

The Illinois River: A Watershed Partnership



Program

**15th Biennial
Governor's Conference
on the Management of the
Illinois River System**
October 27-29, 2015
Pere Marquette, Peoria, Illinois



Welcome

Dear 2015 conference participants,

On behalf of the Planning Committee, we want to welcome you to the 2015 Governor's Conference on the Management of the Illinois River System. This 15th biennial conference continues a tradition begun in 1987 when then-Governor James R. Thompson joined forces with a group of concerned citizens to focus attention on the growing problems of erosion and sedimentation along the Illinois River and its tributaries. They believed bringing citizens and local, state, and federal organizations together in a common forum would help begin the process of discovering solutions to these problems. Held in Peoria, this conference continues to grow with support from Governor Bruce Rauner. This year's theme, "A Watershed Partnership," emphasizes the various partnerships needed to bring about solutions to watershed issues.

Some of the highlights you can expect include:

- The River Coordinating Councils quarterly meeting held on Tuesday, October 27th at 6:00-8:00 p.m., including a public forum for discussion, comments, and questions. This is a joint meeting of the Illinois, Mississippi, and Ohio and Wabash River Coordinating Councils chaired by Lt. Governor Evelyn Sanguinetti.
- A Watershed Tour on Tuesday, October 27th.
- Four workshops on October 27th: Fellowship of the Stream—Education & Outreach; Achieve Your Watershed Objective: Plan, Plan, (Then Work Your) Plan!; Implementing the Illinois Nutrient Loss Reduction Strategy; and Watershed Partners Café.
- Plenary keynote speakers from America's Watershed Initiative, Fox Tales International, the Center for Neighborhood Technology, University of Illinois, and the U.S. Army Corps of Engineers, as well as two authors who join us from the shores of Lake Michigan and the other side of the pond.
- Twelve concurrent sessions allowing you to select from a wide array of topics.
- The Watershed Exchange and Poster Session on Wednesday, October 28th where you can learn about data and information resources available from local, state, and federal organizations and see interesting posters on some of the latest scientific research being conducted in the Illinois River basin.
- An extensive list of exhibitors waiting to show you their latest activities and education opportunities.
- The Peoria Riverfront Museum Meander on Wednesday, October 28th. We will be welcomed by Douglas R. Oberhelman, Chairman of Board of Directors and CEO of Caterpillar, Inc. The evening event will allow you to tour three popular museum exhibits while talking with fellow conference participants right next to the Illinois River.
- Great opportunities to network with Illinois River water and watershed resource experts.

We truly hope you will find this conference to be informative, stimulating, and enjoyable!

Sincerely,



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Introduction & History of Governor's Conference

In 1985, a group of concerned scientists, citizens and river activists began to focus new attention on the growing problems of sedimentation and erosion along the Illinois River and its tributaries. Collectively, this group of individuals formed the nucleus for the planning committee for the First Governor's Conference on the Management of the Illinois River System, which was held at the Hotel Pere Marquette, Peoria, IL on April 1-3, 1987. Governor James R. Thompson believed bringing various state and federal agencies and organizations together in a common forum would help begin the process of discovering solutions to these problems.

Since 1987, this conference has continued to be held on a biennial basis in Peoria - midway on the Illinois River between Chicago and Grafton. Governors Jim Edgar, George Ryan, Rod Blagojevich, and Pat Quinn have continued this strong tradition by providing a Governor's designation to this conference, thus demonstrating the high priority being placed upon our natural resources.

Over the past twenty-six years, the Governor's Conferences on the Management of the Illinois River System have served as an important forum to bring together local, state, and federal leaders to create awareness of the issues of soil erosion and sedimentation, identify important river research initiatives, develop working coalitions, apply conservation practices to the watershed, prepare new river and watershed legislation, and provide for state and federal funding to address the issues of the Illinois River System.

The foundations for the following programs can be directly attributed to successful interagency and multi-disciplinary cooperation, fostered at the Governor's Illinois River Conferences and subsequently implemented at the local, state and federal level:

- Development of low-cost streambank stabilization methods with state and federal funding
- Formation and development of numerous watershed treatment programs for landowners, funded through U.S. Department of Agriculture, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Illinois Department of Agriculture, Illinois Department of Natural Resources, Illinois Environmental Protection Agency and local Soil and Water Conservation Districts. Examples include:
 - USFWS Partners for Wildlife and Fish Program has assisted landowners in restoring over 6,000 acres of habitat along the Illinois River
 - U.S. Army Corps of Engineers Habitat Restoration and Enhancement Projects completed at Swan Lake, Banner Marsh, Lake Chautauqua, Stump Lake, and Peoria Lake Islands
 - USFWS established the 11,122 acre Emiquon National Wildlife Refuge of which the Service now owns 2,114 acres and The Nature Conservancy owns 7,063 acres
 - IDNR completed land acquisition efforts at the Double T Fish and Wildlife Area, the Duck Ranch at Henry, IL; The Wetland Initiative's 2,500 acre Hennepin Hopper restoration effort
 - The Audubon Society's purchase of Plum Island; and Ducks Unlimited Spring Lake acquisition and restoration.
- Formation and operation of the Illinois River Coordinating Council
- Development of the Integrated Management Plan for the Illinois River System
- Illinois Conservation 2000 Programs and Funding
- Illinois River Conservation Reserve Enhancement Program led by efforts of U.S. Congressman Ray LaHood - 123,000 acres presently enrolled

- Illinois Rivers 2020 Initiative
- Development of the Stream and Watershed Assessment and Restoration Program (SWARP).
- “Mud to Parks” Dredging & Re-Use of Sediment from the Illinois River
- Island construction on the Illinois River utilizing dredging sediment
- Illinois Partners for Conservation Program

The conference attendance has ranged from 150 to over 400 participants who represent a diversity of backgrounds, agencies, organizations, and communities. Each conference planning committee presented an agenda designed to continue the tradition of bringing the latest in developments and management techniques to those working towards protecting the Illinois River System for future generations. Dozens of local, state, and federal agencies and organizations currently serve as Conference Co-Sponsors and a number provide financial support of the conference. The following four individuals have faithfully served on the first eleven of the State Conference Planning Committees by sharing their knowledge and expertise: Bob Frazee, University of Illinois Extension; Steve Havera, Illinois Natural History Survey; Gary Clark Illinois Dept. of Natural Resources; and Rick Mollahan, Illinois Dept. of Natural Resources and Illinois Environmental Protection Agency. Glenn Stout, University of Illinois Water Resources Center, provided leadership for organizing the First Governor’s Conference on the Management of the Illinois River System by serving as the first Conference Chair. Subsequent conference leadership has been provided by:

1989 | Bob Frazee, University of Illinois Extension, Chair

1991-1995 | Bob Frazee, University of Illinois Extension and Roberta Parks, Peoria Area Chamber of Commerce, Co-Chairs

1997-2003 | Bob Frazee, University of Illinois Extension and Steve Havera, Illinois Natural History Survey, Co-Chairs

2005-2007 | Bob Frazee, University of Illinois Extension and Kim St. John, Natural Resources Conservation Service-Prairie Rivers Resource, Conservation and Development, Co-Chairs

2009 | Kim St John, USDA-Natural Resources Conservation Service and William P. White, University of Illinois, Institute of Natural Resource Sustainability, Illinois State Water Survey, Co-Chairs

2011 | William P. White, University of Illinois, Prairie Research Institute, Illinois State Water Survey; Christine Davis, Illinois Environmental Protection Agency; and Rick Mollahan, Illinois Department of Natural Resources, Co-Chairs

2013 | Christine Davis, Illinois Environmental Protection Agency and Laura Keefer, Illinois State Water Survey, Prairie Research Institute, University of Illinois, Co-Chairs

2015 | Christine Davis, Illinois Environmental Protection Agency, Laura Keefer, Illinois State Water Survey, Prairie Research Institute, University of Illinois, and Lisa Merrifield, Illinois Water Resources Center, University of Illinois, Co-Chairs

*Original compilation by: Bob Frazee, University of Illinois Natural Resources Educator, 727 Sabrina Drive, East Peoria, IL 61611; Ph. (309) 694-7501, Ext. 226; E-mail: rfrazee@uiuc.edu, April 2007.

Conference Proceedings Information

Conference Proceedings have been compiled by the University of Illinois, Water Resources Center for each of the biennial Illinois River Conferences. The Illinois Rivers Decision Support System, affiliated with the Illinois State Water Survey at Champaign-Urbana, Illinois has a section of their webpage devoted to providing the Conference Proceedings for each of the past thirteen conferences at <http://ilrdss.sws.uiuc.edu>.

Included for each conference are the conference agenda, topics, speakers, printed presentations, conservation tours, exhibits, public forums, and related activities. Listed below are the date and location of the first thirteen *Governor's Conferences on the Management of the Illinois River System*.

1st | 1987 | April 1-3, 1987, Hotel Pere Marquette, Peoria, IL

2nd | 1989 | October 3-4, 1989, Hotel Pere Marquette, Peoria, IL

3rd | 1991 | October 22-23, 1991, Hotel Pere Marquette, Peoria, IL

4th | 1993 | September 21-22, 1993, Hotel Pere Marquette, Peoria, IL

5th | 1995 | October 10-11, 1995, Hotel Pere Marquette, Peoria, IL

6th | 1997 | October 7-9, 1997, Holiday Inn City Centre, Peoria, IL

7th | 1999 | October 5-7, 1999, Holiday Inn City Centre, Peoria, IL

8th | 2001 | October 2-4, 2001, Holiday Inn City Centre, Peoria, IL

9th | 2003 | October 7-9, 2003, Holiday Inn City Centre, Peoria, IL

10th | 2005 | October 4-6, 2005, Holiday Inn City Centre, Peoria, IL

11th | 2007 | October 2-4, 2007, Holiday Inn City Center, Peoria, IL

12th | 2009 | October 20-22, 2009, Hotel Pere Marquette, Peoria, IL

13th | 2011 | October 4-6, 2011, Hotel Pere Marquette, Peoria, IL

14th | 2013 | October 1-3, 2013, Four Points by Sheraton, Peoria, IL

15th | 2015 | October 27-29, 2015, Peoria Marriott Pere Marquette, Peoria, IL; Proceeding will be available to download from the Illinois Rivers Decision Support System (<http://ilrdss.sws.uiuc.edu>) by December 2015.



WHEREAS, the Illinois River fosters environmental, economic, recreational, and educational opportunities for local communities; and,

WHEREAS, working partnerships with local communities and organizations will enhance awareness and capabilities of local stakeholders to address watershed and water resource concerns; and,

WHEREAS, the State of Illinois is encouraging strategies that protect, restore, and expand critical habitats and soil conservation and water quality practices; and,

WHEREAS, the theme of the 2015 Conference on the Management of the Illinois River System is focused on "A Watershed Partnership;" and,

WHEREAS, the conference will be taking place October 27 – 29, 2015 at the Peoria Marriott Pere Marquette in Peoria, Illinois;

THEREFORE, I, Bruce Rauner, Governor of the State of Illinois, do hereby proclaim October 2015 as ILLINOIS RIVER MANAGEMENT MONTH, and encourage all citizens to recognize the economic, recreation, social, and environmental benefits of conserving and managing to properly utilize and sustain the resources of the Illinois River System.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the State of Illinois to be affixed.



Done at the Capitol in the City of Springfield,
this TWENTY-ONE *day of* JULY, *in*
the Year of Our Lord, two thousand and
FIFTEEN, *and of the State of Illinois,*
one hundred and NINETY-SEVENTH.

Dee Dee White
SECRETARY OF STATE

Bruce Rauner
GOVERNOR

Conference Agenda

Tuesday, October 27, 2015

Pre-Conference Workshops and Tours

9:00 a.m.–4:30 p.m.

Quarterly Meeting of the River Coordinating Councils

6:00–8:00 p.m. | Cotillion Ballroom

River Coordinating Councils Reception

8:00–9:00 p.m. | Cotillion Ballroom

Wednesday, October 28, 2015

Conference Registration and Check-In

7:45 a.m.–4:30 p.m. | Pre-Function Marquette

Exhibits and Continental Breakfast

7:45–8:30 a.m. | Marquette Ballroom North

Welcome and Opening Comments

8:30–8:45 a.m. | Marquette Ballroom South

Plenary Session 1

8:45–9:50 a.m. | Marquette Ballroom South

Using Shared Visions and Stories That Influence Change

Moderator: Andrew Barnes, U.S. Army Corps of Engineers

America's Watershed Initiative Report Card for the Mississippi River Watershed—Measuring Six Critical Goals in All Parts of the Mississippi River Watershed

Harald 'Jordy' Jordahl, America's Watershed Initiative

Voices for the River: How Storytelling, Advocacy, and Education Can Inspire Concrete Action

Brian 'Fox' Ellis, Fox Tales International

Break and Exhibits

9:50–10:20 a.m. | Marquette Ballroom North

Plenary Session 2

10:20–11:30 a.m. | Marquette Ballroom South

From Neighborhood to Nation: Getting Better All the Time

Moderator: Dan Injerd, Illinois Department of Natural Resources

Getting the Nation RainReady

Harriet Festing, Center for Neighborhood Technology

Seeking Continuous Improvement in Farm Conservation Practices

Jon Scholl, University of Illinois

Lunch and Learn

11:45 a.m.–1:15 p.m. | Cotillion Ballroom

Illinois River Past, Present, and Future

Moderator: Lauren Lurkins, Illinois Farm Bureau

Irreversible Reaction: Illinois River to Waterway

Richard 'Dick' Lanyon, Metropolitan Water Reclamation District of Greater Chicago (retired), Author

Illinois Waterway Public-Private Partnership (P3) Demonstration Project

Hank DeHaan, U.S. Army Corps of Engineers, Rock Island District

Watershed Exchange and Poster Session

1:30–4:30 p.m. | Cotillion Pre-Function

Watershed Exchange Tables

- **The Illinois Height Modernization Program: What Can LiDAR Do for You and How Can You Get It?:** Janet Holden and Trisha Rentschler, Illinois Geological Survey
- **Where and How to Find USGS Topographic Data:** Shelley Silch, U.S. Geological Survey, Illinois Water Science Center
- **The Resource Management Mapping Service (RMMS):** Jonathan Rush, University of Illinois Cyberinfrastructure and Geospatial Information Laboratory
- **Using GIS for Green Infrastructure and Stormwater Management Analysis—Redeveloping Brownfields in Chicago's**

Poster Session

- **Sangamon River Regional Sediment Management Program:** Heather Bishop, Elizabeth Bruns, and Nicole Manasco, U.S. Army Corps of Engineers, Rock Island District
- **Hydrologic and Hydraulic Studies of the Illinois River Basin at ISWS:** Yanqing Lian, Elias Getahun, Markus Momcilo, Laura Keefer, and Zhenxing Zhang, Illinois State Water Survey
- **Hydrologic and Water Quality Modeling of the Spoon River Watershed for Determining Sediment and Nutrient Critical Source Areas:** Arash Zaregarizi, Yazd University, and Elias Getahun, Illinois State Water Survey
- **Use of Magnetic Fly Ash to Assess Upper Sangamon Basin Post-Settlement Sedimentation Rates:** Jia Wang, University of Illinois, David Grimley, Illinois State Geological Survey, and Alison Anders, University of Illinois
- **Regional Water Supply Planning Studies in Illinois:** Zhenxing Zhang, H. Vernon Knapp, Walton Kelly, Scott Meyer, George Roadcap, Daniel Abrams, Devin Mannix, and Daniel Hadley, Illinois State Water Survey
- **Insights from Long-Term Monitoring: Asian Carp and Fish Communities within the Illinois River:** Rich Bendleton, Levi Solomon, Brian Ickes, and Andrew Casper, Illinois Natural History Survey, Illinois River Biological Station
- **Trends in Illinois River Sport and Commercial Fisheries from the Last 50 Years:** Dan Gibson-Reinemer, Jason DeBoer, Mark Fritts, and Andrew Casper, Illinois Natural History Survey, Illinois River Biological Station
- **Prediction of Potential Nursery Habitat for Asian Carp Larvae in the Illinois River below Starved Rock Lock and Dam Using the FluEgg Model:** Tatiana Garcia and James J. Duncker, U.S. Geological Survey, Illinois Water Science Center

CONCURRENT SESSIONS 1

1:30–2:45 p.m.

