PROCEEDINGS OF THE

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PROCEEDINGS OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM

VOLUME 37

MISSISSIPI RIVER RESEARCH CONSORTIUM, INC.

37th ANNUAL MEETING
28-29 APRIL 2005
RADISSON HOTEL
LA CROSSE, WISCONSIN

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PLATFORM PROGRAM
HOTEL BALLROOM A
THURSDAY, APRIL 28, 2005

8:40 – 8:50 AM Welcome and Announcements
Mark Pegg, MRRC President

SESSION I – VIEW OF A RIVER (Moderator: Michael Delong)

8:50 – 9:10 AM IMMORTAL RIVER: THE UPPER MISSISSIPPI IN MODERN AND ANCIENT TIMES
Calvin R. Fremling, Professor Emeritus, Biology Department, Winona State University, Winona, MN 55987

9:10 – 9:30 AM WETLAND FLOOD WATER RETENTION ESTIMATION USING A 3-DIMENSIONAL GIS MODEL
James Handley[1] and Cynthia Berlin[1, 2]. [1] Center for Geographic Information Science, University of Wisconsin-La Crosse, La Crosse, WI 54601. [3] River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601.

9:30 – 9:50 AM ESTIMATING STATUS AND TRENDS USING LTRMP SURVEY DATA
Brian R. Gray, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603

9:50 – 10:10 AM **BREAK**

SESSION II – BIVALVES (Moderator: Richard Anderson)

10:10 – 10:30 AM 2003 AND 2004 FOLLOW-UPS ON A 2002 UNIONID TRANSLOCATION FROM MISSISSIPPI RIVER MILE 818.9, COTTAGE GROVE, MN
Marian E. Havlik, Malacological Consultants, 1603 Mississippi Street, La Crosse, Wisconsin 54601-4969

10:30 – 10:50 AM THERMAL REQUISITES FOR GROWTH OF ST. CROIX RIVER WINGED MAPLELEAF MUSSEL GLOCHIDIA AND EXCYSTMENT OF TRANSFORMED JUVENILES FROM HOST-FISH.
Mark T. Steingraeber[1], Michelle R. Bartsch[2], John A. Kalas[1], and Teresa J. Newton[2]. [1]U.S. Fish and Wildlife Service, 555 Lester Avenue, Onalaska, WI, 54650; [2]U.S. Geological Survey, 2630 Fanta Reed Road, La Crosse, WI, 54602.

10:50 – 11:10 AM LIFE-HISTORY PATTERNS OF FINGERNAIL CLAMS (*MUSCULIUM TRANSVERSUM*) OF BIG LAKE, POOL 9, UPPER MISSISSIPPI RIVER
Jim Eckblad, Karl Swenson, David Schultz, Melissa Howie, Trish Young, Nick Leslein, Bret Powell, Leah Doerr, Katie McVey. Biology Department, Luther College, Decorah, Iowa 52101

SESSION III – HISTORY (Moderator: Mark Pegg)

11:10 – 11:50 AM ICE SPEAR FISHING: FOCUSING ON THE UPPER MISSISSIPPI LA CROSSE RESEARCH
Ron Deiss, U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois

11:50 – 1:00 PM **LUNCH** (on your own)

SESSION IV – FISH (Moderator: John Chick)

1:00 – 1:20 PM FISH COMMUNITY RESPONSES TO NAVIGATION CHANNEL MAINTENANCE IN THE UPPER MISSISSIPPI RIVER SYSTEM.
Kevin S. Irons and Mark A. Pegg. Illinois River Biological Station, Illinois Natural History Survey, 704 N. Schrader Ave, Havana, Illinois 62644 Phone: 309 543-6000 email: kirons@uiuc.edu

1:20 – 1:40 PM DIETARY OVERLAP BETWEEN BIGHEAD AND SILVER CARP WITH THREE NATIVE FILTER FEEDING FISHES OF THE ILLINOIS AND MISSOURI RIVERS
Schuyler J. Sampson[1], John H. Chick[2], and Mark A. Pegg[3]. [1]Illinois Natural History Survey, Center for Aquatic Ecology, 607 East Peabody Drive, Champaign, IL 61821, [2]Great Rivers Field Station, 8450 Montclair Ave., Brighton, IL 62012, [3]Illinois River Biological Station, 704 N. Schrader, Havana, IL 62644.

1:40 – 2:00 PM CHARACTERIZATION OF FLOODPLAIN LAKE FISH COMMUNITIES IN THE LOWER WHITE RIVER, ARKANSAS
Benjamin J. Lubinski[1], John R. Jackson[2] and Michael A. Eggleton[3]
[1]Illinois Natural History Survey, Great Rivers Field Station, 8450 Montclair Ave., Brighton, IL 62012[2]Arkansas Tech University, Department of Biological Sciences, McEver 4, Russellville, AR 72801
[3]University of Arkansas at Pine Bluff, Aquaculture and Fisheries Center Pine Bluff, Arkansas 71601 USA

2:00 – 2:20 PM FISH ABUNDANCES OF BACKWATER LAKES WITH CONNECTIVITY GRADIENTS IN THE LAGRANGE REACH, ILLINOIS RIVER.
Michael A. McClelland, Mark A. Pegg, Kevin S. Irons, and T. Matt O'Hara. Illinois Natural History Survey, Illinois River Biological Station, 704 N. Schrader Ave., Havana, Illinois 62644.

2:20 – 2:40 PM **BREAK**

SESSION V – FISH *cont.* (Moderator: Kevin Irons)

2:40 – 3:00 PM MONITORING PALLID STURGEON LONG-RANGE MOVEMENT AND HABITAT USE IN THE MIDDLE MISSISSIPPI RIVER
Timothy W. Spier[1], James Garvey, Ron Brooks, Rob Colombo, Brian Koch, and Chris Williamson[2]. [1]WIU Department of Biology, 1 University Circle, Macomb, IL, 61455. [2]SIUC Fisheries and IL Aquaculture Center, Life Sciences 2 Room 173, Carbondale, IL, 92901-6511.

3:00 – 3:30 PM AQUATIC NUISANCE SPECIES: AN EVALUATION OF BARRIERS FOR PREVENTING THE SPREAD OF BIGHEAD CARP TO THE GREAT LAKES.
Ronald M. Taylor[1], **Mark A. Pegg**[1] and John H. Chick[2]. [1]Illinois River Biological Station, Illinois Natural History Survey, 704 North Schrader Avenue, Havana, Illinois 62644. (309) 543 – 6000. [2]Great Rivers Field Station, Illinois Natural History Survey, 8450 Montclair Avenue, Brighton, Illinois 62012. (618) 466 – 9690

3:30 – 5:30 PM **POSTER SESSION**

6:00 – 8:00 PM **BANQUET**

PLATFORM PROGRAM
HOTEL BALLROOM A
FRIDAY, APRIL 29, 2005

8:50 – 9:00 AM Morning Welcome and Announcements

SESSION VI – VEGETATION (Moderator: Kevin Kenow)

9:00 – 9:20 AM SOIL TEXTURE AND FOREST STRATA RELATIONSHIPS OF THE CENTRAL FLOODPLAIN FOREST, LOWER KASKASKIA RIVER, ILLINOIS
Susan P. Romano[1], James J. Zaczek[2], Karl Williard[2], David J. Gibson[3], Loretta L. Battaglia[3], and Sara G. Baer[3]. [1]Department of Biological Sciences, Western Illinois University, Macomb, Illinois 61455. [2]Department of Forestry, Southern Illinois University, Carbondale, Illinois 62901. [3]Department of Plant Biology, Southern Illinois University, Carbondale, Illinois

9:20 – 9:40 AM INTERACTION OF NAVIGATION CHANNEL AND VEGETATION BED PHYTOPLANKTON COMMUNITIES DURING FALL, SPRING, AND SUMMER OF 2003-2004 NEAR LOCK AND DAM 19, MISSISSIPPI RIVER.
Susan T. Meiers and Sean Jenkins, Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

9:40 – 10:20 AM **MIDDLE AND HIGH SCHOOL STUDENT POSTERS/BREAK**

SESSION VII – VERTEBRATES (Non-fish) (Moderator: Kevin Kenow)

10:20 – 10:40 AM BIOACOUSTIC AND BEHAVIOR IN THE SOUTHERN FLYING SQUIRREL (*GLAUCOMYS VOLANS*), A KEYSTONE RIPARIAN MAMMAL.
Deborah L. Beal, and Tony Meyer, Illinois College, Jacksonville, Illinois, USA 62650, 217-245-3463, FAX 217-245-3034; dbeal@ic.edu

10:40 – 11:00 AM AN EXPLORATION IN GROWTH OF THE RED-EARED SLIDER, *TRACHEMYS SCRIPTA ELEGANS*, IN THE UPPER MISSISSIPPI RIVER POOLS 19 & 20 AND SELECTED SITES ON THE DES MOINES AND FOX RIVERS.
Kelly J. Larson, **Michael A. Romano**, Richard V. Anderson, and Sean E. Jenkins Western Illinois University, Department of Biological Sciences, 1 University Circle, Macomb, IL 61455.

