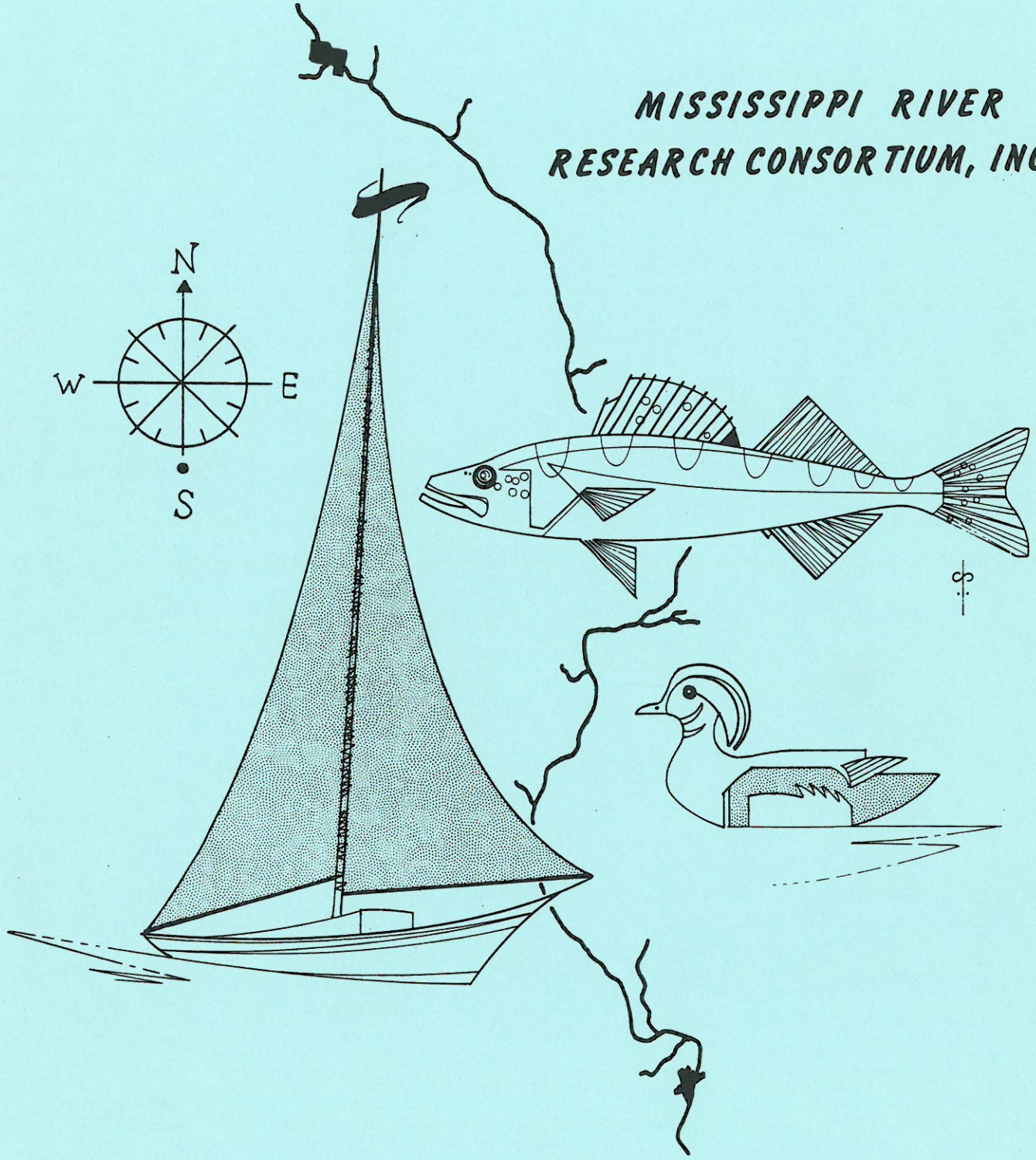


MISSISSIPPI RIVER  
RESEARCH CONSORTIUM, INC.



20th ANNUAL MEETING  
MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.  
7-8 April 1988  
University of Wisconsin-La Crosse  
La Crosse, Wisconsin

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PROGRAM ARRANGEMENTS AND OFFICERS

20th Annual Meeting of the Mississippi River Research Consortium, Inc.

1987-88 Board of Directors

Verdel K. Dawson, National Fisheries Research Center,  
La Crosse, WI

Dr. Fred Copes, University of Wisconsin-Stevens Point  
Stevens Point, WI

John Pitlo, Iowa Dept. of Natural Resources,  
Bellevue, IA

Exhibits Committee

Julie Schreck, National Fisheries Research Center

Ruth Davis, National Fisheries Research Center

Linda Gardner, National Fisheries Research Center

Liaison with the University of Wisconsin-La Crosse

Verdel K. Dawson, National Fisheries Research Center

Preregistration

Ms. Janet H. Beitlich, Fish Disease Control Center

PROGRAM SCHEDULE  
 MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.  
20th Annual Meeting  
 University of Wisconsin - La Crosse

Thursday, 7 April, 1988

REGISTRATION

7:30 - 8:10

INTRODUCTION (Valhalla - B)

8:10 - 8:20 Welcoming Remarks: V. Dawson

SESSION 1 Moderator: L. Holland-Bartels

8:20 - 8:40 Ecological consequences of human intervention in the Lower Mississippi - Atchafalaya River system. C.R. Fremling

8:40 - 9:00 Long term resource monitoring program for the Upper Mississippi River system. J.L. Rasmussen

9:00 - 9:20 Continuous water quality monitoring in backwater habitats of the Mississippi River during the summers of 1986 and 1987. J.F. Sullivan and S.M. Schellhaass

9:20 - 9:40 Preconstruction water quality of the Weaver Bottoms area of the Upper Mississippi River. V.D. Dawson and R.A. Davis

9:40 - 10:00 Metals in Lake Pepin sediments: A history of water quality in the Upper Mississippi River. R.G. Rada, J.G. Wiener, P.A. Bailey, and D.E. Powell

10:00 - 10:20 Break

SESSION 2 Moderator: L. Jahn

10:20 - 10:40 Artesian inputs and lateral diversity of the Mississippi River. J. Eckblad and S. Lehtinen

10:40 - 11:00 Field measurements of the physical impacts of navigation. N.G. Bhowmik, W.C. Bogner, and D.S. Soong

11:00 - 11:20 Barge traffic increases backwater turbidity in the lower Illinois River. K.S. Lubinski and F. Cronin

11:20 - 11:40 Boat-generated wave reflection. J.R. Adams and N.G. Bhowmik

11:40 - 12:00 Bridge clearances affect environmental quality of the Upper Mississippi River. R.K. Wiebusch

12:00 - 1:00 Lunch

SESSION 3 Moderator: B. LeGrande

1:00 - 1:20 Determining the flow needed to protect aquatic habitat and water quality below Chippewa River hydropower dams. P. LaLiberte

1:20 - 1:40 Standing stocks of fishes in the Upper Mississippi River. J. Pitlo

1:40 - 2:00 Some characteristics of commercially harvested channel catfish in four areas of the Mississippi River. P.T. Raibley and L.A. Jahn

2:00 - 2:20 Electrophoretic analysis of the host - parasite relationship between the flathead catfish (*Pylodictus olivaris*) and the mapleleaf mussel (*Quadrula quadrata*). D.B. Markillie, M.A. Romano, and R.V. Anderson

2:20 - 2:40 Effluent toxicity-testing of MWCC wastewater treatment plants discharging to the Mississippi and Minnesota Rivers, Mpls./St. Paul, MN 1982 - 1987. K. Johnson

2:40 - 3:00 A method and rationale for determining the effects of sewage treatment plant effluents on mussels: Lab and field studies. S.E. Goudreau, R.J. Sheehan, and R.J. Neves