TRACK A-1. CARP PAY\$

Marquette Ballroom South

Moderator: Debb Ladgenski, Spring Valley Economic Development

- **Seize the Day, Seize the Carp: Economic Impacts in the Peoria Region:** Leigh Ann Brown, Pekin Economic Development and Tourism

- **One Proven Solution to the Invasive Asian Carp Problem in Our Rivers:** Gray Magee, American Heartland Fish Products, LLC

TRACK B-1. TRENDS IN SPORT AND COMMERCIAL FISHERIES

Cheminee

Moderator: Nerissa McClelland, Illinois Department of Natural Resources

- **Using Commercial Fishing to Limit the Spread of Asian Carp:** Kevin Irons, Illinois Department of Natural Resources
- **Profile of the Current Non-Asian Carp Commercial Fishing Industry on the Illinois River:** Rob Maher, Illinois Department of Natural Resources
- **On-Going Improvements in the Sport Fish of the Illinois River:** Dan Gibson-Reinemer, Illinois Natural History Survey, Illinois River Biological Station

TRACK C-1. THE NUTRIENT LOSS REDUCTION STRATEGY ROADSHOW

LaSalle

Moderator: Kelly Thompson, Association of Illinois Soil and Water Conservation Districts

- **Illinois Nutrient Loss Reduction Strategy: Current Activities and Future Directions:** Marcia Willhite, Illinois Environmental Protection Agency
- **Science Assessment Supporting the Illinois Nutrient Loss Reduction Strategy:** Mark David, University of Illinois at Urbana-Champaign
- **Nitrate and Phosphate—A Loaded Question in Illinois:** Kelly Warner, U.S. Geological Survey

Break and Exhibits

2:45–3:15 p.m. Marquette Ballroom North

CONCURRENT SESSIONS 2

3:15–4:30 p.m.

TRACK A-2. ASIAN CARP DYNAMICS

Marquette Ballroom South

Moderator: Elizabeth Murphy, U.S. Geological Survey

- **Asian Carp Overview:** Duane Chapman, U.S. Geological Survey, Columbia Environmental Research Center
- **Multi-Jurisdictional Approach to Asian Carp in the Upper Illinois River and Chicago Area**

Waterway System, Illinois, United States: Kevin Irons, Illinois Department of Natural Resources

- **Carp on the Move: Do Barriers Matter?:** James Garvey, Southern Illinois University Carbondale

TRACK B-2. LANDSCAPE AND WATERWAY CONNECTIONS

Cheminee

Moderator: Gwen Kolb, U.S. Fish and Wildlife Service

- **LLC Strategy on Connection Between Illinois River Valley and Gulf Hypoxia:** Gwen White, U.S. Fish and Wildlife Service, Eastern Tallgrass Prairie and Big Rivers Landscape Conservation
- **Watershed Management for Control of Nutrient Loss in the Mackinaw River:** Maria Lemke, The Nature Conservancy, Peoria Office
- **Aquatic Vegetation and Fish Community Monitoring at the Emiquon Nature Preserve:** T.D. Van Middlesworth, Illinois Natural History Survey, Illinois River Biological Station
- **Landscape Conservation Design at the Refuge Complex Scale:** Robert Clevenstine, U.S. Fish and Wildlife Service, Rock Island Field Office

TRACK C-2. WATER USE IN CENTRAL ILLINOIS: FROM TRADITIONAL TO INNOVATIVE

LaSalle

Moderator: Kelly Thompson, Association of Illinois Soil and Water Conservation Districts

- **How Much Is 2 Billion Gallons of Reused Effluent Worth?:** Rick Manner, Urbana and Champaign Sanitary District
- **A Farmer's Perspective of Irrigation in Mason County:** Jeffrey Smith, Farmer, Mason County, Illinois
- **Implementing the Irrigation Reporting Portion of the Illinois Water Use Act:** Steven Wilson, Illinois State Water Survey

Peoria Riverfront Museum Meander

5:30–8:30 p.m. | Peoria Riverfront Museum, 222 SW Washington Street

Welcome: Douglas R. Oberhelman, Chairman of the Board of Directors and CEO of Caterpillar, Inc.

Thursday, October 29, 2015

Conference Registration and Check-In

7:45 a.m.–12:00 p.m. | Pre-Function Marquette

Exhibits and Continental Breakfast

7:45–8:30 a.m. | Marquette Ballroom North

CONCURRENT SESSIONS 3

8:30–9:45 a.m.

TRACK A-3. WATERSHED PARTNER SPOTLIGHT

Marquette Ballroom South

Moderator: Mike Miller, Peoria Park District

- **Growth and Strategic Change at the Dixon Waterfowl Refuge at Hennepin and Hopper Lakes:** Paul Botts, The Wetlands Initiative
- **Birds of a Feather:** Mike Miller, Peoria Park District, and Eric Schenck, Ducks Unlimited
- **Peoria's OneWater Initiative:** Jane Gerdes, City of Peoria

TRACK B-3. PUTTING STORMWATER BMPS IN PRACTICE

Cheminee

Moderator: Gina Bean, Association of Illinois Soil and Water Conservation Districts

- **Monitoring Urban Stormwater Engineering Best Management Practices:** Jim Duncker, U.S. Geological Survey, Illinois Water Science Center
- **Using Green Infrastructure to Improve Water Quality, Reduce Flooding, and Revitalize Neighborhoods:** Tom Price, Conservation Design Forum
- **Integrating Stormwater Practices into Transportation:** Scott Marlow, Illinois Department of Transportation

TRACK C-3. MONITORING: FINS, FEATHERS, AND FIELDS

LaSalle

Jason Beverlin, The Nature Conservancy

- **Combining Drainage Water Management and American Gold Plover Conservation in an Agricultural Landscape:** Drew Becker, U.S. Fish and Wildlife Service, Rock Island Field Office
- **Recent Improvements in Waterbird Numbers and Conditions in the Illinois River Valley:** Heath Hagy and Chris Hine, Illinois Natural History Survey, Forbes Biological Station
- **Monitoring CREP's Contribution to Wildlife Conservation and Water Quality in the Illinois River Watershed:** Luke Garver, Illinois Department of Natural Resources

Break and Exhibits

9:45–10:15 a.m. | Marquette Ballroom North

CONCURRENT SESSIONS 4

10:15–11:30 a.m.

TRACK A-4. GREAT LAKES MISSISSIPPI RIVER INTERBASIN STUDY (GLMRIS): OVERVIEW AND CONSIDERATIONS

Marquette Ballroom South

Moderator: Doug Yeskis, U.S. Geological Survey

- **Overview of GLMRIS:** Andrew Leichty, U.S. Army Corps of Engineers, Rock Island District, and Sue Davis, U.S. Army Corps of Engineers, Chicago District
- **Infrastructure Considerations of GLMRIS:** Ben Brockschmidt, Illinois Chamber of Commerce
- **Environmental Considerations of GLMRIS:** Robert Hirschfeld, Prairie Rivers Network

TRACK B-4. STORMWATER POLICY AND FUNDING

Cheminee

Moderator: Rita Lee, Illinois Department of Natural Resources

- **Summary of Results of Urban Flood Awareness Act:** Brad Winters, Illinois Department of Natural Resources
- **Stormwater Utilities in Illinois?:** Mark Hoskins, Michael Baker International
- **Watershed-Based Master Planning for Resiliency in our Communities:** Sarah Hunn, DuPage County Stormwater Management

TRACK C-4. MONITORING: NUTRIENTS AND SEDIMENT

LaSalle

Moderator: Brian Miller, Illinois Water Resources Center

- **Hydrologic, Sediment, and Nutrient Loads in the Illinois River Watershed:** Mike Demissie, Illinois State Water Survey
- **Current State of Suspended-Sediment Surrogate Technology:** Ryan Jackson, U.S. Geological Survey
- **Intensive Streamflow, Sediment, and Water Quality Monitoring of a Small Watershed in Bloomington, Illinois:** Tim Straub, U.S. Geological Survey

Lunch and Learn

11:45 a.m.–1:15 p.m. | Cotillion Ballroom

Getting a Little Help from Friends... And Everyone Else

Moderator: Nani Bhowmik, Illinois State Water Survey

Rules of Engagement: Why 'Education' Is Not Enough to Gain Community Support for River Restoration and Conservation: Paddy Woodworth, Author, Our Once and Future Planet

Closing Comments and Adjourn

1:15–1:30 p.m. | Cotillion Ballroom

Lisa Merrifield, Illinois Water Resources Center



Workshops & Tours

Tuesday, October 28 ♦ 9:00 a.m. - 8:00 p.m.

Watershed Tour

9:00 a.m.–12:30 p.m. *

Infiltrate the green infrastructure movement within the greater Peoria area. This charter bus tour stops at a variety of locations to let you investigate public and private urban stormwater management efforts with those doing the work.

Fellowship of the Stream

9:00 a.m.–1:00 (3:30) p.m.*

Join the quest to protect Illinois water resources through education and outreach. This fellowship provides an overview of citizen science and river education, as well as opportunities for involvement and curricula available across Illinois. See demonstrations of activities from programs like Project WET and Our Mississippi and take advantage of an exhibit session and breaks to connect with new and old colleagues. Enhance your experience with a visit to the Peoria Riverfront Museum (additional \$10) or by recharging at the Watershed Partners Café.

Achieve Your Watershed Objective: Plan, Plan, (then work your) Plan!

9:00 a.m.–1:00 p.m.*

Very few water quality or quantity issues can be solved with a single action. Most issues require many partners taking many steps over many years. This panel discussion uses real-world examples to help you develop effective watershed plans. A unique collection of representatives from state and federal agencies will also share tips for implementing and measuring the success of a plan. PLAN to attend!

Implementing the Illinois Nutrient Loss Reduction Strategy

1:30 p.m.–4:30 p.m.

Illinois has finalized a strategy to improve water quality at home and downstream by reducing nitrogen and phosphorus levels in local waterways. The strategy builds on the successes of past nutrient management efforts with a comprehensive suite of best management practices for point and non-point sources. During this session, panelists will discuss implementation progress and future strategies to reach long-term nutrient loss reduction goals.

Watershed Partners Café

1:30–3:30 p.m.

The Watershed Partners Café explores challenges and opportunities associated with the restoration of the Illinois River system. Facilitated by the Middle Illinois River Collaborative Action Partnership, the session allows individuals and organizations to exchange information on related projects and initiatives while identifying conservation opportunities for alignment and support.

Quarterly Meeting of the River Coordinating Councils

6:00–8:00 p.m.

Lt. Governor Evelyn Sanguinetti invites members of the public to attend the 4th-quarter meeting of the River Coordinating Councils. This meeting will be a joint meeting between the Illinois River, Mississippi River, and Wabash and Ohio Rivers Coordinating Councils.

Lt. Governor Evelyn Sanguinetti chairs three River Coordinating Councils charged with the mission of reviewing state and federal programs that impact the watersheds and working with local communities to raise awareness of and address watershed issues. The River Coordinating Councils meet quarterly around the state to engage the public and encourage partnerships.

* Includes lunch

Concurrent Session A-1: Carp Pay\$!

Wednesday, October 28 ♦ 1:30 -2:45 p.m. ♦ Marquette Ballroom South

Moderator: *Debb Ladgenski, Spring Valley Economic Development*

Seize the Day, Seize the Carp: Economic Impact in the Greater Peoria Region

Leigh Ann Brown, Pekin Economic Development and Tourism

Abstract not available at time of printing.

Born and raised in Pekin, Illinois, Leigh Ann Brown graduated from Pekin High School and attended Illinois State University (ISU), where she earned a bachelor's degree in business administration with a minor in computer science. Coming from a family of entrepreneurial spirit and established businesses, business administration was a great fit and led to spending a few college summers operating her own boat-cleaning business with a girlfriend, an ideal way to get a summer tan and make money! After graduating from ISU, she entered the working world at Associated Bank. From there, she moved into the non-profit sector as the program director for Junior Achievement (JA) of Central Illinois, recruiting business and community leaders to teach business entrepreneurship JA curriculum in K-12 classes throughout central Illinois. Leigh Ann began to explore opportunities to work in her own community and became the director of Pekin Main Street, which launched new business programs and partnerships, events, and awareness of the Main Street program and district. From there, Leigh Ann became the economic development/tourism director for the entire community of Pekin. She was also involved in regional development efforts, and Pekin, being a community on the Illinois River, joined regional water resource and Asian carp teams and took on a leadership role in the latter. Her pride and number one motivation to see Pekin prosper are her children Emily, 10 and Carson, 7. Leigh Ann has enjoyed sharing Pekin with her husband Clint Brown, especially the golf course as Clint teaches her the sport.

One Proven Solution to the Invasive Asian Carp Problem in our Rivers

Gray Magee, American Heartland Fish Products, LLC

This presentation will provide an explanation of the patented process and technology that American Heartland Fish Products, LLC uses to process the whole Asian carp fish in large volumes and produce in-demand products of high protein fish meal and omega-3 fish oil. The patented technology lets the company do this in an environmentally-friendly atmosphere with a small, green footprint. They believe that harvest is the quickest, most efficient, and least costly solution to the invasive Asian carp problem in affected inland waterways.

Gray Magee has been the chief executive officer for American Heartland Fish Products, LLC since 2011. Gray has been in the business world since 1964, with positions ranging from sales manager to president and owner. He was the 2003 commencement speaker at Southern Illinois University and has served on their foundation board for the last 10 years.

Concurrent Session B-1: Trends in Sport & Commercial Fisheries

Wednesday, October 28 ♦ 1:30-2:45 p.m. ♦ Cheminee

Moderator: *Nerissa McClelland, Illinois Department of Natural Resources*

Using Commercial Fishing to the Limit Spread of Asian Carp

Kevin Irons, Illinois Department of Natural Resources

Application of traditional fisheries techniques (capture and removal of over 3 million lb to date) can be a strong tool for minimizing the impacts and spread of bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*) as they approach the Laurentian Great Lakes through the Illinois Waterway. The Illinois Department of Natural Resources (IDNR) has achieved measurable success in limiting populations in the upper Illinois River as well as insights to success for areas of the lower Illinois River. Targeted removal from the upper Illinois River (no Asian carp recruitment) has led to a 50 percent drop in population levels in successive years that can be attributed to these removal efforts. A fishing experiment in the lower Illinois River (well-documented carp recruitment) has affected populations to a lesser degree. Ohio River and Mississippi River Asian carp management plans to be initiated in 2015 contain removal efforts modeled on these efforts.

Kevin Irons has been a large river ecologist at the Illinois Natural History Survey Illinois River Biological Station, as well as a fisheries specialist for the Long Term Resource Monitoring Program, since 1991. In 2010, Kevin was employed by IDNR as the Aquatic Nuisance Species Program manager as well as the Aquaculture Program manager. Duties include managing and coordinating efforts with state and federal partners to prevent Asian carp from getting access to the Great Lakes and establishing populations there, reviewing policy for these programs, coordinating work across the region to prevent, control, and reduce the effects of other aquatic nuisance species, and implementing the *Illinois State Comprehensive Management Plan for Aquatic Nuisance Species*.

