PROCEEDINGS OF THE

MISSISSIPPI RIVER RESEARCH CONSORTIUM

VOLUME 57

14-16 April 2026

Visit our website:

http://m-r-r-c.org/

PROCEEDINGS OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM

Volume 57
April 14 - April 16, 2026
The Radisson Hotel, La Crosse

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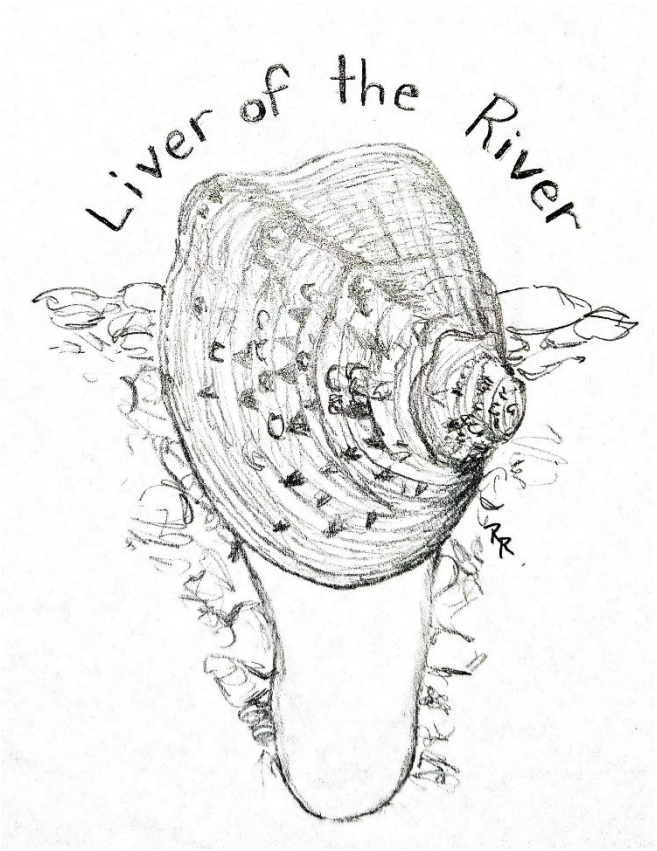
704 N. Schrader Ave.
Havana, IL 62644

RECOGNITIONS

The board would like to express its sincere appreciation for all the donors for the 2026 raffle! The funds go to support our student scholarships each year and will carry over to support additional scholarships next year. Thank you for your generosity and support of our annual raffle.



2026 MRRC Commemorative Pint Glass

This year, our winning submission for the traditional commemorative pint glass was by Ryan Rasmussen, Congratulations, Ryan!

We had several great submissions and will likely use the same designs to hold a vote for future year's glasses. Thank you to all who participated and submitted a design! Please pick up your glass and have a complimentary drink. Be sure to take the cup home. Cheers!

The board appreciates UW-La Crosse River Studies Center support for our guest speaker, Dale Gentry.

The MRRC operates under fiscal sponsorship from La Crosse Neighborhoods (LCNI), Inc. FEIN 47-4445115 since 2022.

LCNI
La Crosse Neighborhoods, Inc

ACKNOWLEDGMENTS

The 2025-2026 Board of Directors and Consortium members acknowledge the following persons or institutions for their contribution to the success of the 57th meeting of the Mississippi River Research Consortium.

Meeting Arrangements & Announcements
Jim Lamer, Illinois River Biological Station, Illinois Natural History Survey
Mike Wellik, U.S. Geological Survey

Program & Proceedings
Mike Wellik, U.S. Geological Survey
2025-2026 MRRC Board of Directors

Online Submission Forms & Website
Jim Lamer, Illinois River Biological Station, Illinois Natural History Survey
April Burgett, Illinois River Biological Station, Illinois Natural History Survey

Poster Boards
Colin Belby, University Wisconsin –La Crosse (transport, storage and long-term maintenance)

Photography
Kim Dunnigan, Illinois Master Naturalist, Lewistown, Illinois

Awards and Raffle Arrangements
Ashley Johnson, Iowa Department of Natural Resources
John Manier, La Crosse, WI
Mike Wellik, U.S. Geological Survey

Registration Table
Kim Dunnigan, Illinois Master Naturalist, Lewistown, Illinois
April Burgett, Illinois River Biological Station, Illinois Natural History Survey

Student Activities
Cody Hagloch - University of Illinois

WORD CLOUD

ABSTRACT TOPICS 2026

MRRC 2026 KEYNOTE SPEAKER

ROOTED IN SCIENCE, RISING WITH THE RIVER: CONSERVING UPPER MISSISSIPPI RIVER BOTTOMLAND FORESTS AND BIRDS

DR. DALE GENTRY

Dr. Dale Gentry is the Director of Conservation for Audubon Upper Mississippi River, where he leads avian conservation and science initiatives across Minnesota, Iowa, and Missouri. With 25 years of experience in avian ecology and conservation, Dale has held academic and field-based roles spanning research, teaching, and applied conservation. He previously served as a professor at the University of Northwestern–St. Paul, where he chaired the biology department and conducted research on woodpeckers and their role in controlling invasive emerald ash borers. Dale also taught as field science faculty with the Graduate Program of the Teton Science Schools in Grand Teton National Park. His graduate research focused on the breeding biology of songbirds and the keystone role of cavity-nesting birds in post-fire pine ecosystems. Dale lives in Shoreview, Minnesota, with his family and enjoys birdwatching, cooking, cycling, and Nordic skiing.

MRRC MEETING AGENDA

Tuesday, 14 April 2026

3:00–4:30 PM	**STUDENT WORKSHOP**: "PREPARING FOR INTERVIEWS IN NRES" with Cody Hagloch (Minnesota Room – 2nd Floor)
4:00–7:30 PM	REGISTRATION TABLE (Radisson Foyer)
5:00–6:00 PM	SETUP POSTER SESSION I (Radisson Foyer)
6:00–7:30 PM	WELCOMING ADDRESS (Radisson Ballroom)

KEYNOTE PRESENTATION:
ROOTED IN SCIENCE, RISING WITH THE RIVER:
CONSERVING UPPER MISSISSIPPI RIVER BOTTOMLAND FORESTS AND BIRDS
BY DR. DALE GENTRY

7:30–9:00 PM	POSTER SESSION I (Radisson Foyer)
7:30–10:00 PM	RECEPTION (Radisson Foyer & Ballroom) BEER AND SNACKS

Wednesday, 15 April 2026

7:15-9:15 AM	**HOT CONTINENTAL BREAKFAST** (Radisson Foyer)
7:30 AM–5:00 PM	REGISTRATION TABLE (Radisson Foyer)
8:00 – 8:10	WELCOME AND ANNOUNCEMENTS
8:10–9:50 AM	**SESSION I** (Radisson Ballroom)
9:50–10:10 AM	BREAK (Radisson Foyer & Ballroom)
10:10–11:30 AM	**SESSION II** (Radisson Ballroom)
11:30 AM–1:30 PM	LUNCH (on your own)
12:30–1:30 PM	**STUDENT EVENT**: ICE CREAM @ The Pearl (207 Pearl St)
12:30–3:30 PM	SETUP POSTER SESSION II (Radisson Foyer)
1:30–3:10 PM	**SESSION III** (Radisson Ballroom)
3:10–3:30 PM	BREAK (Radisson Foyer & Ballroom)
3:30–4:50 PM	**SESSION IV** (Radisson Ballroom)
5:00–6:30 PM	POSTER SESSION II (Radisson Foyer)
5:00–6:30 PM	SOCIAL MIXER (Radisson Foyer & Ballroom)
6:30–6:45 PM	**FRIEND OF THE RIVER AWARD: RECIPIENT JOHN KALAS, WISCONSIN DNR** (Radisson Ballroom)
6:45–9:00 PM	**PLATED BANQUET DINNER** (Radisson Ballroom)

Thursday, 16 April 2026

7:30–10:00 AM	REGISTRATION TABLE (Radisson Foyer)
7:15–9:15 AM	**HOT CONTINENTAL BREAKFAST** (Radisson Foyer)
8:00-8:10 AM	WELCOME AND ANNOUNCEMENTS
8:10–9:30 AM	**SESSION V** (Radisson Ballroom)
9:30–9:50 AM	BREAK (Radisson Foyer & Ballroom
9:50–10:30 AM	**SESSION VI** (Radisson Center Ballroom)
10:30-11:10 AM	STUDENT AWARDS & BUSINESS MEETING (Radisson Ballroom)
11:10 AM-12:00 PM	**LUNCH SERVED AND RAFFLE** (Radisson Ballroom)
12:00 PM	FAREWELL! SEE YOU NEXT YEAR.

MRRC Meeting Agenda
Wednesday, 15 April 2026
Oral Presentations - Radisson Ballroom
(*Student Presenters)

7:15-9:15 AM HOT CONTINENTAL BREAKFAST (Radisson Ballroom)

8:00-8:10 AM: Welcome and Announcements Jim Lamer, MRRC President

SESSION I (Moderator: Kathi Jo Jankowski)

8:10–8:30 RELATIVE SUBSTRATE STABILITY PREDICTS NATIVE FRESHWATER MUSSEL PRESENCE, RICHNESS, AND DENSITY IN THE UPPER MISSISSIPPI RIVER. Traci DuBose1, Jessica Lipschultz2, Angus Vaughan1, Kristen Bouska1, Teresa Newton1. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center. 2University of Wisconsin - Madison.

8:30– 8:50 RESHAPING OUR UNDERSTANDING OF TREMATODE TRANSMISSION USING THE INVASIVE FAUCET SNAIL (BITHYNIA TENTACULATA). *Elise M. Jordahl1, Josh Nelson1, Jennifer AH Koop1. 1Department of Biological Sciences, Northern Illinois University.

8:50–9:10 EXPLORING SPATIAL PATTERNS IN CHLOROPHYLL A AND CYANOBACTERIA ACROSS CONNECTIVITY GRADIENTS IN THE UPPER MISSISSIPPI RIVER. Rebecca M. Kreiling1, Sophia L. LaFond-Hudson2, Luke C. Loken2, Kathi Jo Jankowski1, James H. Larson1, Kenna J. Gierke1, Carrie E. Givens2, Hailey E. Trompeter2. 1USGS-Upper Midwest Environmental Sciences Center. 2USGS-Upper Midwest Water Science Center.

9:10–9:30 HABITAT MOSAICS IN A LARGE-RIVER FLOODPLAIN ECOSYSTEM: UNCOVERING DISPROPORTIONAL EFFECTS OF HABITAT HOMOGENIZATION ACROSS MULTIPLE TAXA. *Julia R. Hampton1, Nathan R. De Jager2, Danelle M. Larson2, Mark A. Kaemingk1, Jason A. DeBoer3. 1University of North Dakota, 2Upper Midwest Environmental Sciences Center, United States Geological Survey, 3, Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

9:30-9:50 RE-OLIGOTROPHICATION OVER 20 YEARS CONTRIBUTED TO MACROPHYTE RECOVERY IN THE UPPER MISSISSIPPI RIVER. Danelle M. Larson1, Mirkka M. Jones2, Benjamin Weigel2, Brian Gray1, Otso Ovaskainen2. 1 U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse WI. 2 University of Helsinki, Helsinki, Finland.

9:50-10:10 AM: BREAK (Radisson Foyer)

SESSION II (Moderator: Alexis VandenBerg)

10:10-10:30 SUBSTANTIAL VARIATION IN ICE PHENOLOGY AND UNDER ICE CONDITIONS ACROSS BACKWATER LAKES OF THE UPPER MISSISSIPPI RIVER. Kathi Jo Jankowski1, John Kalas2, Rob Burdis3, Ashley Johnson4, Travis Kueter4, Stephanie Szura3, and Kyle Landolt1. 1US Geological Survey Upper Midwest Environmental Sciences Center. 2Wisconsin Department of Natural Resources, retired. 3Minnesota Department of Natural Resources. 4Iowa Department of Natural Resources.

10:30-10:50 CRAPPIE WINTER HABITAT EXPANSION FOLLOWING BACKWATER RESTORATION IN POOL 12 OF THE MISSISSIPPI RIVER. Ashley L. Johnson1, Travis G. Kueter1, Hannah S. Lenning1, Seth J. Fopma1. Iowa Department of Natural Resources, Mississippi Monitoring Station.

10:50–11:10 UNDERWATER CAMERA WINTER FISH SAMPLING. Benjamin Patschull1,2, Ross Vander Vorste1, David Schumann1, Patrick Kelly2, Kristen Bouska3. 1University of Wisconsin - La Crosse. 2Wisconsin Department of Natural Resources. 3U.S. Geological Survey.

11:10–11:30 OCCURRENCE PATTERNS AND COMPETITIVE FEEDING INTERACTIONS OF MOTTLED AND SLIMY SCULPIN IN THE KICKAPOO RIVER DRAINAGE. *Evan T. Sirianni1, David A. Schumann1, Jason G. Freund1. 1University of Wisconsin - La Crosse and River Studies Center.

11:30 AM - 1:30 PM: LUNCH (on your own)
12:30 PM - 1:30 PM: STUDENT EVENT
(ice cream @ The Pearl; 207 Pearl St)

SESSION III (Moderator: Tristan Chavez)

1:30–1:50 INVASIVE BIGHEADED CARP MOVEMENT THROUGHOUT THE UPPER MISSISSIPPI AND LOWER WISCONSIN RIVERS. *Elise M. Bass1, Mark W. Fritts2, Jordan G. Weeks3. Jason G. Freund1, David A. Schumann1. 1Department of Biology and River Studies Center, University of Wisconsin-La Crosse. 2U.S. Fish and Wildlife Service. 3Wisconsin Department of Natural Resources.

1:50–2:10 INVASIVE SILVER CARP GROWTH CHRONOLOGIES: AN EVALUATION OF HARVEST SUCCESS AND DRIVERS OF ANNUAL GROWTH. *Kaiden Vinavich1, James Lamer1, Levi Solomon1, Jesse Williams1, Madison Roberts1, Rachel Prostko1, Brandon Harris1, Allison Lenaerts2, Sara Tripp2, Edward Sterling3, Michael Weber4, Christopher Sullivan5. 1Illinois Natural History Survey, University of Illinois. 2Illinois Department of Natural Resources. 3US Fish and Wildlife Service, Columbia, Missouri. 4Iowa State University. 5New York Cooperative Fish and Wildlife Research Unit, Cornell University.

2:10–2:30 INVASIVE CARP AND NATIVE FISH PASSAGE RESPONSE TO AN EXPERIMENTAL UNDERWATER ACOUSTIC DETERRENT SYSTEM. Daniel Gibson-Reinemer1, Jessica C. Stanton1, Andrea K. Fritts1, Janice Albers1, Theodore R. Castro-Santos2, Matt D. Sholtis3, Christa M. Woodley4, Marybeth K. Brey1.1 U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, WI. 2 U.S Geological Survey Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA.3 U.S. Geological Survey Eastern Ecological Science Center, Turners Falls, MA.4 U.S. Army Engineer Research and Development Center, Vicksburg, MS.

2:30–2:50 REAL-TIME INTERACTIVE FORECASTING OF INVASIVE CARP CATCH USING HISTORIC HARVEST DATA IN THE UPPER MISSISSIPPI RIVER. Ekaterina Khadonova1, Danelle M. Larson2, John T. Delaney2, Emily A. Szott1, Rafael Davila1, Mark W. Fritts3, James T. Lamer1. 1Illinois River Biological Station, Prairie Research Institute. 2United States Geological Survey. 3Unites States Fish and Wildlife Service.

2:50-3:10 EVALUATION OF EXTERNAL ATTACHMENT DESIGNS FOR GPS TAGGED INVASIVE CARP. *Abigail Roussin1, Cody Hagloch1, Matthew R. Acre2, Andy Muller2, Sophia M. Bonjour2, Andrew Mathis1, Emily Szott1, Rafael Davila Jr.1, Rafael O. Tinoco3, James Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois. 2U.S. Geological Survey, Columbia Environmental Research Center. 3Department of Civil and Environmental Engineering, University of Illinois.

3:10-3:30 PM: BREAK (Radisson Foyer)

SESSION IV (Moderator: Eric Strauss)

3:30–3:50 FISHTRENDS: AN ONLINE TOOL TO DETECT ANNUAL CHANGES AND LONG-TERM TRENDS OF FISHERIES METRICS. Robert J. Mooney1, Michael J. Spear1, Brian S. Ickes2, Jason A. DeBoer1, Andrya L. Whitten Harris1, David C. Glover3, James T. Lamer1. 1Illinois Natural History Survey - Illinois River Biological Station. 2US Geological Survey, Upper Midwest Environmental Science Center. 3Illinois Department of Natural Resources.

3:50-4:10 LESSONS LEARNED AND BEST PRACTICES FROM ACOUSTIC TELEMETRY STUDIES IN THE MISSISSIPPI RIVER BASIN. Andrea Fritts1, Janice Albers1, Doug Appel1, Mark Fritts2, Daniel Gibson-Reinemer1, Daniel Krause1, William Lamoreux1, Grace Loppnow3, Amanda Milde1, Mark Roth1, Matthew Sholtis4, Jessica Stanton1, Christa Woodley5, Marybeth Brey1.1U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, WI. 2 U.S. Fish and Wildlife Service La Crosse Fish and Wildlife Conservation Office, Onalaska, WI. 3 Minnesota Department of Natural Resources, St. Paul, MN. 4 U.S. Geological Survey Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA. 5U.S. Army Engineer Research and Development Center, Vicksburg, MS.

4:10–4:30 USING ENVIRONMENTAL DNA TO MONITOR FOR INVASIVE MACROPHYTES IN THE UPPER MISSISSIPPI WATERSHED REGION. *Mason Hoffman1, Paul Jeffrey1, Dhananjay Gotarkar1, Grant Vagle1, Danelle Larson2, Steven Spear2, Richard Erikson2, Lynn Waterhouse1. 1Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, St Paul, Minnesota. 2Upper Midwest Environmental Sciences Center, U. S, Geological Survey, La Crosse, Wisconsin.

4:30–4:50 MICROPLASTIC CONSUMPTION IN AVIAN SPECIES FROM THE UPPER MISSISSIPPI RIVER WATERSHED NEAR LA CROSSE, WISCONSIN. *Kassandra C. Zimmer, Eric A. Strauss, and Markus Mika 1University of Wisconsin, La Crosse, Department of Biology and the River Studies Center.

