PROCEEDINGS OF THE

MISSISSIPPI RIVER RESEARCH CONSORTIUM

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PROCEEDINGS OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM

VOLUME 33

MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

33RD ANNUAL MEETING
26-27 APRIL 2001
RADISSON HOTEL
LA CROSSE, WISCONSIN

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PLATFORM PROGRAM
HOTEL BALLROOM B
THURSDAY, APRIL 26, 2001

8:00- 8:10 AM Welcome and Announcements
Yao Yin, MRRC President

SESSION I - BIRDS
(Moderator: Eileen Kirsch)

8:10- 8:30 AM POPULATION GROWTH AS AN INDICATOR OF FOREST HABITAT QUALITY FOR SONGBIRD SPECIES NESTING IN THE DRIFTLESS AREA ECOREGION. **Melinda G. Knutson**[1], Larkin A. Powell[2], Gerald J. Niemi[3], Mary Hammer-Friberg[4], Randy K. Hines[1], Colin M. Sveum[1]. [1]USGS Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 [2]University of Dubuque, Dubuque, IA 52001 [3]Natural Resources Research Institute and Department of Biology, University of Minnesota, Duluth, MN 55811 [4]University of Minnesota, Graduate Program in Conservation Biology, St. Paul, MN 55108.

8:30- 8:50 AM REPRODUCTIVE SUCCESS AND TERRITORY RE-OCCUPATION RATES FOR RED-SHOULDERED HAWK (*BUTEO LINEATUS*) AT NESTING SITES ALONG THE UPPER MISSISSIPPI RIVER DURING 1999 AND 2000. **Jon W. Stravers**. National Audubon Society, Upper Mississippi River Campaign, McGregor, IA 52157.

8:50- 9:10 AM DESCRIPTION AND THIRTY-YEAR HISTORY OF CEDAR GLEN EAGLE ROOST AND BALD EAGLE WINTERING AREA AT LOCK AND DAM 19, MISSISSIPPI RIVER. **Thomas C. Dunstan**. Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

9:10- 9:30 AM DISPERSION OF JUVENILE GREAT BLUE HERONS ALONG SHORELINES OF UPPER POOL 20, MISSISSIPPI RIVER. **Robert L. Connour II**[1] and Thomas C. Dunstan[2]. [1]Dept. of Math, Life, and Natural Sciences, Owens Community College, Findlay, OH 45840 [2]Dept. of Biological Sciences, Western Illinois University, Macomb, IL 61455.

9:30- 9:50 AM DISPERSAL OF JUVENILE PEREGRINE FALCONS DURING A RESTORATION PROJECT IN DUBUQUE, IA. **Dan J. Calvert**, Irene M. Barry, and Larkin A. Powell. Department of Biology, Environmental Science Program, University of Dubuque, Dubuque, IA 52001.

9:50-10:10 AM **BREAK**

SESSION II - MUSSELS

(Moderator: Michael Delong)

10:10-10:30 AM NATIVE UNIONOIDS OF THE UPPER MISSISSIPPI RIVER SYSTEM: HOW DOES THE MISSISSIPPI RIVER FIT IN THE PICTURE? **Marian E. Havlik**[1] and Jennifer S. Sauer[2]. [1]Malacological Consultants, La Crosse, WI 54601-4969 [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

10:30- 10:50 AM LONG TERM CHANGES IN A SHALLOW CHANNEL BORDER MUSSEL COMMUNITY OF POOL 19, MISSISSIPPI RIVER. **Richard V. Anderson**. Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

10:50- 11:10 AM UNIONID MUSSELS IN POOL 26 OF THE UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS. **John K. Tucker** and Robert J. Cosgriff. Great Rivers Field Station, Illinois Natural History Survey, Brighton, Illinois 62012.

11:10- 11:30 AM SWIMMING AGAINST THE TIDE: EFFORTS TO RECOVER FRESHWATER MUSSELS FROM THE THREAT OF EXINCTION. **Kurt I. Welke**[1], Todd Turner[2], Roger Gordon[2], and Pam Thiel[3]. [1]WI DNR, Fitchburg, WI 53711 [2] USFWS, Genoa National Fish Hatchery, Genoa WI 54632 [3] USFWS, LaCrosse FRO, Onalaska, WI 54650.

11:30- 11:50 AM ZEBRA MUSSEL CONTROL EFFORTS ON THE ST. CROIX NATIONAl SCENIC RIVERWAY MINNESOTA AND WISCONSIN. **Byron N. Karns**. National Park Service, St. Croix National Scenic Riverway, St. Croix Falls, WI 54024.

11:50 AM-1:00 PM **LUNCH** (On your own)

SESSION III - SEDIMENT & HYDROLOGY

(Moderator: Michael Romano)

1:00- 1:20 PM 100 YEARS OF CHANGE IN ISLAND MORPHOLOGY AND BACKWATER BATHYMETRY IN POOLS 6, 7, 8, 9 & 10, MISSISSIPPI RIVER. **Anne J. Jefferson**[1] and Carol A. Jefferson[2]. [1] Department of Civil Engineering, University of Minnesota, Minneapolis, MN 55455 [2] Department of Biology, Winona State University, Winona, MN 55987.

1:20- 1:40 PM A 3-YEAR SUSPENDED SEDIMENT BUDGET FOR TWO NAVIGATIONAL POOLS OF THE UPPER MISSISSIPPI RIVER SYSTEM. **Robert F. Gaugush.** U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

1:40- 2:00 PM HYDROLOGIC CONNECTIVITY AND NITROGEN DYNAMICS IN BACKWATERS OF THE UPPER MISSISSIPPI RIVER. **Dennis M. Wasley**[1,2] and David M. Soballe[1]. [1]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 [2]River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601.

2:00- 2:20 PM A CONCEPTUAL MODEL FOR FORMATION OF HANGING BOGS ON THE IOWA EROSION SURFACE IN EASTERN IOWA. **Mark W. Smith** and William L. Niemann. University of Dubuque, Dubuque, Iowa 52001.

2:20- 2:40 PM PM MONITORING OF GROUNDWATER-SURFACE WATER-PRECIPITATION RELATIONSHIPS IN THE HANGING BOG STATE PRESERVE, IOWA. **Lauren B. Esolato** and William L. Niemann. University of Dubuque, Dubuque, Iowa 52001.

2:40- 3:00 PM **BREAK**

SESSION IV - GIS & MODELING

(Moderator: Richard Anderson)

3:00- 3:20 PM UPPER MISSISSIPPI RIVER SYSTEM HABITAT NEEDS ASSESSMENT. **Charles Theiling**, Carl Korschgen, Hank DeHaan, Timothy Fox, Jason Rohweder, and Larry Robinson. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin 54603.

3:20- 3:40 PM INLAND WATERWAYS SPILL RESPONSE MAPPING PROJECT: DEVELOPING PRODUCTS TO PROTECT THE MIDWEST FROM A POTENTIAL DISASTER. **Hank DeHaan**. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin 54603.

3:40- 4:00 PM HYDRODYNAMIC MODELING FOR THE CONSTRUCTION OF ARTIFICIAL ISLANDS WITHIN THE PEORIA LAKE ALONG THE ILLINOIS RIVER. **Nani G, Bhowmik**, M. Demissie, and Pami Parmar. Illinois State Water Survey, Champaign, IL 61820.

4:00- 4:20 PM SIMULATED VARIATIONS IN THE QUANTITY AND DISTRIBUTION OF SUBMERSED AQUATIC VEGETATION IN POOL 8 OF THE UPPER MISSISSIPPI RIVER SINCE 1940. **Yao Yin**[1], James Rogala[1], and John Sullivan[2]. [1]U.S. Geological Survey, Upper Midwest Environmental Science Center, La Crosse, WI 54603 [2]Wisconsin Department of Natural Resources, La Crosse, WI 54601.

5:00- 6:00 PM **POSTERS**

6:00- 8:00 PM **BANQUET**

PLATFORM PROGRAM
HOTEL BALLROOM B
FRIDAY, APRIL 27, 2001

SESSION V - FISH & REPTILES
(Moderator: Robert Connour II)

8:00- 8:20 AM INVESTIGATIONS INTO THE PRE-IMPOUNDMENT FISH COMMUNITY OF THE MISSISSIPPI RIVER, POOLS 4-13. **Jeffrey A. Janvrin**. Wisconsin Department of Natural Resources, La Crosse, WI 54601.

8:20- 8:40 AM FACTORS REGULATING RECRUITMENT OF WALLEYES AND SAUGERS IN NAVIGATION POOL 4 OF THE UPPER MISSISSIPPI RIVER, 1965-1996. **Brian S. Ickes**[1], Donald L. Pereira[2], and Allen G. Stevens[3]. [1]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 [2]Minnesota Department of Natural Resources, St. Paul, MN 55106 [3]Minnesota Department of Natural Resources, St. Paul, MN 55155.

8:40- 9:00 AM STATUS OF NON-NATIVE FISH SPECIES IN THE ILLINOIS RIVER. **Kevin S. Irons**, T. Matt O'Hara, Michael A. McClelland, and Mark A. Pegg. Illinois Natural History Survey, Illinois River Biological Station, Havana, IL 62644.

9:00- 9:20 AM USE OF A CONTIGUOUS BACKWATER LAKE (SWAN LAKE) BY FISHES FOR OVERWINTER HABITAT. **John H. Chick**[1], John K. Tucker[1], Charles Theiling[2], and Robert J. Maher[3]. [1]Illinois Natural History Survey, Great Rivers Field Station, Brighton, IL 62012 [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, LaCrosse, WI 54603 [3]Illinois Department of Natural Resources, Brighton, IL 62012.

9:20- 9:40 AM EFFECT OF SMALL WATER CRAFT ON BASKING ACTIVITY OF MISSISSIPPI RIVER TURTLES. **Laura L. Nash** and Richard V. Anderson. Dept. of Biological Sciences, Western Illinois University, Macomb, IL 61455.

9:40- 10:00 AM LOCK AND DAM 19 AS A BARRIER TO GENE FLOW IN RED-EARED SLIDER TURTLES, *Trachemys scripta elegans*. **James T. Lamer**, Michael A. Romano, Richard V. Anderson and Lara LaDage. Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

10:00-10:20 AM **BREAK, MIDDLE & HIGH SCHOOL STUDENT POSTERS**

SESSION VI - FLOODPLAIN VEGETATION

(Moderator: Terry Dukerschein)

10:20- 10:40 AM FOUR YEARS OF MONITORING WOODY SPECIES SEEDS AND SEEDLINGS IN TWO FOREST STANDS ON THE UPPER MISSISSIPPI RIVER FLOODPLAIN NEAR ALTON, ILLINOIS. **Robert Cosgriff**[1] and Yao Yin[2]. [1]Illinois Natural History Survey, Great Rivers Field Station, Brighton, IL 62012. [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

10:40- 11:00 AM TREE SEEDLING AND SEED FALL STUDY IN POOL 8, UPPER MISSISSIPPI RIVER SYSTEM, 1997-2000. **Heidi Langrehr**. Wisconsin Department of Natural Resources, Onalaska, WI 54650.

11:00- 11:20 AM INTO THE NEW MILLENNIUM: CONTINUED EFFECTS OF THE 1993 FLOOD ON FLOODPLAIN FORESTS, LA GRANGE REACH, ILLINOIS RIVER. **Thad R. Cook** and Mark A. Pegg. Illinois Natural History Survey, Illinois River Biological Station, Long Term Resource Monitoring Program, Havana, IL 62644.

11:20- 11:40 AM A REVISED VEGETATION CLASSIFICATION SYSTEM FOR THE UPPER MISSISSIPPI RIVER SYSTEM. **Larry Robinson.** U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

11:40 AM **MIDDLE AND HIGH SCHOOL STUDENT POSTERS**

12:00 PM **BUSINESS MEETING**

1:00 PM **LUNCH AND RAFFLE**

NOTES

POSTER PRESENTATIONS
THURSDAY, APRIL 26, 2001, 10:00 AM - 6:00 PM
Authors Present 5:00- 6:00 PM
(Listing by topic)

Birds

SURVIVAL OF JUVENILE PEREGRINE FALCONS DURING A RESTORATION PROJECT IN DUBUQUE, IA. **Irene M. Barry,** Dan J. Calvert**,** and Larkin A. Powell. Department of Biology, Environmental Science Program, University of Dubuque, Dubuque, IA 52001.

Fish

MOVEMENT OF BLUEGILLS (*LEPOMIS MACROCHIRUS*) AND BLACK CRAPPIES *(POMOXIS NIGROMACULATUS*) IN BACKWATERS OF NAVIGATION POOL 8, MISSISSIPPI RIVER. **Andrew D. Bartels**. Wisconsin Department of Natural Resources, Onalaska, WI 54650.

SPATIO-TEMPORAL VARIATION IN FISH SPECIES RICHNESS OF THE UPPER MISSISSIPPI RIVER SYSTEM BY RAREFACTION. Todd M. Koel[1] and **Michelle M. Cripps**[1,2]. [1]Minnesota Department of Natural Resources, Mississippi Monitoring Station, Lake City, MN 55041 [2]River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601.

INCIDENCE OF ANGLING INJURIES IN SMALLMOUTH BASS (*MICROPTERUS DOLOMIEU)*, POOL 8, UPPER MISSISSIPPI RIVER, 1997–2000. **Eric Kramer**[1], J. Therese Dukerschein[1], Brian Ickes[2]. [1] Wisconsin Department of Natural Resources Onalaska Field Station, Onalaska, WI 54650 [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

PISCICIDES AS AN EMERGENCY TOOL FOR CONTROLLING RANGE EXPANSION OF THE ROUND GOBY (*NEOGOBIUS MELANOSTOMUS*) IN THE ILLINOIS WATERWAY. **Wendi Larson**, Verdel K. Dawson, Theresa M. Schreier, and Sue Schleis. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

DIET COMPOSITION OF LARVAL AND JUVENILE FISH TAXA IN AN ILLINOIS RIVER FLOODPLAIN LAKE. **A. Maria Lemke**, Jim A. Stoeckel, Melissa Goerlitz, Mark A. Pegg. Illinois Natural History Survey, Illinois River Biological Station, Havana, IL 62644.

AN ASSESSMENT OF THE ANDERSON LAKE FISH COMMUNITY. **Michael A. McClelland,** Kevin S. Irons, T. Matt O'Hara, and Mark A. Pegg. Long Term Resource Monitoring Program, Illinois River Biological Field Station, Havana, IL 62644**.**

STATUS OF NON-NATIVE FISH SPECIES IN LAGRANGE REACH OF THE ILLINOIS RIVER. Kevin S. Irons, **T. Matt O'Hara**, Michael A. McClelland, and Mark A. Pegg. Illinois Natural History Survey, Illinois River Biological Station, Havana, IL 62644.

CHANGES IN ABUNDANCE OF AQUATIC VEGETATION, BLUEGILLS, AND LARGEMOUTH BASS IN LAKE ONALASKA (POOL 7, UPPER MISSISSIPPI RIVER) FROM 1991 TO 1998. **Steven J. Zigler**[1], Robert J. Kennedy[1], Heidi Langrehr[2], and Michael R. Dewey[1]. [1]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin 54603 [2]Wisconsin Department of Natural Resources, Onalaska, Wisconsin, 54650.

Hydrozoan

THE EFFECTS OF VARYING SALINITY ON GROWTH AND REPRODUCTION IN THE COLONIAL HYDROID *CORDYLOPHORA*. **Michael J. Nies** and Nadine C. Folino-Rorem. Biology Department, Wheaton College, Wheaton, IL 60187.

EFFECTS OF FOULING BY THE HYDROID *CORDYLOPHORA* ON THE GROWTH AND SURVIVORSHIP OF THE ZEBRA MUSSEL *DREISSENA POLYMORPHA* IN ADVERSE ENVIRONMENTAL CONDITIONS. **Jason Polk**[1], Jim Stoeckel[2], and Nadine C. Folino-Rorem[3]. [1]Defiance, Missouri 63341 [2] Illinois River Biological Station, Illinois Natural History Survey, Havana, Illinois 62644 [3] Wheaton College, Biology Department, Wheaton, Illinois 60187.

Mussels

EXPERIENCES OF AN INTER-INSTITUTIONAL TEAM TO CONSERVE MUSSELS IN THE ST. CROIX RIVER. **Mark Hove**[1], Richard Baker[2], Michelle Bartsch[3], Ron Benjamin[4], Mike Davis[5], Heidi Dunn[6], Randy Ferrin[7], Dave Heath[8], Dan Hornbach[9], Byron Karns[7], Dan Kelner[2], Robin Maercklein[7], Jill Medland[7], and Teresa Newton[3]. [1]University of Minnesota, St. Paul, MN 55108 [2]Minnesota Department of Natural Resources, St. Paul, MN 55155 [3]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 [4]Wisconsin Department of Natural Resources, La Crosse, WI 54601 [5]Minnesota Department of Natural Resources, Lake City, MN 55041 [6]Ecological Specialists, Inc., St. Peters, MO 63376 [7]National Park Service, St. Croix Falls, WI 54024 [8]Wisconsin Department of Natural Resources, Rhinelander, WI 54501 [9]Macalester College, St. Paul, MN 55105.

MINNESOTA STATEWIDE MUSSEL (BIVALVIA: UNIONIDAE) SURVEY. **Daniel E. Kelner**[1], Rick A. Hart[2], and Mike Davis[3]. Minnesota Department of Natural Resources, Division of Ecological Services, [1]St Paul, Mn 55155 [2]Brainerd, Mn 56401 [3]Lake City, Mn 55981.

RECOVERY OF THE UPPER ILLINOIS RIVER MUSSEL (BIVALVIA: UNIONIDAE) FAUNA FOLLOWING CATASTROPHIC DISTURBANCE. **Bernard E. Sietman**[1], Scott D. Whitney[2], Daniel E. Kelner[3], K. Douglas Blodgett[4], and Heidi L. Dunn[5]. [1]Illinois Natural History Survey, Champaign, IL 61820 [2]U.S. Army Corps of Engineers, Rock Ilsand, IL 61204 [3]Minnesota Department of Natural Resources, St Paul, MN 55155 [4]The Nature Conservancy, Havana, IL 62644 [5]Ecological Specialists, Inc., St Peters, MO 63376.

Macroinvertebrates other than mussels

EFFECT OF LOCATION IN A NAVIGATION REACH ON SECONDARY PRODUCTION OF HYDROPSYCHIDAE LARVAE. **Sharon Loebner** and Michael Delong. Large River Studies Center, Biology Department, Winona State University, Winona, MN 55987.

SEASONAL CHANGES IN SECONDARY PRODUCTION OF HYDROPSYCHIDAE IN REACH 6, UPPER MISSISSIPPI RIVER. **L. Schuette, L. Paulson, D. Bruesewitz**, and M. Delong. Large River Studies Center, Biology Department, Winona State University, Winona, MN 55987.