3:00 - 3:20 Break



SESSION 4 Moderator: E. Stern

- 3:20 - 3:40 Operational culture of the juveniles of freshwater unionid mussels. D.L. Waller, D.J. Heath, and L.E. Holland-Bartels
- 3:40 - 4:00 Quantitative mussel samples at Prairie du Chien, Wisconsin: Year 3. A.C. Miller and B.S. Payne
- 4:00 - 4:20 Naiad mollusks of Sylvan Slough, Mississippi River, Rock Island, IL: Another perspective. J.A. Frink and M.E. Havlik
- 4:20 - 4:40 Naiad mollusks (unionidae) of the St. Croix River at seven proposed bridge/tunnel sites, Stillwater, MN. M.E. Havlik
- 4:40 - 5:00 Evidence of founder effect in Illinois River populations of the three-ridge mussel, Amblema plicata. S. Johnson, M.A. Ramano, and R.V. Anderson
- 5:00 - 6:30 Social Hour (Port-O-Call)
- 6:30 - 8:00 Banquet (Ward Room)
- 8:00 - 12:00 Dance (Valhalla - A)

Friday, 8 April, 1988

- 8:10 - 8:40 Business Meeting

SESSION 5 Moderator: J. Ramsey

- 8:40 - 9:00 Selective feeding in chironomid larvae. E.W. Chilton II
- 9:00 - 9:20 The relationship between the rate of sediment accumulation and the density of benthos in a backwater lake of Pool 2, Mississippi River. D.J. Hornbach, A.C. Miller, and B.S. Payne
- 9:20 - 9:40 Evaluation of several existing sediment-transport formulas for a reach of Pool 20 of the Mississippi River. I. Nakato
- 9:40 - 10:00 Impact of a hydropower facility on Mississippi River navigation: A model study. C. Ellis and H.G. Stefan *Chris*
- 10:00 - 10:20 Break

SESSION 6 Moderator: J. Sullivan

- 10:20 - 10:40 Phytoplankton community composition and primary production of selected habitats in navigation Pool No. 8 of the Upper Mississippi River. T.R. Lange and R.G. Rada
- 10:40 - 11:00 Effect of water temperature on the success of fluorescent pigment marking. L.E. Holland-Bartels, M.R. Dewey, and S.J. Zigler
- 11:00 - 11:20 Preliminary results of natural regeneration and avian utilization of Mississippi River bottomland forests following timber harvesting. T.A. Feavel, and J.M. Hong
- 11:20 - 11:40 A tick attack on the river: Lyme Disease on the Saint Croix. A.R. Weisbrod
- 11:40 - 12:00 A field study of blanding's turtle (Emydoidea blandingii) at Weaver Dunes, Wabasha County, Minnesota. M.J. Pappas and B.J. Brecke

BUSINESS MEETING AGENDA

Mississippi River Research Consortium, Inc.

University of Wisconsin-La Crosse  
Cartwright Center, Valhalla B  
La Crosse, Wisconsin

Presiding Officer: Fred Copes

1. Announcements
  - a. Sale of Contaminants in the Upper Mississippi River.
2. Financial status of the MRRRC.
3. By-law changes.
4. Membership dues and mailing list.
5. Old Business
6. New Business - 1989 meeting dates and locations
7. Nomination and election of Board of Directors.
8. Acknowledgments.

## SUMMARY - MINUTES OF THE 19TH MEETING OF THE MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

April 10, 1987

Unanimous approval of the minutes from the 1986 MRRC meeting

## 1. Announcements

a. Income from sale of Contaminants in the Upper Mississippi River

Butterworth Publishers could only give us the figures from the first half of their fiscal year, April 1, 1986 - September 30, 1986. No books were sold during that time period. There was a book return and we owe Butterworth \$2.02. The report for the entire fiscal year April 1, 1986 - March 31, 1987 will be out shortly. We should not be too optimistic about receiving much of a royalty check.

## 2. Financial Status of the MRRC

\$ 2,213.36	Beginning Balance
1,884.53	Preregistration
500.00	Walk-ins
\$ 4,597.89	
1,311.00	UW-L & Gogi's Music
498.00	Miscellaneous
\$ 2,788.89	Ending Balance

## 3. MRRC Tax Exemption - Report by Pam Thiel

Tax exempt status was granted January 1987. The official documents are housed with Rosalie A. Schnick, National Fisheries Research Center, La Crosse, WI. Contributions from individuals or organizations are now deductible.

## 4. By-Law Changes

None

## 5. Membership Dues and Mailing List

The 1986-1987 Executive Committee attempted to delete some inactive members from the mailing list and add new potential members. The total number on the list pretty much stayed the same. It was suggested that members not attending the meeting mail in their \$5.00 annual dues.

## 6. Old Business

None

## 7. New Business - 1988 Meeting Dates and Locations

We have the Radisson Hotel in La Crosse, WI, booked for April 7 and 8, 1988, but it was suggested we try to have the meeting at the University again next year. It was convenient having the meeting and socials all in the same building and everyone was quite happy with the arrangements. Also, we saved about \$350 in not having to pay for room charges at the University and were able to add extras to the meeting such as the dance. Voted that the meeting be held at the University next year. The new Executive Committee will reserve the University and cancel the Radisson as soon as possible.

Hannibal Bolton suggested that the MRRC and UMRCC have a joint session when the UMRCC was scheduled to be held in the La Crosse-Winona area. This would not pertain to 1988 but perhaps 1989. The new Executive Committee will explore the possibility of a joint session for 1989.

Dave Kennedy requested that the new Executive Committee write a letter to river congressmen in support of a budget request of \$10 million for FY88 for the EMP. Motion was made and carried. Dave suggested this be done every year.

## 8. Nomination and Election of Board of Directors

Names placed in nomination: Fred Copes, Fisheries Professor, University of Wisconsin-Stevens Point  
Verdel Dawson, Research Chemist, National Fisheries Research Center,  
La Crosse, WI  
John Pitlo, Fishery Research Biologist, Iowa Department of Natural  
Resources, Bellevue, IA

Membership voted unanimously in favor of new Board of Directors

## 9. Acknowledgements

Special acknowledgement to Karen Curtis for her efforts at this and previous meetings. Special thank you to Janet H. Beitlich, Fish Disease Control Center; Diane H. Wolfe, Long Term Resource Monitoring; Barbara A. Deml, National Fisheries Research Center, and Ann Prochowicz, Upper Mississippi River National Wildlife and Fish Refuge for assistance with the three mailings, preregistration, and meeting registration. Acknowledgement of the projectionists and persons in charge of lights and all the support people who are relied heavily upon for a successful meeting.

End of business meeting

## ACKNOWLEDGMENTS

The following persons and institutions have contributed substantially to the planning, execution, support, and ultimately, the success of the 20th Annual Meeting. The 1987-88 Board of Directors gratefully acknowledges their involvement.

Meeting Arrangements

Verdel K. Dawson, National Fisheries Research Center

Mailing List, Newsletters, Program, and Registration

Barbara A. Deml, National Fisheries Research Center  
 Janet H. Beitlich, Fish Disease Control Center  
 Diane H. Wolfe, Long Term Resource Monitoring  
 Ann Prochowicz, Upper Mississippi River National Wildlife and  
 Fish Refuge

Technical Session Moderators

Dr. Leslie E. Holland-Bartels, National Fisheries Research Center,  
 La Crosse, WI  
 Dr. Larry Jahn, Western Illinois University, Macomb, IL  
 Dr. Bill LeGrande, University of Wisconsin-Stevens Point, Stevens Point, WI  
 Dr. Ed. Stern, University of Wisconsin-Stevens Point, Stevens Point, WI  
 Dr. John Ramsey, Iowa Cooperative Fish and Wildlife Research Unit, Ames, IA  
 Mr. John Sullivan, Wis. Dept. of Natural Resources, La Crosse, WI

Assistance with Visual Aids

Sue Brazeau, University of Wisconsin-La Crosse  
 Dan Conklin, University of Wisconsin-La Crosse  
 Nancy Cowling, University of Wisconsin-La Crosse  
 Kim Fredricks, University of Wisconsin-La Crosse  
 Chris Lamprech, University of Wisconsin-La Crosse  
 Mike Lauer, University of Wisconsin-La Crosse  
 Bill Mauer, University of Wisconsin-La Crosse  
 Mike Schueller, University of Wisconsin-La Crosse



