

## OVERVIEW OF WATER-RELATED HANDS-ON SCIENCE EDUCATION IN THE RED RIVER WATERSHED

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### INTRODUCTION

#### About the Symposium

The mission of this symposium is to provide a forum for the many people interested in science education in the watershed of the Red River of the North. The focus of the meeting is to bring people together to have a chance to learn about each other and their science-based activities, with the hope of stimulating new partnerships, and to give high school students an opportunity to interact with the science community.

In the year 2000, a proposal was submitted by the Energy and Environmental Research Center (EERC) to the National Science Foundation under Element 1 (NSF00-38), which was an NSF initiative to develop ways to expand geoscience education to younger students. After the grant was awarded, we were at least partially surprised to learn that many other educators and resource managers were interested in using water-quality issues as a way of promoting science and the scientific method in the classroom. This symposium is an outgrowth of some of the collaborations that have developed over the last 18 months. We believe that getting students involved early in practical (beyond book learning) application of methods and practices will instill a long-term interest in science. The presentations by students at this, the 94th North Dakota of Academy of Science, annual meeting will, I understand, be the first at which high school students will speak.

#### WHAT PEOPLE ARE DOING

The watershed of the Red River of the North is the major natural feature of northeastern North Dakota and northwestern-most Minnesota. Over the past decade, hands-on water-related education has grown dramatically using the Red River and its tributaries as a field laboratory to promote science inquiry in students of all ages. Currently, more than 500 students in more than 30 school districts in the Red River watershed are involved in one of the following outreach activities: Red River Geoscience Education, Red River Basin River Watch, FM River, and Minnesota State University at Moorhead (Red River Center for Watershed Education). In addition, 700 students are served

by the Eco-Ed camps (Table 1). This paper provides an overview of the distribution and activities of these programs through the following maps and tables.

#### ACKNOWLEDGMENTS

This activity was funded by grants to the EERC from the National Science Foundation (to Joseph Hartman, NSF EAR00-85583) and the U.S. Environmental Protection Agency (to Dan Daly and Charlene Crocker, EPA NE 998221-01). We also wish to thank Wes Peck for his help with Figures 1 and 2 of this paper.

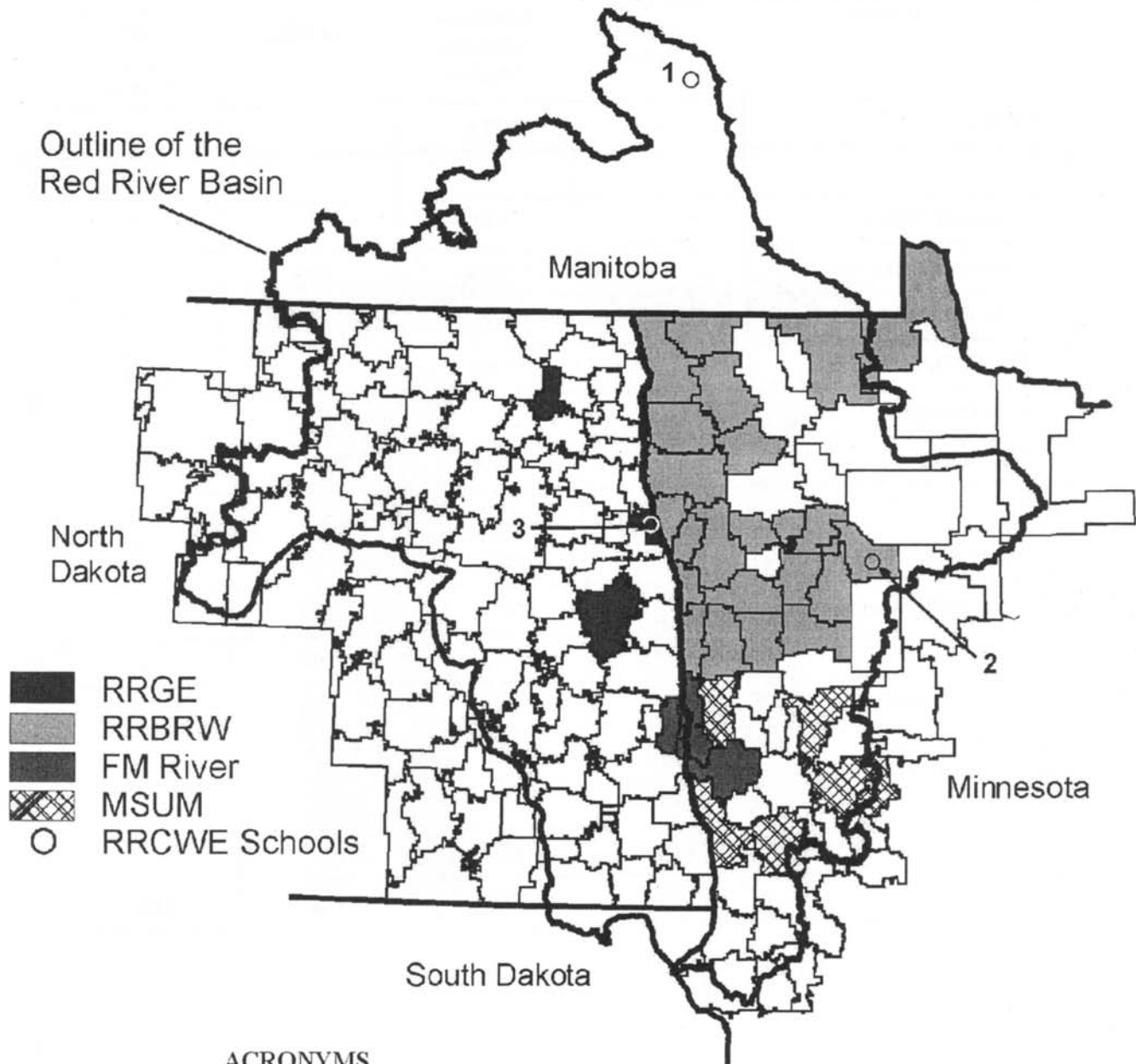
Table 1  
Selected Regional Water-Related Educational Programs in the Watershed of the Red River of the North