Remote sensing

INVESTIGATION OF REMOTE SENSING TECHNOLOGY FOR LAND COVER ACQUISITION FOR UPPER MISSISSIPPI RIVER SYSTEM FLOODPLAIN. **Cynthia Berlin**[1], Peter Joria[3], Larry Robinson[3], Jennifer Dieck[2,3], Heidi Langrehr[4], And Holly Ries[2,3]. [1]Department of Geography and Earth Science, [2]Department of Biology, University Of Wisconsin – La Crosse, WI 54601 [3]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603 [4]Wisconsin Department of Natural Resources, Onalaska, WI 54650.

Turtles

MOVEMENT OF PAINTED TURTLES IN A RESTORED WETLAND NEAR DUBUQUE, IA. **Larkin A. Powell** and Marilyn Kuhns. Department of Biology, Environmental Science Program, University of Dubuque, Dubuque, IA 52001.

SITE PREFERENCE OF SOFTSHELL TURTLE NESTING ACTIVITY, LOCK AND DAM 19 TAILWATERS, MISSISSIPPI RIVER. **Colleen M. Riley** and Richard V. Anderson. Dept. of Biological Sciences, Western Illinois University, Macomb, IL 61455.

Vegetation

COMPOSITION OF THE SEEDBANK IN NAVIGATION POOL 8, UPPER MISSISSIPPI RIVER. **Kevin P. Kenow** and James E. Lyon. U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603.

Water quality

A STUDY OF CHLORIDE, NITRATE AND SULFATE CONCENTRATIONS IN THE CATFISH CREEK WATERSHED, DUBUQUE, IA. Kathy Belden and **Daniel Call**. Department of Biology, Environmental Science Program, University of Dubuque, Dubuque, IA 52001.

COLIFORMS AND CHLORINE SENSITIVITY IN MISSISSIPPI RIVER WATER. **Elizabeth K. Sargent** and Dr. Ted Johnson. Department of Biology, St. Olaf College, Northfield, MN 55057.

LONG TERM CHANGES IN A SHALLOW CHANNEL BORDER MUSSEL COMMUNITY OF POOL 19, MISSISSIPPI RIVER.

Richard V. Anderson.
Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

In order to track changes in native mussel populations, the mussel community found in the shallow channel border area of Pool 19, Mississippi River has been quantitatively sampled from 1983 to present. The site most frequently sampled is located adjacent to Devils Island at RM378.5. During this 17 year period the mussel populations have been subjected to infestations of the Asiatic clam and zebra mussels and river level changes as a result of drought and flooding. Mussels were quantitatively sampled by hand searching between 20 and 100, 1 m^2 quadrants in June or July. Mussels collected were identified, measured, examined for epizoon and returned to the river. Using either Simpson's or Shannon's diversity, there has been a general trend toward a slight decrease in diversity at the site. Neither the presence of the Asiatic clam nor the 1988-89 drought appeared to effect species composition or density. Following the 1993 flood, 3 mussel species which had not previously been collected at the site were found; paper pond shell, white heel-splitter, and lilliput. The paper pond shell was abundant following the flood and all 3 species continue to be present at the site. Zebra mussels were first collected from native mussels at the sample location in 1994. Since that time, zebra mussel infestation frequency and density has steadily increased. In the past 4 years, infestation frequency has exceeded 80% and the infestation density has reached 35 zebra mussels per native mussel. Since 1994 mussel density has significantly declined. In particularly, densities of deer-toe, fawns foot and three-horn have been greatly reduced at the site. Zebra mussel infestation appears to have had a greater impact on the native mussel community than Asiatic clams, severe drought, or severe flooding.

Keywords: native mussels, disturbance, channel border habitat, Pool 19, Mississippi River

HYDRODYNAMIC MODELING FOR THE CONSTRUCTION OF ARTIFICIAL ISLANDS WITHIN THE PEORIA LAKE ALONG THE ILLINOIS RIVER.

Nani G. Bhowmik, M. Demissie, and Pami Parmar.
Illinois State Water Survey, Champaign, IL 61820.

The Peoria Lake is the largest bottomland lake along the Illinois River. Over the years, the lake has lost more than 80% of its capacity. The lake is now essentially flanked by shallow water bodies with the navigation channel containing the deep water. Presently, various alternatives are under consideration to revitalize a portion of the lake as deep water and terrestrial habitats. One of the alternatives is to dredge the deposited sediment and use the dredged materials to build artificial islands. Before such artificial islands are built, hydrodynamic modeling work must be completed to determine the hydraulic stability of those islands. The Illinois State Water Survey has tested about two dozen alternatives within the Upper and Lower Peoria Lake where the artificial island or islands could be built. The two dimensional SMS was used for this purpose. After a considerable amount of testing, review, and evaluation, about 5 potential island sites were identified within the Lower Peoria Lake where these islands could be built. This paper will present modeling results for the five suggested alternatives.

Keywords: artificial island, Peoria Lake, Illinois River, dredged materials, hydrodynamic models

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DISPERSAL OF JUVENILE PEREGRINE FALCONS DURING A RESTORATION PROJECT IN DUBUQUE, IA.

Dan J. Calvert, Irene M. Barry, and Larkin A. Powell.
Department of Biology, Environmental Science Program, University of Dubuque, Dubuque, IA 52001.

As part of the Iowa Department of Natural Resource's largest single restoration effort in Iowa to date, we monitored 17 juvenile peregrine falcons (*Falco peregrinus*) during summer 2000. The restoration site was a natural cliff near Eagle Point Park in Dubuque, Iowa. We used radio-telemetry and observations of color-marked birds at the hack site to estimate weekly survival rates. Falcons were released in a staggered manner from mid-June until late-July. We attached dual-cycle transmitters to 4 juveniles, and 3 radios remained on the birds at the time they left the site. For all color-marked birds, dispersal events occurred sooner, and estimated dispersal probabilities were higher than in 1999. Multiple daily observations of radio-marked birds were determined with triangulation from 200-300 m distance from the cliff face. We used Global Positioning System units to determine telemetry locations, and we compiled movement data on Arc/View.

Keywords: peregrine falcon, *Falco peregrinus*, Mississippi River cliffs, dispersal, habitat use, GIS

USE OF A CONTIGUOUS BACKWATER LAKE (SWAN LAKE) BY FISHES FOR OVERWINTER HABITAT.

John H. Chick[1], John K. Tucker[1], Charles Theiling[2], and Robert J. Maher[3].
[1]Illinois Natural History Survey, Great Rivers Field Station, Brighton, IL 62012 [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, LaCrosse, WI 54603 [3]Illinois Department of Natural Resources, Brighton, IL 62012.

Swan Lake is a 1200 ha backwater lake on the lower Illinois River that was created as a result of the construction of Lock and Dam 26. Sedimentation rates within the lake are high and have affected aquatic habitats through reduced water depth and the formation of flocculent sediments which reduce the coverage of aquatic plants. As a result, the Army Corps of Engineers devised a habitat rehabilitation project (HREP) to improve aquatic habitat within the lake. Connection between Swan Lake and the Illinois River are now managed with water control structures and the lake has been subdivided into three independently managed units. Prior to HREP construction, the upper portion of the lake was maintained as a moist soil unit for migratory water fowl, and will continue to be managed in this way. Management of the middle unit will promote the growth of aquatic vegetation for benefit of water fowl, and the lower portion will be managed for fish and will maintain a connection to the lower Illinois river throughout most of the year. In 1992, before construction of the HREP structures, a twelve month sampling project was undertaken to help assess how the HREP might affect biological and physical characteristics of the lake. Fish sampling was an important part of this project, and demonstrated that abundance of several fishes, including bluegill, black crappie, white crappie, bigmouth buffalo, and black buffalo, increased substantially in the lower and middle portion of Swan Lake during the winter. This suggests that these areas are important overwinter habitats for fishes in the lower Illinois and Mississippi Rivers. Nevertheless, some differences were apparent in use of the lower and middle portion of Swan Lake during the winter, suggesting that habitat quality for overwintering fishes varies spatially. Post-project sampling effort is scheduled to take place in 2002 to assess changes in water quality, vegetation, invertebrates, and fishes.

Keywords: fish, overwinter habitat, Swan Lake, habitat rehabilitation project, Illinois River

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DISPERSION OF JUVENILE GREAT BLUE HERONS ALONG SHORELINES OF UPPER POOL 20, MISSISSIPPI RIVER.

Robert L. Connour II [1] and Thomas C. Dunstan [2].
[1]Dept. of Math, Life, and Natural Sciences, Owens Community College, Findlay, OH 45840 [2]Dept. of Biological Sciences, Western Illinois University, Macomb, IL 61455.

Great Blue Herons (*Ardea herodias*) are common residents along the Mississippi River. Dispersion of juvenile, or young of the year, herons from the Mud Island heronry in upper Pool 20 near Keokuk, IA, was studied from the first recorded fledging on July 8 through September 31, 1997. Locations of herons along the shoreline from river mile 360 to 364.5 were plotted three times each day, three days a week. Juvenile herons were found to be non-uniformly dispersed throughout this shoreline habitat, with preferences for certain areas. Areas exhibiting the highest numbers of shoreline juvenile sightings within 3 weeks of fledging tended to be close to the heronry. These areas are owned and protected from trespass by the Illinois Nature Conservancy. Throughout the remainder of the study, most juvenile herons were found near the dam among the newly exposed rocky areas that appeared as the river lowered late in the season. Thus, changes in preferences appear to correspond to fluctuations in environmental conditions as well as time since fledging. Juvenile and adult herons were frequently observed in extremely close proximity to one another, a behavior that appeared to decline in frequency through time. Further study of both biotic and abiotic factors influencing this dispersion is needed, but results appear to be linked to available foraging habitat and human activity.

Key words: Great Blue Heron, *Ardea herodias*, juvenile, Mississippi River, dispersion

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INTO THE NEW MILLENNIUM: CONTINUED EFFECTS OF THE 1993 FLOOD ON FLOODPLAIN FORESTS, LA GRANGE REACH, ILLINOIS RIVER.

Thad R. Cook and Mark A. Pegg.
Illinois Natural History Survey, Illinois River Biological Station, Long Term Resource Monitoring Program, Havana, IL 62644.

In 1993, the Upper Mississippi River System experienced an extreme flood. Staff at the Illinois River Biological Station as part of the Long Term Resource Monitoring Program began a study of the effects of this significant disturbance to the floodplain forests of the Illinois River's La Grange Reach (RM 80-158), to assess post-flood tree mortality and monitor forest community changes. In 1994, 14 transects were established perpendicular to La Grange Reach of the Illinois River and across the floodplain to monitor and document these changes. In 1995, monitoring continued at 46 random sites within the La Grange Reach. In the spring of 2000, the same 46 sites were re-visited following the same criteria used in 1995. In addition, we took cores and measured canopy height of two over story trees at each site in 2000. The 1995 and 2000 sites will be revisited during flood stage to gather elevation data at a later date. This data may be used to correlate age and growth with past hydrology. Data from 1994 and 1995 were combined and indicated tree mortality for all species combined was 28.2%. Simpson's Diversity Index showed only a slight decrease in species diversity as compared to pre-flood conditions. Trees in smaller diameter classes had a higher mortality than larger diameter classes. Importance Values (IV) indicated Silver Maple (*Acer saccharinum)* to be the most important mature tree species and to have increased in dominance following the 1993 flood. Willow species (*Salix spp*), the second most abundant species, decreased in dominance in 1995. Data for 2000 should reflect the same trends as 94 and 95. Late season flooding in years following 1993 has put additional stress on trees already weakened causing increased mortality to floodplain trees. It appears that regeneration of the floodplain forests is doing well, but the quality of the tree community that is replacing the older forests is in question.

Keywords: floodplain forest, Illinois River, mortality, flood, hydrology

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FOUR YEARS OF MONITORING WOODY SPECIES SEEDS AND SEEDLINGS IN TWO FOREST STANDS ON THE UPPER MISSISSIPPI RIVER FLOODPLAIN NEAR ALTON, ILLINOIS.

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Floodplain forests of the Upper Mississippi River System (UMRS) are characterized as having unusually high species richness. This has been partially attributed to the highly variable biotic and abiotic environment that these tree species experience at the seed and seedling stage. Knowledge of how these species respond to and survive in a floodplain regime is generally lacking.

Woody species seed production and seedling survivorship were monitored from 1996 to 2000 in an oak and a maple-ash stand on Pool 26 of the UMRS. The objective was to obtain information on the seasonal and annual variation in woody species regeneration. Within each stand, fifteen subplots were randomly established. At each subplot, a seedfall trap was erected (plastic bucket) and a 1x1-m quadrat permanently installed. All seeds captured within the seedfall trap were collected and identified to the species level. Within the quadrat, all tree seedlings were given a unique identification tag, aged and identified to the species level. Once a month, each subplot was revisited, seeds counted and seedlings inventoried. The presentation is based on a preliminary analysis of the data collected between August 27, 1996 and December 16, 2000.

Variation in seed production was related to species, forest stand, season, and year. Boxelder, pecan, burr oak, pin oak, and American elm seeds were more numerous in the oak stand, whereas, green ash and eastern cottonwood seeds were more numerous in the maple-ash stand. There was no noticeable difference in the number of silver maple seeds captured between forest stands. There was a distinct pattern in the timing of seed dispersal by species related to season and flow regime of the river. Boxelder dispersed seeds well in advance of spring flooding (February-March), American elm dispersed seeds during spring flood (April), silver maple dispersed seeds immediately following the spring flood (May-June), and eastern cottonwood in mid-summer (July). Green ash had a unique bimodal dispersal pattern of once following the spring flood (June-July) and again in early fall (October). Hard-mast species (pin oak, burr oak, and pecan) generally had a fall dispersal pattern (October-November). In 1998, all species, except green ash, had distinctly lower seed production and consequently seedling recruitment. Low seed and seedling production in 1998 corresponds with the longest and highest intensity flood of all the years studied. Newly dispersed seeds appeared capable of germinating immediately following dispersal. While most seedlings died within two years of germinating, survivorship increased as seedling age increased. Silver maple seedlings experienced 85% mortality within the first two years following seed germination. Annual mortality dropped to approximately 5% by age seven. Green ash and American elm had annual mortality of approximately 48% during the first year following germination. Annual mortality increased to near 75% during the second year and gradually decreased to 4% by age seven. Silver maple produced the most seeds and seedlings annually, followed by green ash, boxelder, and American elm. However, green ash dominated the age three and older age classes.

Floodplain forests provide valuable habitat for many species of birds, invertebrates, herps, fish, and mammals, provide organic input into the aquatic system, support a commercial timber industry, and reduce bank erosion. A further understanding of seedling dynamics is crucial for developing floodplain forest management strategies to satisfy the many uses of these important ecosystems.

Keywords: seedling dynamics, Upper Mississippi River System, floodplain forests, flood disturbance, seed dispersal

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INLAND WATERWAYS SPILL RESPONSE MAPPING PROJECT: DEVELOPING PRODUCTS TO PROTECT THE MIDWEST FROM A POTENTIAL DISASTER.

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The Inland Waterways Spill Response Mapping Project largely owes its existence to the catastrophic 1989 oil spill from the *Exxon Valdez*. Shortly after the disaster, the U.S. Congress passed the Oil Pollution Act (OPA) of 1990 as an amendment to the Clean Water Act. The OPA mandates nationwide preparation of oil spill contingency plans and documentation of spill-sensitive resources to improve the efficiency of spill response efforts. The Inland Waterways Spill Response Mapping Project was initiated by the U.S. Environmental Protection Agency (EPA) to meet the requirements of OPA in EPA Region 5, which includes Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio. Its primary mission is to provide community planners and oil spill responders with information on resources at risk during a spill. The mapping project is a joint effort of four agencies that have partnered to draw on each organization's expertise. The EPA provides funding, overall project coordination, and distributes products generated for the project. The Great Lakes Commission and Upper Mississippi River Basin Association collect resource data and organize the review of draft products. The U.S. Geological Survey Upper Midwest Environmental Sciences Center (UMESC) processes the collected data using geographic information system (GIS) software to produce Inland Sensitivity Atlases. These atlases are being generated for 34 mapping areas throughout EPA Region 5. At this time, 19 areas have been completed along the Upper Mississippi River, Ohio River, and Great Lakes. The atlases are available in hard copy and CD formats. They include information (e.g., sensitive species, water intakes, and pipelines) needed to prepare for and respond quickly to an oil spill. The CDs are designed to provide the user with fast user-friendly access to interactive maps, GIS data, and descriptive information about the mapping area resources. To serve a variety of users, the atlas information is available in several formats including Marplot MIE files, Adobe Acrobat PDF files, Arc/Info export files, and ArcView shapefiles. In addition to producing atlases, UMESC has also started several new initiatives that include developing a web page that makes the project data more accessible and performing analysis to identify high-risk areas within EPA Region 5.

Keywords: GIS, Great Lakes, Mississippi River, oil spill, sensitive species

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DESCRIPTION AND THIRTY-YEAR HISTORY OF CEDAR GLEN EAGLE ROOST AND BALD EAGLE WINTERING AREA AT LOCK AND DAM 19, MISSISSIPPI RIVER.

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Bald Eagles (*Haliaeetus leucocephalus*) are common winter residents in the vicinity of Lock and Dam 19, Mississippi River. Early records document the presence of small numbers of eagles at the site of the Des Moines Rapids in 1850, prior to the building of the first Lock and Dam and related hydroelectric plant on the Mississippi River in 1913. In the late 1960's staff working at Western Illinois University's Alice L. Kibbe Life Science Station, located on the tree covered bluff 3 miles downstream from Lock and Dam 19, noticed bald eagles using a 4-acre 'bowl' eroded in Keokuk limestone at the head of an intermittent stream named Cedar Creek. The 4-acre bowl and 172 acres of surrounding landscape were purchase by the Illinois Chapter of the Nature Conservancy in 1969 as America's first dedicated bald eagle winter roost site. The area was named Cedar Glen Eagle Roost in recognition of both day and night use by wintering eagles. From 1970 through the winter of 2001, numerous bald eagle studies about habitat use, winter populations, and resting, foraging and night roosting behavior were conducted in the area by University staff and students. The data were used to decide and support management procedures and land purchases within the study area that extended 6 miles downstream (river miles 359.5 to 365.5) of the present lock and dam. Today, approximately 1,600 acres are under private, state or federal protection and managed for the benefit of bald eagles and other natural resources. Four essential eagle habitat types (night roosts, foraging, eating and resting perches and sites) are included within the protected landscape. The total management effort remains as an exemplary example of the mutual benefits derived from the cooperation of conservation and management agencies from private, state and federal sectors of our society.

Keywords: Bald Eagle, *Haliaeetus leucocephalus*, Mississippi River, wintering area

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MONITORING OF GROUNDWATER-SURFACE WATER-PRECIPITATION RELATIONSHIPS IN THE HANGING BOG STATE PRESERVE, IOWA.