11:00 – 12:00 PM **BUSINESS MEETING AND RAFFLE**

12:00 – 1:30 PM **LUNCH**
1:30 **ADJOURN**

NOTES

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POSTER PRESENTATIONS
THURSDAY APRIL 28, 2005 11:00 AM – 6:00 PM
Authors Present 3:30 PM – 5:30 PM
(Listing by Topic)

BIRDS

1) DISTRIBUTION AND ABUNDANCE OF TUNDRA SWANS ON SELECTED AREAS OF THE UPPER MISSISSIPPI RIVER DURING FALL 2004.
Kevin P. Kenow[1], Larry R. Robinson[1], Brian R. Gray[1], James M. Nissen[2], and Brian Lubinski[3]. [1]U. S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603. [2]U. S. Fish and Wildlife Service, Upper Mississippi River National Wildlife and Fish Refuge, Onalaska, WI 54601. [3]U. S. Fish and Wildlife Service, Regional Office, Bishop Henry Whipple Federal Building, Fort Snelling, MN 55111

INVERTEBRATES

2) TEMPORAL RELATIONSHIPS IN THE ASSIMILATION OF TRANSPORTED ORGANIC MATTER BY THE FILTERER *HYDROPSYCHE ORRIS*
Cheng Xiong, Paul Bates, and Michael Delong. Large River Studies Center and Biology Department, Winona State University, Winona, Minnesota 55987

3) LOTIC SESTON QUALITY AND THE GROWTH OF A COMMOM FILTER-FEEDING CADDISFLY
Jason A. Veldboom and Roger J. Haro. River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601.

FISH

4) SPATIAL DISTRIBUTION OF FISH NEAR INDUSTRIAL WARM WATER OUTFLOWS ON POOL 19 OF THE MISSISSIPPI RIVER DURING COLD WATER CONDITIONS.
Joe DeBold, Dr. Timothy Spier, David Wyffels Department of Biological Sciences, Western Illinois University, 1 University Circle, Macomb, Il 61455

5) AN EXAMINATION OF PHYTOPLANKTON CONSUMPTION BY GIZZARD SHAD IN POOL 19 OF THE MISSISSIPPI RIVER
Lee Ann Brammeier, Lacey Strack, and Susan T. Meiers. Department of Biological Sciences, Western Illinois University, Macomb, IL 61455

MUSSELS

6) ASSESSING THE SPREAD OF ZEBRA MUSSELS IN THE ST. CROIX RIVER USING DENSITY MEASUREMENTS AND NATIVE MUSSELS.
Byron N. Karns[1] and Dan Kelner[2]. [1]St. Croix National Scenic Riverway, National Park Service P.O. Box 708, St. Croix Falls, WI 54024, [2]U.S. Army Corps of Engineers, St. Paul District 190 Fifth Street East, St. Paul, MN 55101-1638

7) ASSESSMENT OF TRACE METALS CONTAMINATION IN UPPER MISSISSIPPI RIVER USING ZEBRA MUSSEL (*DREISSENA POLYMORPHA*)
Matthew McDermott and Chulsung Kim. Department of Natural and Applied Science, University of Dubuque, Dubuque, IA 52001

8) SAFETY OF CHEMICAL TREATMENTS TO MUSSEL GLOCHIDIA
Theresa M. Schreier[1], Jeff J. Rach[1], Tony Brady[2], and Doug Aloisi[2].

9) THE INFLUENCE OF DIET ON SURVIVAL OF *LAMPSILIS CARDIUM* JUVENILES IN LABORATORY EXPOSURES.
Casey Sleznikow[1], Teresa Newton[2], and Michelle Bartsch[2]. [1]Central High School, 1801 Losey Blvd, La Crosse, WI 54601; [2]USGS, Upper Midwest Environmental Sciences Center, 2630 Fanta Reed Road, La Crosse, WI 54603.

PLANTS

10) PLANT COMMUNITIES IN RIPARIAN WETLAND MEADOWS DOMINATED BY REED CANARY GRASS
Robin W. Tyser [1,2], Eileen M. Kirsh[2], and Melissa S. Meier[2]. [1]River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601. [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54602.

WATER QUALITY

11) EVALUATION OF HEAVY METAL MOBILITY FROM ABANDONED LEAD AND ZINC MINING AREA INTO THE MISSISSIPPI RIVER
Christopher Green and Chulsung Kim. Department of Natural and Applied Science, University of Dubuque, Dubuque, IA 52001

12) CHARACTERIZATION OF MICROBIAL NITRIFICATION AND DENITRIFICATION IN AN URBAN WISCONSIN MARSH
Kevin M. Miller and Bonnie Bratina. River Studies Center, University of Wisconsin- La Crosse, La Crosse, WI 54601

REPTILES

13) ASSESSMENT OF A TURTLE COMMUNITY IN THE CEDAR RIVER, IOWA
Andrew J. Huck[1] and Gerald L. Zuercher[1]. [1] Department of Natural and Applied Sciences, University of Dubuque, 2000 University Avenue, Dubuque, IA 52001

14) A TURTLE SURVEY OF A WETLAND AREA, DUBUQUE COUNTY, IOWA.
Mark R. Stover[1] and Gerald L. Zuercher[1]. [1] Department of Natural and Applied Sciences, University of Dubuque, 2000 University Avenue, Dubuque, IA 52001

FOOD WEB

15) TEMPORAL DYNAMICS IN STABLE ISOTOPE RATIOS OF TRANSPORTED ORGANIC MATTER IN THE UPPER MISSISSIPPI RIVER
Rebecca J. Bown and Michael D. Delong. Large River Studies Center and Biology Department, Winona State University, Winona, Minnesota 55987

16) TEMPORAL AND SPATIAL PATTERNS IN CHLOROPHYLL CONCENTRATION OF TRANSPORTED ORGANIC MATTER IN THE UPPER MISSISSIPPI RIVER
Emily R. Forde and Michael D. Delong, Large River Studies Center, Winona State University, Winona MN, 55987

17) TEMPORAL PATTERNS OF BENTHIC-PELAGIC COUPLING IN MICROALGAE: A STABLE ISOTOPIC EVALUATION
Laura E. Luger and Michael D. Delong. Large River Studies Center and Biology Department, Winona State University, Winona, Minnesota 55987

NOTES

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BIOACOUSTIC AND BEHAVIOR IN THE SOUTHERN FLYING SQUIRREL (*GLAUCOMYS VOLANS*), A KEYSTONE RIPARIAN MAMMAL.

Deborah L. Beal and Tony Meyer
Illinois College, Jacksonville, Illinois, USA 62650, 217-245-3463

Southern Flying Squirrels *Glaucomys volans* are elusive nocturnal arboreal mammals which have been identified as "keystone species" in Riverine Floodplain and Deciduous forests throughout the eastern United States and Canada. Many ecological studies of the species have been done but little analysis of their vocal repertoire, or predator avoidance behavior exists. In this study we evaluate acoustic and behavioral responses to predator calls among varying age and gender classes and document acoustic signals used by flying squirrels to communicate. This information may be important in helping to census and identify individuals in the field.

A captive colony of 16 - 22 individuals of varying ages and gender, housed in an outdoor 8' x 8' x 6' wire mesh pen were studied over a three month period. Several different methods were used to acquire acoustic data. First, calls made at random in the colony were recorded and analyzed for 10 days each in May, June and July. Then, individual males and females, and juveniles were isolated and calls between the individual and the colony recorded. Finally, predator calls of Barred and Great Horned Owls were broadcast and the responses of individuals of varying gender and age were recorded. Squirrels were video taped and photographed during broadcasts to evaluate behavior responses.

Flying squirrels communicate with high pitch chirps and squeaks. Call frequency ranged from 4-24 Hz/1000. There were significant differences in the number of calls made by males and females and the response of each to predator calls. Males were more significantly more likely to sound an alarm call than females (ttest = .08) in response to predator signals. Infants less than 4 weeks communicated with inaudible high frequency calls when separated from their mothers (>18 hz/1000). There was some indication that flying squirrels have the capacity for ventriloquism such as that used by western ground squirrels. Observers were only able to identify individuals sounding alarm calls from different areas by watching thoracic movement and sounds appeared to originate from outside the pen. Last, individuals separated from the colony responded to colony callers when placed more than 100 feet away which may indicate that sound is one method used to join up to form colonies during the winter.

Keywords: riparian, flying squirrel, behavior, predator response, *Glaucomys volans*

ICE SPEAR FISHING: FOCUSING ON THE UPPER MISSISSIPPI LA CROSSE REACH

Ron Deiss
Clock Tower Building, P.O. Box 2004, U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois 61204-2004

Ice spear fishing is one of the oldest, traditional methods for harvesting fish during the winter months. It has been practiced in the Upper Midwest Great Lakes region for over 1000 years. Ice spear fishing became popular in the La Crosse Reach on the Upper Mississippi River in the late 19th and early 20th centuries, but was completely prohibited by the late 1930s. During the height of its popularity, ice spear fishing in the La Crosse Reach adapted to the varying river conditions and developed a regional style.

Keywords: spear fishing, history, fisheries, native culture

LIFE-HISTORY PATTERNS OF FINGERNAIL CLAMS (*MUSCULIUM TRANSVERSUM*) OF BIG LAKE, POOL 9, UPPER MISSISSIPPI RIVER

Jim Eckblad, Karl Swenson, David Schultz, Melissa Howie, Trish Young, Nick Leslein, Bret Powell, Leah Doerr, Katie McVey
Biology Department, Luther College, Decorah, Iowa 52101

In order to build realistic models of a benthic population like *Musculium* it is essential to have realistic estimates of its life-history characteristics. We have been participating in a two-year study, May to October 2003 and 2004, in which monthly samples were taken of these fingernail clams. During 2003 we dissected 1808 adult *Musculium* to establish pregnancy rates and numbers of shelled-embryos per adult. Pregnancy rate ranged from 80 to 40 percent, with a decline noted from June to October. The number of shelled-embryos per pregnant adult also declined from over 10 to less than 5 per adult. With this information, and population size, we calculate that the reproductive contribution to the next generation is spread out over this six-month period, but it is three times greater in July and August than it is in September and October. Upon completion of these life-history characteristics we will be much more confident of our ability to build a realistic model of this dynamic population.

