mussels experienced physiological disturbances related to acid base disturbance following CO<sub>2</sub> exposure, but body condition is unaffected even after chronic exposure, and there is evidence of recovery following removal of the CO<sub>2</sub> challenge. Results are further discussed in the context of how CO<sub>2</sub> barriers may impact non-target organisms.*

**John A. Tix, University of Illinois Urbana-Champaign**

**[John A. Tix, Caleb Hasler, Cody Sullivan, Jennifer D. Jeffrey and Cory D. Suski]**

The Impact of Elevated Carbon Dioxide (CO<sub>2</sub>) on Alarm Cue Behaviors in Fathead Minnows

*The spread of invasive species poses a serious threat to aquatic ecosystems. Previous research has shown that elevated CO<sub>2</sub> impairs fish movement, thus making it a potentially powerful tool to block further movement of invasive fishes. However, at present, there are unknowns that need to be addressed prior to deploying CO<sub>2</sub> barriers, such as impacts to non-target taxa. Recent work in the marine environment suggests that increased CO<sub>2</sub> levels due to climate change can negatively affect a fish's ability to detect predators, home to natal environments, and perform aerobically; thus, elevated CO<sub>2</sub> may have equally negative impacts on freshwater communities, an area that remains understudied. The objective of our study was to quantify the impacts of elevated CO<sub>2</sub> on Fathead Minnow (*Pimephales promelas*) alarm pheromone behaviors. Fathead Minnow behaviors associated with their response to conspecific alarm pheromones were significantly impaired following exposure to elevated CO<sub>2</sub> levels for at least 96 hours. Behaviors to alarm pheromones did not completely re-establish after 15 days of returning fish to ambient CO<sub>2</sub> levels. Potential impacts to non-target fishes following CO<sub>2</sub> exposure in both short- and long-term are discussed further.*

**Sarah Huck, Illinois Natural History Survey**

**[Sarah Huck, Solomon David, Jeffery Stein]**

Utility and Precision of Hard Structures used to Estimate Age for Three Species of Gar

*Recreational angling for gars has grown in popularity in recent years, yet we lack a fundamental understanding of population dynamics in Illinois requisite for proper management and conservation. Age data is essential to describe population parameters, however, there are few studies describing which hard structures are best used to estimate age of gars. Therefore, we collected Spotted Gar (n=94), Shortnose Gar (n= 79), and Longnose Gar (n= 47) from multiple Illinois watersheds to assess the precision and utility of otoliths, cleithra, pectoral fin rays, and branchiostegal rays for age estimation based on collection process, preparation to read annuli, and precision between readers. Pectoral fin rays generated the best between reader precision (Spotted Gar (CV= 5.21 ± 0.80), Shortnose Gar (CV= 7.97 ± 1.55), Longnose Gar (CV= 9.57 ± 2.15)), followed by branchiostegal rays (Spotted Gar (CV= 8.76 ± 0.90), Shortnose Gar (CV=14.73 ± 3.13), Longnose Gar (CV= 16.66 ± 5.35)) for all three species. Precision estimates for cleithra were significantly worse than pectoral fin rays for Spotted Gar (ANOVA, P < 0.001) and Shortnose Gar (ANOVA, P = 0.002), while otoliths were significantly worse than pectoral rays for Longnose Gar (ANOVA, P < 0.001). Our results suggest pectoral fin rays are most useful to age Spotted, Shortnose, and Longnose Gars compared to branchiostegal rays, otoliths, and cleithra. Therefore, pectoral fin rays can be used to estimate population dynamics of gars to determine if management strategies are necessary to sustain Illinois populations.*

**Anabela Maia, Department of Biological Sciences- Eastern Illinois University**

**[Anabela Maia; Probst, B; Foster, A; Reeves, JD]**

Hydrodynamic Function of the Spiny Dorsal Fin of Bluegill Sunfish

*The spiny portion of the dorsal fin in Centrarchids is a nuisance to anglers, but why is it important for fish? In growing fish this portion of the fin is a potential deterrent to gape limited predators. However, one single spine would probably be sufficient to deter a predator. In spite of this, the spiny dorsal fin in bluegill sunfish has a larger area than the soft dorsal fin, which suggests additional hydrodynamic functions. Locally caught bluegill sunfish were brought to the lab and swam in a flow tank at IBL.s-1 in the presence or absence of streamwise turbulence. High speed video was used to investigate the kinematics of fish swimming in three different conditions: with the fin intact, after the injection of a muscle relaxant, or an afferent nerve blocker. In control conditions, the spiny dorsal fin is normally collapsed with no turbulence, but becomes erected in the presence of turbulence to aid in recovery when fish loses its heading in the flow. Fish injected with the muscle relaxant are unable to raise their spiny dorsal fin as expected. Fish injected with the afferent nerve blocker also fail to deploy the spiny dorsal fin in response to perturbations. When exposed to turbulent conditions, the fish most affected were the fish without sensory information, followed by the fish with no muscle control of the spiny dorsal fin, indicating that the absence of a functional spiny dorsal fin decreases stability.*

**Evan Boone, Eastern Illinois University**

**[Evan Boone, Les Frankland, Devon Keeney, Jeffrey Laursen, and Robert Colombo]**

White Grub in Centrarchidae from the Ohio River Drainage

*White grub (*Posthodiplostomum minimum centrarchi*) is a juvenile strigeoid trematode that has been documented in many centrarchid fishes. It infects fish by cercariae penetrating the skin, so transmission should be more efficient in slow moving water, and most studies are done on lentic systems where sunfish predominate. In this study, eleven centrarchid fish species (spotted bass (n=126), largemouth bass (n=18), smallmouth bass (n=8), bluegill (n=44), green sunfish (n=26), longear sunfish (n=50), orangespotted sunfish (n=36), redear sunfish (n=17), warmouth (n=13), black crappie (n=15), and white crappie (n=6)) were collected from the Ohio River Drainage in 2014 and 2015. Organs were examined for the presence of white grub metacercariae. Prevalence of white grub ranged from 0 in white crappie to 100% in redear sunfish and warmouth. Prevalence in bluegill, the most commonly studied host, was 86.4%. Mean intensity of white grub ranged from one in black crappie to 231 in spotted bass. To adjust for the effect of host size on intensity infections were standardized by organ and body weight. White grub metacercariae were recovered from the head, liver, heart, kidney, and spleen. White grub burdens in individual organs varied by host. Preliminary genetic evidence suggests that there may be two species of white grub in this system, one in the genus *Micropterus* and one in the genus *Lepomis*.*

**Alex Sotola, Eastern Illinois University**

**[V. Alex Sotola, Aaron Schrey, Eric Bollinger, Les Frankland, Gregory W. Whitley, Robert E. Colombo]**

Genetic Population Structure and Diversity of Adult Channel and Blue Catfish in the Wabash and Ohio Rivers

*For sportfishes in large rivers, little information is currently available regarding their genetic population structure and diversity which can be vital to continuing the sustainable exploitation of these fisheries. In the Midwest, channel and blue catfish are two of the most important commercial and recreational fisheries; therefore, understanding and assessing their genetic population structure and diversity should be of utmost importance for managers. We screened microsatellite loci to assess the genetic population structure and diversity of channel catfish from four sites on the Wabash River and two sites on the Ohio River. We also screened blue catfish from two sites on the Wabash River and one site on the Ohio River. We characterized the genetic population structure and diversity for both species. Of note, there is a lock and dam between two of the Ohio River sites. Heterozygosity levels for channel and blue catfish ranged from 0.517 to 0.602 and 0.446 to 0.557, respectively. Inbreeding coefficients (*F<sub>IS</sub>*) showed some signs of inbreeding and outbreeding for both species (channel catfish range: -0.057 to 0.216; blue catfish range: -0.147 to -0.055). There was a significant positive relationship between genetic differentiation (*G''ST*) and river distance (Pearson's *R*=0.8138, *P*=0.0002) for channel catfish, but this relationship was not significant for blue catfish (Pearson's *R*=-0.3653, *P*=0.7619). Dendrograms and PCA plots show strong defined structure for channel catfish, but there is no apparent structure for blue catfish. The presence of genetic differentiation may provide vital information for managing these commercially and recreationally exploited species.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 4 (Tuesday 11:00-12:30)**

**Carl A. Favata, Eastern Illinois University**

**[Carl A. Favata, Robert E. Colombo, Don Roseboom, Tim Straub, Anabela Maia]**

Fish Community Structure in a Restored Stream: What is Driving Dissimilarity?

*Anthropogenic habitat degradation has devastated Midwestern stream ecosystems, yet comprehensive assessments of these impacts remain infrequent. Recent restoration efforts in East-Central Illinois have contributed to unravel complex dynamics driving an altered stream. Our research examined the long-term linkages between structural rehabilitation and ecomorphology of fishes in Kickapoo Creek. We monitored habitat integrity and fish communities annually in seven 200m reaches using single-pass DC barge electrofishing. Nonmetric multidimensional scaling of assemblage data displayed dissimilar temporal shifts in community structure, with assemblages varying significantly as a factor of habitat rehabilitation. Restored reaches displayed beneficial increases in evenness and diversity, characterized by abundance of Centrarchidae, Catostomidae, Percidae, and Ictaluridae species. Permutational regression analyses significantly linked community structure with overall habitat integrity and driving habitat parameters — mean channel depth and abundance of boulder substrate, deep pools, submerged logs, and aquatic, terrestrial and overhanging vegetation. Significant multiple regression analyses on species abundances supported our multivariate models and confirmed that fish were most sensitive to changes in substrate profile. We correlated substrate and velocity profiles in each reach, and investigated the linkages between flow alteration and ecomorphology using a model species. We modeled the effects of flow alteration in the lab on cost of transport in Longear Sunfish (*Lepomis megalotis*) navigating a turbulent flow regime. Ecomorphology of Longear Sunfish suggests that increased metabolic demands associated with navigating complex flow regimes may affect behavior, driving habitat use and distribution. This highlights a key physiological mechanism responsible for shifts in community structure following intensive habitat and flow alteration.*

**Tristan Widloe, Illinois Department of Natural Resources [Stephen Pescitelli]**

The Duality of Asian Carp Monitoring: Protecting the Great Lakes While Providing Insight into Fish Species Distribution and Abundance in the Chicago Area Waterway System (CAWS)