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The Hanging Bog State Preserve near Cedar Rapids, Iowa, is owned by the Nature Conservancy and managed as part of the Iowa State Preserve system. Within the preserve ground water flows from a seep ("hanging bog") on a valley wall of the Cedar River floodplain. The seep creates an ideal environment for skunk cabbage and other flora relatively rare in Iowa.

Since June of 2000, students from the University of Dubuque Environmental Science Program have been monitoring surface water and groundwater levels within the preserve in order to better understand the hydrologic dynamics that contribute to this unique natural setting. A glacial till, discovered during installation of monitoring wells, acts as an aquitard in the subsurface, forcing ground water to exit the aquifer and flow onto the surface. An automatic water-level probe installed just upgradient of the seep indicates that hydraulic head, and thus flow to the seep, is almost constant in the coarse-grained glacial outwash overlying the till, despite variations in precipitation. This pattern suggests a deeper source of recharge than simply shallow seepage of recent precipitation.

A second aquifer exists below the floodplain areas of the preserve. This aquifer is characterized by clay and silt sediments accumulated during overbank deposition of the Cedar River. This aquifer is interconnected with the Cedar River, located, approximately one-quarter mile from the preserve, although the fine-grained nature of the aquifer mutes the response of ground water to fluctuations in river stage. During the cold winter of 2000-2001, the water table beneath the floodplain rose significantly in one area of the preserve due to freezing and damming of surface water draining the floodplain surface.

Keywords: Bogs, wetlands, hydrology, geology, groundwater, groundwater-surface water interaction

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A 3-YEAR SUSPENDED SEDIMENT BUDGET FOR TWO NAVIGATION POOLS OF THE UPPER MISSISSIPPI RIVER SYSTEM.

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The suspended sediment budget for Pool 13 of the Mississippi River and the La Grange Pool of the Illinois River has been examined over a three year period (October 1995 through September 1997). Pool 13 output between 3.07 - 3.64 million metric tons of suspended sediment annually during the study period. Loads to Pool 13 were dominated by those delivered by the Mississippi River (76%, 74%, and 66% in the 1995, 1996, and 1997 water years, respectively). Pool 13 exhibited sediment export (output > input) in 1995, a balance in 1996, and marked sediment trapping (output < input) in 1997. Within the three study years, Pool 13 received it's highest water and sediment loads during the spring (March through May) but this period was marked by sediment export. Suspended sediment loads were trapped during the remainder of the year. The La Grange Pool output between 3.71 - 5.04 million metric tons of suspended sediment annually during the 1995-1997 water years. The Illinois River accounted for less than 50% of the suspended sediment load to the pool (19%, 25%, and 45% in the 1995, 1996, and 1997 water years, respectively. The La Grange Pool exhibited considerable sediment trapping in 1995 while the 1996 and 1997 water years were much closer to a balance where output was within 5% of input. Generally, the La Grange Pool received it's largest water and sediment loads during the late spring - early summer period (April through June), but in 1997 the late winter loads predominated. In all years, the La Grange Pool trapped the sediments during these high discharge, high loading periods and exported suspended sediments for the remainder of the year. The distinct differences in the manner in which these pools process suspended sediment loads may be related to the considerable differences between the morphometry of these pools.

Keywords: sediment budget, sediment load, Mississippi River, Illinois River

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NATIVE UNIONOIDS OF THE UPPER MISSISSIPPI RIVER SYSTEM: HOW DOES THE MISSISSIPPI RIVER FIT IN THE PICTURE?

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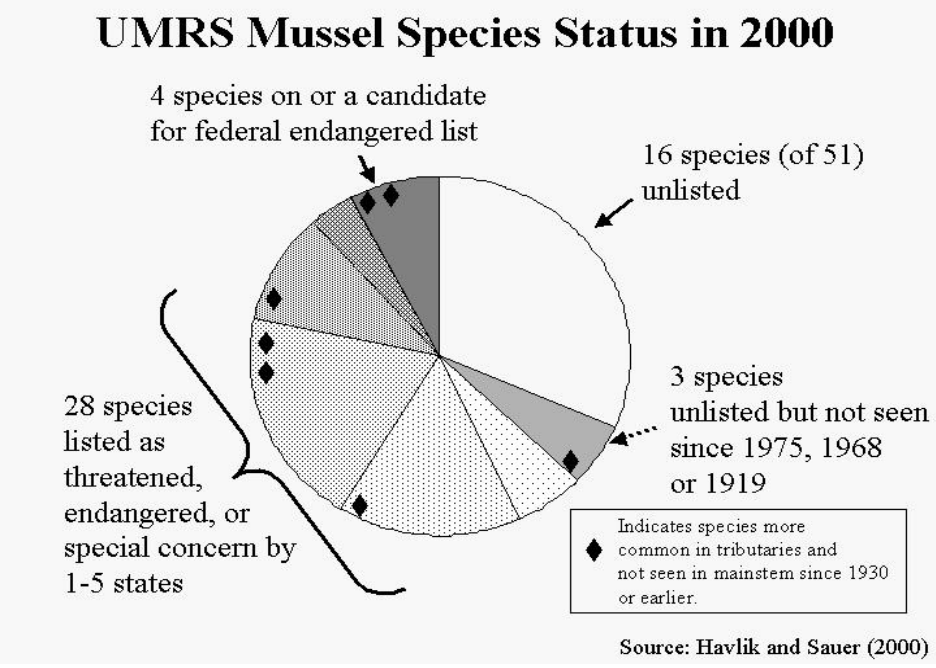
Historically, at least 51 of 304 native freshwater mussel species (Order Unionoida) in the United States have been documented in the Upper Mississippi River System (UMRS = Upper Mississippi and Illinois Rivers). Two unionoids are federally endangered, and a third is under federal review. Although 28 species have some type of special status designation in the five states that border the UMRS, 44 species have been documented in UMRS surveys conducted since 1968. The loss of UMRS species richness may be linked to habitat changes after the locks and dams were built. Nearly all of the seven species not found recently were considered infrequent inhabitants of the UMRS mainstem by late 19th and early 20th century biologists, since they were more commonly found in UMRS tributaries where they all still survive. Havlik and Sauer (2000) give the present status of all 51 species historically found in the UMRS. The conservation status varies from state to state, because each state describes the status of a species population within that particular state, not the UMRS as a whole. *Leptodea leptodon* and *Alasmidonta viridis* have been found in UMRS tributaries, but rarely in the UMRS. Some species reported in the early literature were apparently misidentified, or vouchers do not seem to exist. Some rare species may go unrecognized, indicating the importance of depositing unusual specimens in a museum and having identifications verified by an experienced malacologist. See: http://www.umesc.gov/reports-publications/psrs/emesc_psr.html



Keywords: Mississippi River mussels, unionoids, unionid surveys, unionid species, endangered species

FACTORS REGULATING RECRUITMENT OF WALLEYES AND SAUGERS IN NAVIGATION POOL 4 OF THE UPPER MISSISSIPPI RIVER, 1965-1996.

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We analyzed stock and recruitment data for walleye *Stizostedion vitreum* and sauger *S. canadense* in Navigational Pool 4 of the upper Mississippi River. The primary goal of this work was to synthesize knowledge of recruitment mechanisms in this riverine system to promote research and assessment of long-term river impoundment effects on walleye and sauger reproductive ecology. We developed regression models of recruitment for each species by considering such generalized factors as spawning stock size, river hydrology, and climate. Our objective was to systematically, yet conservatively, account for variability in recruitment. Surprisingly, density-dependent relationships between the size of the spawning stock and subsequent recruitment accounted for the majority of the variation in walleye and sauger recruitment, though abiotic factors also contributed. Our results suggest that biotic factors may be the principal determinants of year class strength for Pool 4 walleye and sauger stocks. Furthermore, our results suggest that simple correlation studies of the relationships between year-class strength and myriad environmental factors (e.g., river discharge, climate, etc…) may fail to account for the key factors driving year-class dynamics in large river systems. We highlight the need to investigate biotic determinants of population dynamics in large river systems and the value that long-term standardized datasets hold for investigating these relationships.

Keywords: stock, recruitment, walleye, sauger, *Stizostedion*, Pool 4, Upper Mississippi River, population dynamics, biotic, abiotic, density-dependence

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STATUS OF NON-NATIVE FISH SPECIES IN THE ILLINOIS RIVER.

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Since 1990, staff at the Illinois River Biological Station have been monitoring the LaGrange Reach of the Illinois River as part of the Long Term Resource Monitoring Program (LTRMP). Over 700,000 fish have been collected in the past years consisting of 83 species and 7 hybrids. Of these, non-native fish species such as common carp *Cyprinus carpio*, goldfish *Carassius auratus*, white perch *Morone americana,* striped bass *Morone saxatilis*, grass carp *Ctenopharyngodon idella*, bighead carp *Hypopthalmichthys nobilis*, and silver carp *Hypophthalmichthys molitrix* have been found with ever increasing numbers in the LaGrange Reach of the Illinois River. White catfish *Ameiurus catus* may also be present as noted by Illinois Department of Natural Resources biologists. Several species of trout and salmon, hybrid stripped bass, and tiger muskies are routinely used in fish management in the Midwest and could affect both the Illinois River and the Upper Mississippi River System (UMRS) if significant water quality improvements in the watershed continue. The LTRMP has proved useful in monitoring and detecting some of these invaders. Other non-native species are poised for dispersal throughout the UMRS such as the round goby *Neogobius melanostomus* (Great Lakes and into Upper Illinois Waterway), Ruffe *Gymnocephalus cernuus*, (Lake Superior and Lake Huron), black carp *Mylopharyngodon piceus* (Missouri River) and others. Dynamics of these invaders should be assessed and plans to slow additional invaders should be investigated.

Keywords: Illinois River, non-native fish, Long Term Resource Monitoring Program

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INVESTIGATIONS INTO THE PRE-IMPOUNDMENT FISH COMMUNITY OF THE MISSISSIPPI RIVER, POOLS 4-13.

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A critical component of successful habitat restoration is obtaining historical information to document the changes which have occurred in a project area. This data provides some insight into the physical changes which have occurred and may also provide evidence of the physical forces which have altered the ecosystem. Snapshots of historical floodplain features of the Upper Mississippi River (UMR) are available and cover various times from the late 1800's to the present. However, documentation of fish and wildlife communities of the UMR prior to 1930 are non-existent or of limited coverage.

The need for describing the pre-impoundment, or even pre-European, fish and wildlife communities of the UMR has been implied in many recent publications. Some of the purposes include: developing bio-criteria for assessment of ecosystem health, establishing ecosystem goals and objectives aimed at restoring the UMR, and determining if current and future restoration efforts are promoting a "more natural" or "unnatural" assemblage of UMR fish and wildlife communities.

A preliminary investigation of available fisheries related data was conducted, with the focus being pools 4-13 of the UMR. Many of the sources did not include a detailed description of the fish community, but did yield qualitative statements regarding the composition of the pre-impoundment fishery resources. For example, one source stated the following with regards to largemouth bass *(Micropterus salmoides)* in Minnesota, "It is a fish of the lakes, sloughs and other sluggish waters, and is perhaps more common in the Mississippi bottom lands than elsewhere in the state..." (Surber, 1920).

Some sources of pre-impoundment "quantitative" data have been identified, although the level of detail varies. Sources of quantitative fishery data were found in the reports associated with fish rescue operations on the UMR by federal and state agencies and a statewide database for the fishes of Wisconsin. These data have been summarized to yield a "fuzzy" snapshot of the pre-impoundment fish community and compared to the fish community of today. Comparisons between pre-impoundment data from the Wisconsin fisheries database and federal fish rescue operations and post-impoundment fisheries data from the USGS, Environmental Management Program, Long Term Resource Monitoring (LTRM) seining records were compared for similarity in the rank of 15 specie (or groups) of fish common to all 3 datasets. There was a significant correlation between the pre-impoundment datasets and no significant correlation between the pre-impoundment datasets and the LTRM post-impoundment dataset. This indicates that the community structure has changed for the specie (or groups) included in this analysis.

Keywords: Mississippi River, fish, pre-impoundment, fish rescue, history

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100 YEARS OF CHANGE IN ISLAND MORPHOLOGY AND BACKWATER BATHYMETRY IN POOLS 6, 7, 8, 9 & 10, MISSISSIPPI RIVER.

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Islands and backwaters in the lower reaches of navigation pools in the Upper Mississippi River have changed substantially since the 1890's and the installation of locks and dams in the 1930's. The Mississippi River Commission maps of the 1890's and the USDA Flowage maps of the 1930's contain depth soundings for the navigation channels, side channels and sloughs, as well as the elevation of emergent portions of the floodplain. During 1996 through 1999, we duplicated numerous historical depth sounding transects and analyzed maps dating from the 1870's and aerial photography dating from 1926.

In the lower portions of Pools 6 and 10, islands are enlarging, new islands are appearing, and islands are migrating downstream. Morphology of islands along the main channel approximates the 1870's configuration, while backwater islands and sloughs are reestablishing configurations that existed in the 1920's. Island area in lower Pool 6 increased 36% between 1962 and 1994, with a gain of 27 ha. A new island that emerged enlarged 2.2 ha from1993-1998. Since 1993, several other islands have formed and are expanding rapidly. In Pool 6, the river bed rose 3-6 m since the 1890's. In Pool 10, 2-3 m of sediment cover land inundated by impoundment, and former sloughs have filled 6-7 m. Side channels passing over spillways rose 3 m in Pool 6 and downcut 4.5 meters in Pool 10.

In lower Pools 8 and 9, islands have eroded and backwater sloughs have filled, resulting in a nearly level river bed. In lower Pool 8, islands have lost about 1 meter in height, and slough beds have risen 0.5-4.0 m. In Pool 9, the highest islands of 1894 eroded 1-3 m, and the low relief islands elevated 1 m. Backwater sloughs filled 1-3 m.

Lower Pool 7 presents a different picture. Erosion and deposition in Lake Onalaska have produced a mostly level bed, with the higher parts of islands losing 0.5 meter and the lower parts rising 2 meters. French Slough, which flows over the spillway, has deepened 4 meters. Along the main channel of lower Pool 7, islands are shrinking. The shape of an island, or island group, is related to its stability. Horseshoe-shaped islands are more stable than linear islands. Where islands are emerging, horseshoe island configurations are forming. Side channels that pass over spillways and have closing dams at their heads are filling. These same channels are downstream of a major bend in the navigation channel. The probable reason for leveling of the river bed is trapping of sediment by wing, closing, and navigation dams. The lower reaches of pools may be attaining a new equilibrium, but the eventual results are unclear. The Mississippi may become confined to the navigation channel, and be surrounded by a low relief floodplain in former backwater areas. The leveling of the river bed is a loss of environmental heterogeneity, with implications for biotic diversity.

Keywords: islands, backwaters, Mississippi River, sedimentation, erosion

ZEBRA MUSSEL CONTROL EFFORTS ON THE ST. CROIX NATIONAL SCENIC RIVERWAY MINNESOTA AND WISCONSIN.

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In 1992, zebra mussels were discovered in the Mississippi River as it flows through Minneapolis. Downstream lies the St. Croix National Scenic Riverway, a unit of the National Park System. Renown for its recreational and biological resources, the St. Croix River is nationally significant for its richness and abundance of freshwater mussels (~40 species). With the greatest diversity of unionids in the Upper Mississippi watershed, the Riverway will be severely impacted by a zebra mussel infestation.

Since that discovery of zebra mussels on the Mississippi River, the National Park Service has led an interagency task force (U.S. Fish and Wildlife Service, Minnesota/Wisconsin Departments of Natural Resources, MN/WI Boundary Area Commission, Minnesota Sea Grant, Great Lakes Indian Fish and Wildlife Commission, St. Croix Marina Association, and others) designed to halt or slow the spread of zebra mussels (*Dreissena polymorpha*) into the St. Croix Riverway. The prevention efforts include education and information, access management, monitoring, planning for remediation and research. A new element for the task force this year has been the formation of an agency-staffed SCUBA dive team to monitor the river from under the surface. With the creation of a dive team staffed with members of the National Park Service and the Fish and Wildlife Service, the river can be surveyed by trained biologists and experts, all of whom sit on the task force. Thus, monitoring conclusions and recommendations can be made with a unique degree of first-hand information. The creation of a St. Croix dive team could not have come at a more critical time in the history of the zebra mussels on the Riverway. Zebra mussels have been found attached to a small number of boats in the St. Croix since 1995 and individual mussels have been discovered scattered in small numbers on substrate along the lower 25 miles of river. While these animals have had an individual presence on the river for a number of years, a reproducing population has never been discovered in the St. Croix River. Unfortunately, that changed during the summer of 2000. This year, for the first time, zebra mussel reproduction has been located within the lower 16 miles (or so) of the river. The source of reproduction has yet to be pinpointed, but the resulting settlement of juvenile mussels is very disturbing, if not unexpected. Armed with the unfortunate knowledge that the mussels have arrived, the task force is beginning the painful chore of creating recommendations for policy makers and agency managers. The river may indeed be at a juncture in its ecological history. What actions are taken may be critical to the plants and animals that call the river home and a recreating public that enjoys the many wonderful aspects of this nationally protected waterway. The management issues surrounding zebra mussels are complex and may be controversial. This presentation will focus on the multi-agency actions designed for 2001 and beyond.

Keywords: zebra mussel, St Croix River, interagency task force, monitoring

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POPULATION GROWTH AS AN INDICATOR OF FOREST HABITAT QUALITY FOR SONGBIRD SPECIES NESTING IN THE DRIFTLESS AREA ECOREGION.