Profile of the Current Non-Asian Carp Commercial Fishing Industry on the Illinois River

Rob Maher, Illinois Department of Natural Resources

The Illinois River has supported a robust commercial fishery for many decades. At one time, the Illinois River supported one of the largest freshwater fisheries in the world. The draining of many backwater complexes for agricultural use and water quality impairments caused by the diversion of water from Lake Michigan led to drastic declines in commercial fish harvest. The recent invasion of Asian carp into the Illinois River has led to an increase in overall harvest levels. Efforts to find markets for these fish are ongoing and will hopefully result in an increase in the harvest of these invasive exotic fishes. This talk will summarize historic trends in the harvest of several species of fish and discuss the current status and regulatory framework of the commercial fishery on the Illinois River.

Rob Maher works as a fisheries biologist for the Illinois Department of Natural Resources (IDNR). Rob has been employed by IDNR since 1995 and has been the program manager for the Commercial Fishing Program since January 2001. Prior to becoming the Commercial Fishing Program manager, Rob worked as both a district fisheries manager and a streams biologist for IDNR. Before working for IDNR, Rob was employed by the Illinois Natural History Survey (INHS) for nearly eight years. While at the INHS, Rob worked primarily under the Upper Mississippi River Restoration Long Term Resource Monitoring Program as a fisheries specialist. Rob attended Eastern Illinois University, receiving a bachelor of science degree in environmental biology in 1987.

On-Going Improvements in the Sport Fish of the Illinois River

Daniel Gibson-Reinemer and Andrew Casper, Illinois Natural History Survey, Illinois River Biological Station

The fish community in the Illinois River has been monitored from 1957 to the present, yielding a unique opportunity to examine trends in fish populations across six decades. One of the most prominent trends shown in the long-term monitoring is a strong increase in sport fish populations along the length of the Illinois River. Although sport fish demonstrated an overall increase throughout the river, there were differences in both the strength of the improvement and its timing. The greatest improvements in sport fish occurred in the more upstream reaches of the river, which occurred as water quality improved.

Daniel Gibson-Reinemer received his PhD in ecology from the University of Wyoming in 2014. His research focuses on evaluating ecological changes using long-term records of species distributions.

Andrew Casper is the director of the Illinois River Biological Station.

Concurrent Session C-1: Nutrient Loss Reduction Strategy Roadshow

Wednesday, October 28 ♦ 1:30-2:45 p.m. ♦ LaSalle

Moderator: Kelly Thompson, Association of Soil and Water Conservation Districts

Illinois Nutrient Loss Reduction Strategy: Current Activities, Future Directions

Marcia Willhite, Illinois Environmental Protection Agency

Illinois has two water quality issues related to nutrients: 1) impacts on in-state rivers, lakes, and streams and 2) contribution to Gulf of Mexico hypoxia. The actions that address nutrient losses to water are important for solving both water quality issues. In late 2014, the Illinois Department of Agriculture and the Illinois Environmental Protection Agency (Illinois EPA) released a draft of the *Illinois Nutrient Loss Reduction Strategy* (Illinois NLRS) for public review and comment. The Illinois NLRS was developed with the advice of the Policy Working Group comprised of wastewater agencies, agricultural groups, environmental advocates, state/local government, and University of Illinois researchers. The centerpiece of the document is a science assessment that describes current conditions of nutrient loss, what reductions various practices can achieve, and what level of effort and expenditure is needed to significantly reduce losses to Illinois waters. The strategy identifies important current activities to reduce losses as well as future implementation actions.

Marcia Willhite became chief of the Bureau of Water for Illinois EPA in May 2001. In this capacity, she oversees water pollution control, drinking water, groundwater, watershed management, and State Revolving Fund programs for the state. Marcia is active in the Association of Clean Water Administrators, serving as its national president in 2006-07. Prior to coming to Illinois, she worked for 13 years in air quality, including program management at the state level in Texas and at the local level in Lincoln, Nebraska. Marcia participates in the Water Quality Executive Committee of the Upper Mississippi River Basin Association and represents Illinois EPA on the Ohio River Valley Water Sanitation Commission. She has a bachelor of science degree in wildlife biology from Eastern Kentucky University and master of science degree in toxicology from the University of Kentucky.

The Science Assessment Supporting the Illinois Nutrient Loss Reduction Strategy

Mark David, University of Illinois at Urbana-Champaign

States in the Midwest along the Mississippi River have been required by U.S. Environmental Protection Agency to develop nutrient loss reduction strategies that will lead to 45 percent reductions in their exports of nitrate and total phosphorus down the river. The goal is to reduce nutrient loads enough to meet the United States goal of a 2,000 sq mi hypoxic zone each summer. These reductions could also improve local water quality in streams and lakes. In an effort led by the Illinois Environmental Protection Agency and Illinois Department of Agriculture with input from all stakeholders, a nutrient loss reduction strategy was recently developed for Illinois. As part of the strategy development, a science assessment was conducted to evaluate nutrient sources (agricultural, point source, and urban) and determine methods to meet nutrient loss reduction goals. River loads determined the amounts of nitrate and phosphorus that need to be reduced in our rivers. An evaluation was made of the effectiveness of various practices and methods for meeting the nutrient loss reduction goals. In this presentation, we'll examine the science behind the proposed agricultural practice changes and their associated costs and discuss the task ahead for all of us. Practices include fertilizer amounts and timing, cover crops, tile bioreactors, constructed wetlands, tillage changes, and riparian buffer strips.

Mark B. David is a professor in the Department of Natural Resources and Environmental Sciences at the University of Illinois at Urbana-Champaign and has been on the faculty since 1985. He studies nitrogen and phosphorus cycling in agricultural fields, losses to streams and rivers, and methods to reduce these losses, such as fertilizer application timing, cover crops, drainage water management, constructed wetlands, and bioreactors. His research team conducts long-term monitoring of water quality in several tile-drained watersheds in east central Illinois to better understand the mechanisms of nutrient loss and to evaluate the effectiveness of nutrient loss reduction methods. Currently, he serves on the Board of Directors of the American Society of Agronomy. He has degrees from Penn State University, the University of Maine, and the State University of New York College of Environmental Science and Forestry.

Additional contributors: Greg McIsaac, George Czapar, Gary Schmitkey, and Corey Mitchell, University of Illinois

Nitrate and Phosphate—A Loaded Question in Illinois

Kelly L. Warner, U.S. Geological Survey

The state of Illinois is one of the largest contributors of nutrient loads to the Mississippi River and Gulf of Mexico. Relatively-new methods for continuous nitrate and phosphate monitoring are providing a more detailed picture of nutrient loads over extreme (low- or high-flow) hydrologic events and the ability to identify and respond to developing or occurring high-nutrient events. The U.S. Geological Survey (USGS) network of stream gages with continuous water quality monitoring uses in-stream instruments to measure consecutive observations of streamflow, nitrate, phosphate, turbidity, and other water quality characteristics. Real-time data transmission eliminates the waiting time inherent in laboratory chemical analyses and allows scientists and water managers to make decisions based on rapid changes in water quality. The first stream gage with continuous nitrate and phosphate in Illinois, and one of the first in the country, is at the Illinois River at Florence. While the general nitrate loading in the Illinois River can be determined by interpretive modeling using periodic sample collection and a continuous record of streamflow, a cooperative study with USGS and Illinois Environmental Protection Agency determined that the nutrient loads are mischaracterized with interpretive modeling during rapidly-changing flow conditions. The low- and high-flow periods are critically important with respect to the total amount of nitrate transported or the potential effects on the stream ecosystem. Additionally, with the implementation of continuous water quality monitoring at stream gages in eight major river basins across Illinois, the baseline nutrient loading (nitrate, phosphate, and sediment), seasonal loadings, and storm-event loadings of nutrients and sediment over time can be determined.

Bio not available at time of printing.

Additional contributors: Paul Terrio, U.S. Geological Survey, Illinois Water Science Center; and Gregg Good, Illinois Environmental Protection Agency

Concurrent Session A-2: Asian Carp Dynamics

Wednesday, October 28 ♦ 3:15-4:30 p.m. ♦ Marquette Ballroom South

Moderator: Elizabeth Murphy, U.S. Geological Survey

Asian Carp Overview

Duane Chapman, U.S. Geological Survey, Columbia Environmental Research Center

Using a timeline format, this overview considers the Asian carp invasion and human activities associated with the invasion from the 1963 original importation of grass carp until the formation of the Asian Carp Regional Coordinating Committee in 2010. Responses to the invasion, including risk assessments, control efforts, and the development of the national management plan, are placed in context with the range and abundance of the Asian carp, as determined by available records. Special attention is given to stakeholder collaborations in responses to the invasion.

Duane C. Chapman is a research fish biologist with the U.S. Geological Survey Columbia Environmental Research Center. Duane is nationally and internationally known as an expert on the biology of Asian carp, publishing his first article on an Asian carp in 1987. He is an author of the books *Asian Carps of the Genus Hypophthalmichthys: A Biological Synopsis and Risk Assessment* and *Invasive Asian Carps in North America*, of the *Binational Risk Assessment of Bigheaded Carps in the Great Lakes*, and many journal articles on bighead, silver, and grass carp. Duane chaired the committee that wrote the control and mitigation sections of the *National Asian Carp Management and Control Plan*. He is chair of the Research and Risk Assessment Committee of the Mississippi River Basin Panel on Aquatic Nuisance Species, and he continues an active research program on the biology, risk, and control of Asian carp.

Additional contributors: Greg Conover, U.S. Fish and Wildlife Service, and Kevin Irons, Illinois Department of Natural Resources

Multi-Jurisdictional Approach to Asian Carp in the Upper Illinois River and Chicago Area Waterway System, Illinois, United States

Kevin Irons, Illinois Department of Natural Resources

Bi-national, federal, state, provincial, local, and non-governmental agencies are collaborating in several state-of-the-science approaches to stop the advancement of bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*) as they approach the Laurentian Great Lakes through the Illinois Waterway. Increased coordination of efforts began in 2010 has benefited these efforts with funding and coordination provided by the U.S. Environmental Protection Agency Great Lakes Restoration Initiative. An *Asian Carp Control Strategy Framework* has been established to bolster efforts across these agencies, as well as a *Monitoring and Response Plan* to implement the collaborative plan. Application of traditional fisheries techniques, new technologies, targeted and intensive efforts, and increased communication has led to over 3 million lb of invasive fish being removed since 2010, with the leading edge of this invasion being stalled approximately 55 mi from Lake Michigan over the last nine years. Building on this effort, Great Lakes governors and premiers have accelerated international (Canada-United States) efforts to harmonize management and regulations across the Great Lakes Basin, agreeing on a least-wanted species list, providing a framework for mutual aid, and helping to facilitate efforts to produce a basin-wide multi-species surveillance plan. Finally, increased awareness and knowledge sharing have promoted the development of plans for the monitoring and control of Asian carp in the upper Mississippi and Ohio River watersheds. This talk will broadly document successes and lingering needs of Asian carp efforts since 2010. We suggest that these accomplishments and collaborations may broadly effect and improve natural resource management and interagency collaborations in the future.

Kevin Irons has been a large river ecologist at the Illinois Natural History Survey Illinois River Biological Station, as well as a fisheries specialist for the Long Term Resource Monitoring Program, since 1991. In 2010, Kevin was employed by IDNR as the Aquatic Nuisance Species Program manager as well as the Aquaculture Program manager. Duties include managing and coordinating efforts with state and federal partners to prevent Asian carp from getting access to the Great Lakes and establishing populations there, reviewing policy for these programs, coordinating work across the region to prevent, control, and reduce the effects of other aquatic nuisance species, and implementing the *Illinois State Comprehensive Management Plan for Aquatic Nuisance Species*.

Additional contributors: Duane Chapman, U.S. Geological Survey, Columbia Environmental Research Center, and Scott Yess

Carp on the Move: Do Barriers Matter?

James E. Garvey, Southern Illinois University Carbondale

Asian carp have established in the Illinois River and threaten the Great Lakes. Dams used to facilitate navigation, such as those in the Illinois River, may reduce the upstream movement of Asian carp. Since 2010, we have implanted 965 acoustic transmitters in carp from the Illinois River and Pool 26 of the Mississippi River. A network of 39 Vemco VR2W receivers has been deployed and monitored in the Illinois River by Southern Illinois University Carbondale since 2012 to record movement of acoustically-tagged Asian carp. Movement of Asian carp into the Illinois River from the Mississippi River was strongly positively correlated to increased discharge. Upstream movement within the lower Illinois River was high in spring. Movement was less notable in the upper Illinois River above Starved Rock Lock and Dam. Passages through dams in the lower river were common, whereas only one upstream movement of a silver carp was quantified through Starved Rock. Starved Rock Lock and Dam appears to be a barrier to carp movement.

Jim Garvey is the director of the Center for Fisheries, Aquaculture, and Aquatic Sciences, a professor of zoology, and interim vice chancellor for research at Southern Illinois University Carbondale. He received his PhD at The Ohio State University and is interested in the population dynamics and ecosystem effects of invasive species in aquatic ecosystems. He has worked in both lakes and rivers and is interested in applying his results to management and conservation issues.

Additional contributors: Marybeth K. Brey and Ruairi MacNamara

Concurrent Session B-2: Landscape & Waterway Connections

Wednesday, October 28 ♦ 3:15-4:30 p.m. ♦ Cheminee

Moderator: Gwen Kolb, U.S. Fish and Wildlife Service

Landscape Conservation Cooperatives: Meeting Large-Scale Multi-Sector Objectives for Wildlife, Water Quality, and Agriculture

Gwen White, Eastern Tallgrass Prairie and Big Rivers, LLC

According to water quality model assessments, Midwestern states currently contribute the greatest nutrient load to the Gulf of Mexico hypoxic zone. The Mississippi River Basin/Gulf Hypoxia Initiative, spearheaded by the seven Landscape Conservation Cooperatives (LCCs), is undertaking a systematic and transparent process to create an integrated framework that supports planning, design, configuration, and delivery of wildlife conservation practices within the watershed. This framework consists of multiple quantitative objectives and associated metrics representing three interests of wildlife, water quality, and agricultural productivity, a tiered set of conservation strategies to achieve those objectives within five production agriculture systems (corn and soybean, grazing lands, floodplain forest, rice, cotton), and a modeling approach to determine where to best implement those actions within four key ecological systems of the Mississippi River Basin (headwater row crop fields, upland prairies, mid-sized riparian streams, mainstem floodplains in the upper and lower basin). Conceptual models will explore relationships and leverage points where actions affect objectives or where uncertainty requires additional research. Scenario planning for landscape change could provide forecasts and adaptation strategies over time scales across key portions of this landscape in response to ecological, social, or economic drivers. An analysis of barriers and opportunities will be used to rate feasible strategies with high leverage value. The initial framework was developed through web meetings and three structured decision making workshops, culminating in Memphis, Tennessee on August 12-14, 2014 with an interdisciplinary group of 50 stakeholders. Additional input will continue to refine the conceptual models to support a spatial analysis resulting in a landscape conservation design. This effort is intended to be complementary to related on-going efforts, like the Gulf of Mexico Hypoxia Task Force, Mississippi River Basin Initiative and state nutrient reduction initiatives, but with an added emphasis on the ecological and social values of wildlife habitat.

Gwen White works for the U.S. Fish and Wildlife Service as the science coordinator for the Eastern Tallgrass Prairie and Big Rivers, LLC. She previously developed communications approaches with DJ Case and Associates, managed fisheries and watershed projects at the Indiana Department of Natural Resources, and served in the U.S. Peace Corps aquaculture program in Honduras. Gwen holds a PhD in conservation biology from the University of Minnesota and a master's in zoology from the University of Maryland.