Program	School and Area	Description	Group/Funding Source/Duration	Contact
Red River Basin River Watch (RRBRW)	24 schools in northwestern MN	Extracurricular activity with a group of 10 students per school; monthly sampling of tributary or Red River mainstem under ice-free conditions; in-school analysis for four parameters; data reduction; up to 7 years of data available depending on school; annual regional water forums where schools present and compare findings; high school focus.	Past grants from MN Board of Water and Soil Resources and financial support from the Red River Watershed Management Board (RRWMB); currently funded from Flood Damage Reduction Funds (MN Department of Natural Resources) administered by RRWMB, subject to annual budget review and renewal.	Wayne Goeken RRBRW (218) 574-2622 wrg@gvtel.com
Red River Geoscience Education (RRGE) Pilot Project	3 schools in northeastern ND	Pilot project to initiate ND water education; modeled on RRBRW, but with geoscience context and GIS activities; goal of monthly sampling and in-school analysis of tributary or Red River mainstem waters during ice-free months; high school focus; full class and summer school field camp groups	EERC/National Science Foundation (NSF); NSF funding 8/00 to 8/02; out-year funding in development.	Dan Daly, Charlene Crocker, and Joseph Hartman EERC (701) 777-5000 ddaly@undeerc.org ccrocker@undeerc.org
North Dakota River Watch Laboratory Field Experience (LFE)	3 schools in northeastern ND	Pilot project to initiate program providing students with 1-day sessions in a professional laboratory setting (e.g., laboratories at local universities, water treatment facilities, industries, research facilities) performing water analysis and critical thinking activities under the guidance of professionals; high school focus; full-class groups; stand-alone or supplement to other water education programs; students learn about Red River watershed natural setting, range of water types over the watershed, and treatment needs for use options.	EERC/Environmental Protection Agency (EPA), Region VIII; EPA funding 6/00 to 11/01; verbal commitment from Grand Forks Water Treatment Laboratory to host future sessions for local schools.	Dan Daly and Charlene Crocker EERC (701) 777-5000 ddaly@undeerc.org ccrocker@undeerc.org
FM River	School program in development in the Fargo (Cass County, ND) and Moorhead (Clay County, MN) area	EPA EMPACT (Environmental Monitoring for Public Access and Community Tracking) project; goal of semimonthly sampling of 3 sites on Red River mainstem by school and community groups supplemented by other data sources; data management by the EERC; data and data context available to community through Web site, television, and other venues; high school focus for sampling and in-class analysis activities; annual water forum.	Project management by EPA Region VIII; partnership of municipalities, state agencies, the EERC, Prairie Public Television, and FM RiverKeepers; EPA, Region VIII (EMPACT) funding 6/01--6/03; out-year funding in development.	Christine Holland River Keepers (701) 235-2895 riverkeepers@j29.net
Water Education/MSUM Regional Science Center (RSC)	10 schools in Fargo-Moorhead metropolitan area, ND-MN	Annual 1-day class sessions featuring water sampling and school laboratory analysis of water samples from local tributary or Red River mainstem; middle school focus.	Minnesota State University Regional Science Center (MSUM/RSC) Environmental Education Center/Mix of long-term funding and grants..	George Davis MSUM/RSC (218) 236-2904 davisg@mnstate.edu
Red River Center for Watershed Education (RRCWE)	NA	Watershedwide facilitation of water-related education curriculum development.	Tri Colleges (MSUM, North Dakota State University, Concordia College)/Bremer Foundation (BF); BF grant 2001--2003; out-year funding in development	Joe Courneya Center for Watershed Education (701) 231-6184 journay@ndsuext.nodak.edu
Eco-Ed Camps	7 middle schools in Grand Forks School District	Combination of 2- and 1-day camps held annually in September at Turtle River State Park featuring a variety of units, including soils, wetlands, and water quality, facilitated by professionals; 9 camps held in 2001 for 700 students.	Eastern Grand Forks County Soil Conservation District; district resources and grants; annual application and renewal	Nedra Hoberg Education Coordinator (701)746-7934 nedra.hoberg@nd.usda.gov

