February 13, 2013

Red River Basin River Watch Annual Report

Red River Basin River Watch actively engages youth in long-term monitoring and exploration activities in their local watersheds using current technology, training and applied science.

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Contents

Introduction

This report fulfills the interim and initial evaluation reporting requirements for the Clean Water Legacy River Watch Project from April 2012 through December 2012. The Red River Watershed Management Board is the project sponsor with lead coordination and project management provided by the International Water Institute. The purpose of this report is to provide a summary of progress towards meeting the identified outcomes within the FY 2012 – 2013 Clean Water Fund Work Plan.

Program Overview

The Red River Basin River Watch was initiated in 1995 as a pilot project involving four schools in the Sand Hill River watershed. As of 2012, the River Watch program includes 25 schools/communities monitoring and exploring over 150 sites on rivers, creeks and ditches in northwest Minnesota and North Dakota.

River Watch Objectives

1. Increase understanding of water and human land use interactions.
2. Develop technical, research, and critical thinking skills in students and citizens.
3. Expand available water quality data sets for the Red River Basin.
4. Provide opportunities to monitor the health of local watersheds.

Operational Overview

Basic Field Parameters Monitored: pH, conductivity, turbidity, dissolved oxygen, transparency, stage level, and water and air temperature.
Sampling Sites: 4-16 sites are sampled per school. Staff from the local Soil and Water Conservation District, Watershed District and River Watch Program, assist with site selection.
Sampling Frequency: Once a month during open water months of April/May through Oct/Nov.
Sampling Team: From 4 to 12 students. Some schools use an application process. Utilizing mixed grades (8-12) is helpful for continuity and experience.
Sampling Event: Calibrate equipment and assemble materials before driving out to sampling sites. Collect measurements, record field observations at each site. Return to school. Clean and store equipment, make copies of data sheets, enter data and forward to resource managers.

Program Features

- Training, oversight and coordination to ensure data quality.
- An on-line data site (http://riverwatch.umn.edu) provides accessible and immediate data management tools allowing for a full experience of collection, reporting and analysis.
- Annual Youth Forum for participants to present their data analysis to their peers, natural resource managers and the public. Education sessions provided on emerging watershed issues, science topics, and technology tools. Poster judging and awards ceremony.
- Professional support to develop news releases, presentations, build research skills, and develop outreach programs and activities such as river clean-ups and storm drain stenciling.

Progress and Evaluation

Red River Basin River Watch actively engages youth in long-term monitoring of their local watersheds using current technology, training and applied science. In 2012 Clean Water Legacy funding was secured to expand and enhance the River Watch Program. Three main objectives were identified for implementation in 2012 – 2013.

Expand and Enhance Objectives

1. Build program rigor and consistency.
2. Increase awareness and knowledge of local land use and watershed connections.
3. Assist in provision of Science, Technology, Engineering and Math (STEM) education and engagement opportunities through watershed science.

The remainder of this report discusses the project progress in meeting the tasks and measureable outcomes of the expanded River Watch activities from April 2012 through December 2012 (9 months).

OBJECTIVE 1: Develop a standardized framework for program implementation to build rigor and consistency with communities currently involved in River Watch, while expanding monitoring and engagement opportunities.

Task A: Develop strategic watershed water quality monitoring plans in partnership with local resource managers and education partners for three pilot watersheds**.**

Task B: Establish guidelines and implement a two track program for River Watch participation.

Task C: Expand and develop macroinvertebrate monitoring options for RW teams and citizen groups using kits, a check out and training system and basic protocols.

Measurable Outcomes:

1A1 *Inventory of all river monitoring sites and monitoring resources for three pilot watersheds by December 2012.*

1A2 *Developed rationale or purpose for each River Watch monitoring site and its' fit with overall watershed monitoring and education needs and plans by February 2013.*

1A3 *River Watch monitoring plans developed and finalized for three watersheds by April 2013.*

1B1 *Certification program defined and implemented for participation in River Watch monitoring—to be in place by April 2013. Final program guidelines, training materials, training sessions held, and alternative certification methods will be reported as part of Final Report due 12/31/2013.*

IB2 *Number of participants certified and data submitted to MPCA EQIS by RW monitoring participants will be reported as part of Final Report due 12/31/2013.*

1B3 *Track 2 participation guidelines developed and offering of resources and activities made available on-line by April 2013.*

1C1 *Six (6) macroinvertebrate kits assembled and a system developed for checkout by River Watch participants by September 2012.*

1C2 *Training in macroinvertebrate methods, safety, identification and field protocols developed. Ongoing over contract period, completed by October, 2013.*

1C3 *Resources (modules, videos, print) developed and/or located to connect macroinvertebrate findings with water quality issues. Ongoing over contract period, completed by October, 2013.*

1C4 *Teacher evaluation of ease of use, problems, highlights of kit experience collected, as well as pre/post surveys for students. Ongoing over contract period, completed by October, 2013. Results will be reported as part of Final Report due 12/31/2013.*

Objective 1 Progress:

- An inventory of all river monitoring sites was completed for three pilot watershed districts; Bois de Sioux, Sand Hill, and Middle River Snake River Tamarac River. The inventory areas encompass five 8-digit HUC watersheds within the Red River Basin. Site inventory is included for review in Appendix A. The inventory of monitoring resources by watershed district will be completed following face-to-face meetings with district personnel (early February 2013).

- Established the guidelines and began implementation of a two track program for River Watch participation. Guidelines are posted in a downloadable pdf format on the IWI website, www.iwinst.org/education/participate and are also included in Appendix B.

- Guidelines for macroinvertebrate sampling have been developed along with six macroinvertebrate kits. A kit check out system is in place for River Watch participants. The guidelines and list of kit materials have been assembled into the document, "Overview of Aquatic Macroinvertebrate Sampling." This document is included in Appendix C.