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

<u>Meeting</u>	<u>Year</u>	<u>Place</u>	<u>President</u>
1st	1968	St. Mary's College, Winona	Brother George Pahl
2nd	1969	Wisconsin State University, La Crosse	Dr. Thomas Clafin
3rd	1970	Winona State College, Winona	Dr. Calvin Fremling
4th	1971	St. Cloud State College, St. Cloud	Dr. Joseph Hopwood
5th	1972	Loras College, Dubuque	Dr. Joseph Kapler
6th	1973	Quincy College, Quincy	Rev. John Ostdiek
7th	1974	No Meeting	
8th	1975	Monmouth College, Monmouth	Dr. Jacob Verduin
9th	1976	St. Mary's College, Winona	Mr. Rory Vose
10th	1977	Winona State University, Winona	Dr. Dennis Nielsen
11th	1978	University of Wisconsin-La Crosse	Dr. Ronald Rada
12th	1979	Cancelled	Dr. Edward Cawley
13th	1980	Loras College, Dubuque	Dr. Edward Cawley
14th	1981	Ramada Inn, La Crosse	Mr. Michael Vanderford

Executive Committee

15th	1982	Radisson Hotel, La Crosse	Dr. Richard V. Anderson Dr. David R. McConville Dr. James G. Wiener
16th	1984	Radisson Hotel, La Crosse	Dr. Kenneth S. Lubinski Ms. Rosalie A. Schnick Dr. Miles M. Smart
17th	1985	Radisson Hotel, La Crosse	Mr. Raymond C. Hubley Dr. John G. Nickum Ms. Pamela A. Thiel

Board of Directors

18th	1986	Radisson Hotel, La Crosse	Dr. James W. Eckblad Dr. Carl E. Korschgen Dr. James H. Peck
19th	1987	University of Wisconsin-La Crosse	Mr. Hannibal Bolton Dr. Leslie E. Holland Dr. Michael R. Winfrey
20th	1988	University of Wisconsin-LaCrosse	Mr. Verdel K. Dawson Dr. Fred Copes Mr. John Pitlo

CONSTITUTION  
OF  
MISSISSIPPI RIVER RESEARCH CONSORTIUM, INC.

ARTICLE I. NAME AND OBJECT

1. This organization shall be named Mississippi River Research Consortium, Inc.
2. The objectives 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 the 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.

## BY-LAWS OF 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 include 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 within or without 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: BOARD OF DIRECTORS.

3.01 General Powers 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 jointly organize, hold and preside over the annual meeting. The Board shall be responsible for the development of a program of technical papers to be presented at the annual meeting. The number of Directors of the corporation shall be not less than three (3) elected members.

3.02 Election and Term of Directors.

Each director shall hold office for a term of one (1) year. The term of the office begins and ends with the annual meeting. The director shall be elected by the membership of the corporation at the annual meeting. At least one director shall be a representative of an academic institution and at least one director shall be a representative of either a state or federal agency. A director may be removed from the 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.

3.03 Regular Meetings.

The Board of Directors shall meet on the times and dates to be established by them but at least once per year.

3.04 Special Meetings.

Special 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.

3.05 Notice; Waiver.

Notice of such meeting of the Board of Directors shall be given by written notice delivered personally or mailed or given by telegram to each director at his/her home address or at such other address as such director shall have designated in writing with the secretary of the Board of Directors, in each case not less than ten (10) days prior to such meeting. Notices of special meetings must be given not less than two (2) days prior to such meeting. Whenever any notice whatever is required to be given to any director of the

corporation under the Articles of Incorporation or By-Laws or any provision of law, a waiver thereof in writing, signed at any time, whether before or after the time of the meeting, by the director entitled to such notice, shall be deemed equivalent to the giving of such notice. The attendance of a director at a meeting shall constitute a waiver of notice of such meeting, except where a director attends a meeting and objects to the transaction of any business because the meeting is not lawfully called or convened. Neither the business to be transacted at, nor the purpose, or any regular or special meeting of the Board of Directors need be specified in the notice or waiver of notice of such meeting.

3.06 Quorum.

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

3.07 Removal.

Any member of the Board who is absent from three (3) consecutive regular 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.

3.08 Conduct of Meetings.

The president and in his/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.

3.09 Vacancy.

Any vacancy occurring in the Board of Directors shall be filled as soon as possible by the majority action of the Board.

ARTICLE 4: MEMBERSHIP AND DUES.

4.01 Membership and Eligibility.

Membership to include anyone interested in the research and study of the upper 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: OFFICERS.

5.01 Creation of Officers.

The officers of the Board shall consist of a president, vice-president, secretary-treasurer and such additional assistant officers as the Board may elect.

5.02 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.

5.03 Election of Term of Office.

The officers of the corporation shall be elected by the Board of Directors at the first meeting following the annual meeting to serve as one (1) year term. Each officer shall hold office until his successor shall have been duly elected or until his death, resignation or removal.

5.04 Removal.

Any officer or agent 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 if any of any person so removed. Election or appointment shall not of itself create contract rights.

5.05 Vacancies.

A vacancy in any principal office because of death, resignation, removal, disqualification or otherwise, shall be filled by the Board of Directors for the unexpired portion of the term.

5.06 President.

The present 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.

5.07 Vice-President.

The vice-president, at the request of the president, shall perform the duties and exercise the functions of the president, and when so acting shall have the power of the president and shall perform such other duties as delegated by the president.



The secretary-treasurer 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,
- (e) Keep all financial records of the Board,
- (f) Be responsible for record keeping and assessment of dues as established by the Board of Directors,
- (g) Supervise the preparation of the annual budget,
- (h) Perform all duties incident to the office of the treasurer of the Board and such other duties as from time to time may be assigned by the president of the Board.

5.09 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 is so appointed to be assistant or as to which he is so appointed to act, except as such powers may be otherwise defined or restricted by the Board of Directors.

ARTICLE 6: COMMITTEES.

6.01 Nominating Committee.

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

6.02 Other Committees.

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

ARTICLE 7: MEETING OF MEMBERSHIP.

7.01 Annual Meeting.

The Annual Meeting of the organization shall be held in La Crosse, Wisconsin, with local arrangements being handled by the membership located in La Crosse, Wisconsin. The time of the meeting shall be established by the Board of Directors within the month approved by a two-thirds (2/3rds) vote of the membership at the previous annual meeting. At the meeting reports of officers and committees shall be delivered. 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.

7.02 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.

7.03 Quorum.

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

ARTICLE 8: AMENDMENTS.

8.01 By The Membership.

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

ABSTRACTS FOR TECHNICAL PAPERS

Thursday and Friday

7-8 April 1988

Abstracts are listed in the order of presentation

ECOLOGICAL CONSEQUENCES OF HUMAN INTERVENTION IN THE LOWER MISSISSIPPI-ATCHAFALAYA RIVER SYSTEM. C. R. Fremling, Department of Biology, Winona State University, Winona, MN 55987.

Louisiana's coastal marshes and swamps comprise over 40% of U.S. wetlands. They provide winter habitat for 7 million waterfowl, account for 20% of U.S. commercial catch of fish and shellfish, produce over 50% of U.S. furs, and serve as vital nurseries for marine fishes and invertebrates. Louisiana's coastal wetlands are being lost to the sea, however, at a rate of 100 km<sup>2</sup>/yr due to: 1) decreased sediment input by the Mississippi River because of dam building and changing land use practices, 2) conduction of sediments via guide levees beyond the inner continental shelf, 3) rising relative sea level (1.2-4.3 cm/yr) caused by subsidence and melting of polar ice caps, 4) erosion of barrier islands which protect wetlands from storm surges and hurricane waves, and 5) intrusion of salt water via 16,000 km of canals. The Atchafalaya River, the Mississippi's main distributary, presently diverts 20% of Mississippi flow and threatens to capture the Mississippi, thereby diverting it directly to the Gulf of Mexico and threatening the freshwater supplies and sea access of Baton Rouge and New Orleans.

Long Term Resource Monitoring Program  
for the  
Upper Mississippi River System

by

Jerry L. Rasmussen  
Assistant Program Manager (Ecology)

The Environmental Management Technical Center (EMTC), currently located in La Crosse, WI and staffed by 6 people, is the central management facility for the Long Term Resource Monitoring Program (LTRMP). The EMTC will continue to expand in FY 88 as needed to support the activities of the overall program. LTRMP data collection is designed to assess resource problems and detect changes or trends in land use, water and sediment, vegetation, invertebrates, fish, birds, mammals and public use. Water quality and bathymetric monitoring will be initiated in FY 88 on pools 8, 13 and 26. This activity will be conducted by personnel at three state operated field stations established at LaCrosse, WI; Bellevue, IA; and Havana, IL. Problem identification and analysis activities will initially focus on sedimentation, navigation effects and water level fluctuations problems. Scopes of work will be developed and funded in FY 88 as permitted by funds remaining after equipment purchase and completion of funding transfer to the states for trend analysis activities. Some baseline data for Habitat Rehabilitation and Enhancement Project Assessment will be provided in FY 88 for some water quality parameters in pools 8, 13 and 26 through the resource trend analysis data collection efforts. A Quality Assurance/Quality Control plan will be developed and implemented in FY 88 for all future LTRMP data collection activities. A Computerized River Information Center (CRIC) will be established in FY 88 as part of the EMTC to house a mainframe computer and staff. The mainframe computer will be used to store, manipulate, and analyze data, as well as provide GIS capability. Over its life, it is anticipated that the LTRMP will require the assistance of many public and private human and technical resources to complete its mission.