Table 2  
Types of Data Being Collected by Water Education Programs

Parameter	Red River Basin River Watch	Red River Geoscience Education Program	FM River	Red River Valley Water Quality Testing Network
Ammonia	-	YES	-	-
BOD	-	-	-	YES
Dissolved Oxygen	YES	YES	YES	YES
Electrical Conductivity	YES	YES	YES	-
Fecal Coliform Bacteria	YES	YES	-	-
Nitrate/Nitrite Nitrogen	YES	YES	YES	YES
Total Phosphates	-	-	-	YES
Total Phosphorus	YES	YES	YES	-
pH	YES	YES	YES	YES
Salinity	-	YES	YES	-
Stream Depth/Stage	YES	YES	YES	-
Stream Flow	-	YES	-	-
Temperature (air)	YES	YES	YES	-
Temperature (water)	YES	YES	YES	YES
Total Solids	-	-	-	YES
Transparency	YES	YES	YES	-
Turbidity	YES	YES	YES	YES

Figure 1  
 Map of the Red River Drainage Basin Showing the School  
 Districts Involved in Water-Quality-Based School Studies



ACRONYMS

- RRGE – Red River Geoscience Education
- RRBRW – Red River Basin River Watch
- FM River – Districts shown are planned activities
- MSUM – Minnesota State University at Moorhead  
 (in collaboration with FM River districts)
- RRCWE – Red River Center for Watershed Education