5:00-6:30 POSTER SESSION I (Radisson Foyer)

5:00-6:30 SOCIAL MIXER (Radisson Foyer)

6:30-6:45 **FRIEND OF THE RIVER AWARD: RECIPIENT JOHN KALAS, WISCONSIN DNR** (Radisson Ballroom)

6:45-7:30 **BANQUET DINNER** (Radisson Ballroom)

MRRC Meeting Agenda
Thursday, 16 April 2026
Oral Presentations - Radisson Ballroom
(*Student Presenters)

8:00-8:10 AM: Welcome and Announcements Jim Lamar, MRRC President

SESSION V (Moderator: Dhananjay Gotarkar)

8:10–8:30 THE PALATABILITY OF FORMULATED DIETS INTENDED FOR LAKE STURGEON PRODUCTION. *Marik Dickson1, Orey Eckes2, Jadon Motquin2, David A. Schumann1.1University of Wisconsin-La Crosse, Biology Department and River Studies Center, 1725 State Street, La Crosse, WI 54601. 2U.S. Fish and Wildlife Service, Genoa National Fish Hatchery, S5631 WI-35, Genoa, WI 54632.

8:30–8:50 MICROBIAL COMMUNITY ASSEMBLY ACROSS THE MISSISSIPPI RIVER REFLECTS CONSERVED PROCESSES UNDER VARIABLE NUTRIENT REGIMES. *Axel J Leon-Rodriguez1, Shelby Huffington1, J. Cameron Thrash2, and Michael W. Henson1. 1 Department of Biological Sciences, Northern Illinois University, DeKalb, IL, U.S.A. 2 Department of Biological Sciences, University of Southern California, Los Angeles, CA U.S.A.

8:50–9:10 CONTEXT-DEPENDENT RETENTION OF SEDIMENT AND NUTRIENTS IN NAVIGATION POOLS IN THE UPPER MISSISSIPPI RIVER SYSTEM. Patrick T. Kelly1. 1Wisconsin Department of Natural Resources, La Crosse Field Station.

9:10–9:30 CREATING RESILIENCY AT MARSH LAKE: REVERTING A SHALLOW FRESHWATER LAKE FROM A TURBID TO CLEAR WATER STATE. David Potter1, Jim Noren1, Kevin Hanson1, Rebecca Seal-Soileau1, Daniel Kelner1, Walt Gessler2, Chris Domeier2, and Todd Call3. 1Corps of Engineers, St. Paul District. 2Division of Fish and Wildlife, Minnesota Department of Natural Resources, Lac Qui Parle Wildlife Management Office. 3Shallow Lakes Program, Minnesota Department of Natural Resources.

9:30–9:50 AM: BREAK (Radisson Center Foyer)

SESSION VI – (Moderator: Patrick Kelly)

9:50–10:10 TOWARDS AN INTEGRATED FRAMEWORK FOR FLOODPLAIN VEGETATION MONITORING, RESEARCH, AND MODELING IN THE UPPER MISSISSIPPI RIVER SYSTEM. Matthew L. Trumper1, Shelby A. Weiss2, Nathan R. De Jager1, Lyle J. Guyon2, Molly Van Appledorn1. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center. 2National Great Rivers Research and Education Center.

10:10–10:30 MODELING TO SUPPORT INTEGRATED FLOODPLAIN VEGETATION SCIENCE IN THE UPPER MISSISSIPPI RIVER SYSTEM. Shelby A. Weiss1, Matthew L. Trumper2, Nathan R. De Jager2, Lyle J. Guyon1, Molly Van Appledorn2. 1National Great Rivers Research and Education Center, 2U.S. Geological Survey, Upper Midwest Environmental Sciences Center.

10:30-11:10 AM STUDENT AWARDS & BUSINESS MEETING (Radisson Ballroom)

11:10 AM-12:00 PM LUNCH SERVED AND RAFFLE (Radisson Ballroom)

12:00 PM FAREWELL! SEE YOU NEXT YEAR.

Poster Session I
Tuesday, 14 April 2026
Radisson Foyer

Poster set-up 5:00–6:00 PM
Authors present at posters 7:30–9:00 PM
(*Student presenters)

1) "SEASONAL MONITORING OF SECRETIVE MARSH BIRDS ON THE UPPER MISSISSIPPI RIVER USING AUTONOMOUS RECORDING UNITS *Ava Cross-Weisbeck1, Madelyn Slaven1, Marie Perkins1, Jason Riddle1, Stephen Winter2. 1College of Natural Resources, University of Wisconsin-Stevens Point. 2U.S. Fish and Wildlife Service, Winona, MN.

2) "COVARIATE UNCERTAINTY IN ECOLOGICAL MODELS: TESTING BAYESIAN INFORMATIVE PRIORS" Ryan C. Burner1, Jeffrey A. Hostetler2, Alan Kirschbaum3. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. 2U.S. Geological Survey, Eastern Ecological Science Center, Laurel, Maryland. 3Great Lakes Inventory and Monitoring Network, National Park Service, Ashland, Wisconsin.

3) "CROSSING THE STREAMS: SEARCHING FOR LOCAL ADAPTATION BETWEEN PARASITE AND HOST" *Joshua Nelson1, Katelin Wolken-Wright1, Jennifer A.H. Koop1. 1Northern Illinois University.

4) "COYOTE & WHITE-TAILED DEER DETECTION AND THE HUMAN SHIELD HYPOTHESIS IN THE QUAD CITIES" *Kaitlin Troha, Dr. Kevin Geedey. Upper Mississippi Center for Sustainable Communities, Augustana College.

5) "SEASONALITY OF TROPHIC DYNAMICS OF UPPER MISSISSIPPI RIVER BACKWATERS COMPARED TO THE MAIN CHANNEL" *Caden M. Boge1, Eric A. Strauss1, 1River Studies Center, University of Wisconsin-La Crosse.

6) "TRACKING RESIDUAL-YOLK ENERGY IN DORMANT HATCHLING TURTLES" *Aliza G. Salinas-Cervantes1, Tom Pham1, Samira T. Radi1, Jacob A. Wyco1, Tim J. Muir1. 1Biology Department, Augustana College.

7) "AMUR HONEYSUCKLE (LONICERA MAACKII) AND WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS ZIMMERMANN) BROWSE PRESSURE'S SYNERGISTIC INFLUENCE ON FOREST TREE DIVERSITY AND SUCCESSION" *Mallek Newkirk1, C. Kevin Geedey1, Michael Reisner1. 1Upper Mississippi Center, Augustana College

8) “WATER QUALITY'S IMPACT ON FISH GUT MICROBIOME IN DUBUQUE COUNTY, IA STREAMS” *Ava J. Friedrichsen1, *Olivia G. Rosenberg1, Adam R. Hoffman, PhD1. 1Department of Natural and Applied Sciences, University of Dubuque, Dubuque, IA 52001.

9) “ONE SAMPLE, MANY SPECIES: REVEALING AQUATIC PLANT BIODIVERSITY USING EDNA” *Mars Giehtbrock1, Simone Kirkeby1, Abby Thompson1, Mason Hoffman1, Paul Jeffrey1, Danelle Larson2, Stephen Spear2, Grant Vagle1, Dhananjay Gotarkar1, Lynn Waterhouse1.1Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, St Paul, Minnesota. 2Upper Midwest Environmental Sciences Center, U. S, Geological Survey, La Crosse, Wisconsin.

10) “LONG-TERM MONITORING PROVIDES INSIGHTS ON POPULATION STATUS OF RARE FISHES IN THE ILLINOIS WATERWAY” Alexis L. VandenBerg1, Brandon S. Harris1, Michael J. Spear1, Andrew T. Mathis1, Madison Myers1, Olivia Salrin1, Kristopher A. Maxson1, Levi E. Solomon1, Andrya L. Whitten Harris1, Eric C. Hine1, Jesse Williams1, Nicholas Barkowski2, Alexander Catalano2, James T. Lamer1. 1Illinois Natural History Survey, Prairie Research Institute, University of Illinois. 2 United States Army Corps of Engineers, Chicago, Illinois.

11) “GRASS CARP TROPHIC ECOLOGY IN TWO LARGE RIVERS: IMPACT ON RESOURCE COMPETITION WITH OTHER INVASIVE CARPS IN THE ABSENCE OF AQUATIC VEGETATION”. *Olivia G. Salrin1,2, Brandon S. Harris1, Michael J. Spear1, Levi E. Solomon1, Vaskar Nepal2, and James T. Lamer1.1Illinois River Biological Station, Illinois Natural History Survey, University of Illinois Urbana-Champaign, Havana, IL 2Western Illinois University, Macomb, IL.

12) “MODELING INTER-NAVIGATION POOL MOVEMENT PROBABILITIES OF BIGHEADED CARPS” John T. Delaney1, Tyler J. Butts2, Andrea K. Fritts1, Mark W. Fritts3, Daniel K. Gibson-Reinemer1, Jessica Z. Leroy4, James P. Peirce5, Richard A. Erickson1. 1US Geological Survey - Upper Midwest Environmental Sciences Center, 2University of Minnesota, 3US Fish and Wildlife Service - La Crosse Fish and Wildlife Conservation Office, 4US Geological Survey - Central Midwest Water Sciences Center, 5University of Wisconsin - La Crosse.

13) “MACROINVERTEBRATE DIVERSITY AND SEDIMENT GRAIN SIZE DISTRIBUTION OF DUCK CREEK WATERSHED, DAVENPORT IA” *Emma A. McVicker1, Dr. K Geedey1, Dr. M Reisner1, Dr. K Arkle1. 1Departments of Environmental Studies, Geology, and Geography, Augustana College.

14) “AN EVALUATION OF COLLECTION METHODS FOR IMMATURE VERSUS ADULT AQUATIC INSECT ORDERS ALONG THE UPPER MISSISSIPPI RIVER” *Elizabeth Clemens1, David Ellefson1,2, Ross Vander Vorste1. 1University of Wisconsin-La Crosse River Studies Center. 2Wisconsin Department of Natural Resources.

15) "AUDIT OF NON-DEGRADED WASTE IN THE MUNICIPAL SEWAGE AT EAU CLAIRE, WI" Libby K. Nelson, *Alicia L. Merklein, Scott K. Clark. Department of Geology and Environmental Science, University of Wisconsin-Eau Claire.

16) "EFFECT OF WATER TEMPERATURE ON THE GROWTH OF SCULPIN (COTTUS SPP.) IN A CONTROLLED ENVIRONMENT" *Morgan F. Schmidt1, Katelynn. Ripper1, Ross W. Vander Vorste1. 1Biology department, University of Wisconsin La Crosse.

17) "WATER QUALITY AND FLOOD DISTURBANCE AS DRIVERS OF MACROINVEREBRATE COMMUNITY STRUCTURE IN URBAN TRIBUTARIES" *Tara Armas1, C. Kevin Geedey1, Michael Reisner1, Alyssa Klauer1, Kelsey Arkle1. 1Upper Mississippi Center, Augustana College.

18) EVALUATING FILTER PERFORMANCE FOR ENHANCED MACROPHYTE EDNA COLLECTION IN LENTIC SYSTEMS. *Paul Jeffrey1, Mason Hoffman1, Dhananjay Gotarkar2, Lynn Waterhouse2,3. 1Water Resources Science Program, University of Minnesota. 2Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota. 3USGS, Minnesota Cooperative Fish and Wildlife Research Unit.

Poster Session II
Wednesday, 15 April 2026
Radisson Foyer

Poster set-up 12:30–3:30 PM
Authors present at posters 5:00–6:30 PM
(*Student presenters)

1) "INFLUENCE OF WATERSHED CHARACTERISTICS AND LAND USE ON TOTAL SUSPENDED SOLID COMPOSITION ON DUCK CREEK TRIBUTARIES" Kevin Geedey, *Kelsey A. Olsen, Michael Reisner. Upper Mississippi Center, Augustana College.

2) "ONE-WAY PASSAGE: A MECHANISM TO LIMIT FISH MOVEMENT AND OPTIMIZE HARVEST" *Cody Hagloch1, Abigail Roussin1, Matthew R. Acre2, Jacob Faulkner2, Alex Catalano3, Nicholas Barkowski3, Marybeth Brey2, P. Ryan Jackson2, James Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, 2United States Geological Survey, 3United States Army Corps of Engineers.

3) "CHANGES IN ZOOPLANKTON COMMUNITIES IN BACKWATER LAKES OF THE UPPER MISSISSIPPI RIVER DURING THE WINTER SEASON" **Cody Vlasaty1,2, Ben Patschull1,2,3, Ross Vander Vorste1,2. 1Biology Department, University of Wisconsin-La Crosse, 2River Studies Center, 3: Wisconsin Department of Natural Resources.

4) "INFLUENCE OF DISPERSAL LIMITATION AND ENVIRONMENTAL FACTORS ON AQUATIC INVERTEBRATE COMMUNITIES IN THE UPPER MISSISSIPPI RIVER" *David Ellefson1,2, Patrick Kelly3, Cadie Olson3, David Schumann1,2, Ross Vander Vorste1,2. 1University of Wisconsin-La Crosse, Department of Biology. 2UWL River Studies Center. 3Wisconsin Department of Natural Resources.

5) "BUMBLEBEE ASSOCIATIONS WITH FLOWERS IN NORTHERN DUBUQUE COUNTY" *Leah Balsbaugh1, David E. Koch1. 1Department of Natural and Applied Sciences, University of Dubuque.

6) "COMPARING LEPIDOPTERAN DIVERSITY BETWEEN POLLINATOR AND NON-POLLINATOR PRAIRIES IN NORTHEASTERN IOWA" *Taryn A. Richey1, Paige M. Manning1, Olivia G. Rosenberg1, Christopher M. Chase1, Paige A. Peterson1, Jessicca M. Dix1, and Gerald L. Zuercher1. 1Wolter Woods and Prairies, University of Dubuque.

7) “CREATING A BIODIVERSITY REFERENCE COLLECTION FOR THE UNIVERSITY OF DUBUQUE'S WOLTER WOODS AND PRAIRIES” *Tatum R. Levedahl1, David E. Koch1, Jessicca M. Dix1, Paige A. Peterson1, and Gerald L. Zuercher1. 1Wolter Woods and Prairies, University of Dubuque.

8) “MOVEMENT BEHAVIORS AND SURVIVAL OF BROWN TROUT IN SOUTHWESTERN WISCONSIN” *Kyle T. Kamm1, David A. Schumann1, Jason G. Freund1. 1 University of Wisconsin-La Crosse.

9) “SOIL COMPOSITION AND MICROBIAL COMMUNITY SHIFTS DURING EARLY-STAGE PRAIRIE RECONSTRUCTION FROM AGRICULTURAL LAND USE IN DUBUQUE COUNTY, IA” Tatum Levendahl1,*Emily Johnson1, Adam Kleinschmit1,1Department of Natural and Applied Sciences, University of Dubuque, Dubuque, IA.

10) “A COMPARISON OF WATER QUALITY PARAMETERS IN LA GRANGE REACH BACKWATERS OF THE ILLINOIS RIVER” Rachel Prostko1, Sara Sawicki1, Madison Roberts1, James Lamer1. 1Illinois Natural History Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign.

11) “DEER ACTIVITY AND THE IMPACTS ON LOCAL FOREST COMMUNITIES” *Christian Mammoser1, Michael Reisner1. 1Augustana College Upper Mississippi Center.

12) “AN ASSESSMENT OF WATER QUALITY AND STORMWATER INFRASTRUCTURE: DAVENPORT, IA” *Joren J. Weller-VanHollebeke, Augustana College.

13) “HOW URBANIZATION AFFECTS COYOTE PRESENCE IN THE QUAD CITIES AREA” *Isaac Loyo1, Kevin Geedey1, 1Augustana College.

14) “SURVEY OF EAU CLAIRE COUNTY RESIDENTS' HABITS AND PERSPECTIVES ON FLUSHING NON-DEGRADING WASTE PRODUCTS” *Alicia L. Merklein, Libby K. Nelson, Scott K. Clark. University of Wisconsin-Eau Claire.

15) “SPATIOTEMPORAL PATTERNS OF DISSOLVED ORGANIC CARBON IN THE UPPER MISSISSIPPI RIVER POOL 8” *Vera P. Hrdlicka1, Eric Strauss1. 1University of Wisconsin - La Crosse Department of Biology, River Studies Center.

16) "COMPARISON OF LARVAL FISH SPECIES AND GEAR TYPES IN TRIBUTARIES OF LOWER POOL 19 IN THE UPPER MISSISSIPPI RIVER" Samantha J. Murray1, Esther E. Atutey1, Rafael Davila Jr.1, Emily A. Szott1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

17) "LARVAL FISH ABUNDANCE ACROSS TIME AND HYDROLOGICAL CONDITIONS IN THREE TRIBUTARIES OF LOWER POOL 19 IN THE UPPER MISSISSIPPI RIVER" Rafael Davila Jr.1, Emily A. Szott1, James T. Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

18) "SEX-SPECIFIC TARGETING OF BIGHEADED CARP DURING HARVEST IN POOLS 14-19 OF THE UPPER MISSISSIPPI RIVER" Emily A. Szott1, Tressa R. Rogers1, Rafael Davila Jr.1, James T. Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

19) "INVESTIGATING THE EFFECTS OF RECONSTITUTED WATER ON SLIMY SCULPIN (COTTUS COGNATUS) GROWTH AND SURVIVAL" *Katelynn M. Ripper1, Morgan F. Schmidt1, Ross Vander Vorste1. 1UWL River Studies Center, University of Wisconsin-La Crosse.

FULL ABSTRACTS ARE AT THE END OF THE PROGRAM

PAST RECIPIENTS OF THE MRRC *FRIEND OF THE RIVER* AWARD

Friend of the River	Organization	Year	Meeting	Presenter
Calvin R. Fremling	Winona State University	1992	24th	Neal Mundahl
Thomas O. Claflin	University of Wisconsin-La Crosse	1993	25th	Ronald G. Rada
Pamela Thiel	U.S. Fish & Wildlife Service	1997	29th	Terry Dukerschein
Richard V. Anderson	Western Illinois University	1998	30th	Michael A. Romano
Ronald G. Rada	University of Wisconsin-La Crosse	1999	31st	Terry Dukerschein
Marian E. Havlick	Malacological Consultants, La Crosse, Wisconsin	2008	40th	Brian Ickes
Carl Korschgen	USGS, Columbia Environmental Research Center, Columbia, Missouri	2009	41st	Roger Haro and Jim Wiener
Ken Lubinski	USGS, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin	2012	44th	Susan Romano
Neal Mundahl	Winona State University	2016	48th	Susan Romano
Michael Vanderfort	U.S. Fish & Wildlife Service	2018	50th	Pamela Thiel
Jennifer Sauer	Upper Midwest Environmental Science Center	2023	54th	Jeff Houser
Michael Delong	Winona State University	2025	56th	Danelle Larson
John Kalas	WI Department of Natural Resources	2026	57th	John Manier

PLATFORM PRESENTATION ABSTRACTS
IN ORDER OF PRESENTATION

(*Student Presenter)

RELATIVE SUBSTRATE STABILITY PREDICTS NATIVE FRESHWATER MUSSEL PRESENCE, RICHNESS, AND DENSITY IN THE UPPER MISSISSIPPI RIVER. Traci DuBose1, Jessica Lipschultz2, Angus Vaughan1, Kristen Bouska1, Teresa Newton1. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center. 2University of Wisconsin - Madison.