- A macroinvertebrate training workshop was held on August 7th, 2012. Twelve attendees participated including six River Watch teachers, five staff from local watersheds who work with River Watch schools, and one U of M Extension educator. See Appendix D for agenda and items covered during the workshop.

- On-site macroinvertebrate training was provided to two River Watch schools. IWI staff presented sampling methods, importance of macro sampling, and how to use macros as water quality indicators. Staff also accompanied schools into the field for collection of macros using a macro kit assembled by IWI.

OBJECTIVE 2: Increase awareness and knowledge of local land use and watershed connections through a Red River Explorers Paddling Program to allow RW teams and community members to "water-truth" streams in the Red River Basin, documenting local watershed conditions.

Task A: Establish capacity and structure of Red River Explorers Paddling Program to allow RW teams and community members to safely explore and document river conditions.

Task B: Lead six guided river ecology excursions each summer (2 each in June, July, and August), done as paired outings on three streams in the Red River Basin. Each paired outing will consist of a first descent by an adult team with an emphasis on scouting the proposed river reach and training the adults in safety and paddling skills. The second outing will be with adults and youth on the same reach of river at which time the field documentation of watershed conditions will occur.

Task C: Develop three on-line 'river story' modules connecting physical, chemical, and biological indicators of watershed health through photos, videos, monitoring data and stories from the guided river excursions and supplemented by additional inquiry and investigation that arises from the river experiences.

Measurable Outcomes:

2A *Red River Explorers Program in place to facilitate access to streams for eco-excursions. Equipment, training, and engagement program piloted in 2012 and fully operational in 2013.*

2B *Twelve guided river ecology excursions in the Red River Basin, of which six will utilize GPS and mapping/photo documentation of baseline geomorphology and recreation conditions. Reporting will include number of trip participants, river reaches covered, documentation of river conditions, and a summary of comments by participants regarding impact of experience on their interest in rivers and watershed issues. Results to be included as part of Final Report due 12/31/2013.*

2C1 *Incorporation of three 'river story' modules into RW classroom outreach and for presentation and discussion to engage community audiences. To be completed by November 2013 and included in Final Report due 12/31/2013.*

2C2 *Evaluation (self-reported) of changes in knowledge, attitude and perceptions of local rivers after engaging in river story modules. Both print and on-line methods. To be completed by November 2013 and included in Final Report due 12/31/2013.*

Objective 2 Progress:

- Kayaks and gear are in place through cooperative arrangement with University of MN Extension. Conducted initial pilot testing on 6/8/12 using iPads and a GPS Bad Elf Kit app to document sampling sites, conditions, and

an on-water river route on a reach of the Sand Hill River in the Fertile area. All the information was downloaded into Google Earth to allow a virtual watershed tour.

- Coordinated training with Minnesota Extension at Red Lake Watershed District office on 6/26/12 for River Watch teachers and students and staff assisting RW schools in use of iPads and geotagging digital cameras to use in documenting watershed conditions through the River Explorers program. See Appendix E "Nikon CooPix SOPforGeoTagImages."
- Provided input on development of a "River Explorers" App for web-based or mobile devices to compliment the River Explorers program.
- The Grygla, MN River Watch team was the first "River Explorer" team to document a reach of river with iPads and digital cameras. The team along with IWI and MN Extension staff made up a contingent of 11 kayaks, paddling a reach of the Thief River where the Grygla team's monitored waters flow into. All images taken (culverts, bank sloughing, erosion, garbage, wildlife, etc.) were geotagged for reference. A digital summary report was provided to the Red Lake Watershed District which was able to use photos taken of culverts immediately to verify field conditions for a mapping project they were working on. See Appendix F "REJournal~Thief River~081712" as example of River Explorer's Journal that will be created for each trip which provides detailed documentation of participation and conditions encountered.
- Also attached in Appendix G are two reports of river reaches ("Wild Rice R. scouting~Mahnomen area" and "Red Lake R scouting~Fisher to EGF") that were scouted but were not able to be paddled due to low water levels in 2012. The massive wild fire near Karlstad also resulted in cancellation of a planned river trip with the Tri-County RW team based in Karlstad and cold weather didn't allow a planned outing by the Thief River Falls team on the Thief River. These and several other teams are ready to go in 2013. If water levels remain low, special emphasis will be to do trips early in 2013 while water levels are higher.

OBJECTIVE 3: Assist in provision of Science, Technology, Engineering and Math (STEM) education and engagement opportunities through watershed science.

Task A: Provide professional teacher development through watershed inquiry and education opportunities. Regional fall kick-off events, incorporating team building skills, local watershed project presentations and data integration will be held for RW teachers and youth leaders. A summer training session will be held for teachers to provide extended learning opportunities on watershed topics such as river ecology, watershed impairments, and flooding.

Task B: Utilize the annual River Watch Forum to provide exposure to relevant research topics and an opportunity to present findings from current research involvements. Provide opportunities for youth to engage in scientific research.

Measurable Outcomes:

3A *2-3 regional fall kick-off events in both 2012 and 2013; and minimum of one teacher summer training session. Summary report will be provided to document participants at regional kick-off events, topics covered, and evaluation comments from participants. A summary report will also be provided for the summer teacher training documenting participation, materials presented, and evaluation summary from participants.*

3B1 *River Watch Forum presented in March 2013 with keynote speaker and concurrent sessions focused on emerging watershed education and research. Poster displays of assigned research topic and special investigations by RW teams in collaboration with research partners.*

3B2 *Summary report written to document participating RW teams/schools and highlighting awards and watersheds represented in research, with links to posters. To be completed by April 2013 and included in Final Report due 12/31/2013.*

Objective 3 Progress:

- Three regional fall kick-off events were held for River Watch teams (two events in October and one in December 2012). Kick-off participants participated in team building activities. Participants also received presentations on data visualization, natural resource projects, drought forecasting, and the 2013 River Watch Forum team challenge. In all 16 River Watch teams participated in the kick-off events. A copy of the agenda for the fall team kick-off events is included here as Appendix H.
- Ongoing planning for concurrent sessions and keynote speaker for 2013 River Watch Forum which will be Wednesday, March 20, 2013 on the campus of the University of Minnesota, Crookston campus. Preparing for site visits to all RW schools to review Forum assignment and assist schools as needed for Forum preparation. The 2013 Forum assignment is included as Appendix I.