*The Chicago Area Waterway System (CAWS) has received much attention in recent years due to increased recreational use resulting from improvements in water quality standards. Disinfection of wastewater has been initiated at two of the three wastewater treatment facilities in Chicago. Additional improvements in water quality are expected as the Deep Tunnel project is completed, reducing combined sewer overflow events. The Illinois Department of Natural Resources (IDNR) has been involved in habitat restoration projects, including stocking catchable-size Channel Catfish in the CAWS in 2015. Further attention on the CAWS due to concerns of upstream migration of Asian carp towards Lake Michigan led to intensive sampling upstream of the Electric Dispersal Barrier. Since 2010, approximately 875 hours of electrofishing and 372 miles of commercial netting have been completed as part of this monitoring effort. Aside from contributing to our understanding of Asian carp distribution and density, the results of Asian carp monitoring have served to augment previous data on fish species distribution and abundance in the CAWS. The extensive effort expended during Asian carp monitoring resulted in the identification of more than 72 species and 300,000 individuals. Recent Lake Michigan basin surveys completed by IDNR identified 36 species and 2,784 individuals in similar areas of the CAWS. This highlights the importance of by-catch collected during Asian carp monitoring to supplement existing data. This information may serve to direct future management decisions as water quality and habitat continue to improve throughout the CAWS bringing further attention to these urban waterways.*

**Brian A. Metzke, Illinois Natural History Survey [Brian A. Metzke and Leon C. Hinz, Jr.]**

Investigating the Relationship between Fish and Private Land Conservation Programs

*Incentive-based private land conservation programs (e.g., Conservation Reserve Program, CRP) preserve or enhance environmentally sensitive properties in exchange for payments or tax liability reduction. The assumption of these programs is that enrolled lands provide a direct (e.g., habitat quantity or enhancement) or indirect (e.g., reduced sedimentation) benefit to wildlife. Because the direct link between private conservation lands and stream fish may be difficult to evaluate, our objective was to describe the relationship between environmental characteristics and fish assemblages and then use that information to estimate how private lands might influence assemblage composition. We sampled fish, measured water quality and qualitatively assessed stream habitat at 81 locations in Kaskaskia River basin. We used linear regression and Akaike's Information Criterion (AIC) to identify which models best estimate the relationship between stream and watershed characteristics and fish assemblages. Fish assemblage composition correlated with sampling effort, habitat heterogeneity, riparian zone characteristics and stream disturbance. We used CRP density within a watershed to quantify private conservation land in the Kaskaskia River basin. CRP density correlated with some of the same factors as did fish assemblages suggesting the potential for these lands to influence fish assemblages. Investigating the interaction between private conservation lands and streams is a first step in identifying ways these lands can be used to enhance stream biota.*



**Shannon C.F. Smith, Eastern Illinois University****[Shannon C.F. Smith, Ryan Hastings, Trent Thomas, Scott Meiners, Devon Keeney, Robert Colombo]**Examining the Effects of Low-head Dams on River Ecosystems: from Habitat Quality to Population Genetics

*Artificial impoundments such as dams are extremely prevalent throughout the Midwest, and have been shown to decrease hydrologic connectivity and disrupt the natural flow regime of river systems. These physical changes can alter habitat types and precipitate a shift from lotic to lentic habitats. Environmental variation influences fish movement and dispersal, leading to changes in fish assemblages over time. We semiannually assessed habitat quality and fish assemblages at sites above and below two low-head dams on two rivers in east-central Illinois to investigate the impacts of these dams on the ecosystem. Our twelve sites included two below each dam, two sites in the pool above each dam, and two sites upriver of each dam. Additionally, we analyzed microsatellites of Longear Sunfish (*Lepomis megalotis*) and Bluntnose Minnow (*Pimephales notatus*) to evaluate genetic structuring of these species as a result of the dams. Habitat quality was lowest in the pool sites and highest in upriver sites ( $p < 0.05$ ), suggesting poorer habitat immediately above the dams. Fish habitat guilds differed among study sites, with riffle specialists preferring upriver habitats to pool habitats ( $p < 0.05$ ). Genetic analyses revealed weak genetic differentiation in Longear Sunfish among sites. Bluntnose Minnow showed genetic differentiation between upriver sites in the North Fork and all sites in the Vermilion River, indicating a possible effect of distance ( $p < 0.0005$ ) and suggesting the presence of two genetically distinct populations. Overall, data indicate the presence of these dams influences habitat type and fish assemblages but does not contribute to genetic differentiation in these species.*

**David B. Muir, Illinois Environmental Protection Agency**The Relationship of the Fish Index of Biotic Integrity to the Qualitative Habitat Evaluation Index in Illinois Streams

*The Qualitative Habitat Evaluation Index (QHEI), (Rankin, E. T. 1989), was developed by Ohio EPA and is used to evaluate the potential of stream habitat to support aquatic life. It was adopted by Illinois EPA in 2005 and is used routinely in Cooperative Intensive Basin Stream Surveys. The QHEI is mostly a subjective visual evaluation of habitat quality based on substrate, instream cover, riparian zone, bank erosion, channel morphology, pool/glide quality, riffle/run quality and gradient. Although used by Illinois EPA since 2005, its relationship to fish communities in Illinois streams and its effectiveness as a predictor of biological potential in Illinois has not been evaluated. This study looks at the relationship between Fish Index of Biotic Integrity scores and QHEI scores collected from 2006 through 2010 at 456 Cooperative Intensive Stream Survey sites across Illinois. Results show that the FIBI has a somewhat weak but statistically significant correlation to the QHEI. FIBI scores grouped into Good, Fair and Poor categories of the QHEI are also significantly different. Although the QHEI is not a good predictor of Biotic Potential at scores above the fair range (45), values in the poor and very poor ranges may indicate lower biotic potential. Also, 74% of QHEI scores below 45 are associated with FIBI scores indicating impairment of aquatic life use.*

**Stephen Pescitelli, Illinois Department of Natural Resources**Evaluation of the Blackberry Creek Dam Removal on Stream Fish Assemblages

*Blackberry Creek Dam was in place for 175 years prior to removal in March 2013. The 12 ft. high dam was located 800 ft. upstream of the Fox River, blocking fish movement in the entire stream system. Compared to nearby un-dammed streams, Blackberry Creek was lacking some common migratory and intolerant fishes which contributed to lower IBI scores. Two weeks following dam removal in March, we collected spawning Shorthead Redhorse and Quillback Carpsucker. Shorthead Redhorse spawning nests were observed throughout the area upstream of the former dam. We also observed spawning Smallmouth Bass and Longnose Gar upstream following dam removal. The largest post-removal changes were observed in the former dam pool where fish species richness was three times greater and CPUE increased by a factor of 20 compared to pre-removal conditions. The IBI also increased by 11 points. We collected 25 fish species in the former dam pool which were not found in the pooled area prior to removal. Ten of the species collected upstream of the dam following removal were not previously recorded at any upstream sampling locations from pre-removal surveys. Smallmouth Bass and Channel Catfish were last collected upstream of the dam in 1997 and were in low abundance. Both species were common in the upstream segments following dam removal and young-of-the-year of both species were found four miles upstream of the former dam. A brief description of the dam removal process will also be presented.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 5 (Wednesday 9:00-10:30)**

**Jason DeBoer, Illinois River Biological Station- Illinois Natural History Survey**

**[Jason DeBoer, Mark Fritts, Daniel Gibson-Reinemer, Collin Hinz, Doyn Kellerhalls, Richard Pendleton, Levi Solomon, Andrew Casper]**

Biotic response to the establishment and expansion of Asian carp in the Illinois River

*As a heavily modified river system that connects the Mississippi River watershed to the Great Lakes watershed, the IRW is a conduit for the movement of invasive species between watersheds. The most-recent – and perhaps most-feared – invasives are Asian carps, which threaten the Great Lakes themselves, and countless highly productive miles of connected rivers as well. In the 1950s, Illinois Natural History Survey scientists initiated a standardized electrofishing sampling program (Long-Term ElectroFishing - LTEF) on the Illinois River Waterway (IRW). The Upper Mississippi River Restoration Program's Long Term Resource Monitoring (LTRM) element combines environmental monitoring, research, systemic data acquisition, and modeling to provide a solid scientific foundation for its partners in the Upper Mississippi River System. Using the unparalleled spatio-temporal record of the LTEF and LTRM programs in Illinois, we present an analysis of ongoing large-scale datasets, including ebbs and flows in Asian carp CPUE, condition, and chronic effects on the fish, zooplankton, and phytoplankton communities. These programs provides biotic community data prior to the invasion and at every step as it happens. Our objective is to provide a better understanding of how Asian carps have affected biotic communities throughout the IRW. We believe these findings may provide indications of how Asian carp populations can become established and grow in novel habitats.*

**Scott F. Collins, Kaskaskia Biological Station- Illinois Natural History Survey [Scott F. Collins, David H. Wahl]**

Exploitative Effects of Bighead Carp: Alterations to Organic Matter Exchanges within and between Ecosystems

*Asian carp are invasive planktivores that are capable of greatly depleting planktonic resources and have demonstrated the capacity to achieve high levels of productivity. Due to inefficiencies of converting food into fish tissue, portions of consumed materials are egested and shunted to benthic habitats. We explored how bighead carp alter pools of organic matter between pelagic and benthic habitats, and across ecosystem boundaries via insect emergence. Here we report evidence from a manipulative experiment demonstrating that bighead carp (*Hypophthalmichthys nobilis*) greatly reapportion pools of organic matter from pelagic to benthic habitats to such a degree that additional effects propagated across ecological boundaries into terrestrial ecosystems. Strong direct consumption by bighead carp reduced filamentous algae, biomass and production of zooplankton, and production of a native planktivorous fish within pelagic habitats, and reduced the cross-boundary emergence of adult Chaoboridae midges. Consequently, reduced herbivorous zooplankton indirect increased phytoplankton (chlorophyll a) via trophic cascade. Reductions in these pools of organic matter accompanied strong flows (i.e., total consumption) through bighead carp populations, which in turn supported a high degree of carp production and concomitant losses of materials due to egestion. Egested material subsidized benthic Chironomidae larvae, increasing their standing crop biomass, as well as cross-boundary fluxes of their adult life stage. The perception and conception of bighead and silver carp should evolve beyond competitors for planktonic resources, to mediators and processors of nutrients and energy within and across ecosystems.*

**Eli G. Lampo, Department of Biological Sciences- Western Illinois University**

**[Eli G. Lampo, James T. Lamer, Brent Knights, Jon Vallaza, James H. Larson, Andrew Casper, Rich Pendleton, and Levi Solomon]**