Animals that reside in river bottoms contend with the fundamental physical forces that shape their habitat. Managers can intentionally alter the magnitude of those forces using river modifications (e.g., islands) to increase habitat if quantitative relationships between the physical forces, like the shear stress at which substrate is likely to move, and animals are known. For native freshwater mussels, an emblematic member of the benthic community, the stability of river substrates is positively correlated with their presence, density, and survival. Yet, few predictive models between substrate stability and mussels have been developed, complicating the definition of mussel habitat to aid conservation decisions. We aimed to estimate the relationship between substrate stability and mussel presence, richness, and density at a planned restoration site across a 4.4 km2 reach of the upper Mississippi River (Pool 13) near Clinton, Iowa. In 2024, divers used a systematic sample design to quantitatively sample native mussels, obtain surficial sediment samples, and measure substrate resistance using a handheld penetrometer at 293 sites. We estimated the 50th and 84th percentile of particle size from the sediment samples and used a numerical model of the Shields diagram to compute the critical shear stress at which sediment likely starts moving for each site. Bed shear stresses were determined from a hydrodynamic model, and the combined data were used to estimate the relative substrate stability (RSS) metric that describes the ratio of bed shear stress at a specific flow rate to the critical shear stress, so that at RSS > 1 we expect substrate instability. We compared RSS at 5% flow exceedance (high flows) and substrate resistance to mussel presence, richness, and density. Mussel survey data indicated a diverse and abundant mussel assemblage in the project area. The probability of mussel presence increased in areas of higher substrate stability. Mussel richness and density were highest in areas with higher substrate stability, but both exhibited a limiting relationship with substrate stability, where other factors (e.g., food quality) likely also affect mussel richness and density. Predictive relationships between substrate stability and mussel presence, richness, and density can be used by resource managers to design future restoration projects that could enhance physical habitat for mussels, potentially increasing the diversity and density of mussels in the upper Mississippi River.

RESHAPING OUR UNDERSTANDING OF TREMATODE TRANSMISSION USING THE INVASIVE FAUCET SNAIL (BITHYNIA TENTACULATA). *Elise M. Jordahl1, Josh Nelson1, Jennifer AH Koop1. 1Department of Biological Sciences, Northern Illinois University.

Faucet snails (Bithynia tentaculata) are a freshwater, invasive gastropod to North America and act as first and second intermediate hosts for the trematodes Cyathocotyle bushiensis, Sphaeridiotrema globulus, and Sphaeridiotrema pseudoglobulus. Other successful aquatic invasives have shown the ability to survive desiccating conditions, allowing for easier movement via natural or anthropogenic means; however, these other invasive species are not known to serve as intermediate hosts for invasive trematodes. Faucet snails have shown resistance to desiccation; however, it is unknown if their trematode parasites are also resistant to desiccation. Furthermore, it is unknown if these trematodes can survive and retain infectivity in a snail after the snail host has died. We studied the effects of desiccation on snail and trematode survival by desiccating both for 1, 2, and 3 weeks in lab conditions. We found that Faucet snails and their parasites were capable of surviving up to three weeks of constant desiccation conditions, with 27.6% (139 of 504 metacercaria) of metacercaria surviving the full 3 weeks of exposure, being recovered from both live and dead snails. Survival of both snails and the parasites after 3 weeks of desiccation has great significance for the continued management and spread of Faucet snails, as well as the zoonoses they inflict upon waterfowl.

EXPLORING SPATIAL PATTERNS IN CHLOROPHYLL A AND CYANOBACTERIA ACROSS CONNECTIVITY GRADIENTS IN THE UPPER MISSISSIPPI RIVER. Rebecca M. Kreiling1, Sophia L. LaFond-Hudson2, Luke C. Loken2, Kathi Jo Jankowski1, James H. Larson1, Kenna J. Gierke1, Carrie E. Givens2, Hailey E. Trompeter2. 1USGS-Upper Midwest Environmental Sciences Center. 2USGS-Upper Midwest Water Science Center.

Large differences in water quality and phytoplankton communities exist across lateral and longitudinal gradients in the upper Mississippi River (UMR). Understanding water quality in large rivers requires consideration of the influence of tributaries, the degree of connectedness among river habitats, rates of several biogeochemical processes (e.g., primary production), and how these vary temporarily across seasons and flow regimes. In particular, we have limited understanding of the role of these drivers of variation on the abundance of phytoplankton and the potential emergence of harmful algal blooms (HABs), especially in understudied reaches of the UMR. For this project, we assessed the spatial and temporal variability in chlorophyll a concentrations (indicator of algal biomass) and phycocyanin fluorescence (indicator of potentially toxic cyanobacteria) in select reaches of the UMR and assessed the influence of lateral connectivity, flow regimes, and tributaries on those parameters. We used the Fast Limnological Automated Measurements (FLAMe) platform to continuously measure and map chlorophyll a and phycocyanin in the main channel and in aquatic areas with variable hydrological connectivity that could be prone to greater phytoplankton densities and HAB formation. We conducted four, repeat spatial surveys in six pools of the UMR: Pools 10, 13, and 18-21. We also conducted a single longitudinal survey of the river from Pool 10 to Pool 24. Chlorophyll a and phycocyanin varied both spatially within the river and among sampling surveys. Chlorophyll a was highest in September when discharge was lowest, and chlorophyll a was lowest in June when discharge was highest. Chlorophyll a concentrations in off-channel areas of the UMR increased with temperature, but only in May and September in response to flow conditions. Ratios of phycocyanin to chlorophyll a, a proxy metric for the proportion of

phytoplankton that are cyanobacteria, varied more among sampling surveys than longitudinally within surveys, indicating the river shifted similarly over the season to support higher abundances of cyanobacteria in August and September than May and June. The ratio of phycocyanin to chlorophyll a in backwaters and the main channel was similar, but we observed some hot spots and hot moments of high phycocyanin to chlorophyll a ratios that highlight potential areas to focus for future study and management. These findings provide preliminary data about potential occurrence of HABs in the UMR.

HABITAT MOSAICS IN A LARGE-RIVER FLOODPLAIN ECOSYSTEM: UNCOVERING DISPROPORTIONAL EFFECTS OF HABITAT HOMOGENIZATION ACROSS MULTIPLE TAXA. *Julia R. Hampton1, Nathan R. De Jager2, Danelle M. Larson2, Mark A. Kaemingk1, Jason A. DeBoer3. 1University of North Dakota, 2Upper Midwest Environmental Sciences Center, United States Geological Survey, 3, Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

Large-river floodplain ecosystems are highly diverse due to their age, watershed size, and hydrodynamic and habitat variability. Historically, river ecosystems were typified by diverse habitat mosaics, which encompass gradients in physiochemical properties, creating biodiversity hotspots. However, anthropogenic stressors such as temporal changes in climate and precipitation, land use, pollution, invasive species, and exploitation have led to habitat homogenization. Thus, we used a habitat-centric lens to explore whether the physical-biological relationships have been maintained for multiple taxa, despite habitat homogenization, within the Upper Mississippi River System (UMRS). Our specific objectives were to 1) compare differences in aquatic vegetation, mussels, and fish across aquatic areas (i.e., habitat types) within UMRS navigation pools, and 2) assess which aquatic areas are most similar or different among these components. We hypothesized that the strength of the habitat-taxa relationships will vary across components, as each taxonomic group uses a variety of life history strategies and some may be disproportionally affected by homogenization. We used multivariate techniques to assess relationships between UMRS aquatic areas (i.e., detailed GIS habitat classifications) and aquatic vegetation, mussels, and fish for Mississippi River Pools 8 and 13 from 2017-2021. The aquatic areas we included were contiguous floodplain lake, contiguous impounded, isolated floodplain lake, side channel, structured channel border, tertiary channel, and unstructured channel border. Overall, aquatic areas exhibited unique patterns, leading to habitat-level differentiation among components. However, pairwise comparisons identified some similarity between aquatic areas and associated biotic components, though the strength of these patterns varied. For example, fish taxa were fairly unique across aquatic areas, while mussels were mostly similar across aquatic areas, and aquatic vegetation displayed intermediate responses. Pattern variability across biotic components likely indicates differing responses to riverine habitat homogenization or other anthropogenic stressors over time, ultimately reflecting the variation in life history strategies and extant biotic community diversity. The unique response across taxa may provide insight about the scale or severity of homogenization and disproportionally affected ecosystem components, further showcasing the need for cross-taxa assessments in large-river floodplain ecosystems.

RE-OLIGOTROPHICATION OVER 20 YEARS CONTRIBUTED TO MACROPHYTE RECOVERY IN THE UPPER MISSISSIPPI RIVER. Danelle M. Larson1, Mirkka M. Jones2, Benjamin Weigel2, Brian Gray1, Otso Ovaskainen2. 1 U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse WI. 2 University of Helsinki, Helsinki, Finland.

Several large rivers across the globe have recently undergone noticeable improvements to water quality, a process called re-oligotrophication. The cascading ecological effects of re-oligotrophication are largely unknown, owing to the lack of suitable data and the complexity of modelling. Our study leveraged multiple big datasets from 1998-2019 within a 400-kilometer stretch of the Upper Mississippi River in the United States of America, which has experienced major changes to hydrology, water quality, and climate. Joint species distribution models showed how re-oligotrophication and changes to hydrogeomorphology affected macrophyte taxonomic and ecological (trait) diversity at a macrosystem-scale. The models uncovered substantial macrophyte community recovery as evidenced by increased species prevalence and diversity. Community traits also shifted from free-floating plants towards submersed plants. Submersed species responded positively to re-oligotrophication (specifically, reduced concentrations of total phosphorus, chlorophyll a, and total suspended solids). However, total nitrogen concentrations modestly increased over the 22-year period and high values were negatively associated with occurrences of nearly all species. The traits of pollination mode and life form responded predictably to environmental changes; as examples, submersed plants recovered with re-oligotrophy, and epihydrophilous plants that pollinate on the water's surface increased with hydrogeomorphic connectivity. Re-oligotrophication explained approximately 25-40% of the macrophyte community's temporal variation. The spatial variations of water depth and velocity were also major environmental drivers. Macrophyte community assembly was shaped partially by strong temporal changes of hydrogeomorphology and water quality, but the spatial habitat heterogeneity within the large riverscape was also important.

SUBSTANTIAL VARIATION IN ICE PHENOLOGY AND UNDER ICE CONDITIONS ACROSS BACKWATER LAKES OF THE UPPER MISSISSIPPI RIVER. Kathi Jo Jankowski1, John Kalas2, Rob Burdis3, Ashley Johnson4, Travis Kueter4, Stephanie Szura3, and Kyle Landolt1. 1US Geological Survey Upper Midwest Environmental Sciences Center. 2Wisconsin Department of Natural Resources, retired. 3Minnesota Department of Natural Resources. 4Iowa Department of Natural Resources.

Winter can be a bottleneck for riverine organisms, and providing overwintering habitat is a key objective for restoration projects in the Upper Mississippi River (UMR). Further, winter conditions vary substantially across the diversity of off channel areas and can fluctuate during winter in response to variable weather, ice, and snow. There has been limited study of these dynamic winter conditions, and this limits our understanding of how overwintering habitat may respond to changing winter climate. To address these gaps, we monitored 12 backwater lakes across three reaches of the UMR that spanned a gradient of winter intensity and varied in depth and connectivity to the mainstem river. We quantified the timing and duration of ice and snow cover; continuous dissolved oxygen concentration (DO), temperature, and light intensity under

ice; and drivers of this variation. Ice duration varied by up to a month between the most northern and southern reaches and one to two weeks among sites within the same reach, indicating local factors mediated regional climate effects on backwater ice dynamics. Ice phenology varied with backwater connectivity and depth; ice formed later in more connected lakes and lasted longer and thawed later in deeper lakes. Water temperature and DO were highly dynamic in response to ice and snow cover. The highest daily fluctuation of DO, an indicator of under ice productivity, occurred in shallower, less-connected backwaters and during intermittent ice and snow cover at the edges of winter. These findings show that factors such as water depth and hydraulic connectivity affect both ice and under ice conditions in the UMRS, emphasizing the importance of maintaining habitat diversity in river ecosystems as winters change.

CRAPPIE WINTER HABITAT EXPANSION FOLLOWING BACKWATER RESTORATION IN POOL 12 OF THE MISSISSIPPI RIVER. Ashley L. Johnson1, Travis G. Kueter1, Hannah S. Lenning1, Seth J. Fopma1. Iowa Department of Natural Resources, Mississippi Monitoring Station.

Habitat Rehabilitation and Enhancement Projects are a cornerstone of the Upper Mississippi River Restoration Program, with more than 63 completed projects and many more in development. One such project was completed on pool 12 of the Mississippi River to help increase over-wintering habitat for native fishes. To evaluate project effects, we radio-tracked black crappie (Pomoxis nigromaculatus) and white crappie (Pomoxis annularis) during winter prior to restoration in two project lakes (Stone and Tippy Lakes) while simultaneously collecting water quality data. After project completion, we replicated these methods and supplemented them with continuous dissolved oxygen and temperature monitoring. Crappie home ranges expanded in both systems post restoration. Most notably, fish in Stone Lake transitioned from being nearly absent at specific sites to being consistently detected across all locations, indicating an increase in functional habitat availability. Despite pronounced diel fluctuations in dissolved oxygen and temperature, concentrations remained well above hypoxic thresholds and fish movement was not driven by diel fluctuations. Remarkably, hypoxic conditions were absent during our post construction study period, with dissolved oxygen levels never falling below 6.5mg/L. These findings indicate that the HREP mitigated physiological constraints, allowing crappie to shift from physiologically restricted distributions to habitat selection driven by physical structure and habitat quality.

UNDERWATER CAMERA WINTER FISH SAMPLING. Benjamin Patschull1,2, Ross Vander Vorste1, David Schumann1, Patrick Kelly2, Kristen Bouska3. 1University of Wisconsin - La Crosse. 2Wisconsin Department of Natural Resources. 3U.S. Geological Survey.

Gear limitations imposed by ice conditions in temperate regions have created a significant knowledge gap regarding the winter habitat use of the backwater fish assemblage. We developed and optimized an underwater camera method for under-ice sampling in four freshwater backwaters on the Upper Mississippi River. We found that site depth (Ewi = 1.0), water clarity (Ewi = 0.99), snow depth (Ewi = 0.89), and ice depth (Ewi = 0.86) were the main factors

influencing camera viewing distance. Rarefaction analysis showed 21 sampling sites per backwater and 15-minute recordings sufficiently captured species richness and relative abundance. Using this optimized underwater camera method, we evaluated the effect of environmental factors on fish assemblage metrics (i.e., species richness and combined MaxN) and species-specific data for Bluegill, Largemouth Bass, and Yellow Perch. Random forest models ranked water temperature (C) and dissolved oxygen (mg/L) as the primary factors influencing the fish assemblage metrics and the centrarchid presence and relative abundance. Yellow Perch presence and relative abundance were driven by site depth (m) and conductivity (µS), respectively. The results of this study can be used by managers to guide restoration strategies incorporating environmental factors that promote quality overwintering habitat for backwater fishes.

OCCURRENCE PATTERNS AND COMPETITIVE FEEDING INTERACTIONS OF MOTTLED AND SLIMY SCULPIN IN THE KICKAPOO RIVER DRAINAGE. *Evan T. Sirianni1, David A. Schumann1, Jason G. Freund1. 1University of Wisconsin - La Crosse and River Studies Center.

Sculpins are key coldwater invertivores and were once abundant throughout Wisconsin Driftless Area streams, but poor historical land use caused population declines and local extirpations. Current occurrence patterns remain unknown, limiting future conservation. I sampled fish assemblages using single-pass backpack or barge electrofishing along with instream and riparian zone habitat measurements of 60 randomly selected streams stratified across five watersheds in the Kickapoo River drainage. Key habitat occurrence drivers were identified (i.e., instream substrate, watershed, land use) alongside patterns of relative abundance, size, and population size structure, informing future sculpin reintroductions and instream habitat improvement projects. Because cooccurrence was rare, competitive feeding interactions were evaluated experimentally to assess a possible driver of the allopatric distributions. Aggressive behaviors (i.e. nips, chases) and amphipod consumption were quantified across different assemblage types (i.e., interspecific, intraspecific) and size classes (i.e., adult, juvenile) during 20-minute trials. Adult Mottled Sculpin had the highest aggression, primarily in adult intraspecific trials, whereas Slimy Sculpin accounted for 93% of amphipods consumed. Food availability did not explain aggression, indicating feeding competition is unlikely to drive observed allopathy, improving our understanding of mottled and slimy sculpin distributional patterns and providing value background for reintroduction efforts.

INVASIVE BIGHEADED CARP MOVEMENT THROUGHOUT THE UPPER MISSISSIPPI AND LOWER WISCONSIN RIVERS. *Elise M. Bass1, Mark W. Fritts2, Jordan G. Weeks3. Jason G. Freund1, David A. Schumann1. 1Department of Biology and River Studies Center, University of Wisconsin-La Crosse. 2U.S. Fish and Wildlife Service. 3Wisconsin Department of Natural Resources.

Invasive bigheaded carps (Hypophthalmichthys spp.) have had detrimental effects on ecosystem structure and function by outcompeting native fishes. Relatively little is known about the habitat use and movement behaviors of invasive bigheaded carps at current invasion fronts, especially within shallow and sandy, dynamic river systems such as the Lower Wisconsin River (LWR), a large tributary of the Mississippi River. Invasive bigheaded carps were first detected within the LWR in 2011 and have recently been observed moving throughout the system, which may be used for spawning. I will investigate movement behaviors and predictors of movement of bigheaded carps throughout the LWR using acoustic telemetry tagged bigheaded carps and an array of over 30 receivers and gates to identify potential spawning areas and inform future removal efforts. I will also describe the largescale detection range of acoustic transmitters within the LWR by conducting detection range testing at three locations and time periods to represent different river environments and hydrograph changes, which will allow for a better understanding of the detection limits of transponders. Results will allow managers to incorporate detection rates in the LWR into movement models and better manage species of interest in this and similar dynamic river systems worldwide.