OBJECTIVE 4: Project Management and Reporting

Task A: Track project grant-related expenditures. Compile and organize invoices, pay bills and submit for expense reimbursements in a timely manner.

Task B: Track objectives and tasks to ensure outcomes are being met. Prepare and complete reports and results from the Red River Basin River Watch program as follows:

- 1/15/2013 Interim report to MPCA
- 2/15/2013 Interim report and initial evaluation results to the:
- Commissioners of Education and the Pollution Control Agency,
- Legislative Natural Resources Finance and Policy Committees, and
- K-12 Finance and Policy Committees

12/31/2013 Final report including final evaluation results to entities identified for 2/15/2013 report above.

Measurable Outcomes:

- This report fulfills the initial and second reporting requirements of this objective.
- Invoices have been submitted and are current through December 31, 2012. Below is a summary of the project budget through this period.

Project Budget	MPCA Grant Funds Available	Total MPCA Funds Expended	Total Remaining Balance	% Budget Expended
Objective 1: Rigor	$86,101.00	$41,252.36	$44,847.64	48%
Objective 2: River Recon	$69,400.00	$9,023.98	$60,376.02	13%
Objective 3: Educate and Engage	$32,499.00	$12,013.31	$20,486.69	37%
Objective4: Project Mgmnt&Reporting	$12,000.00	$4,601.50	$7,398.50	38%
TOTAL PROJECT BUDGET	$200,000.00	$66,891.15	$133,108.85	33%

Summary

Past support for Red River Basin River Watch (RW) from the Red River Watershed Management Board, local watershed districts, and other regional partners has built a solid watershed education foundation across the Red River Basin. The International Water Institute (Institute) RW program trains students to monitor physical and chemical conditions of local rivers using standard operating procedures that yield scientific data which are used by MN Pollution Control Agency for surface water assessment. RW team data collected at over 150 sites on Rivers, streams, and agricultural ditches in the Red River Basin.

The 2012-2013 River Watch Clean Water Fund project has enabled the Institute to build on this solid watershed education foundation by providing additional learning opportunities that complement the core physical and chemical monitoring done by RW teams with our resource agency partners. These new learning opportunities are designed to instill concepts of water stewardship and a more comprehensive understanding of watersheds to protect and improve Minnesota's valuable water resources.

The Institute provided training and information materials for students to engage in macroinvertebrate monitoring. Macroinvertebrate monitoring engages students through hands on learning during field visits. Students use macroinvertebrate kits to collect organisms and discover what lives in the stream providing a good indication of relative health. These results are correlated with their past and ongoing physical and chemical results to provide a more comprehensive understanding of stream and watershed health.

The River Explorers program provides opportunity to explore their local waters by paddling down local river corridors to see first-hand what the conditions and factors that influence the water quality results that they have been measuring. Students use current geo-spatial and communication technologies to document and share conditions that they discover with their local resource managers, leading to further dialogue and activities to address issues.

Clean Water Funds also allow the Institute to provide additional training and support for RW program participants and enhance important science, technology, engineering, and math (STEM) skills that are a critical need for preparing students for 21st century jobs and challenges.

Progress toward meeting each of the objectives reported herein provides evidence that the River Watch Project is making substantial headway towards meeting its goals of developing program rigor and consistency, increasing awareness of watershed connections, and providing STEM watershed education activities. 2013 project activities will continue to develop the critical thinking and human resource capacity of our youth which is critical to protecting and improving the natural resource capital of Minnesota.

APPENDICES

Appendix A: River Monitoring Site Inventory

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
JD #25, SE INTERSEC 280TH AVE & 210TH ST, 5.5 MI E OF WARREN	JD #25	MPCA	S002-108	9020309		1	1					
MIDDLE R AT CSAH-10 8.5 MI NW OF ARGYLE	Middle River	MPCA	S000-697	9020309								
MIDDLE R AT CSAH-28 ON WEST EDGE OF NEWFOLDEN	Middle River	MPCA	S002-987	9020309		1			1	1		
MIDDLE R AT CSAH-30, 5 MI NW OF NEWFOLDEN	Middle River	MPCA	S002-988	9020309		1			1			
MIDDLE R AT CSAH-4 AT ARGYLE	Middle River	MPCA	S000-700	9020309	USGS	1			1	1		
MIDDLE R AT CSAH-34 BRG XING, 6 MI E OF ARGYLE	Middle River	MPCA	S004-215	9020309		1			1	1		
MIDDLE R AT CSAH-39, 11 MI W OF NEWFOLDEN	Middle River	MPCA	S002-989	9020309		1				1		
MIDDLE R ON CSAH-17 BRG, 12 MI W OF ARGYLE	Middle River	MPCA	S003-691	9020309						1		1
MIDDLE R ON CSAH-28, 0.5 MI E OF NEWFOLDEN	Middle River	MPCA	S004-106	9020309								1
SNAKE R AT 210TH ST NW IN BOXVILLE TWP, 2.5 MI SW OF WARREN	Snake River	MPCA	S002-994	9020309		1				1		
SNAKE R AT 5TH STREET IN WARREN	Snake River	MPCA	S002-986	9020309		1						
SNAKE R AT CSAH-14, 5 MI NW OF VIKING	Snake River	MPCA	S004-152	9020309						1		1
SNAKE R AT CSAH-34, 3 MI NE OF WARREN	Snake River	MPCA	S003-101	9020309		1						1
SNAKE R AT MN-1 CROSSING IN ALVARADO	Snake River	MPCA	S004-142	9020309	MNDNR			1		1		1
SNAKE R ON CSAH-17 BRG, 12 MI W OF ARGYLE	Snake River	MPCA	S003-692	9020309						1		1
SNAKE RIVER AT BRIDGE ON MN-220 N OF BIG WOODS	Snake River	MPCA	S000-185	9020309				1		1	1	1
SWIFT COULEE, 5 MI SW OF ARGYLE	Swift Coulee	MPCA	S001-598	9020309					1			
JD #19 (TAMARAC R) ON 220TH AVE NW, 3 1/4 MI W STRANDQUIST	Tamarac River	MPCA	S003-109	9020311								1
SD-90 CULVERT ON CSAH-27, 6 MI NW OF STRANDQUIST	SD 90	MPCA	S004-216	9020311						1		
TAMARAC R AT 390TH AVE NW ON W SIDE OF STEPHEN	Tamarac River	MPCA	S002-991	9020311		1						
TAMARAC R AT CSAH-10, 6.3 MI NW OF STEPHEN	Tamarac River	MPCA	S002-990	9020311		1						