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Population growth (8) is a fundamental population parameter that can be used to estimate habitat quality. Many types of demographic data have been used to measure bird habitat quality, including bird distribution, abundance estimates (numbers of breeding pairs/area), breeding season productivity (the per-capita number of offspring surviving to the end of the breeding season), food availability, and survival. Direct measures of habitat quality such as reproductive success are strongly preferred over indirect measures such as abundance. Models are available to estimate population growth from variables that can be measured in the field, including nesting success. Models can incorporate error estimates that are needed to simulate realistic variability in population growth over time. We used field data on songbird nesting success and a computer model to assess population growth rates in upland forests and three types of floodplain forests of the Driftless Area Ecoregion for 3 species of neotropical migrant birds. We tested the null hypothesis that the modeled population growth rate for each species was = 1 over a simulated 200–year time span (stable population). Data were collected on bird nests in upland and floodplain forest plots located in southeastern Minnesota, northeastern Iowa, and western Wisconsin and in the Mississippi River floodplain from 1992 and 1996-1998. In the floodplain, we stratified forest units among three habitat classes: mature silver maple forest, mature, mast-producing bottomland forest, and early successional forest stands. We estimated breeding season productivity by modifying Powell's dynamic, stochastic, individual-based model of songbird reproduction. We used our nesting data to parameterize the reproductive portions of the model and we used estimates from the literature for survival parameters. We found that productivity was 1.80 (±1.41 SD) fledglings per year for wood thrush (*Hylocichla mustelina*) females, 0.86 (±1.35) for prothonotary warblers (*Protonotaria citrea*), and 1.42 (±0.69) for American redstarts (*Setophaga ruticilla*). Population growth rate predictions were below replacement for prothonotary warblers (8 = 0.86, ±0.04, 95% CI) and American redstarts (8 = 0.90, ±0.02, 95% CI). Wood thrushes (8 = 1.04, ±0.04, 95% CI) did not reject the null hypothesis of 8 = 1.0. Wood thrushes and American redstarts had high productivity in upland habitats. Of the 3 floodplain habitats, prothonotary warblers and American redstarts had lowest productivity in the early successional stage habitat. Growth rates of prothonotary warblers ranged from a low of 8 = 0.78 (±0.04) in early successional floodplain habitats to 8 = 0.90 (±0.04) in maple-dominated floodplain habitat. American redstart growth rates ranged from 8 =0.98 in upland habitat to 8 = 0.91 in floodplain habitats combined. Wood thrushes attempted more nests and had more successful nests during the breeding season in our productivity model than prothonotary warblers or American redstarts. Wood thrushes also had more parasitized nests than the other species, but the effects of parasitism were not as negative (no abandonments or total clutch removals). Sensitivity analyses

revealed differing effects of parasitism rates on the population growth rate of the three species. In general, higher nest parasitism rates resulted in trends of lower annual population growth. Both the American redstart and the prothonotary warbler fared poorest in the early successional floodplain habitats. This is attributed to higher cowbird parasitism rates and a lower proportion of successful nests in this habitat type. Parasitism and predation patterns for redstarts and prothonotary warblers were reversed among maple and mast forests, indicating that these patterns can show species- rather than habitat-specific patterns. Upland habitats supported stable populations of wood thrushes and the best productivity among habitat types for redstarts.

Keywords: habitat quality, birds, nesting success, productivity, Driftless Area ecoregion

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LOCK AND DAM 19 AS A BARRIER TO GENE FLOW IN RED-EARED SLIDER TURTLES, *Trachemys scripta elegans*.

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Two population samples of red eared slider turtles, *Trachemys scripta elegans,* were live-trapped from sites above (n = 14) and below (n = 26) Lock and Dam 19 only separated by approximately 5 km. Blood was extracted from the scapular vein using a 25-gauge hypodermic needle and a 1 cm segment of tail was excised to provide a source of soluble enzymes. From these tissues allelic variation was quantified by starch gel electrophoresis at 14 enzyme loci to determine if the dam was an effective barrier to gene flow. Sliders often occupy isolated aquatic habitats but males tend to have a high propensity for aquatic dispersal for reproductive purposes. Average heterozygosity above the dam was 0.021 and 0.031 below the dam; however, these levels were not significantly different ($p = 0.550$). Extremely high levels of inbreeding were exhibited in both populations with $f = 0.596$ ($X^2 = 3.552$, $p = 0.063$) above the dam and $f = 0.459$ ($X^2 = 5.477$, $p = 0.027$) below the dam. These alarming levels of inbreeding suggest potential problems for the long term sustainability of these populations.

The most significant finding was a Gpi^{144} allele that was found in moderate frequency (0.056) above the dam but was completely absent below the dam. The fact that this allele was found in a relatively small sample of 10 turtles compared to the much larger sample of 26 turtles below the dam strongly imply that the dam does act as a significant barrier to dispersal and gene flow. The potential impact on natural turtle populations by dams like Lock and Dam 19 will be discussed.

Keywords: red eared sliders, electrophoresis, average heterozygosity, gene flow, inbreeding

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TREE SEEDLING AND SEED FALL STUDY IN POOL 8, UPPER MISSISSIPPI RIVER SYSTEM, 1997-2000.

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One concern for the Upper Mississippi River System (UMRS) floodplain forests is inadequate regeneration. A study was initiated in 1997 to describe both seed fall and seedling germination and survival. Two sites were established in Pool 8, UMRS. Site 1 (located in mid-pool) was dominated by swamp white oak, silver maple, and river birch, and site 2 (located in upper pool) by silver maple and cottonwood. Fifteen plots were randomly selected within a 30 meter radius at each site. Each plot had a bucket for collecting seeds and a 1 meter square area within which seedlings were tagged and counted. Seedling survival and number of seeds collected were recorded each month (April through November). Seedling height was recorded when first tagged and in October of each year. The largest seed drop occurred in 1998 for both sites. River birch produced the largest number of seeds at site 1 while cottonwood seeds dominated site 2. Very few acorns were collected. Most germination of seeds occurred in 1999 with over 95% of those being silver maple. The largest drop of silver maple seeds occurred in 1998. A total of 97 seedlings were tagged at site 1 while 45 were tagged at site 2. Survival rate was higher for site 1 (59%) than site 2 (38%). The number of days during the growing season (April 15 through October 15) each plot was flooded was calculated for both sites. The total number of days flooded by plot for the four year period varied in site 1 from 13 to 385. Site 2 was less varied ranging from 13 to 43 days. Although site 2 was less frequently flooded, site 1 had more seedlings and a higher survival rate.

Keywords: floodplain forest, seeds, seedling, monitoring, Mississippi River

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EFFECT OF SMALL WATER CRAFT ON BASKING ACTIVITY OF MISSISSIPPI RIVER TURTLES.

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Turtles are a typical inhabitant of a variety of habitats along the Mississippi River. Turtles are ecototherms in that they rely upon the environment via solar radiation to obtain the required energy to maintain a constant body temperature and for physiological processes. This, in part, is accomplished by basking. Turtles climb onto fallen trees, open beach sites or sometimes can be seen near the water surface where they bask. However, this basking activity can be interrupted by human activity. If turtles are approached they will leave their basking sites and return to the protection of the water. As human use of the river increases the frequency of this disturbance is likely to increase. This study was designed to begin to estimate the amount and type of human activity basking turtles will tolerate. The objectives of this research were to determine the effect of water craft commonly found using shallow areas of the river on basking behavior of turtles. A 16 foot Jon boat and a 24 foot pontoon boat were used. While the boats motored along the shoreline, basking turtles were observed through Bushnell 400 or 800 yardagepro rangefinders. The distance between the boat and a turtle, when the turtle flushed off a basking perch, was recorded. In almost 3000 observations it was found that softshell turtles were the most sensitive to disturbance with most individuals leaving basking sites when boats were over 40 m away. False map turtles were the least likely to flush with approximately 30% of the observed false map turtles remaining on perch sites even when approaching water craft were within 5 m or less of the turtles. Turtles flushed more frequently when approached by a pontoon boat than a Jon boat. They were also more likely to flush if the boat was going slow than if it were moving rapidly whether the boat was a pontoon boat or a Jon boat. The results indicate that turtles species, boat type and boat speed are all factors effecting basking turtle displacement.

Keywords: turtles, basking, disturbance, human activity, Mississippi River

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A REVISED VEGETATION CLASSIFICATION SYSTEM FOR THE UPPER MISSISSIPPI RIVER SYSTEM.

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In 1999, the Upper Mississippi River System (UMRS) vegetation classification system underwent a substantial overhaul as part of the reevaluation of the Long Term Resource Monitoring Program. The established version had been in place for eight years and a large part of the UMRS had been mapped using this classification. However, this classification was not easily scalable or learned by new photo interpreters. Nor were plant dominance or the relative hydrology of an area considered. Vegetation units are frequently mapped as mixtures when delineation of single species is impossible or the species present are smaller than the minimum mapping unit. For example, one unit may contain a mixture of *Leersia*, *Scirpus*, and *Sagittaria*. This area may be very wet or fairly dry depending on which species is dominant. Making that distinction was impossible using the older classification. This classification was also genus-based and contained over 150 unique classes, many of which were rarely mapped or encountered in the floodplain. This combination of concerns made for inefficient photo interpretation and lengthy turnaround times when mapping some of the larger pools or reaches. It was with these concerns and limitations in mind that a revision to the UMRS vegetation classification system was put in place. The revised classification needed to be hierarchical in order to accommodate a variety of mapping scales and complexities, yet still be compatible with previous versions. It should take species dominance, and thus hydrologic implications, into consideration and still be intuitive to use. And lastly, it should easily crosswalk to established classifications such as those used by the Nation Park Service or the National Wetlands Inventory. This presentation will demonstrate why this vegetation classification revision was necessary and how it was accomplished.

Keywords: aquatic vegetation, aerial photos, photo interpretation, Mississippi River, GIS

A CONCEPTUAL MODEL FOR FORMATION OF HANGING BOGS ON THE IOWA EROSION SURFACE IN EASTERN IOWA.

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The Iowa State Preserve manages a "hanging bog" located south of the Cedar River near Cedar Rapids, Iowa. The bog is caused by the flow of groundwater along an impermeable subsurface layer that intersects a hillside. Four monitoring wells, including a continuous-measurement water-level probe, were placed in the bog to record water levels. The well data was compared to water levels in the Cedar River and precipitation levels to determine if the above groundwater was connected with the Cedar River Aquifer. The site data was used to construct a geologic cross section of the hillside. In addition, the geology of the surrounding area was studied using published maps and the Iowa Geological Survey Bureau's online well-log database (GEOSAM). From the site and area data a general conceptual model was developed to explain formation of hanging bogs on the Iowa Erosion Surface in eastern Iowa. This model was then used to compare similar locations along the Cedar River to detect and predict possible additional hanging bogs.

Keywords: Bogs, geology, conceptual model, Iowa Erosion Surface

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REPRODUCTIVE SUCCESS AND TERRITORY RE-OCCUPATION RATES FOR RED-SHOULDERED HAWK (*BUTEO LINEATUS*) AT NESTING SITES ALONG THE UPPER MISSISSIPPI RIVER DURING 1999 AND 2000.

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Between 1983 and 1998, we collected information on 49 Red-shouldered Hawk (*Buteo lineatus*) nesting sites in floodplain forests along the Upper Mississippi River between Keokuk, Iowa, and Wabasha, Minnesota (river mile 362 to 760). During 1999 and 2000 we were able to reconfirm Red-shouldered Hawk nesting in 24 of those sites. Four sites that were formerly active were determined to be inactive. We suspect nesting in 21 other sites but we were unable to visit these sites, or our searches were considered incomplete.

The average density for this 398 mile stretch of the Mississippi River is one active Red-shouldered Hawk nesting for every 9.26 miles. The highest density we found was in a seven mile stretch of Pool 10 where we found six active sites (one active site every 1.17 river miles). In a ten mile stretch of Pool 12 we found five active sites (one active site every 2.0 river miles). The lowest density we found was between Muscatine and Keokuk where we found three active sites in 92 river miles (one active site every 30.6 miles).

We confirmed the outcome of 15 nesting attempts in 1999 and 2000. Of those, 10 (66.7%) were successful and fledged 21 nestlings for an average of 2.1 nestlings per successful attempt and 1.4 per known nesting attempt. This is similar to our findings between 1982 and 1998. During that period we determined the outcome of 80 nesting attempts: 54 (67.5%) were successful and the average number of fledglings per successful nesting attempt was 2.17 per successful attempt and 1.46 per known nesting attempt.

Of the 43 sites with confirmed or suspected nesting, 18 are in Iowa, 12 in Wisconsin, 11 in Illinois, and 2 in Minnesota. 29 are on federal land (U.S. Fish & Wildlife Service Refuge, U.S. Army Corps of Engineers, National Park Service), 6 are on state property, 2 are on private land, and we are not certain of ownership at 6 sites.

Our observations show that Red-shouldered Hawks nesting along the Upper Mississippi River prefer large tracts of mature flood-plain forests. It appears they have a strong nest-site fidelity to most nesting sites. Consequently, we feel this species is an excellent “Umbrella Species” – an indicator of high quality habitat. Management practices that favor Red-shouldered Hawks are likely to benefit several species of concern that require large unfragmented forest tracts, especially some of the neotropical migrant passerines which may be more difficult to monitor.

Keywords: Red-shouldered Hawk, *Buteo lineatus*, Upper Mississippi River, raptor monitoring, floodplain forests

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UPPER MISSISSIPPI RIVER SYSTEM HABITAT NEEDS ASSESSMENT.

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The EMP Habitat Needs Assessment was designed to help guide future habitat protection and restoration efforts on the UMRS. To identify habitat needs, historical, existing, forecast, and desired future conditions were compared. Issues of scale are important in this regard because ecological processes and needs vary at the system, reach, and pool levels. In addition, a wide variety of habitat characteristics must be addressed including habitat fragmentation, connectivity, and diversity. To accomplish this assessment, a GIS tool and a new floodplain vegetation successional model were developed. These tools allow geomorphic and land cover characteristics to be translated into the potential for species to occur. Over time, the landscape, land use, and hydrology of the Upper Mississippi River and its basin have changed. Much of the grasslands, wetlands, and forests have been converted to agriculture use, which now accounts for 50 percent of the floodplain. Impoundment, channelization, and levee construction have altered the hydrologic regime and sedimentation patterns, resulting in loss of backwaters, islands, and secondary channels. While future changes in broad geomorphic features are expected to be relatively small, habitat degradation is expected to continue. There is a broadly recognized need among resource managers and scientists for improved habitat quality, increased habitat diversity, and a closer approximation of pre-development hydrologic variability.

The Habitat Needs Assessment identified clear differences in habitat types and conditions among river reaches. Those differences are largely related to the amount and distribution of public land, degree of floodplain development, the geomorphic form of the river, and the effects of impoundment for navigation. The differences also suggest that habitat needs and restoration objectives will vary by river reach and pool.

The Habitat Needs Assessment yielded gross quantitative and qualitative estimates of habitat needs both system-wide and within river reaches. These estimates provide the first approximation of a set of system-wide objectives for habitat protection and restoration. While they do not offer quantitatively precise goals, they will help focus future planning on the most important geomorphic processes both system-wide and in specific river reaches. However, perhaps the greatest contribution this first Habitat Needs Assessment has made is the development of new and improved tools for future habitat planning. In particular, the GIS Query tool will help evaluate the potential distribution of species and habitat area types throughout the UMRS. While the results of the Habitat Needs Assessment are not a substitute for the more detailed and spatially explicit planning that will be done at the pool scale, it has provided new tools for that planning.

Keywords: GIS, landscape analysis, restoration

UNIONID MUSSELS IN POOL 26 OF THE UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS.

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Changes in mussel populations (Unionidae) between 1992 and 2000 for two sites on the Mississippi River and two sites on the Illinois River are reported. The Illinois River sites are at river mile 5.5 and inside Swan Lake, a backwater of the Illinois River. The Mississippi River sites include Brickhouse Slough in Missouri and a site at river mile 217 just downriver of the confluence with the Illinois River on the Illinois side of the Mississippi River. Mussel populations at one of the Mississippi River sites have remained stable between 1994 and 2000 with the number of species present, their density, and the average size of the dominant species showing no changes. This site on the Missouri side of the river has few zebra mussels (*Dreissena polymorpha*) present. The Illinois site is heavily colonized by zebra mussels and the number of species present has declined from 18 to 5, the density has declined from greater than 10 mussels per m^2 to less than 1 mussel per m^2, and the mean size of the dominant species has also declined. The mussel population at river mile 5.5 on the Illinois River has declined from 8.4 mussels per m^2 to 0.8 mussels per m^2 with the number of species present reduced by 50%. The Swan Lake mussel population has declined for a density of 12.9 mussels per present remaining similar from year to year. Sites with reduced densities and reductions in the number of species present may reflect the adverse impact of heavy zebra mussel colonization.

Keywords. Population declines, Unionidae, Mississippi River, Illinois River, *Dreissena polymorpha*

HYDROLOGIC CONNECTIVITY AND NITROGEN DYNAMICS IN BACKWATERS OF THE UPPER MISSISSIPPI RIVER.

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We found that nitrogen dynamics in off-channel areas of the Upper Mississippi River (UMR) system are influenced by the degree of hydrologic connection to the main channel. Our earlier mass-balance calculations revealed that net longitudinal transport of total nitrogen in the UMR was approximately conservative across several reaches; even though we found strong evidence of nitrogen transformation in backwater areas. Subsequent investigations show that areas relatively isolated from the main flow of the river often have low nitrate concentrations (< 0.01mg/L) from June through November, while nitrate in the main channel ranges from 1 to 4 mg/L. We found that fluctuations in river stage (< 1m) deliver main channel water (and nitrate) into semi-isolated backwaters (e.g., Lawrence Lake near La Crosse, Wisconsin), and the nitrate in this inflow is rapidly removed by assimilation or denitrification within the backwater. Backwaters that are well connected to the channel exhibit seasonal nitrate concentrations that closely follow those in the main channel. We speculate that increased delivery of main-channel water to off-channel areas could result in additional removal of nitrate from the UMR; however, the overall effect on downstream transport of nitrogen would be small due to overwhelming inputs from the surrounding drainage basin.

Keywords: nitrogen, Mississippi River, backwater, transport, connectivity

SWIMMING AGAINST THE TIDE: EFFORTS TO RECOVER FRESHWATER MUSSELS FROM THE THREAT OF EXINCTION.

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Freshwater Mussels (Unionidae) are recognized as North Americas most seriously imperiled fauna. Approximately 67% of the 300 recognized species are designated as vulnerable to extinction or already extinct. The rate of loss has accelerated rapidly within the last 50 years as the effects of impoundment, sedimentation, channelization, dredging and water pollution have manifested themselves acutely and chronically. Currently, the zebra mussel *(Dreissena polymorpha)* threatens to eliminate already weakened populations, a fact legally affirmed by the issuance of a jeopardy opinion on the continued operation and maintenance of the Mississippi River 9-foot navigation project. In early 2000, a cooperative effort was initiated by personnel from the WDNR and USFWS to prevent the extinction of the federally listed Higgins Eye Pearly Mussel (*Lampsilis higginsi*). Juvenile mussels were propagated at the Genoa National Fish Hatchery using standard mass infection procedures on largemouth bass (*Micropterus salmoides)* and walleye (*Stizostedion vitreum)* host fish. Culturing of juveniles occurred in 4 differing treatments to identify factors that contributed to optimal survival and growth. Mussels were successfully stocked into recipient habitats in summer/fall 2000. The effort will be continued and expanded in 2001.

Keywords: mussels, recovery, propagation

SIMULATED VARIATIONS IN THE QUANTITY AND DISTRIBUTION OF SUBMERSED AQUATIC VEGETATION ON POOL 8 OF THE UPPER MISSISSIPPI RIVER SINCE 1940.

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Submersed aquatic vegetation (SAV) prospered in Pool 8 after Lock and Dam 8 was constructed in 1938. Over the past 6 decades, SAV in Pool 8 experienced sometimes drastic fluctuations, such as the crash following the drought in 1987'-89. The fluctuations are revealed in a time series of historical aerial photos and survey maps. The photos and maps alone, however, did not provide the information we were seeking - the relative importance of flow, transparency, and the erosion of islands in the long-term dynamics of the SAV in Pool 8. To pursue that goal, we used a statistical model to simulate the variations of the quantity and distribution of SAV in Pool 8 under a variety of observed or hypothesized physical conditions since 1940.