INVASIVE SILVER CARP GROWTH CHRONOLOGIES: AN EVALUATION OF HARVEST SUCCESS AND DRIVERS OF ANNUAL GROWTH. *Kaiden Vinavich1, James Lamer1, Levi Solomon1, Jesse Williams1, Madison Roberts1, Rachel Prostko1, Brandon Harris1, Allison Lenaerts2, Sara Tripp2, Edward Sterling3, Michael Weber4, Christopher Sullivan5. 1Illinois Natural History Survey, University of Illinois. 2Illinois Department of Natural Resources. 3US Fish and Wildlife Service, Columbia, Missouri. 4Iowa State University. 5New York Cooperative Fish and Wildlife Research Unit, Cornell University.

Invasive carp, specifically silver carp (Hypopthalmichthys. molitrix), have negatively impacted the food webs and native biota of the Mississippi River Basin since their introduction in the early 1970s. Harvest is the primary management strategy to reduce silver carp populations, however, due to their complicated life history (e.g., long-range movements and sporadic production and recruitment) and absence of robust population estimates, additional assessment tools are needed to help evaluate the effectiveness of harvest. Therefore, I am exploring variation in silver carp annual growth as a surrogate for density in response to management and removal efforts. This will be accomplished through two main objectives: 1) characterize silver carp annual growth within discrete, spatially-explicit management units across a spectrum of invasion densities in the Mississippi River Basin and 2) quantify how intrinsic and extrinsic factors influence silver carp growth, with an emphasis on how growth responds to management (harvest). I will evaluate growth through incremental lapillus otolith measurements from silver carp across reaches of the

Mississippi River, Illinois River, Missouri River, Ohio River, and select tributaries collected from 2014-2024 (n=50 per species-reach-year combination). Mixed effects modeling will be used to estimate annual growth in response to management and external drivers, while adjusting for allometric and individual-specific growth intraclass variation. This work will yield silver carp master chronologies across their invaded range, capturing several stages of their invasion throughout the Mississippi River Basin and hopefully serve as a baseline for future collections and a tool to help evaluate management success.

INVASIVE CARP AND NATIVE FISH PASSAGE RESPONSE TO AN EXPERIMENTAL UNDERWATER ACOUSTIC DETERRENT SYSTEM. Daniel Gibson-Reinemer1, Jessica C. Stanton1, Andrea K. Fritts1, Janice Albers1, Theodore R. Castro-Santos2, Matt D. Sholtis3, Christa M. Woodley4, Marybeth K. Brey1.1 U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, WI. 2 U.S Geological Survey Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA.3 U.S. Geological Survey Eastern Ecological Science Center, Turners Falls, MA.4 U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Silver carp (Hypophthalmichthys molitrix), Bighead carp (H. nobilis), Black Carp (Mylopharyngodon piceus), and Grass carp (Ctenopharyngodon idella), collectively, invasive carps, are invasive fishes expanding their range in the Mississippi River Basin. Research has demonstrated that invasive carps are sensitive and responsive to underwater sounds. These signals could be engineered to elicit behavioral responses, potentially deterring invasive carps from moving upstream in rivers with limited effects on native fishes. Deploying and evaluating underwater acoustic deterrent systems (uADS) at large, management-relevant scales, such as at navigation locks, is a necessary step in determining their feasibility and selectivity as a control tool. For four years, we used two acoustic telemetry arrays (69 kHz and 307 kHz) and over 2700 fish with acoustic transmitters to evaluate the changes in upstream fish passage relative to uADS operation at Mississippi River Lock No. 19. We will present model results that evaluate the effect of the uADS on the upstream passage success of invasive carps and native fish species. Results of ongoing acoustic deterrent research will help managers understand the effectiveness of acoustic deterrents and provide considerations for balancing native fish passage with invasive species deterrence.

REAL-TIME INTERACTIVE FORECASTING OF INVASIVE CARP CATCH USING HISTORIC HARVEST DATA IN THE UPPER MISSISSIPPI RIVER. Ekaterina Khadonova1, Danelle M. Larson2, John T. Delaney2, Emily A. Szott1, Rafael Davila1, Mark W. Fritts3, James T. Lamer1. 1Illinois River Biological Station, Prairie Research Institute. 2United States Geological Survey. 3Unites States Fish and Wildlife Service.

We developed a real-time, interactive forecasting tool that uses historic commercial harvest records from Pools 14-19 to predict where invasive carp harvest is most likely and where expected catch per unit effort (CPUE) is highest across the Mississippi River. Forecasts update daily using live hydrology and temperature data, and results are delivered through an online, map-based Shiny app designed for operational use by field staff and partners. During 2025, we

produced and evaluated two model versions, updating the framework to better handle the spatiotemporal structure of ecological data. The finalized workflow combines a predicted probability of harvest with a predicted catch magnitude to generate spatial CPUE forecasts. Diagnostics indicated river location and seasonality were the strongest predictors, with bathymetry and hydrology contributing significantly as well. In held-out validation, the model predicted carp presence with 81% accuracy; CPUE forecasts generally tracked observed patterns but were sensitive to occasional extreme outliers. Spring 2026 deployment will focus on field validation by comparing forecast CPUE to realized harvest outcomes and refining the tool for management decision support.

EVALUATION OF EXTERNAL ATTACHMENT DESIGNS FOR GPS TAGGED INVASIVE CARP. *Abigail Roussin1, Cody Hagloch1, Matthew R. Acre2, Andy Muller2, Sophia M. Bonjour2, Andrew Mathis1, Emily Szott1, Rafael Davila Jr.1, Rafael O. Tinoco3, James Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois. 2U.S. Geological Survey, Columbia Environmental Research Center. 3Department of Civil and Environmental Engineering, University of Illinois.

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

FISHTRENDS: AN ONLINE TOOL TO DETECT ANNUAL CHANGES AND LONG-TERM TRENDS OF FISHERIES METRICS. Robert J. Mooney1, Michael J. Spear1, Brian S. Ickes2, Jason A. DeBoer1, Andrya L. Whitten Harris1, David C. Glover3, James T. Lamer1. 1Illinois Natural History Survey - Illinois River Biological Station. 2US Geological Survey, Upper Midwest Environmental Science Center. 3Illinois Department of Natural Resources.

Informed decision making in fisheries management hinges on data accessibility. Understanding how populations and communities of fishes change annually and over extended periods of time can help managers identify and prioritize intervention efforts. To help inform fisheries management in the Mississippi and Illinois Rivers, we created an online tool (FishTrends) that uses data from several long-term monitoring programs and provides quick access to annual

changes and long-term trends of fisheries metrics (relative abundance, relative weight, and proportional stock density) for a wide range of species. We combined data from the Long-Term Electrofishing program (LTEF), Illinois DNR, Iowa DNR, the Multi-Agency Monitoring program (MAM), and the Long-Term Resource Monitoring program (LTRM) that were collected using the same gear type via random sampling to ensure that the data were comparable and representative of each individual pool/reach. Using those data, we calculated annual means and variance terms for each metric, species, and pool combination, and applied Cochran's equation to ensure that sample sizes were sufficient to detect specific annual changes. Within the tool, a user can select which river, pool/reach, gear type, and species combination they are interested in, and select a threshold for detecting an annual change in a metric (e.g., detect a 20% decline in annual relative abundance for bluegill in Pool 16 of the Mississippi River). Overall, the online tool is meant to provide managers with easily accessible long-term trends of important fisheries metrics and detect annual declines in metrics with statistical confidence that may warrant immediate management intervention.

LESSONS LEARNED AND BEST PRACTICES FROM ACOUSTIC TELEMETRY STUDIES IN THE MISSISSIPPI RIVER BASIN. Andrea Fritts1, Janice Albers1, Doug Appel1, Mark Fritts2, Daniel Gibson-Reinemer1, Daniel Krause1, William Lamoreux1, Grace Loppnow3, Amanda Milde1, Mark Roth1, Matthew Sholtis4, Jessica Stanton1, Christa Woodley5, Marybeth Brey1.1U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, WI. 2 U.S. Fish and Wildlife Service La Crosse Fish and Wildlife Conservation Office, Onalaska, WI. 3 Minnesota Department of Natural Resources, St. Paul, MN. 4 U.S. Geological Survey Western Fisheries Research Center, Columbia River Research Laboratory, Cook, WA. 5U.S. Army Engineer Research and Development Center, Vicksburg, MS.

The broad range of available acoustic telemetry technologies provides opportunities for assessments of fish movements and behaviors in large rivers. Within the Mississippi River Basin, the combination of large-scale longitudinal arrays, coupled with fine-scale positioning arrays near focal navigation locks and dams, provides valuable information on the propensity of fish to complete passage through or around these structures. Installing arrays of acoustic telemetry receivers to detect fish implanted with transmitters is currently the primary means of assessing both native and invasive (i.e., invasive carp) fish passage to inform management and control decisions (e.g., the evaluation of experimental invasive carp deterrents at navigation locks). We present a range of "lessons-learned" and best-practice considerations for using acoustic telemetry tools to evaluate fish passage and invasive carp deterrents across the Mississippi River Basin. Topics include the importance of range testing under variable environmental conditions, performance of different receiver models (i.e., VR2Tx vs. NexTrak), use of depth-sensor tags, and information gained by dual-tagging individuals with 69-kHz and 307-kHz transmitters. The importance of building redundancy into telemetry arrays and intentional application of tag life studies will also be discussed. These lessons learned will provide information for others to consider when implementing acoustic telemetry programs or studies in large rivers to inform fish management and conservation decisions.

USING ENVIRONMENTAL DNA TO MONITOR FOR INVASIVE MACROPHYTES IN THE UPPER MISSISSIPPI WATERSHED REGION. *Mason Hoffman1, Paul Jeffrey1, Dhananjay Gotarkar1, Grant Vagle1, Danelle Larson2, Steven Spear2, Richard Erikson2, Lynn Waterhouse1. 1Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, St Paul, Minnesota. 2Upper Midwest Environmental Sciences Center, U. S, Geological Survey, La Crosse, Wisconsin.

Control of invasive aquatic plants relies heavily on early detection as established populations become much more difficult to extirpate. Environmental DNA has emerged as a useful tool to track nascent invasions. eDNA can increase the odds of early detection and broaden the diversity of species detected when employed alongside point-intercept methods. This project developed a metabarcoding assay for the detection of aquatic invasive plants from eDNA using the nanopore sequencing platform. The assay focused on invasive macrophytes in the Upper Mississippi River Watershed and surrounding regions, with an emphasis on making methods complementary to current early detection and rapid response efforts. Tissue samples were collected from 24 invasive and 56 native species of interest through field sampling and collaboration with other institutions. To assure regional specificity and account for online database gaps, extracted DNA from tissue samples was used to build a reference database to compare to eDNA results. A primer mix was chosen that amplified all species for at least one of three DNA barcode regions. Initial results affirm that multiple species can be detected at a given site, with comparable diversity to rake-toss surveys from the same location. The infrastructure built for eDNA monitoring also allowed for analysis of hybrid species, clarifying lake survey results for natural resource managers. In the summer 2025 field season, our primers, sampling protocols, and nanopore sequencing were tested. Our preliminary results affirm that multiple species can be detected at a given site, with comparable diversity to rake-toss surveys from the same location. With the workflow developed and validated, the project will move forward with analysis of eDNA samples from the 2025 field season.

MICROPLASTIC CONSUMPTION IN AVIAN SPECIES FROM THE UPPER MISSISSIPPI RIVER WATERSHED NEAR LA CROSSE, WISCONSIN. *Kassandra C. Zimmer, Eric A. Strauss, and Markus Mika 1University of Wisconsin, La Crosse, Department of Biology and the River Studies Center.

Microplastics are synthetic, nonbiodegradable particles (250Âµm-5mm in size) polluting various environmental systems including air, soil, water, and biotic organisms. Microplastic pollution is of increasing environmental concern threatening various ecosystems and organisms. Avian wildlife are widely recognized bioindicators for pollutants because they are highly mobile, occupy various trophic levels, and biomagnify certain environmental pollutants. As bioindicators, they provide insight into pollution exposure rates and potential impacts on environmental and human health. Exposure to larger plastic waste increases the likelihood of entanglement, resulting in suffocation, drowning, elevated predation risk, and impaired prey capture efficiency. The accidental ingestion of smaller pieces of plastic can lead to gut obstruction, ulcers, a feeling of fake satiety, and direct fatality. There is a dearth of studies recording location in the digestive tract microplastic particles accumulate and how species-

specific microplastic accumulation varies with mass and trophic position within the Upper Mississippi River watershed. My project aimed to address this lack of knowledge for avian taxa by pinpointing primary sites of microplastic accumulation in birds' digestive tracts and observing how body mass and trophic guild affect microplastic abundance. Bird specimens of numerous species were collected postmortem around the La Crosse, WI area using federal and state salvage permits for taxidermy preservation. These bird specimens (n=123) from 50 species provided the tissues needed in this study. Digestive tracts from each bird were removed and digested using filtered 20% KOH to break down biological tissues. Microplastics were separated from the remaining heavier materials through density separation in a filtered 1.4 g/L CaCl solution. Microplastics were then isolated on a filter for enumeration and measured via microscopy. Further polymer identification was completed via Fourier Transform Infrared (FTIR) Spectroscopy. In total, 1538 microplastic particles were found in 123 bird digestive tracts (mean = 12.5 particles/bird) and ranging from 0-83 particles/bird. There were no significant differences in microplastic accumulation across digestive tract regions. We found that smaller birds exhibited a higher abundance of microplastics per gram of body weight and therefore are likely most affected by plastic waste. Microplastic abundance was significantly greater in birds occupying intermediate trophic levels, ranging from 2.5 to 3.0. These results confirm that avian wildlife ingest microplastics from the environment; however, the harmful threshold of microplastic accumulation remains unknown. Regardless, the prevalence of microplastics in avian samples highlights the importance of reducing plastic pollution and need for monitoring microplastic abundance and consumption in the driftless region of Wisconsin.

THE PALATABILITY OF FORMULATED DIETS INTENDED FOR LAKE STURGEON PRODUCTION. *Marik Dickson1, Orey Eckes2, Jadon Motquin2, David A. Schumann1.
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Effective conservation aquaculture operations and stocking programs are vital for restoring and bolstering recruitment of rare fishes such as Lake Sturgeon (Acipenser fulvescens). Lake Sturgeon propagation relies on expensive and labor-intensive feeding regimes during larval development to reach sizes that maximize post-stocking survival. Use of natural diets increases hatchery spending, limits production and stocking abilities and requires intensive care, whereas commercial diets reduce feed expenses, simplify feeding regimes, and enables more rearing and stocking capabilities. Efforts to transition Lake Sturgeon to commercially available formulated diets have generally been poorly accepted, causing decreased survival and growth. This study evaluates the feeding behavior and palatability of 20 diets fed to larval Lake Sturgeon. Larvae were reared under standard hatchery procedures and fed brine shrimp nauplii (Artemia) for 4 weeks prior to the study. Feeding behaviors of individual larvae (n = 180) were observed across 20 diet treatments (n = 9), including two reference diets (i.e. brine shrimp and bloodworms), nine commercial diets, and nine diet mixing strategies using brine shrimp and the selected commercial diets. Individual fish were video recorded for 5 minutes to quantify the interaction frequency and time to first interaction with each diet. A time-to-event analysis was used to compare feeding interactions among diets. Brine shrimp had the highest interaction frequency (70%) whereas

commercial diets had relatively low interaction frequencies never exceeding 28%. The individual variability in interaction suggests differences in diet texture, smell, and composition influence diet recognition and acceptance. These findings demonstrate that diet mixing improves acceptance of commercial diets and highlights the importance of optimizing diet transition timing to increase the overall effectiveness of commercial diets used in Lake Sturgeon propagation.

MICROBIAL COMMUNITY ASSEMBLY ACROSS THE MISSISSIPPI RIVER REFLECTS CONSERVED PROCESSES UNDER VARIABLE NUTRIENT REGIMES. *Axel J Leon-Rodriguez1, Shelby Huffington1, J. Cameron Thrash2, and Michael W. Henson1. 1 Department of Biological Sciences, Northern Illinois University, DeKalb, IL, U.S.A. 2 Department of Biological Sciences, University of Southern California, Los Angeles, CA U.S.A.

Large rivers integrate biogeochemical transformations across continental scales and play a disproportionate role in downstream carbon and nutrient export. The River Continuum Concept (RCC) predicts structured longitudinal shifts in biological communities along environmental gradients from headwaters to river mouth, yet how microbial assembly processes operate under variable nutrient regimes remains unresolved. Building on prior evidence of strong longitudinal gradients in nutrients and microbial composition, we conducted multi-year, whole-river sampling to evaluate the consistency of nutrient regimes, the persistence of spatial organization, and whether free-living and particle-associated communities differ in sensitivity to temporal versus geographic variation. At the basin scale, 2016 was characterized by significantly higher concentrations of nitrate, phosphate, and silicate. Filter fraction explained the greatest proportion of variation in microbial community composition; however, free-living communities were more strongly structured by both year (2014 vs. 2016) and location (Upper vs. Lower river) than particle-associated assemblages, indicating greater sensitivity to hydrologic and nutrient variability. Despite shifts in alpha diversity and declines in putative keystone freshwater lineages, spatial structure remained conserved between years. A core microbiome persisted along the river continuum in both years, though its overall contribution was significantly lower under the higher-nutrient regime of 2016. Consistent with these changes, distance-decay analyses showed that longitudinal organization was maintained in both fractions, but interannual shifts were amplified in the free-living assemblage, where mean dissimilarity patterns flattened under elevated nutrient conditions. Together, these findings indicate that nutrient enrichment reshapes taxonomic composition and increases temporal variability without overriding the longitudinal framework structuring microbial diversity across the Mississippi River.

CONTEXT-DEPENDENT RETENTION OF SEDIMENT AND NUTRIENTS IN NAVIGATION POOLS IN THE UPPER MISSISSIPPI RIVER SYSTEM. Patrick T. Kelly1. 1Wisconsin Department of Natural Resources, La Crosse Field Station.

The Upper Mississippi River System (UMRS) serves as a transport system for sediment and nutrients from the landscape to downstream ecosystems. The magnitude and rate of delivery is

not static, as ecological and geomorphological features of river reaches may contribute to more or less material being retained in the river rather than moved downstream. For example, areas where velocity declines and hydrologic residence time increases may contribute to high rates of sedimentation and loss from the water column (e.g. Lake Pepin). Habitat restoration may increase the amount of sedimentation that occurs, as island construction and resulting increases in aquatic vegetation may influence flow rates and therefore loss of sediment from the water column. To date, there have been few ecosystem-scale assessments of retention as a result of ecological changes due to habitat restoration in large rivers. I used a dataset from the Long Term Resource Monitoring element of the Upper Mississippi River Restoration (UMRR LTRM) to characterize sediment and nutrient retention across 3 navigation pools that differed in geomorphology and aquatic vegetation. My objective was to determine the potential environmental influences on retention at the pool-scale. I observed increases in sediment and phosphorus retention in pool 8 across the time series, correlating with recovery of aquatic vegetation within the pool. In pools 13 and the La Grange reach of the Illinois River, I observed a stronger correlation with hydrology, but in different directions depending on geomorphology of the navigation pools. These results indicate retention may be highly context-dependent across the river system, and influenced by a combination of factors including ecological responses to habitat restoration.