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
TAMARAC R AT CSAH-22, 4.7 MI NW OF STEPHEN	Tamarac River	MPCA	S005-788	9020311	MNDNR			1				
TAMARAC R AT CSAH-220, 11 MI W OF STEPHEN	Tamarac River	MPCA	S002-100	9020311		1		1				1
TAMARAC R AT CSAH-34, 9.5 MI SE OF STEPHEN	Tamarac River	MPCA	S002-992	9020311		1						1
TAMARAC R AT UNN ST(PEMBINA TRAIL CROSSING) 4 MI SO.KARLSTAD	Tamarac River	MPCA	S002-995	9020311		1						1
TAMARAC R ON CSAH-32 BRG XING, 6 MI SE OF STEPHEN	Tamarac River	MPCA	S005-569	9020311								1
TAMARAC R ON CSAH-6 BRG XING, 13 MI E OF STEPHEN	Tamarac River	MPCA	S005-568	9020311								1
COUNTY DITCH NO. 8 AT CSAH-2, 4.4 MI SE OF GRACEVILLE	CD#8	MPCA	S003-283	9020102		1						
TWELVE MILE CREEK W BR AT KING AVE, 1.7 MI W OF GRACEVILLE	TWELVE MILE CREEK	MPCA	S003-117	9020102		1						
UNN INLET TO WEST TOQUA LK AT CR-52 3 MI SW OF GRACEVILLE	UNNAMED INLET TO TOQUA	MPCA	S003-110	9020102		1						
CD #8 ON MN-27, 3.4 MI W OF HERMAN	CD#8	MPCA	S003-106	9020102		1						
MUSTINKA R AT 300TH ST, 1 MI NE OF WENDELL	MUSTINKA R	MPCA	S005-146	9020102					1			1
MUSTINKA R AT CR-42, 3.8 MI SE OF WENDELL, MN	MUSTINKA R	MPCA	S004-356	9020102					1			
MUSTINKA R AT CR-44, 4.5 MI SW OF ELBOW LAKE	MUSTINKA R	MPCA	S004-741	9020102					1			
MUSTINKA R AT CR-67 BRG (340TH AVE), 3.4 MI WNW OF NORCROSS	MUSTINKA R	MPCA	S004-360	9020102					1			
MUSTINKA R AT CSAH-1, 4 MI SW OF ELBOW LAKE	MUSTINKA R	MPCA	S004-742	9020102					1			
MUSTINKA R AT CSAH-12, 5.5 MI SW OF ELBOW LAKE	MUSTINKA R	MPCA	S004-740	9020102					1			
MUSTINKA R AT CSAH-13, 6 MI NE OF HERMAN	MUSTINKA R	MPCA	S003-104	9020102		1						1
MUSTINKA R AT CSAH-13, 6 MI NE OF HERMAN	MUSTINKA R	MPCA	S003-104	9020102		1						1
MUSTINKA R AT CSAH-26, 5.3 MI NE OF WENDELL, MN	MUSTINKA R	MPCA	S004-355	9020102					1			1
MUSTINKA R AT CSAH-8, 1.75 MI E OF NORCROSS	MUSTINKA R	MPCA	S004-144	9020102		1						1