Juvenile Asian Carp Predation on the LaGrange Reach, Illinois River

*The Silver Carp spawning event in 2014 has led to an abundance of juvenile silver carp in the La Grange Reach of the Illinois River. The objectives of our study were to determine if native piscivores are using these year one fish as forage, estimate the length of silver carp that were consumed, and, to determine if there was a significant relationship between predator length and the length of silver carp they consumed. We collected fish from contiguous backwaters and tributaries on the La Grange Reach of the Illinois River using pulsed DC- electrofishing. During diet analysis we used the presence of silver carp pharyngeal teeth and masticating pads to confirm the identification of silver carp in the piscivores diets. We collected 919 piscivores representing 17 species of fish. 5 species of fish were found to have eaten silver carp: largemouth bass, shortnose gar, white bass, white crappie, and channel catfish. The frequency of occurrence percentage for silver carp was 9.7% for largemouth bass (n=257), 17.8% for shortnose gar (n=28), 9.1% for white bass (n=77), 2.1% for channel catfish(n=48), and 1.9% for white crappie(n=52). We found that there was a significant relationship between the size of masticating pads and silver carp length( $p < 0.0001$ ). We estimated the length of silver carp by measuring the masticating pads found during diet analysis and comparing them to the sizes of masticating pads from known length silver carp. We determined that there was a significant relationship between largemouth bass length and the length of silver carp consumed ( $p < .0001$ ).*

**Matthew Lubejko, Southern Illinois University Carbondale****[Matthew Lubejko, James E. Garvey, Marybeth K. Brey\*, Gregory W. Whittedge]**Influence of a Gated Dam on the Seasonal Movements and Upstream Passage of Asian Carp in the Illinois River

*Invasive Bighead Carp (*Hypophthalmichthys nobilis*) and Silver Carp (*H. molitrix*), hereafter, Asian Carp (AC), pose a major threat to the Great Lakes ecosystem as they advance toward Lake Michigan via the Illinois River. Starved Rock Lock and Dam (SRLD) is the most downstream gated dam on the Illinois River, therefore presenting the first navigation challenge for upstream migrating AC. Since 2013, less than 1% of acoustically tagged AC have passed upstream through SRLD. In addition, hydroacoustic surveys indicate the abundance of AC significantly declines upstream of SRLD. Our objective was to investigate the permeability of SRLD to AC migration. We increased our acoustic receiver network around SRLD and tagged an additional 119 AC downstream of SRLD. This information will allow us to relate AC movements to environmental variables and the operation of gates at SRLD, which will be particularly important for managing AC and reducing their upstream movement at other gated dams along the Illinois and Mississippi Rivers.*

**Elizabeth P. Tristano, Southern Illinois University-Carbondale****[Elizabeth P. Tristano and James E. Garvey]**Direct and Indirect Effects of Invasive Asian Carp on Native Communities

*Invasive species may alter primary productivity and nutrient content in native ecosystems, affecting condition of native species. For example, planktivorous Asian carp (*Hypophthalmichthys* spp.) may alter freshwater trophic dynamics, reduce phytoplankton and zooplankton, and compete with native gizzard shad (*Dorosoma cepedianum*). To examine how Asian carp affect zooplankton, system primary productivity, and gizzard shad, we conducted a series of pond mesocosm experiment with varying densities of gizzard shad and silver carp (*H. Molitrix*). Ponds were sampled weekly for zooplankton abundance, chlorophyll a concentration, and water column NH<sub>4</sub>, NO<sub>3</sub>, and PO<sub>4</sub> concentrations throughout each experiment. Additionally, gizzard shad gut samples were taken at the conclusion of the experiment. Preliminary results suggest that Asian carp presence does not significantly affect gizzards growth, although zooplankton density and chlorophyll a concentration declined in the presence of Asian carp over time. This result could be due to a lack of competition between Asian carp and gizzard shad for food resources, as is evident by the high amount of detritus found in gizzard shad diets. Additionally, although water NH<sub>4</sub>, NO<sub>3</sub>, and PO<sub>4</sub> concentrations do not appear to differ in the presence or absence of Asian carp, these fish may alter detrital quality, thereby providing a high quality food source for gizzard shad.*

**Brian Zalay, Illinois Natural History Survey****[Brian Zalay and Andrew F. Casper]**Zooplankton Response to Asian Carp Harvesting in Illinois River Backwaters

*Since Asian carp (*Hypophthalmichthys nobilis* and *Hypophthalmichthys molitrix*) have arrived in the Illinois River, they appear to have a major negative impact on zooplankton. In an effort to protect the Great Lakes by keeping the Asian carp population low and thus to reduce the pressure on the electric barrier, the Illinois DNR has contracted ten commercial fishing crews to conduct regular Asian carp removals. The objectives of this study are to understand the zooplankton ecological response to the reduction of Asian carp and thus determine the effectiveness of Asian carp harvesting for ecosystem recovery. The fishing crews harvested bimonthly at select backwaters of the upper reaches of the Illinois River. The hypothesis is that zooplankton, a major food source for Asian carp and other fish, may respond positively to the harvesting. Although zooplankton have recovered from other types of disturbances in different ecosystems, it is not known how zooplankton might respond to planktivore harvesting in a large river system. Zooplankton samples were collected over four months at ten backwaters during the summer of 2015. The macrozooplankton community was primarily copepod nauplii followed by cladocerans and copepods. I will compare the zooplankton community structure between a spectrum of Illinois River backwaters with harvesting of Asian carp at different frequencies and intensities.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **AFS Session 6 (Wednesday 11:00-12:30)**

**Sara M. Creque, Illinois Natural History Survey**

**[Sara M. Creque, John H. Chick, Sergiusz J. Czesny, Rebecca Rogers, Justin Bopp, & Nathan Jermain]**

Underestimation of Microzooplankton in the Great Lakes is a Macro-problem

*Rotifers are an important but overlooked part of zooplankton communities and aquatic food webs, particularly in the Great Lakes. We compared collection efficiency using the traditional 63- $\mu$ m mesh plankton net with a microzooplankton method using whole-water samples filtered through a 20- $\mu$ m mesh screen. We collected 81 paired samples throughout Lake Michigan. Mean density and biomass of the most abundant rotifer taxa, copepod nauplii and veligers were significantly higher in the microzooplankton method samples. The largest difference between methods was for rotifers. The macrozooplankton method significantly underestimated total rotifer density by an order of magnitude. Percent composition of rotifers increased from 56% to 82% of density and percent composition of cladocerans and copepods decreased from 15% to 5% in macro- only samples compared to dual method results. Rotifers contributed 51% of total mean zooplankton biomass when using combined results from both methods, which refutes the past notion that rotifers contribute little to overall zooplankton biomass. Our study demonstrates that the one-size fits all sampling used in zooplankton monitoring studies in the Great Lakes significantly underestimates microzooplankton abundance and its relative importance. The lack of accurate data on microzooplankton suggests that prey resources available to Asian carp in Lake Michigan have been greatly underestimated along with the likelihood these invasive species could become established. The dual sampling approach must become the norm rather than the exception for zooplankton research in the Great Lakes and other freshwater systems.*

**Joshua Dub, Lake Michigan Biological Station- Illinois Natural History Survey**

**[Joshua Dub and Sergiusz Czesny]**

Evaluating Yellow Perch Spawning Habitat using Side Scan Sonar

*In aquatic systems, habitat is determined by the physical, chemical, and structural complexities present within the environment. While physical and chemical characteristics can be measured using conventional techniques, describing structural complexity requires a different approach. Illinois waters of Lake Michigan are home to a diverse assemblage of fishes that occupy nearshore areas at different periods throughout their life history. Yellow perch are an economically and ecologically valuable native sport fish that spawn over complex rocky substrate during spring months. Despite the ecological significance of the coastal zone, quantitative and qualitative data describing the structural complexity and habitat suitability of nearshore areas within Lake Michigan is lacking. We used an EdgeTech 4125 dual frequency side scan sonar (400/900 kHz) to collect high resolution substrate data near historical yellow perch spawning grounds in Illinois waters of Lake Michigan. Chesapeake Technologies SonarWiz was used to create a geo-referenced mosaic of side scan transects and substrate types were distinguished by differing backscatter characteristics. A geographic information system (GIS) was used to isolate and quantify substrate areas. Quantification and qualification of substrate types paired with biological data will provide a more complete picture of the nearshore habitat and expand our understanding of the role it plays in structuring the nearshore community.*

**Charles Roswell, Illinois Natural History Survey**

**[Charles Roswell, Joshua Dub, Sergiusz Czesny, Victor Santucci, Daniel Makauskas]**

Yellow Perch Angling Effort and Harvest Dynamics in Lake Michigan, and the Value of a New Biological Metric

*Yellow perch (*Perca flavescens*) constitute an important component of Illinois' Lake Michigan fishery, typically accounting for more than one-third of total angling effort and more than half of fish harvested annually. A creel survey conducted annually by the Lake Michigan Biological Station generates estimates of directed angler effort and harvest. More recently, spines collected from angler-harvested yellow perch allow estimates of harvest age composition. Variable recruitment and regulation changes have been qualitatively shown to have impacted the yellow perch fishery; however, impacts on important fishery metrics for yellow perch (e.g., harvest rates) have not been quantitatively assessed. Moreover, angler behavior and its importance to underlying fishery dynamics (e.g., hyperstability) are poorly understood. Finally, patterns in harvest sex ratio for the recreational yellow perch fishery are unknown, despite several factors that suggest its importance (e.g., sexual dimorphism, regulations aimed at influencing population sex ratio). We use 30 years of creel survey data, coupled with fishery-independent data, to elucidate the influence of recruitment variation and assess the impact of regulation changes on yellow perch angler effort, harvest, and harvest rates. We also examine hyperstability and other dynamics related to angler behavior, with a special focus on comparing boat and shore anglers. Lastly, we introduce a non-intrusive, external method to determine sex of harvested yellow perch via photographs of the urogenital papilla (UGP) and apply preliminary UGP-derived sex ratios to illustrate their utility for understanding fishery dynamics and implications for management.*

**Jerrod Parker, Illinois Natural History Survey**

**[Jerrod Parker, John Epifanio, Yong Cao]**

Efficiently Sampling Fish Assemblages in the Tributaries of Large Rivers with Boat-Mounted Electrofishing

*Major tributaries of large rivers in Illinois are often non-wadeable and have substantial variation in flow among seasons and years. Complex channel geo-morphology, limited areas for boat entry, and flow variability greatly effect access to portions of these medium sized rivers. It is a challenge to sufficiently document the long-term responses of fish assemblages to natural environmental changes and human disturbances with constrained resources and problematic access. Key factors to account for when designing a sampling regime are the number of sampling sites and sampling frequency. To address the relative importance of these factors, we made use of three consecutive years of intensive boat-mounted electrofishing data collected from 25 fixed site locations within the 6th order Kankakee River, a major tributary of the Illinois River. Fifteen minute pulsed-DC electrofishing surveys were conducted between early June and Late October in 2013, 2014, and 2015 for a total of 42.5 hours of electrofishing effort. These data were assessed to determine the contribution of year, season, and segment to the total variance in fish samples. The results were combined with field experience to help produce a practical sampling regime that should adequately capture long-term responses of fish to environmental factors.*

**Michael Nannini, Illinois Natural History Survey**

**[Michael Nannini, David Wahl]**

Does Prey Community Composition Effect the Way Different Behavioral Types Interact with their Environment?