CREATING RESILIENCY AT MARSH LAKE: REVERTING A SHALLOW FRESHWATER LAKE FROM A TURBID TO CLEAR WATER STATE. David Potter1, Jim Noren1, Kevin Hanson1, Rebecca Seal-Soileau1, Daniel Kelner1, Walt Gessler2, Chris Domeier2, and Todd Call3. 1Corps of Engineers, St. Paul District. 2Division of Fish and Wildlife, Minnesota Department of Natural Resources, Lac Qui Parle Wildlife Management Office. 3Shallow Lakes Program, Minnesota Department of Natural Resources.

Marsh Lake is located on the Minnesota River, 300-river miles upstream of its confluence with the Mississippi River. Originally this was a river floodplain lake created by a tributary delta. In the 1930s, a dam was constructed that enlarged the lake into a 2,000-hectare pool with aquatic vegetation important for migrating waterfowl. Initial conditions were indicative of a clear-water state. However, the environment degraded over eight decades, largely driven by elevated wind and wave action, sediment loading, infestation by common carp and static water levels. By the 1990s, the system transitioned to a turbid water state, resulting in a near complete loss of aquatic vegetation. The Marsh Lake Dam embankment also moved the mouth of the Pomme de Terre River upstream and into the pool, resulting in the loss of two kilometers of the river and blocking seasonal fish passage. After a lengthy planning process, the Corps of Engineers, in cooperation with the Minnesota Department of Natural Resources and the Upper Minnesota River Watershed District, designed modifications to the dam intended to restore ecosystem processes that included a water control structure, rock arch rapids fishway, embankment breach, and re-route the Pomme de Terre River into its historic channel. Despite challenges with record high flows, construction of the $13 million project occurred between 2017 and 2020. This was followed by two consecutive years of an intentional pool-wide drawdown under drought conditions. This resulted in drying most of the lake bed, compacting sediment and exposing important seed banks. In

2022, the water surface elevation was restored, and the pool became dominated by emergent and submersed aquatic vegetation that act to damper wave action and filter nutrients, thus improving water clarity. In the two years post-drawdown, aquatic vegetation showed a positive response with an improved clear water state. In addition, fish passage through the dam was enhanced, and flow through the historic Pomme de Terre River channel was restored. These features and management thereof, simulate a more natural hydrologic regime to sustain aquatic vegetation critical as a food source and cover for migrating waterfowl, colonial waterbird, shorebird and other wetland wildlife populations. Over the long term, improvements in water clarity and fish passage will benefit native fish populations in the pool to the detriment of invasive carp. An adaptive management team monitor performance and make recommendations for maintaining the system's resiliency and maximize project success.

TOWARDS AN INTEGRATED FRAMEWORK FOR FLOODPLAIN VEGETATION MONITORING, RESEARCH, AND MODELING IN THE UPPER MISSISSIPPI RIVER SYSTEM. Matthew L. Trumper1, Shelby A. Weiss2, Nathan R. De Jager1, Lyle J. Guyon2, Molly Van Appledorn1. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center. 2National Great Rivers Research and Education Center.

The Upper Mississippi River System (UMRS) comprises a complex mosaic of lotic and lentic aquatic areas and floodplains. Our understanding of ecosystem patterns and processes in these aquatic areas has advanced through decades of monitoring and research by the Long Term Resources Monitoring (LTRM) element of the Upper Mississippi River Restoration Program, which has generated extensive data on fisheries, water quality, aquatic vegetation, land cover-land use, and other components of the river system. Although LTRM and its partners have also invested in monitoring floodplain vegetation, these efforts have often progressed in a piecemeal manner without a cohesive framework linking monitoring, research, and modeling to address the challenges facing floodplain forests. Here, we outline a conceptual framework for integrated floodplain vegetation science in the UMRS to support manager decision making. We summarize outcomes from a 2025 workshop that identified monitoring priorities from partners across the system and evaluated the suitability of existing datasets for river-wide assessments of floodplain vegetation. We then describe a framework to integrate current floodplain vegetation monitoring, research, and modeling efforts through a hierarchical network-of-networks conceptual approach that includes system-scale mapping, regional-scale forest inventories, and site-scale surveys. This framework represents an initial step toward routine assessments of the status and trends of floodplain vegetation across the UMRS.

MODELING TO SUPPORT INTEGRATED FLOODPLAIN VEGETATION SCIENCE IN THE UPPER MISSISSIPPI RIVER SYSTEM. Shelby A. Weiss1, Matthew L. Trumper2, Nathan R. De Jager2, Lyle J. Guyon1, Molly Van Appledorn2. 1National Great Rivers Research and Education Center, 2U.S. Geological Survey, Upper Midwest Environmental Sciences Center.

The Upper Mississippi River System (UMRS) floodplain supports a mosaic of wetland vegetation types shaped by dynamic hydrogeomorphic processes operating within and across scales. Effective management of this system requires a comprehensive understanding of vegetation patterns, processes, and dynamics, yet translating disparate monitoring and research datasets into actionable information for managers presents challenges. Process-based modeling offers a powerful tool for bridging this gap, enabling the integration of information across spatiotemporal scales, characterization of vegetation status and trends, and identification of gaps in knowledge that can guide future monitoring and research investment. Here, we present an application of an existing process-based forest landscape model developed for the UMRS floodplain as a key step in integrating existing multi-scale datasets and highlighting areas where targeted data collection could most improve our understanding of floodplain vegetation dynamics and reduce uncertainty in projected outcomes of management or environmental change scenarios. Drawing on insights from a 2025 workshop with partners across the system, we found that existing datasets align well with many management priorities and are sufficient for modeling broad successional patterns throughout the system, but data gaps may limit representing more complex competitive vegetation dynamics and responses to changing environmental conditions. While our approach is specific to the UMRS, we aim to demonstrate how process-based modeling can serve as an integrating step within a broader vegetation science program for large river floodplain ecosystems.

POSTER PRESENTATION ABSTRACTS IN ORDER OF PRESENTATION

(*Student Presenter)

Poster Session I

“SEASONAL MONITORING OF SECRETIVE MARSH BIRDS ON THE UPPER MISSISSIPPI RIVER USING AUTONOMOUS RECORDING UNITS *Ava Cross-Weisbeck1, Madelyn Slaven1, Marie Perkins1, Jason Riddle1, Stephen Winter2. 1College of Natural Resources, University of Wisconsin-Stevens Point. 2U.S. Fish and Wildlife Service, Winona, MN.

Secretive marsh birds, including sora (Porzana carolina) and Virginia rail (Rallus limicola), are important indicators of wetland condition on the Upper Mississippi River, yet they remain difficult to monitor due to their cryptic behavior, low vocalization rates, and the dense emergent vegetation they inhabit. Traditional call-broadcast surveys have been used to estimate presence and breeding activity of secretive marsh birds. However, concerns persist that this method may disturb individuals during sensitive periods and may not fully capture true site use, especially across large and logistically challenging riverine systems. Passive acoustic monitoring with autonomous recording units (ARUs) provides an opportunity to collect continuous, non-invasive data for long periods of time, but its effectiveness for marsh bird monitoring on the Upper Mississippi River has not been fully evaluated. To address this gap, we assessed the utility of ARUs for monitoring secretive marsh birds during two ecologically important periods: spring breeding and fall migration. We deployed ARUs in emergent wetlands on the Upper Mississippi River National Wildlife and Fish Refuge from May through mid-June and again from September through mid-October 2025. Recordings were processed using BirdNET to identify detections of focal species. During the spring breeding season, ARU detections supported estimation of detection probabilities and site occupancy for sora and Virginia rail, revealing spatial patterns of site use across wetlands. In the fall, continuous acoustic data allowed us to identify sora migration departure timing. Preliminary results indicate that ARUs provided more frequent and consistent detections of secretive marsh birds than traditional call-broadcast surveys and offered valuable insights into both breeding-season occupancy and migration phenology. Together, these findings demonstrate that passive acoustic monitoring can strengthen long-term marsh bird monitoring programs on the Upper Mississippi River by improving understanding of habitat use across seasons, reducing observer disturbance, and offering a scalable approach for large wetland complexes. Integrating ARUs into existing monitoring frameworks may enhance wetland management, restoration assessment, and conservation planning for secretive marsh bird communities.

“COVARIATE UNCERTAINTY IN ECOLOGICAL MODELS: TESTING BAYESIAN INFORMATIVE PRIORS” Ryan C. Burner1, Jeffrey A. Hostetler2, Alan Kirschbaum3. 1U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. 2U.S. Geological Survey, Eastern Ecological Science Center, Laurel, Maryland. 3Great Lakes Inventory and Monitoring Network, National Park Service, Ashland, Wisconsin.

Many ecological models include covariates that are estimated rather than precisely measured. This implicit covariate uncertainty has been shown to bias covariate effect estimates low (‘shrinkage’) while also deflating covariate error estimates, with substantial implications for model inferences and predictive ability. Nevertheless, most modeling frameworks do not explicitly incorporate underlying covariate uncertainty to address these issues. We developed and tested a method for estimating covariate uncertainty and incorporating it into models using Bayesian information priors. We present a case study from the 55+ year record of the North American Breeding Bird Survey (BBS). The BBS was designed in the pre-GPS era for continent-scale trend analyses that do not require precise spatial information, so the exact location of each bird count is not recorded. This means that the land cover associated with a given count is also not known with precision. Using the BBS, we ran simulations to test our informative prior model and compare it to a ‘naïve’ model that assumes consistent stop spacing and a ‘true’ model with the actual land cover covariates used in the simulation. We find that the accuracy of our informative prior model approaches that of the ‘true’ model and substantially outperforms the naive model. We thus unlock untapped potential of the extensive BBS dataset for fine-scale ecological analyses. More broadly, we provide evidence that ignoring covariate uncertainty can reduce model performance, and we present a method for overcoming this challenge.

“CROSSING THE STREAMS: SEARCHING FOR LOCAL ADAPTATION BETWEEN PARASITE AND HOST” *Joshua Nelson1, Katelin Wolken-Wright1, Jennifer A.H. Koop1. 1Northern Illinois University.

The selective pressures parasites and their hosts exert on one another have the potential to drive coevolutionary processes. Geographic isolation between populations can then lead to local adaptation, wherein hosts and/or parasites adapt to localized selective pressures. In some cases, this can mean that parasites achieve greater fitness when infecting their sympatric rather than allopatric hosts. Although conventional wisdom holds this pattern as common in host-parasite systems, empirical support is mixed. Evidence shows that moderate levels of gene flow tend to increase the capacity for local adaptation by maintaining genetic diversity, however populations may become homogenized if gene flow is too great, swamping local adaptation. To effectively study this dynamic, a host-parasite system with extensive spatiotemporal spread is ideal. The invasive faucet snail (Bithynia tentaculata) was introduced to the Great Lakes of North America in the late 1800s, alongside the parasitic trematode species Cyathocotyle bushiensis and Sphaeridiotrema spp. which use snails as a first and second intermediate host. In recent decades, faucet snails and their trematode parasites have expanded their range to include the Upper Mississippi River (UMR). These trematodes use migratory waterfowl as a definitive host, leading to potentially high levels of gene flow between parasite populations; however relatively

little is known about whether local adaptation is present in this complex system. Our study used a cross-infection design to test for evidence of local adaptation in this host-parasite system. Naïve faucet snails were reared to adulthood in common garden lab conditions, originating from either UMR Navigation Pool 13 or Lake Macatawa, Michigan populations. 30 snails from each population were paired by size and exposed to ten trematode cercariae each. The cercariae originated from snails collected from UMR Navigation Pool 8, since neither Pool 13 nor Lake Macatawa populations exhibited high parasite prevalence in resampled adult populations. 14 days after exposure, snails were euthanized, dissected, and inspected for the presence of trematode infection. Our study found that trematodes successfully infected sympatric and allopatric second intermediate host snails at equal rates, showing no evidence of local adaptation among these populations. Due to the high level of dispersal these trematodes achieve through their definitive waterfowl hosts, it is likely these populations are highly genetically similar, reducing the likelihood of local adaptation occurring in this system. Future work should include trematode populations from a broader geographic range and examine snail populations with varying histories of parasite exposure as alternate drivers of local adaptation.

“COYOTE & WHITE-TAILED DEER DETECTION AND THE HUMAN SHIELD HYPOTHESIS IN THE QUAD CITIES” *Kaitlin Troha, Dr. Kevin Geedey. Upper Mississippi Center for Sustainable Communities, Augustana College.

This research aims to evaluate human-wildlife interactions in the Greater Quad Cities Area in relation to the human shield hypothesis [HSH]. The HSH posits that human presence will affect predator and prey species’ behavior in distinct ways, with predator avoidance of humans potentially “shielding” prey species in more urban or populated areas. Based on this precedent, it would be expected that higher human activity and/or built infrastructure would result in lower coyote presence and a subsequent increase in detection of white-tailed deer. Using Reconyx motion-activated cameras, data were collected seasonally between Summer 2024 and Spring 2025 in identified forest patches for roughly 14 days each season at 18 sites across the Quad Cities Area. Results supporting the HSH would be expected to show a positive correlation between White-Tailed Deer and human presence and a negative correlation between coyote and human presence. Data was analyzed first at the landscape level using USGS’s Presence software, then at site scale in Microsoft Excel, but neither showed any significant results. The HSH predicts a negative correlation between human and coyote presence and a positive trend between humans and white-tailed deer; no significant trend was shown for either species pairing. The human shield hypothesis, a relatively popular concept in urban mesopredator ecology, is not supported by multi-season findings in the Quad Cities region.

“SEASONALITY OF TROPHIC DYNAMICS OF UPPER MISSISSIPPI RIVER BACKWATERS COMPARED TO THE MAIN CHANNEL” *Caden M. Boge1, Eric A. Strauss1, 1River Studies Center, University of Wisconsin-La Crosse.

The Upper Mississippi River is a complex mosaic of habitats, including a channelized main channel, secluded backwaters, floodplain forests, expansive marshes, and numerous transitional environments. Understanding how energy flows among these habitats is critical for effective management and for monitoring disturbances such as pollution and invasive species. This research will assess energy flow through the lower trophic levels of backwater ecosystems using stable isotope analysis. Carbon and nitrogen isotope signatures from a range of organisms-including algae, zooplankton, invertebrates, and plants-will be used to identify primary carbon sources and trophic relationships. For example, an aquatic beetle that primarily consumes a specific aquatic plant is expected to exhibit a similar carbon signature as the plant, along with an elevated nitrogen signature indicative of a higher trophic position. Carbon sources of local and external origin will be reflected in the isotopic signatures of higher trophic-level organisms and therefore will indicate the source of energy driving backwater aquatic communities. Results will be compared with findings from a previous study conducted in the main channel near Winona, Minnesota, which indicated that carbon sources originated largely within the main channel rather than from upstream inputs or surrounding floodplains. Each season can bring different habitat fluctuations such as flooding or higher photosynthesis rates, and for this reason sampling will be conducted at five backwater sites during the spring, summer, and fall to capture temporal variation in backwater carbon sources.

"TRACKING RESIDUAL-YOLK ENERGY IN DORMANT HATCHLING TURTLES" *Aliza G. Salinas-Cervantes1, Tom Pham1, Samira T. Radi1, Jacob A. Wyco1, Tim J. Muir1. 1Biology Department, Augustana College.

Many animals, including hatchling painted turtles (Chrysemys picta), endure extended seasonal dormancy during which they rely solely on endogenous energy stores. Painted turtles are aphagic between hatching and a ~7-month hibernation, and are thus reliant on maternally derived energy. A large residual yolk was presumed to gradually fuel dormancy, but recent evidence suggests that the yolk may already be depleted by mid-autumn and that its energy is either used or transferred to somatic stores soon after hatching. To track the use or transfer of residual-yolk energy, we measured the mass and triglyceride content of the residual yolk, liver, and remaining carcass of hatchling turtles at 0, 2, 4, 6, 10, and 33 weeks of age. Within the first two weeks, residual yolks lost 63% and 68% of their mass and total triglycerides, respectively. By week 4, the mass and total triglycerides of the residual yolk had been further reduced to 13% of the week-0 values. Carcass and liver mass and total triglycerides generally increased in the first 6 weeks, and then gradually decreased to week 33, consistent with transfer of residual-yolk energy into those compartments followed by slow catabolism over winter. It is clear that hatchling turtles do not gradually draw down their yolk energy, but instead quickly mobilize yolk substrates for immediate use or storage elsewhere. To quantify the metabolic cost of this transfer, we performed a second experiment in which we surgically removed residual yolks from a subset of turtles upon hatching and compared their metabolic rates (VO_2) to those of turtles with intact yolks at 1, 2, 4, 6, 10, and 33 weeks of age. At 1 and 2 weeks, turtles with yolks (no-surgery and sham turtles) exhibited VO_2 rates 50 and 32% higher, respectively, than did yolkectomied

turtles, suggesting that assimilating residual yolk energy carries a large energetic cost. The difference in VO2 rates among groups disappeared by week 4, suggesting that extra energetic cost is no longer being incurred, likely because very little energy remains in the residual yolk by that time. Our data strongly suggest that residual yolk is assimilated quickly-within the first month after hatching-and costs substantial energy similar to a large postprandial specific dynamic action. Early nutrient transfer from the residual yolk may be necessary as cold-induced downregulation of yolk absorption may otherwise render residual-yolk energy inaccessible throughout winter.

"AMUR HONEYSUCKLE (LONICERA MAACKII) AND WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS ZIMMERMANN) BROWSE PRESSURE'S SYNERGISTIC INFLUENCE ON FOREST TREE DIVERSITY AND SUCCESSION" *Mallek Newkirk1, C. Kevin Geedey1, Michael Reisner1. 1Upper Mississippi Center, Augustana College.