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
MUSTINKA R AT CSAH-8, 8 MI NE OF HERMAN	MUSTINKA R	MPCA	S003-105	9020102		1						1
MUSTINKA R AT CSAH-9 BRIDGE, 1.3 MI NW OF NORCROSS	MUSTINKA R	MPCA	S002-001	9020102		1						1
MUSTINKA R AT MUSTINKA DAM (PINE RIDGE PARK), 5 MI NE HERMAN	MUSTINKA R	MPCA	S003-122	9020102		1						
MUSTINKA R AT TWP HWY 89, 1.3 MI NE OF NORCROSS, MN	MUSTINKA R	MPCA	S004-357	9020102					1			
MUSTINKA R, 1/8 MI S OF CSAH-12, 5.5 MI SW OF ELBOW LAKE	MUSTINKA R	MPCA	S004-739	9020102					1			
UNN STR AT CSAH-15, 4 MI NE OF WENDELL, MN	MUSTINKA R	MPCA	S004-354	9020102					1			1
TWELVE MILE CREEK E BR AT CSAH-18, 9 MI SE OF DUMONT	MUSTINKA R	MPCA	S003-112	9020102		1						
CD #37 AT CSAH-6, 4 MI E OF DUMONT	CD#37	MPCA	S004-865	9020102		1						
CD #8 AT CR-70, 3.5 MI NE OF DUMONT	CD#8	MPCA	S004-866	9020102		1						
EIGHTEEN MILE CK AT MN-27, 1.2 MI E OF WHEATON	18 Mile Creek	MPCA	S004-196	9020102		1						
EIGHTEEN MILE CK ON CSAH-7, 1.5 MI SW OF WHEATON	18 Mile Creek	MPCA	S005-143	9020102					1			1
FIVE MILE CK ON MN-27, 5.7 MI W OF HERMAN	5 Mile Creek	MPCA	S003-118	9020102		1						1
MUSTINKA R AT BR CO RD 76 0.5 MI W OF WHEATON	MUSTINKA R	MPCA	S000-680	9020102					1			1
MUSTINKA R AT BR CSAH-9 AT WHEATON	MUSTINKA R	MPCA	S000-681	9020102								1
MUSTINKA R ON CSAH-13, 9.3 MI WNW OF NORCROSS	MUSTINKA R	MPCA	S004-107	9020102								1
MUSTINKA R USH-75 AT WHEATON	MUSTINKA R	MPCA	S000-062	9020102	USGS	1						1
MUSTINKA R. SH-117 W OF WHEATON	MUSTINKA R	MPCA	S000-344	9020102								1
TWELVE MI CK ON CR-72, 7.1 MI ESE OF WHEATON	12 Mile Creek	MPCA	S004-194	9020102		1						
TWELVE MILE CK AT MN-27, 5.8 MI E OF WHEATON	12 Mile Creek	MPCA	S004-197	9020102		1						1
TWELVE MILE CK E FK ON CR-62/CSAH-8, 8.2 MI SE OF DUMONT	12 Mile Creek	MPCA	S004-189	9020102		1						

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
TWELVE MILE CK ON CSAH-14, 7.5 MI NE OF WHEATON	12 Mile Creek	MPCA	S003-124	9020102		1						1
TWELVE MILE CK W BR ON CR-72, 6.8 MI ESE OF WHEATON	12 Mile Creek	MPCA	S004-195	9020102		1						
TWELVE MILE CK W BR ON CSAH-6, 0.25 MI E OF DUMONT	12 Mile Creek	MPCA	S003-123	9020102		1						
TWELVE MILE CREEK E BR ON CSAH-6, 3.4 MI E OF DUMONT	12 Mile Creek	MPCA	S003-114	9020102		1						
TWELVE MILE CREEK W BR AT CR-62, 2 MI SE OF DUMONT	12 Mile Creek	MPCA	S003-116	9020102		1						
TWELVE MILE CREEK W FK AT CR-62, 5 MI SE OF DUMONT	12 Mile Creek	MPCA	S003-113	9020102		1						
TWELVEMILE CK AT CSAH-13, 3.8 MI NE OF DUMONT, MN	12 Mile Creek	MPCA	S006-152	9020102								1
TWELVEMILE CK, W BR, AT T82, 4 MI NE OF DUMONT, MN	12 Mile Creek	MPCA	S006-151	9020102					1			1
UNN STR AT CSAH-13, 8 MI NE OF WHEATON, MN	UNNamed Stream	MPCA	S006-150	9020102								1
UNN TRIB (E BR 12 MILE CK TO W BR) AT CR-62, 3 MI SE DUMONT	UNNamed Trib	MPCA	S003-115	9020102		1						
LATERAL THREE OF JD #2 AT CR-42, 9.1 MI ESE OF TINTAH	Lat. 3 JD#2	MPCA	S003-273	9020101		1	1					
NORTH LATERAL ONE OF JD #12 AT CR-41, 9.8 MI SE OF TINTAH	Lat. 1 JD#12	MPCA	S003-272	9020101		1	1					
UNN DTCH AT INTERSECTION 240TH ST & CR-40, 5.5 MI SE TINTAH	UNNamed Ditch	MPCA	S006-159	9020101			1					
JD #12 AT 2ND STREET BRIDGE ON EAST EDGE OF TINTAH	JD #12	MPCA	S003-275	9020101		1	1					
BOIS DE SIOUX R AT MN-55 2 MI E FAIRMOUNT ND/5.4 W TENNEY MN	Bois De Sioux R	MPCA	S003-119	9020101		1						
BOIS DE SIOUX R ON CSAH-6 5.1 MI SW OF DORAN	Bois De Sioux R	MPCA	S000-553	9020101	USGS	1		1			1	
BOIS DE SIOUX R. AT BRECKENRIDGE	Bois De Sioux R	MPCA	S000-089	9020101								1
CD-9 AT UNN RD, 3 MI NE OF CAMPBELL	CD #9	MPCA	S004-177	9020101		1						
JD #2 ON MN-55, 2 MI E OF NASHUA	JD #2	MPCA	S003-274	9020101		1	1					
RABBIT R AT CR-152, 3.1 MI SE OF CAMPBELL	Rabbit R	MPCA	S004-176	9020101		1						