Keywords: fingernail clam, *Musculium transversum*, modeling, life-history, Mississippi River

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ESTIMATING STATUS AND TRENDS USING LTRMP SURVEY DATA

Brian R. Gray
U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54603

Reporting status and trends statistics is standard for most monitoring programs. Given a probabilistic design, these statistics are reasonably estimated using so-called 'design-based' and 'model-assisted design-based' estimators. Inferences using these methods, being based on the survey design rather than on subjective selection of a model, are arguably more standard and less vulnerable to challenge. However, the use of design-based methods requires attention to monitoring design features. For the LTRMP, these features include stratification (geomorphic and temporal), sampling weights (we don't sample strata proportional to size), clustering (veg's sites and, for all components, years) and finite population correction factors (strata with small numbers of cells). These methods have previously been used to generate status estimates but have not historically been used to estimate trends in LTRMP data. Estimation of status is described, and monotonic trend estimation for linear (water), dichotomous (relative frequency) and count data are illustrated using SAS® and SUDAAN® software.

Keywords: design-based estimates, LTRMP, status, survey regression, trends

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WETLAND FLOOD WATER RETENTION ESTIMATION USING A 3-DIMENSIONAL GIS MODEL

James Handley[1] and Cynthia Berlin[1, 2]
[1]Center for Geographic Information Science, University of Wisconsin-La Crosse, La Crosse, WI 54601. [3] River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601.

This research examines the utility of estimating surface flood water retention by wetlands through the use of remotely-sensed data, digital topographic data, and a 3-dimensional GIS model. The study focused on a small urban wetland, the La Crosse River Marsh, in the Upper Mississippi River System. The April 2001 Mississippi River flood provided an excellent opportunity for developing the model, since Landsat ETM imagery and 1:24,000-scale aerial photography were available for the day the flood peaked in the study area. The model was evaluated using the photographs and images separately, and the statistical comparisons were made for estimation results. An aerial photograph and ETM image of non-flood conditions were used to provide baselines for the model. Digital topographic data were used to derive a digital elevation model, which provided the basis for depth and water volume measures. The aerial photographs and pan-enhanced ETM images were interpreted to identify water and non-water surface cover, and used to derive the surface spatial extent of inundation. This data was then combined with the DEM to produce estimates of surface flood water retention.

Key words: Flooding, GIS modeling, wetlands, Landsat, aerial photography.

2003 AND 2004 FOLLOW-UPS ON A 2002 UNIONID TRANSLOCATION FROM MISSISSIPPI RIVER MILE 818.9, COTTAGE GROVE, MN

Marian E. Havlik
Malacological Consultants, 1603 Mississippi Street, La Crosse, Wisconsin 54601-4969

In 2003 and 2004 we conducted follow-ups of a 2002 mussel translocation from Mississippi River Mile 818.9, downstream from St. Paul, at Cottage Grove, Minnesota. The 52258 m^2 area (1500 X 375 feet) extended from the LDB to the Main Channel. The translocation, done prior to burial of a wastewater disposal pipe, yielded a mean mussel density of 0.38/m^2 among 19,630 live mussels (23 live plus 4 sub-fossil species). Of the 1439 (7.33%) mussels which represented two Minnesota endangered and five threatened species, at least 572 mussels were numbered, measured, and aged (1-17 years of age). All other living mussels were hash-marked. In May 2003, 609 live unionids (18 live plus 5 sub-fossil species) were recovered from the two Translocation Sites; 515 were numbered and hash-marked mussels. 76 *Arcidens confragosus* had a 98.7% survival, while 232 *Quadrula nodulata* had a 98.3% survival. One each of *Tritogonia verrucosa, Obovaria olivaria,* and *Ligumia recta* were recovered alive. The survival of numbered special status mussels was 98.36%; 12.6% of the numbered mussels had external growth ring disturbances. About 3% of numbered mussels showed little growth. The overall survival of all marked and numbered mussels was 97.2%. The substratum throughout both translocation sites was mostly mud with woody debris, and up to 6 m deep.

In June 2004, 183 numbered *Quadrula nodulata* (98.9% survival), 58 numbered *Arcidens confragosus* (96.7% survival), and 2 numbered *Obovaria olivaria* (100% survival) represented 54.2% of 448 mussels recovered (15 live plus 1 dead [hash-marked] species). Of the numbered mussels, 81 (33.3%) were new to the follow-up measuring and external aging process. Nearly 98% of the numbered mussels survived in a muddy habitat, <1 meter deep. About 12.7% of the numbered unionids showed little or no growth; however, most of these were older mussels that would be expected to have a slow growth rate. At least 10.7% of the numbered mussels had external growth ring disturbances. In 2004, the overall survival of all hash-marked and numbered mussels was nearly 95%. Most numbers engraved on threatened and endangered mussels were still very legible. A total of 392 of 572 (68.5%) numbered mussels were recovered three times with an overall survival of 97.95%, in spite of an increased mussel density. Similar percentages of all age classes were recovered during each project year. Two years after translocation, the overall survival of all numbered and hash-marked mussels was nearly 96%. No numbered mussels ever moved into the sandy area upstream of Translocation Site 1. Slightly more *Dreissena* were found in 2003 than in 2002, but none were found dead or alive in 2004. Since several PVC pipes remained in the original project area in 2004, construction impacts were unlikely to have extended beyond the marked project site.

Keywords: mussel translocation, external unionid aging, unionid substrata, Mississippi River, Threatened and Endangered mussels

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FISH COMMUNITY RESPONSES TO NAVIGATION CHANNEL MAINTENANCE IN THE UPPER MISSISSIPPI RIVER SYSTEM.

Kevin S. Irons and Mark A. Pegg
Illinois River Biological Station, Illinois Natural History Survey, 704 N. Schrader Ave, Havana, Illinois 62644

Navigation channel maintenance in the Upper Mississippi River System (UMRS) is primarily performed through dredging operations to sustain appropriate water depths for safe passage of shipping vessels. However, the ecological effects on riverine fish communities from dredging and placement of dredge materials have raised concerns about proper management approaches to this maintenance process. Therefore, we are assessing fish community structure of areas that have been influenced by dredge placement activities in comparison to areas that have not been recently dredged. We used available data from the U.S. Army Corps of Engineers (USACE) and Long Term Resource Monitoring Program (LTRMP) fisheries component that samples six regional trend areas throughout the Upper Mississippi River System. Using GIS we have been able to intersect these two datasets spanning much of the UMRS to create a dynamic wealth of information from 1998-2004. This analysis gives insight into dredging effects and the potential recovery rates in the UMRS at a much larger scope than previous site-specific comparisons.

Keywords: fish communities, dredging, Mississippi River, Illinois River, Upper Mississippi River System.

AN EXPLORATION IN GROWTH OF THE RED-EARED SLIDER, *TRACHEMYS SCRIPTA ELEGANS*, IN THE UPPER MISSISSIPPI RIVER POOLS 19 & 20 AND SELECTED SITES ON THE DES MOINES AND FOX RIVERS.

Kelly J. Larson, **Michael A. Romano**, Richard V. Anderson, and Sean E. Jenkins
Western Illinois University, Department of Biological Sciences, 1 University Circle, Macomb, IL 61455.

Growth rates of emydid turtles is well-documented for populations in lentic habitats. Few studies examine the growth rate of these species in lotic riverine systems. Red-eared sliders (*Trachemys scripta elegans*) were trapped during consecutive summers from 1997 through 2003 at sites in the Mississippi River Pools 19 and 20, Des Moines River, and Fox River. Sites in the Mississippi River included three in Pool 20: open river, slough, and backwater; and one in Pool 19: just above Lock and Dam 19. In addition, one site was located in the Des Moines River and one site in the Fox River. The latter two sites were located just upstream form their confluence with the Mississippi River, Pool 20.

Specimens were measured for carapace length, plastron length, weight, and gender. Morphometric values were log-transformed and those for carapace length and weight were analyzed by simple linear regression as an estimate of growth rate. Analysis of Covariance (ANCOVA) was utilized to compare growth rates between sexes, among sampling years, and among sites.

Data revealed significant differences in slopes for females versus males ($p<0.0001$) and thus, the data from different genders were not pooled. No significant differences were found among slopes of females and among slopes of males for sample years (females: $p=0.65$; males: $p=0.115$) or sites (females: $p=0.91$; males: $p=0.23$). Data from all sample years and sites were pooled for each sex. For females, significant differences were found among elevations of slopes of the year 2003 and all other years ($p<0.0001$). For males, significant differences were found among elevations of slopes of the year 2003 and all other years ($p<0.0001$) and also between the years 1999 and 2002 ($p<0.01$). For both sexes, significant differences existed among the elevations of slopes of the Mississippi River sites and, concordantly, the Des Moines River and Fox River sites (females: $p<0.0001$; males: $p<0.0001$). Linear regression produced two lines: one for each gender: females, $r^2=0.97$ and $y=2.83x-1.58$, males, $r^2=0.94$ and $y=2.49x-0.69$.

The growth rates for sexes were different, with female growth rate greater than male growth rate. From these data, and based on the resulting slopes, it was determined females in this study have a faster growth rate than males. Growth rate (slope) was the same for all sample sites and years for females or males. Thus, sample site and year had no effect on growth rate for the study populations. Elevations of slopes among certain sites and years differed due to different starting points in weight for the regression lines.