Amur honeysuckle (Lonicera maackii) is an invasive shrub that has spread throughout the forests of the Eastern United States. L. maackii's impact on forest tree composition has been studied, mostly focusing on its impact on tree seedlings. White-tailed deer (Odocoileus virginianus Zimmermann) browsing also affects seedling diversity and forest succession, and the synergistic effects of white-tailed deer browsing and L. maackii are observable. This study aims to identify patterns in the diversity of seedlings, saplings, and mature trees in forest plots with varying L. maackii densities across the Quad City Area and to see how white-tailed deer activity associates with forest composition and L. maackii density. Using the Point-Quarter Method, densities of L. maackii and trees of different ages were recorded and assessed for the various plots. For white-tailed deer activity, motion-capture RECONYX camera traps were set up in plots where the Point-Quarter Method was performed. To assess browse pressure, twig age of seedlings and browse damage were recorded for the forest plots. There were marginally significant negative relationships between L. maackii density and seedling richness ($p>0.087$), sapling Shannon's H ($p>0.057$), and mature tree Shannon's H ($p>0.066$). L. maackii density and white-tailed deer activity were found to be independent of one another, but there was a significant negative relationship between white-tailed deer activity in the winter and spring months and sapling Shannon's equitability values ($p>0.028$). These results suggest that L. maackii at high densities is associated with lower levels of seedling, sapling, and mature tree diversity. White-tailed deer browsing also suggested a compounding effect on sapling equitability, with its combined effects with L. maackii hypothetically creating a bottleneck effect. Further research is needed to determine long-term effects of white-tailed deer browsing and its potential interaction with the effect of L. maackii on seedling recruitment to determine land management practices.

"WATER QUALITY'S IMPACT ON FISH GUT MICROBIOME IN DUBUQUE COUNTY, IA STREAMS" *Ava J. Friedrichsen1, *Olivia G. Rosenberg1, Adam R. Hoffman, PhD1. 1Department of Natural and Applied Sciences, University of Dubuque, Dubuque, IA 52001.

Water quality plays a critical role in maintaining the health and stability of freshwater ecosystems. Physical and chemical factors such as pH, organic matter, and dissolved oxygen influence not only aquatic environmental conditions but also fish physiology and stress responses. Anthropogenic activities are a primary source of water pollution, with major contributors including industrial discharge, agricultural runoff, sewage, and wastewater effluent. During the 2024 summer field season, water quality measurements were collected from eight sites in urban and rural areas of Dubuque County, Iowa. Fish samples were also collected at each site, focusing on creek chub (Semotilus atromaculatus). Four individuals were selected from each of the two sites with the greatest contrast in nitrate and Escherichia coli levels, Swiss Valley Campground and the Little Turkey River. This study investigates how degraded water quality alters the composition of the fish gut microbiome and to determine if fish health might be compromised through the growth of potentially harmful bacteria. Among the samples analyzed, our high E. coli site had a higher abundance of pathogenic bacteria, possibly due to the notably high coliform counts in the water resulting from wastewater infiltration from surrounding areas. The pathogenic bacteria cause an array of health problems, including hemorrhagic infectious diseases. Other troubling indicators we encountered were: bulging eyes, bloated abdomen, red spot disease, and several samples were found dead on site. Health concerns identified through both field observations and laboratory analyses suggest possible linkages to poor water quality and to the integrity of fish gut microbiomes and overall health.

“ONE SAMPLE, MANY SPECIES: REVEALING AQUATIC PLANT BIODIVERSITY USING EDNA” *Mars Giehtbrock1, Simone Kirkeby1, Abby Thompson1, Mason Hoffman1, Paul Jeffrey1, Danelle Larson2, Stephen Spear2, Grant Vagle1, Dhananjay Gotarkar1, Lynn Waterhouse1.1Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, St Paul, Minnesota. 2Upper Midwest Environmental Sciences Center, U. S, Geological Survey, La Crosse, Wisconsin

Environmental DNA (eDNA) metabarcoding provides an efficient and non-invasive approach for assessing aquatic plant communities in freshwater ecosystems. Traditional methods for identifying aquatic invasive plant species are more time consuming and usually focus only on the littoral zone. In this study, we developed and applied a chloroplast-targeted eDNA metabarcoding workflow to identify native and invasive aquatic plants from Minnesota lakes using a single environmental sample. Surface water samples were collected in triplicate from five sites per lake, with samples from each site filtered separately in triplicate through 0.45 Âµm mixed cellulose ester (MCE) filter membranes to capture environmental DNA (eDNA). DNA was extracted from filters using the Qiagen PowerWater DNA Isolation Kit and amplified by PCR using chloroplast gene primers selected from the literature and validated in the Waterhouse laboratory. Amplicons were sequenced in the laboratory using Oxford Nanopore Technologies (ONT) MinION. Sequencing data were processed using a custom bioinformatics workflow that included quality filtering and taxonomic classification with Kraken2. Taxonomic assignments were performed against a combined reference database consisting of publicly available chloroplast sequences from NCBI and an in-house aquatic plant metabarcoding reference

database. This approach enabled the simultaneous identification of multiple native and invasive aquatic plant taxa from mixed eDNA samples. Our results demonstrate that chloroplast-based eDNA metabarcoding, combined with ONT amplicon sequencing and curated reference databases, provides an effective and scalable framework for characterizing aquatic plant assemblages in freshwater lake ecosystems.

“LONG-TERM MONITORING PROVIDES INSIGHTS ON POPULATION STATUS OF RARE FISHES IN THE ILLINOIS WATERWAY” Alexis L. VandenBerg1, Brandon S. Harris1, Michael J. Spear1, Andrew T. Mathis1, Madison Myers1, Olivia Salrin1, Kristopher A. Maxson1, Levi E. Solomon1, Andrya L. Whitten Harris1, Eric C. Hine1, Jesse Williams1, Nicholas Barkowski2, Alexander Catalano2, James T. Lamer1. 1Illinois Natural History Survey, Prairie Research Institute, University of Illinois. 2 United States Army Corps of Engineers, Chicago, Illinois

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

“GRASS CARP TROPHIC ECOLOGY IN TWO LARGE RIVERS: IMPACT ON RESOURCE COMPETITION WITH OTHER INVASIVE CARPS IN THE ABSENCE OF AQUATIC VEGETATION”. *Olivia G. Salrin1,2, Brandon S. Harris1, Michael J. Spear1, Levi E. Solomon1, Vaskar Nepal2, and James T. Lamer1.1Illinois River Biological Station, Illinois Natural History Survey, University of Illinois Urbana-Champaign, Havana, IL 2Western Illinois University, Macomb, IL.

The trophic ecology of grass carp (Ctenopharyngodon idella) - a large-bodied invasive species in the Upper Mississippi River Basin - is largely understudied in their invasive range. This trophic relationship is intriguing where grass carp populations persist in habitats that are devoid of their preferred food source (submerged aquatic vegetation), such as sections of the Illinois and

Mississippi Rivers where it is lacking. When vegetation is scarce, studies have shown that grass carp consume items such as detritus/organic material, invertebrates, and zooplankton. However, consumption of non-plant material is mostly thought to be incidental while consuming vegetation. To differentiate trophic niches of grass carp across distinct vegetated and unvegetated habitats, we used stable isotope analysis (fish tissue) of carbon (δ13C), nitrogen (δ15N), and sulfur (δ34S) from vegetated pools of the Illinois (Starved Rock) and Mississippi rivers (Pool 19) and unvegetated pools (La Grange and Pool 26, respectively). We also assessed trophic overlap of grass carp with silver carp (Hypophthalmichthys molitrix), a prominent invasive planktivore in the basin, to determine how resource competition may vary. Tissue samples were collected from a total of 80 grass carp and 75 silver carp across both rivers from August-October, 2025. An isotopic baseline was included for pools that included both pelagic (Unionid mussels) and benthic (snails) energy sources to permit intra- and inter-river comparisons of trophic niches between species. Results of this study will disentangle the trophic ecology of grass carp across this important biotic gradient and provide information on the potential for resource competition with silver carp.

“MODELING INTER-NAVIGATION POOL MOVEMENT PROBABILITIES OF BIGHEADED CARPS” John T. Delaney1, Tyler J. Butts2, Andrea K. Fritts1, Mark W. Fritts3, Daniel K. Gibson-Reinemer1, Jessica Z. Leroy4, James P. Peirce5, Richard A. Erickson1. 1US Geological Survey - Upper Midwest Environmental Sciences Center, 2University of Minnesota, 3US Fish and Wildlife Service - La Crosse Fish and Wildlife Conservation Office, 4US Geological Survey - Central Midwest Water Sciences Center, 5University of Wisconsin - La Crosse.

Bigheaded carps (Hypophthalmichthys nobilis, H. molitrix, and their hybrids) are among the most ecologically disruptive invasive species in North American waterways, threatening native fish communities and altering ecosystem dynamics. Their ability to move between navigation pools in the Upper Mississippi River System complicates management efforts aimed at limiting their spread. Understanding the environmental and operational conditions that influence inter-pool movement is therefore critical for developing effective control strategies. This study focuses on modeling the probability of bigheaded carp movement among navigation pools of the Upper Mississippi River (Navigation Pools 4-19). We employed a machine learning framework to analyze movement patterns using a suite of predictor variables, including hydrologic conditions, gate operations, seasonal timing, and water temperature. The model was trained on empirical movement data collected from telemetry studies, allowing us to identify drivers of dispersal behavior. Movement appears to be influenced by a combination of hydrologic cues and seasonal behaviors, with certain conditions increasing the likelihood of inter-pool transitions. These findings underscore the complexity of bigheaded carp dispersal and highlight the importance of integrating environmental variability into predictive models. By identifying conditions under which movement is more likely, management agencies can prioritize monitoring and control efforts during high-risk periods, thereby improving the efficiency of invasive species mitigation strategies. Furthermore, the modeling approach presented here offers a scalable framework for

predicting movement in other invasive species contexts, supporting broader ecological management goals. Future work will refine these models by incorporating additional environmental predictors and bigheaded carp movement observations as well as predicting how inter-pool movement may change under future hydrologic conditions.

“MACROINVERTEBRATE DIVERSITY AND SEDIMENT GRAIN SIZE DISTRIBUTION OF DUCK CREEK WATERSHED, DAVENPORT IA” *Emma A. McVicker1, Dr. K Geedey1, Dr. M Reisner1, Dr. K Arkle1. 1Departments of Environmental Studies, Geology, and Geography, Augustana College.

Urban Stream Syndrome (USS) describes urban waterways characterized by flash floods, nutrient and contaminant concentrations, altered channel morphology, reduced biotic richness, and tolerant-species dominance. USS affects the highly developed Upper Mississippi watershed, observed in the Duck Creek tributaries of the Mississippi River (Davenport, IA). Macroinvertebrate communities are vulnerable to streambed disturbances during flood events, possibly due to limited mobility and sensitivity to disturbances or upstream urban land use. Flood events alter sediment grain-size distribution, which could be related to community structure and macroinvertebrate vulnerability across four Duck Creek tributaries: Goose Creek (GOS), Pheasant Creek (PHS), Silver Creek (SIL), and Stafford Creek (STF). It is hypothesized that the July 2025 flood of the Duck Creek tributaries shifted grain-size distribution and associated macroinvertebrate vulnerability and diversity indicators. Two stream transects of equal length were measured across 100 meters, and eight macroinvertebrate sampling efforts were conducted in each: two vegetated bank and six habitat samples based on relative abundance. Bedload sampling was conducted at each of the different macroinvertebrate sampling habitats, with the same number of sediment and macroinvertebrate samples. Sediment was dried, sieved, and weighed for grain-size fraction in a sample. Results show that STF community structure aligns with STF grain size distribution and that STF has high diversity metrics and strong environmental vectors. Cumulative grain size curves indicate a shift in grain sizes towards an abundance of fine-grained sediments across all four tributaries. Furthermore, STF exhibits the highest overall diversity metrics: a high median Shannon’s diversity, high evenness, and a high median richness. In contrast, GOS, PHS, and SIL display overall low diversity. SIL has the smallest range of evenness and PHS has the lowest median Shannon’s diversity. Despite this, these three sites have some high diversity metrics, with GOS having the most consistent, high evenness. These findings suggest STF possesses either a strong resilience to flood events and natural disturbances or a pre-existing presence of disturbance-tolerant species. Future research involves further macroinvertebrate studies with the Upper Mississippi Center in Summer 2026.

“AN EVALUATION OF COLLECTION METHODS FOR IMMATURE VERSUS ADULT AQUATIC INSECT ORDERS ALONG THE UPPER MISSISSIPPI RIVER” *Elizabeth Clemens1, David Ellefson1,2, Ross Vander Vorste1. 1University of Wisconsin-La Crosse River Studies Center. 2Wisconsin Department of Natural Resources.

Researchers use different methods to sample aquatic insects depending on their life stage. Adult insects can be measured through floating emergent traps, while immature insects can be measured through Hester-Dendy multi-plate samplers. Few studies have compared these methods to determine how well adult sampling represents the abundance and presence of immature insects within the same habitat. Evaluating collection methods for immature versus adult stages can provide explanations on whether there are sampling biases and clarify whether adult aquatic insects will remain in the same habitat as their immature stage. Using data collected in previous experiments conducted in Pool 8 in the Upper Mississippi River, we compared the mean abundance and presence of eight aquatic insect orders collected using sticky traps and Hester-Dendy samplers using t-tests and multivariate statistical methods. We hypothesized that the abundance of aquatic insect orders would not differ significantly between these two life stages. Preliminary results suggest similarity between immature and adult insects collected using the two methods. These results can help determine whether adult sampling methods collect a representative amount of the aquatic insects from their natural environment.

"AUDIT OF NON-DEGRADED WASTE IN THE MUNICIPAL SEWAGE AT EAU CLAIRE, WI" Libby K. Nelson, *Alicia L. Merklein, Scott K. Clark. Department of Geology and Environmental Science, University of Wisconsin-Eau Claire.

The Eau Claire, WI, wastewater treatment plant (WWTP) treats sewage from the cities of Altoona and Eau Claire. The treated water is then released into the Chippewa River, a tributary of the Mississippi River. The sewage carries non-degraded waste that is inappropriately discarded into sewage systems, and that must be removed before the WWTP can effectively clean the water and return it to the environment. As sewage travels to the WWTP, non-degrading waste can cause blockages that lead to backups in residences, and municipalities must clean out sewage lift stations to avoid clogging that would result in backups releasing sewage into the environment. Removing solid waste is costly, and the process exposes workers to hazardous materials. While WWTP personnel are qualitatively aware of the common non-degraded items in the sewage, published quantitative data on solid waste that reaches WWTPs is lacking. To better understand the composition of non-degraded solid waste in the City of Eau Claire's sewage, our research team conducted three audits of the solid waste captured by the bar screens at the Eau Claire WWTP over a five-month period. Wearing personal protective equipment, non-degraded solids that had been removed by the bar screens were sorted into six categories: 1-4) non-woven wipes in various stages of decay (intact, mostly intact, mostly shredded, and shreds entangled with hair or roots), 5) feminine hygiene products, and 6) miscellaneous items (e.g., plastic, latex, leaves, and food). The amount of waste in each category was measured by volume. Our findings show consistent trends across the three sampling dates: non-woven wipes accounted for 81.3% (±5.6%), feminine hygiene products 11.3% (±1.6%), and miscellaneous waste 7.3% (±4.2%). Non-woven wipes account for four times more waste than all other non-degraded waste combined. Given that non-woven wipes are the most abundant non-degraded waste, are widely marketed, and that findings from our companion study indicate people are unclear about how to dispose of these wipes, a public outreach campaign on proper flushing habits is being developed.

“EFFECT OF WATER TEMPERATURE ON THE GROWTH OF SCULPIN (COTTUS SPP.) IN A CONTROLLED ENVIRONMENT” *Morgan F. Schmidt1, Katelynn. Ripper1, Ross W. Vander Vorste1. 1Biology department, University of Wisconsin La Crosse.

Freshwater ecosystems are increasingly affected by rising water temperatures due to climate change. Cold-water fish species, such as slimy sculpin (Cottus cognatus), may be particularly vulnerable to even small increases in temperature because of their narrow thermal tolerances. This study examines how incremental warming affects growth and survival under controlled conditions. We hypothesized that incremental increases in temperature will reduce growth rates and potentially decrease survival as metabolic demands increase under warmer conditions. Slimy sculpin collected from the Kickapoo Watershed in Wisconsin using backpack electrofishing were placed in mesocosms at the Prairie Springs Science Center. Fish were exposed to three temperature treatments: 16°C (baseline), 18°C (moderate increase), and 22°C (elevated stress condition). All other environmental variables, including dissolved oxygen, food availability, and water quality, were be kept constant. Growth was measured through recordings of total length and body mass over a four-week period, and survival and behavior were monitored daily. Data were be analyzed using ANOVA to compare growth and survival across treatments. This study will help clarify how gradual warming may impact cold water fish populations in natural stream ecosystems.

“WATER QUALITY AND FLOOD DISTURBANCE AS DRIVERS OF MACROINVEREBRATE COMMUNITY STRUCTURE IN URBAN TRIBUTARIES” *Tara Armas1, C. Kevin Geedey1, Michael Reisner1, Alyssa Klauer1, Kelsey Arkle1. 1Upper Mississippi Center, Augustana College.

Macroinvertebrate communities are important indicators of stream health because they are species-rich, their diversity reflects the stream conditions experienced over their life cycles, and they exhibit a wide range of tolerance to pollutants. Urbanization serves as a primary driver of stream impairment, typically increasing nutrient loading, elevating temperatures, and introducing organic pollution. These stressors often cause degraded water quality and a decrease in pollution-intolerant taxa. This study examined the environmental and biological drivers of macroinvertebrate community structure across four urban Duck Creek tributaries: Goose, Pheasant, Silver, and Stafford, in the Quad Cities region, with a specific focus on community response following a major flood event in July 2025. Macroinvertebrate abundance data and averaged summer water quality parameters were analyzed to evaluate how water quality may have influenced diversity and community composition at each site, and how the Family Biotic Index (FBI), richness, evenness, and taxonomic turnover changed following the flood. Community health was assessed in R using a weighted FBI, changes in richness (ΔS), changes in evenness (ΔPIE), and taxonomic turnover. A standardized Euclidean PERMANOVA on scaled sample data revealed significant multivariate separation in water quality profiles among tributaries (Pseudo-$F = 3.94$, $p = 0.001$), confirming that each stream was environmentally

distinct. Water quality variables were highly site-specific, and post-flood community responses did not follow a consistent trend across tributaries. Goose and Stafford remained similarly tolerant before and after the flood, while Pheasant and Silver exhibited increases in pollution tolerance. Goose, Silver, and Stafford increased in evenness following the flood; however, Silver and Stafford also experienced declines in richness, suggesting the increase in evenness may have been a result of the decrease in richness. In contrast, Pheasant became richer while evenness decreased. Because Pheasant also showed increased pollution tolerance, this pattern may indicate a shift toward dominance by a few resilient taxa. Overall, these findings suggest that flood-driven disturbance does not uniformly alter stream communities. Instead, flood effects appear to interact with pre-existing environmental conditions, resulting in complex and site-dependent community responses.

EVALUATING FILTER PERFORMANCE FOR ENHANCED MACROPHYTE EDNA COLLECTION IN LENTIC SYSTEMS. *Paul Jeffrey1, Mason Hoffman1, Dhananjay Gotarkar2, Lynn Waterhouse2,3. 1Water Resources Science Program, University of Minnesota. 2Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota. 3USGS, Minnesota Cooperative Fish and Wildlife Research Unit.