CONTINUOUS WATER QUALITY MONITORING IN BACKWATER HABITATS OF THE MISSISSIPPI RIVER DURING THE SUMMERS OF 1986 AND 1987. J. F. Sullivan and S. M. Schellhaass, Wisconsin Department of Natural Resources, La Crosse, WI 54601

Diurnal changes in dissolved oxygen (DO) and water temperature were determined using automatic monitoring equipment in ten Mississippi River backwater areas during the summer of 1986 and 1987. Continuous measurements of photosynthetically active radiation and light attenuation were also made, but at fewer locations. This monitoring program was used to assess water quality conditions in areas where habitat enhancement projects are planned or underway.

Average diurnal DO fluctuations ranged from 2.4 to 10.5 mg/l. Largest changes were encountered in dense aquatic macrophyte beds that were not shaded by terrestrial vegetation. Maximum DO saturation reached 200 percent in the more productive habitats. Dissolved oxygen levels fell below Wisconsin's water quality standard of 5.0 mg/l for more than 50 percent of the time in backwater areas receiving little freshwater inflow from the river or tributary streams. Daily water temperature changes were normally less than 4° C. Maximum water temperatures were warmer in 1987 and exceeded 30° C in two areas.

Fouling of water quality monitoring probes by detritus, plants, invertebrates and chemical precipitates presented problems in some areas. These and other problems will be discussed.

PRECONSTRUCTION WATER QUALITY OF THE WEAVER BOTTOMS AREA OF THE UPPER MISSISSIPPI RIVER. V. K. Dawson and R. A. Davis, National Fisheries Research Center, P.O. Box 818, La Crosse, WI 54602.

The Weaver Bottoms is a backwater area in Pool 5 of the upper Mississippi River. Plans have been developed to rehabilitate the area by (1) closing or reducing a number of existing channels to decrease the volume of water entering the area, and (2) by constructing barrier islands within the area to reduce wave action. In order to assess impacts of the rehabilitation project, a number of preconstruction studies were conducted including determination of the water quality at a series of sampling stations in or near the project area. Over 10,000 water quality data points were collected during the preconstruction phase (April 1985-September 1986) of the study. These data will be used to provide a baseline point of reference from which to evaluate impacts of the project on water quality in the area. Most of the area sampled was relatively shallow with little or no stratification at any of the sampling stations. Average values for each water quality variable at all sampling stations were within acceptable water quality criteria established by the U.S. Environmental Protection Agency (USEPA). However, individual values for dissolved oxygen, pH, and total phosphate occasionally did not conform to the recommended limit. The ratios of chlorophyll  $\alpha$  to pheophytin  $\alpha$  for all sampling stations were consistently high (overall average = 1.5) indicating the phytoplankton community was in excellent physiological condition. These results should provide a data base from which to evaluate the impacts of the rehabilitation project in the Weaver Bottoms area if the data are integrated with gauging, discharge, and weather events during the sampling periods.



METALS IN LAKE PEPIN SEDIMENTS; A HISTORY OF WATER QUALITY IN THE UPPER MISSISSIPPI RIVER. R. G. Rada<sup>1</sup>, J. G. Wiener<sup>2</sup>, P. A. Bailey<sup>1</sup>, and D. E. Powell<sup>1</sup>. <sup>1</sup>River Studies Center, Department of Biology/Microbiology, University of Wisconsin-La Crosse, La Crosse, WI; <sup>2</sup>National Fisheries Contaminant Research Center, Field Research Station, La Crosse, WI.

Lake Pepin is a large natural lake in Pool 4 of the heavily impounded Upper Mississippi River (UMR). The lake, which has a high trapping efficiency, is located about 75 km downstream of the Twin Cities Metropolitan Area. The Metropolitan Wastewater Treatment Plant has processed the vast majority of industrial wastes of this metropolitan area and has probably been the major source of metals discharged into the upper reaches of the UMR. In 1981 and 1984, we studied metal stratigraphy (Cd, Cr, Cu, Ni, Pb, Zn) in 20 sediment cores of the lake to document the historical input intensity of metals to the lake. The data demonstrate that Lake Pepin is an efficient sink for sediments and associated metals. Radiocesium dating of the sediment cores suggested that inputs of most metals studied had increased markedly in the late 1950s and early 1960s, were greatest in the early 1970s, and have decreased in more recent times. The most highly contaminated sediments became nearer to the sediment-water interface with progression from upstream to downstream, due to lower sedimentation rates in downstream reaches of the lake. Thus, the greatest sensitivity in monitoring metal inputs to the lake would be achieved by sampling in reaches with greatest sedimentation rates; however, the greatest potential for release of sediment-associated metals is probably in downstream reaches of the lake.

ARTESIAN INPUTS AND LATERAL DIVERSITY OF THE MISSISSIPPI RIVER. Jim Eckblad and Steve Lehtinen, Department of Biology, Luther College, Decorah, Iowa 52101

Numerous sources of artesian waters enter the Mississippi River along its border in N.E. Iowa. Their water chemistries, although somewhat variable, have higher concentrations of dissolved salts than is present in surface river water. Under certain conditions lateral gradients associated with artesian inputs can be detected. The role of this lateral input to a large river system is currently under investigation.

#### FIELD MEASUREMENTS OF THE PHYSICAL IMPACTS OF NAVIGATION

By

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Movement of commercial or recreational traffic in any inland waterway or lake can and will impact the aquatic habitats through an alteration of the physical characteristics of the flow and the substrates including the banks. Information on physical changes within such an environment is essential in the development of better management techniques for these waterways. Extensive data were collected on resuspension and movement of sediment both within and near the off channel areas of commercial navigation channels and the waves generated by river traffic from within the Illinois and Mississippi Rivers. Recently, some data on sediment resuspension, water quality changes and waves were collected from a section of the Ohio River where a set of experimental runs were conducted by the U.S. Army Corps of Engineers. Field data that were collected by the Illinois State Water Survey required an extensive amount of outlay and planning. This presentation will incorporate techniques that have been successfully applied in the collection of these data on resuspension of sediment, alteration of flow fields and wave dynamics on the Illinois, Mississippi and Ohio Rivers. It is suspected that these techniques can be utilized at other locations for the collection of data on the physical attributes related to the navigation or recreational traffic.

BARGE TRAFFIC INCREASES BACKWATER TURBIDITY IN THE LOWER ILLINOIS RIVER. K. S. Lubinski and F. Cronin. River Science Center, Grafton, IL 62037.

Speculation about environmental impacts of river boat traffic has been common since the Corps of Engineers proposed replacing Lock and Dam 26 on the Mississippi River. We measured traffic-related changes in Secchi Disk transparency (SDT) and water levels in a small backwater of the lower Illinois River in the summer of 1987. During the last five weeks of the observation period most barge traffic was terminated because of repairs being made at the nearest upstream lock. Barge traffic events that caused measureable changes in water elevations (drawdown) also produced short-term (0.5 -1.5 hr) increases in backwater turbidity. Water level and SDT changes associated with individual traffic events were difficult to predict but were generally related to the speed of the barge and whether or not it was loaded. Combined impacts of repetitive traffic events were indicated. Weekly average SDT levels while traffic was present ranged between 27-28 cm but increased to 39-41 cm two weeks after traffic ceased. Impacts of surface waves on SDT from wind, recreation boats or barge traffic appeared to be minimal.

BOAT-GENERATED WAVE REFLECTION. J. Rodger Adams and Nani G. Bhowmik, Illinois State Water Survey, 2204 Griffith Drive, Champaign, IL 61820.