Keywords: red-eared sliders, *Trachemys scripta elegans*, growth rates, linear regression, ANCOVA

CHARACTERIZATION OF FLOODPLAIN LAKE FISH COMMUNITIES IN THE LOWER WHITE RIVER, ARKANSAS

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The lower White River, Arkansas represents one of the least altered river-floodplain ecosystems (RFE) in the United States. The lower White River floodplain encompasses approximately 65,000 ha of bottomland hardwood forest that contains over 300 lakes scattered throughout public and private lands. River regulation, including irrigation and navigation channel projects, threatens to alter the natural hydrology of the lower White River RFE. The objective of this research was to examine relationships between fish communities and environmental variables associated with river/lake morphology and flooding regimes in lower White River floodplain lakes. Fish communities were sampled by experimental gill nets, mini-fyke nets, and night time electrofishing during the summer and fall 2002. Multivariate direct gradient analyses suggested that lake depth, water clarity, dissolved oxygen and, to a lesser extent, degree of flooding (reflecting connectivity of floodplain lake and the main river channel) were most important in the structuring of lake fish communities. Fish species richness was positively correlated with degree of flooding, whereas evenness exhibited a significant positive relationship with dissolved oxygen and significant negative relationships with water temperature and conductivity. Species diversity exhibited a significant positive relationship with linear distance to the main channel. Conversely, species diversity had significant negative relationships with water temperature and total dissolved solids (TDS). Assessment of empirical fish community-environment relationships prior to alteration of the lower White River should help guide river management and species conservation efforts by identifying environmental factors that affect fish community composition. This project also aids in defining baseline ecological conditions for temperate-zone RFEs.

Keywords: floodplain lake, fish, diversity, gradient analysis, physical variables, White River

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FISH ABUNDANCES OF BACKWATER LAKES WITH CONNECTIVITY GRADIENTS IN THE LAGRANGE REACH, ILLINOIS RIVER.

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Flood plain productivity in large river ecosystems can be greatly influenced by the level of connection of backwater habitats to the river's main stem. Backwater habitats of the LaGrange Reach of the Illinois River were examined for differences in fish abundances according to their main channel connectivity. Two backwater categories were assessed, one with continual connection to the main channel, and one with seasonal connection to the main channel. Data obtained from the Long Term Resource Monitoring Program (LTRMP) were analyzed from multiple gear collections (electrofishing, fyke netting, mini-fyke netting, and seining) occurring over a 12-year period (1993-2004). Seasonal variability was also analyzed to determine catch differences throughout a given hydrological event, within three sample periods occurring from June 15-October 31. Mean catches for electrofishing (198.0 fish per run) and mini-fyke netting (179.1 fish per net) were significantly higher ($P<0.005$) in seasonally connected backwaters. Mean electrofishing catches were also significantly higher ($P<0.005$) during the two later sample periods (284.0 and 265.3 fish per run, respectively) in seasonally connected backwaters. Catches based on maximum annual river stage from the LTRMP data set were also compared to those observed by the Long Term Illinois River Fish Population Monitoring Program (LTEF). In general, fish catches had a tendency to increase as maximum annual flood levels increased. These results indicate that although flood events are important for all backwaters, lakes exhibiting seasonal connection to the main channel can have a positive affect on fish abundances.

Key words: Illinois River, connectivity, backwaters, fish, Long Term Resource Monitoring Program

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INTERACTION OF NAVIGATION CHANNEL AND VEGETATION BED PHYTOPLANKTON COMMUNITIES DURING FALL, SPRING, AND SUMMER OF 2003-2004 NEAR LOCK AND DAM 19, MISSISSIPPI RIVER.

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There have been several studies of how phytoplankton community composition varies in large rivers, though few have examined how phytoplankton communities in open water and vegetation beds interact. Identification and counts of algal species in surface samples taken from mid-navigation channel, mid-vegetation bed, and halfway in between these two sites ("upriver sites"), were compared with 5 sites downriver ("downriver sites": three sites just below Lock and Dam 19 near the Iowa side, the Illinois side, and the midway point between these two; and two sites further downriver at mid-navigation channel and approximately 200 m north of Eagle Island near the Illinois shore) were made during the months of August, September, and November 2003, and April and June of 2004. Preliminary analyses suggest that although the navigation channel and vegetation bed share many species in common, they do have different community compositions. Mixing of many species occurs, as measured in samples downstream, and the amount of mixing between the upstream sites varies with time of year.

Keywords: phytoplankton, Mississippi River, algal community composition, aquatic vegetation, Lock and Dam 19

SOIL TEXTURE AND FOREST STRATA RELATIONSHIPS OF THE CENTRAL FLOODPLAIN FOREST, LOWER KASKASKIA RIVER, ILLINOIS

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Soil texture has been shown to be an important factor in forest community development for the silver maple – American elm (*Acer saccharinum – Ulmus americana*) central floodplain forest. A southern Illinois floodplain study suggested that inundation, soil drainage, and aeration were the most important factors in floodplain forest community development. Other studies indicated that soil may be the most important environmental factor for the overstory species, and less important in other forest strata. The purpose of this study is to determine if the proportions of sand, silt, and clay are related to species importance in the floodplain forest community of the Lower Kaskaskia River, a tributary of the Mississippi River, located in Illinois east of St. Louis, Missouri.

Three sites were sampled near Posey, Venedy, and Fayetteville, Illinois. Regressions of importance values of tree species in overstory positions and percent sand indicated that *A. saccharinum* decreased in importance when the sand content of the soil increased at Posey ($p<0.001$, $r^2=0.379$) and Venedy ($p=0.031$, $r^2=0.187$). At Posey, greater sand content was also related to a decrease in the importance of *Acer negundo* ($p=0.01$, $r^2=0.227$) and *Fraxinus pennsylvanica* ($p<0.001$, $r^2=0.438$). Only one species increased in importance with increased sand, *Celtis occidentalis* ($p=0.025$, $r^2=0.193$), and only at Fayetteville. Soils with a greater silt component at Posey were significantly related to an increase in the importance of *A. negundo* ($p=0.010$, $r^2=0.227$), and *F. pennsylvanica* ($p=0.006$, $r^2=0.246$) in the overstory. Greater amounts of clay increased the importance of *A. saccharinum* ($p<0.001$, $r^2=0.411$) and *F. pennsylvanica* ($p=0.001$, $r^2=0.338$) at Posey, and *U. Americana* ($p=0.045$, $r^2=0.186$) at Venedy. At the Fayetteville site, increasing clay in the soil was significantly related to the increase in importance of *A. negundo* ($p=0.022$, $r^2=0.186$) in the overstory. The importance values of tree species in understory positions were only occasionally related to soil texture content.

Keywords: Kaskaskia River, *Acer saccharinum*, *Ulmus americana*, soil texture, floodplain.

DIETARY OVERLAP BETWEEN BIGHEAD AND SILVER CARP WITH THREE NATIVE FILTER FEEDING FISHES OF THE ILLINOIS AND MISSOURI RIVERS

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During the 1980's bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*Hypophthalmichthys molitrix*) were introduced into the Mississippi River via accidental escape from aquaculture facilities. Since their introduction, populations of these non-native fishes have dramatically increased and expanded their range within the Mississippi River drainage. The result has been a rising concern about the potential negative effects on native fishes. Both species are considered filter-feeders, consuming zooplankton and algae; therefore, bighead carp and silver carp may directly compete for food resources with three economically and ecologically important native filter-feeders: bigmouth buffalo (*Ictiobus cyprinellus*), gizzard shad (*Dorosoma cepedianum*) and paddlefish (*Polyodon spathula)*. Our objectives for this investigation were to: 1) assess zooplankton abundance and composition to allow for the evaluation of feeding electivity and influence of bighead carp and silver carp on the zooplankton community, and 2) evaluate dietary overlap between bighead and silver carp with these three native filter-feeders. Our preliminary data suggest the diet of bighead carp and silver carp primarily consists of rotifers and other zooplankton less than 200 mm, and the diets of bighead carp and silver carp are more similar to gizzard shad and bigmouth buffalo diets than with paddlefish diet.

Keywords: Asian carp, diet overlap, native fish, Mississippi River, zooplankton, Illinois River

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AQUATIC NUISANCE SPECIES: AN EVALUATION OF BARRIERS FOR PREVENTING THE SPREAD OF BIGHEAD CARP TO THE GREAT LAKES.

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Reproducing populations of bighead carp (*Hypophthalmichthys nobilis*) and silver carp (*Hypophthalmichthys molitrix*), large filter-feeding fishes native to Asia, are moving upstream in both the Mississippi and Illinois Rivers. These fishes will enter the Great Lakes in large numbers if nothing is done to stop their upstream spread. Such an introduction poses a very serious threat to the ecology of these systems as both species are planktivorous. Consequently, these aquatic invaders could affect every species of fish in the Great Lakes as all fishes forage on plankton at some point during their lives. Therefore, identifying mechanisms to control their range expansion is imperative. We evaluated the effectiveness of three behavioral fish guidance systems (bio-acoustic, integrated electric / bio-acoustic and electric) in restricting the movements of bighead carp in outdoor experimental raceways. Each barrier experiment consisted of three trials with each trial being three days in duration. A total of 3219 observed attempts to cross the bio - acoustic array were made by Bighead carp. Of those attempts, 57% were successful repels. The integrated electric / bio – acoustic barrier was found to be more effective in restricting the movements of bighead carp. In total, only 54 attempts were made to cross this barrier type. Of those attempts, 87% were successful repels. Finally, the electric barrier was found to be the most effective of the three barrier types. A total of 59 attempts were made by bighead carp to cross this barrier type. Of those attempts 100 % were successful repels. Large - scale applications related to these finding will be addressed.

Keywords: Asian carp, Illinois River, planktivore, barrier, behavior

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MONITORING PALLID STURGEON LONG-RANGE MOVEMENT AND HABITAT USE IN THE MIDDLE MISSISSIPPI RIVER

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The federally endangered pallid sturgeon *Scaphirhynchus albus* is rare in the Middle Mississippi River, and little is known about its habitat use and movement patterns in this portion of the river. During a 10 year period, we implanted ultrasonic transmitters in 92 pallid sturgeon and tracked their movements throughout the Middle Mississippi River. Once a fish was located, we recorded its position and then used GIS to evaluate pallid sturgeon macrohabitat use. Pallids (N = 59 fish relocated, 362 positions recorded) selected open water, such as the main channel and open channel borders, over other macrohabitats such as diked channel borders, wing dikes, island tips, or side channels. Movement per day was greatest during the spring, and some pallids made relatively long migrations during this time of year. Currently, we are supplementing our active tracking with an array of passive receivers spread throughout the Middle Mississippi River which allow us to track long term movement patterns of pallid sturgeon.