Early Detection and Rapid Response (EDRR) is for preventing the establishment of new invasive aquatic macrophytes and their spread in freshwater systems. Traditional methods, such as dive and rake toss surveys, can fail to detect invasive aquatic macrophytes early in the growing season and when species are present at low abundances. Environmental DNA (eDNA) methods may provide a cost-effective solution for improving the detection of invasive macrophytes, but the dynamics of aquatic biomaterial collection are not well understood. Additionally, environmental conditions in lentic systems pose challenges to the efficient capture of macrophyte eDNA. This study aims to compare the impact of filter material and pore size on the collection of aquatic macrophyte biomaterial and provide guidance for sampling in various environments.

POSTER PRESENTATION ABSTRACTS IN ORDER OF PRESENTATION

(*Student Presenter)

Poster Session II

“INFLUENCE OF WATERSHED CHARACTERISTICS AND LAND USE ON TOTAL SUSPENDED SOLID COMPOSITION ON DUCK CREEK TRIBUTARIES” Kevin Geedey, *Kelsey A. Olsen, Michael Reisner. Upper Mississippi Center, Augustana College.

This research compares the intensity and composition (organic vs. mineral) of total suspended solids (TSS), a key water quality parameter, within the tributaries of the Duck Creek Watershed. Monitoring TSS is important for understanding a stream's water clarity, assessing impacts of reduced light on aquatic organisms, and determining if streams are carrying pollutants such as metals. All streams carry some level of TSS, however, when accelerated by human activities it can lead to irreversible changes to a water body's physical, chemical, and biological makeup. We investigated differences in the organic and mineral composition of TSS, and related those observed differences to land usage and watershed size. Water samples collected across 21 sites, 19 tributaries and 2 mainstem locations, in summer 2025, were analyzed using a multistep filtration and combustion process. Geographic Information System (GIS) methods were used to delineate watershed attributes, including watershed area and land use distribution. Results indicate a positive relationship between larger tributaries and higher percentages of mineral TSS. Additionally, agricultural and developed land uses exerted the strongest influence across the 21 sampled tributaries. These findings highlight clear relationships among TSS composition, land use, and watershed characteristics, providing a foundation for targeted watershed management strategies.

“ONE-WAY PASSAGE: A MECHANISM TO LIMIT FISH MOVEMENT AND OPTIMIZE HARVEST” *Cody Hagloch1, Abigail Roussin1, Matthew R. Acre2, Jacob Faulkner2, Alex Catalano3, Nicholas Barkowski3, Marybeth Brey2, P. Ryan Jackson2, James Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, 2United States Geological Survey, 3United States Army Corps of Engineers.

Invasive Bighead Carp (Hypophthalmichthys nobilis) and Silver Carp (H. molitrix) are widespread throughout the Mississippi River Basin where they have negative ecological impacts at high densities. Current management relies on removal with gill nets and commercial seines, which exploit carp aggregation behavior in backwaters. Although effective, identifying when to best harvest large aggregates of carp can be difficult. To increase efficiency of harvest, a need exists to passively congregate and confine invasive carp into areas where mass harvest can occur at the convenience of fishers. Therefore, we are investigating the use of one-way passage structures that allow fish to enter but prevent escape, concentrating carp in targeted areas (e.g.

river backwaters). Our objectives are: (1) evaluate fish interaction and movement through one-way passages, (2) determine retention of fish with one-way passage designs, and (3) evaluate driving factors that could be shaping species movement and community composition to these backwaters. We will evaluate and optimize the design's effectiveness in controlled ponds with 2D positioning of fish before installing at three backwater locations in the Illinois River where invasive carp congregate at various times of the year. This passive approach could sequester fish in backwater areas, thereby enhancing harvest efficiency, reducing carp densities at invasion fronts, and restricting access to spawning habitats, ultimately mitigating ecological impacts.

"CHANGES IN ZOOPLANKTON COMMUNITIES IN BACKWATER LAKES OF THE UPPER MISSISSIPPI RIVER DURING THE WINTER SEASON" *Cody Vlasaty1,2, Ben Patschull1,2,3, Ross Vander Vorste1,2. 1Biology Department, University of Wisconsin-La Crosse, 2River Studies Center, 3: Wisconsin Department of Natural Resources.

Zooplankton play a crucial role in aquatic ecosystems, contributing to environmental regulation through nutrient recycling and serving as an important foundation in the trophic system. Previous research has been conducted on zooplankton dynamics, but most studies are completed during the summer. Our goal is to determine if the communities of zooplankton are significantly different at given locations during the winter season. We collected zooplankton (n= 80 samples) from four backwater locations on Pools 7 and 8 of the Upper Mississippi River during winter 2024. In the laboratory, species richness and abundance of the communities were identified and counted. A count of 1,000 zooplankton was recorded for each sample, with exceptions to samples that did not reach this goal, in which case the entire sample was used. Several environmental variables were also recorded at each location (Site depth, water temperature, dissolved oxygen, conductivity) to identify correlations between the variables and the zooplankton community structure. Preliminary results show a higher average abundance in the Pettibone location, followed closely by Lawrence and Stoddard. The Airport location, however, showed the least amount of average abundance. Cyclopoid copepods and nauplii species made up the majority of total abundance. In samples where these two specific species counts were low, the chydorus species seemed to thrive. These results establish a better understanding of zooplankton structure exclusively in the winter season and provide a baseline for later research. Future work could explore the connection between zooplankton abundance/species and fish abundance/species.

"INFLUENCE OF DISPERSAL LIMITATION AND ENVIRONMENTAL FACTORS ON AQUATIC INVERTEBRATE COMMUNITIES IN THE UPPER MISSISSIPPI RIVER" *David Ellefson1,2, Patrick Kelly3, Cadie Olson3, David Schumann1,2, Ross Vander Vorste1,2. 1University of Wisconsin-La Crosse, Department of Biology. 2UWL River Studies Center. 3Wisconsin Department of Natural Resources.

The Upper Mississippi River System includes a dynamic network of side channels and floodplains that experience disturbances, such as floods and droughts. Recovery of disturbed

river habitats is often facilitated by the dispersal of aquatic invertebrates, which provide essential ecosystem functions and support aquatic communities after disturbances. Limitations to invertebrate dispersal may have an important role in determining diversity and abundance in floodplain communities. When invertebrate dispersal is limited, the recovery of entire aquatic communities may be comparatively slower than when dispersal is not limited. Aquatic invertebrates may be influenced by the distance of travel, mode of dispersal, and local environmental conditions. Therefore, I hypothesize that species richness and abundance of aquatic and aerial dispersers will show patterns related to flow path and Euclidean distance, respectively. If aquatic invertebrates are not dispersal limited, I predict to see no significant patterns between richness or abundance and distance, but rather correlation with local environmental factors (e.g., dissolved oxygen, temperature, conductivity, pH). In summer 2026, I will sample invertebrate communities across a gradient of distance categories and determine the richness and abundance of invertebrates. Furthermore, I will collect supplemental data related to water quality and sediment to understand how biotic and abiotic factors influence floodplain invertebrate communities. Findings may further our understanding of aquatic invertebrate dispersal and its role in facilitating habitat recovery in large river systems.

"BUMBLEBEE ASSOCIATIONS WITH FLOWERS IN NORTHERN DUBUQUE COUNTY"
*Leah Balsbaugh1, David E. Koch1. 1Department of Natural and Applied Sciences, University of Dubuque.

Bumble bees (Bombus spp.) are recognized as one of the most effective global pollinators, both in natural and agricultural environments. There has been a drastic decline in bumble bee populations in recent decades, believed to be caused by habitat destruction and fragmentation. As generalist pollinators, bumble bees are known to visit a broad range of floral species, but the specific associations between bumble bees and the plants they pollinate are shaped by various ecological factors, including flower availability, bee foraging behavior, and habitat characteristics. This study looks for possible plant preferences among bumble bee species documented at the University of Dubuque's Wolter Woods & Prairies located in Sherrill, Iowa. My hypotheses are that bumble bees will display certain plant preferences upon investigation, and that bumble bee activity will be highest when the highest density of flowers are blooming. Surveys were conducted surveys along established 100-m transects in nine restored prairies on the WW&P property. Flowering plant abundance was estimated using the Daubenmire method, while simultaneously recording bumble bee species and the plant species they visited. Wild bergamot (Monarda fistulosa) was the most frequently visited flowering species by bees throughout the survey period. However, a Poisson generalized linear model indicated that bergamot presence was not a significant predictor of bee abundance ($\beta = -0.051 \pm 0.082$ SE, $z = -0.616$, $p = 0.538$). Similarly, a Poisson generalized linear mixed-effects model including date as a random intercept found no evidence that bumble bees preferentially visited wild bergamot relative to other flowering species ($\beta = 0.065 \pm 0.108$ SE, $p = 0.546$). Planned multivariate analyses examining overall flower abundance and bee activity are expected to further test the hypothesis that bumble bee activity peaks during periods of highest floral density. Although

preliminary results do not support this hypothesis, these findings contribute to our understanding of bumble bee foraging patterns in restored Midwestern prairies.

“COMPARING LEPIDOPTERAN DIVERSITY BETWEEN POLLINATOR AND NON-POLLINATOR PRAIRIES IN NORTHEASTERN IOWA” *Taryn A. Richey1, Paige M. Manning1, Olivia G. Rosenberg1, Christopher M. Chase1, Paige A. Peterson1, Jessicca M. Dix1, and Gerald L. Zuercher1. 1Wolter Woods and Prairies, University of Dubuque.

Butterflies and moths make up the Order Lepidoptera (Class Insecta). There are approximately 180,000 described Lepidopteran species making this the second most speciose insect order and constituting a significant percentage of all living animals. Estimated numbers of Lepidopterans range between 300,000 and 500,000 species. Lepidopteran diversity and abundance are crucial indicators of ecosystem health. Even small changes within an ecosystem can dramatically change their diversity and abundance. Research on Lepidopterans is lacking in many areas of the world, including northeastern Iowa. A Lepidopteran survey was conducted at the University of Dubuque’s Wolter Woods and Prairies in northeastern Iowa along the Mississippi River to assess diversity and abundance of species. The primary goal of the survey was to better understand the impact of management strategies for restored prairie landscapes on pollinators. A capture and release method using transects in restored prairies was used to document the butterflies and moths. Captured specimens were identified in the field and pictures were uploaded to iNaturalist for identification confirmation. A total of 624 Lepidopterans were captured, and 73 species were identified at the Wolter Woods and Prairies. The most common species captured and identified were the Northern and Pearl Crescents complex (Phyciodes cocyta/Phyciodes tharos), the Eastern tailed-blue (Cupido comyntas), and the Confused Eusarca (Eusarca confusaria). These species were the most captured species in each restored prairie unit with Crescents being most common in seven of the ten surveyed prairies, Eastern tailed blue being most common in two of ten prairies, and the Confused Eusarca being most common in the remaining prairie. While species richness ranged from 13 to 27 unique species per prairie, most prairies were similar. The two prairies with the highest butterfly biodiversity were Spartan and Dutch with 27 and 26 species respectively. These two prairies were seeded specifically to benefit pollinators and their management plan aims for maximizing native wildflowers. Other prairies on the property were not initially seeded for maximum pollinator benefits. Comparisons of pollinator prairies versus non-pollinator prairies indicate differences between them in both Shannon-Wiener and Simpson diversity indices. The Shannon-Wiener Index for pollinator prairies was 2.80405 compared to 2.39417 for non-pollinator prairies while the Simpson Diversity Index for pollinator prairies was 0.94898 compared to 0.86195 for non-pollinator prairies. These findings establish a critical biodiversity baseline for Lepidopterans at Wolter Woods and Prairies and confirm the importance of the site as valuable habitat for Lepidopteran conservation in northeastern Iowa.

“CREATING A BIODIVERSITY REFERENCE COLLECTION FOR THE UNIVERSITY OF DUBUQUE'S WOLTER WOODS AND PRAIRIES” *Tatum R. Levedahl1, David E. Koch1,

Jessicca M. Dix1, Paige A. Peterson1, and Gerald L. Zuercher1. 1Wolter Woods and Prairies, University of Dubuque.

The University of Dubuque acquired the Wolter Woods and Prairies in late 2020. An additional 25-acres was added in 2023 and the property now consists of ~125-acres of forest and ~20-acres of restored prairies. Property management priorities are promoting native fauna and flora while removing invasive species, documenting biodiversity of the site, providing a place for student engagement with the natural world, and supporting research efforts. In 2025, the first annual Franzen Biodiversity Internship created an opportunity for student-led inventories of fauna, flora, and fungi at the site. This internship is tasked with: 1) continuing collections for an Herbarium, 2) initiating reference collections for Fungi and Arthropods, and 3) acoustically documenting avifauna. Priorities for the Herbarium collection included targeted specimens currently in bloom or specifically sought life stages (e.g., vegetative, pre-budding). Additionally, specific regions of the property were surveyed to enhance detection of new specimens. During 2025, 76 new species, 39 new Genera, and 2 new Families were added to the Herbarium. The collection currently holds 298 species, 213 Genera, and 76 Families. Fungal surveys were prioritized immediately after rain events in sections of the property that were more recently acquired. The collection holds 84 specimens representing 10 Classes, 17 Orders, and 38 Families. Multiple specimens still need further identification. Arthropod surveys occurred predominantly in prairie remnants, with specimens also acquired opportunistically during other activities. While no specific taxa were targeted, Lepidopterans were avoided so as not to impact other survey activities occurring at the property. The collection holds 94 arthropod specimens representing five Classes with most (n = 80) belonging to Insecta. Insects represent 12 Orders and 18 Families and multiple specimens still need further classification. Birds were surveyed between mid-June and mid-July through point counts and with acoustic recordings. Collectively, 57 species of birds were identified representing the mid-summer resident community. Reference collections documenting biodiversity are valuable by establishing a reference baseline, serving as a response data from management actions, and providing resources for classes. Documenting biogeographical and ecological patterns will uncover connections between specimens and their habitat requirements that will be useful for future land management planning. Biodiversity reference collections at Wolter Woods and Prairies will be expanded for the foreseeable future.

“MOVEMENT BEHAVIORS AND SURVIVAL OF BROWN TROUT IN SOUTHWESTERN WISCONSIN” *Kyle T. Kamm1, David A. Schumann1, Jason G. Freund1. 1 University of Wisconsin-La Crosse.

Driftless coldwater streams support abundant Brown Trout (Salmo trutta) fisheries that are highly pressured and economically important to the region. Knowledge of population parameters (e.g., density, growth rates, age structure, survival) and movement behaviors is beneficial to fisheries managers for setting information-based harvest regulations and assessing recreational fishery status. I will use Wisconsin DNR mark-recapture surveys at eight streams comprising 34 stream reaches sampled for five consecutive years. I will estimate annual population parameters (e.g., sizes, recruitment, growth rates, apparent survival, and inter-stream movements) and

identify relationships between these parameters and stream environmental characteristics and harvest regulations. Open-system multi-state Cormack-Jolly-Seber models will predict population dynamic parameters. By estimating Brown Trout population demographics across Driftless Area streams, I will generalize which stream characteristics, population dynamics, and bag limits influence populations and individual movements within a watershed. My results will enable fisheries managers to predict population parameters from stream characteristics, furthering understanding of Brown Trout movement and informing sustainable size and bag limit regulations.

"SOIL COMPOSITION AND MICROBIAL COMMUNITY SHIFTS DURING EARLY-STAGE PRAIRIE RECONSTRUCTION FROM AGRICULTURAL LAND USE IN DUBUQUE COUNTY, IA" Tatum Levendahl1,*Emily Johnson1, Adam Kleinschmit1,1Department of Natural and Applied Sciences, University of Dubuque, Dubuque, IA.

In prairie ecosystems, soil composition is a key factor that influences plant productivity, nutrient cycling, and overall stability. Long term agricultural land use can degrade soil quality by reducing nutrient availability and altering microbial communities. As a result, interest in prairie reconstruction has increased as a restoration strategy. Although reconstructed prairies may increase plant diversity, they may not replicate the biological complexity of local remnant prairie soils, making it necessary to evaluate whether soil microbial communities recover from agricultural use. The purpose of this study was to compare chemical characteristics and microbial community structure of soils between a reconstructed prairie undergoing early-stage restoration and an adjacent, actively row-cropped agricultural site, with samples collected from both sites across years 1 and 2 in Dubuque County, Iowa. We hypothesized that there would be a significant contrast between the two sites due to the differences in land use and that these differences would shift between years 1 and 2 as prairie restoration progressed. To test this, soil cores were collected from each site, and DNA and chemical analyses were performed to compare across our study sites. 16S rRNA amplicon sequencing was performed to determine the microbial taxa present and their abundance in the samples. Analyses revealed significant differences in microbial communities related to land use. Cornfield soils were dominated by disturbance-adapted, fertilizer-associated taxa such as Nitrosospira and Udaeobacter. These taxa have been demonstrated to be associated with previous research suggesting rapid nitrification, accelerated decomposition, and reduced plant-microbe symbiosis in agricultural areas. In contrast, reconstructed prairie soils established greater representation of taxa such as Nitrososphaera, Bacillus, and Lysinibacillus. These taxa are associated with slower nutrient turnover, enhanced organic matter stability, and oligotrophic conditions. Preliminary chemical analysis indicates differences between the agricultural site and the reconstructed prairie site in just two years. The agricultural site shows higher concentrations of nitrates and phosphates, as well as a slightly acidic soil pH. This data may suggest overuse in the application of fertilizers or inhibited nutrient uptake, which corresponds with our findings in our microbial analysis. Early conclusions can be made that prairie reconstruction from row-cropped land is effective, as shown

by significant soil microbial community shifts and changes in soil chemistry. Further data collection is planned to continue to monitor any changes taking place between the two sites of interest.

"A COMPARISON OF WATER QUALITY PARAMETERS IN LA GRANGE REACH BACKWATERS OF THE ILLINOIS RIVER" Rachel Prostko1, Sara Sawicki1, Madison Roberts1, James Lamer1. 1Illinois Natural History Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign.