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
RABBIT R AT CSAH-19 2.5 MI N OF NASHUA	Rabbit R	MPCA	S001-053	9020101		1						1
RABBIT R AT CSAH-9 8 MI NW OF CAMPBELL	Rabbit R	MPCA	S001-051	9020101		1						
RABBIT R, AT CSAH-4 RT BANK OF BRG, 0.1 MI SW OF CAMPBELL	Rabbit R	MPCA	S002-002	9020101	MNDNR	1						1
RABBIT RIVER AT US-75, 5 MILES NW OF CAMPBELL	Rabbit R	MPCA	S001-029	9020101		1		1				1
UNN STR (DORAN SLOUGH) AT 190TH AVE 2.6 MI S OF BRECKENRIDGE	UNNamed Stream	MPCA	S005-144	9020101								1
UNN STR (DORAN SLOUGH) ON US-75, 1 MI SW OF DORA	UNNamed Stream	MPCA	S005-145	9020101								1
UNN TRIB TO THE RABBIT R AT MN-9, 1.5 MI NO. OF CAMPBELL	UNNamed Trib	MPCA	S003-120	9020101		1						
SANDHILL R AT MN-9, .5 MI SO OF BELTRAMI	Sand Hill R	MPCA	S003-130	9020301		1			1			
CD #16 AT CSAH-31, 5.4 MI SSE OF MCINTOSH	Polk CD16	MPCA	S003-131	9020301		1			1			
CD-46 AT 240TH ST SW CROSSING, 3 MI SE OF CLIMAX	MPCA	MPCA	S004-182	9020301		1			1			
CD-6 AT 240TH STREET SW CROSSING, 2 MI E OF N EDGE OF CLIMAX	Polk CD6	MPCA	S004-183	9020301		1			1			
CD-73 AT 240TH ST SW CROSSING, 4.8 MI SE OF CLIMAX	Polk CD73	MPCA	S004-185	9020301		1			1			
SAND HILL R AT 240TH ST SW CROSSING, 7.5 MI SE OF CLIMAX	Sand Hill R	MPCA	S004-186	9020301		1			1			1
SAND HILL R AT MN-220, 0.5 MI W OF CLIMAX	Sand Hill R	MPCA	S003-134	9020301		1			1			
SAND HILL R AT RD BTN S20/29 0.5 MI W OF FERTILE	Sand Hill R	MPCA	S000-706	9020301		1			1			
SAND HILL R AT 350TH AVE SW, 4 MI SW OF FERTILE	Sand Hill R	MPCA	S003-136	9020301	MNDNR	1		1	1			
SAND HILL R AT 200TH ST SE, 6 MI SW OF FOSSTON	Sand Hill R	MPCA	S003-138	9020301		1			1			
SAND HILL R AT 345TH AVE SE, 4.5 MI SW OF FOSSTON	Sand Hill R	MPCA	S003-139	9020301		1			1			
KITTLESON CK AT 330TH AVE SW CROSSING, 5.6 MI W OF FERTILE	Kittleson Ck	MPCA	S004-187	9020301	MNDNR	1		1	1			1
SAND HILL R AT CSAH-1, 5.2 MI E OF FERTILE	Sand Hill R	MPCA	S003-140	9020301	MNDNR	1		1	1			1

Station Name:	Waterbody Name:	Data Steward Org:	Station ID:	Hydrologic Unit Code (HUC):	Flow gage	Prj. RW	Prj. FDR	Prj. MWLM	Prj. CSM	Prj. LGU	Prj. MDA	Prj. MPCA
SAND HILL R AT CSAH-10, 9 MI SE OF FERTILE	Sand Hill R	MPCA	S003-141	9020301		1			1			
RED R AT CSAH-7, 2.2 MI W OF CLIMAX	Red R	MPCA	S003-142	9020301		1			1			
RED R OF THE N ON CSAH-1 2.6 MI W OF NIELSVILLE	Red R	MPCA	S000-563	9020301		1			1			
SAND HILL R AT US-75 ON NORTH END OF CLIMAX	Sand Hill R	MPCA	S002-099	9020301	USGS	1	1	1	1			1
Sand Hill River at CR107 2.5 Miles SW of Winger, MN	Sand Hill R	MPCA	S006-559	9020301								1
SAND HILL R AT 110TH ST SW (CR-213), 3 MI SE OF BELTRAMI	Sand Hill R	MPCA	S004-648	9020301		1			1			
SAND HILL R AT 340TH AVE SW, 5.6 MI ESE OF BELTRAMI	Sand Hill R	MPCA	S004-188	9020301		1			1			
Sand Hill River at 110th Ave SE 2.5 miles NE of Fertile, MN	Sand Hill R	MPCA	S006-560	9020301								1
SAND HILL R AT 185TH ST SE, 5.5 MI SE OF MCINTOSH	Sand Hill R	MPCA	S003-143	9020301		1			1			1
SAND HILL R AT 150TH ST SE CROSSING, 2 MI ESE OF WINGER	Sand Hill R	MPCA	S004-198	9020301		1			1			
SAND HILL R AT 120TH ST SE, 2.8 MI SW OF WINGER	Sand Hill R	MPCA	S003-144	9020301		1			1			
SAND HILL R AT CSAH-7 CROSSING, 7.6 MI SW OF WINGER	Sand Hill R	MPCA	S004-199	9020301		1			1			
SAND HILL R AT CSAH-1, 4.3 MI E OF WINGER, MN	Sand Hill R	MPCA	S003-499	9020301					1			

Appendix B: River Watch Participation Guidelines

International Water Institute
Supporting Flood Research and Watershed Education

River Watch
Engaging citizens and communities in local watershed stewardship

"River Watch is really fun because it's a hands-on experience in learning." – Bagley River Watch Student

Program Overview

The Red River Basin River Watch was initiated in 1995 as a pilot project involving four schools in the Sand Hill River watershed. As of 2012, the River Watch program includes 25 schools/communities monitoring over 150 sites on rivers, creeks and ditches in northwest Minnesota and North Dakota.

River Watch Objectives

1. Increase understanding of human land use and water interactions.
2. Develop technical, research, and critical thinking skills in students and citizens.
3. Expand available water quality data sets for the Red River Basin.
4. Provide opportunities to monitor the health of local watersheds.

Basic Field Parameters Monitored: pH, conductivity, turbidity, dissolved oxygen, transparency, stage level, and water and air temperature.

Sampling Sites: 4-16 sites are sampled per school. Staff from the local Soil and Water Conservation District, Watershed District and River Watch Program, assist with site selection.

Sampling Frequency: Once a month during open water months of April/May through Oct/Nov.

Sampling Team: From 4 to 12 students. Some schools use an application process. Utilizing mixed grades (8-12) is helpful for continuity and experience.

Sampling Event: Calibrate equipment and assemble materials before driving out to sampling sites. Collect measurements, record field observations at each site. Return to school. Clean and store equipment, make copies of data sheets, enter data and forward to resource managers. Document.