In July, 1987 wave-height data were collected for incident and reflected waves generated by a variety of recreational boats in the Black River at La Crosse, Wisconsin. Reflection coefficients for wave height and wave energy are presented for many combinations of boat type, speed, and distance from the vertical side of a barge and from a sloping natural shoreline.

Wave heights were obtained from video tape records of wave trains passing staff gages attached to pipes driven into the river bed. Other data on boat-generated waves is shown for comparative purposes. In terms of wave height, reflection from the vertical barge sides was about 80% of the incident wave height, while reflection from the sloping shoreline was less than 10%. Excerpts from the video tapes show the combination of incident and reflected waves and combinations of waves from several boats passing in succession.

BRIDGE CLEARANCES AFFECT ENVIRONMENTAL QUALITY OF THE UPPER MISSISSIPPI RIVER. R. K. Wiebusch, Bridge Administrator, Second Coast Guard District, 1430 Olive St., St. Louis, MO 63103.

There are 87 bridges that cross the Upper Mississippi River between the head of commercial navigation in Minneapolis, Minnesota and Cairo, Illinois. From 1983 through 1987, there were 213 reported collisions between commercial towboats and these bridges. Of this total, 177 or 83% involved 10 railroad swing span bridges that were originally constructed between 1868 and 1916. These collisions resulted in sunken barges, release of pollutants into the river, severe bridge and barge damage and millions of dollars of damage to riverside facilities.

The number of bridge collisions is small when compared to the number of tows and barges that transit the river each year. The potential for major environmental damage is great due to the cargoes carried by the tows and the restrictive navigational openings provided by many bridges. Older railroad swingspan bridges were not designed for modern barge traffic; they were built prior to the construction of the locks and dams and creation of the 9 foot navigation channel. The original bridge protection system were also inadequate for today's waterway traffic. Restrictive clearances are compounded by physical factors that are bridge specific such as wind, water elevation, set and nearby physical factors such as river bends and shallow water.

The solution to the navigational problems created by restrictive bridges is to plan and design new bridges to provide for the reasonable needs of present and prospective navigation and to alter existing restrictive bridges. By focusing more attention on the adequacy of bridge clearances, safer bridges can be built that will greatly reduce the potential for vessel collisions and the environmental damage that results.

DETERMINING THE FLOW NEEDED TO PROTECT AQUATIC HABITAT  
AND WATER QUALITY BELOW CHIPPEWA RIVER HYDROPOWER DAMS

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To efficiently meet peak power demands, the hydropower dams on the Chippewa River hold back water when demand for electricity is low and let it pass through the turbines during high-demand periods in daily and weekly cycles. Generally, the greater the extent of flow fluctuation the greater the threat to river biology. When the time comes to determine a minimum flow requirement for a hydropower dam, a classic conflict between industry economics and natural resource protection arises. Since the operational constraints of hydropower dams are typically specified in a federal license with a 30-50 year duration, the need to get things correct the first time is great.

The economic effect of alternative minimum flow requirements is readily available from the power company. The environmental effects are rarely as well known. Several techniques for estimating the environmental effects of flow in terms of tailwater aquatic habitat and water quality were examined. Three simple aquatic habitat models were utilized on existing Chippewa River flow records. Five more intensive habitat techniques were reviewed and summarized for possible future application to the Chippewa River. Two simple water quality modeling techniques were applied to assess the link between hydropower plant flow and the river's capacity to assimilate municipal and industrial discharges. The results indicate that current minimum flow requirements for several Chippewa River hydropower dams are inadequate. Alternatives available for pursuing more appropriate minimum flow requirements are outlined.

STANDING STOCKS OF FISHES IN THE UPPER MISSISSIPPI RIVER, 1946-1984. John Pitlo,  
Iowa Dept. Nat. Res., Bellevue Research Station, Bellevue, Iowa 52031

Twenty-five rotenone samples were collected from the Upper Mississippi River between 1946 and 1984. Rotenone samples documented 75 fish species and the average standing stock for a backwater lake, slough or side channel from the pooled portion of the Upper Mississippi River was 320.4 lbs/acre. Composition by major fish groups was 6.3% predators, 5.7% game fish, 30.8% forage fish, 4.7% catfish and bullheads and 38.2% rough fish. Comparisons of standing stocks indicated considerable decreases in predators and catfishes and increases in panfish and forage fish when comparing past to recent collections. Wide fluctuations in standing stocks were documented within and among sample sites in the same pool for a given year or consecutive years. A "hit" or "miss" phenomenon was noted for forage and rough fish occurring in a particular backwater during a single summer or time period. Recovery of marked fish for data expansion ranged from 19.3% to 100%. Differences in recovery rates were noted, with gar sp. (Lepisosteus sp.), bowfin (Amia calva), and northern pike (Esox lucius) being collected in the 80% range and gizzard shad (Dorosoma cepedianum), carp (Cyprinus carpio), and bluegill (Lepomis macrochirus) having recovery rates that ranged between 30%-50%. Seven primacord samples in Pool 13 collected seventeen fish species. Primacord samples were collected in main channel border habitats and the average standing stock in this habitat was 572.2 lbs/acre. Rough fish and catfish contributed 79% and 16%, respectively.

SOME CHARACTERISTICS OF COMMERCIALY HARVESTED CHANNEL CATFISH IN FOUR AREAS OF THE MISSISSIPPI RIVER. P. T. Raibley and L. A. Jahn, Department of Biological Sciences, Western Illinois University, Macomb, IL 61455.

Commercially harvested channel catfish in the Mississippi River from Pools 13 (Thomson), 19 (Dallas City), 25 (Hamburg), and the Chester area were examined for age, growth, fecundity and population size. Fish grew fastest in Pool 19, followed by those from Pool 13, Chester, and Pool 25, respectively. Fish from Pool 19 entered the commercial catches as much as one year earlier than in other areas. Fish 4 through 8 years old comprised 45 to 85% of those harvested. Females generally matured no sooner than age 5 and of those with eggs, fecundity peaked at ages 6 and 7 (16" to 18" TL). Egg estimates ranged from 8,800-11,100 for age 4, 11,900-18,100 for age 5, 14,700-30,900 for age 6, and 11,300-35,800 for age 7. Mean conditions (KTL) ranged from 1.00 to 1.14 during spawning but were lower at other times. At least 300 catfish were marked with spaghetti tags at each area in 1986 but numbers of tag returns were low. In 1987, 937 and 942 fish were tagged in Pools 13 and 19, respectively; 92% of those with known recapture locations from Pool 13 (190 of 224) were taken less than 10 miles from the release point (Thomson). Fewer were returned from Pool 19. Estimates of minimum numbers of fish commercially harvested in 1986 ranged from 12,500 to 52,000. Population estimates of legal-sized fish were considerably higher.

Electrophoretic Analysis Of The Host - Parasite Relationship Between The Flathead Catfish (Pylodictus Olivaris) And The Mapleleaf Mussel (Quadrula Quadrula). D.B. Markillie, M.A. Romano, and R.V. Anderson, Department of Biological Sciences, Western Illinois University, Macomb, Illinois 61455.

The only reported fish host for the glochidial stage of the mapleleaf mussel, Q. quadrula, is the flathead catfish, Pylodictus olivaris; therefore patterns of gene flow within these two species should be correlated. To test this hypothesis, sample sites of similar mussel density and diversity were chosen from Pools 15, 16, 18, 19, 20, 26 of the Mississippi River, and one site from the Illinois River. Electrophoretic analysis indicated gene flow among the mapleleaf populations tended to be higher within pools and lower between pools separated by lock and dam systems. Preliminary data suggest that the flathead catfish is not the only host fish for the mapleleaf glochidia; however, additional analyses of systematic relationships among populations of both species should confirm or refute this suggestion. A comparison of the patterns of relationship may indicate the extent of effect of the flathead catfish on the genetic structure and ecology of mapleleaf populations. Populations of flathead catfish and their relationship to the gene flow among populations of mapleleaf mussels will be discussed.

EFFLUENT TOXICITY-TESTING OF MWCC WASTEWATER TREATMENT PLANTS  
DISCHARGING TO THE MISSISSIPPI AND MINNESOTA RIVERS, MPLS./ST. PAUL, MN,  
1982-1987

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Since 1982, the Water Quality Division of the Metropolitan Waste Control Commission (MWCC) has been conducting toxicity-testing of the effluents discharged by its 12 wastewater treatment facilities. Both effluent screening and definitive toxicity-testing have been used to measure the direct, acute effects of a wastewater treatment plant (WWTP) effluent on aquatic organisms, enabling the MWCC to determine if effluent quality complies with the narrative federal and state standard prohibiting the "discharge of toxic materials in acutely toxic amounts."