*We examined how different exploratory behavioral temperaments of largemouth bass responded to differing prey communities in experimental ponds and examined effects on growth, survival and diet. We found evidence that non-explorer largemouth bass target young-of-year bluegill early on in life, but bluegill were not an important diet item by late summer. The presence of young-of-year bluegill as prey does appear to affect the foraging strategy of the two exploring temperaments differently. In the absence of small bluegill both temperaments feed primarily on benthic invertebrates and zooplankton. When small bluegill were present, we saw a shift away from zooplankton as prey for largemouth bass. However, that shift was toward more benthic invertebrates for non-exploring behavioral types and toward terrestrial insects for exploring behavioral types. Thus it appears that prey community composition can have important effects on the way in which different behavioral types interact with their environment.*

**Nathan Grider, Illinois Department of Natural Resources**

A Quick Tour of the IDNR Aquatic Impact Review Program and Your Role as Managers and Researchers

*The Aquatic Impact Review Program within the Illinois Department of Natural Resources (IDNR), Impact Assessment Section reviews roughly 500 permits each year related to construction projects, restoration activities, and pesticide applications in wetlands, streams, rivers, and lakes throughout Illinois. The reviews, referred to as "consultation," are a regulatory requirement for applicants seeking U.S Army Corps of Engineers, Office of Water Resources, and other state and local government agency permits. While the IDNR holds broad authority over permitted activities in designated Public Waters, reviews are more narrow in Waters of the State with the primary focus being compliance with the Illinois Endangered Species Protection Act [520 ILCS 10/11], the Illinois Natural Areas Preservation Act [525 ILCS 30/17], and Illinois State Agency Historic Resources Preservation Act [20 ILCS 3420/4]. Consultation with IDNR is initiated by applicants using the online Ecological Compliance Assessment Tool (EcoCAT). The purpose of this presentation is a quick tour of regulatory authorities, EcoCAT, Incidental Take Authorization, and your role in the process.*





## Conference Abstracts

*Abstracts will be listed by session by organization*

### **ILMA Session 1 (Monday 1:00-2:30)**

**Gregg Ratliff, Illinois Environmental Protection Agency**

The Volunteer Lake Monitoring Program

*Greg Ratliff will give a brief talk about the Illinois EPA's Volunteer Lake Monitoring Program. The presentation will include the elements comprising the program, purpose of the program, significance of the data collected, overview of previous year's data, and the proposed strategy for the upcoming sampling season.*

**Gary Raines, HMG Engineers, Inc**

There is no try, the do's and do not's of grant writing for lake and watershed projects: Effective grant application from the consultant's viewpoint

*Effective grant applications begin with the identification of a specific need of an existing or prospective client (owner). This information may be a recommendation from a previous study or evaluation of the owner's infrastructure, may be based on the consultant's knowledge of the owner's facilities, and often may originate from the client's demonstrated need for such an improvement. The process may then involve the review of all potential funding sources which will likely include combined funding from local sources coupled with funding from one or more grant programs using public funds. Once the appropriate grant program (or programs if leveraging is planned) is decided upon, grant application preparation begins. The consultant must be certain the purpose and goals of the grant program are appropriate for the proposed project. In order for the grant application to be effective, the author must be aware of several fundamentals, including: application deadlines, funding limits, grantor's review process, and the investment in time and cost to prepare the application relative to the amount of the award if funded. All components of the application must be completed as accurately as possible. Elements known to be more important to the application reviewers than others should be given more thought by the writer. Technical aspects of the application, including attachments, should be as technically accurate as possible. Generally, complete and concise information is more important than verbosity and redundancy. Lastly, the consultant must be representing the owner to the max. All grant sources utilizing public funds require serious commitments, both immediate and long term of the owner. The owner (applicant) must be fully aware of these requirements and committed to the project as presented.*

**Gerry Urbanozo, Lake County Health Department**

Implementing a Request for Proposal (RFP) to Achieve Aquatic Plant Management Goals

*A key to a healthy lake is a well-balanced aquatic plant population. Aquatic plants compete with algae for nutrients and stabilize bottom substrate, which in turn improves water clarity. Putting together a good aquatic plant management plan should include a Request for Proposal (RFP). The RFP for aquatic plants ensures lake managers are able simultaneously distribute bids to qualified vendors with type of services, the frequency of needs, budget allocation and the length of the contract terms to get competitive prices.*

## ILMA Session 2 (Monday 3:00-4:30)

### **Brian Valleskey, Illinois Lake Management Association**

#### Stormwater Science: A Watershed & Lakes Perspective

*The timeline of stormwater management has us led us to where we are today. Mandated municipal management of stormwater and watershed protection via agency policy. For many of us stormwater runoff is the key hydrologic input for lake water levels and brings with it all the evils of the watershed. How does the interpretation and management of stormwater policy at these levels impact our lakes, streams, and other water resources? How do policy and stormwater science match up? How can I as an interested stakeholder play a part in informed decision making? These are a few questions we will touch upon during this presentation.*

### **Danielle Gallet, Metropolitan Planning Council**

#### Solving Stormwater Challenges through Coordination: The Calumet Stormwater Collaborative

*The Calumet Stormwater Collaborative (CSC) was formed to bring together a range of stakeholders involved with or affected by urban flooding in the Calumet region, which encompasses south Chicago and some southern suburbs. MPC has been the facilitator of CSC since April 2014, which is made up of national, state and local government partners, non-profits, private organizations and community members, and has been going strong with well-attended monthly meetings and organized working groups, which are leading to productive improvements. Some of the results include: bringing hands-on assistance, planning and resources to multiple municipalities; creation of best practice green infrastructure design templates for communities; a working paper that MPC will be releasing with CH2M on how a robust, regional stormwater modeling tool could function and provide resources in decision-making to communities; and the development of a needs assessment and preliminary market analysis report to better understand the role green infrastructure installation and maintenance can have in local jobs and work training opportunities within communities. Beyond the accomplishments of this collaborative, the specific design, engagement and retention of members has been a case study for how to develop a successful stakeholder engagement process that keeps individuals and various agencies consistently involved and productive.*

### **Jeff Boeckler, Northwater Consulting**

#### Lake Management Planning & Implementation

*In almost all cases, lake and reservoir quality is directly tied to inputs from the contributing watershed. Lake management can only be successful if in-lake measures are coupled with upland treatments. Effective watershed management begins with a sound understanding of basin dynamics followed by focused implementation and the execution of a comprehensive strategy. Two examples of this include Lake Mauvaise Terre in Morgan County, Illinois and Lake Springfield in Sangamon County, Illinois. Both are public water supply reservoirs and both are suffering from substantial sediment and nutrient loading. Unfortunately, each lake is now faced with a balancing act between the need to manage current and future contributions with a need to address a long legacy of accumulated sediment and nutrients deposited over time. In an attempt to improve future water quality, both lakes are undertaking large scale watershed management, planning and implementation activities. In addition to recent dredging efforts, targeted watershed BMP implementation is underway in the Lake Mauvaise Terre watershed following the completion of a watershed plan and thanks in part to a large Illinois EPA Section 319 grant. Lake Springfield is finalizing a comprehensive watershed inventory and plan concurrent with the implementation of numerous BMPs and a rigorous water quality monitoring program. The presentation will include a history and description of the Lake Mauvaise Terre planning efforts and the current implementation project. The presentation will describe the Lake Springfield watershed project and will focus on results of the planning process, methods and recommendations moving forward.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **ILMA Session 3 (Tuesday 9:00-10:30)**

#### **Marcia Willhite, Illinois Environmental Protection Agency**

##### Update on the Illinois Nutrient Loss Reduction Strategy

*Illinois has two water quality problems to solve caused by losses of phosphorus and nitrate-nitrogen to water: 1) local impacts to in-state rivers lakes and streams, and 2) Illinois' significant contribution of nutrients that reach the Gulf of Mexico and contribute to the hypoxic zone. Over the past three years, Illinois EPA and Illinois Department of Agriculture have worked with stakeholders to develop a strategy for addressing these losses which includes actions directed at point sources, agricultural non-point sources and urban stormwater.*

#### **Gregg Good, Illinois Environmental Protection Agency**

##### Establishment of the Nutrient Monitoring Council

*The Illinois Nutrient Loss Reduction Strategy (NLRS) guides state efforts to improve water quality by reducing nitrogen and phosphorus levels in our lakes, streams, and rivers. It lays out a comprehensive suite of best management practices for reducing nutrient loads from wastewater treatment plants and urban and agricultural runoff. Recommended activities target the state's most critical watersheds and are based on the latest science and best-available technology. The NLRS also calls for more collaboration between state and federal agencies, cities, non-profits, and technical experts on issues such as water quality monitoring, funding, and outreach. The NLRS was developed by a Policy Working Group led by the Illinois EPA and the Illinois Department of Agriculture, with coordination and facilitation assistance provided by Illinois Water Resource Center-Illinois Indiana Sea Grant. Key to implementation of the NLRS is the establishment of five working groups now convened that will be continuing to work over the next two years to answer questions raised in the NLRS and monitoring progress. One of the five working groups established is the Nutrient Monitoring Council (NMC) whose overarching charge is to coordinate water quality monitoring efforts by government agencies, universities, non-profits, and industry. Formally established at its first meeting on May 13, 2015, the NMC is comprised of representatives from agencies and organizations involved in monitoring nutrients, including Illinois EPA, the Illinois State Water Survey, U.S. Geological Survey, Illinois Department of Natural Resources, sewage treatment plants, agricultural groups, and others. The NMC meets three to four times a year to coordinate the development and implementation of monitoring activities that provide the information necessary to respond to three primary charges, including (a) calculating annual nutrient loads leaving the state, (b) calculating annual nutrient loads leaving selected high priority watersheds, and (c) assessing improvements to or declines in water quality. This presentation will provide an overview of the NMC, its development, its membership, its primary charges, its activities to date, and its plans for the future.*