Additional contributors: Bob Clevestine, U.S. Fish and Wildlife Service, and Glen Salmon

Watershed Management for Control of Nutrient Loss in the Mackinaw River

Maria Lemke, The Nature Conservancy, Peoria Office

The Mackinaw River is a major tributary of the Illinois River, which feeds into the Mississippi River. The 740,000-acre watershed contains some of the most productive agricultural land in the nation and plays a key role in the livelihood of farmers and the Illinois economy. Urban development and row-crop agriculture have stressed freshwater resources, leading to stream bank erosion, habitat loss, and drinking water quality concerns. Our research in the Mackinaw River has shown that surface water-oriented conservation practices are not enough to improve water quality in these highly drained, agricultural watersheds and has led to subsequent research testing effectiveness of constructed wetlands to intercept and treat non-point source runoff. Strategies include: (1) precision outreach for wetland placement, (2) quantifying optimum wetland to tile-drained watershed area, (3) watershed-scale monitoring of wetland effectiveness, and (4) bundling on-field and off-field practices. We are using a paired watershed design to measure watershed-scale effectiveness of strategically placed wetlands at the 10,000-acre scale. A separate seven-year study showed that wetland to watershed ratios of 3 to 9 percent can remove an average of 19-47 percent of nitrate-nitrogen and 50-60 percent of orthophosphorus loadings, respectively. This long term research is being applied to address nitrate-nitrogen concerns in a local drinking water source similarly impacted by agricultural non-point source drainage.

Maria Lemke received her bachelor's and master's degrees from the University of Oklahoma, where she studied the response and recovery mechanisms of aquatic insect communities to flooding and drying disturbances. She earned her PhD from the University of Alabama, where her research focused on population and production dynamics of wetland microcrustaceans. After moving to Illinois in 1999, Maria worked for several years at the Illinois Natural History Survey in Havana, Illinois monitoring larval fish and zooplankton

production in backwater lakes on the Illinois River. She has been with The Nature Conservancy for the last 13 years working with partners to quantify the effectiveness of multiple agricultural conservation practices in the Mackinaw River watershed and with the Illinois River's science team to coordinate and conduct wetland research at the Emiquon Preserve in central Illinois. Additional research interests include quantifying diversity and secondary production of aquatic invertebrates in floodplain and backwater habitats along the Illinois River.

Additional contributors: Krista Kirkham, Bill Perry, Mike Wallace, David Kovacic, Miran Day, Kent Bohnhoff, Rick Twait, and Jackie Kraft

Aquatic Vegetation and Fish Community Monitoring at the Emiquon Nature Preserve

T.D. Van Middlesworth, Illinois Natural History Survey Illinois, River Biological Station

Floodplains provide many ecosystem services, including biodiversity, fish and wildlife refuge, flood-peak reduction, shoreline stabilization, groundwater recharge, sediment accretion, nutrient uptake, as well as recreational, educational, research, economic, and aesthetic services. River connectivity is critical for maintaining ecosystem integrity and services. The Illinois River is one example of a productive floodplain river system, but its natural biological productivity has changed through floodplain disconnection, elevated nutrient inputs, and invasive fish species introductions. Currently, floodplain restoration efforts are intended to benefit and improve the Illinois River, as well as others throughout the Midwest. Thompson and Flag lakes at The Nature Conservancy's Emiquon Nature Preserve serve as one example and have sustained a diverse (10 species) and abundant native submersed aquatic vegetation community that is otherwise difficult to find within the Illinois River valley today. As the diversity and plant density increased has since restoration, so has the species richness and biomass of native fishes. However, common carp (*Cyprinus carpio*) are present in the Emiquon Preserve and management is critical for maintaining balance in aquatic ecosystems. Because rotenone is not 100 percent effective, additional research on largemouth bass (*Micropterus salmoides*), bowfin (*Amia calva*), and gars (*Lepisosteus*) has been conducted and suggests that they cannot control common carp population growth through direct predation. Additionally, research has been conducted to assess how the aquatic vegetation and fish communities respond to river connection and natural flood events. The knowledge gained from this research will continually serve useful for the Emiquon Preserve and future floodplain restoration projects.

T. D. Van Middlesworth earned an associate's degree from Spoon River College in 2008, a bachelor's degree with an emphasis on zoology and natural resources/conservation from Western Illinois University in 2010, and a master's degree with an emphasis on fisheries biology and management from Western Illinois University in 2014. Since 2003, he has volunteered and been employed with the U.S. Fish and Wildlife Service, Illinois Department of Natural Resources, and Illinois Natural History Survey (INHS). He is currently employed with INHS conducting fish and aquatic vegetation restoration monitoring at Emiquon Nature Preserve. This work assists The Nature Conservancy with management decisions at this property. His research interests include restoration, primitive fishes such as bowfin and gars, non-native species, and anything else involving aquatic ecosystems.

Landscape Conservation Design at the Refuge Complex Scale

Robert Clevestine, U.S. Fish and Wildlife Service, Rock Island Field Office

Implementation of the U.S. Fish and Wildlife Service (USFWS) Strategic Growth Policy rests on the execution of landscape conservation designs that provide the ecological and social context for the establishment and management of the National Wildlife Refuge System. Established refuge units operate under comprehensive conservation plans, habitat management plans, and annual management or work plans designed to meet the goals and objectives articulated in the higher-level documents. In 2013, *A Landscape-Scale Approach to Refuge System Planning* articulated the need for planning beyond refuge boundaries in the company of, and in partnership with, other agencies, tribes, non-governmental organizations, and private landowners. Further, the approach called for the development of landscape conservation designs in geographies and spatial scales to be defined by the partnership assembled for individual refuges or groups of refuges. This policy was made official in September 2014, and a partnership has initiated the design process for the Illinois River National Wildlife and Fish Refuge Complex centered on the Chautauqua National Wildlife Refuge near Havana, Illinois. The partnership has recently formed, and partners have a number of considerations before them. This presentation will outline the policy and principles of landscape conservation design, the goals articulated by the partnership, and the status of the design process at the time of the conference.

Bob Clevestine is a fish and wildlife biologist with the Upper Mississippi River National Wildlife and Fish Refuge stationed in Moline, Illinois. Bob received his bachelor of arts degree in zoology from Southern Illinois University in 1979 and his master of science degree in biology from Western Illinois University in 1992. He is a certified wildlife biologist and is an active member of The Wildlife Society. Bob began his career at Starved Rock Lock and Dam in 1981 prior to moving into the U.S. Army Corps of

Engineers (USACE) Environmental Analysis Branch in 1984. His experience with natural resource policy and management issues on the upper Mississippi River includes navigation, flood control, and restoration. Since transferring to USFWS in 1999, he has chaired or co-chaired several interagency committees and worked with staff from USACE and five states bordering the upper Mississippi River. His background on the Mississippi River led to his assignment to the White House Office of Environmental Policy Interagency Floodplain Management Review Committee following the 1993 flood. He served as a member of the Science Panel for the Navigation and Ecosystem Sustainability Program and is currently an advisory member for the Eastern Tallgrass Prairie and Big Rivers Landscape Conservation Cooperative. Since 2013, he has been the regional liaison to USFWS's Gulf of Mexico Restoration Program, working with the Landscape Conservation Cooperative to integrate habitat restoration with nutrient reduction project delivery.

Additional contributors: Robert Barry, U.S. Fish and Wildlife Service, Douglas Blodgett, The Nature Conservancy, and Kristin Shaw, U.S. Fish and Wildlife Service

Concurrent Session C-2: Water Use in Central Illinois: From Traditional to Innovative

Wednesday, Oct. 28 • 3:15-4:30 p.m. • LaSalle

Moderator: Kelly Thompson, Association of Illinois Soil and Water Conservation Districts

How Much Is Two Billion Gallons per Year of Sewage Plant Effluent Worth?

Rick Manner, Urbana and Champaign Sanitary District

In 2013, Cronus Fertilizer approached the Urbana and Champaign Sanitary District about the potential purchase of 4,400 gal/minute of effluent. This talk will review what has happened since then and the issues associated with selling two billion gallons of water per year. In addition to the financial aspects of this project, there will be discussion about wastewater reuse generally, the Mahomet Aquifer, surface water, and aquatic life needs as well as other environmental issues.

Rick Manner received his bachelor's in chemical engineering and master's in environmental engineering from the University of Illinois at Urbana-Champaign. He worked at the Fox River Water Reclamation District in Elgin for 22 years in a variety of positions, starting as the pretreatment coordinator, before moving into engineering. In 2011, he became the executive director at the Urbana and Champaign Sanitary District.

A Farmer's Perspective of Irrigation in Mason County

Jeffrey Smith, Farmer, Mason County

This presentation will cover:

- How and why we started irrigating on our farms
- The basics of operating irrigation
- How irrigation has evolved in Mason County over the years
- Some of the new technology being used to conserve water and power
- Imperial Valley Water Authority's foresight in installing a rain gauge and observation well network to study and monitor the Mahomet Aquifer in Mason and southwestern Tazewell counties

Jeff Smith graduated from Eureka College in 1977 with a bachelor of science degree in physics. He taught junior high math and coached basketball for two years before coming back to the family farm in 1979 to pursue a career in farming. Jeff currently farms 2,500 acres in Mason County, of which 1,700 acres are irrigated. Over the years Jeff has raised several different specialty crops, such as green beans, sweet corn, peas, popcorn, seed corn, seed bean, and seed wheat, along with the traditional crops of corn, soybeans, and wheat. He is a past president of Mason County Farm Bureau and Central Illinois Irrigated Growers Association. Currently, Jeff is the chairman of Imperial Valley Water Authority and a member of the East Central Illinois Regional Water Supply Planning Committee representing agricultural stakeholders.

Implementing the Irrigation Reporting Portion of the Illinois Water Use Act

Steve Wilson, Illinois State Water Survey

In 2010, the Illinois Water Use Act was amended to make reporting for all high-capacity wells or intakes mandatory in Illinois, including agricultural irrigation. The act gave agricultural irrigators five years to comply, which means irrigators are required to report their water use from both wells and surface water intakes starting in the 2015 growing season. This presentation will describe how the data from the Illinois Water Inventory Program (IWIP) has been traditionally used by scientists in Illinois, discuss changes in reporting required by the Water Use Act amendments, and describe how IWIP is being implemented to include irrigation reporting starting in 2015.

Steve Wilson is a groundwater hydrologist who has been at the Illinois State Water Survey (ISWS) since 1983. Steve has bachelor of science degrees in agricultural science and agricultural engineering and a master of science degree in civil engineering from the University of Illinois. He authored the Private Well Class, a free online curriculum for private well owners, and is implementing the irrigation reporting portion of IWIP at ISWS.

Additional contributors: Karen Bridges, Illinois State Water Survey

Concurrent Session A-3: Watershed Partner Spotlight

Thursday, October 29 ♦ 8:30-9:45 a.m. ♦ Marquette Ballroom South

Moderator: *Mike Miller, Peoria Park District*

Growth and Strategic Change at the Dixon Waterfowl Refuge at Hennepin and Hopper Lakes

Paul Botts, The Wetlands Initiative

Established in 2000, the Dixon Waterfowl Refuge is now in the midst of major growth and change. The Wetlands Initiative has made some new strategic decisions regarding the site, new international recognition has raised its profile, important new ground has been added for the first time since its beginnings, public access is being dramatically expanded, and the organization is about to undertake the site's first-ever formal master planning and community engagement process.

Paul Botts has been the executive director of the Wetlands Initiative since 2011. Previously, he served as director of Chicago programs at the Gaylord and Dorothy Donnelley Foundation in Chicago. Prior to his work at the foundation, Paul served in operations and development roles at The Nature Conservancy of Illinois for eight years and was an executive director in professional theater for four years. He began his non-profit career many moons ago as communications officer for the former Center for Great Lakes.

Birds of a Feather

Mike Miller, Peoria Park District, and Eric Schenck, Ducks Unlimited

How do a group dedicated to preservation of all birds and a conservation group focusing on waterfowl partner in building a long term project together? Learn how Peoria Audubon's Sanctuary Initiative and Ducks Unlimited (DU) came together to form a partnership for the preservation of a 200-plus acre sanctuary along the Illinois River. It is a partnership between two NGO groups. From DU's perspective, it opens up the prospect of finding long-term project partners outside of the normal government partners, and from Peoria Audubon's perspective, it allows them to benefit from the knowledge base of DU's vast experience of habitat enhancement.

Mike Miller is the past president and current member of the board of directors for the Peoria Audubon Society, a local not-for-profit that has an active sanctuary initiative. Mike has been involved in conservation initiatives in central Illinois for close to 30 years in both his professional career as supervisor of environmental services for the Peoria Park District and his personal service through Peoria Audubon Society, Illinois Audubon Society, and Peoria Wilds.

As manager of conservation programs with DU, Eric has been the driving force behind several conservation projects in the middle Illinois River region including the development of Wightman Lake and Spring Lake Bottoms. A Canton native, Eric has also been involved with the Prairie State Conservation Coalition and Vital Lands Illinois.

Peoria's OneWater Initiative

Jane Gerdes, City of Peoria

Abstract and bio not available at time of printing.

Concurrent Session B-3: Putting Stormwater BMPs in Practice

Thursday, October 29 ♦ 8:30-9:45 a.m. ♦ Cheminee

Moderator: Gina Bean, Association of Illinois Soil and Water Conservation Districts

Monitoring Urban Stormwater Engineering Best Management Practices

Jim Duncker, U.S. Geological Survey, Illinois Water Science Center

The Chicago Department of Transportation (CDOT) Sustainable Streetscapes Program utilizes a variety of urban stormwater engineering best management practices (BMPs) to reduce stormwater runoff volume, reduce stormwater pollutant loads, and improve the functionality of public right-of-way within the city. Similar green infrastructure methods are being implemented to address stormwater runoff issues in urban areas around the world. Since 2009, CDOT has partnered with the Metropolitan Water Reclamation District of Greater Chicago and the U.S. Geological Survey (USGS) Illinois Water Science Center to monitor hydrologic conditions in the Blue Island-Cermak Streetscapes Corridor. Rain gauges, soil moisture probes, shallow groundwater monitoring wells, sewer flow meters, and water quality samplers were installed to document pre- and post-construction hydrologic conditions and evaluate the effectiveness of urban stormwater BMPs. The data quantifies the effectiveness of the BMPs, identifies the need for BMP maintenance, and highlights the challenges of monitoring urban hydrology.

Jim Duncker received his bachelor's degree in geology from the University of Colorado and began working for USGS as a student while attending graduate school at Northern Illinois University. Jim began working full-time for USGS in 1985. Since then, he has worked throughout the Chicago area on urban hydrology projects and the Chicago Area Waterway System with an emphasis on data collection and hydroacoustic flow monitoring.

Using Green Infrastructure to Improve Water Quality, Reduce Flooding, and Revitalize Neighborhoods

Tom Price, Conservation Design Forum

Abstract not available at time of printing.

Tom Price is the principal water resources engineer at Conservation Design Forum. Conservation Design Forum is a multi-disciplinary planning and design firm composed of engineers, landscape architects, and ecologists focused on sustainable green infrastructure solutions that integrate stormwater and landscape systems. The focus of Tom's career has been on sustainable stormwater management approaches that address both the hydrologic and water quality impacts of development. Projects are designed to integrate stormwater management systems throughout the site rather than using more typical end-of-the-pipe solutions that collect and then detain stormwater. Stormwater strategies include bioretention systems such as green roofs, rain gardens, and bioswales, porous paving, rainwater collection and reuse, and naturalized conveyance and detention.