Program Features

* Training, oversight and coordination to ensure data quality.
* An on-line data site (http://riverwatch.umn.edu) provides accessible and immediate data management tools allowing for a full experience of collection, reporting and analysis.
* Annual Youth Forum for participants to present their data analysis to their peers, natural resource managers and the public. Education sessions provided on emerging watershed issues, science topics, and technology tools. Poster judging and awards ceremony.
* Professional staff support to develop news releases, presentations, build research skills, and develop outreach programs and activities such as river clean-ups and storm drain stenciling.

www.iwinst.org

RRB River Watch Overview Combined 2012

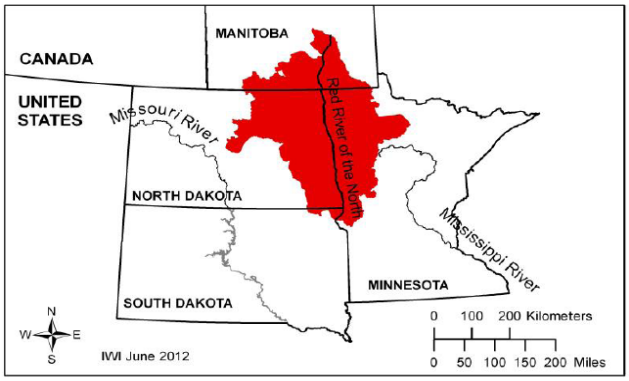
International Water Institute
Supporting Flood Research and Watershed Education

Red River Basin River Watch actively engages youth in long-term monitoring of their local watersheds using current technology, training and applied science.

Activities include:

* Water quality monitoring
* Snow depth study
* Frost depth study
* Macroinvertebrate monitoring
* Benthic assessments of sediment health

Red River of the North



The Basin

The Red River Basin was once a vast glacial lake (Agassiz) that drained 10,000 years ago and became a rich complex of tallgrass prairie, wet meadows, deep marshes and peatlands. Roughly 200 years ago, settlers saw the potential for growing crops in the region and the Red River Basin is now a significant producer of sugar beets, wheat, soybeans and corn.

Over 70% of the basin is in agriculture, aided in part by the drainage of water off the flat valley floor. Soil erosion from water and winds are significant in places, and more frequent flooding contributes added sediment to the Basin's rivers.

RIVER WATCH, a program of the **International Water Institute**, strives to work across borders to enhance our understanding of watershed health in the Red River Basin. Primary funding support has been provided by the Red River Watershed Management Board and individual Watershed Districts, Minnesota Pollution Control Agency, Minnesota Legislature through Clean Water Legacy Funds, and the Northwest Regional Sustainable Development Partnership.

Additional program partners include:

Individual River Watch schools and teams
University of Minnesota-Crookston
North Dakota State University – Extension
University of Minnesota – Extension
Fargo/Moorhead Area River Keepers
Prairie Waters, Valley City State University
Oak Hammock Marsh Interpretive Center
South Central Eco Institute ~ Manitoba

Youth involvement in local watershed monitoring creates authentic learning experiences, builds community service leadership, and provides opportunities to explore careers around natural resource issues while expanding our understanding of local watershed health. We welcome new partners!

For more information:

Danni Halvorson at 218-280-0515, danni@iwinst.org or Wayne Goeken at wrg@gvtel.com.

www.iwinst.org

RRB River Watch Overview Combined 2012

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Supporting Flood Research and Watershed Education

River Watch
Engaging citizens and communities in local watershed stewardship

Implementing a River Watch Program

One of the many benefits of the Red River Basin River Watch program is the flexibility with which it can be implemented. River Watch is a 2 tiered program that maintains program rigor and data quality while providing greater opportunities for participating schools and groups interested in local watershed systems.

Tier 1 – River Q teams maintain an active monitoring schedule (once a month) during the open water season, upload their data to the on-line River Q database, present their findings to the local community and participate in **River Q** events and annual training. Teams are supported by River Watch staff and watershed district resources.

Tier 2 – River Watch teams participate in monitoring but are not required to monitor monthly, or to maintain certification. Collected data may be entered into the database, but will be marked as non-certified. All River Watch educational resources are available for use.

River Watch Activity Schedule:

Annual events that all River Watch Schools are invited to attend include the River Watch Forum, held during the spring break at UMC, typically early in March; and fall Kick-offs that bring schools together for education and program development. The monitoring cycle runs from April to October, and all data must be submitted by **October 30th**.

WATER QUALITY MONITORING

August to October	Monitor monthly and submit data. Consider a news release highlighting project. Confirm that all paperwork, release forms are gathered from students.
October	Fall Kick-off meetings in North, Middle, South Basin (leader and 5 youth) Equipment/field methods certification, training
November	Data review for Minnesota Pollution Control Agency
December	Data analysis and news release of year's sampling events and activities
January	River Watch staff visits to review team results and prep for Forum Make preparations for spring sampling and presentations to watershed districts.
February	Check of Forum presentations, poster review
March	**River Watch Annual Forum** Final prep for upcoming monitoring season – plans, equipment and supplies.
April to May	Training of new schools and citizen volunteers, consent waiver forms handed in. Monitor monthly and submit data in a timely manner.
June – July	Monitor monthly and submit data in a timely manner. Submit news release.

International Water Institute
Supporting Flood Research and Watershed Education

SNOW STUDY PARTICIPANTS

October	Install any needed equipment for Snow Study project
November	Final Snow Study equipment install and initial measurements and data submittal
December	Snow Study measurements and data submittal
January to March	Snow Study measurements and submit data for flood forecasting

MACROINVERTEBRATE MONITORING

September	Placement of hester-dendy macroinvertebrate sampling plates in streams
October	Macroinvertebrate monitoring—sweep/kick method at same time HD samplers collected (early October)
May	Placement of hester-dendy macroinvertebrate sampling plates in streams and/or do sweep/kick net method
June	Macroinvertebrate monitoring—sweep/kick method at same time HD samplers collected

Additional options to consider

Presentation opportunities:

Mid-January	Red River Basin Commission Land and Water Stewardship Conference
March	Red River Watershed Management Board Conference
April	Watershed District meetings, legislative briefings, school boards, etc.