**Figure 2**  
**FM River Sampling Location in the Fargo–Moorhead Area**

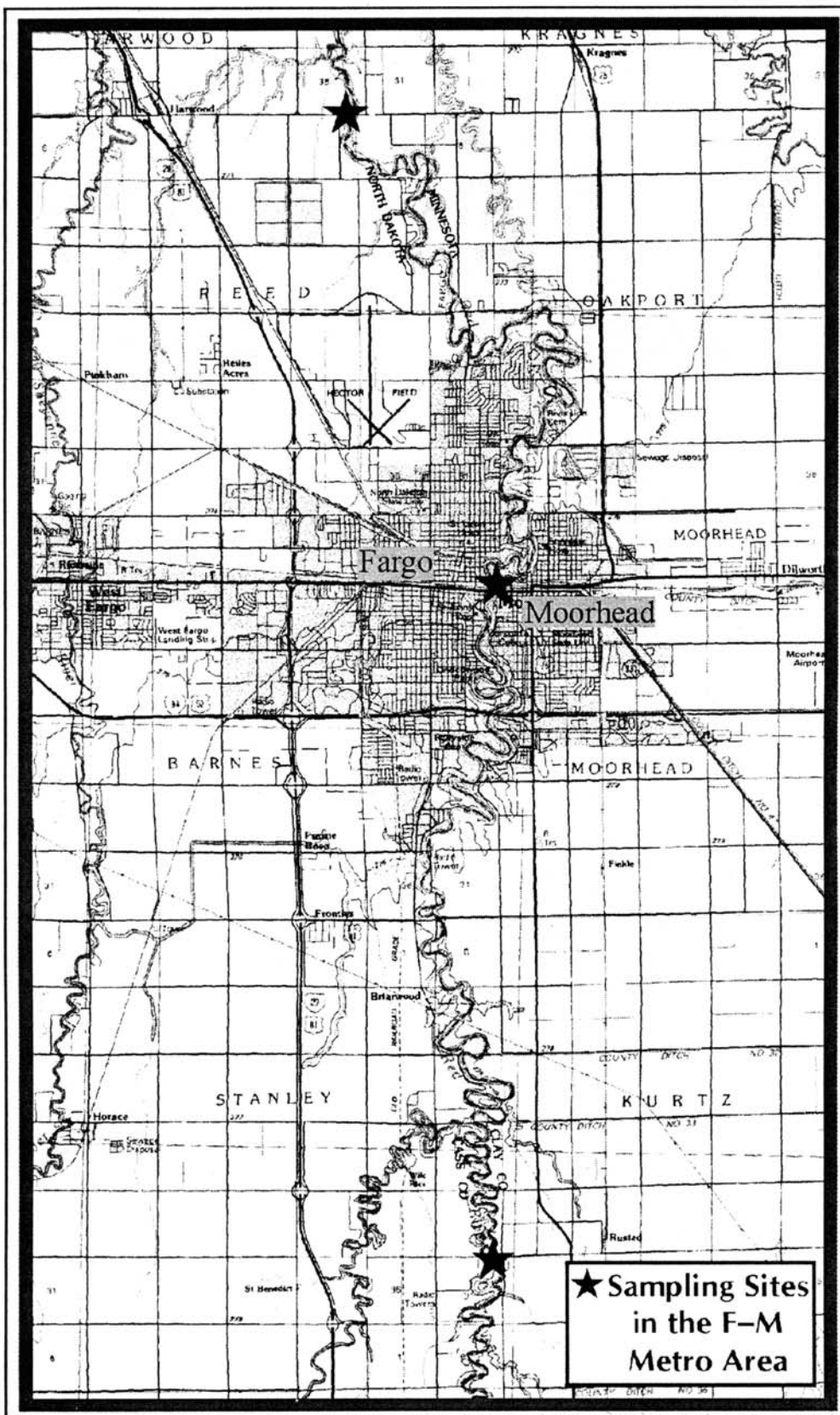


Table 3  
**Schools, Sampling Sites, and Related Water-Based Educational Programs**

School/Community	Watershed/Subwatershed	Monitoring Initiated	Organization
Ada, MN	Wild Rice River, Felton Ditch, Dalen Ditch	2000	RRBRW
Barnsville, MN	Red and Buffalo Rivers	2001	FM River
Breckenridge, MN	Bois de Sioux, Otter Tail, and Red Rivers	1992	MSUM
Clearbrook–Gonvick, MN	Clearwater River	1998	RRBRW
Climax, MN	Sand Hill and Red Rivers	1995	RRBRW
Crookston, MN	Red Lake River, Burnham Creek	1999	RRBRW
Detroit Lakes, MN	Buffalo River, Otter Tail River	1992	MSUM
Dillworth–Glyndon–Felton, MN	Buffalo River	1992	MSUM
East Grand Forks Public, MN	Red Lake and Red Rivers, Grand Marais Creek	1999	RRBRW
East Grand Forks Sacred Heart, MN	Red Lake River, Red River	2000	RRBRW
Edinburg, ND	Park River	2000	RRGE
Fargo North, ND	Red River	1992	MSUM
Fargo Shanley, ND	Red River	1992	MSUM
Fargo South, ND	Red River	1992	MSUM
Fargo Woodrow Wilson, ND	Red, Sheyenne, and Wild Rice Rivers	1993	MSUM
Fergus Falls, MN	Otter Tail River	1993	MSUM
Fertile–Beltrami, MN	Sand Hill River	1995	RRBRW
Fisher, MN	Red Lake River, Burnham Creek, Grand Marais Creek	2001	RRBRW
Fosston, MN	Sand Hill and Poplar Rivers	1995	RRBRW
Grand Forks Red River, ND	English Coulee, Red River	2000	RRGE
Hallock, MN	Two Rivers	1999	RRBRW
Karlstad, MN	Two and Tamarac Rivers	2000	RRBRW
Lancaster, MN	Two Rivers	1999	RRBRW
Mahnomen, MN	March Creek, Spring Creek, White Ditch	2000	RRBRW
MayPort CG, ND	Goose River, Mayville city pond	2000	RRGE
Moorhead, MN	Buffalo River	1992	MSUM
New York Mills, MN	Otter Tail River	1994	MSUM
Newfolden, MN	Middle River	1999	RRBRW
Norman County East, MN	Coon, Mash, and Moccasin Creeks	2000	RRBRW
Norman County West, MN	Marsh and Wild Rice Rivers, Spring Creek	1995	RRBRW
Oklee, MN	Clearwater River, Hill River, Lost River	1998	RRBRW
Perham, MN	Otter Tail and Toad Rivers	1993	MSUM
Plummer, MN	Clearwater, Hill River, and Lost Rivers	1998	RRBRW
Red Lake Falls, MN	Red Lake, Clearwater, and Black Rivers	1998	RRBRW
Roseau, MN	Roseau River, Hay Creek	2000	RRBRW
Stephen–Argyle, MN	Tamarac River	1999	RRBRW
Warren–Alvarado–Oslo, MN	Snake River	1999	RRBRW
Warroad, MN	Warroad River, Swift Ditch	2000	RRBRW
West Fargo, ND	Sheyenne River	1992	MSUM
Win-E-Mac, MN	Sand Hill River, County Ditch 16, Poplar River, Oak Lake	1995	RRBRW