During the 1982-1987 period, effluents of nine MWCC facilities discharging to the Mississippi and Minnesota Rivers generally exhibited little acute toxicity. Some occasional toxicity at five facilities was primarily attributed to un-ionized ammonia, cyanide, and copper. It is expected that un-ionized ammonia toxicity at the Blue Lake and Seneca WWTPs will be eliminated when facilities upgrades are complete (1992); at that time, monthly and seasonal NPDES Permit limits on total ammonia become operative. The existing Industrial Waste Control (Pre-treatment) Program should effectively reduce copper and cyanide toxicity.

Since acute effects of MWCC effluents on organism survival appear to be minimal, chronic toxicity-testing is appropriate, as a next step, to evaluate more subtle, low-level, long-term effluent effects on aquatic organisms. In recent years, effluent chronic testing has been employed with increasing frequency, as a method for measuring effluent effects on survival, growth, and/or reproduction, and estimating the safe concentration of the effluent in the receiving water. Use of chronic tests nationwide is being advocated by the EPA, as part of its strategy for toxics control. To assist dischargers with evaluation of whole effluent toxicity, the EPA has developed two short-term chronic tests, using Ceriodaphnia and larval fathead minnows. In September, 1987, the MWCC employed the Ceriodaphnia test to evaluate the chronic toxicity of Metro WWTP effluent, with promising results.

Regulatory agencies are already requiring some dischargers, through NPDES Permits, to employ acute and/or chronic toxicity-testing protocols to evaluate effluent toxicity. As a result of new toxicity-testing requirements in the reissued Blue Lake and Seneca NPDES Permits, the MWCC will be conducting extensive acute and chronic toxicity-testing at these facilities in 1988. Acute and chronic toxicity-testing requirements are also anticipated in the reissued permit for the Metro WWTP.

A METHOD AND RATIONALE FOR DETERMINING THE EFFECTS OF SEWAGE TREATMENT PLANT EFFLUENTS ON MUSSELS: LAB AND FIELD STUDIES. Stephanie E. Goudreau, Robert J. Sheehan<sup>a</sup>, and Richard J. Neves, Virginia Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA, 24061. <sup>a</sup>Current address: Fisheries Research Laboratory and Department of Zoology, Southern Illinois University, Carbondale, IL, 62901.

We tested the tolerance of glochidia to two constituents (ammonia and monochloramine) of sewage treatment plant (STP) effluents in the laboratory, and we evaluated water quality, and mussel and host fish diversity and abundance above and below STPs in the Clinch River, Virginia. We chose glochidia for laboratory tests because: 1) larval stages are usually the most sensitive to pollution; 2) they can be conveniently held in the lab in the brood pouches of adults; 3) their attachment to fish hosts is likely a limiting step in mussel reproduction; 4) the environmental requirements of juvenile mussels are not yet defined; and 5) adult mussels temporarily avoid the effects of pollutants by closing for varying periods of time, making toxicity tests difficult to quantify.

*Villosa nebulosa* glochidia were more sensitive to monochloramine than un-ionized ammonia. The 24-hour EC50s were 0.04 mg NH<sub>2</sub>Cl/liter and 0.23 mg NH<sub>3</sub>/liter. LC50s (0.08 mg NH<sub>2</sub>Cl and 0.28 mg NH<sub>3</sub>/liter)<sup>2</sup>, calculated at the end of a 24-hour post-exposure period, were similar to corresponding EC50s, indicating that closed glochidia do not recover even if removed from toxic solutions. Glochidia appear to be more sensitive to ammonia and monochloramine than other fish and mollusks. Field studies indicated that mussels were absent from river reaches 4 to 5 km downstream of two STPs. Fish host species did not appear to be similarly affected. However, lethal concentrations of monochloramine and un-ionized ammonia were only detected as far as 0.1 km downstream of the STPs. The disparity between mussel abundance and diversity below STPs in the Clinch River and measured ammonia and monochloramine concentrations may be due to short-term water quality perturbations coupled with the relatively slow rate of mussel recolonization.

OPERATIONAL CULTURE OF THE JUVENILES OF FRESHWATER UNIONID MUSSELS. D.L. WALLER, D.J. HEATH, and L.E. HOLLAND-BARTELS. National Fishery Research Center, Box 818, La Crosse, WI, 54602-0818.

Currently over 30 species of freshwater unionid mussels are listed as federally endangered, and the recovery plans for many of these mussels include provisions for artificial culture. Propagation of endangered mussels offers obvious benefits to conservation of a species; stocking into new or existing habitat, and research on requirements of the juvenile life stage would be possible. We are attempting to develop an operational method for rearing large numbers of juveniles in a controlled laboratory and outdoor hatchery system. In the first phase, several laboratory designs were tested to produce rapid growth of large numbers of juveniles over a short period of time. These included an intermittent flow-through, a continuous flow-through and a static system. An intermittent flow-through system was initially tested and compared to a static system using 1-3 day old juveniles of *Lampsilis higginsii*, *L. radiata siliquoidea*, and *L. ventricosa*. Juveniles were fed from one of three different sources, mixed phytoplankton, trout chow and alfalfa blend, and culture with fish. Survival and growth of juveniles was greatest in a culture of mixed phytoplankton, however, high rates of mortality in all food sources indicated the intermittent flow-through system did not provide sufficient food and water quality for the juveniles. Subsequently, continuous flow-through systems were examined. A descending flow chamber is currently being tested using juveniles of *L. ventricosa* fed from a phytoplankton culture.



QUANTITATIVE MUSSEL SAMPLES AT PRAIRIE DU CHIEN, WISCONSIN: YEAR 3.  
Andrew C. Miller and Barry S. Payne, US Army Engineer Waterways Experiment  
 Station, Vicksburg, Mississippi 39180-0631.

A total of 50, 116, and 60 0.25 m<sup>2</sup> total substrate samples for mussels were collected in the East Channel of the Mississippi River near Prairie du Chien, (RM 635) in October 1984, July 1985, and September 1987, respectively. Samples were taken at a barge turning zone (Site I) and a reference site (Site III) located 0.5 km downriver to determine the effects of past dredging and commercial navigation traffic on mussel density, community composition, and evidence of recent recruitment. Twenty-nine species of mussels, in addition to the Asiatic clam Corbicula fluminea, were identified. Ranges in percentage abundance for the six dominant species at Sites I and III in 1985 and 1987 were: Amblema plicata (32.49 - 65.67%), Truncilla donaciformis (1.81 - 27.67%), Leptodea fragilis (2.41 - 6.80%), Potamilus alatus (1.81 - 3.88%), Quadrula quadrula (3.04 - 4.22%), and Truncilla truncata (2.41 - 12.45%). The majority of the species (ca. 20), were rare and comprised less than 1% of the assemblage. Evidence of recent recruitment (number of species and fractional abundance of individuals < 30 mm total shell length) was: 13 and 19.2% (1984), 22 and 22.4% (1985), 20 and 37.3% (1987). Densities of A. plicata < 30 mm total shell length were relatively similar throughout the East Channel and appeared to be unaffected by commercial traffic (ave = 4.4, s = 4.8 for 1985, and ave = 6.0, s = 6.4 for 1987). Densities of large sized (> 30 mm) A. plicata were more variable, reflecting past dredging and spatial heterogeneity of the mussel bed (ave = 38.2, s = 40.2 for 1985, and ave = 21.6, s = 15.2 for 1987).

NAIAD MOLLUSKS OF SYLVAN SLOUGH, MISSISSIPPI RIVER, ROCK  
 ISLAND, IL: ANOTHER PERSPECTIVE. James A. Frink,  
 1539 10th Ave., Rock Island, IL 61201 and Marian E. Havlik,  
 Malacological Consultants, La Crosse, WI 54601.