Key Words: *Scaphirhynchus albus*, pallid sturgeon, telemetry, habitat, movement

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THERMAL REQUISITES FOR GROWTH OF ST. CROIX RIVER WINGED MAPLELEAF MUSSEL GLOCHIDIA AND EXCYSTMENT OF TRANSFORMED JUVENILES FROM HOST-FISH.

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The winged mapleleaf mussel (*Quadrula fragosa***)** historically occupied a greater range than it does today and now has only one known reproducing population that is restricted to a 12-mile reach of the lower St. Croix River (Wisconsin and Minnesota). Federal, state, and university biologists are working cooperatively to learn more about the current range, life-history, and genetics of this federally endangered species to initiate controlled propagation programs that will aid its recovery. Successful propagation depends on identifying suitable host fish for transformation of glochidia into juveniles. We initiated a series of host fish tests at three different temperature regimes on 3 October 2003 that later identified blue catfish (*Ictalurus furcatus*) and channel catfish (*Ictalurus punctatus*) as suitable hosts for this mussel. During the first test, groups of glochidia-infested fish were held at a near constant and unseasonably warm water temperature (~19.6°C) to accelerate the rate at which transformation might occur. Meanwhile, additional channel catfish used in the two remaining tests were infested with the same stock of glochidia but kept at colder temperatures (~12.6°C) for the next 47 days. Fish used in the second test were then supplied with water at a temperature (~19.5°C) similar to that of the first test. Peak juvenile recovery occurred about 6 weeks after the start of the first test and 10 weeks after the start of the second. Comparisons of the time and cumulative water temperature units required to recover juveniles from channel catfish reared under these thermal regimes allowed us to empirically estimate: the minimum daily mean water temperature (9.25EC) required for winged mapleleaf glochidia to grow and transform into juveniles; and the cumulative water temperature units of net daily growth (~395EC≅d) needed to initiate peak excystment and recovery of winged mapleleaf juveniles. Remaining fish used in the third test were subsequently maintained in a thermal regime that closely followed St. Croix River water temperatures from mid-November 2003 through June 2004. Peak recovery of juveniles in this test began 21 June 2004, 261 days after infestation (453EC≅d of growth) and just 7 days later than we predicted. Our test results also suggest that minimum daily mean water temperatures of 17 to 20EC are likewise needed to trigger peak excystment of winged mapleleaf juveniles from the gills of their host fish. These early life-history findings are now being applied in propagation programs to help recover winged mapleleaf populations within this species' historic range.

Keywords: winged mapleleaf mussel, St. Croix River, glochidia, growth, water temperature

TEMPORAL DYNAMICS IN STABLE ISOTOPE RATIOS OF TRANSPORTED ORGANIC MATTER IN THE UPPER MISSISSIPPI RIVER

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Stable isotope studies have identified autochthonous sources of organic matter as a major driver in large river food webs, particularly transported organic matter (TOM). The temporal scope of these studies, however, is limited. A better understanding of the temporal aspects of TOM composition and quality is needed. The objective of this study was to examine temporal shifts in composition and quality of transported organic matter in the Upper Mississippi River (UMR) using carbon and nitrogen stable isotope ratios and carbon:chlorophyll *a* ratio. Water samples were taken from sites in the main channel, side channels, and backwaters April - October 2004. Water samples (15 - 60 L) were step-filtered in the field through 105-µm and 53-µm sieves. Each filtered sample was mixed with a colloidal silica solution and centrifuged to separate the algal and detrital constituents of each size fraction of TOM. Samples were prepared and shipped for determination of stable isotope ratios. Chlorophyll concentrations were determined using spectrophotometry. Preliminary results indicate that carbon and nitrogen stable isotope ratios do shift temporarily in response to hydrological patterns of the UMR, but little change in isotopic ratios occurs during periods of hydrological stability. The carbon:chlorophyll *a* ratio for detrital TOM indicates high quality, probably due to a large component of senescent phytoplankton and benthic algae. A better understanding of the temporal and spatial dynamics of potential organic matter sources will allow for a broader recognition of trophic processes, thereby providing functional measures to support management plans in the rehabilitation of river ecosystems.

Keywords: transported organic matter, temporal, stable isotope ratios, hydrological patterns, Upper Mississippi River

AN EXAMINATION OF PHYTOPLANKTON CONSUMPTION BY GIZZARD SHAD IN POOL 19 OF THE MISSISSIPPI RIVER

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Though game fish have been more intensively studied in regards to diet, non-game fish have been less studied. In order to understand how planktivorous fish affect the phytoplankton communities of the Mississippi River, fish were harvested by electroshocking from above Lock and Dam 19 and a small tributary, Chaney Creek, in August 2004. The stomach and intestinal contents of the sampled planktivorous fish were harvested and preserved in I2KI for further analysis. For this particular project, we are examining 10 gizzard shad to determine the number and species of phytoplankton found in the stomach and intestine. We will compare these data with the number and species of phytoplankton in water samples taken at the sampling sites at the time the fish were sampled. Preliminary data suggest that gizzard shad are, to some extend, actively choosing particular algae to eat, as the numbers and species composition of the stomach and intestine appear to be different. Upon completion of this project, future studies will concentrate analysis of stomach and intestine contents of other sampled species that are considered planktivorous.

Keywords: gizzard shad, algae, phytoplankton, Mississippi River, planktivorous fish, Lock and Dam 19

SPATIAL DISTRIBUTION OF FISH NEAR INDUSTRIAL WARM WATER OUTFLOWS ON POOL 19 OF THE MISSISSIPPI RIVER DURING COLD WATER CONDITIONS.

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It is well known that various species of fish congregate within warmer waters during cold water conditions. This study aims to show species composition, size distribution and microhabitat utilization in relation to these warm water outlets in Pool 19 of the Mississippi River. During this experiment we randomly spot sampled two warm water outlets on the Iowa shoreline of pool 19 with a DC electrofishing boat. We also sampled two shoreline areas that had no warm water outlets and compared fish species found and catch per unit effort. Preliminary results showed temperatures ranging from 1.9 ^{0}C to 13.2 ^{0}C. Common carp (*Cyrinus carpio*) and gizzard shad (*Dorosoma cepedianum*) were the only fish species utilizing these warm water outlets during cold water conditions. The majority common carp were found in water temperatures from 8^{0}C to 12^{0}C, whereas gizzard shad were found in water temperatures from 3^{0}C to 9^{0}C. All fish were found within 15 meters of warm water outlets which is closer than we expected. Temperature, conductivity and bathometric maps were constructed of the warm water plumes using GIS and were compared to the spatial distribution of fish species.

Keywords: Mississippi River, Pool 19, *Dorosoma cepedianum*, *Cyrinus carpio*, GIS

TEMPORAL AND SPATIAL PATTERNS IN CHLOROPHYLL CONCENTRATION OF TRANSPORTED ORGANIC MATTER IN THE UPPER MISSISSIPPI RIVER

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Recent studies have shown algal transport organic matter (TOM) to be an important influence on food web dynamics in large rivers. Unfortunately, research has been limited to main channel habitats and addressed limited spatial scales. This study examined how the abundance of algal TOM changed temporally in different habitats of the Upper Mississippi River. This was addressed by sampling different particle sizes of TOM from April to September 2004 in side channel, backwater and main channel habitats of the Upper Mississippi River near Winona, MN. Samples were drawn monthly from four point transects across the channel at a depth of 1 meter and divided into fine (FTOM; 100-1000 μm) and ultrafine (UTOM; 1-100 μm). TOM samples were then split into algal and detrital fractions using colloidal silica. Chlorophyll concentrations were determined spectrophotometrically, using the monochromatic method. Similar temporal trends were evident for both UTOM and FTOM. Chlorophyll concentrations increased between April and May, which corresponded to a decrease in discharge. Concentrations declined from May to June as discharge increased to its spring maxima. Both UTOM an FTOM increased to highest observed concentrations in August during baseflow condition. Only small differences in chlorophyll concentrations were evident between habitats, with all three exhibiting similar temporal patterns. Overall, however, concentrations were slightly higher in the main channel. This study indicated that an inverse relationship exists between chlorophyll concentrations of phytoplankton and discharge. Small differences observed between habitats demonstrate the productivity capacity of lotic habitats within the river.

Keywords: chlorophyll concentration, Mississippi River, transport organic matter, food web, large river, habitat

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EVALUATION OF HEAVY METAL MOBILITY FROM ABANDONED LEAD AND ZINC MINING AREA INTO THE MISSISSIPPI RIVER

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There is a 60-acre abandoned lead (Pb) and zinc (Zn) mining area in northwestern Illinois. The primary residual minerals are metal sulfides such as galena (PbS), sphalerite (ZnS) and pyrite (FeS_2). The drainage area reaches to Smallpox Creek which flows into the Mississippi River potentially contributing heavy metal for decades. This study was conducted to evaluate the mobility of heavy metals from the abandoned mining area by determination of the amount of metals in water and sediments around the drainage areas. In addition to Pb and Zn, various other heavy metals such as cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), iron (Fe), manganese (Mn), and nickel (Ni) in aqueous and solid phases were determined using atomic absorption spectroscopy following EPA methods 3005A and 3050B, respectively. For the aqueous phases, total recoverable metals and dissolved metals were determined separately to investigate the degree of contribution of dissolved and suspended metal particles to the mobility. According to the obtained results, significant amounts of Pb, Fe, Cu, and Mn contents were observed in the sediments and aqueous samples while minor amounts of Ni, Cr, and Co were detected. Various heavy metal contents in water and sediments will be presented.