The statistical model, based on the following parameters, calculates the probability of having SAV at a site: (1) the number of days that a sufficient amount of sunlight in the water column was available to allow growth, (2) the number of days the site was dewatered, (3) the current velocity on the site when river discharge was 90,000 cubic feet per second and, (4) effective wind fetch at the site. Sunlight penetration through the water column was calculated from light extinction coefficient or total suspended solids, site elevation, and river stages on a daily basis. The number of days the site was dewatered was calculated from records of daily river stages and site elevation. Data of the third and fourth parameters were obtained from output files of two models developed by other researchers.

Based on the performance of the model we put forward the following hypotheses for discussion:

Hypothesis one: The dynamics of the SAV in Pool 8 since 1988, which consisted of a crash between 1988 and 1991 and a subsequent rebound, were driven primarily by changes in water transparency.

Hypothesis two: Several water level management changes in pool 8 that raised the control-point water level at Lock and Dam 8 have contributed to the loss of SAV in the deep areas behind the dam, as well as an increase of SAV in the middle section of the pool. As a result of these management changes, there was a net gain in the whole.

Hypothesis three: The loss of islands in the lower section of Pool 8 from 1940 to 1989 had an equivalent effect of approximately 15'-20% reduction of SAV habitat. However, this reduction had been offset by the gain from the raised control-point water level at Lock and Dam 8 (Hypothesis two). As a result, there was a decline of approximately 5% of SAV habitat since the mid 1970s.

Keywords: modeling, submersed aquatic vegetation, dynamics, Upper Mississippi River

SURVIVAL OF JUVENILE PEREGRINE FALCONS DURING A RESTORATION PROJECT IN DUBUQUE, IA.

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As part of the Iowa Department of Natural Resource's largest single restoration effort in Iowa to date, we monitored 17 juvenile peregrine falcons (*Falco peregrinus*) during summer 2000. The restoration site was a natural cliff near Eagle Point Park in Dubuque, Iowa. We used radio-telemetry and observations of color-marked birds at the hack site to estimate weekly survival rates. Falcons were released in a staggered manner from mid-June until late-July. We attached dual-cycle transmitters to 4 juveniles, and 3 radios remained on the birds at the time they left the site. Only 1 of the 17 juveniles died, from an electrocution on a nearby electrical line. Weekly survival rates were 0.988 (SE = 0.01), and the weekly resighting probability was 0.885 (SE 0.03). We will use aerial telemetry to attempt to relocate these returning birds in spring 2001. Prior concerns about great-horned owl predation were unfounded at this release site, as no mortalities were attributed to these predators although substantial numbers of owls were seen in summer 2000.

Keywords: peregrine falcon, *Falco peregrinus*, Mississippi River cliffs, dispersal, survival

MOVEMENT OF BLUEGILLS (*LEPOMIS MACROCHIRUS*) AND BLACK CRAPPIES *(POMOXIS NIGROMACULATUS*) IN BACKWATERS OF NAVIGATION POOL 8, MISSISSIPPI RIVER.

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I conducted a pilot study designed to evaluate opportunities for mark and recapture studies of fishes within the Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River (UMR). The objective was to determine if enough recapture information could be gained during routine monitoring activities and from the angling public to characterize movement patterns of bluegills (*Lepomis macrochirus*) and black crappies (*Pomoxis nigromaculatus*) in Navigation Pool 8 (Pool 8) of the UMR. Spring tagging during 1998 and 1999 yielded 5,812 bluegills and 5,476 black crappies, which were subcutaneously implanted with plastic fabric tags. Tagging occurred in each of three sampling sites, which differed in amount of water current velocity, depth, and amount of aquatic vegetation. Recapture information from 17 fish was recorded during routine LTRMP fish monitoring. Anglers provided 102 recapture reports, 64 of which came during the ice-free season. Bluegill recaptures totaled 69, or 1.18% of the total number tagged. Black crappie recaptures totaled 50, for a return rate of 0.91%. Fish of both species exhibited the greatest propensity to remain at the capture site in Lawrence Lake, which had the greatest depth, abundant aquatic vegetation, and low current velocity. The highest degree of straying occurred from Shady Maples, which had the most current velocity, least aquatic vegetation, and shallow depth. Twenty-eight percent of bluegills and 42% of black crappies recaptured had strayed from the original tagging site. Maximum linear distances between the tagging site and recapture site were 7.4 km for bluegills and 17.1 km for black crappies. All long-distance movements by bluegills were oriented downstream, whereas black crappies moved large distances both upstream and downstream. The project demonstrated that a large-scale mark and recapture effort for these or other target species has the potential to help answer a variety of management-related questions. Recent interest and concern about overwintering habitat and angling exploitation of several fish species suggests that this type of project may become important in the near future.

Keywords: bluegill, black crappie, mark and recapture, Pool 8, Upper Mississippi River

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INVESTIGATION OF REMOTE SENSING TECHNOLOGY FOR LAND COVER ACQUISITION FOR UPPER MISSISSIPPI RIVER SYSTEM FLOODPLAIN.

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The purpose of this study is to evaluate current remote sensing technologies for their utility in developing a land cover/use (LCU) database for the Upper Mississippi River System (UMRS) floodplain. An LCU for the entire system, derived from 1:15,000 scale color-IR aerial photography acquired in 1989, is nearing completion. It would be time- and cost-prohibitive to update this dataset using the same scale aerial photography and the same level of classification detail. A less complex classification scheme has already been developed through discussions with data users. Smaller scale photography or high-resolution satellite images may further expedite the classification process. The objective of this phase of the project is to evaluate 1:24,000 scale aerial photography and 4-meter IKONOS satellite images for their utility in developing an LCU database for the UMRS floodplain.

Multispectral IKONOS images, two sets of color-IR aerial photography (1:15,000 and 1:24,000 scale) and ground-based data for three study sites were acquired in the late summer and early fall of 2000. Both sets of aerial photography were interpreted to 27 land cover classes. Portions of the 1:15,000 scale interpretation were used as training data to help classify the IKONOS images. Other areas of the 1:15,000 scale interpretation will be used to assess the accuracy of both the classified IKONOS images and the interpreted 1:24,000 scale photography. The IKONOS classifications and the interpreted 1:24,000 scale photography will be compared on the basis of accuracy and ease of production. Results of the project will help determine an improved methodology for updating the land cover classifications for the entire UMRS.

Keywords: IKONOS, remote sensing, Mississippi River, land cover classification, floodplains

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A STUDY OF CHLORIDE, NITRATE AND SULFATE CONCENTRATIONS IN THE CATFISH CREEK WATERSHED, DUBUQUE, IA.

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Several branches of Catfish Creek watershed, a tributary of the Mississippi River with its confluence in Dubuque, Iowa, were monitored during the spring of 2000 for concentrations of chloride, nitrate, and sulfate. Samples were collected from six sites over a six-week period. Water samples were analyzed by ion chromatography, and the sites were compared to one another by an analysis of variance and the Tukey method of multiple comparisons. Chloride concentrations exhibited a dichotomy for the six stations, with three stations having lower concentrations (i.e., means of 30 to 80 mg/L) and three having higher concentrations (i.e., means of 159 to 180 mg/L). Chloride and total conductivity also exhibited a fairly strong positive correlation (r = 0.9790). Nitrate concentrations were highest at an upstream site, possibly due to its proximity to crop land. Sulfate concentrations ranged from a mean of 25 mg/L at an upstream site to a mean of 63 mg/L at a downstream site, which was significantly higher than all other sites.

Keywords: water quality, chloride, nitrate, sulfate, ion chromatography

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SPATIO-TEMPORAL VARIATION IN FISH SPECIES RICHNESS OF THE UPPER MISSISSIPPI RIVER SYSTEM BY RAREFACTION.

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The Long Term Resource Monitoring Program (LTRMP) has documented spatial and temporal trends in fish communities of the Upper Mississippi River System (UMRS) for over a decade. A metric based on these communities that can be useful for understanding the status of this system's health is species richness. A problem typically encountered when comparing species richness among sampling units is that values are greatly affected by both sample size (total number of individuals collected) and spatial area covered. We used rarefaction methodology to calculate expected species richness values at standardized sample sizes E(Sn) because for most gear types the number of LTRMP samples taken and individuals collected has varied among aquatic habitat areas, trend areas (river pools), seasonal time periods, and years. Spatially-randomized fish collections, stratified by natural aquatic/geomorphic habitat, were completed in all six LTRMP trend areas. A standardized total of 12 electrofishing, 18 fyke-netting, and 24 hoop-netting collections were randomly selected for rarefaction from each trend area, habitat, and year, 1994-1999.

At the pool scale, no difference was noted in mean $E(S_{460})$ by electrofishing among contiguous backwater shorelines, main channel borders, and side channel borders within pools 4, 13, 26, or the open (non-pooled) Mississippi River ($P>0.2$). However, mean $E(S_{460})$ values of main channel borders of pool 8 and La Grange Reach of the Illinois River were significantly lower than that of other habitat types within each trend area ($P<0.05$). At the system scale, mean $E(S_{460})$ values by electrofishing were significantly higher in contiguous backwater shorelines, main channel borders, and side channel borders of pools 4, 8 and 13 than of pool 26, the open river, or La Grange Reach ($P<0.0001$). Mean $E(S_{460})$ by electrofishing in contiguous backwaters ranged from 31 in pool 8 to 21 in pool 26; in main channel borders it ranged from 28 in pool 13 to 14 in La Grange Reach; and in side channel borders it ranged from 32 in pool 8 to 20 in La Grange Reach. Similar trends were noted by fyke-netting in contiguous backwaters and by hoop-netting in main channel and side channel borders, although total numbers of fish collected and mean E(Sn) were lower. Systemically, the LTRMP collections indicated that pools 4, 8 and 13 consistently had the highest expected fish species richness. This trend may be attributed to low habitat heterogeneity and predictability of pool 26, the open river, and La Grange Reach.

Keywords: large river fishes, standardized diversity metric, aquatic habitat comparisons

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EXPERIENCES OF AN INTER-INSTITUTIONAL TEAM TO CONSERVE MUSSELS IN THE ST. CROIX RIVER.

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Over the last four years representatives from private, state, and federal institutions have been coordinating efforts to conserve the mussel fauna of the St. Croix River. This river supports most of the mussel species that previously occurred in the upper Mississippi River. Consequently the St. Croix River is one of the most important rivers in the region for conservation efforts of the Mississippian fauna. Some of the activities the team has worked on include coordinated studies on mussel relocation, and effects of sedimentary ammonia on mussels, presentations of research results at the St. Croix River Research Rendezvous, endangered species recovery plans, large scale zebra mussel reconnaissance, draft mussel community recovery plan, nutrient monitoring, and streamlined permitting program. Challenges the team faced include temporary loss of team coordinator, team participation of key parties, and meeting logistics to maximize member participation. Practices that have been particularly effective for this group include selecting one agency to coordinate meeting logistics, broad participation to facilitate decision making, and patient and regular communication in support of team activities.

Keywords: mussels, St Croix River, inter-agency team, planning, conservation

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MINNESOTA STATEWIDE MUSSEL (BIVALVIA: UNIONIDAE) SURVEY.

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Freshwater mussels are one of the most imperiled groups of animals in North America, yet prior to 1999 we knew their status in relatively few of Minnesota's many river systems. To fill this information gap, we initiated the first statewide freshwater mussel survey in July of 1999. A qualitative sampling design was developed using timed searches which allows us to rapidly; 1) define the distribution of species, 2) locate rare species, 3) compare the present and historic fauna, and 4) determine species richness, abundance, and some limited population demographics. Two survey crews targeted two-person hrs./site with the intent of maximizing our ability to sample many sites over a large geographical area. Sample sites were selected by identifying access points (e.g., canoe landings, bridge crossings, etc.) along each river and its tributaries and spaced no more than 3 km apart. We also contacted local resource agency personnel and landowners about potential mussel communities and conducted cursory investigations via brail and/or bank searches. During 1999 and 2000, we spent over 1,000 hours searching for mussels at 686 sites in 25 rivers, 64 tributaries, and 7 lakes. To date, mussel surveys in two drainage basins of the Mississippi River; the Missouri and St. Croix, are complete. Surveys have been nearly completed in tributaries of the Lower Mississippi River Basin (below St. Anthony Falls at Minneapolis including those which enter the Mississippi River below the Minnesota/Iowa border), and partially completed in the Minnesota and Upper Mississippi (above St. Anthony Falls) River Basins, and Pools 1, 2, and 3 of the Mississippi River proper. Survey work in the southern one-third of the state (Missouri, Minnesota, and Lower Mississippi River Basins) shows that most streams no longer support their historic complement of mussel species. This loss of species is probably due to poor water quality and habitat degradation. In contrast, tributaries of the St. Croix River support healthy mussel communities of up to 25 live species, indicating sustained quality of the system. The high quality habitats in the St. Croix River Basin are probably the result of less intensive agricultural and urban developments than are found in other drainage basins throughout Minnesota. The mussel fauna in Pools 1, 2, and 3 of the Mississippi River, once decimated by pollution, appears to be re-establishing itself following improved water quality conditions over the past 25 years**.** Twenty-seven mussel species, most of which were represented by young individuals, were found inhabiting this reach of the Mississippi River. Included in the assemblage were several Minnesota state listed species, a few of which have not recently been reported either in the state or in this reach. The data we collect are compatible with Geographic Information Systems and managed by the Minnesota DNR's Natural Heritage and Nongame Research Program. Ultimately, the data will be used to avoid or minimize impacts from development projects, measure the success of watershed management projects, assign legal conservation status to mussel species, and integrated into the conservation planning process for mussels in Minnesota.

Key words: Unionid, freshwater mussel, Minnesota, statewide survey, Mississippi River tributaries

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COMPOSITION OF THE SEEDBANK IN NAVIGATION POOL 8, UPPER MISSISSIPPI RIVER.

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In an effort to enhance aquatic plant production and habitat diversity on the Upper Mississippi River (UMR), the U.S. Army Corps of Engineers St. Paul District has scheduled a pilot water level reduction on Navigation Pool 8 of the UMR. The water level reduction is expected to dry and consolidate bottom sediments and, thereby, increase the area of emergent and submersed aquatic vegetation by natural seed germination. To quantify the availability of seed, we assessed the potential seed bank of selected areas of Navigation Pool 8 of the UMR from substrate samples collected in spring 2000. Samples from each sample site were divided into 4 equal portions, spread over sterile soil, and reared in containers under prescribed conditions. We tested these samples for viable seed content under 4 sets of hydrologic conditions; substrate exposed and allowed to dry (dry), substrate exposed but kept moist (moist), substrate covered with 2-3 cm of water (shallow flooded), and substrate covered with about 60 cm of water (submerged). The experiment was initiated on 1 May and containers were monitored for plant growth on a regular basis (i.e., 2-3 times per week) through the end of August. Fifty species were identified in the seedbank, including 10 submersed aquatic, 6 emergent, 13 obligate wetland, 11 facultative wetland, and 10 upland species. Dominant taxa within the seedbank included *Sagittaria spp*. (0 density = 508 seedlings/m^2; frequency of occurrence = 85%), *Lindernia dubia* (378; 60%), *Zosterella dubia* (146; 70%), *Cyperus spp*. (122; 53%), *Eragrostis spp*. (110; 40%), and *Leersia oryzoides* (73; 43%). Of the 4 hydrologic treatments, moist substrate flats had the greatest species diversity and were the most productive, yielding an average density of 1,420 propagules/m^2. Propagule density generally did not differ ($P > 0.05$) between sites with sand or silt substrates. Emergent and submersed aquatic species were widely distributed, occurring in more than 90% of the samples. Invasive species (*Phalaris arundinaceae, Lythrum salicaria*, and *Potamogeton crispus*) were present in 35% of the samples. Pool 8 seedbank results are compared to seedbank assessments conducted on selected areas of Pool 5 and 9 of the UMR. Experimentally determining the composition of seedbanks is an effective way of predicting the types of vegetation that may develop on substrates exposed during water level reductions. The information is useful to resource managers in determining whether a specific water level management action has the potential of achieving desired vegetation response.

Keywords: aquatic plant, Navigation Pool 8, propagule, seedbank, Upper Mississippi River

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INCIDENCE OF ANGLING INJURIES IN SMALLMOUTH BASS (*MICROPTERUS DOLOMIEU)*, POOL 8, UPPER MISSISSIPPI RIVER, 1997–2000.

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During annual standardized fish monitoring for the Long Term Resource Monitoring Program (LTRMP), we recorded angling injuries in the years 1997 through 2000 in smallmouth bass (*Micropterus dolomieu*) collected by electrofishing within Pool 8 of the Upper Mississippi River System. We defined angling injuries as either healed scars or fresh tears to the maxillary, premaxillary, mandible, or gill membranes. Assuming that injured and non-injured fish were both equally vulnerable to electrofishing gear, the incidence of angling injuries could be used to estimate the fraction of surviving fish that were caught and released by anglers through that time. Over all years, 365 of the 2,243 smallmouth bass (180-550 mm total length) we collected showed evidence of angling injuries. Legal-sized fish (≥350 mm [14"], n=437) over all years had over double the injury rate (30%) of sub-legal sized fish (≤ 349 mm, 13%, n=1806). This relationship was significant (Chi-square=74.81, $P<<0.00$) and also held when each of the four years was analyzed independently. The difference, however, between observed and expected injury rates in legal verses sub-legal length classes varied somewhat year to year. The effect was most extreme during 2000 (Chi-square=37.12, $P<<0.001$), followed by 1999 (Chi-square =11.54, P=0.0007); 1997 (Chi-square =8.62, P=0.0033); and 1998 (Chi-square =4.89, P=0.0270). Analysis of marginal contributions to the overall Chi-square test result indicated that the legal sized fish were 2.88 times more likely to show evidence of angling injury than the sub-legal sized fish. The differences in rates of injury between larger and smaller fish could have multiple causes. Among the possibilities are different harvest/mortality rates, different susceptibilities to the types of lures used by anglers, a longer time for the larger, older fish to accumulate injuries, and differences in healing/regeneration/growth abilities.

Keywords: angling injuries, smallmouth bass, *Micropterus dolomieu,* fishing, Mississippi River

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PISCICIDES AS AN EMERGENCY TOOL FOR CONTROLLING RANGE EXPANSION OF THE ROUND GOBY (*NEOGOBIUS MELANOSTOMUS*) IN THE ILLINOIS WATERWAY.