While we have a strong understanding of water quality trends of the La Grange Reach backwaters of the Illinois River in the aggregate from the Long-Term Resource Monitoring water quality component of the Upper Mississippi River Restoration Program, there is potentially significant variation between different backwater sites, which could lead to differences in the makeup of the communities using them. This is a preliminary look at how distinct backwaters in the La Grange Reach compare between water quality parameters, to indicate which backwaters may be better quality habitat for organisms such as fish, to guide future explorations. Linear mixed effects models were used to examine the effect on different water quality parameters from the individual backwaters and river stage (based on the US Army Corps' of Engineers river gauge in Havana, IL), using season and year as random effects. The backwaters examined were Meyer's Ditch, Quiver, Matanzas, Chain and Stewart Lakes, Treadway, and Lilly Lake. The parameters examined were dissolved oxygen concentration (as it is assumed organisms need a concentration of at least 5 mg/L (Houser, 2005)), total suspended solids (as water clarity can affect the ability of visual predators to hunt prey), chlorophyll-α concentration (as an indicator of primary productivity), depth, temperature, and velocity. River stage had a significant, negative effect on dissolved oxygen concentration and on total suspended solids. It had a large positive effect on velocity. Matanzas was the only location with a significant, negative effect on velocity. Matanzas rarely has noticeable flow, being often unconnected to the main channel. It was the only backwater with a significant, positive effect on chlorophyll -α concentration. Treadway and Quiver had large significant, positive effects on velocity amongst backwaters, generally having higher flow rates than other locations. Quiver had the largest negative impact on total suspended solids concentration. None of the backwaters were generally below the assumed necessary minimum dissolved oxygen concentration. Maximum depth is significantly affected by all backwaters and river stage, as expected since the bathymetry of the backwaters and water level would be predominant factors for water depth. Temperature, at the surface and bottom, was almost entirely determined by year and season. While backwater locations had significant and contrasting effects on temperature, the location impact rarely resulted in significant differences in temperature. This information will be useful for more species-specific targeted studies to see if the predicted optimal backwater has actual variation in its biotic communities.

“DEER ACTIVITY AND THE IMPACTS ON LOCAL FOREST COMMUNITIES” *Christian Mammoser1, Michael Reisner1. 1Augustana College Upper Mississippi Center.

White-tailed deer (Odocoileus virginianus) populations have been steadily increasing since the early to mid-1900s, recovering from historically low levels but now reaching concerning densities in many regions of North America. Overabundant deer can cause forest degradation through overbrowsing, reduced sapling and seedling growth, and long-term impacts on forest regeneration. The consequences of overbrowsing may not be visible for decades due to the time-lag of forest growth. At the same time, fire suppression is increasingly giving a competitive advantage to shade tolerant or avoiding tree species, while disturbances related to urbanization are giving advantages to another suite of species. This study hypothesized that forest plots with higher deer browsing would exhibit greater signs of browsing impact, which in turn would impact tree community composition and diversity. We surveyed nine forest plots along an urbanization gradient. Camera traps were used to measure total and winter/spring deer activity. Point quarter method was used to assess the composition of the seedling (<2.5cm DBH), sapling (2.5 to 9.99cm DBH), mature (10-39.99cm DBH), and legacy (>40cm DBH) tree communities. The proportion of terminal buds browsed and twig age were assessed using the methods described by Waller 2025. Data analyzed in SPSS Cluster analysis revealed two groups of forest plots-one with extremely high levels of deer browsing and another with more moderate, but still significant browsing levels. High browsing level sites were characterized by higher total and winter-spring deer activity (ANOVA, $F = 10.6$, $P = 0.007$ and $F = 4.7$, $P = 0.048$), greater percentage of terminal buds browsed (ANOVA, $F = 11.4$, $P = 0.006$) and younger average twig age (ANOVA, $F = 9.5.6$, $P = 0.01$) compared to other sites. The browsing measures were consistent with one another with the exception of the proportion of terminal buds browsed. Deer browsing levels were associated with lower richness and diversity in the seedling and sapling communities, but these relationships were relatively weak. There was no relationship between deer browsing levels and the diversity of the mature and legacy tree communities. Our findings are consistent with the findings of other studies. Our findings are confounded by the likely influence of increasing competition for shade and increasing disturbances associated with urban development. These findings highlight importance of browsing on the diversity of the seedling and sapling tree communities, which in turn will have long-term implications for forest succession in the coming decades.

“AN ASSESSMENT OF WATER QUALITY AND STORMWATER INFRASTRUCTURE: DAVENPORT, IA” *Joren J. Weller-VanHollebeke, Augustana College

Urban streams face a mix of pollutants and hydrologic changes, exacerbated by impervious surfaces, land use, and stream connectivity. One understudied aspect of these landscapes are untreated stormwater outfalls. In this study, outfall water quality was measured at the 36 stormwater outfalls with measurable flow from a total of 85 outfalls visited under dry conditions (>10 days since last precipitation), across 5 urban watersheds within Duck Creek, a tributary of the Mississippi River. Outfalls were sampled on 6 dates from June 17th to July 24th, 2025. Parameters measured on all dates included Total Dissolved Solids (TDS) and Percent Saturation

of Dissolved Oxygen (%DO), Total Suspended Solids, and Biological Oxygen Demand. On the dates 6/26/25, 7/10/25, and 7/24/25, a suite of additional parameters was measured, including E. coli, chloride, nitrate, phosphate, and ammonia. Hierarchical cluster analysis revealed 4 outfall groups based on shared water quality characteristics. Temperature (ANOVA, $F = 6.1$, $P = 0.007$) , pH ($F = 3.7$, $P = 0.038$, dissolved oxygen ($F = 3.2$, $P = 0.057$), nitrates ($F = 24.4$, $P = 0.001$), ammonia ($F = 3.7$, $P = 0.037$), phosphates ($F = 4.6$, $P = 0.020$), chloride ($F = 25.4$, $P = 0.001$), and TDS ($F = 30.5$, $P = 0.001$), and BOD ($F = 4.1$, $P = 0.028$) differed across the four groups. Total fecal coliforms, total E. coli, and TSS did not differ ($P > 0.05$). Group 1 outfalls were characterized by higher phosphate and ammonia levels and high BOD and lower dissolved oxygen levels. Group 2 outfalls were characterized by consistently lower levels of all pollutants and high dissolved oxygen levels. Group 3 outfalls were characterized by higher chloride and TDS levels, while Group 4 outfalls were characterized by slightly elevated nutrient levels and lower dissolved oxygen levels. The four clusters were not significantly related to watershed, suggesting water quality is diverse and site-specific. The lack of a simple watershed scale explanation for outflow quality suggests that local processes may play a large role in outflow quality. A one-size-fits-all management approach may not be viable for these highly diverse and dynamic environments, with site-specific adaptive strategies likely providing a better fit solution for management decisions to come. New methods of manual delineation and catchment area estimation, coupled with on the ground observation may further improve our understanding of stormwater dynamics in urbanized environments.

“HOW URBANIZATION AFFECTS COYOTE PRESENCE IN THE QUAD CITIES AREA”
*Isaac Loyo1, Kevin Geedey2, 1Augustana College

Urbanization continues to transform natural landscapes, leading to profound changes in animal behavior, movement ecology, and population dynamics. One important species heavily influenced by urbanization in the Quad Cities is Coyotes. This apex predator plays a substantial role in the stability of urban ecosystems in the Mississippi River basin. As human infrastructure proliferates, coyotes frequently modify their temporal activity patterns. These ecological disruptions compel both predators and prey to adapt in ways that frequently destabilize natural trophic interactions and species distributions. The present study examines how urbanization has affected coyote presence in and around the Quad Cities area. Sixteen forest plots were chosen for monitoring with camera traps beginning in the summer of 2024. Each trap was deployed for fourteen days every season to observe coyote occupancy and activity. Using PRESENCE (a statistical occupancy software), we ran several single-species, multi-season occupancy models that first estimated site occupancy during the initial season and then used the following seasonal data to estimate colonization and extinction probabilities. Models compared nine covariates assessed at a radius equal to the coyotes’ home range, including structure density, tree density, cropland, and bare land within the coyotes’ range, with presence data to identify key variables influencing coyote colonization and extinction events. Covariates of perimeter and area were derived from forest plot size and shape, not corrected for coyote home range. Only some covariates appeared in the best-fitting models. The model with the lowest AIC value indicated

that coyotes more frequently colonize and less frequently go extinct in forest plots with larger areas (forest area in ha). Coyotes show no clear preference regarding the degree of surrounding urbanization. The amount of bare and crop land did correlate positively with coyote colonization; however, the number of built structures did not have the same effect. These findings suggest that coyotes may actively colonize forest plots with more space and potentially fewer human encounters.

“SURVEY OF EAU CLAIRE COUNTY RESIDENTS' HABITS AND PERSPECTIVES ON FLUSHING NON-DEGRADING WASTE PRODUCTS” *Alicia L. Merklein, Libby K. Nelson, Scott K. Clark. University of Wisconsin-Eau Claire.

Flushing of non-degrading waste (e.g., non-woven wipes and feminine hygiene products) can lead to costly blockages in municipal sewage systems and on-site septic systems. This study sought to gain insights into Eau Claire County, Wisconsin, residents’ perspectives on and habits of flushing non-degrading waste. Our hypothesis was that people whose sanitary sewage is treated via an on-site septic system would be more informed and careful about what they flush. To test this hypothesis, we distributed 444 surveys over a two-month period. Initially, we distributed doorknob hangers with a QR code link to the survey. Response rates using this method were 26% for residences with septic systems but only 8% for residences whose sewage is treated at the wastewater treatment plant (WWTP). To improve the response rate for WWTP residences, we began knocking on doors and discussing the survey with residents. This approach resulted in response rates of 47% for residents in both targeted populations. In total, we received survey responses from 43 septic and 43 municipal residences, with total response rates of 28% and 15%, respectively. Survey results showed residents whose sewage flows to the WWTP were more likely to respond that non-flushable wipes and feminine hygiene products should not be flushed (by 19% and 9%, respectively). Concurrently, residents with septic systems reported experiencing clogs at a significantly higher rate (40% of responses) than municipal participants (7%). We contacted three local septic service companies who all stated that most septic system blockages are caused by improper flushing of nonwoven wet wipes with some blockages being caused by feminine hygiene products. High survey response rates from residents with septic systems suggest they are more aware of the importance of knowing what shouldn’t be flushed. However, an analysis of survey results combined with insights from local septic service companies suggests that septic system residents are not more aware. Inversely, residents whose houses are connected to the municipal sewer system were less likely to respond to a survey on flushing habits, but their response showed a better understanding of what products are not flushable. This study along with our audit of solid waste screened at the Eau Claire Municipal WWTP will be used to develop an outreach program to inform residents with on-site septic systems and municipal sewer systems on the importance of proper flushing habits.

“SPATIOTEMPORAL PATTERNS OF DISSOLVED ORGANIC CARBON IN THE UPPER MISSISSIPPI RIVER POOL 8” *Vera P. Hrdlicka1, Eric Strauss1. 1University of Wisconsin - La Crosse Department of Biology, River Studies Center.

Large river systems link terrestrial and aquatic environments and are responsible for transporting a wide range of materials, including dissolved organic carbon (DOC). DOC is a basal resource for aquatic ecosystems and an important component of the global carbon cycle. Microbial respiration of DOC to greenhouse gases (e.g., carbon dioxide and methane) also contributes to the rising levels in the atmosphere. However, spatial and temporal variability of quantity, quality, and microbial use of DOC in the Upper Mississippi River (UMR) is poorly understood. The origin of carbon, autochthonous vs. allochthonous, generally determines preferential DOC use. Over time, the composition and quality of DOC can shift based on microbial preferences for the different types, as more labile DOC (generally autochthonous) is consumed, and recalcitrant carbon is left behind. We are addressing this knowledge gap by providing a comprehensive assessment of DOC concentrations and biodegradability across seasons and spatial locations in UMR Navigation Pool 8 system. Preliminary sampling occurred in August and October 2025 at eight main channel sites, six backwater sites and four Black River sites to compare DOC concentration and biodegradability spatially and temporally. DOC concentrations were analyzed using a Shimadzu total organic carbon analyzer and optical properties related to DOC quality were analyzed using UV-visible light spectroscopy and fluorescence (SUVA254, E2:E3 CDOM). In addition, biodegradability was assessed with 21-day laboratory incubations. The preliminary results suggest that DOC concentration patterns vary temporally more than spatially. DOC concentrations were higher in August samples compared to both October sample periods. Little variation was found between backwater and main channel sites for DOC concentration, amongst all sample periods. Biodegradability assays suggest little change in the loss of DOC over time. Further research will be done in 2026 to further discover spatial and temporal patterns of DOC in the UMR Pool 8.

“COMPARISON OF LARVAL FISH SPECIES AND GEAR TYPES IN TRIBUTARIES OF LOWER POOL 19 IN THE UPPER MISSISSIPPI RIVER” Samantha J. Murray1, Esther E. Atutey1, Rafael Davila Jr.1, Emily A. Szott1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

The complex ecosystem of the Mississippi River provides habitat to many species, including well-documented injurious species such as invasive Silver Carp (Hypophthalmichthys moltrix), Bighead Carp (Hypophthalmichthys nobilis), and Grass Carp (Ctenopharyngodon idella). Early detection in presence and absence of the early life stages of these invasive fish is important for managing their spread from established zones. This study compared the abundance of larval and young-of-year native and invasive fish species captured using multiple gear types in small tributaries of lower Pool 19 in the Upper Mississippi River in 2024-2025. Main objectives included 1) determine light trap larval abundance per creek and per year, 2) compare the percentage of invasive carp captured per sample to understand the potential magnitude of invasive carp retention, and 3) stage invasive carp to understand the diversity of life stages and

abundance in each gear type. For this preliminary study, three sampling methods were used: light traps in 2024 and 2025; cast and seine nets in 2025. Fish collection occurred in 3 creeks in 2024, and 5 creeks in 2025 from May-October in both years. Fish captured included 48,071 fish from 14 families in 2024 (n=858 larval, 1 juvenile invasive carp), and 18,786 fish from 15 families in 2025 (n=10,882 larval, 540 juvenile invasive carp). Larval abundance is expected to peak in summer in both years, with consistency across years in percentage of larval fish caught in certain families. Larval and earlier life stage fish are expected to be captured in light traps, with the highest occurrence of young-of-year, juvenile fish captured in seine nets. This study aimed to 1) communicate the presence and potential magnitude of invasive carp retention, and 2) show the need to implement and continually evaluate additional gears to capture a wider range of early life stages of these injurious species in the Upper Mississippi River.

"LARVAL FISH ABUNDANCE ACROSS TIME AND HYDROLOGICAL CONDITIONS IN THREE TRIBUTARIES OF LOWER POOL 19 IN THE UPPER MISSISSIPPI RIVER" Rafael Davila Jr.1, Emily A. Szott1, James T. Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

Large river floodplain systems are experiencing ecological changes from anthropogenic sources, biological invasions and extreme climatic events. In the Upper Mississippi River (UMR), the establishment of invasive carp (Silver Carp (Hypopthalmichtys moltrix), Bighead Carp (H. nobilis), and Grass Carp (Ctenopharyngodon idella)) and extreme precipitation events have added additional challenges to manage the expansion of invasive carp from the intensive management zone (IMZ). Conducting larval surveys can provide managers with early detection of invasive carp presence when deployed during the conditions needed for a spawning event. To better identify and understand these sampling requisites, the focus of this study was to 1) identify UMR hydrological conditions across time related to invasive carp spawning events, and 2) determine if native taxa reproduction responded to the same conditions. We used larval light trap abundance data and spawning scar absence/presence on adult invasive carp from 2020-2025 and compared it against environmental variables: water temperature, river discharge, days the river was above flood stage, and river flashiness (Richards-Baker flashiness index). We predicted that overall larval catch would increase with peak yearly tributary discharge and that larval abundance would decrease as main stem discharge increased. We also predicted that larval invasive carp capture would be higher in years with high river flashiness than in less flashier years. The results of this study can provide managers with a timeline of when to deploy larval detection gears effectively to efficiently capture large invasive carp spawns and monitor native larval spawning events based on observed hydrological conditions.

"SEX-SPECIFIC TARGETING OF BIGHEADED CARP DURING HARVEST IN POOLS 14-19 OF THE UPPER MISSISSIPPI RIVER" Emily A. Szott1, Tressa R. Rogers1, Rafael Davila Jr.1, James T. Lamer1. 1Illinois River Biological Station, Illinois Natural History Survey, Prairie Research Institute, University of Illinois Urbana-Champaign.

Non-native Silver Carp (Hypophthalmichthys molotrix) and Bighead Carp (Hypophthalmichthys nobilis), collectively bigheaded carp, are problematic species in the Upper Mississippi River (UMR), in part due to their high reproductive and dispersal capabilities. Effective targeting of gravid, fecund females capable of producing upwards of 5 million eggs in a single spawn could improve population management strategies for these fish. In Pools 14-19 of the UMR, potential sex-specific bigheaded carp staging and spawning location behaviors have been observed, but validation and further identification of these behaviors is needed to efficiently inform sex-specific harvest. This study aimed to combine telemetry data with field-collected net set data and fish sex data to improve seasonal targeting of sexually mature bigheaded carp. Main objectives included 1) compare sex of bigheaded carp collected in two different gill net set types (high-float drift sets, anchored pound sets) in 2025, 2) identify sex of bigheaded carp at different locations seasonally in Pools 14-19 throughout 2025 from harvest and telemetry data, 3) compare sex ratio of captured bigheaded carp to that of telemetry data to determine effectiveness of nets set in those locations, and 4) analyze net effectiveness through ratio of bycatch to bigheaded carp per net set type. High-floating drift gill nets are expected to target males in the high flow main channel during spawning season, and anchored gill nets are expected to target females in backwaters between spawning events. Knowing which gears are most effective, and when and where male and female bigheaded carp are most vulnerable to capture, can help inform adaptive management strategies for their removal.

“INVESTIGATING THE EFFECTS OF RECONSTITUTED WATER ON SLIMY SCULPIN (COTTUS COGNATUS) GROWTH AND SURVIVAL” *Katelynn M. Ripper1, Morgan F. Schmidt1, Ross Vander Vorste1. 1UWL River Studies Center, University of Wisconsin-La Crosse.

Sentinel benthic vertebrate species, including slimy sculpin (Cottus cognatus), can be used in laboratory studies to test the effects of environmental changes on growth and survival of organisms. However, using aquatic species in laboratory settings requires special protocols to ensure normal growth and behavior compared to natural settings. Slimy sculpin growth and survival may be different in mesocosms using municipal water as opposed to reconstituted water in which chemicals can be adjusted to match the conditions of where the organisms were collected. We used laboratory mesocosms (n=18) to study the effects of reconstituted water treatments on slimy sculpin (n= 3 fish per mesocosm) growth and survival. A hard reconstituted water solution (pH>8.0), prepared according to EPA protocols, was introduced into half of the tanks while the remaining tanks received dechlorinated municipal water. Slimy sculpin length and weight measurements were recorded at the start of the experiment and end of the four-week study. Identifying which water type most effectively promotes sculpin growth and survival provides valuable insight into optimizing their laboratory husbandry protocols to support their continued use as a sentinel species for detecting ecological change.