Repeated shoreline-shallow water collecting in the upstream end of Sylvan Slough, an area proposed as critical habitat for Lampsilis higginsii, has yielded 25 1/2 specimens (about 1/2 fresh-dead) from 9-86 to 3-87. Hundreds of live or fresh-dead naiades were found along the shoreline (29 species + 6 species represented by subfossil shell only). Previous surveys yielded large numbers of Magnonaias nervosa (55%) and Amblema plicata (22%) from the center portion of the channel; the opposite occurs 250 to 300 yards away, along the shoreline (5% each species). Large numbers of Ellipsaria lineolata (20%), Quadrula metanevra (20%), and Quadrula pustulosa (30%) are found. Young Plethobasus cyphus have been found. Quadrula nodulata is common. Several species are much more common than reported previously. Found alive during this study only are Pleurobema sintoxia, Toxolasma parvus, Lampsilis t. teres, and Corbicula fluminea. In spite of the fact that Sylvan Slough is only 3 miles long, and there have been several intensive studies, shoreline collections reveal vastly different diversities in different portions of a riverine habitat. Sylvan Slough is one place in the UMR where several rare species are reproducing, thus the area should be protected during the COF permitting process; commercial clamming should be prohibited. Records from Sylvan Slough since 1977 indicate a total of 33 live or fresh-dead and 5 subfossil naiad species, + Corbicula, exceeded only by the Prairie du Chien, WI area naiad fauna.



NAIAD MOLLUSKS (UNIONIDAE) OF THE ST. CROIX RIVER AT SEVEN PROPOSED BRIDGE/TUNNEL SITES, STILLWATER, MN. Marian E. Havlik, Malacological Consultants, 1603 Mississippi St., La Crosse, WI 54601.

Surveys were conducted for Minnesota DOT at 7 proposed bridge/ tunnel sites, Stillwater, MN, St. Croix R.M. 21.5 - 25.4. Sampling was by diving, wading and shore collections. A crowfoot survey was ineffective. 6656 naiades (30 species plus *Corbicula*) were recovered: 4702 living (24 species) and 1954 empty specimens (7 additional species). Five empty *Lampsilis higginsii* were found at 3 sites. Recent-dead *Quadrula nodulata* was a St. Croix record, and sub-fossil *Fusconaia ebena* represented an upstream record. Dominant species is *Amblema plicata*, (overall 63%, 17% to 80% at individual sites). Only 6 other living species were each represented by more than 1% of the fauna. 2/3 of the 24 live species were each represented by less than 1%. Juveniles were present in 21 species: 17 species at Site 1 and decreased going downstream to only 3 species at Site 7 at the King Power Plant. At Sites 1, 2, and 3 specimens were generally found throughout the areas. At Sites 4, 5, 6, and 7 naiades were found only in a restricted 200 to 300 foot wide band parallel to the shorelines (mostly the Wisconsin shore). The St. Croix has dense populations (22 live and 18 dead/m<sup>2</sup>) in restricted areas. Opposite the Power Plant the Wisconsin shore substrata consisted of a 200 foot wide band of sand, gravel, and cobble, then a 50 foot wide band of bark, followed by 72% to 82% silt (jello-like) at least 2.5 ft. deep and 400 ft. out into the flat-bottomed channel. Measurements taken at 10 sub-sites on center-lines included sediments for particle size, temperature, current, and depth profiles; locales were verified with an EDM instrument.

EVIDENCE OF FOUNDER EFFECT IN ILLINOIS RIVER POPULATIONS OF THE THREE-RIDGE MUSSEL, *AMBLEMA PLICATA*. S. Johnson, M.A. Romano and R. V. Anderson. Western Illinois University, Macomb, IL 61455

The genetic structure of Illinois River populations of the three-ridge mussel, *Amblema plicata*, were compared with *A. plicata* from the Mississippi River in order to investigate the effect of fish movement, dams and current flow on gene flow in Unionid mussels. Starch gel electrophoresis was utilized to analyze electromorph variation at 16 presumptive enzyme loci. Average heterozygosity of Illinois River populations were slightly lower (0.048) than those from the Mississippi River (0.061). This was expected considering Illinois populations have recovered over the past 20 years after being almost extirpated by pollution. What was not expected was an unusually high relationship between *A. plicata* populations from Peoria Lake with distant populations from Pool 19 on the Mississippi River. We suggest that individuals from Pool 19 were used to re-establish populations in Peoria Lake following pollution in the Illinois River. Preliminary data from heavy metal analysis of mussel shells corroborate these findings.

SELECTIVE FEEDING IN CHIRONOMID LARVAE. E. W. Chilton II, National Fisheries Research Center, P. O. Box 818, La Crosse, Wisconsin, 54601-0818.

Chironomid (aquatic midge) feeding behavior is not well understood. To test for selectivity, chironomid feeding habits were evaluated. During summer 1983 macrophyte-associated chironomid larvae were collected from the following species of aquatic plants: Vallisneria americana (wild celery), Myriophyllum spicatum (Eurasian watermilfoil), and Ceratophyllum demersum (coontail), in Lake Onalaska, Wisconsin. Diatom assemblages found growing epiphytically on these plants were compared to assemblages found in the digestive tracts of chironomids collected from them. Strongly adnate diatoms such as Cocconeis placentula were selected against. However, several species of colonial, planktonic, and stalked diatoms were often preferred. It is unclear whether the observed selection was behavioral or a function of morphological constraints.

THE RELATIONSHIP BETWEEN THE RATE OF SEDIMENT ACCUMULATION AND THE DENSITY OF BENTHOS IN A BACKWATER LAKE OF POOL 2, MISSISSIPPI RIVER. Daniel J. Hornbach, Dept. Biology, Macalester College, St. Paul, MN 55105, Andrew C. Miller and Barry S. Payne, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS 39180.

The relationship between sediment deposition and the density of mayflies and midges was ascertained at each of 3 stations along 3 transects in River Lake (RM 826). To measure sedimentation rate, 9 sediment traps were placed at each of the 9 stations for 2 week periods during the summer of 1987. The total weight and ash-free dry weight of the accumulated sediment was measured for 6 of the traps and the volume of sediment was assessed for 3 of the traps. Midge densities were gauged by taking 3 replicate 3-inch diameter cores at each station every 2 weeks. Mayfly densities were ascertained by taking 5 replicate samples with a petit ponar at each station every 2 weeks. Preliminary analyses indicate that sedimentation rate is not directly related to river stage or discharge. There is, however, a significant correlation ( $p=0.02$ ) between sedimentation rate and the level of suspended solids in the water. Variation in sedimentation rate within the lake appears to be related to the degree to which the river vs. the local runoff affects various regions of the lake. There is a significant negative correlation between the sedimentation rate as total dry weight and midge density ( $p=0.0007$ ) and a significant negative correlation between sedimentation rate as ash-free dry weight and both midge and mayfly densities ( $p=0.0001$  and  $0.03$  respectively). Whether these correlations are causal or based on changes in river stage or emergence patterns will form the basis of future studies.

EVALUATION OF SEVERAL EXISTING SEDIMENT-TRANSPORT FORMULAS FOR A REACH OF POOL 20 OF THE MISSISSIPPI RIVER. Tatsuaki NAKATO, Iowa Institute of Hydraulic Research, The University of Iowa, Iowa City, Iowa 52242.

Extensive flow and sediment field data were collected along the Mississippi River (MR) reach between Buzzard Island and Fox Island (RM349-RM356) by the Iowa Institute of Hydraulic Research (IIHR) in 1976 and 1978. The field data collected during two field studies were utilized primarily to explain the complex river processes that create chronic shoaling problems in the general vicinity of these two islands and to propose remedial schemes to alleviate them. Although there have been numerous sediment-discharge predictors proposed to estimate sediment discharges in natural rivers, their estimates are unfortunately far from the observed data, in general. In order to evaluate various sediment-transport formulas, the measured flow and bed-material data were utilized, and the computed results of the suspended-, bed-, and total-load discharges were compared with the measured values. The sediment-discharge predictors evaluated include those of Ackers-White, Einstein-Brown, Engelund-Fredsoe, Engelund-Hansen, Inglis-Lacey, Meyer-Peter Mueller, Schoklitsch, and Toffaleti. Empirical, power-law type relationships were also obtained between sediment discharges and flow parameters such as water discharge and mean flow velocity. According to the empirical formulas, the bed-load discharge per unit width appears to vary approximately as the 4.7 power of the mean flow velocity, the suspended-load discharge per unit width as the 2.4 power of the unit water discharge, and the total-load discharge per unit width as the 2.4 power of the unit water discharge for this particular study reach in Pool 20.