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The Illinois Waterway System provides a direct connection for the continuous transfer of water from Lake Michigan to the Mississippi River and is presumed responsible for the transfer of certain exotic species from Lake Michigan to the Mississippi River basin. Recent surveys suggest that the exotic species, *Neogobius melanostomus* (round goby), has invaded the Illinois Waterway System from Lake Michigan via the Calumet River drainage. To prevent the spread of round goby populations into the Mississippi River, conservationists plan to install an electrical barrier across the Illinois Waterway. As populations spread beyond this barrier site, however, the use of piscicides is being considered as an additional control method. Newly developed delayed-release formulations of Bayluscide® and antimycin may be ideal toxicants for reducing bottom-dwelling round goby populations without negatively impacting native fish populations in the water column. To determine if Bayluscide® and antimycin are effective piscicides for controlling round goby populations we 1) tested their avoidance/attraction behavior to each chemical and 2) established their minimum effective contact time to each chemical. Round goby did not demonstrate avoidance behavior to either Bayluscide® or antimycin, and the minimum effective contact time indicated that a few minutes of exposure to each chemical was lethal. These results suggest that applications of Bayluscide® and antimycin may be effective in reducing the expansion of round goby populations in the Illinois Waterway System.

Keywords: piscicides, round goby, exotic species, Bayluscide®, antimycin

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DIET COMPOSITION OF LARVAL AND JUVENILE FISH TAXA IN AN ILLINOIS RIVER FLOODPLAIN LAKE.

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Lake Chautauqua, a floodplain lake on the Illinois River, is managed by the U.S. Fish and Wildlife Service as a moist soil unit to provide food and refuge for migrating waterfowl and shorebirds. Floodplain lakes managed for these purposes are annually flooded with river water from fall to early summer and subsequently dewatered during the summer. Additional interest pertaining to the suitability of Lake Chautauqua as habitat for larval fish has promoted a multi-year study to investigate the production and subsequent release of larval and juvenile fish into the Illinois River. One important component of habitat suitability assessment in freshwater ecosystems is the extent to which availability of edible plankton affects interspecific competition among larval fish. An additional consideration for managed floodplain lakes is how the timing of dewatering events affects survivorship of larval and juvenile fish released into the river. Because zooplankton production is typically lower in rivers than lakes, fish produced in Lake Chautauqua may exhibit lower survivorship in the river system if they have not yet shifted their reliance from zooplankton as a primary food resource to fish and/or macroinvertebrates.

The primary objective of this study was to compare diet compositions among several fish taxa in order to (1) gain some insight into diet overlap and possible interspecific competition at the larval and juvenile stages, and (2) determine the size ranges at which piscivorous species shift their diet from zooplankton to macroinvertebrates and fish. A secondary aspect of this study was to investigate the utilization of the exotic claodoceran, *Daphnia lumholtzi*, by larval and juvenile fish. Previous reports from Lake Chautauqua have shown that high abundances of *D. lumholtzi* can occur from mid- to late-summer when river water levels exceed levee height of Lake Chautauqua for extended periods of time.

Diet compositions were analyzed for 3 larval and 3 juvenile fish taxa collected during 2 separate escapement periods in early (5-15 June) and late (31 July-2 August) summer, respectively. The diet compositions of larval white bass (<20 mm) and freshwater drum (<10 mm) were comprised almost exclusively of cyclopoid copepods and microcrustacean eggs. Clupeid larvae (4-24 mm) fed on a wider variety of small-bodied invertebrates including rotifers, microcrustacean eggs, cyclopoid and naupliar copepods, cladocerans, and ostracods. Juvenile white bass (61-142 mm) and largemouth bass (56-89 mm) exhibited very similar diets comprised of *Daphnia lumholtzi*, microcrustacean eggs, corixids, and fish. Our data indicates that smaller size classes of white bass (61-100 mm) and largemouth bass (56-65 mm) juveniles fed primarily on zooplankton and macroinvertebrates, and shifted to a more piscivorous diet after reaching 100 and 72 mm in total length, respectively. *Daphnia lumholtzi* were consumed by several juvenile (white bass, largemouth bass) and adult (emerald shiner) fish, and comprised a significant proportion (47%) of juvenile bluegill (41-63 mm) diets.

Similar diet composition suggests that larval white bass and freshwater drum may compete for zooplankton during early summer, and that white bass and largemouth bass may compete for macroinvertebrate and forage fish later in the summer. Because

juvenile centrarchids and white bass have shifted their diets from plankton to macroinvertebrates and fish by mid- to late-summer, their survival is likely high in the river system when dewatering occurs later in the summer. High abundances of *Daphnia lumholtzi* in late summer provide an additional food source for juvenile bass and bluegill when native zooplankton exhibit low abundances.

Keywords: floodplain lake, Illinois River, larval/juvenile fish, diet composition, *Daphnia lumholtzi*

EFFECT OF LOCATION IN A NAVIGATION REACH ON SECONDARY PRODUCTION OF HYDROPSYCHIDAE LARVAE.

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Navigation dams, in contrast to flood control and hydroelectric dams, are often viewed as relatively benign structures since they do not appear to markedly influence hydrological patterns of large rivers. Closer investigation, however, reveals that annual hydrological patterns are altered by low-head dams and that habitat gradients are generated within a reach between navigation dams. The area immediately below a navigation dam exhibits tailwater traits, with higher current velocities, whereas the bottom of a navigation reach becomes more lentic in nature in proximity to the next dam. Only the middle areas of a navigation reach possess traits approaching pre-dam conditions. It is in the middle areas of a reach, therefore, that native riverine invertebrates would be expected to have optimal conditions and exhibit their greatest abundance and growth. We measured secondary production of members of Hydropsychidae to determine of location in a navigation reach influenced rates of productivity. Samples were taken from individual cobbles at river kilometers 1192 (lower), 1202 (middle), and 1213 (upper) in Reach 6 of the upper Mississippi River. Samples were collected from nearshore areas in September and October 2000. Preserved samples were returned to the lab where Hydropsychidae larvae were removed, identified and measured for biomass determination. Secondary production was estimated using the increment-summation method. Secondary production was highest in the upper portion of the reach and Hydropsychidae larvae were primarily *Hydropsyche orris* and *Cheumatopsyche*. This contrasted with a previous study that found that *Dreissena polymorpha* production was highest in the middle area of a reach. The middle and lower sites had low abundances of hydropsychid larvae, with most of these consisting of *Cheumatopsyche* sp. Water levels during the sample period were lower than average and reflected the overall low-flow conditions prevalent in this year of near-drought conditions. We hypothesize that tailwater conditions at the top of the reach maintained flow conditions suitable for hydropsychid larvae growth, but the low-flow conditions resulted in lower numbers of *H. orris* in the middle of the reach. This hypothesis is supported by the high abundance of Polycentropodidae larvae, net-spinning caddisflies that generally prefer slow-flow habitats.

Keywords: macroinvertebrate, Mississippi River, secondary production, navigation dam, longitudinal gradient

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AN ASSESSMENT OF THE ANDERSON LAKE FISH COMMUNITY.

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Anderson Lake is a backwater lake in the La Grange Reach of the Illinois River downstream of Havana, IL. In 1999, staff at the Illinois River Biological Field Station began sampling Anderson Lake during the months of June-September as part of the Long Term Resource Monitoring Program (LTRMP) sampling of the La Grange Reach. Approximately 24 sites were sampled randomly each year including one offshore fixed site. Multiple gears were used to sample the lake, including fyke nets, mini fyke nets, tandem fyke nets, tandem mini fyke nets, and day electrofishing. The offshore fixed site was sampled only through electrofishing. Approximately 33 species of fish were collected each year with a total catch of over 5,900 fish. Comparison of day electrofishing runs for 1999 and 2000 between Anderson Lake and all of the La Grange backwaters combined shows that Anderson Lake species richness and catch per unit effort (CPUE) is below the average for backwaters in the La Grange Reach. Specific comparisons of day electrofishing runs were made with a backwater lake (Matanzas Lake) that received a similar amount of effort. Species richness and CPUE of day electrofishing runs in Matanzas Lake was much higher for both years. Possible explanations for the lower species richness and abundance could be due to water quality, sedimentation, and level of connectivety to the Illinois River. Lower fish abundances and how they relate to abiotic factors will be discussed.

Keywords: Illinois River, Long Term Resource Monitoring Program, backwaters, La Grange Reach, Anderson Lake

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THE EFFECTS OF VARYING SALINITY ON GROWTH AND REPRODUCTION IN THE COLONIAL HYDROID *CORDYLOPHORA*.

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Cordylophora, (Phylum Cnidaria, class Hydrozoa, family Clavidae) is a colonial hydroid occurring throughout the world in Europe, Australia, and the Americas. *Cordylophora* exists in both fresh and brackish water and therefore has an amazing ability to survive in varying habitats. Since this organism can survive such a wide range of salinity, it has become more prevalent as a fouling organism in many bodies of water globally and has become an organism of increased interest. *Cordylophora* colonies are dioecious and also reproduce asexually via budding, thus allowing populations to quickly colonize and proliferate in a given habitat. This experiment sought to determine morphological and growth changes with varying salinity for two populations of the colonial hydroid, *Cordylophora.* Freshwater hydroids from the Des Plaines River in Illinois (salinity 0ppt), and brackish water hydroids from Exeter, New Hampshire (salinity 10ppt) were utilized. For each population, six trays were established, each containing twelve slides. To each slide, a colony of five feeding polyps (no buds or reproductive polyps were used) was attached. All six trays of the Des Plaines population were allowed to acclimate at 0ppt for two days. The Des Plaines trays were moved in increments of 2ppt from 0ppt to 10ppt over a two-week period. Through out the experiment, one tray (of twelve slides) was left in the previous salinity in order to measure the adaptability and survival of this population at various salinities. The same protocol was used for the Exeter population but colonies were transferred from 10 ppt to 0ppt. To measure growth and morphological changes, numbers of feeding and reproductive polyps, and buds were recorded as well as the length of tentacles, and length and width of polyps. The Des Plaines colonies generally increased in tentacle length, polyp length and width, and the number of reproductive and feeding polyps as salinity was increased. The Exeter colonies responded in an opposite manner. As salinity was decreased, the number of feeding and reproductive polyps decreased over the two-week period. This decrease eventually lead to many of the Exeter colonies dying at salinities below 6ppt. The control population at 10ppt continued to flourish. These results suggest that growth in *Cordylophora* is enhanced in a more saline environment. This may explain the possible range expansion of this organism as changes in water quality occur due to runoff and other types of water pollution.

Keywords: hydrozoan, *Cordylophora*, salinity, growth, fouling

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STATUS OF NON-NATIVE FISH SPECIES IN LAGRANGE REACH OF THE ILLINOIS RIVER.

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Since 1990, staff at the Illinois River Biological Station have been monitoring the LaGrange Reach of the Illinois River as part of the Long Term Resource Monitoring Program (LTRMP). Over 700,000 fish have been collected in the past years consisting of 83 species and 7 hybrids. Of these, non-native fish species such as common carp *Cyprinus carpio*, goldfish *Carassius auratus*, white perch *Morone americana,* striped bass *Morone saxatilis*, grass carp *Ctenopharyngodon idella*, bighead carp *Hypopthalmichthys nobilis*, and silver carp *Hypophthalmichthys molitrix* have been found with ever increasing numbers in the LaGrange Reach of the Illinois River. White *catfish Ameiurus catus* may also be present as noted by Illinois Department of Natural Resources biologists. Several species of trout and salmon, hybrid stripped bass, and tiger muskies are routinely used in fish management in the Midwest and could affect both the Illinois River and the Upper Mississippi River System (UMRS) if significant water quality improvements in the watershed continue. The LTRMP has proved useful in monitoring and detecting some of these invaders. Other non-native species are poised for dispersal throughout the UMRS such as the round goby *Neogobius melanostomus* (Great Lakes and into Upper Illinois Waterway), Ruffe *Gymnocephalus cernuus*, (Lake Superior and Lake Huron), black carp *Mylopharyngodon piceus* (Missouri River) and others. Dynamics of these invaders should be assessed and plans to slow additional invaders should be investigated.

Keywords: Illinois River, non-native fish, Long Term Resource Monitoring

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EFFECTS OF FOULING BY THE HYDROID *CORDYLOPHORA* ON THE GROWTH AND SURVIVORSHIP OF THE ZEBRA MUSSEL *DREISSENA POLYMORPHA* IN ADVERSE ENVIRONMENTAL CONDITIONS.

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Field observations of settling plates and natural benthic communities in the Illinois River during the summer and fall of 1998 and 1999 suggest that two invasive species, the zebra mussel *Dreissena polymorpha* and the freshwater colonial hydrozoan *Cordylophora*, frequently co-exist in areas of suitable substrate. Furthermore, *Cordylophora* colonies often foul the zebra mussels, exhibiting rapid growth of dense colonies on the mussel shells. This raises questions about possible interspecific interactions, and the resulting effects on the growth and development of these two organisms.

Zebra mussels (5-10 mm) were collected from Lake Michigan and maintained in the laboratory for several weeks prior to exposure to experimental conditions. Eight randomly selected groups of 50 mussels were attached to plexiglass plates which were vertically mounted in ten-gallon aquaria with identical temperature, flow, aeration, and filtration conditions. In four of the aquaria, excised pieces of a Des Plaines River *Cordylophora* colony were tied to the plexiglass plates next to each mussel and allowed to grow on and around the mussel shells. Mussels in the other four aquaria were kept free of fouling by *Cordylophora*. All aquaria received identical feeding regimes of brine shrimp nauplii and cryopreserved algae. During an 11-week experimental period, the experimental aquaria were exposed to a standard set of unfavorable environmental conditions (e.g. high salinity, low pH, low calcium ion concentration, and low flow) for weeks 1-6 and favorable environmental conditions for weeks 7-11. The average shell length, wet tissue mass, dry tissue mass, and gamete maturity of the zebra mussels were measured by sacrificing a sub-sample of five mussels from each aquarium every other week. The average wet and dry tissue mass of *Cordylophora* was also measured by collecting all the hydroid tissue within 1.5 cm^2 surrounding each sacrificed mussel.

Mussel growth was limited during the initial seven weeks of the experiment due to unfavorable water quality conditions. Experimental mussels exhibited high mortality, gamete immaturity, and a decrease in average tissue mass. There was no detectable difference between treatments indicating that *Cordylophora* fouling did not affect mussel response to adverse environmental conditions. Following the remediation of the poor water quality during the seventh week of the experiment, the mussels of both treatments showed signs of recovery in the form of increased average shell length and tissue mass. Zebra mussels not fouled by *Cordylophora* did show a lower rate of mortality and a higher rate of recovery and growth than those fouled by the hydroid, however this difference was not statistically significant at the □=0.05 level due to the large degree of variation among the mussel sub-samples of several aquaria. The difference in mussel growth rate between the two treatments during the final weeks of the experimental period suggests that the presence of *Cordylophora* had a negative impact on the recovery and subsequent growth and survival of experimental mussels, but additional experimentation using larger sample size, longer experimental period, and stricter

control of environmental conditions would be necessary to confirm or deny its statistical significance. Further investigations into the interspecific relationships between invasive species in the Illinois and Mississippi River system should provide valuable information concerning the expansion, impacts, and control of non-endemic organisms.

Keywords: zebra mussel, hydroid, invasive species, *Cordylophora*, *Dreissena polymorpha*

MOVEMENT OF PAINTED TURTLES IN A RESTORED WETLAND NEAR DUBUQUE, IA.

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We captured Eastern painted turtles in a restored wetland in Mines of Spain State Recreation Area near Dubuque, Iowa in fall 2000. Five turtles were monitored with radio transmitters, attached with adhesive to their carapace. The attachment method worked well, and turtles were released after 3 days in the laboratory to ensure the radios were attached. The turtles weighed between 80 and 610 grams with lengths from 7.7 cm to 17.1 cm. Radio telemetry data was gathered as bearings from fixed locations surrounding the wetland. Program Locate II was used to estimate location of the turtles, and ArcView GIS was used to estimate home range size. Turtles stayed near the area of the wetland that they were captured. Recaptured turtles were used to estimate population size in this restored wetland (N = 29.4, SE = 14.95).

Keywords: painted turtle, *Chrysemys picta*, restored wetland, movement, population size

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SITE PREFERENCE OF SOFTSHELL TURTLE NESTING ACTIVITY, LOCK AND DAM 19 TAILWATERS, MISSISSIPPI RIVER.

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Softshell turtles have been found to be the dominant turtles species in the open water habitat below Lock and Dam 19, Mississippi River. The sandy shoreline on the Illinois side of the river was used as nesting sites by this turtle species. This area is part of Kibbe Life Sciences Field Station and thus access to the shoreline area is limited, reducing human disturbance of the site. The study occurred between mid-June and mid-July, 1999, when turtles were actively nesting in the area. To characterize the type of nesting habitat preferred by the smooth softshell turtle, the shoreline was examined in terms of substrate type, amount of covering vegetation and amount of sunlight. The shoreline was divided into 15 equal areas and after characterizing habitat conditions, was examined for the presence of turtle nests. One hundred and forty-eight nest sites were discovered. Of these nest sites approximately 40% were false sites, no eggs having been laid at the site. Of the remaining sites over 65% successfully hatched turtles. The majority of hatched nests were in areas of complete sunlight, little to no vegetation and a sandy substrate. The greatest number of nests were located in areas where the substrate temperature during the day was above 30C yet did not exceed 45C. Most of the unsuccessful nests were in areas where habitat conditions differed in terms of substrate, vegetative cover or sunlight intensity. The study suggests that optimum nesting habitat can be identified for this turtle species and if necessary human activity can be limited during nesting periods.

Keywords: smooth softshell turtles, nesting sites, habitat characteristics, Mississippi River, Pool 19 tailwaters

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COLIFORMS AND CHLORINE SENSITIVITY IN MISSISSIPPI RIVER WATER.

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This is a preliminary study of the sensitivity of bacteria to disinfectants in river water, specifically the upper half of the Mississippi River. For each site the number of bacteria, the Most Probable Number (MPN) of coliforms per 100 ml of water, and the presence of *E.coli* was determined. In addition, the bacterial resistance to the disinfectants Clorox, Pine Sol, Comet and the active ingredient Triclosan, which is found in many commercial products, was examined. The number of coliforms was found to increase as the Mississippi River flows downstream while there was no noticeable change in the number of bacteria. There was some resistance to chlorine although it was not correlated with exposure to chlorine in water treatment facilities. With the exception of a few sites there was no major resistance to the disinfectants or to Triclosan.

Keywords: Triclosan, Mississippi River, disinfectants, coliforms, bacteria

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SEASONAL CHANGES IN SECONDARY PRODUCTION OF HYDROPSYCHIDAE IN REACH 6, UPPER MISSISSIPPI RIVER.

L. Schuette, L. Paulson, D. Bruesewitz, and M. Delong.
Large River Studies Center, Biology Department, Winona State University, Winona, MN 55987.