Keywords: heavy metal, mining, Illinois, mobility, particulate, dissolved

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ASSESSMENT OF A TURTLE COMMUNITY IN THE CEDAR RIVER, IOWA

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We initiated a pilot project at Ingawanis Boy Scout Camp along the Cedar River (Bremer County, Iowa) to assess the river turtle community. Wire turtle traps (Nichols Net & Twine Co., Inc., Granite City, Illinois) were opportunistically placed at a depth of no more than 1 m and baited with fat, gristle, and bone. Most trapping took place on weekends between late-May and early-September 2004. Significant flooding prevented trapping for several weeks throughout the summer. We recorded 47 captures of 46 individual turtles representing five species; spiny softshells (*Apalone spinifera*; $n = 19$), snapping turtles (*Chelydra serpentina*; $n = 11$), painted turtles (*Chrysemys scripta*; $n = 12$), common map turtles (*Graptemys geographica*; $n = 2$), and false map turtles (*Graptemys pseudogeographica*; $n = 2$). All turtles were weighed, measured, and marked by drilling a binary code on the posterior scutes with a Dremel® tool. *Chelydra serpentina* were the largest turtles captured, exceeding our capability to weigh them accurately; new equipment has since been purchased for use in the field during the next trapping effort. Mean carapace length and mean carapace width was greater for *Apalone spinifera* than for *Chrysemys scripta*, but mean total mass was greater for *Chrysemys scripta*. Both *Graptemys* species were smaller in all measurements than the other species. *Graptemys pseudogeographica* were larger than *G. geographica*. We intend to continue and expand this project on river turtles to address issues of community-level and population-level change.

Keywords: *Apalone spinifera*, *Chrysemys scripta*, *Chelydra serpentina*, Iowa Cedar River

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ASSESSING THE SPREAD OF ZEBRA MUSSELS IN THE ST. CROIX RIVER USING DENSITY MEASUREMENTS AND NATIVE MUSSELS.

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The St. Croix National Scenic Riverway was the first wild and scenic river unit of the National Park System, in 1968. The Riverway is considered a nationally significant resource for its richness and abundance of freshwater mussels (~40 species, the greatest in the Upper Mississippi watershed) and is recognized for its outstanding recreational and biological assets. The diversity of unionids within the Riverway is well documented and many threats to that diversity have been identified. This faunal group will be severely impacted by a zebra mussel infestation and from other exotic invasions. Freshwater mollusks are a keystone faunal group of freshwater systems and their potential loss is unacceptable.

In order to understand the invasion of zebra mussels into the St. Croix, measurements of density were taken within the known infestation zone (the last 21 miles of river). Anecdotal evidence from the upper Mississippi River suggests zebra mussel colonization predominates on native mussel beds, especially when substrates are less favorable for recruitment (e.g., sand, silt, etc.). Therefore, sample locations were chosen based on native mussel bed survey work previously conducted by the second author. Six locations were identified from Stillwater, MN, to Prescott, WI, reflecting the range of habitats and hydrology found in the infestation zone. Thirty 1/8-meter quadrate samples were collected by divers at each of the locations. These samples were processed off river, frozen and examined under magnification. Data collected will aid managers who are creating policy based on the spread and intensity of the invasion.

The poster will showcase the methods established to determine zebra mussel densities on the lower river, and present results of not only this invasive, but of Asian Clams and snails found during the sampling events. It will also highlight management decisions resulting from this information.

Keywords: Zebra Mussels, Population Density, Aquatic Invasive Species, Native Mussel Beds, St. Croix National Scenic Riverway.

DISTRIBUTION AND ABUNDANCE OF TUNDRA SWANS ON SELECTED AREAS OF THE UPPER MISSISSIPPI RIVER DURING FALL 2004.

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The Upper Mississippi River (UMR) is an important stopover area for the Eastern Population of tundra swans (*Cygnus columbianus columbianus*) during fall migration. Because of the increased public interest in swans and the responsibility for management of the UMR for this trust species, river managers and biologists have identified and prioritized several research needs that would provide important information to support the wise management of tundra swans. A project was recently initiated to assess the availability of food resources and the impacts of tundra swans on those resources on the UMR, a primary research need that was identified.

One objective of the project is to determine the distribution and abundance of tundra swans on selected areas of the UMR using remote sensing techniques. Digital aerial photography was acquired on multiple occasions during October through December 2004 to document numbers and distribution of tundra swans. Georeferenced composite imagery is then used to map the distribution of swans and automated counting software employed to generate an accurate count. Here we provide swan distribution maps, including an interpretation of swan core use areas using the fixed kernel home range utilization distribution for 95% probability; abundance of swans by pool management areas; and link the information with vegetation cover data. Seasonal change in swan distribution will also be illustrated. This information should contribute to our understanding of swan ecology and be useful to river resource managers in the development and implementation of management strategies for enhancement of the UMR as an important resource for tundra swans.

Keywords: *Cygnus columbianus*, digital imagery, survey techniques, tundra swan, Upper Mississippi River

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TEMPORAL PATTERNS OF BENTHIC-PELAGIC COUPLING IN MICROALGAE: A STABLE ISOTOPIC EVALUATION

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Stable isotope ratios were used to examine temporal relationships in sestonic and benthic microalgae. Samples were collected April-September 2004, from the main channel of the Upper Mississippi River near Winona, Minnesota. Samples were collected to create a time series of ^{13}C and ^{15}N stable isotope ratios of transport organic matter (TOM) and benthic microalgae that would allow us to ascertain if these two algal forms are linked. Water column samples (TOM) were pumped from 1 m below the surface. Microalgae were scraped from substrate at three different sites. Hydropsychid caddisflies were collected from rocky substrate and held in aerated buckets for 48 hr to allow the gut to clear, then were frozen. Algal and detrital TOM fractions were separated using colloidal silica centrifugation separation. The same process was used to separate sediment and detritus from benthic microalgae. Isotopic ratios of algal TOM were used to evaluate potential benthic-pelagic interactions between sestonic and benthic habitats. A two-source mixing model will be applied to ascertain the contribution of sestonic vs. benthic microalgae to the diet of Hydropsychid larvae and as another measure for assessing the presence of benthic-pelagic coupling in the trophic dynamics of the Upper Mississippi River. We hypothesize that isotopic ratios of TOM and benthic microalgae will remain similar over time if there is a rapid turnover in benthic algae. Pronounced differences will suggest that residence time of benthic algae is more protracted, meaning that turnover from TOM is slow or that the extent of benthic-pelagic coupling is limited.

Keywords: stable isotope: transported organic matter; Hydropsychid; benthic microalgae; benthic-pelagic coupling

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ASSESSMENT OF TRACE METALS CONTAMINATION IN UPPER MISSISSIPPI RIVER USING ZEBRA MUSSEL (*DREISSENA POLYMORPHA*)

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Zebra mussel (*Dreissena polymorpha*) has been considered as a promising bioindicator for the evaluation of trace metal contaminations in fresh water system. Efforts have been made to determine the bioaccumulation of trace metals in zebra mussels in the upper Mississippi River which is potentially exposed to abandoned lead mining areas. Five sampling sites were selected to collect zebra mussels covering 4 miles long along the Mississippi River shore lines. Collected samples were oven-dried followed by acid digestion following EPA 3050B method to determine various trace metals concentration such as copper (Cu), manganese (Mn), Iron (Fe), cobalt (Co), Nickel (Ni), Cadmium (Cd), and lead (Pb) using atomic absorption spectrophotometer. Results confirmed that the zebra mussel is a good bioindicator well representing the contamination of trace metals in fresh water system. Consistent amount of trace metals were detected in zebra mussel regardless the sampling sites except Mn and Fe. Results show that zebra mussels are less exposed to Co (0.56 – 2.06 μg/g) and Cd (0.56 – 0.86 μg/g) than Ni (3.77 –6.29 μg/g), Pb (4.08 – 5.80 μg/g) and Cu (16.80 – 20.36 μg/g). For Mn, zebra mussel at one site has relatively higher than mussels collected from four other sites (117.03, 122.14, 131.62, 184.30, and 381.17 μg/g) and Fe (234.03 – over 700 μg/g) concentrations are independent on the location. Both Fe and Mn concentrations are high enough concerning trace metal pollution in the upper Mississippi River.

Keywords: heavy metals, zebra mussel, bioindicator, Mississippi

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CHARACTERIZATION OF MICROBIAL NITRIFICATION AND DENITRIFICATION IN AN URBAN WISCONSIN MARSH

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Nitrogen is a major component of amino acids, nucleic acids, and amino sugars that plants, animals, and microorganisms need for survival. Therefore, nitrogen can often be the limiting factor for productivity in aquatic ecosystems. Influxes of nitrate and ammonia from urban run-off may lead to algal blooms that can have adverse affects on an aquatic ecosystem. The microbial communities that utilize the available nitrates and ammonia are the focus of this study since there has been little research done on these communities from urban freshwater marshes. This study will help fill the void of information on nitrogen cycling in urban freshwater marshes by determining three characteristics of these bacterial communities in an urban Wisconsin marsh: process rate, abundance, and diversity. We chose Myrick Marsh which is an urban marsh located in La Crosse, Wisconsin. Within Myrick Marsh, there are two pond types, perennial and intermittent, based on annual water levels. We seasonally sampled five ponds of each type within Myrick Marsh starting in late summer of 2004 and ending in early summer of 2005. Ammonia and nitrate concentrations were determined from the sediment and water column. In addition to sediment and water column chemistries, we also determined the process rates for nitrification and denitrification. Preliminary results indicate that nitrification and potential denitrification rates differ seasonally. However, pond type does not seem to control either nitrification or denitrification. So far, it seems as though temperature regulates the two processes more so than annual water presence.

Keywords: Nitrification, denitrification, nitrate, ammonia, marsh.