#### **Paul Terrio, U.S. Geological Survey- Illinois Water Science Center**

**[Paul Terrio, Kelly Warner, David Fazio, Colin Peake, and Shawn Cutshaw]**

##### Illinois Nutrient Super Gage Network

*The State of Illinois contributes substantial amounts of nutrients (nitrogen and phosphorus) to the Mississippi River and Gulf of Mexico. Relatively new methods for continuously monitoring nitrate, phosphate, and turbidity concentrations are providing a more detailed picture of nutrient concentrations and loads over time and during important low- and high-flow events. The U.S. Geological Survey (USGS), in cooperation with the Illinois Environmental Protection Agency, has implemented a network of monitoring stations that provide a continuous data record of streamflow, nitrate, phosphate, turbidity, pH, dissolved oxygen, temperature, and specific conductance. These stations are called nutrient super gages. Data from these nutrient super gages are transmitted to the USGS in near real-time and are generally available to the public within several hours of measurement. These data will provide improved data sets for water-quality modeling, trend and loading analyses, and other important data analyses. The Illinois nutrient super gage network measures nutrients and turbidity (a surrogate for suspended sediment) from the drainage areas of eight major river basins that collectively account for over 70 percent of the land area of Illinois. The continuous monitoring at these nutrient super gages will provide a comprehensive record of nutrient concentrations and loads exported from Illinois. Comparison of the continuous water-quality data with laboratory analyses is done routinely and plans call for verification sampling during at least four storm events over the first year of operation of each nutrient super gage. This verification sampling is important for determining phosphates, turbidity, and sediment relations that are used to calculate total phosphorus loads.*

## ILMA Session 4 (Tuesday 11:00-12:30)

### Sandy Kubillus, ILM (Integrated Lakes Management)

#### E. coli, Giardia, and Chrypto, Oh My! Is it Safe to Swim at the Beach?

*Have you ever been to a beach ready to go swimming, and then noticed a sign stating “No swimming, high bacteria counts?” What does this mean? If no sign is present, is the water safe? Maybe, maybe not. E. coli bacteria counts are required to determine if a beach is safe, but other contaminants may be lurking in the water, such as Giardia and Cryptosporidium cysts, and Salmonella bacteria. Should the water be tested for these? Can the risk be reduced? Learn about our experiences with these studies, how to collect samples, what the results mean, the most likely times for beaches to have these contaminants, and what can be done to reduce the likelihood of their presence.*

### Karen Clementi, Deuchler Environmental, Inc.

#### Mysterious Brown Algae: A Fox River Phenomenon

*On behalf of the Fox Metro Water Reclamation District, Deuchler Environmental, Inc. (DEI) has been collecting biological and water chemistry data on the Aurora-area of the Fox River for the past several years. During this study, DEI started documenting a new kind of algal bloom in 2013 that was discovered to be a diatom species, a type of brown algae. Other types of algae have high public and scientific prominence, such as blue-green algae (cyanobacteria) and green algae that cause a large portion of the Fox River to be included on the 303(d) list as an impaired water for nuisance algae; however, diatom blooms are a newly-observed phenomenon on the Fox. DEI collaborated with the several entities to investigate the details of this bloom. Subsequently, DEI was able to use the 2013 and 2014 ambient condition data to predict a 2015 diatom bloom. This early warning information fostered positive public relations with recreational users and environmental groups, and provided information to local governmental bodies and the IEPA to utilize when they received citizen inquiries. This presentation will focus on DEI's diatom bloom monitoring from 2013 to 2015 and possible causes of these blooms.*

### Kaitlin Hollenbeck, Illinois Water Resources Center

#### Potential Predictors of the Cyanobacterial Toxin, Microcystin, in Illinois Lakes

*Failure to control the nutrient load from agricultural run-off threatens water quality conditions through eutrophication that can result in a cyanobacterial bloom. Some of these blooms are harmful (i.e., harmful algal blooms, HABs) and can produce a deadly hepatotoxin variants known as microcystin. Microcystin causes a range of detrimental health, economic, and ecological effects that can be quite damaging and costly. Although toxic and nontoxic blooms have been known to occur naturally in the environment, frequency and severity of HABs have been increasing due to intensifying anthropogenic factors. Although much research has been done to determine what causes bloom formation, studies to determine stimuli for production of the microcystin toxin during a bloom event are much less prominent. The overall goal of this study was to identify potential stimuli that may contribute to microcystin production and to identify the most reliable causal indicator for microcystin production in inland Illinois lakes. Forty-five samples were collected from 9 inland lakes in the months of July, August, and October by Illinois Environmental Protection Agency biologists as part of the 2013 Statewide Ambient Lake Monitoring HAB Pilot Program. Eight predictor variables were examined: rainfall, temperature, total nitrogen, total phosphorus, TN:TP ratio, chlorophyll-a, microcystin-producing genera, and total cyanobacteria. Among them, phosphorus, rainfall, and microcystin-producing genera were significant contributors to microcystin toxin production, with phosphorus as the most robust predictor variable. In light of our findings, nutrient reduction and mitigation would be paramount to prevent and control toxin-containing blooms in aquatic freshwater systems.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **ILMA Session 5 (Wednesday 9:00-10:30)**

**Sarah Zack, Illinois-Indiana Sea Grant & Illinois Natural History Survey**

Comprehensive Public Outreach Efforts for Invasive Species in Illinois

*May 2013 saw the launch of Be a Hero-Transport Zero™ (BAHTZ), a public aquatic invasive species (AIS) outreach campaign for recreational water users. BAHTZ was created by IISG to complement the Stop Aquatic Hitchhikers!™ message and address concerns among Illinois water users about the burden of AIS prevention. To broaden the impact of this new brand, IISG partnered with IDNR to develop: (1) a terrestrial version of BAHTZ to address movement of terrestrial invasive species by hiking, camping, and other outdoor activities; and (2) Be a Hero-Release Zero™, geared at water gardeners, aquarium hobbyists, and teachers to address problems caused by improper disposal of water and organisms in trade. Future and current outreach efforts utilizing these new brands will be discussed. Prior to development of the two new complementary brands, a survey of the boating and fishing public was conducted to better understand public perception of the existing recreational water user BAHTZ brand. Surveys were conducted at outdoor shows in downstate Illinois and the Chicagoland area. Results indicated that despite a slow rollout and uneven statewide exposure, public response to BAHTZ was favorable and the brand was easily understood. Importantly, respondents familiar with the slogan were more likely to participate in AIS prevention behaviors and less likely to “never” participate in AIS prevention. Although we found that the majority of respondents had not been exposed to the new brand, this preliminary survey indicates that increased awareness of AIS and the BAHTZ brand does facilitate adoption of preventative activities.*

**Kristopher Maxson, Missouri State University**

**[Kristopher Maxson; John E. Havel; Susan E. Knight]**

Trophic Interactions and the Efficacy of Milfoil Weevils for Biocontrol of Eurasian Water-milfoil in Wisconsin Lakes

*Eurasian water-milfoil (*Myriophyllum spicatum* L., henceforth “EWM”) is the most heavily managed nuisance submersed aquatic plant in the United States. EWM’s rapid spring growth and formation of dense surface mats inhibits native macrophyte communities, serves as poor-quality habitat for fish and macroinvertebrates, impacts recreation, and can clog water supply infrastructure. The milfoil weevil (*Euhrychiopsis lecontei* Dietz) has been associated with EWM declines in several states, though natural weevil densities are generally too small to effect control. Augmentative biocontrol has had varied success and fish predation may account for high weevil mortality. Weevils were augmented in 4 northern Wisconsin lakes in summer 2013. In summer 2014, I collected invertebrates associated with EWM plus 442 bluegill (*Lepomis macrochirus* Rafinesque) diet samples from the 4 study lakes. Overall, chironomids and oligochaetes were the dominant invertebrates associated with plants, while chironomids and *Daphnia* spp. constituted up to 27.2% and 24.0% of the fish diets, respectively. Milfoil weevils were found in 2.9% of diet samples examined. Weevil larvae were preyed upon more frequently than adults (94.2% of weevils consumed) and sometimes occurred in high numbers within single diet samples. Since the larval stage contributes the most to EWM damage, selective predation on this stage may limit its use as a control agent.*

**Tim Gardner, Clarke Aquatic Services**

Using Aeration to Improve Water Quality and Enhance Aquatic Habitat

*Aeration is a valuable aid in adding oxygen to the waterbody. With the implementation of a mechanical aeration system water quality is improved, healthy oxygen levels are maintained, nutrient decomposition is aided and mosquito breeding is reduced. Promotion of fish and aquatic habitat is also a benefit of a fountain installation as well as an aesthetic feature. This presentation provides an overview of these benefits for both lakes and ponds. Sub-surface, deicers and surface aeration systems are discussed including electrical considerations, system maintenance and economics.*



## ILMA Session 6 (Wednesday 11:00-12:30)

**Nancy Schumm, Schumm Consulting LLC**

The Design Funding and Creation of a School Raingarden

*Rain gardens can make excellent outdoor classrooms, nature sanctuaries and stormwater management systems, but funding can be a challenge when traditional landscaping seems more cost effective. This case study will explore the challenges in the design and funding of a rain garden for a new school in Gurnee, Illinois. Learn how a local non-profit helped make the project happen with creative partnerships, volunteers, and community assistance.*

**Barb Mendenhall, Sangamon County Soil and Water Conservation District**

The Lake Springfield Watershed Project

*The Lake Springfield Watershed Resource Planning Committee (LSWRPC) was established by the Sangamon County Soil and Water Conservation District (SCSWCD) in September 1990 to prepare the resource plan for the Lake Springfield watershed. A volunteer organization, LSWRPC meets regularly to discuss and implement strategies for reducing sediment, nutrients and chemical runoff to the lake. This diverse group consists of farmers, resource professionals, utility representatives, agricultural fertilizer and chemical retailers, farm managers, and other individuals concerned about the preservation of Lake Springfield and its watershed. The committee has written legislation, sponsored research, and provided recommendations to resource agencies to implement strategies aimed at maintaining and improving the quality of Lake Springfield. The LSWRPC and the City of Springfield were part of an intensive five-year study assessing BMP effectiveness. As a result of that study, landowners were offered incentive payments to establish filter strips on their farms by enrolling in the USDA Conservation Reserve Program (CRP). Currently, the Illinois Council on Best Management Practices is coordinating a Lake Springfield Watershed Special Project with local agriculture retailers, Springfield City Water, Light, and Power, SCSWCD and Lincoln Land Community College to achieve a sustained reduction in nitrate loading from agricultural non-point sources into Lake Springfield through education, promotion and voluntary adoption of nitrogen management systems and scientific initiatives.*

**John R. O'Connell, Southern Illinois University**

**[John R. O'Connell, Michael W. Eichholz]**

Determining the Available Wetland Area for Waterfowl, Shorebirds and Marsh Birds in Illinois

*Different inundation regimes impact the productivity of wetlands. Inundation, or lack thereof, can have more direct impacts on waterfowl, shorebirds and marsh birds; if a wetland is not inundated during the period when one of those functional groups are in the area, then it is not available to that group. Relying on the National Wetlands Inventory (NWI) alone and lacking the data necessary to consider wetland availability during biologically important periods, managers may substantially underestimate the amount of wetlands needed to support waterfowl, waterbirds and shorebirds. Considering that Illinois has lost over 85% of its historical wetland area, it is important to determine the timing and extent of Illinois wetland inundation as an important step towards making informed decisions in wetland management in the state. This project aims to develop models to estimate wetland inundation for the entire state of Illinois. Two different approaches are being used to reach these ends. Objective 1 will use ground surveys to estimate the seasonal changes in inundation at random sites and then scale those values to the statewide NWI layers. Objective 2 will utilize satellite-based synthetic aperture radar (SAR) imagery to detect inundation on a larger scale and use the results from that analysis to model inundation patterns in the state. The results from these two approaches will allow managers to evaluate wetland availability for the focal species with an accuracy previously unavailable.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### **ILMA Session 7 (Wednesday 1:00-2:30)**