Integrating Stormwater Practices into Transportation

Scott Marlow, Illinois Department of Transportation

Prior to the issuance of the revised National Pollutant Discharge Elimination System ILR10 permit from the Illinois Environmental Protection Agency, which requires post-construction stormwater controls, the Illinois Department of Transportation (IDOT) began working to update its practices. As opposed to construction-related stormwater practices, which are temporary, post-construction stormwater practices are permanent and require maintenance and siting considerations. This presentation will discuss the current state of post-construction practices and the challenges of adopting these changes for linear projects.

Scott Marlow is the environmental policy manager for the IDOT Bureau of Design and Environment, a position he has held since 2007. Previously, Scott worked as a natural resource analyst, screening projects for natural resource impacts. He started in 1999 as an intern at the department and was hired full time in 2001. Scott also serves as a co-chair for the department's Stormwater Committee. He holds a master's degree in biology from the University of Illinois at Springfield and a bachelor's in Zoology from Southern Illinois University. He is married with two children and lives in Springfield.

Concurrent Session C-3: Monitoring: Fins, Feathers, and Fields

Thursday, October 29 ♦ 8:30-9:45 a.m. ♦ LaSalle

Moderator: Jason Beverlin, *The Nature Conservancy*

Combining Drainage Water Management and American Gold Plover Conservation in an Agricultural Landscape

Drew Becker, U.S. Fish and Wildlife Service, Rock Island Field Office

Novel solutions that simultaneously address natural resource issues, promote and conserve wildlife, and provide benefits to agricultural producers are needed. The Shorebird Conservation Acreage via Drainage Water Runoff Control (SCARC) program will demonstrate one potential solution through the strategic location of drainage water management (DWM). The benefits of DWM to water quality are extensive and well documented (e.g., Lalonde et al., 1996, Fausey et al., 2004, and Drury et al., 2009). However, the potential for DWM to provide and improve wildlife habitat has yet to be established. SCARC represents a multi-agency approach that will demonstrate how DWM can be used to provide habitat for wildlife, specifically migrating shorebirds and waterfowl, while helping to reduce nutrient runoff and increase crop production.

Millions of migrating shorebirds and waterfowl once came through the Midwest every spring. These individuals used flooded prairies and wetlands to refuel for their northbound migration. While some species have altered their migratory route in response to the loss of habitat, others still depend heavily on the agricultural fields of the Midwest. Many of these species have declined dramatically (Skagen 2006). Specifically, at least 20 shorebird species that still rely on Midwestern habitats have been declining (Potter et al. 2007). One species in particular, the American golden plover (*Pluvialis dominica*), is almost completely dependent on Midwestern agricultural fields during its spring migration (Johnson and Conners, 2010 and Sullivan et al., 2009). The golden plover is a focus of the SCARC program.

Drew Becker is a fish and wildlife biologist with the U.S. Fish and Wildlife Service stationed at the Rock Island Field Office. His work is focused on high-priority migratory bird issues, and he serves as the eagle biologist for Illinois, Iowa, and Missouri. Drew's duties include providing technical assistance to landowners, project proponents, and government entities regarding regulations and permits issued under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Additionally, he is the species lead for the federally-endangered Iowa Pleistocene snail. Previously, Drew worked for the National Park Service in Hawaii, focusing on endangered seabirds. He began his career working as the Natural Areas Manager at Allerton Park in Monticello, Illinois. Drew received his bachelor of science (2007) and master of science (2010) degrees in natural resources and environmental sciences from the University of Illinois. His thesis research focused on the deer management program at Allerton Park. He grew up in Watseka, Illinois and currently resides in Eldridge, Iowa, where he lives with his wife and two sons. Drew enjoys spending time with his family recreating in the great outdoors.

Additional contributors: Mike Ward, Kirk Stodola, and T.J. Benson, Illinois Natural History Survey; Kraig McPeck, Drew Becker, and Rober Clevestine, U.S. Fish and Wildlife Service; Wade Louis and Mark Alessi, Illinois Department of Natural Resources; Ben O'Neal, Franklin College; and Richard Warner and Jake Hendee, Lewis and Clark Community College and National Great Rivers Research and Education Center

Recent Improvements in Waterbird Numbers and Conditions in the Illinois River Valley

Heath Hagy and Chris Hine, Illinois Natural History Survey, Forbes Biological Station

Floodplains of large river systems in the Midwest are often disconnected or partially disconnected from flood waters for the benefit of agriculture, urban development, and managed natural resource management. Many of these rivers are drastically altered from their natural state to allow commercial navigation, recreation, and managed flows. In these altered systems, tradeoffs in ecosystem services exist between connected floodplains and disconnected floodplains. We will present data from two case studies on the Illinois River of central Illinois that illustrate the tradeoffs in biotic communities, especially waterbirds, using floodplains that have been connected hydrologically and those that are isolated behind levees. Wetland birds, fishes, and vegetation all respond differently to floodplain connectivity, and management objectives must be considered carefully prior to restoring hydrologic connections between floodplains and highly-altered river systems.

Heath Hagy serves as the director of Forbes Biological Station and assistant research program leader of the Illinois Natural History Survey (INHS) within the University of Illinois at Urbana-Champaign. He completed his postdoctoral studies at the University of Tennessee-Knoxville, a PhD at Mississippi State University, a master's of science degree at North Dakota State University, and a bachelor's of science degree at Southern Nazarene University. He hails from a small town in southwestern Oklahoma

Chris Hine has been employed by the INHS Forbes Biological Station since earning his bachelor's of science degree from Western Illinois University in 1990. Chris has been involved with various waterfowl and wetlands research projects throughout his career, including waterbird and wetland vegetation monitoring at the Emiquon Preserve. Chris' research interests include waterfowl ecology and management, wetland vegetation management, foraging ecology of waterfowl and shorebirds, distribution of waterfowl populations in Illinois, and migration ecology of dabbling ducks and diving ducks.

Monitoring CREP's Contribution to Wildlife Conservation and Water Quality in the Illinois River Watershed

Luke Garver, Illinois Department of Natural Resources

The Conservation Reserve Enhancement Program (CREP) is a state incentive conservation program tied to U.S. Department of Agriculture Conservation Reserve Program. CREP aims to reduce sediment and nutrient runoff while increasing wildlife and fish populations by retiring frequently-flooded cropland through habitat restoration and long-term protection. Currently, 86,000 acres of grasslands, woodlands, forests, and wetlands are enrolled in CREP in the Illinois River watershed. An area of that magnitude has the potential to provide large benefits to the overall health of the Illinois River and its associated watershed. A wide variety of research and monitoring has been conducted on CREP properties to assess the program's ability to achieve its goals. As a model, CREP uses the Illinois Department of Natural Resources (IDNR) Illinois Wildlife Action Plan (IWAP), which has outlined priorities and strategies to achieve success in wildlife and habitat conservation. In four of Illinois' natural divisions, major contributions to the targeted number of acres in forest, woodland, grassland, and wetland habitats have been made as those areas were restored and protected through CREP. Research is also being conducted to assess the impact CREP has had on conservation-priority bird species by providing large areas of critical habitat. The research aims to quantify CREP's contribution to IWAP goals and also provide insight into habitat selection and nesting ecology of those species. Finally, the La Moine River watershed, a major tributary of the Illinois River, is the most concentrated area of CREP enrollment in the state. By taking a close look at this watershed, we can quantify the amounts of sediment and nutrients not reaching the Illinois River as well as the number of acres restored to woodland, grassland, and wetland, giving us one of CREP's best success stories.

Luke Garver grew up in Jacksonville, Illinois and was introduced to upland, deer, turkey, and waterfowl hunting at a young age by his father. In addition to being an avid hunter, he enjoys camping, mountain biking, paddling, and playing or watching most sports. He roots for the St. Louis Cardinals, St. Louis Rams, and the Fightin' Illini. Luke and his wife, Natalie, live in Jacksonville with their one-year-old son, Henry, and their chocolate lab, Bison. Luke is a 2006 graduate from the University of Illinois. After graduating he worked for Louisiana State University on black bear and wild turkey research projects in Louisiana. In 2007, he moved to Texas to begin a graduate project with the Caesar Kleberg Wildlife Research Institute at Texas A&M-Kingsville. While pursuing a master's degree in wildlife management, he conducted research on white-tailed deer on private ranches near Laredo on the Mexican border. Upon finishing graduate school, he worked for the Natural Resources Conservation Service as a soil conservation technician from 2010 to 2014 in the Ford, Macon, Piatt, and Pike field offices. He joined IDNR in 2014 as the CREP program coordinator in the Springfield office and is involved in every phase of the program, from application to management.

Concurrent Session A-4: Great Lakes Mississippi River Interbasin Study (GLMRIS)

Thursday, October 29 ♦ 10:15-11:30 a.m. ♦ Marquette Ballroom South

Moderator: Doug Yeskis, U.S. Geological Survey

Overview of GLMRIS

Andrew Leichty, U.S. Army Corps of Engineers, Rock Island District, and Susanne Davis, U.S. Army Corps of Engineers, Chicago District.

The Great Lakes and Mississippi River Interbasin Study (GLMRIS), which evaluated options and technologies to prevent the interbasin transfer of aquatic nuisance species (ANS) was released in January 2014. In the fall of 2014, the U.S. Army Corps of Engineers (USACE) initiated a scoping process for a feasibility study focused on the GLMRIS – Brandon Road report as a feasibility study that built on the foundation of the GLMRIS report. This feasibility study will evaluate alternatives to prevent the upstream transfer of ANS from the Mississippi River basin into the Great Lakes basin near the Brandon Road Lock and Dam in Joliet, Illinois. This presentation will focus on the GLMRIS report and the Brandon Road feasibility study.

Andrew Leichty began his career with USACE in 2002 as a planner in the Rock Island District plan formulation section. In 2009, Andrew accepted a position as project manager in the Rock Island District working on flood damage reduction, navigation, flood plain management, and ecosystem restoration projects. In 2014, he accepted a position as program manager for the Illinois River Basin Restoration (IRBR) Program, and in 2015, he accepted a position as assistant chief of the Rock Island District Project Management Branch. Currently, Andrew serves as the program manager for the IRBR Program, assistant chief of the Project Management Branch, and the project manager for the GLMRIS – Brandon Road study. He is a certified project management professional and a member of the Project Management Institute. A native of Southeast, Iowa, Andrew received his bachelor of science in civil engineering from Iowa State University in 1993.

Susanne Davis is the chief of the Chicago District Planning Branch at the Chicago District. She is a civil engineer with a background in hydrology and hydraulics. Susanne has worked for the Chicago District for the past 28 years in various positions. She became the chief of planning in 2005. Susanne oversees a diverse planning program that includes the development of study documents for the mission areas of ecosystem restoration, flood risk management, and navigation. Most recently, she was heavily engaged in the development of the GLMRIS report, which was released in January 2014. Susanne started her career at the Chicago District in 1987. She served as a lead hydraulic engineer and lead planner from 1991 through 2002, and she has participated in the development of flood risk management and ecosystem restoration projects for the Chicago District. In 2002, Susanne was selected as the Hydraulic Engineering Section chief, and in 2004 as the Hydraulic and Environmental Engineering Branch chief.

Infrastructure Considerations of GLMRIS

Benjamin Brockschmidt, Illinois Chamber of Commerce

The threat of aquatic invasive species in the Great Lakes and Mississippi River basins led to language being included in a transportation authorization to the U.S. Army Corps of Engineers to assess the situation. Within the various alternatives that were eventually included in the *Great Lakes and Mississippi River Interbasin Study* were a number of infrastructure considerations. Each proposed alternative has a cost as well as a multitude of questions that remain about the impacts they would have on the environment, commercial and recreational navigation, and other infrastructure.

Benjamin J. Brockschmidt currently serves as the executive director of the Infrastructure Council and director of federal affairs for the Illinois Chamber of Commerce. The Infrastructure Council is a subgroup focused on increasing infrastructure investments in a strategic and thoughtful way in order to boost the overall business climate in Illinois. Overall, Benjamin keeps a close watch on policies at both state and federal levels, advocating against shortsighted regulations that inhibit economic growth and add uncertainty. A native of the Chicago suburbs, Benjamin's experience with urban and rural interests has built a strong foundation for him to work with different interests toward improving the business climate throughout Illinois. Additionally, his professional relationships with elected offices, agency officials, and industry leaders make him a vital partner in Illinois, Washington, D.C., and throughout the United States. Benjamin is a 2006 graduate of Illinois State University with a double major in history and political science. In 2012 he earned his master's degree in national security and strategic studies through the U.S. Naval War College College of Distance Education.

Environmental Considerations of GLMRIS

Robert Hirschfeld, Prairie Rivers Network

The Chicago Area Waterway System (CAWS) links two great bodies of water—the Great Lakes and the Mississippi River basins. The manmade canal that was completed in 1900 allowed for the diversion of sewage and the movement of commerce, prompting the city's great growth in the 20th Century. But Chicago and the greater region still live with the consequences of the river's reversal, including the threat of invasive species moving in both directions and ongoing water quality and flooding problems. The interest surrounding the Asian carp issue offers the chance to leverage big, systemic improvements to the deeply flawed system that is CAWS—improvements in terms of water quality, flooding, the two-way invasive species superhighway, and the city's engagement with the river.

Robert Hirschfeld is water policy specialist and communications coordinator for Prairie Rivers Network (PRN), Illinois's advocate for clean water and healthy rivers. Robert leads PRN's advocacy efforts seeking improvements to the Chicago River, including stopping the two-way transfer of invasive species through CAWS. Robert joined PRN in March 2011. Before joining the professional staff, Robert was a legal intern for PRN, working on Clean Water Act compliance and enforcement. He holds a bachelor of arts degree in religion and Asian studies and JD from the University of Illinois College of Law.

Concurrent Session B-4: Stormwater Policy & Funding

Thursday, October 29 ♦ 10:15-11:30 a.m. ♦ Cheminee

Moderator: Rita Lee, Illinois Department of Natural Resources

Summary of the Report Required by the Urban Flooding Awareness Act

Brad Winters, Illinois Department of Natural Resources

In 2013, research by the Center for Neighborhood Technology indicated that flooding in urban communities may occur outside the floodplain even more than inside it, resulting in severe property damage that is not addressed by current federal and state flood control programs. This led to the proposal and passage of the Urban Flood Awareness Act in 2014. The Urban Flood Awareness Act tasked the Illinois Department of Natural Resources (IDNR), in cooperation with a number of partners, with determining the extent, contributing factors, and ways to decrease the amount of urban flooding in Illinois. IDNR was required to report its findings to the General Assembly and governor by June 30, 2015. This presentation will describe the sources and underlying research that went into creating the report. It will also explain the outcomes and recommendations from the study.

Brad Winters is a professional engineer, certified floodplain manager, and project engineer for IDNR's Office of Water Resources in Springfield. He was the project manager for the Urban Flood Awareness Act at IDNR. Brad received his civil engineering degree from the University of Missouri at Rolla in 2001 and has worked for the Office of Water Resources ever since. Brad is back to 'normal' after a severe ankle break mid-2013 and is finally getting back to house projects and volunteer firefighting.

Stormwater Utilities in Illinois?

Mark Hoskins, Michael Baker International

Stormwater utility (SWU) programs are very prevalent across the Midwest—as documented by the 2014 Western Kentucky Stormwater Utility Survey—especially within Minnesota (160), Wisconsin (115), Iowa (68), Ohio (100), and Indiana (68). Why has Illinois (16) been so slow implementing this style of funding source? This presentation will survey and report the present active SWU programs, interested municipalities, and failed attempts within Illinois.