The theoretical models proposed to explain trophic dynamics in large rivers differ critically in the relative importance of autochthonous vs. allochthonous organic matter. Studies testing these theories have focused on the role of different forms of organic matter. An additional aspect of these forms of organic matter is the timing of their deliver. Allochthonous organic matter is delivered either continuously via downstream transport or in conjunction with annual flood periods. Autochthonous matter is present in greatest quantities during low-flow periods when the abundance of slackwater habitats is maximized and nutrient spiraling is slowed by reduced current velocities. We studied Hydropsychidae larvae to determine if seasonal changes occurred in rates of secondary production. Samples were collected every 3-4 wk from May-Oct 2000 by removing cobble from wing dams in the upper area of Reach 6 near Winona, MN. Hydropsychids were removed from samples and divided into two size classes representing different cohorts. Biomass was determined and secondary production was estimated for each sample interval using the increment-summation method. Three species were identified: *Hydropsyche orris*, *Cheumatopsyche* sp., and *Potamyia flava*. Secondary production was highest in August and September, which coincided with the low-flow period. While annual spring flood patterns deviated from the historical average, rates of secondary production would have been predicted to remain constant if hydropsychids were relying on allochthonous organic matter derived from upstream processing. We propose that hydropsychid production was maximized during this sample year through consumption of autochthonous materials typically present during the period when production was highest.

Keywords: trophic dynamics, riverine productivity model, macroinvertebrate, Mississippi River, secondary production

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RECOVERY OF THE UPPER ILLINOIS RIVER MUSSEL (BIVALVIA: UNIONIDAE) FAUNA FOLLOWING CATASTROPHIC DISTURBANCE.

Bernard E. Sietman[1] Scott D. Whitney[2] Daniel E. Kelner[3] K. Douglas Blodgett[4] and Heidi L. Dunn[5]
[1]Illinois Natural History Survey, Champaign, IL 61820 [2]U.S. Army Corps of Engineers, Rock Island, IL 61204 [3]Minnesota Department of Natural Resources, St. Paul, MN 55155 [4]The Nature Conservancy, Havana, IL 62644 [5]Ecological Specialists, Inc., St. Peters, MO 63376.

Freshwater mussels are recolonizing the upper Illinois River following their extirpation by pollution in the early part the 20th century. From 1990 to 1999, we collected 332 individuals of 18 species between river miles 232.0 and 271.2. Age structure of the community suggests mussels began recolonizing in the early 1980s, which coincides with improvements in water quality and the upper river fish community. We found four sites with five or more species, which we considered to be recently formed mussel beds. We collected live individuals of six species (*Actinonaias ligamentina*, *Alasmidonta marginata, Lampsilis cardium*, *Lasmigona costata*, *Pleurobema sintoxia*, and *Strophitus undulatus*) thought to have been extirpated from the entire Illinois River mainstem, and one species (*Anodonta suborbiculata*) that has recently expanded its range into the upper river. Upper Illinois River tributaries and lower reaches of the Illinois River harbored source populations for the recolonizing mussels. Although the present community does not approximate the pre-disturbance fauna, these data show that given adequate time and improved conditions, mussel communities may recover from a devastating disturbance**.**

Keywords: mussels, Illinois River, recolonization, community

CHANGES IN ABUNDANCE OF AQUATIC VEGETATION, BLUEGILLS, AND LARGEMOUTH BASS IN LAKE ONALASKA (POOL 7, UPPER MISSISSIPPI RIVER) FROM 1991 TO 1998.

Steven J. Zigler[1], Robert J. Kennedy[1], Heidi Langrehr[2], and Michael R. Dewey[1].
[1]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin 54603 [2]Wisconsin Department of Natural Resources, Onalaska, Wisconsin, 54650.

Many backwaters in the Upper Mississippi River historically contained large beds of aquatic vegetation. However, vegetation abundance in the Upper Mississippi River precipitously declined in the late 1980's. To investigate the ecological relations between aquatic vegetation and fish, we sampled bluegills and largemouth bass by electrofishing at 21 stations in Lake Onalaska, a large backwater lake (3155 ha) in Pool 7 of the Upper Mississippi River, each fall from 1991 through 1998. Captured fish were subsampled to estimate age and growth from scales. Aerial photographs of Lake Onalaska were interpreted and digitized into GIS coverages to quantify the spatial extent of aquatic vegetation beds (submersed, emergent, mixed) during each year. Areal coverage of aquatic vegetation beds increased from 465.8 ha in 1991 to 1442.6 ha in 1998 (>300% increase). Expansion of submersed vegetation beds from 101.4 ha in 1991 to 1118.1 ha in 1998 accounted for the largest proportion of the increase. Although age structure of bluegills and largemouth bass substantially varied, biomass (CPUE) of both species significantly increased during the study and may be related to the increases in aquatic vegetation. Future analyses will evaluate growth and other population vital rate responses of fish to the changes in vegetation abundance.

Keywords: aquatic vegetation, bluegill, largemouth bass

MINUTES OF THE 2000 BUSINESS MEETING
ANNUAL MEETING OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

14 April 2000

The meeting was called to order at 10:15 by Richard Anderson (President). Yao Yin (Vice-President), Brent Knights (Secretary), and about 50 other members were present. Neal Mundahl (Treasurer) was not present at the meeting.

President Anderson called for a motion to approve the 1999 Minutes as printed in the Proceedings; motion was made by Mike Romano, seconded by David Kennedy, and passed by the membership.

Acknowledgements

President Anderson acknowledged Vice President Yao Yin, Brent Knights, Georginia Ardinger, and Ron Rada for making local arrangements. Thanks to Georginia Ardinger and Mike Dewey for working the registration desk. The President thanked Ron Rada and the University of Wisconsin- La Crosse for providing poster boards for the meeting. Thanks to Mark Sandhindrich and the River Studies Center students for coordinating and operating the slide and computer projectors. The President thanked Brent Knights (Secretary) for drafting and mailing letters to Congressional staff in support of the Environmental Management Program and other mailings. He also thanked Mark Steingraber for organizing this year's Raffle, again. President Anderson commented that Mark would like to be replaced as the Raffle chair, but is willing to help the new chair. Thanks to Mike Caucutt and Brent Knights for maintaining our web page. From a show of hands the web site is receiving at least moderate use. Thanks again to Dave Kennedy and Terry Dukerschein for serving as photographers at our annual meeting. Thanks to the people judging student platform and poster presentations and moderating sessions. Full acknowledgments can be found in the Proceedings. Finally, thanks to the Educational Committee, including Joe Wlosinski, Terry Dukerschein, Ron Rada, and some local educators for inviting area high school students and teachers to join us for our annual meeting. We hope they enjoyed themselves.

Old Business

Educational Committee Report. Joe Wlosinski updated us on the educational committees activities over the past year. Joe reported that students from five area schools were invited, with two accepting (La Crosse-Central and La Crescent) and three not accepting (Onalaska, Winona, and Sparta) our invitation. Joe indicated that teachers and students are busy this time of year.

Marion Havlek indicated that Winona did not come because of other commitments.

Joe reported that the committee will continue inviting students annually, but indicated that he did not want to chair the committee. Mike Dewey expressed interest in being on the committee.

Joe indicated that the committee discussed other possible involvement of students with MRRC including a possible poster session, mentoring, science fair judges, etc.

President Anderson suggested some of these activities would be up to individual members rather than MRRC. Poster session for students might be a good idea.

Marian Havlek suggested that we might want to consider inviting Jr. High School students as well. Might get better participation.

Joe Wlosinski noted that the committee considered a total of 15 high schools. The committee felt that we should target juniors in high school as participants.

Terry Dukerschein said the committee did discuss Jr. High students, but noted that those students already have an outlet for science in the form of science fairs, whereas high school students do not have science fairs and that something like MRRC might be a good alternative.

Mike Dewey again noted he would like to help (new Chair?) given his role as outreach person at the UMESC, and associated involvement with area schools. He stated that Longfellow Middle School might be interested in participating at some level because of their School on the River Program.

Melinda Knutson restated that a poster session would be an excellent way to involve high school students.

Someone suggested we could have an alcohol-free hour at the beginning of the poster session to avoid serving alcohol with high school students present.

Discussion will be continued at the next Educational Committee Meeting with Mike Dewey as Chair and Joe Wlosinski as a member.

Historic Summary. The President pointed out the historic summary "The Mississippi River Research Consortium: Looking Back at the Start of a New Millennium" on pages 51 to 58 of the Proceedings. He indicated that the Board would maintain the electronic files of this information to allow for periodic updates. He also encouraged anyone with additional historic information to pass it on to the Board. President Anderson noted that we are still missing Proceedings from the 1st , 3rd, and 9th Annual Meetings. Copies of all other Proceedings are being maintained at the UMESC and by the President. As well, a copy of the MRRC Procedures Manual resides with each Board member. He also made a plea for volunteers for Board positions in the future.

Treasurer's Report. Treasurer Mundahl was not present at the Annual Meeting, but he submitted a report that is included (page 63) in the Proceedings. The President noted that the MRRC is in good fiscal shape with account balances totaling $8,537.20 as of March 1, 2000. He expects that costs for this years meeting will be close to income from registration, raffle, and T-Shirt sales**.**

No questions regarding the Treasurers Report came from the membership. Joe Wlosinski motioned to accept the Treasurers Report as printed in the Proceedings. Melinda Knutson seconded and the membership passed the motion.

Booking Facilities for Annual Meeting. President Anderson remarked that Annual Meetings will need to be booked two years in advance now that facilities are booking further into the future and our options are fewer (no Yacht Club). This means that for now the Board will need some flexibility in setting dates for 2002. In future, membership will vote on dates two years in advance instead of one.

Marian Havlek noted that this was already determined last year and is reflected in the 1999 Minutes.

Joe Wlosinski brought up a possible joint meeting with the UMRCC when that group meets in Wisconsin or La Crosse.

No other Old Business

New Business

Election of Officers. Nominations for Vice-president were Brent Knights and Todd Koel. Mike Romano was the only nominee for Secretary. Nominations were closed by M/S/P. Ballots for the election of Vice President and Secretary were distributed and collected. Brent Knights was elected Vice President and Mike Romano was elected Secretary.

President Anderson thanked everyone for support and attendance and turned the meeting over to incoming President Yao Yin.

President YaoYin thanked Rick Anderson for his leadership the past year and in previous years, noting that this was Rick's 4th (or 5th) year on the Board. Yao presented him with a plaque of appreciation from the MRRC.

Melinda also expressed thanks from the membership to Rick for the great historical summary he put together for this year's Proceedings. Applause.

Rick thanked the membership again, and noted we should also acknowledge Marian Havlek for being the author with the most presentations at MRRC meetings. Applause.

Time, Place, and Other Meeting Details. President Yin called for discussion on the memberships level of satisfaction with this year's meeting at the Radisson and thoughts on meeting time and place in the future. Next year's meeting is already tentatively set for April 19 and 20 at the Radisson.

John Wetzel asked if costs were reasonable as compared to past meetings.
Yao indicated that we won't know for sure until the numbers (registration, sales, and facility costs) are in, but we think that income should be nearly the same as costs. We do have some reserve as indicated by the Treasurer's Report, but we shouldn't need it.

John Wetzel suggested we check into facilities and costs at the Best Western. He felt that they could probably accommodate a group of our size.

Dave Soballe noted that the Radisson is steps and steps above other facilities in La Crosse for accommodating slide presentations.

Others complimented the facilities for presentations including high ceiling, good projector and screen, and good audio.

Ron Rada commented that the Best Western could handle a group our size but the ceiling in the platform presentation room is not high.

Melinda Knutson (past President) remarked that when she scoped out places to hold the meeting the Best Western could not adequately accommodate a Banquet and Poster Session at the same meeting.

Dave Soballe asked if the La Crosse Center could accommodate the Meeting.

Ron Rada suggested that the La Crosse Center could but when integrating meeting with a banquet there may be more difficulties as compared to the Radisson. If we need more room for Posters, the Radisson has other rooms available upstairs.

Dave Soballe noted that poster numbers were down from previous years and that the foyer was a little crowded for the poster session.

Marian Havlek commented that the foyer is a nice place to have the poster session because of the natural lighting from the large windows.

Scot Johnson commented that the Radisson was hard to beat because of the downtown location and good presentation facilities. Others agreed. Nice hotel rooms too!

Overall, a lot of satisfaction expressed with the Radisson. No further discussion on place.

Yao Yin posed the question…Do we want a Keynote Speaker at next years meeting. If yes, then are there any suggestions for keynote speakers.

Rick Anderson said yes to a keynote speaker and suggested either Tom Claflin or Cal Fremling, both past presidents and noted researchers and experts on the Upper Mississippi River.

Melinda Knutson thought either of those two would be good.

Marian Havlek suggested David Stansbury of Ohio State University (?) who has information from an early-century, UMR mussel study that might be of interest to the membership. No further discussion on keynote speakers.

Melinda brought up the idea of a joint meeting between UMRCC and MRRC again. She noted this might be a good way to get research in the hands of managers.

Rick Anderson suggested the meetings could be held sequentially or overlap at the same location.

Joe Wlosinski motioned that the Board investigate the idea of holding a joint meeting sometime in the future with the UMRCC. Melinda Knutson seconded and the membership passed the motion.

President Yao Yin noted that next year's meeting will be at the Radisson on **April 19 and 20, 2001**. The Board will also book the year 2002 meeting in the next couple of weeks for mid to late April 2002.

Rick Anderson noted that discussions with members during this meeting indicated that the MRRC should hold an Annual Meeting in 2001 despite the fact that the NABS meeting will be held in La Crosse in June 2001. He indicated that most thought that not much overlap (in terms of people attending and subject matter) occurs between the two meetings and thus attendance at these meetings would not be affected much. No discussion from the membership.

Dave Soballe suggested that the membership consider holding the Annual Meeting on a Wednesday-Thursday versus a Thursday-Friday so people don't have to travel on Friday afternoon. This might lead to better attendance at the last session of the meeting.

Mike Romano and Rick Anderson said that for academics, this would not be advantageous.

Chuck Theiling commented that the Thursday-Friday format worked fine for him.

No other discussion on moving the meeting days.

Terry Dukerschein asked if the Board could look into allowing registrants to use a credit card to pay for registration. This would be more convenient for State of Wisconsin employees.

President Yin indicated that he would have the Treasurer check into the use of credit cards for registration.

Ron Rada commented that the MRRC would have to pay a percentage to the credit card company and that this would have to be taken into account when establishing registration cost.

Marian Havlek suggested that the percentage be passed on to just those registering with a credit card.

No further discussion of credit card use.

***Other New Business*.**

President Yao Yin called for other new business.

Rory Vose (past President) from St. Mary's University in Winona proposed a resolution (attachment) that the MRRC support the "Upper Mississippi River Basin Conservation

Act of 2000". This Act addresses a number of Upper Mississippi River basin problems such as runoff of sediments and nutrients.

After considerable discussion by the Membership concerning boundaries, current and future agricultural system, research and monitoring, and programs like CRP, Melinda Knutson motioned to accept the resolution (attached) as written. The motion was seconded by Marian Havlek and passed by the Membership.

The President will ensure a letter of support for the Act is sent to appropriate congressional staff by the Secretary.

Announcements:

This year's award for Best Student Platform Presentation went to Erik M Thorson with the University of Minnesota, St. Paul for his paper entitled "Fall local movements, habitat use, and population dynamics of tundra swans on the Upper Mississippi River". The paper was co-authored by James A. Cooper also from the University.

This year's award for Best Student Poster Presentation went to Jason A. Veldboom with the University of Wisconsin-La Crosse for his paper entitled "Changes in a sand prairie plant community after applying a native seed mixture". The paper was co-authored by Kristen K. Kamla and Robin W. Tyser also from the University and Melinda Knutson with the U.S. Geological Survey, Upper Midwest Environmental Sciences Center – La Crosse, WI.

President Yao Yin called for a motion to adjourn. M/S/P. Meeting adjourned at 11:35.

MISSISSIPPI RIVER RESEARCH CONSORTIUM
TREASURER'S REPORT – SUBMITTED BY NEAL D. MUNDAHL
1 MARCH 2001

Accounts as of 30 June 1998	$ 6,249.14
Accounts as of 30 June 1999	$ 8,730.84

Transactions, 1 July 1999 to 30 June 2000

INCOME	
2000 Registration and dues	$ 7,046.00
2000 Raffle proceeds	$ 383.00
T-shirt sales	$ 130.00
Interest	$ 108.08
Total	$ 7,667.08
EXPENSES	
Radisson Hotel-2000 meeting	$ 4,314.04
2000 Proceedings	$ 250.00
2000 Raffle prizes	$ 76.78
2000 Best paper/poster awards	$ 120.00
Mailing costs	$ 294.82
Printing costs	$ 141.98
Supplies	$ 111.63
Film developing	$ 10.48
Corporation fee	$ 10.00
Total	$ 5,329.73
Accounts as of 30 June 2000	$11,068.19

Transactions, 1 July 2000 to 1 March 2001

INCOME	
Interest	$ 32.64
Total	$ 32.34
EXPENSES	
Mailing costs	$ 116.65
Printing costs	$ 63.00
Corporation fee	$ 10.00
Total	$ 189.65
Accounts as of 1 March 2001	$10,911.18

Accounts

Checking account	$ 6,557.71
Savings account	$ 4,353.47
Total	$10,911.18

MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.
BUSINESS MEETING AGENDA

27 April 2001, 12:00 PM
Radisson Hotel, La Crosse, Wisconsin

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1. Call to Order

2. President's Report
    - Approval of 2000 minutes
    - Acknowledgments for 2001 meeting
    - Friend of the River Award
3. Treasurer's Report
4. Old Business
    - Educational Committee Report
    - MRRC support of the “Upper Mississippi River Basin Conservation Act of 2000”
    - Possibility of accepting credit card payment for registration
5. New Business
    - Executive board nomination
    - Election of officers
    - Standards for abstracts of platform presentations and posters
6. Adjournment

Business Meeting Notes

RESOLUTION

Many of the problems in the Upper Mississippi basin are related to excessive inputs of sediments. Inputs of nutrients also create problems in the system, particularly in the Gulf of Mexico. Reducing these inputs is critical to any attempts at long-term solutions to many of the system's problems.

H.R. 4013, a strongly bi-partisan bill recently introduced in Congress, directly addresses these problems. Among others, it would accomplish several key things:

-Concentrate on the entire upper basin rather than the river itself, therefore forming a strong complement to programs such as EMP

-Develop an effective monitoring system throughout the basin to assess the problems and results of remedial efforts

-Through a grant program, examine potential new ways to attack runoff of sediments and nutrients

-Use sound science, largely through GIS-based modeling, to locate the most likely problem areas, and to concentrate efforts there rather than using a shotgun approach

-Concentrate efforts at significantly increasing funding levels for voluntary, already-proven programs such as CRP and buffer strips, but target these increases at known or suspected problem sites

-Closely monitor results, and use the data to increase or decrease funding at various sites, as appropriate

-Develop an oversight group of governmental and public representatives

-Significantly increase cooperation among involved agencies

While this is a very strong bill, it would be desirable if a mechanism that would ensure broad public involvement by a diversity of stakeholders were included.