IMPACT OF A HYDROPOWER FACILITY ON MISSISSIPPI RIVER NAVIGATION: A MODEL STUDY. C. Ellis and H. G. Stefan, St. Anthony Falls Hydraulic Laboratory, Department of Civil & Mineral Engineering, University of Minnesota, Minneapolis, MN 55414.

In 1985, the City of Hastings began investigation of the possibility of building and operating a 5 megawatt hydroelectric facility at Lock and Dam No. 2 on the Mississippi River with the goal of selling power to the local utility company and using the profit as a source of revenue for the city. As part of its licensing procedure with the Federal Energy Regulatory Commission, Hastings was required to come to an agreement with the Army Corps of Engineers regarding the impact of the proposed facility on river navigation, flood conveyance, and bed scour. In compliance with this requirement, the City contracted with the St. Anthony Falls Hydraulic Laboratory, University of Minnesota, in Minneapolis, Minnesota, to have a 1:72 scale model study done of a 2 mile reach of the river in the vicinity of Lock and Dam No. 2. This study, 1) documented the effect of powerhouse operation on navigation into and out of the operating lock, 2) determined the effect of the proposed installation on flood heights, 3) documented flow patterns resulting from the revised gate operation schedule and powerplant release, and 4) assessed the scour potential of powerhouse discharge and the affect such scour would have on navigation currents. Supplementally, the model was used to study the powerhouse approach flow with the objective of developing design modifications that would improve intake velocity uniformity and minimize the potential for vortex formation.

PHYTOPLANKTON COMMUNITY COMPOSITION AND PRIMARY PRODUCTION OF SELECTED HABITATS IN NAVIGATION POOL NO. 8 OF THE UPPER MISSISSIPPI RIVER. Lange, T. R., and R. G. Rada. River Studies Center, Department of Biology and Microbiology, University of Wisconsin-La Crosse, La Crosse, WI, USA, 54601.

Phytoplankton was studied in main channel, side channel, and backwater habitats during 1986. Community composition, total standing crops, and net primary production were similar among habitats. Phytoplankton was dominated by diatoms (*Melosira granulata*, *M. italica*, *Stephanodiscus astrea*, and *Cyclotella meneghiniana*), which comprised about 70% of the total cell volume. *Aphanizomenon flos-aquae*, *Cryptomonas ovata*, and *Ulothrix subconstricta* were the most abundant non-diatoms. Total standing crops (CV) were maximal (11.8 mm<sup>3</sup>/L) in late June and minimal (0.8 mm<sup>3</sup>/L) in early November. Rates of net primary production were indicative of mesotrophic to eutrophic conditions and ranged from 2.2 gC/m<sup>2</sup>·D<sup>-1</sup> in late June to 0.1 gC/m<sup>2</sup>·D<sup>-1</sup> in late October. The studied habitats usually become different from each other as the ice-free season progresses; hence, the similarity among phytoplankton of different habitats was unexpected. However, 1986 was an unusual hydrologic year with high discharges during the entire study. This minimized differences among locations with regard to N, P, Si, temperature, light penetration, etc., which explains the similarities of the phytoplankton communities among habitats.

EFFECT OF WATER TEMPERATURE ON THE SUCCESS OF FLUORESCENT PIGMENT MARKING. L. E. Holland-Bartels, M. R. Dewey, and S. J. Zigler, National Fisheries Research Center, U.S. Fish and Wildlife Service, P.O. Box 818, La Crosse, WI 54602.

The cumulative effect of collection, handling, and fluorescent pigment marking on the survival of selected young-of-the-year sport species and adult cyprinids and centrarchids under various river water temperatures was determined. Field studies were conducted in Pool 7 of the upper Mississippi River from July to October as river water temperatures declined. Mortalities among young-of-the-year bluegills (*Lepomis macrochirus*) and the larger centrarchid/percid group were directly related to temperature and decreased noticeably below 18.5°C. Minnows did not show this decrease in mortality with cooling river temperatures. Their mortality was high at all temperatures and survival was never greater than 50%. Considerable variation in mortality by size of fish and taxa existed related to river water temperatures which affects accurate application of mark-recapture techniques.

PRELIMINARY RESULTS OF NATURAL REGENERATION AND AVIAN UTILIZATION OF MISSISSIPPI RIVER BOTTOMLAND FORESTS FOLLOWING TIMBER HARVESTING. T.A. Feavel, J.M. Hong, U.S. Army Corps of Engineers, P.O. Box 34, Pleasant Valley, IA 52767

Since 1982, the Rock Island District, U.S. Army Corps of Engineers has implemented an active forest management program along the Mississippi River. Included in the program are ten year monitoring studies on natural regeneration and avian utilization, begun in 1983.

Preliminary results of natural regeneration show that timing and duration of flooding, coupled with site elevation, are very important to successful natural regeneration. Competition from annual herbaceous growth may decrease seedling survival among the shade intolerant Silver Maple (*Acer saccharinum*) and cottonwood (*Populus deltoides*). Two parcels are being surveyed, one harvested in January 1983, and the other in August, 1983. Preliminary results indicate that the area cut earliest is more successful in natural regeneration than the August harvest area due to ideal seeding conditions in the spring of 1983.

Avian monitoring was also instituted in 1983 in areas following timber harvesting. The method of survey used is the population index method. Four surveys are conducted annually; two spring breeding bird surveys, and two fall migration surveys. The mean population index of 53 species of birds has increased out of a total of 63 species, potentially as a result of increased edge. The habitat diversity created by the timber harvesting appears to benefit most species of birds.

A TICK ATTACK ON THE RIVER: LYME DISEASE ON THE SAINT CROIX. A. R. Weisbrod  
Saint Croix National Riverway, P.O. Box 708, St. Croix Falls, Wisconsin 54024.

A study of riparian habitat use by long distance migrating birds has been studied at two sites (Valley Creek and Sandrock Cliffs) 100 km apart on Saint Croix National Riverway. Nearly 45,000 individual migrants representing 125 species have been captured, measured, banded, released since 1984. Incidental to other data recorded for each bird ectoparasites were removed when found and preserved in FAA for later study. Examination of ixodid ticks from Sandrock Cliffs in 1986 showed a majority were Ixodes dammini, one of several acarine vectors for Lyme disease (an ailment exhibiting an etiology similar to reprints fever and syphilis to which it is related). Subsequently all ticks were collected alive in 1987 and examined for the spirochete Borrelia burgdorferi (by R.C. Johnson, Microbiology, U - MN), the Lyme disease pathogen. B. burgdorferi was found in 46% of ticks removed from birds and field crews during spring 1987. A lower frequency was found in Dermacentor variabilis but this may not be significant because it is less likely it transmits the spirochete. Preliminary results (with 1/2 of 96 samples examined) show at least 16 fall migrant species were tick infested of which 10 species (typical ground foragers such as Catharus thrushes, Seiurus and Geothlypis warblers, and emberizine sparrows) account for nearly 90% of the infested individuals. However, infested birds represent less than 1.4% of all individuals from the 16 bird species so far processed. Nearly 95% of the ticks removed from the fall birds were either larvae or nymph, with the former predominating. It is increasingly clear Lyme disease is an insidious malady infecting persons who work or play in those habitats containing the tick vectors. Hopefully, future data obtained from both birds and their habitats will provide insights leading to reduction of rising infection rates of those persons living in tick inhabited regions of the United States.

A FIELD STUDY OF BLANDING'S TURTLE, EMYDOIDEA BLANDINGII, AT  
WEAVER DUNES, WABASHA COUNTY, MINNESOTA. Michael J. Pappas,  
248 S.W. Pkwy., Dallas, TX 75067, and Bruce J. Brecke, 217 No.  
Cedar Lake Road., Minneapolis, MN 55405.

The Weaver Dunes area of southeastern Wabasha Co., Minnesota is located between an old channel of the Zumbro River on the west and the Mississippi River to the east. The area provides habitat for the largest population of Blanding's turtle, Emydoidea blandingii, yet reported. A field study of E. blandingii was conducted at Weaver Dunes from 1974-78. Various aspects of the life history of this poorly-known species were examined including: emergence and dispersal from hibernation, courtship and mating behavior, seasonal movements, nesting ecology, growth, and population structure. E. blandingii is a geographically restricted, habitat-specific, moderately aquatic species, formerly abundant on wet prairies, and has suffered serious habitat degradation within the last century. The Minnesota DNR considers E. blandingii a "threatened" species.