What are the core elements to a successful SWU program? There are other 'flavors' of stormwater funding that have tried to replace the SWU concept. Some programs are basing the fee on a flat rate, others by water meter size, while others by a sales tax increase. Yet the elegance of a SWU program lies in the fact that the individual fee is rated by the amount of runoff generated by each property. Why not handle stormwater expenses with fees directly related to contribution peaks, volumes, and degrees of pollution? This presentation covers how to advertise the needs of each program to residents and the media and plan future needs in order to meet U.S. Environmental Protection Agency regulations and sustainability and ecological community goals.

Why have so many programs been so successful? This presentation will report on the five most successful programs across America and document why they have been active and growing over that last 10-20 years. Illinois suffers from poor financial management, yet recent flood damages across the state has increased, and Illinois residents must find a stable stormwater funding source. Across the nation, a properly run stormwater utility funding approach is the most fair, provides fee credits/incentives, and offers outreach to families, ultimately costing less than any other stormwater program, period!

Mark Hoskins, P.E., CFM, is a technical manager III working for Michael Baker International located in Chicago. He has over 30 years of professional experience in the design of complex storm drainage systems, highway drainage site development, and stormwater outreach. His airport experience includes the development of an XP-SWM model for the St. Louis International Airport existing and proposed conditions. He has also been responsible for the preparation of Phase I and Phase II drainage studies and hydraulic reports for the Illinois Department of Transportation and the Florida Department of Transportation. While employed by the Illinois Department of Natural Resources for 10 years, Mark reviewed, drafted, and merged numerous Federal Emergency Management Association watershed studies used to generate preliminary flood insurance rate mapping and flood insurance studies. He also teaches the review class for the Certified Floodplain Manager Program to four different floodplain associations and tries to make the training relevant and interesting. Mark graduated from Principia College with a degree in biology and from the University of Connecticut with a bachelor of science degree in civil engineering.

Watershed-Based Master Planning for Resiliency in our Communities

Sarah Hunn, DuPage County Stormwater Management

DuPage County is eligible to receive additional Housing and Urban Development (HUD) Community Development Block Grant (CDBG) funding under a competitive application process under the CDBG's National Disaster Resilience Competition (NDRC). The CDBG-NDRC will award up to \$1 billion to communities that have been struck by natural disasters in recent years. The competition, which involves two phases, promotes resiliency strategies to better prepare communities for future storms and other extreme events. Due in March 2015, Phase 1 asked applicants to identify unmet needs from their disasters and create resiliency plans that also consider a broader region. If invited to Phase 2, the county will submit designs for specific projects that will help address unmet needs and mitigate future events.

Locally, DuPage County has identified the Lisle area and the broader East Branch DuPage River watershed as having the largest amount of unmet needs for which the county is eligible for support from the April 2013 floods. HUD also confirmed this area meets their minimum criteria in both housing and infrastructure needs. In line with Phase 1, DuPage County has developed an East Branch DuPage River Watershed Resiliency Plan that was approved by the DuPage County Stormwater Management Planning Committee and the county board in March of 2015. The development of this plan included a multitude of stakeholders, including all municipalities within the watershed, several county departments (Health Department, Office of Emergency Management, Transportation, Community Development, Economic Development, etc), regulatory agencies (local, state, and federal) and many other partners who have a vested interest in the East Branch DuPage River. DuPage County Stormwater Management believes this planning effort will serve as a template for watershed plans. The planning efforts will develop a more resilient community and help all stakeholders develop capital plans and secure funding for projects within the watershed.

Sarah Hunn is the chief engineer for DuPage County Stormwater Management. Sarah started her career at the Illinois Department of Transportation and has worked for DuPage County Stormwater Management for the past 10 years, where she currently manages the flood control and stormwater operations groups. She holds a bachelor of science degree in civil engineering from Michigan Technological University.

Additional contributors: Mary Mitros

Concurrent Session C-4: Monitoring: Nutrients & Sediment

Thursday, October 29 ♦ 10:15–11:30 a.m. ♦ LaSalle

Moderator: *Brian Miller, Illinois Water Resources Center*

Hydrologic, Sediment, and Nutrient Loads in the Illinois River Watershed

Mike Demissie, Illinois State Water Survey

The Illinois River drains nearly half of the state. Many of the major streams in Illinois drain into it. The Illinois Waterway, with its system of locks and dams, links Chicago and the Great Lakes to the Mississippi River, and thereby to the Gulf of Mexico. This linkage has a significant transportation and commercial value for the state and the nation. In addition, with its numerous backwater lakes, wetlands, and floodplain forests, the Illinois River valley provides a significant habitat for fisheries, waterfowl, birds, and other animals, making it an important ecological resource.

The Illinois River's environment has been subjected to many of the impacts associated with the developments in the watershed, including waste discharges from urban areas, water-level control for navigation, and sediment and chemical inflow from agricultural lands. The water quality of the river was severely degraded for several decades prior to the 1970s, when environmental regulations were enacted to control pollutant discharges. Since then the river water quality has been gradually improving. However, problems associated with erosion and sedimentation still persist and are recognized as the primary environmental problem in the Illinois River valley (Illinois State Water Plan Task Force, 1987).

Restoration of the Illinois River requires proper understanding of the natural factors and human-induced changes that control hydrology, hydraulics, and water quality over time. To facilitate that process, the Illinois State Water Survey (ISWS) has been assessing trends in hydrology and sediment and nutrient loads in the Illinois River, as well as the resulting sedimentation and water quality issues, for a long time. The results of the latest assessment will be presented.

Mike Demissie is the director of ISWS, a division of the Prairie Research Institute at the University of Illinois at Urbana-Champaign. He is responsible for leading and managing over 150 professional and support staff that are engaged in data collection, research, and public service in the field of water and atmospheric resources. His long-term research at ISWS has focused on problem solving in the general area of watershed science with an emphasis on watershed processes and restoration. He has conducted research addressing issues such as the ecology of large rivers, stream flow hydraulics, erosion and sediment transport, lake sedimentation, the hydrology and hydraulics of floods, and the hydrology of wetlands. He has published over 150 journal articles, reports, and conference proceedings. Mike received his bachelor of science degree in civil engineering from the University of Iowa and master of science and PhD in civil engineering from the University of Illinois at Urbana-Champaign. He is a registered professional engineer in Illinois, a fellow of the American Society of Civil Engineers, and a diplomate of the American Academy of Water Resources Engineers. He is also a member of the International Water Resources Association and the International Association of Hydrological Sciences.

Additional contributors: Laura Keefer, Elias Bekele, and Momcilo Markus, Illinois State Water Survey

Current State of Suspended-Sediment Surrogate Technology

Ryan Jackson, U.S. Geological Survey

Methods are rapidly advancing to estimate sediment characteristics in aquatic systems using acoustic metrics. The advantages of hydroacoustic metrics as surrogates of suspended sediment include greater accuracy due to high temporal resolution, a large sample volume, environmental robustness, a technology that is now ubiquitous in streamflow monitoring, and simultaneous velocity measurement. In tested fluvial, estuarine, and marine systems, this approach is effective for continuous monitoring of suspended sediment concentrations and possibly particle-size categories, bedload transport, and bed-material composition. However, best methods have not been determined for measuring acoustic attenuation and adjusted backscatter amplitude and for computing suspended sediment concentration and other sediment characteristics. This presentation will focus on the current state of suspended-sediment surrogate technology, primarily with respect to acoustic methods, and report on the ongoing efforts of the multi-agency Sediment Acoustic Leadership Team (SALT) to develop standardized techniques and practices for suspended sediment monitoring using hydroacoustic technology.

Ryan Jackson is a hydrologist with the U.S. Geological Survey Illinois Water Science Center in Urbana, Illinois. Ryan specializes in the use of hydroacoustic instrumentation and autonomous technology for the measurement of velocity and water quality distri-

butions in rivers, lakes, and estuaries. Ryan's work supports ongoing research into the use of hydroacoustic instrumentation for the measurement of suspended sediment concentration, the evaluation of Asian carp spawning habitat in Great Lakes tributaries, mixing in Great Lakes freshwater estuaries and river mouths, understanding nearshore transport of contaminants near swimming beaches, and the transport of contaminants in highly unsteady urban waterways. Ryan is also one of the primary authors of the Velocity Mapping Toolbox, a suite of post processing tools for acoustic Doppler current profiler data, and a member of SALT.

Intensive Streamflow, Sediment, and Water Quality Monitoring of a Small Watershed in Bloomington, Illinois

Tim Straub, U.S. Geological Survey

The City of Bloomington Illinois restored Kickapoo Creek to a more natural state by incorporating green infrastructure—specifically flood-plain reconnection, riparian wetlands, meanders, and rock riffles—at a 90-acre park within The Grove residential development. A team of state and federal agencies and contractors are collecting data to monitor the effectiveness of this stream restoration in improving water quality and stream habitat. The U.S. Geological Survey (USGS) is collecting and analyzing water resources data; Illinois Department of Natural Resources (IDNR) is collecting fish population data, the Illinois Environmental Protection Agency (IEPA) is collecting macroinvertebrates and riparian habitat data, and Prairie Engineers of Illinois, P.C. is collecting vegetation data. The data collection includes conditions upstream, within, and downstream of the development and restoration. This presentation will focus primarily on sediment monitoring but will also briefly discuss streamflow and water quality monitoring.

The monitoring effort includes a U.S. Environmental Protection Agency (U.S. EPA) National non-point source pollution monitoring project using funds under Section 319 of the Clean Water Act, which were distributed through IEPA. Additional monitoring and/or implementation funds were provided by U.S. EPA, IEPA, IDNR, USGS, the City of Bloomington, and the U.S. Department of Agriculture Natural Resources Conservation Service.

The 480-acre development was designed by the Farnsworth Group to reduce peak stormwater flows by capturing runoff in the reconnected flood plains with shallow wetland basins. Also, an undersized park bridge was built at the downstream end of the park to pass the 20 percent annual exceedance probability (historically referred to as the five-year flood) flows but detain larger floods. This design also helps limit sediment deposition from sediments transported in the drainage ditches in the upper 9,000 acres of agricultural row crops. Maintaining sediment-transport capacity minimizes sediment deposition in the restored stream segments, which reduces the loss of riparian and wetland plant communities and instream habitat. Two additional goals of the restoration were to reduce nutrient loads and maintain water quality to support a diverse community of biotic species. Overall, two miles of previously managed agricultural-drainage ditches of Kickapoo Creek were restored, and the park landscape maximizes the enhancement of native riparian, wetland, and aquatic species for the park's trail system.

Tim Straub earned bachelor of science and master of science degrees in civil and environmental engineering degrees from the University of Illinois and a PhD from Colorado State University. He works for USGS on various projects, including hydraulic and hydrologic modeling, sediment transport, and river mechanics.

Additional contributors: Amy Walkenbach and Don Roseboom

Plenary Sessions 1 & 2

Wednesday, October 28 • 8:45–11:30 a.m. • Marquette Ballroom South

Plenary Session 1: Shared Visions & Stories That Influence Change

Moderator: Andrew Barnes, U.S. Army Corps of Engineers

America's Watershed Initiative Report Card for the Mississippi River Watershed—Measuring Six Critical Goals in All Parts of the Mississippi River Watershed

Harald 'Jordy' Jordahl, America's Watershed Initiative

With financial support from The Nature Conservancy and facilitation by the University of Maryland, over 400 organizations, businesses, and agencies have engaged in shaping America's Watershed Initiative (AWI) *Report Card for the Mississippi River Watershed*. In September 2013, the AWI team kicked off a series of workshops in Moline, IL with a gathering of stakeholders from Illinois, Minnesota, Wisconsin, Iowa, and Missouri. This initial workshop focused on the Upper Mississippi River, of which the Illinois River is an integral part, and was the foundation for an outreach effort that brought more than 700 people into the process. Diverse experts and stakeholders came together in these workshops and additional meetings and webinars to identify information about six broad goals and create a report card to support collective action toward sustaining the economic and natural vitality of the river system. Data and information will measure and report on progress against these six goals: flood control and risk reduction, recreation, ecosystems, transportation, economics, and water supply. Each workshop and meeting was different, but the importance of the rivers and waters to every sector and in each basin was clear. The report card is not a goal into itself—it's a tool to bring together leaders from around the watershed to develop a shared vision for the future and create awareness among key constituencies of the opportunities and challenges that face our states and nation. This shared vision can be used to identify and form partnerships to pursue shared solutions to these critical water management challenges. Knowing what's important and how to measure it is the foundation to taking collaborative action to improve the watershed. The AWI report card will be finalized and shared with key leaders and the public in October 2015.

This presentation will share report card results for the entire 31-state Mississippi River watershed and discuss the Upper Mississippi River basin specifically, including the Illinois River.

Harald 'Jordy' Jordahl is the first director of AWI, starting the position in January 2013 and previously working with the initiative as a consultant on America's Great Watershed Initiative Summit held in St. Louis in September 2012. In this position, he works with the AWI steering committee and leads the initiative working with a diverse coalition of businesses, agencies, and organizations committed to developing collaborative solutions to challenges facing water resources throughout the entire Mississippi River watershed. The steering committee includes representatives from The Nature Conservancy, Great Rivers Partnership, Iowa Soybean Association, City of Dubuque, Iowa, Mississippi River Commission/US Army Corps of Engineers, Upper Mississippi River Basin Association, the Mississippi River delta region, Ohio River Basin Alliance, Mississippi River Valley Flood Control Association, Ingram Barge Company, state of Wyoming Engineer's Office, Big River Works, DuPont Pioneer, and Caterpillar, Inc. For the last two years, Jordy and AWI partners have traveled throughout the Mississippi watershed and each of the main basins to meet with stakeholders and experts to develop a report card measuring the status of six broad goals for the watershed, including transportation, ecosystems, recreation, water supply, economics, and flood control/risk reduction. Close to 700 participants have helped inform and shape the AWI report card that will be released in 2015. Prior to this position, Jordy worked on resource policy issues with state, local, federal, and tribal governments while serving in legislative, executive, administrative, and advocacy positions, including policy adviser to the governor, legislative policy aide, director of intergovernmental relations for the Wisconsin Department of Administration, and director of government relations for The Nature Conservancy in Wisconsin. His interests have focused on advancing projects affecting working landscapes and the connections between conservation and communities, agriculture, forestry, and transportation. Jordy's first exposure with the Mississippi River came on duck hunting trips with his dad to pool #9, often ending with a fresh catfish sandwich at the Bright Spot in DeSoto, Wisconsin before returning home. Jordy lives in the upper Mississippi River watershed in Madison, Wisconsin with his three children, wife, and hunting dogs and also manages family agricultural, timber, and recreational properties in western and northern Wisconsin.

Voices for the River: How Storytelling, Advocacy, and Education Can Inspire Concrete Action

Brian 'Fox' Ellis, *Fox Tales International*

Our stories connect us to the river and to the land. They remind us of our connection to our home land, our local ecology. Stories can also make abstract ideas visceral: the water cycle is not just out there or in a text book, it flows through our blood streams. A well told tale can change hearts and minds, ignite passion, build partnerships, and motivate action. If you have something important to say, put it in a story! This interactive plenary will remind you of the stories you already know and help you shape them to inspire your audience. You will hear a few good tales and tell a few of your own. Most importantly, you will leave this session with the tools you need to craft the right tale for the right audience at the perfect moment.