Because this bill has so much potential to address important basin problems, the following resolution is offered to the MRRC meeting for consideration:

WHEREAS- we are concerned about the health of the Upper Mississippi River basin, and

WHEREAS- the long-term health of this resource depends on effectively controlling the loss of sediments and nutrients from the watershed, and

WHEREAS- H.R. 4013, the "Upper Mississippi River Basin Conservation Act of 2000" directly addresses these problems in an effective manner

BE IT RESOLVED THAT- The Mississippi River Research Consortium states its support for this measure, asks that public involvement be increased, and urges
that it be enacted into law.

Past “Friend of the River” recipients

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

CONSTITUTION OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

ARTICLE I. NAME AND OBJECT

1. This organization shall be named Mississippi River Research Consortium, Inc.

2. The objective of this organization shall be:

   a. To establish and encourage communication between river scientists and between the scientific community and the public.

   b. To encourage pure and applied research concerning the water and land resources of the Mississippi River and its valley.

   c. To provide an annual meeting where research results can be presented, common problems can be discussed, information can be disseminated, and where river researchers can become acquainted with each other.

   d. To encourage cooperation between institutions and to encourage the sharing of facilities.

   e. To function as an advisory group to other agencies.

   f. To aid in the formation of a concerted and organized research effort on the Mississippi River.

ARTICLE II. ORGANIZATION

1. The organization of the Mississippi River Research Consortium shall be provided for by the enactment of suitable bylaws.

2. The bylaws of this organization shall designate the officers and standing committees, the provisions for the election of officers, the conduct of meetings, and for any other matters which are necessary for the government of this organization.

ARTICLE III. MEMBERSHIP AND DUES

1. The membership of this organization shall consist of any persons who demonstrate an interest in any aspect of the Mississippi River and who express a desire to join the organization.

ARTICLE IV. AMENDMENTS

1. The constitution or the bylaws of the MRRC may be amended by an affirmative vote of two-thirds of the eligible voting members present at the annual meeting.

BY-LAWS OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

ARTICLE I: NAME, PURPOSES, AND DUTIES

1.01 There is hereby established a Board under the name of the Mississippi River Research Consortium, Inc., having the purpose and duties of governing all matters relating to this corporation. These shall be deemed to include the following without limitation:

(a) To have the ultimate decision making authority for any and all affairs of the Mississippi River Research Consortium, Inc. which includes, but is not limited to, the authority to create and terminate the corporation, to determine the budget and expenditure of funds, to manage affairs, to determine the manner, location, and extent of services performed by the corporation, to determine the number of, location, and job duties of any employees, and to do all other and necessary work for the benefit of the corporation.

(b) To formulate all policies necessary for the effective and continuous operation of the corporation.

(c) To coordinate and make decisions regarding priorities of services.

1.02 The purposes of the organization shall be as follows:

(a) To establish and encourage communication between river scientists and between the scientific community and the public.

(b) To encourage pure and applied research concerning the water and land resources of the Mississippi River and its valley.

(c) To provide an annual meeting where research results can be presented, common problems can be discussed, information can be disseminated, and where river researchers can become acquainted with each other.

(d) To encourage cooperation between institutions and to encourage the sharing of facilities.

(e) To function as an advisory group to other agencies.

(f) To aid in the formation of a concerted and organized research effort on the Mississippi River.

ARTICLE 2: OFFICES

2.01 Principal and Business Offices.

The corporation may have such principal and other offices, either in or out the State of Wisconsin as the Board of Directors may designate or as the business of the corporation may require from time to time.

2.02 Registered Office.

The registered office of the corporation required by the State of Wisconsin corporation law to be maintained in the State of Wisconsin may be, but need not be, identical with the principal office in the State of Wisconsin, and the address of the registered office may be changed from time to time by the Board of Directors or by the Registered Agent. The business office of the registered agent of the corporation shall be identical to such registered office.

ARTICLE 3: OFFICERS AND BOARD OF DIRECTORS

3.01 General Powers, Responsibility, and Number.

The business and affairs of the corporation shall be managed by its Board of Directors. It shall be the responsibility of the Board to carry out the objectives of the organization and to jointly organize, hold, and preside over the annual meeting. The Board of Directors of the corporation shall consist of an elected president, vice-president, secretary, and treasurer.

3.02 Election and Terms of Officers.

Each Board member will be elected for a two year term after the 1991 election. In odd numbered years a treasurer and a vice-president will be elected, with at least one being a representative of either a state or federal agency. In even numbered years a secretary and a vice-president will be elected, with at least one being a representative of an academic institution. After a vice-president serves for one year, he or she shall become president for the next year. In 1991 all four officers will be elected. The term for president and secretary elected in 1991 will be for one year. The term for the treasurer elected in 1991 will be for two years. The vice-president elected in 1991 will become president in 1992. The term of each officer begins at the annual meeting.

3.03 Removal From Office.

Any officer may be removed by the Board of Directors whenever in its judgment the best interests of the corporation shall be served thereby, but such removal shall be made without prejudice to the contract rights of any person so removed. Election or appointment shall not of itself create contract rights. An officer may be removed from office by affirmative vote of a majority of the Board of Directors, taken at a meeting by the Board of Directors for that purpose. A director may resign at any time by filing a written resignation at the registered office. Any officer who is absent from three (3) consecutive meetings of the Board shall, unless excused by action of the Board, cease to be a member of the Board of Directors and shall be removed forthwith.

3.04 Meetings.

The Board of Directors shall meet on the times and dates to be established by them but at least once during the annual meeting. Meetings of the Board of Directors may be called by or at the request of any officer. The president or secretary may fix the place of the meeting and if no other place is designated or fixed the place of the meeting shall be at the principal business office of the corporation in the State of Wisconsin. Telephone conference calls can be used in place of regular meetings except during the annual meeting.

3.05 Notice; Waiver.

Notice of such meetings of the Board of Directors shall be given by written or verbal notice delivered personally, by phone or mailed or given by telegram to each director at such address or telephone number as such director shall have designated with the secretary, not less than ten (10) days, or a number of days to be decided by the Board, prior to such meeting. Whenever any notice whatever is required to be given to any director of the corporation under the Articles of Incorporation or By-Laws or any provision of law, a waiver thereof in writing, signed at any time, whether before or after the time of the meeting, by the director entitled to such notice, shall be deemed equivalent to the giving of such notice. The attendance of a director at a meeting shall constitute a waiver of notice of such meeting, except where a director attends a meeting and objects to the transaction of any business because the meeting is not lawfully called or convened. Neither the business to be transacted at, nor the purpose, or any regular or special meeting of the Board of Directors need be specified in the notice or waiver.

3.06 Quorum.

A majority of the elected members of the Board is necessary for the transaction of business at any meeting and a majority vote of those present shall be sufficient for any decision or election.

3.07 Conduct of Meetings.

The president, and in his or her absence, a vice-president, and in their absence, any director chosen by the directors present shall call meetings of the Board of Directors to order and shall act as the presiding officer of the meetings. The secretary of the corporation shall act as secretary of all of the meetings of the Board of Directors, but in the absence of the secretary, the presiding officer may appoint any assistant secretary or any director or other person present to act as secretary of the meeting.

3.08 Vacancy.

Any vacancy occurring in the Board of Directors because of death, resignation, removal, disqualification, or otherwise, shall be filled as soon as possible by the majority action of the Board. If the president vacates office, the vice-president shall become president and the Board shall fill the vice-president position. A vacancy shall be filled for the unexpired portion of the term.

3.09 Executive Director of the Corporation.

The Board may retain, compensate, and give directives to an executive officer. Said executive director shall not be considered as a member of the Board of Directors.

3.10 Duties of Officers.

All officers have the responsibility of carrying out the objectives of the organization, assisting in the organization of the annual meeting, and preparing a Procedures Manual for the organization. In addition, the president shall:

(a) Act as chairperson of the Board and of any executive committee,
(b) Appoint all committees unless otherwise specified by the Board,
(c) Be executive on behalf of the Board of all written instruments except as provided or directed by the Board,
(d) Be responsible for the agenda to be used at the meeting,
(e) Perform all duties incident to the office of a president and such other duties as shall from time to time be assigned to him by the Board.

The vice-president shall:

(a) Perform the duties and exercise the functions of the president at the request of the president and when so acting shall have the power of the president,
(b) Be responsible for the preparation and updating of the Procedures Manual for the organization,
(c) Perform such other duties as delegated by the president.

The secretary shall:

(a) Keep the minutes of the meetings of the Board,
(b) See to it that all notices are fully given in accordance with the provisions of the By-Laws,
(c) Be custodian of the records of the Board,
(d) Perform all duties incident to the office of the secretary of the Board and such other duties as from time to time may be assigned by the president of the Board.

The treasurer shall:

(a) Be responsible for financial record keeping and assessment of dues as established by the Board of Directors,
(b) Supervise the preparation of the annual budget,
(c) Receive all funds paid to the organization and shall pay all bills incurred by the Consortium,
(d) Perform other duties as from time to time may be assigned by the president.

3.11 Other Assistance to Acting Officers.

The Board of Directors shall have the power to appoint any person to act as an assistant to any officer, or agent for the corporation in his stead, or to perform the duties of such officer when for any reason it is impractical for such officer to act personally, and such assistant or acting officer or other agent so appointed by the Board of Directors shall have the power to perform all of the duties of the office to which he or she is so appointed to be assistant or to which he or she is so appointed to act, except as such powers may be otherwise defined or restricted by the Board of Directors.

ARTICLE 4: MEMBERSHIP AND DUES

4.01 Membership and Eligibility.

Membership to include anyone interested in the research and study of the Mississippi River and its valley.

4.02 Membership and Dues.

Membership to be for one (1) year with annual dues determined by the Board of Directors.

ARTICLE 5: COMMITTEES

5.01 Nominating Committee.

The Board of Directors shall serve as the nominating committee and file its report with the members at the annual meeting.

5.02 Other Committees.

The Board may, by resolution, provide for such other committees as it deems advisable and may discontinue the same at its pleasure. Each entity shall have the power and shall perform such duties as may be assigned to it by the Board and shall be appointed and the vacancies filled in the manner determined by the Board. In the absence of other direction, the president shall appoint all committees.

ARTICLE 6: MEETING OF MEMBERSHIP

6.01 Annual Meeting.

The annual meeting of the organization shall be held in La Crosse, Wisconsin. The time of the meeting shall be established by the Board of Directors and announced at the previous annual meeting. Reports of officers and committees shall be delivered at the meeting. The Board of Directors shall be elected from those individuals nominated by the Nominating Committee and those nominated from the floor with prior consent of the nominee. All persons attending the annual meeting shall be required to pay membership dues for that year and be a member of the organization in order to participate. Notice of the annual meeting shall be sent in writing to all members.

6.02 Special Meetings.

Special Meetings may be called by the president or by a majority of the Board and shall be called by the secretary on request of five (5) members in writing. The time and place of special meetings shall be announced at least two (2) weeks in advance.

6.03 Quorum.

At all meetings the members of the corporation present shall constitute a quorum for the transaction of business.

ARTICLE 7: AMENDMENTS

7.01 By The Membership.

These By-Laws may also be altered, amended or repealed and new By-Laws may be adopted by the Board of Directors by affirmative vote of two-thirds ($^2/_3$) of the members present at a meeting at which a quorum is in attendance.

Updated April 1999

PAST MEETINGS AND OFFICERS OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

Meeting	Year	Location	President
1st	1968*	St. Mary's College, Winona, MN	Brother George Pahl
2nd	1969	Wisconsin State Univ., La Crosse, WI	Dr. Thomas Claflin
3rd	1970	Winona State College, Winona, MN	Dr. Calvin Fremling
4th	1971	St. Cloud State College, St. Cloud, MN	Dr. Joseph Hopwood
5th	1972	Loras College, Dubuque, IA	Dr. Joesph Kapler
6th	1973	Quincy College, Quincy, IL	Rev. John Ostdiek
7th	1974	No Meeting	---
8th	1975	Monmouth College, Monmouth, IL	Dr. Jacob Verduin
9th	1976	St. Mary's College, Winona, MN	Mr. Rory Vose
10th	1977	Winona State University, Winona, MN	Dr. Dennis Nielsen
11th	1978	Univ. Wisconsin-La Crosse, La Crosse, WI	Dr. Ronald Rada
12th	1979	Cancelled	Dr. Edward Cawley
13th	1980	Loras College, Dubuque, IA	Dr. Edward Cawley
14th	1981	Ramada Inn, La Crosse, WI	Mr. Michael Vanderford
			Executive Committee
15th	1982	Radisson Hotel, La Crosse, WI	Dr. Richard Anderson Dr. Dave McConville
-------	1983	No Meeting	Dr. Jim Wiener
16th	1984	Radisson Hotel, La Crosse, WI	Dr. Ken Lubinski Ms. Rosalie Schnick Dr. Miles Smart
17th	1985	Radisson Hotel, La Crosse, WI	Mr. Ray Hubley Dr. John Nickum Ms. Pam Thiel
			Board of Directors
18th	1986	Radisson Hotel, La Crosse, WI	Dr. Jim Eckblad Dr. Carl Korschgen Dr. Jim Peck
19th	1987	Univ. of Wisconsin-La Crosse, La Crosse, WI	Mr. Hannibal Bolton Dr. Leslie Holland Dr. Mike Winfrey
20th	1988	Univ. of Wisconsin-La Crosse, La Crosse, WI	Mr. John Pitlo Mr. Verdel Dawson Dr. Nani Bhowmik

Meeting	Year	Location	Board of Directors
21st	1989	Holiday Inn, La Crosse, WI	Dr. Larry Jahn Mr. Jerry Rasmussen Dr. Bill LeGrande
22nd	1990	Island Inn, La Crosse, WI	Mr. Doug Blodgett Dr. John Ramsey Mr. John Sullivan
23rd	1991	Holiday Inn, La Crosse, WI	Mr. Kent Johnson Dr. Mike Romano Dr. Joe Wlosinski
24th	1992	Holiday Inn, La Crosse, WI	Dr. Richard Anderson Mr. Mike Dewey Mr. Kent Johnson Dr. Joe Wlosinski
25th	1993	Holiday Inn, La Crosse, WI	Dr. Richard Anderson Dr. Teresa Naimo Mr. Charles Theiling Dr. Joe Wlosinski
26th	1994	Holiday Inn, La Crosse, WI	Dr. Teresa Naimo Dr. Mark Sandheinrich Mr. Charles Theiling Dr. Neal Mundahl
27th	1995	Holiday Inn, La Crosse, WI	Dr. Mark Sandheinrich Mr. Rob Maher Dr. Michael Delong Dr. Neal Mundahl
28th	1996	Holiday Inn, La Crosse, WI	Dr. Mark Sandheinrich Ms. Therese Dukerschein Dr. Michael Delong Dr. Neal Mundahl
29th	1997	Holiday Inn, La Crosse, WI	Ms. Therese Dukerschein Mr. Mark Steingraeber Dr. William Richardson Dr. Neal Mundahl
30th	1998	Yacht Club Resorts, La Crosse, WI	Mr. Mark Steingraeber Dr. Melinda Knutson Dr. William Richardson Dr. Neal Mundahl
31st	1999	Yacht Club Resorts, La Crosse, WI	Dr. Melinda Knutson Dr. Richard Anderson Mr. Brent Knights Dr. Neal Mundahl
32nd	2000	Radisson Hotel, La Crosse, WI	Dr. Richard Anderson Dr. Yao Yin Mr. Brent Knights Dr. Neal Mundahl

Meeting	Year	Location	Board of Directors
33rd	2001	Radisson Hotel, La Crosse, WI	Dr. Yao Yin Mr. Brent Knights Dr. Michael Romano Dr. Neal Mundahl

*The proceedings of the annual meetings of the Mississippi River Research Consortium, Inc. have been published since 1968. Volumes 7 and 12 were not published, as annual meetings were not convened in 1974 and 1979, respectively.

ACKNOWLEDMENTS 2001

The following persons or institutions have contributed substantially to the planning, execution, support, and ultimately, the success of the 33rd Annual Meeting of the Mississippi River Research Consortium. The 2000-2001 Board of Directors gratefully acknowledges their involvement.

Local Meeting Arrangements, Meeting Announcements, And Mailings

Georginia Ardinger, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Mike Romano, Department of Biological Sciences, Western Illinois University, Macomb, Illinois

Brent Knights, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Neal Mundahl, Department of Biology, Winona State University, Winona, Minnesota

Program and Proceedings

Yao Yin, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Heidi Langrehr, Wisconsin Department of Natural Resources, Onalaska, Wisconsin

Registration Table

Georginia Ardinger, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Mike Dewey, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Visual Aids and Poster Arrangements

Virginia (Ginny) Stefanez, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Students from the River Studies Center, University of Wisconsin-La Crosse

Rob Tyser, River Studies Center, University of Wisconsin- La Crosse, La Crosse, Wisconsin

Mark Sandheinrich, River Studies Center, University of Wisconsin-La Crosse, La Crosse, Wisconsin

Raffle and Prizes

Rick Anderson

Tom Claflin

Terry Dukerschein

David Kennedy

Mike Romano

Kurt Welke

Burkhardt Physical Therapy Center, 1540 Heritage Blvd., Garland Square Suite 101A, West Salem, Wisconsin 54669. (608)-786-4989

The Company Store, 301 Sky Harbour Dr., La Crosse (608)-783-6646

The Radisson Hotel, 200 Harborview Plaza, La Crosse (608)-784-6680

Sales and Arrangements

Mike Dewey, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Georginia Ardinger, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Platform Session Moderators

Eileen Kirsch, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Michael Delong, Large River Studies Center, Biology Department, Winona State University, Winona, MN

Michael Romano, Department of Biological Sciences, Western Illinois University, Macomb, Illinois

Richard Anderson, Department of Biological Sciences, Western Illinois University, Macomb, IL

Robert Connour II, Dept. of Math, Life, and Natural Sciences, Owens Community College, Findlay, OH

Terry Dukerschein, Wisconsin Department of Natural Resources, Onalaska, Wisconsin

Website

Mike Caucutt, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Brent Knights, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Judges for Student Presentations

Mark Pegg, Illinois Natural History Survey, Illinois River Biological Station, Havana, IL 62644.

John Chick, Illinois Natural history Survey, Great Rivers Field Station, Brighton, IL 62012

Maria Lemke, Illinois Natural History Survey, Illinois River Biological Station, Havana, IL 62644.

Tom Dunstan, Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

Sean Jenkins, Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

Bob Connour, Department of Math, Life, and Natural Sciences, Owens Community College, Findlay, OH 45840

Shawn Meagher, Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

Jack Grubaugh, University of Memphis, Department of Biology, Ellington Hall, Memphis, TN 38152

Photography

Terry Dukerschein, Wisconsin Department of Natural Resources, Onalaska, Wisconsin

Randy Hines, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

School Outreach and Poster Session

Mike Dewey, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Terry Dukerschein, Wisconsin Department of Natural Resources, Onalaska, Wisconsin

Joe Wlosinski, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Mike Johnson, Longfellow Middle School, La Crosse, WI

Fay Larsen, Onalaska High School, Onalaska, WI

Tim Gerber, University of Wisconsin-La Crosse, La Crosse, WI