SAFETY OF CHEMICAL TREATMENTS TO MUSSEL GLOCHIDIA

Theresa M. Schreier[1], Jeff J. Rach[1], Tony Brady[2], and Doug Aloisi[2].
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Freshwater mussels have dramatically declined in the U. S. and numerous species are classified as threatened or endangered. The freshwater mussel's life cycle includes a larval or glochidia stage in which the glochidia attach to the gills or fins of a fish host for up to several months. Fisheries managers and scientists have developed propagation techniques to duplicate the natural glochidial infestation of fish. However, various fish diseases may threaten the survival of these fish and their glochidia. Chemical treatments may be required to control the causative fish pathogens. However, chemical treatment may be toxic to the glochidia or result in the premature detachment of the glochidia. We evaluated the safety of five common aquaculture therapeutants (formalin, Cutrine®, hydrogen peroxide, sodium chloride and chloramine-t) to mussel glochidia during encystment on largemouth bass *Micropterus salmoides* by comparing the number of glochidia that transform into juvenile mussels in an untreated control group versus chemically treated test groups. Bass were infested with glochidia from the pocket book mussel *Lampsilis cardium* seven days before the first treatment. Aquaria were siphoned each weekday to determine the number of sloughed glochidia or transformed juveniles. The initial number of glochidia on fish was estimated to be the sum of the number of sloughed glochidia and juveniles in each aquarium. The mean percent of sloughed glochidia varied by less than 2 % between the untreated and treated test groups. In a mussel propagation program, therapeutic treatment of diseased fish with the treatment regimens we evaluated may be a viable option to enhance glochidia survival to the juvenile life stage.

Keywords: freshwater mussels, glochidia, chemical treatments, survival, mussel propagation.

THE INFLUENCE OF DIET ON SURVIVAL OF *LAMPSILIS CARDIUM* JUVENILES IN LABORATORY EXPOSURES.

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We evaluated the effects of diet and laboratory holding time on the survival of juvenile *Lampsilis cardium* mussels in a 7-week study. The diets included a water only exposure, river sediment, a commercial shellfish diet, and a combination of the commercial diet and river sediment. The experimental design consisted of 3 38-L flow-through aquaria per diet, each containing 8 suspended PVC chambers (5 cm tall x 2 cm OD with 153 µm mesh on bottom). Fifteen 3-day old juveniles (cultured in vivo) were added to each chamber on day 0. Chambers receiving sediment diets received –200 g of surficial sediment from an uncontaminated reach of the Upper Mississippi River at the start of the test and aquaria receiving the commercial diet received 250 µL three times per week. Temperature, dissolved oxygen, and flow rate were measured in each aquarium three times per week. One chamber from each aquarium was randomly removed weekly for 7 weeks to assess survival. Survival of juveniles varied significantly among diets and over time. Survival exceeded 80% in all diets through week 3, exceeded 60% in the sediment diets through week 5 and then declined to 0% in all diets by week 7. These data suggest that diets containing sediment enhanced survival of juveniles for a longer duration than non-sediment diets, but no diet maintained juveniles in a healthy condition for more than –4 weeks.

Keywords: unionid mussels, diet, survival, juveniles, laboratory

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A TURTLE SURVEY OF A WETLAND AREA, DUBUQUE COUNTY, IOWA.

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We initiated a pilot project at the Mines of Spain Recreation Area (MoSRA) to study turtles. MoSRA is located immediately south of Dubuque, Iowa and borders the Mississippi River's Pool 12. Wire turtle traps (Nichols Net & Twine Co., Inc., Granite City, Illinois) were placed in two ponds of a wetland region during late-August and early-September 2004. Chicken quarters were used as bait and replenished at every trap check. Ponds were less than 50 meters from each. We recorded 175 captures of 90 individual turtles during eleven trap nights. All turtles were weighed, measured, and marked by drilling a binary code on the posterior scutes with a Dremel® tool. Only two species were captured; painted turtles, *Chrysemys scripta* (n = 77), and snapping turtles, *Chelydra serpentina* (n = 13). Using the Schnabel method, we estimated the *Chrysemys scripta* population at 90 individuals (95% C.I. = 100, 81). A population estimate for *Chelydra serpentina* was not possible as we recorded only one recapture. Female *Chrysemys scripta* (n = 24) were larger than males (n = 53) with respect to mean carapace length, mean carapace width, and total mass. Mean total mass for *Chelydra serpentina* was 7.83 $\pm$ 4.73 kg. We intend to continue and expand this project on river turtles to address issues of community-level and population-level change.

Keywords: *Chrysemys scripta*, *Chelydra serpentina*, Mississippi River, turtles, Iowa

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PLANT COMMUNITIES IN RIPARIAN WETLAND MEADOWS DOMINATED BY REED CANARY GRASS

Robin W. Tyser [1,2], Eileen M. Kirsh[2], and Melissa S. Meier[2]
[1]River Studies Center, University of Wisconsin-La Crosse, La Crosse, WI 54601. [2]U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, WI 54602.

Reed canary grass (*Phalaris arundinacea*) is known to aggressively invade and alter the composition of vegetation in wetland communities in the Upper Midwest. However, plant species that can tolerate reed canary grass dominance and environmental factors potentially associated with greater reed canary grass dominance are not well known. Our primary objective was to describe plant species associations in wet meadows with a range of reed canary grass dominance. In addition, we examined whether certain environmental nutrients were associated with occurrence of reed canary grass in these communities. Thirteen riparian wet meadows sites (4.5-16.5-ha) located within 75-km of La Crosse, WI were sampled in early to mid-August 2002, and aerial cover of plant species at points within each site (n=33-89) was estimated. Concentrations of selected soil nutrients (NO_3, NO_4, total nitrogen, and available phosphorus) were sampled at three to nine randomly selected points at each site (ca. one sample per 1.5 ha). Vegetation and nutrient data were analyzed using non-metric multidimensional scaling, which is a multivariate ordination technique commonly used to explore relationships between community composition and environmental gradients. A 2-axis ordination accounted for most of the variation in the plant species data (cumulative $r^2 > 0.90$) and separted sites into two distinct clusters. Cluster 1 sites were characterized by relatively high coverage of RCG and taxa (e.g., *Sagittaria latifolia* and *Sparganium eurycarpum*) with relatively strong wetland indicator status (classified as obligate wetland or facultative wetland species). Cluster 2 sites were characterized by relatively low coverage of reed canary grass and taxa (e.g., *Amphicarpaea bracteata*, *Eupatorium perfoliatum*, and *Baptisia alba*) with lower wetland indicator status (classified as facultative wetland, facultative, or facultative upland species). In addition, ordination axes show generally weak associations with individual soil nutrients ($r^2 < 0.20$). Our results show that RCG greatly affects wetland vegetation patterns, but also that several species, e.g., *Polygonum amphibium, Sagittaria latifolia, and Sparganium eurycarpum*, may be capable of attaining relatively high coverages in sites dominated by RCG. This study also suggests that the abundance of RCG is positively correlated with a moisture gradient and that soil nutrients may not be not strongly associated with vegetation patterns in these study sites.

Keywords: *Phalaris arundinacea*, upper Mississippi River, non-metric multidimensional scaling, wet meadow, soil nutrients

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LOTIC SESTON QUALITY AND THE GROWTH OF A COMMOM FILTER-FEEDING CADDISFLY

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In order to maximize growth, organisms must acquire adequate amounts of carbon, nitrogen and phosphorus from their food. The growth of organisms can be limited by the relative supply of these nutrients, especially in aquatic ecosystems. In streams, growth of larval aquatic insects has been shown to be influenced primarily by density, thermal regimen, and food quantity. Here we take a different approach, we assess the growth of a common filter-feeding caddisfly (*Brachycentrus occidentalis* Banks: Brachycentridae: Trichoptera) from a stoichiometric perspective by comparing the elemental composition (C:N:P) of the organism to its food resource. We analyzed C:N:P ratios of *B. occidentalis* body tissue and its food resource, seston, from four streams near Coon Valley, Wisconsin. Samples were collected in summer and fall of 2004 for C:N:P analysis and to estimate the instantaneous growth of *B. occidentalis*. Our preliminary findings showed differences in the growth of this caddisfly among the four streams, even though the streams possessed very similar thermal regimes. These differences appear to be correlated to the C:N ratio of the seston; *B. occidentalis* growth was higher in streams transporting seston of lower C:N ratio.

Keywords: seston, ecological stoichiometry, caddisfly growth, driftless zone, streams

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TEMPORAL RELATIONSHIPS IN THE ASSIMILATION OF TRANSPORTED ORGANIC MATTER BY THE FILTERING HYDROPSYCHIDAE

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Large River Studies Center and Biology Department, Winona State University, Winona, Minnesota 55987

Recent work in large rivers has linked algal transport organic matter (TOM) as a major food source for the primary consumers, including Hydropsychidae, using stable isotopes. It is possible, however, that stable isotope ratios of TOM will change temporally at a rate more rapid than tissue turnover would change SI ratios of consumers. This situation would require that models be developed to account for temporal differences between sources and consumers when using stable isotopes to examine riverine trophic dynamics. To address this issue, temporal patterns in the isotopic ratios of TOM and *Cheumatopsyche* sp. and *H. orris* were examined in the Upper Mississippi River. Water samples were collected at multiple points across a transect by pumping water from a depth of 1 m at 4 - 5 transects from April - October 2004. TOM was partitioned into fine TOM (FTOM, 100 μm – 1 mm) and ultrafine TOM (UTOM, 1 μm-100 μm). FTOM and UTOM were further separated into algal and detrital fractions by colloidal silica centrifugation. The δ^{13} C and δ^{15} N were determined for all TOM fractions. Hydropsychidae were collected from rocks and processed to ascertain δ^{13} C and δ^{15} N. We hypothesize that physical and chemical dynamics of large rivers are stable over relatively long time periods. During these periods, phytoplankton SI ratios will accurately reflect the ratios of its consumers. There has, however, been an indication that SI ratios of algal TOM change temporally in response to hydrological changes. Assessment of consumer-source linkages over a broader temporal scale is needed to better define this relationship.