Brian 'Fox' Ellis is an internationally acclaimed author, storyteller, and naturalist who has worked with science museums and environmental organizations across the country. Fox has been a featured speaker at regional and international conferences, including the International Wetlands Conservation Conference, the National Science Teachers Association Conference, and the North American Prairie Conservation Conference. He is the author of 16 books, including the critically acclaimed *Learning From the Land: Teaching Ecology Through Stories and Activities* (Libraries Unlimited, 2011) and the award-winning children's picture book *The Web at Dragonfly Pond* (DAWN Publications, 2006). Fox has also written, produced, and directed a documentary on the long-term watershed management plan for the Illinois River, *Voices for the River*. Many of his stories are also available on one of his 12 CDs.

Plenary Session 2: From Neighborhood to Nation: Getting Better All the Time

Moderator: Dan Injerd, *Illinois Department of Natural Resources*

Getting the Nation RainReady

Harriet Festing, *Center for Neighborhood Technology*

Elizabeth Rafferty's South Side Chicago home flooded four times in two years, causing an estimated \$75,000 in damage. At one point, her basement filled with 5 ft of murky sewage water in less than an hour. That was the day Rafferty found the family's large oak dining room table crashing into the basement walls and the clothes dryer bobbing upside down in the water. Bad luck sometimes creates bad luck—Rafferty's flood insurance was canceled after her third flood. Rafferty is one of millions of homeowners across Illinois affected by urban flooding, defined as the inundation of property in a built environment caused by rain overwhelming the capacity of drainage systems such as storm sewers. Flooding can affect neighborhoods and homes in several ways: back-up through property floor drains, tubs, toilets, and sinks; seepage through foundation walls and basement floors; direct entry through windows, doors, or other openings; and overland flow from rivers, streams, and coastal areas. As cities, towns, and suburbs have developed to accommodate increasing population, more impervious surfaces have increased stormwater runoff, and natural drainage systems have been replaced with pipes and tunnels. In many cities, this infrastructure is aging, poorly maintained, and undersized. As a result, stormwater can overflow with devastating flood effects even after modest events. In Illinois, over 90 percent of the properties damaged are outside the floodplains. There's a clear link between the solutions to Elizabeth's misery, and the management of Illinois rivers—the stormwater runoff that causes billions of dollars of flood damage to homes and businesses is also a major threat to the vitality of the state's rivers and streams. So, imagine the power of bringing together flood victims and healthy river advocates around a coordinated program of action both locally and nationally. This is the essence of RainReady, a national program launched in 2014 by the Chicago-based non-profit the Center for Neighborhood Technology (CNT). RainReady helps individuals and communities find solutions to the problems of too much and too little water. Participating communities and residents are provided with planning and implementation services to improve stormwater management in ways that bring wider benefits to the community and water resources.

Harriet Festing, water program director at CNT, will describe the research, programs, and policies that underpin RainReady and CNT's work protecting American homes, businesses, and water resources in a changing climate.

Seeking Continuous Improvement in Farm Conservation Practices

Jon Scholl, University of Illinois

Farmers and landowners have made a lot of progress implementing conservation practices to protect soil and water. Significant public resources have been invested to assist with these efforts. More recently, technology has provided options that bring a new and exciting level of precision to the use and management of crop inputs. But the fact remains that there is a lot of work yet to be done. Vexing problems still challenge our ability to keep nutrients in their proper place and targeted to their intended purpose. Issues of soil health are becoming more prevalent. Regulatory pressures continue to build and the patience of others impacted by the off-site and cumulative effect of such problems is waning.

These are complex and difficult problems to address. Farmers and the public share the desire for a clean environment. Everyone wants abundant, high quality, reasonably priced food. Farmers are concerned about acquiring and maintaining economic security that will allow them to provide a reasonable standard of living for their family and to pass along a viable farm to the next generation. Balancing these and potentially other goals in the context of addressing environmental problems where the source and contribution of such problems is often unclear presents significant challenges. Devising a course of action that brings sustained environmental improvement often conflicts with choices farmers must make to protect the economic viability of their family farm.

This presentation will look at the progress and difficulty farmers and landowners have seen in managing their soil and water resources. It will address alternative courses of action and look at examples that provide the best opportunity to sustain long-term progress in achieving multiple goals on the farm. It will promote the idea of 'continuous improvement' as the central idea in the conservation ethic practiced in farmers' and landowners' daily decision making.

Jon Scholl teaches agricultural policy at the University of Illinois at Urbana-Champaign as part of an experiential learning program focused upon a hands-on, real-world approach to learning. He served five years as president of American Farmland Trust (AFT), where he refocused the organization on a mission of protecting farmland, promoting sound farming practices, and helping keep farmers on the land. He successfully led the organization through the most severe economic recession since the Great Depression. Under his leadership, AFT increased its credibility as a national advocate on land conservation issues and a convener of divergent interest groups consisting of farmers, consumers, and environmentalists. Prior to leading AFT, Jon served as counselor to the administrator for agricultural policy at the U.S. Environmental Protection Agency (U.S. EPA) in the George W. Bush administration. At U.S. EPA, Scholl led the development of the first national agricultural strategy, first agricultural advisory committee, and the first agency-wide cross-media agriculture team. He also helped direct agency regulations on animal feeding operations, spill prevention, clean air rules, and emission reporting requirements. In 2007, Scholl provided counsel to the U.S. Department of Agriculture farm bill team on conservation provisions. Prior to his work at U.S. EPA, Scholl was executive assistant to the president of the Illinois Farm Bureau. He also served as the director of public policy, director of national legislation, and director of natural resources. Over his 25 years with Illinois Farm Bureau, he worked with the Illinois congressional delegation and coordinated several legislative initiatives at state and local levels. Jon is a partner in a family farming operation in McLean County, Illinois that grows corn and soybeans and generates wind power. He graduated from the University of Illinois in 1978 with a bachelor of science degree in agricultural science. He was the recipient of the University of Illinois College of Agricultural, Consumer and Environmental Sciences Award of Merit in 2008. He is currently serving on the board of directors of the Soil and Water Conservation Society. He is the former chairman of the Illinois FFA Foundation.

Lunch & Learn Sessions

October 28 & 29 • 11:45 a.m. - 1:15 p.m. • Cotillion Ballroom

Wednesday, October 28

Lunch and Learn: Illinois River Past, Present, and Future

Moderator: *Lauren Lurkins, Illinois Farm Bureau*

Irreversible Reaction: Illinois River to Waterway

Richard Lanyon, Metropolitan Water Reclamation District (retired), Author

The Illinois River, a product of the Wisconsin Glacial Episode, morphed into the Illinois Waterway over the past two centuries, a determined effort to have nature serve national and local economic development. The lower Illinois River was first to experience changes to serve settlement and industries. Then the Illinois and Michigan Canal opened the navigable link to the Chicago River and Lake Michigan. Drainage and levee districts have isolated about half of the floodplain from the river channel and the Illinois General Assembly authorized the Sanitary District of Chicago to create the first segment of the deep waterway early in the 20th Century. A state project completed by the federal government followed, extending the deep waterway to Starved Rock. Added flow and sewage from Cook County adversely impacted the Illinois Waterway until sewage treatment plants and water quality standards brought some ecological recovery late in the Twentieth Century. Meanwhile, passive agricultural practices were replaced by industrial agriculture practices, loading the Illinois River with nutrients and sediments. Point sources of pollution are tightly controlled by environmental regulations while incentives and voluntary programs are being used to control non-point sources. Ecological restoration of the watershed is being attempted, but is it possible to restore a river that is so extensively modified? If and when a nutrient control strategy is decided, will it achieve the desired result? And what to do about those unwelcome fish?

Better known as Dick, Richard Lanyon retired from his position as executive director of the Metropolitan Water Reclamation District of Greater Chicago (MWRD), a position that he held for over four years, at the close of 2010. As executive director, he directed the day-to-day operations of MWRD, which included 2,100 employees serving 5 million people in Cook County and the industrial equivalent of another 4 million people. MWRD provides wastewater and stormwater management and other related services to protect the environment. Dick's career at MWRD spanned nearly 48 years. In 2012, he published *Building the Canal to Save Chicago*, a historical documentary of the first project of MWRD. Dick received the 2013 Abel Wolman Award from the Chicago Metro Chapter of the American Public Works Association for the single best new book on public works history. Other awards include the American Society of Civil Engineer's National Government Civil Engineer of the Year Award in 1999, Distinguished Alumnus of the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign in 2003, the Edward J. Cleary Award from the American Academy of Environmental Engineers and Scientists in 2011, and the Distinguished Service Award from the National Association of Clean Water Agencies (NACWA) in 2011. He is also a past president of the Illinois section of the American Society of Civil Engineers and holds bachelor and master of civil engineering degrees from the UIUC. In 2013, Dick was inducted into the NACWA Hall of Fame. Dick has been involved in a variety of technical activities for the above and other organizations, and he has served in a number of leadership roles on environmental protection and water resource management matters for federal, state, and local agencies and organizations. He is currently providing technical guidance for teaching stormwater management concepts to third- and sixth-grade students in the Evanston/Skokie School District 65. Dick served on the Evanston Public Library Board of Directors and as alderman of the 8th Ward on the Evanston City Council. He is currently the chairman of the Evanston Utilities Commission. He and his wife Marsha reside in Evanston, and he continues to be an advocate for sensible and sustainable water management in the urban environment.

Illinois Waterway Public-Private Partnership (P3) Demonstration Project

Hank DeHaan, U.S. Army Corps of Engineers, Rock Island District

The nation is experiencing serious problems in maintaining its infrastructure to keep people safe and support the economic viability of the country. The U.S. Army Corps of Engineers (USACE) operations and maintenance (O&M) budget has not kept up with inflation, which has led to many of its navigation structures falling into serious disrepair. Alternative funding sources are now being considered to help resolve this issue.

The Illinois Waterway (IWW) includes eight locks and dams that were largely constructed in the 1930s. It serves as an important component of the nation's inland navigation system. For example, more than 26 million tons (or \$10 billion) in commodities were

shipped through the LaGrange Lock in 2014. With the lack of sufficient O&M funding, deferred maintenance now exceeds \$600 million on the IWW. This has led to increasing service interruptions and reduced system reliability. In 2014, commerce was significantly impacted with more than 50 percent of the vessels experiencing delays at most of the IWW locks and dams.

The 2014 Water Resources Reform and Development Act offers new alternative financing authorities that could help address USACE unfunded maintenance, including a new Public-Private Partnership (P3) Program. Prior to full authorization, several P3 demonstration projects are proceeding to help inform this new program. The IWW was selected for this effort to help better understand the opportunities and challenges of implementing an inland navigation P3 project. USACE, along with the Illinois Soybean Association and other industry and state partners, are analyzing possible scenarios for an IWW P3 project. These proposals range from supplementing maintenance to reduce risk of major break downs to implementation of the Navigation Ecosystem Sustainability Program lock expansions as authorized in the Water Resources Development Act of 2007. USACE continues to work with partners, stakeholders, and senior decision makers to develop and advance the IWW P3 Demonstration Project.

Hank DeHaan obtained a master of geography degree from the University of Wisconsin-Madison with an emphasis in fluvial geomorphology and GIS and is a certified project manager. For almost 25 years, he has used his education and training to manage Mississippi and Illinois River projects. Earlier in his career, Hank worked for several state agencies and was a teacher at St. Mary's University in Winona, Minnesota. He then moved on to perform research and author reports as a physical scientist for the U.S. Geological Survey. For the past 13 years, Hank has worked for USACE on navigation, environmental restoration, and flood damage reduction projects located throughout the Mississippi River basin. He currently serves as chief of the Operations Division Technical Support Branch in Rock Island District, overseeing navigation channel maintenance and natural resource management in USACE mission areas throughout the five-state region of the district.

Thursday, October 29

Lunch and Learn: Getting a Little Help from Friends...And Everyone Else

Moderator: Nani Bhowmik, Illinois State Water Survey

Rules of Engagement: Why 'Education' Is Not Enough to Gain Community Support for River Restoration and Conservation

Paddy Woodworth, Author, Our Once and Future Planet

Ecological restoration has a vital social aspect that its advocates ignore at their peril: without the engagement of the human community where ecological restoration takes place, it may fail, no matter how 'correct' the ecological principles behind it may be. Faced with local opposition to their (technically excellent) restoration of prairie and prairie-savanna in the forest preserves along the North Branch of the Chicago River, the North Branch Restoration Project (NBRP) declared, "Those who are ecologically educated will not resist us." This statement makes two troubling assumptions: (1) that there is some universal ecological 'education' that is not open to debate and (2) that education consists in pouring this truth into the heads of the 'uninformed.'

I think both these assumptions are flawed, indeed false. The science of restoration ecology, like all science, does not propagate a single universal truth or fixed knowledge but rather tests its principles and theories against the evidence. And new evidence may invalidate a long-accepted theory.

Equally importantly, implementing ecological restoration on public land is as much about social policy as it is about ecological principles. And in a democracy, social policy has to be discussed and agreed between equals, not poured fully-formed from an 'educated' mind into an 'uneducated' one.

So, it is vital for restorationists working on public land to have a strategy of genuine engagement with the community before a project begins that respects the diverse traditions, values, and aspirations of local communities (always plural!) and indeed draws on their local ecological knowledge. Restorationists may certainly try to persuade people to do things differently in their local environments, but first they need to make sure they really listen to community views; and after they have heard those views, restorationists may well have to adapt their proposals and their practice in accordance with majority opinion. They are free to continue engaging the community to advocate changing majority opinion as matters progress.

This presentation draws on research on the NBRP narratives for my book, *Our Once and Future Planet*, and also on the restoration of the Sacramento River in California, the Working for Water project in South Africa, and the StreamScapes project in the speaker's native Ireland.

Paddy Woodworth is an author, journalist, lecturer, editor, and specialist tour guide.

He is best known for his two books on the Basque Country and especially for his most recent book, *Our Once and Future Planet: Restoring the World in the Climate Change Strategy*, a worldwide assessment of ecological restoration as a conservation strategy. It was selected by *Choice*, the journal of American librarians, as one of the “outstanding academic titles of 2013,” and received glowing reviews from *Science* and *Bioscience*.

He is an adjunct senior lecturer at the School of Languages and Literatures at University College Dublin and a research associate at the Missouri Botanical Garden.

He was on staff at *The Irish Times* as arts editor and then as a foreign desk editor from 1988-2002 and has written on Basque and Spanish affairs for that paper and other media since 1979. He also has strong links with the arts in Ireland, having managed both Project Arts Centre under Jim Sheridan (1977-78) and the Field Day Theatre Company for Brian Friel and Stephen Rea (1980).

He has also written for the *International Herald Tribune*, *Vanity Fair*, *The Scientist*, *The Sunday Times*, *Ecological Restoration*, *The World Policy Journal*, and BBC Wildlife. He broadcasts for Raidió Teilifís Éireann, the British Broadcasting Corporation, and United States and other international radio and TV networks.

Our Once and Future Planet (University of Chicago Press, October 2013), is described as “outstanding” by the renowned biologist Daniel Janzen and as “a great piece of investigative journalism...on a topic vital to the future of people and biodiversity on earth” by Stephen Hopper, former director of the Royal Botanic Gardens, Kew.

His first book on the Basque Country, *Dirty War, Clean Hands: ETA, the GAL, and Spanish Democracy*, (Yale UP 2003) was described by Franco biographer Paul Preston as “one of the most important books about post-Franco Spain ever published.”

His second book, *The Basque Country: A Cultural History* (Oxford UP 2008) is a series of essays on the region, ranging from gastronomy to the Guggenheim museum, from folk rituals to political violence. *Financial Times* described the book as “shrewd and affectionate...full of gems...a good eye for architecture and topography...a splendid portrait of a bewitching land.”