**Jeremy S. Tiemann, Illinois Natural History Survey**

**[Jeremy S. Tiemann, Alison P. Stodola, Sarah A. Douglass, and Kevin S. Cummings]**

Vermilion River Mussel Projects – from Reintroductions to Dam Removal

*Freshwater mussels are a vital component of stream ecosystems. Their sensitivity to stream habitats and their sessile, filter-feeding habits allow them to be biological indicators of stream integrity. Freshwater mussels play an important role in aquatic ecosystems by providing a food source for many animals, habitat for algae and aquatic insect larvae, and nests and refuges for certain species of fishes. In addition, mussels help stabilize stream substrate against the scouring effects of floods. However, North American freshwater mussels have undergone drastic decline during the past century, and subsequently have become one of the most imperiled groups of animals. Of the approximate 350 species of freshwater mussels native to North America, nearly three-quarters are extinct, federally-listed as endangered or threatened, or are in need of conservation status. Factors responsible for the decline in freshwater mussels include habitat destruction and environmental contamination. Loss of this taxonomic group affects ecosystem function, influences nutrient cycling, and may indicate declining water quality. In this presentation, we will discuss two on-going projects occurring in the Vermilion River basin that aim to enhance the freshwater mussel assemblage. The first project is Steps Taken During the Reintroduction of Two Federally-Endangered Mussels, which will reflect how a salvage project in Pennsylvania has provided an opportunity for the translocation of two federally-endangered freshwater mussels back into Illinois. The second project is Effects of Lowhead Dams on Freshwater Mussels, which will discuss the two upcoming dam removals occurring in the basin and how these dams appear to have affected the freshwater mussel assemblage.*

**Leonard Dane, Deuchler Environmental, Inc.**

Greater Redhorse (*Moxostoma valenciennesi*) and River Redhorse (*Moxostoma carinatum*) Status and Distribution in the Fox River near Aurora, Illinois

*Deuchler Environmental, Inc. (DEI) was contracted by Fox Metro Water Reclamation District (FMWRD) to evaluate the biological condition of the Fox River in the Aurora area. In the sampling conducted by DEI from 2010 through 2014, no River Redhorse were collected but Greater Redhorse were collected throughout the entire study area, both upstream and downstream of the FMWRD combined sewer overflow (CSO) and treated effluent. The collection of Greater Redhorse was significant as it was a new record to the Aurora area of the Fox River as of 2010. The fact that they have been collected every year since 2010 indicated that there is a viable population within the study area. The presence of Greater Redhorse was significant since the species was thought to be extirpated from Illinois at one time. In addition to the study results, this presentation focuses on the habitat characteristics that influence the distribution of the Greater Redhorse within the study area.*

**Amanda Carter, Illinois State University**

Seasonal Shift in Sex Ratios via Maternally Derived Estrogens in a Turtle Species

*Reptiles with temperature-dependent sex determination (TSD) may be particularly susceptible to rapid climatic changes, which underscores the importance of investigating environmental and maternal effects on TSD. Numerous studies have demonstrated that estrogens can alter how temperature influences sex determination, such that the incubation temperature required to produce females is altered when exogenous estrogens are applied to the egg. Unfortunately, this phenomenon is almost exclusively studied using supraphysiological doses of estrogens and unnatural constant incubation temperatures. We used the red-eared slider turtle (*Trachemys scripta*) to examine how natural variation in yolk estrogens (estrogen levels are higher in late-season clutches) influences sex determination under more natural fluctuating incubation temperatures. We tested if the effect of temperature on sex determination changed across the nesting season when using fluctuating incubation temperatures in 2014 and 2015. We found that maternally derived estrogens significantly affect sex determination, by increasing the production of females in clutches laid later in the nesting season. Results from these studies will provide a mechanistic approach to predicating how reptile species may be affected by climatic changes.*

## Poster Session (Tuesday 5:00-6:00)

**Nicholas Abell, Southern Illinois University Carbondale [Nicholas Abell, Greg Whitledge, Devon Oliver, Neil Rude]**

Population Characteristics, Connectivity and Recruitment Sources of Spotted Bass in Southern Illinois Streams

*Naturally occurring chemical markers, such as trace elements and stable isotopes, within calcified structures of fishes have proven useful for determining environmental history and natal origin of fishes. Differences in the chemical signatures of tributaries within lotic networks are reflected within structures such as otoliths, fin rays, and spines. In this study, we are using fin ray microchemistry to determine environmental history and population characteristics of stream-dwelling spotted bass in southern Illinois. Fin rays are being used as a non-lethal alternative to otoliths due to the limited distribution and relatively small population size of spotted bass in Illinois waters. Spatial differences in water chemistry were identified within the range of spotted bass in southern Illinois to detect where movements between chemically distinct environments may occur. One-way Analysis of Variance followed by Tukey's Honest Significant Differences Tests was conducted to test for differences in water chemistry parameters among sites. In 2014, spotted bass were collected from southern Illinois streams during IDNR electrofishing surveys, as well as by seining, and angling. In 2015, spotted bass were collected from the Ohio River in addition to several tributaries to allow for comparison of population characteristics between these habitats. All fish were collected by electrofishing in 2015 to prevent gear bias. Fish were promptly released upon obtaining a total length and the left leading pectoral and pelvic fin rays. Fin rays from each fish were mounted in epoxy molds and a thin transect was cut from each to be used for age estimation and trace element (Strontium/Calcium and Barium/Calcium ratios) analysis. Analysis of fin ray chemistry data for fish collected in 2014 indicated that both Sr/Ca and Ba/Ca were needed to reconstruct environmental history of individual fish. Age estimates derived from sectioned fin rays are being used to compare population age composition, growth characteristics, and mortality rates in the Ohio River and its tributaries in southern Illinois.*

**Tyler Carpenter, VLMP Southern Coordinator- IEPA Watershed Planning**

Greater Egypt Regional Planning and Development Commission- Water Quality Management Planning

*For 32 years, the Greater Egypt Regional Planning and Development Commission has coordinated the Volunteer Lake Monitoring Program for the 15 county region in Southern Illinois. Counties included are: Alexander, Franklin, Gallatin, Hamilton, Hardin, Jackson, Jefferson, Johnson, Massac, Perry, Pope, Pulaski, Saline, Union, and Williamson. Staff from Greater Egypt begins the VLMP season in April with a luncheon commemorating volunteers for participation and years of service. Volunteers are trained in the beginning of the season. Training involves the instruction of secchi disk transparency readings, water chemistry sampling, and dissolved oxygen and temperature measurements. In addition to the VLMP, Greater Egypt has been contracted to complete a watershed-based plan for the Hurricane Creek watershed. Two waterbodies in the watershed have been placed on IEPA's 303(d) List of Impaired Waters: Hurricane Creek and Herrin Old Lake (Herrin Reservoir). Impairments for these waterbodies include: sedimentation/siltation (Hurricane Creek) and mercury, PCBs, TSS, phosphorus, and aquatic algae (Herrin Old). The first step in developing the plan was the development of a comprehensive watershed resource inventory. This involved gathering information on characteristics of the watershed, implementing GIS, conducting field assessments for identifying areas of erosion, channelization, and condition of riparian buffers, and using STEPL and the Region 5 Model to estimate existing pollutant loads and load reduction targets. The Hurricane Creek Watershed Council was formed to provide guidance for the plan. This includes local knowledge of water-related activities and identifying Best Management Practices that will be suggested in the plan.*

**Bethany Hoster, Eastern Illinois University**

**[Bethany Hoster, David Petry, Clinton Morgeson, Sarah Huck, Robert E. Colombo]**

Spatial and Temporal Effects of Wastewater Treatment Effluent on Fish Communities in an Illinois River Tributary

*Artificial impoundments and wastewater treatment effluent have the potential to alter water quality and flow regimes of rivers. During periods of low flow, wastewater can account for the majority of a river's composition downstream of an effluent discharge, causing changes in water quality and impacting biotic communities. The Sangamon River is impounded in Decatur, IL, and approximately 4 miles downstream receives effluent from the Sanitary District of Decatur. To determine the impact of effluent, we assessed fish communities using electrofishing above and below the effluent discharge in 2013 and 2015. Additionally, we assessed water quality parameters monthly, including dissolved oxygen, pH, temperature, conductivity, alkalinity, hardness, total nitrates, and total phosphates. River discharge was recorded monthly. Catch per unit effort differed between upstream and downstream reaches in 2013, as well as between years for both reaches. Although shifts in relative abundances of families were observed between 2013 and 2015, no significant changes in the relative abundance of sport fishes were found. Water quality differed between reaches and years, with river discharge being the largest cause of variance. Data showed homogeneous water quality throughout the river when river discharge was greater than 200 cubic feet per second. These results indicate water quality in the Sangamon River is impacted by effluent discharge, as well as by temporal variations. These results also suggest effluent discharge effects water quality the greatest during periods of low flow from the Lake Decatur Dam.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### Poster Session (Tuesday 5:00-6:00)

**Neeta Parajulee Karki, Department of Biological Sciences- Eastern Illinois University**

**[Neeta Parajulee Karki, Robert Colombo, Karen Gaines, Anabela Maia]**

Effects of 17 $\beta$  estradiol in the Metabolism of Sunfish Species

*Fish natural habitats are getting increasingly contaminated with various estrogenic compounds, including 17 $\beta$  estradiol (E2). E2 is known to cause adverse effects on the reproductive system of male fish; however the effects of E2 on other aspects of fish metabolism are not well documented and are likely to vary depending on the levels of stress the fish is subjected to. The objective of this study is to evaluate the effects of varying concentrations of E2 exposure on the basal and stressed metabolic rate of sunfish species. There will be two treatments (E2 concentration 40 and 80 ng/l) and one control group (no E2). The experiment is ongoing in a small mesocosm setup to mimic natural conditions while controlling as many variables as possible, and we will initiate E2 exposure soon. Basal and maximum aerobic scopes have been measured using close respirometry at the beginning of the experiment and will also be measured at the end of the experiment. The duration of the basal metabolic trials was 30 minutes under resting condition, whereas for chasing trails, it was 30 minutes after intensive chasing for 5 minutes. Preliminary results showed an increase in the oxygen consumption when sunfish were subjected to stress by chasing. The mass corrected mean oxygen consumption during basal metabolism and maximum metabolic scope were 205.3 mg O<sub>2</sub>Kg<sup>-1</sup>.h<sup>-1</sup> and 243.1 mg O<sub>2</sub>Kg<sup>-1</sup>.h<sup>-1</sup> respectively. This research will help to understand the role of varying concentration of E2 compounds on the metabolism of sunfishes.*