Keywords: stable isotope; trophic linkages; transport organic matter; Hydropsychidae, season

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MINUTES OF THE 2004 BUSINESS MEETING
ANNUAL MEETING OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

2 April 2004 - The meeting was called to order at 12:30 p.m. by Mike Romano (President). Jim Fischer (Secretary), and about 60 other members were present. Neal Mundahl (Treasurer) and Mark Pegg (Vice-President) were not present at the meeting.

President's Report

Awards
Secretary Jim Fischer presented the awards for Best Student Paper (platform) to James T. Lamer, Western Illinois University, Dept. of Biological Sciences, and for Best Student Poster to Tiffany Schriever, Large River Studies Center, Winona State University.

Meeting Attendance
President Romano noted that the meeting attendance for 2004 was 119, down by three from 2003. He said that he had received several comments about the earlier meeting date this year, and thought that may have prevented people from attending. On 6 April 2004, Georgina Ardinger notified the outgoing secretary that the correct registration number was 95 attendees, not 119. Therefore attendance was down by 27 from the 2003 meeting.

Minutes
A motion to accept the Minutes from the 25 April 2003 Business Meeting as printed on page 47 of the Proceedings was seconded and approved.

Acknowledgements
President Romano acknowledged the members of the Board (Mark Pegg, Neal Mundahl, and Jim Fischer), and particularly the volunteers: Terry Dukerschein for help with the raffle, the judges for student awards, Dr. Rob Tyser and UW-L for setting up delivery and covering costs of the posters boards, Georgina Ardinger for her assistance with registration, set-up, and maintenance of the mailing list, and Jerry Cox for taking photos.

Treasurer's Report
Treasurer Neal Mundahl was not present at the Annual Meeting, so President Romano gave the report on his behalf. The report was published on page 49 of the Proceedings. Mike indicated that the financial status of the organization remained about the same as last year with total holdings of $10,322 as of March 1, 2004 (after mailings), compared to $10,410 in 2003.

Old Business

Booking Facilities for Annual Meeting
President Romano reported that it is getting more difficult to book dates for the meeting, so we must now book three years out. The 2005 meeting will be held on Thursday-Friday, 28-29 April 2005 at the Radisson, in La Crosse, Wisconsin. The Radisson facility has also been booked for 27-28 April 2006 (Thursday-Friday). The Radisson staff recently notified President Romano that

the only opportunity to have the meeting during April 2007 was on 12-13 April. President Romano called for discussion or questions about the meeting dates. Rick Anderson inquired whether the 2007 meeting date was firm, and Romano confirmed that the contract had been signed for 2007.

No other old business was discussed, and President Romano called for New Business.

New Business

Nominations

President Romano noted that Vice President, Mark Pegg, will become President for next year, in accordance with the constitution. Romano reported that the Executive Board nominated Mike Delong for Vice President, and Lynn Bartsch for Secretary. He asked for further nominations from the floor. No further nominations were offered from the floor, so President Romano called for a vote. The vote was all in favor with no oppositions, and both positions were approved. The president-elect was absent, so Mike turned the meeting over to the new Vice President, Mike Delong at 12:40 p.m.

Upcoming Meeting Locations

Bob Hrabik requested discussion to be held about moving the meeting further south on some occasions. Rick Andersen noted that the meeting location is stipulated in the Constitution, and suggested that the group approve an amendment to allow the 2008 meeting to be held in Dubuque, IA. He suggested that we approve an amendment to hold the 2008 meeting in Dubuque. Mike Romano seconded the motion. Delong restated that it was a motion to amend the Constitution to permit holding the 2008 meeting in Dubuque. Romano suggested that it should be discussed further, and noted that the 2008 meeting coincides with the 40th Annual Meeting. He suggested that the amendment could be written to permit meetings in other locations under special circumstances, such as the 40th Anniversary. Marian Havlik stated that the location was set in La Crosse during the early 1980's because the group nearly fell apart after the 1978 meeting. She suggested that there is no problem with holding the meeting elsewhere, but noted that the meeting scheduled for Dubuque in 1979 was cancelled, and that the 1980 meeting in Dubuque was poorly attended. Bob Miller said that there is no question about having a home for the meeting in La Crosse, but feels that the new National River Museum (in Dubuque) would be a good venue to have for a special occasion, that it would be an added attraction, and would bring more people from the south. He emphasized that it would not be a change for the home location of the meeting. Vice President Delong then reiterated that the motion was for an amendment to the Constitution to allow holding the meeting in other locations on special occasions. He asked for further discussion. No further discussion ensued. Delong noted that the motion was made and seconded, so called for a vote. Motion was passed, all in favor, none opposed.

Other New Business

Rick Andersen made a motion to authorize the Executive Committee to draft a letter in support of full funding for the Environmental Management Program (EMP). The motion was seconded, and passed by unanimous vote.

Mike Delong noted that in 2002 the EPA had sent out a request for proposals for bioassessment approaches in Great Rivers. Only two proposals were submitted, so EPA cancelled the request. A preliminary listing on EPA funding notification was made in January for a similar program, but it was subsequently postponed due to budgeting priorities. He suggested that the MRRC send a letter to the UMRBA to encourage support for the EPA Great Rivers assessment program. Mike Romano made a motion that the Board drafts a letter in support of reinstating the funding. VP Delong called for further discussion. There was no further discussion, so a vote was called and the motion passed; all in favor, none opposed.

Vice President Delong called for other new business. No other new business was brought to the floor, so the meeting was adjourned at 12:52 p.m.

MISSISSIPPI RIVER RESEARCH CONSORTIUM
TREASURER'S REPORT - SUBMITTED BY NEAL D. MUNDAHL
1 MARCH 2005

Accounts as of 30 June 2002			$11,175.75
Accounts as of 30 June 2003			$10,409.96
Transactions, 1 July 2003 to 30 June 2004			
INCOME			
	2004 Registration and dues	5152.00	
	2004 Raffle proceeds	871.00	
	2004 T-shirt sales	296.00	
	Interest	12.61	
Total		6331.61	
EXPENSES			
	Radisson Hotel - 2004 meeting	4073.84	
	2004 Proceedings	547.12	
	2004 Raffle prizes	656.08	
	2004 Best paper/poster awards	70.00	
	T-shirts	544.00	
	Postage, mailing, supplies	224.80	
	Corporation fee	10.00	
Total		6125.84	
Accounts as of 30 June 2004			$10,615.73
Transactions, 1 July 2004 to 1 March 2005			
INCOME			
	Interest	4.35	
Total		4.35	
EXPENSES			
	Postage, mailing, supplies	79.01	
	Corporation fee	10.00	
Total		89.01	
Accounts as of 1 March 2005			$10,531.07
Accounts			
	Checking account	6204.00	
	Savings account	4327.07	
	Total	10531.07	

MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.
BUSINESS MEETING AGENDA

29 April 2005, 11:00 AM
Radisson Hotel, La Crosse, Wisconsin

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1. Call to Order
2. President's Report
    - Approval of 2004 minutes
    - Acknowledgments
3. Treasurer's Report
4. Old Business
    - MRRC meeting at Dubuque in 2008
5. New Business
    - Executive board nomination
    - Election of officers
    - Future meeting dates
    - Other new business
6. Adjournment

Business Meeting Notes

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 by-laws.

2. The by-laws 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 by-laws of the MRRC may be amended by an affirmative vote of two-thirds of the eligible voting members present at the annual meeting.

BYLAWS 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 reside 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 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 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 these 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 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 and 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 as 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 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 Bylaws may also be altered, amended or repealed and new Bylaws may be adopted by the Board of Directors by affirmative vote of two-thirds (2/3rds) of the members present at a meeting at which a quorum is in attendance.

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
34th	2002	Radisson Hotel, La Crosse, WI	Mr. Brent Knights Mr. Jeff Arnold Dr. Michael Romano Dr. Neal Mundahl
35th	2003	Radisson Hotel, La Crosse, WI	Mr. Jeff Arnold Dr. Michael Romano Mr. Jim Fischer Dr. Neal Mundahl
36th	2004	Radisson Hotel, La Crosse, WI	Dr. Michael Romano Dr. Mark Pegg Mr. Jim Fischer 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.

ACKNOWLEDGEMENTS 2005

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Local Meeting Arrangements, Meeting Announcements, and Mailings

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

Lynn Bartsch, Upper Midwest Environmental Science Center, La Crosse, Wisconsin

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

Program and Proceedings

Michael Delong, Large River Studies Center, Winona State University, Winona, Minnesota

Lynn Bartsch, Upper Midwest Environmental Science Center, La Crosse, Wisconsin

Mark Pegg, Illinois Natural History Survey, Havana, Illinois

Mary Diekmann, Department of Biology, Winona State University, Winona, Minnesota

Registration Table

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

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

T-shirt Logo Design

Heidi Imker, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Visual Aids and Poster Arrangements

Bob Kratt, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Robin Tyser and University of Wisconsin-La Crosse Biology Department, University of Wisconsin-La Crosse, Wisconsin

Sales and Arrangements (Raffle and T-shirt)

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

Platform Session Moderators

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

John Chick, Great Rivers Field Station, Illinois Natural History Survey, Brighton, Illinois

Kevin Irons, Illinois River Biological Station, Illinois Natural History Survey, Havana, Illinois

Kevin Kenow, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin

Mark Pegg, Illinois River Biological Station, Illinois Natural History Survey, Havana, Illinois

Raffle Prizes

Dr. Tom Claflin, T.O.C. Fishing Rods, La Crosse, Wisconsin, 54601

Dr. Calvin Fremling and University of Wisconsin Press

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

For a complete list of contributors, please visit our website
http://www.umesc.usgs.gov/mrrc/sup_agn.html

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