Paddy has lectured widely in the United States (including Harvard, Dartmouth, William and Mary, Carleton, DePaul, Georgetown, University of Wisconsin-Madison, Mount Holyoke, Lehigh, Loyola, New York University, Wagner, the University of Nevada, the University of Missouri, the University of Iowa, Morton Arboretum, the Carnegie Round Table on Foreign Affairs), Ireland (University College Dublin, University College Cork, Dublin City University, Royal Dublin Society), and Britain (London School of Economics, Cambridge University, Canning House). He has contributed to a number of think tanks and other forums, including the Liberty Fund, the Fundación Sabino Arana, the Kate O’Brien Weekend, and Basque Global Initiatives. He has been a member of the European Cultural Parliament since 2008. He is a founder member of the Irish Forum for Natural Capital.

He has been a visiting fellow on several United States campus programs: the International Writing Program at the University of Iowa (2003); the Dickey Center for International Understanding at Dartmouth College (2008); the Institute for Nature and Culture in the Department of Environmental Science and Studies at De Paul University, Chicago, where he also taught a five-seminar undergraduate course in restoration related to his new book (2014); and the Hilliard Foundation, the departments of English, history, and geography, and the Center for Basque Studies at University of Nevada, Reno (2015).

Since 2008, he has worked as a specialist cultural guide for visitors to the Basque Country in partnership with Jon Warren of San Sebastian Food (SSF), developing the “Discovering the Basque Country” tour series. He also works as a cultural and environmental guide in Ireland, most recently with DePaul University and Georgia College and State University. Tom Blinkhorn, leader on the most recent Woodworth/SSF Basque tour for Dartmouth College’s Institute for Life-Long Education at Dartmouth, wrote of Woodworth’s work:

“A spectacular performance...Your command of the history, language, architecture, landscapes, historic sites and heritage was absolutely stunning. I learned a lot about this extraordinary place as did everyone on the tour.”

He also works as an editor for scientists who wish to reach a wide public readership. Kingsley Dixon, director of science at King’s Park and Botanic Garden, Perth, Australia writes:

“Paddy is an outstanding editor. I find he has provided superb editorial support on a number of projects, some of a deep scientific nature and others for more general readers.”

Watershed Exchange and Poster Session

October 28 ♦ 1:30–4:30 p.m. ♦ Cotillion Pre-Function

Watershed Exchange Tables

The Illinois Height Modernization Program: What Can LiDAR Do for You and How Can You Get It?

Janet Holden and Trisha Rentschler, Illinois Geological Survey

Abstract and bio not available at time of printing.

Where and How to Find USGS Topographic Data

Shelley Silch, U.S. Geological Survey, Illinois Water Science Center

Abstract and bio not available at time of printing.

The Resource Management Mapping Service (RMMS)

Jonathan Rush, University of Illinois Cyberinfrastructure and Geospatial Information Laboratory

The Resource Management Mapping Service is a web-based GIS system for learning about and creating maps of your watershed—the lakes and streams, geology, land use, and social and economic factors. The system provides both standard and customized tools that make it fast and easy to make and share maps of Illinois natural resources. The ability of RMMS to display and summarize a wide range of environmental data enables government agencies and others to develop and implement appropriate resource protection and enhancement measures. RMMS includes data on Clean Water Act projects (section 319), impaired waters (section 303d), water quality reports (section 305b), priority watersheds for non-point pollution or nutrient loss reductions, and more. Visit the table on Wednesday afternoon for a demonstration and hands-on time with RMMS.

Johnathan Rush is the education, outreach, and training coordinator at the CyberGIS Center for Advanced Digital and Spatial Studies, an interdisciplinary research center at the University of Illinois. At the CyberGIS Center, he helps train scholars to use high performance geospatial analysis tools to enable them to answer bigger questions. Johnathan's background is in geography and GIS research and applications in the academic and public sectors. His first fieldwork project was in 2003, measuring the water quality of the Canadian River and its tributaries in Norman, Oklahoma.

Using GIS for Green Infrastructure and Stormwater Management Analysis—Redeveloping Brownfields in Chicago's Southland

Dennis Latto and Jose Alarcon, South Suburban Mayors and Managers Association

Abstract and bio not available at time of printing.

Poster Session

Sangamon River Regional Sediment Management Program

Heather Bishop, Elizabeth Bruns, and Nicole Manasco, U.S. Army Corps of Engineers, Rock Island District

Abstract and bio not available at time of printing.

Hydrologic and Hydraulic Studies of the Illinois River Basin at ISWS

Yanqing Lian, Elias Getahun, Markus Momcilo, Laura Keefer, and Zhenxing Zhang, Illinois State Water Survey

Abstract and bio not available at time of printing.

Hydrologic and Water Quality Modeling of the Spoon River Watershed for Determining Sediment and Nutrient Critical Source Areas

Arash Zaregarizi, Yazd University, and Elias Getahun, Illinois State Water Survey

In the Midwest, non-point source pollution resulting from agriculturally-dominated watersheds remains one of the major causes of water quality impairments. To address this issue in Illinois, a statewide nutrient loss reduction strategy was recently completed, which sets reduction goals and provides recommendations for conservation measures. The objective of this study is to determine the critical source areas of sediment and nutrients in the Spoon River watershed. Previous Illinois State Water Survey (ISWS) studies showed that the Spoon River generates the largest sediment per unit area among the major tributaries of Illinois River. To accomplish the study objective, a Spoon River watershed model was developed using the Soil and Water Assessment Tool (SWAT), and it was calibrated and validated for monthly streamflow and sediment at USGS 05570000. For both calibration and validation, the streamflow NSE and absolute bias were greater than .80 and less than 5 percent, respectively, and an NSE value of at least .57 and absolute bias of less than 14.5 percent were obtained for sediment simulations. Using the watershed sediment and nutrient outputs at the sub-basin level, three pollution quantifying indices were computed to facilitate the identification and selection of critical source areas for best management practice (BMP) targeting. The impact indices include a concentration impact index, a load per unit area index, and a load impact index. Each index was used to obtain pollutant-specific rankings of the sub-basins in the Spoon River watershed. A total impact index was derived from these indices and was grouped into low, medium, or high classes using the natural breaks method to prioritize the sub-basins with respect to all pollutants. Using this index, the sediment- and nutrient-critical source areas were determined, covering about 9 percent of the Spoon River watershed and accounting for 30, 40, and 36 percent of the overall sediment, nitrate, and total phosphorus loads generated in the watershed, respectively.

Arash Zaregarizi is a visiting research scholar at ISWS and a PhD candidate in the Department of Watershed Management at Yazd University in Iran. Arash's doctoral research focuses on optimizing BMPs for soil and water conservation at the watershed level, and his research interests include water quality assessment and modeling. He has published research articles in both international and Iranian peer-reviewed journals.

Elias Getahun is a research hydrologist with ISWS at the Prairie Research Institute. Elias has extensive experience in watershed modeling, the development of decision support systems for non-point source pollution control, and water resources systems analysis. He has published his research work in peer-reviewed journals, technical reports, and conference proceedings.

Use of Magnetic Fly Ash to Assess Upper Sangamon Basin Post-Settlement Sedimentation Rates

Jia Wang, University of Illinois

Sedimentation rates have been one of the most important factors that impact the landscapes and livelihoods of residents in Midwestern states. The occupation of the landscape by Europeans started in the mid-1800s, when the use of coal for heating houses and then later for railroads and power plants liberated humans' ability of production. This study focuses on the measurement of magnetic spherules, a byproduct of coal combustion called fly ash, as the marker of the beginning of coal burning in the upper Sangamon basin valley alluvium. Alluvium are river deposits left behind by the flowing of water. Samples were collected and analyzed from seven sites in 10 cm intervals up to 1.5 m beneath the ground throughout different parts of the Sangamon River valley and its tributary valleys. Fly ash were extracted and purified from the samples and examined under the microscope to try to provide a basis for identifying post-settlement alluvium from pre-settlement alluvium. The extracted magnetic fraction was also examined under a scanning electron microscope to confirm fly ash in alluvium. The data were combined with previous data collected from soil samples in the other locations in the area and analysis showing interesting relationships between fly ash percentage and depth beneath the surface. Alluvium from the tributaries shows that the highest fly ash percentage, about 15-20 percent, is at the 10-20 cm interval, while the main valleys in Allerton Park, Champaign County peaks around 35-40 cm beneath the surface with a 40-45 percent fly ash content. The data shows an increasing trend from the bottom of the soil core that peaks and then decreases. This result can suggest a correlation with the effects of the Clean Air Act implemented in the 1970s. Particle size analysis shows increases and decrease throughout the soil sample core. Sedimentation rate can be further examined through the data collected and analyzed to find any observable trends post European settlement. This study can provide valuable insight for scientists to understand the effects of modern agriculture and the impact to soils that industrialization and urbanization has brought upon this landscape. This project was originally part of the Critical Zone Observatory project, funded by NSF and later by the National Great Rivers Research and Education Center, to better understand human impacts on landscapes.

Jia Wang is currently an undergraduate student at the University of Illinois at Urbana-Champaign. She is majoring in environmental geology and earth, society, and environmental sustainability. She began working on this project in November 2014 under the guidance of David A. Grimley, a geologist at the Illinois State Geological Survey, and Alison Anders, a professor at the University of Illinois at Urbana-Champaign.

Additional contributors: David Grimley, Illinois State Geological Survey, and Alison Anders, University of Illinois

Regional Water Supply Planning Studies in Illinois

Zhenxing Zhang, Illinois State Water Survey

It is vital for Illinois to provide citizens and industries sustainable and affordable clean water in the present and for the future. As a state, it is important to understand future water demand, water supply, costs associated with providing and conveying water, and the costs and impacts of wastewater effluent. Well-designed state and regional water supply planning is a valuable tool to ensure sustainable water sources in the future for the entire state. Executive Order 2006-01, signed by Governor Rod Blagojevich in January 2006, authorized the Illinois Department of Natural Resources (IDNR) to lead state and regional water supply planning activities. Since 2006, the Illinois State Water Survey (ISWS) has been working closely with IDNR to conduct technique analysis of water demand and water availability in Illinois. The entire state is divided into 10 water supply planning regions, with northeastern Illinois and east central Illinois prioritized. ISWS has completed water supply planning studies in northern Illinois, east central Illinois, and the Kankakee River basin. ISWS is currently working on the middle Illinois and northwest Illinois regions. The Kankakee River watershed was identified in the northeastern Illinois water supply planning report as needing additional study due to significant expected development in the watershed. The watershed is currently being studied as a sub-region. For water supply planning studies in each region, groundwater models are developed to assess the impact of the past and future withdrawal on groundwater levels and determine the sustainable withdrawal rate. Groundwater monitoring is conducted to evaluate the impact of past groundwater withdrawals. The Illinois Streamflow Accounting Modelling was developed to analyze surface water availability under various climate conditions and the impact of surface water withdrawals and wastewater effluents. Water demand is analyzed and projected based on available population, water use, socioeconomic, and climatic data. Three different scenarios are developed to represent uncertainty.

Zhenxing (Jason) Zhang is a water supply hydrologist with ISWS focusing on surface water supply, water availability, hydrologic modelling, and stochastic hydrology. He holds a PhD in water resources engineering from the State University of New York College of Environmental Science and Forestry. Zhenxing is a licensed professional engineer and professional hydrologist. He has extensive experience in water supply, water resources planning and management, and hydrologic modeling with years of experience working for the Susquehanna River Basin Commission and Pennsylvania State University before he joined ISWS.

Additional contributors: H. Vernon Knapp, Walton Kelly, Scott Meyer, George Roadcap, Daniel Abrams, Devin Mannix, and Daniel Hadley, Illinois State Water Survey

Insights from Long-Term Monitoring: Asian Carp and Fish Communities within the Illinois River

Rich Bendleton, Illinois Natural History Survey, Illinois River Biological Station

Long-term monitoring can provide novel information regarding ecological patterns and processes. While long-term monitoring efforts have gained greater recognition in their importance in understanding ecological patterns, few have documented the influence of invasive species on ecosystem properties and processes throughout the course of an invasion (introduction, establishment, and spread). The Long Term Resource Monitoring Program, an element of the Upper Mississippi River Restoration – Environmental Management Program, has been monitoring ecological patterns and aquatic resources throughout the upper Mississippi River system for over 20 years and provides a unique opportunity to understand the influence of invasive species on the existing fish community. With the arrival and establishment of Asian carp in Illinois waterways, long-term monitoring has revealed that significant changes have occurred within the fish community of the La Grange reach of the Illinois River. In general, several sport fishes (e.g. largemouth bass, crappie, white bass, bluegill) and catostomids (i.e. suckers) have declined in terms of relative abundance since the establishment of Asian carp, whereas several non-sport fishes such as gar, grass carp, and emerald shiners have increased in abundance. Changes observed in fish community structure may have potentially altered other aspects of ecosystem functioning (e.g. primary/secondary production, decomposition), and continued research and long-term monitoring will be necessary to further our understanding of existing impacts of invasive species while continuing to study and monitor future invasions occurring within our ecosystems.

Rich Pendleton is a large river ecologist with the Illinois Natural History Survey based out of the Illinois River Biological Station located in Havana, Illinois. Specifically he works as a fish component specialist for the Long Term Resource Monitoring Program. His research includes natural and anthropogenic disturbances to large rivers, invasion dynamics, and the life history and dynamic rate functions of fishes.

Additional contributors: Levi Solomon, Brian Ickes, and Andrew Casper, Illinois Natural History Survey

Trends in Illinois River Sport and Commercial Fisheries from the Last 50 Years

Dan Gibson-Reinemer, Illinois Natural History Survey, Illinois River Biological Station

Abstract not available at time of printing.

Dan Gibson-Reinemer is a large river ecologist with the Illinois Natural History Survey based out of the Illinois River Biological Station located in Havana, Illinois. Specifically he works as a fish component specialist for the Long Term Resource Monitoring Program. His research includes natural and anthropogenic disturbances to large rivers, invasion dynamics, and the life history and dynamic rate functions of fishes.

Additional contributors: Jason DeBoer, Mark Fritts, and Andrew Casper, Illinois Natural History Survey, Illinois River Biological Station

Prediction of Potential Nursery Habitat for Asian Carp Larvae in the Illinois River below Starved Rock Lock and Dam Using the FluEgg Model

Tatiana Garcia and James J. Duncker, U.S. Geological Survey, Illinois Water Science Center

An Asian carp spawning event was observed in June 2015 in the Illinois River below Starved Rock Lock and Dam near Utica, Illinois. High densities of Asian carp were observed spawning in turbulent water for several miles below the lock and dam. Although the location of this spawning event was well-defined, both the fate and transport of the eggs and larvae and the location of potential nursery habitat are not well known. The Fluvial Egg Drift Simulator (FluEgg) model was used to simulate the transport and dispersal of silver (Hypophthalmichthys molitrix) and bighead (Hypophthalmichthys nobilis) carp eggs and larvae after this spawning event. In the model simulation, eggs drifted from the spawning site until hatching and eggs in suspension were allowed to hatch. After hatching, larvae were allowed to develop until reaching the gas bladder inflation stage at which larvae start leaving the current looking for nursery habitats. The input data for FluEgg was generated using hydraulic and water quality data collected over a more than 40 mi reach of the Illinois River during the spawning event. The hydraulic data consisted of a combination of acoustic Doppler current profiler data and estimated hydraulic parameters based upon gaging station data. The water quality data consisted of near surface water temperature data collected during the event. Herein, we present preliminary results of these simulations, including the longitudinal distribution of both eggs at hatching time and larvae at gas bladder inflation. The location of the trailing edge of the larvae at gas bladder inflation was used to identify river reaches with potential nursery habitat for Asian carp larvae. This information is useful for the application of potential control strategies to target the early life stages of Asian carp.

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