**Eli G. Lampo, Western Illinois University**

**[Eli G. Lampo, James T. Lamer, Brent Knights, James Larson, and Jon Vallazza]**

A Comparison of Fish Communities in Contiguous Backwater and Vegetated Impounded Areas of Pool 19, Upper Mississippi River

*Sedimentation in the impoundment behind a high-head dam (~10m; Lock and Dam 19) on the Upper Mississippi River near Keokuk, IA created a unique shallow-water ecosystem dominated by floating-leaf and submersed aquatic vegetation. The importance of these post-impoundment, vegetated areas for fish is not well understood. To increase our understanding, we compared the community structure, composition, and size structure of fish between these areas and contiguous backwaters in Pool 19. We sampled 180 randomly stratified sites over four, 6-week periods from May 19th- Oct 31st, 2014. We fished paired sets of tandem fyke (1/4 in. diameter mesh) and mini-fyke nets (1/8 in. diameter mesh) with standardized methods. We sampled 63,503 fish representing 64 species (48,879 fishes and 50 species from impounded sites and 14,624 fishes and 55 species from contiguous backwater sites). Species composition and structure were greatest in the impounded areas. These results suggest that as sediment continues to accumulate in Pool 19, the resultant aquatic vegetation and associated habitat for centrarchids, catostomids, and cyprinids will expand.*

**Alex Loubere, Southern Illinois University- Carbondale**

**[Alex Loubere, Gregory Whitley, Neil Rude, Devon Oliver]**

Using Otolith Analysis and Microchemistry to Estimate Growth and Identify Recruitment Sources of Ohio River Sauger

*Sauger are a recreationally important species in the Ohio River basin and population assessment and monitoring is needed in order to provide the most accurate and useful management recommendations for state and federal agencies to maintain the integrity of the fishery. The objectives of this study are to use stable isotope and trace element analyses of otoliths to identify principal recruitment sources and inter-river movement patterns of Ohio River sauger and to compare body condition and growth and mortality rates among pools in the lower Ohio River. Water data collected over several years indicate significant differences in chemistry between the Ohio River and its tributaries. This will allow us to distinguish individuals that originated in the Ohio River from those of tributary origin. Sauger were collected from the lower six pools of the Ohio River during November and December of 2014 and 2015, measured for length and weight, and their sagittal otoliths extracted for ageing and chemical analyses. Age data were used to estimate growth and mortality rates for each pool. Mean relative weight was also compared among pools. Preliminary results indicated that mean *W<sub>r</sub>* differed among the sampled pools. Identification of the principal sources of sauger recruitment to the fishery in each of the lower Ohio River navigation pools will facilitate conservation of important natal habitats for this species and contribute to assessment of the most appropriate spatial scale for managing sauger stocks.*

**Andrew T. Mathis, Western Illinois University**

**[Andrew T. Mathis, James T. Lamer, James H. Larson, Brent Knights, John Vallazza, Kevin Irons]**

Assessing Movement of Adult Silver Carp and Bighead Carp in the Upper Illinois Waterway System Using GPS Satellite and Radio Telemetry

*Invasive silver carp and bighead carp have established populations throughout the Illinois River. Efforts to prevent invasion into the Great Lakes rely on a comprehensive monitoring program. Despite a wealth of information on Asian carp movement, a finer-scale approach to understand real-time movements and habitat use would strengthen management efforts. We are testing GPS tags to determine patterns of movement, identify potential feeding and spawning areas, and inform commercial removal efforts in the Upper Illinois River. To optimize and determine the feasibility of this technology, data logging tags (manually tracked with radio telemetry) were tethered to bighead and silver carp species in raceway and field experiments. Seven of fifteen field-deployed tags have been recovered and have returned 1,461 individual waypoints. We have demonstrated the use of this technology to monitor Asian carp and will begin testing remotely-accessed, real-time satellite-linked prototypes in January 2016. Fine-scale accuracies and fast acquisition speeds, make this an ideal tool and is the first use of GPS technology to track fish in riverine systems.*

**Rich Pendleton, Illinois Natural History Survey- Prairie Research Institute**

**[Rich Pendleton, Andrew Casper, Jason DeBoer, Andrea Fritts, Mark Fritts, Nikolai Klibansky, Levi Solomon, T.D. VanMiddlesworth]**

The Evaluation of a Cost-effective, Digital Approach to Estimate Fecundity in Freshwater Fishes

*Determining the basic life-history of organisms enhances our ecological understanding and ability to conserve or manage species. However, oftentimes the resources and time needed to document expression of life-history traits can hinder our ability to understand the ecology of a species. Studies of species reproductive traits, such as fecundity, inform researchers and managers of the reproductive potential of a species and offer insight into population dynamics. However, traditional gravimetric methods of estimating fecundity in fishes can be costly and laborious. Using methodology developed for marine fishes, we evaluate a cost-effective, digital approach (i.e. auto-diametric) to estimate fecundity using free ImageJ software to determine the validity and accuracy of auto-diametric estimates relative to gravimetric estimates within freshwater systems. We collected three freshwater fishes within an environmentally heterogeneous watershed to determine if estimation methodology (auto-diametric vs. gravimetric) is influenced by species, size of individual, or location. Strong correlations between methods existed for medium- to large-sized bluegill and largemouth bass, however, little to no correlation existed between the methods for black crappie. Location influenced the strength of the relationship between counting methods, but was predominately an artifact of the size of individuals collected within each location. Currently, auto-diametric methodology provides a quicker and relatively accurate way to estimate fecundity for bluegill and largemouth bass, yet refinements must be made to account for smaller individuals and potential differences in ovary physiology and/or egg development among species.*

**Jordan Pesik, Eastern Illinois University**

**[Jordan Pesik, Cassi Carpenter, Evan Boone, Tim Edison, Leslie Frankland, Robert Colombo]**

Habitat Selection by Non-game Fish Species in a Large River

*Since only a few sport-fish species occupy the majority of commercial, recreational and fisheries research interests, most studies have focused on understanding the influence of habitat on distribution patterns of these select species. However, little study has entertained habitat preferences of non-game fish in large rivers. We were interested in evaluating the influence of microhabitat features and water conditions on the distribution of several riverine fishes. The Wabash River is the twelfth longest river in the contiguous United States and the longest unimpounded river (lower 622km unimpounded) East of the Mississippi River, which provides a unique system for study due to its unregulated flow regime and intact floodplain. Data was collected as part of a long-term electrofishing river monitoring project on the Wabash River. Preliminary results indicate Shorthead Redhorse (*Moxostoma macrolepidotum*) and Blue Sucker (*Cycleptus elongates*) both prefer silt/sand substrates over gravel or rock substrates. Not only does preliminary analysis indicate gravel substrate holds fewer individuals, but data also suggest individuals holding in gravel areas are smaller in size. While ontogenetic separation in habitat selection is common in many species of fish, many suckers are known to utilize gravel bars for spawning. Our results indicate additional environmental variables may have a strong influence on habitat selection of these species in a large river.*





## Conference Abstracts

Abstracts will be listed by session by organization

### Poster Session (Tuesday 5:00-6:00)

**Emily Reed, University of Illinois at Urbana-Champaign**

**[Emily Reed, Sara Thomas, John Chick, and Sergiusz Czesny]**

Evaluating the Nearshore Rotifer Community Composition in Lake Michigan

*Rotifers are an important part of aquatic food webs; they play a role in nutrient cycling and are consumed by larval and planktivorous fishes. However, due to their small size, rotifers in the Great Lakes are often overlooked, particularly in nearshore zones. Nearshore areas of lakes provide an important linkage between the watershed and open-lake zones and they serve as spawning and nursery habitat for many sport and prey fish species. Recent anthropogenic alterations and invasive species introductions have dramatically changed species assemblages in the Great Lakes, including within the microzooplankton community. These community changes can have system-wide ramifications, impacting nutrient levels and top predator population dynamics. Accurate assessment of microscopic communities can help determine energy available to consumers within the system. To better evaluate microzooplankton abundance and community composition within critical nearshore areas, we compared the rotifer community composition from 35 nearshore sites, including harbors, drowned river mouth lakes, and Green Bay over a period of two years. Overall, rotifer communities were dominated by *Keratella*, *Polyarthra*, and *Synchaeta*. Patterns of species composition among sites varied in relation to known trophic states throughout Lake Michigan, with rotifer abundance tending to be highest in drowned river mouths and harbors. Evaluating nearshore rotifer population demographics enables a more complete understanding of Lake Michigan's food web and provides insight to community structures that may emerge in this dynamic system.*

**Daniel R. Roth, Eastern Illinois University**

**[Daniel R. Roth, Evan C. Boone, Cassi J. Carpenter, Leslie D. Frankland, Robert E. Colombo]**

Temporal Effects of River Discharge on Asian Carp Abundance and Size Structure in the Wabash River

*The lower Wabash River is unimpounded and follows a more natural hydrological pattern than impounded rivers of similar size. This temporally and spatially variable pattern has tremendous effects on biota within the system. Invasive Asian carp (*Hypophthalmichthys* spp.) are of major concern within the Wabash and exhibit variable patterns of abundance between years. We sought to examine possible effects the dynamic hydrology of the Wabash has on Asian carp populations through the use of Long Term Electrofishing Survey data. During 2014, the Wabash River followed a relatively average cycle with several moderate flood pulses throughout the spring, followed by low flows from early summer into fall. In 2015, typical spring flood pulses occurred, but an abnormally large pulse occurred later and subsisted through much of the summer. Catch per unit effort of Asian carp, silver carp in particular, more than doubled between these years. Preliminary results suggest that this major difference is partially driven by discharge among years. Size structure in 2014 was dominated by large individuals (>500mm), and in 2015 a high abundance of small individuals (<200mm) appeared in June and persisted throughout much of the summer. This suggests that Asian carp utilized the long flood period of 2015 for spawning, evident in the high number of young of year individuals. These results support previous findings that Asian carp spawning activity is highly dependent on discharge. This further elucidates what factors affect the abundance of these prolific invasive species and could aid in the practice of better control efforts.*

**Kimberly Shoemaker, Southern Illinois University- Edwardsville**

**[Kimberly Shoemaker, Caleb Wehling, Ben Lubinski, & Z.-Q. Lin]**

The Bioaccumulation of Mercury and Selenium in Fish from the Lower Illinois River

*Mercury (Hg) is a well-known pollutant that is prevalent in the Illinois-Missouri area due to a high concentration of coal fired power plants. Selenium (Se) is an essential micronutrient that is required for the production of certain proteins. It has been reported that selenium may have the ability to mitigate mercury's toxic effects through the formation of more stable compounds. This study explores the possibility of using the molar ratio Se:Hg in fish tissue as a bioindicator of mercury's environmental effects. Fish samples of different local common species were collected from the Lower Illinois River near Grafton, Illinois. Each fish was dissected for brain, heart, kidney, liver, gill, skin, scale, and muscle tissue samples. The samples were acid digested and analyzed for concentrations of selenium and mercury using ICP-MS. Mercury and selenium concentrations and Se:Hg molar ratios were compared among different tissues and species to determine which tissue(s) or species are more or less affected by mercury and have a higher potential for mercury toxicity. Diet effects on the molar ratio Se:Hg were also examined. Results show that Se:Hg molar ratios were lowest in muscle tissue for all species surveyed, with the exception of gizzard shad, indicating that muscle tissue is most affected by mercury bioaccumulation. Filter feeders were found to have lower muscle tissue Se:Hg molar ratios indicating these species accumulate more active mercury and represent a higher toxicity risk for consumers than non-filter feeders.*

**Emily A. Szott, Department of Biological Sciences- Western Illinois University**

**[Emily A. Szott, James T. Lamer, James H. Larson, Brent Knights, John Vallazza, Levi Solomon, Rich Pendleton, Andrew Casper]**

Quantification of Daily Otolith Increments in Young of Year Asian Carp

*Silver and bighead carp are invasive species that have become established throughout the Mississippi River Basin. A large body of research and resources have been dedicated to their management. Despite these efforts, information on hydrological spawning triggers and growth of young of year Asian carp is lacking. Here, daily incremental growth annuli from sagittal and lapillus otoliths are used to estimate birth and growth of young of year Asian carp. We collected juvenile Asian carp from the LaGrange Reach of the Illinois River following a large spawning event in August 2014. Total length was measured, and the lapillus and sagittal otoliths removed from each individual. A 0.5 cm x 0.5 cm piece of caudal fin tissue was excised for later genetic analysis. Otoliths were aged from 20 fish per 5 mm length group (15-79 mm). The extracted otoliths were mounted to slides with cyanoacrylate, polished, photographed, and aged. Otolith microstructure was validated using juvenile Asian carp from Chinese aquaculture. Aging the juvenile Asian carp gives valuable information on the growth of this poorly studied life history stage. Preliminary results show that the collected Asian carp range from 26 to 44 days old, putting their days of birth between June 23 and July 11, 2014. Further study of age will help determine spawning periodicity and hydrological conditions responsible for spawning. Ultimately, the ability to determine daily growth rates of young of year Asian carp will help in the management of these invasive species.*

**Jeremy S. Tiemann, Illinois Natural History Survey**

**[Jeremy S. Tiemann, Sarah A. Douglass, Mark A. Davis, and Kevin S. Irons]**

America's Newest Invader? – Discovery of a Third Corbicula Species in Illinois

*Corbicula, a “hyper-invasive alien” with great biofouling capabilities, was first recorded in North America in 1924 in British Columbia and breached the Continental Divide in the late 1950s. Since then, it has spread throughout the continent. Corbicula taxonomy is muddled and unclear, as is the number of species that have become established. Literature reports vary from an invasion of but a single species to invasions of multiple species. The Midwest has long been recognized as having only Corbicula fluminea. However, in 2008, a tentative second species, Corbicula largillierti, began appearing in the navigable rivers of Illinois. It has purple nacre with more compressed, tighter ridges when compared with C. fluminea. A third Corbulid species was discovered in Illinois while sampling the Illinois River near Marseilles on 15 October 2015. Over 200 individuals were collected in conjunction with C. fluminea and C. largillierti. This undetermined species has fuchsia colored rays radiating from the umbo and white nacre with purple lateral teeth. It is currently unknown in North America, and we have no information for what the species is or its potential impact on aquatic ecosystems. In collaboration with the University of Michigan - Museum of Zoology, genomic and morphometric assessments are being employed to confirm the identity of this undocumented Corbulid and also that of C. largillierti. Accurate species delimitations are essential for informing adaptive management, developing predictive invasion/dispersal models, and assessing potential effects on aquatic ecosystems. We request that our colleagues to please alert us to the presence of unusual Corbulids in your study areas if encountered.*

**Todd D. VanMiddlesworth, Illinois Natural History Survey- Prairie Research Institute**

**[Todd D. VanMiddlesworth, Jason A. Deboer, Andrea K. Fritts, Mark W. Fritts, Doyn M. Kellerhals, Richard M. Pendleton, Levi E. Solomon]**

Estimating population size of select indicator fish species at The Nature Conservancy's Emiquon Nature Preserve

*Largemouth Bass Micropterus salmoides and Black Crappie Pomoxis nigromaculatus are popular sportfish species, making their study and management a priority for many natural resource agencies and organizations. These species can be used as bioindicators of the relative quality of aquatic habitats, making them an invaluable resource for both managers and researchers assessing the effects of natural and anthropogenic disturbance in aquatic systems. As such, the Upper Mississippi River Restoration program has labeled both species indicators of ecosystem health, and the Illinois Department of Natural Resources monitors these species in lakes and reservoirs throughout the state, including a large disconnected floodplain restoration project known as The Nature Conservancy's (TNC) Emiquon Nature Preserve. Emiquon has been disconnected from the Illinois River since the early 1900's, drained and put into agricultural production until 2000, and then restored back to a floodplain lake beginning in 2007. TNC began construction of a water control structure in 2015 that will result in a managed reconnection with the Illinois River. The objective of this research was to establish pre-reconnection population estimates for Largemouth Bass and Black Crappie to benefit TNC managers by allowing them to more precisely evaluate the status of sportfish populations within the Emiquon Preserve. These data will allow for post-reconnection comparisons with the Illinois River and subsequent water level management.*



## Conference Abstracts

*Abstracts will be listed by session by organization*

### Poster Session (Tuesday 5:00-6:00)

**Jacob Huey, Illinois River Biological Station- Illinois Natural History Survey**

**[Jacob Huey, Rich Pendleton, Levi Solomon, and Andrew Casper]**

Status and trends of Largemouth Bass in the La Grange Reach of the Illinois River from 1993-2015

*Upper Mississippi River fishes are the subject of commercial and recreational fisheries, both of which contribute substantially to local economies. For example, recreation on the Upper Mississippi River alone has been estimated to provide 18,000 jobs and generate \$1.2 billion for the economy per year; recreational fishing for several fish species is a key component of this economic activity. An area of the Upper Mississippi River System that has received extensive research over the past 22 years is the La Grange Reach of the Illinois River. Within this reach, Largemouth Bass *Micropterus salmoides* have been monitored through extensive fish community sampling conducted by the Long Term Resource Monitoring (LTRM) element of the Upper Mississippi River Restoration Program using a multi-gear stratified random sampling (SRS) design since 1993. Using LTRM data, we investigate trends in proportional size distribution (PSD), catch per unit effort (CPUE), and relative weight ( $W_r$ ) of Largemouth Bass over time. Based on data from day electro-fishing in connected backwater areas, catch per unit effort has declined more drastically for preferred and quality PSD categories, when compared to stock and sub-stock PSD categories. However, trends in relative weight have remained stable across all PSD categories. Declines in CPUE observed over time could be due to competition with invasive species, altered river hydrology, or lack of habitat needed at critical life stages of the Largemouth Bass. Further analysis of long-term monitoring data may reveal direct causes for these declines and may provide managers essential information regarding the status and trends of this recreational fish species.*

**Jacob McQuaid, Illinois River Biological Station- Illinois Natural History Survey**

**[Jacob McQuaid, Rich Pendleton, Levi Solomon, and Andrew Casper]**

Trends in the Populations of White and Yellow Bass over 21 Years within the Illinois River

*White Bass (*Morone chrysops*) and Yellow Bass (*Morone mississippiensis*), to a lesser degree, are recreationally valued fishes within the Upper Mississippi River System (UMRS). The Illinois River is a major tributary of the UMRS, in which, the Upper Mississippi River Restoration Program's Long Term Resource Monitoring (LTRM) element has consistently collected data on these species since 1993. LTRM data from the La Grange Reach of the Illinois River were used to evaluate the status and trends of both White and Yellow Bass by calculating relative weight ( $W_r$ ), catch-per-unit-effort (CPUE), and proportional size distribution (PSD). In addition, otoliths were collected from 2012-2015 to evaluate age structure and length-at-age of both species. Trends in relative weight revealed no discernable pattern over time for either species. However, the overall CPUE, accounting for fishes of all sizes, indicated that both species are in decline, with White Bass experiencing a greater decline compared to Yellow Bass. The cause of these trends is difficult to pinpoint due to the multitude of stressors acting on the system, such as siltation, invasive species, pollution, and the continued impacts of navigation. Trends in CPUE among different PSD categories, in addition to age structure information, may help clarify the overall declines observed in CPUE. Overall, these results indicate populations of White and Yellow Bass are in decline and highlight the importance of long-term data when assessing populations of sport fishes.*

**Samuel J. Gradle, Eastern Illinois University**

**[Samuel J. Gradle, Robert E. Colombo, Charles L. Pederson, and Jeffrey R. Laursen]**

Assessing Macroinvertebrate Assemblages: Gauging the Difference in Microhabitat type in an Effluent Dominated River

*Over the past three years, different macroinvertebrate sampling strategies were implemented in the Sangamon River above and below the effluent discharge of Decatur's sanitary district near Decatur, IL. The purpose of this sampling was to find if the effluent had an effect on the macroinvertebrate community. In 2013, a proportional sampling 20-jab method based on QHEI was used. The Sangamon River is dominated by fine substrates, so the 20-jab method oversamples these typically deprecate microhabitats. In 2014, a semi-qualitative habitat approach, similar to that used by the IL RiverWatch, was used. In this method, the 4 best microhabitats were sampled at each site in the reach in an effort to more effectively assess rare but typically more productive microhabitats. Macroinvertebrate assemblages from 2014 qualitative sampling differed from 2013 objective samples, but this could have been due to environmental differences between years. An enhanced qualitative approach has currently been adopted in an attempt to better gauge the importance of microhabitat types to macroinvertebrate assemblages in the Sangamon River. In this approach, replicate samples from five different microhabitats (riffles, fine sediments, root wads, snags, and leaf packs) at six different sites (three upstream of effluent discharge, three below) were taken. Samples will be identified down to genus. Although samples are still being processed preliminary data indicates that assemblages downstream verses upstream differ greatly in richness, diversity and overall structure.*

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