Community Engagment Ideas:

Tour of local watersheds and summer picnic/recreation outing
Adopt-A-River clean-ups
Science Camp for younger students w/ RW students assisting/leading activities
Storm drain marking as watershed awareness project.
River of Dreams activity—RW students work with younger students/community

Checklist for Schools Wishing to Start a River Watch Program

- ☐ Contact River Watch staff
- ☐ Work with River Watch staff and local resource managers (Watershed District, Soil and Water Conservation District) to identify potential monitoring sites and discuss possible support.
- ☐ Know who your contact is for equipment and review timelines with River Watch Staff.
- ☐ Review sampling protocol and schedule, make arrangements.
- ☐ Identify your monitoring team, either through student applications or as a class.
- ☐ Note links to resources, curriculum support and activity information on-line.

Appendix C: Overview of Aquatic Macroinvertebrate Sampling

OVERVIEW OF AQUATIC MACROINVERTEBRATE SAMPLING[1]

SITE VERIFICATION - Field Ecology Lab Techniques

Topography will be reviewed via Google Earth to find the approximate location of the site. On designation of the X site, a Geographic Positioning System (GPS) reading will be taken and recorded on the River Field Data Sheet as the site of the X cross-section. At all sites, pictures will be taken of the X cross-section with a digital camera. One view downstream of the X, and one view upstream of the X.

STAKING OUT THE REACH

After location and verification of the X site, a 100-meter reach will be established by measuring 50 meters downstream and 50 meters upstream from the X site. To stake out the reach, begin at the X and place a red flag at the X site. Using the 50 meter measuring tape one person will stand at the X and the second person will proceed 50 meters to the end of the reach and a red flag will be placed. If it is decided that a single habitat protocol will be done, mark every 10 meters with a flag. The crew will then walk back to the X site and complete the same procedure upstream. In measuring the reach, try to follow the contours of the channel and minimize disturbance to the stream bottom as little as possible. After all sampling and protocols are completed, collect the flags and clean them for use at the next site.

MULTIHABITAT COLLECTION PROTOCOL

The multihabitat protocol provides for the sampling of all the habitat types found within a reach. Crew members will examine the reach and determine the proportion of different habitat types present in the reach (riffles, runs, snags…). Different types of habitat are to be sampled in approximate proportion to their representation of surface area of the total macroinvertebrate habitat in the reach, with 20 jabs total to be taken over the length of the reach. For example, if riffles comprise 50 percent of the habitat in the 100-meter reach and snags comprise 20 percent, then 10 jabs should be taken in riffle areas and four jabs should be take in snag material. The remainder of the jabs (six) would be taken in any remaining habitat type. Habitat types contributing less than 5 percent of the stable habitat in the stream reach should not be sampled. In this case, allocate the remaining jabs proportionately among the predominant substrates. The number of jabs taken in each habitat type should be recorded on the River Field Data Sheet. Also be sure to record the beginning and ending time on the data sheet. Beginning is the time when you first start collecting jabs and ending is when all 20 jabs have been composited and placed in wide mouth jars with 95 percent ETOH.

Sampling will begin at the downstream end of the reach and proceeds upstream. A total of 20 jabs or kicks will be taken over the length of the reach; a single *jab* consists of forcefully thrusting the net into a productive habitat for a linear distance of 0.5 m. A *kick* is a stationary sampling accomplished by positioning the net and disturbing the substrate for a distance of 0.5 m upstream of the net. This can be done in two ways, by either standing on the upstream side of the net and shuffling your feet upstream for 0.5 meters so that disturbed organisms are taken into the net by the current; or by using a stick or other implement to disturb the bottom 0.5 meters upstream of the net.

[1]Procedures, checklist, and field sheet based on protocols from Dr. Andre DeLorme, Valley City State University.

Equipment and Supplies for River Macroinvertebrate Monitoring	Per Kit
MACROINVERTEBRATE FLASH CARDS. Set of 25 2.75" x 3.5" flash cards - www.waterbugkey.vcsu.edu.	1
Roll of paper towels (or paper towels packed in large ziplock)	1
LAMINATED GUIDE TO AQUATIC MACROINVERTEBRATES. Izaak Walton League	1
QUICK GUIDE TO MAJOR GROUPS OF FRESHWATER INVERTEBRATES. Voshell	1
Field Guide to Freshwater Mussels of Minnesota	1
HEALTHY WATER, HEALTHY PEOPLE, Water Quality Educators Guide. The Watercourse.	1
HEALTHY WATER, HEALTHY PEOPLE, Testing Kit Manual. The Watercourse.	1
STREAMKEEPER'S FIELD GUIDE: Watershed Inventory and Stream Monitoring Methods. Murdoch, et. al.	1
A GUIDE TO COMMON FRESHWATER INVERTEBRATES OF NORTH AMERICA. Voshell.	1
FRESHWATER AQUATIC MACROINVERTEBRATES INSECT LIFE CYCLE & HABITAT CARDS.	1
Pocket knife	1
clipboard	1
Mechanical lead pencils with erasers	3
River Field Data Form--Habitat Assesment form	3
Chest waders (assorted sizes from 7-13)	6
Latex/nitrile gloves to prevent contamination. Sizes S, M, L, XL and shoulder length(vet)--6 pair each	30
Wide rubber bands to secure shoulder length gloves	10
100 ft. tape measure for marking stream reach to sample	1
Flagging for marking sample reaches	10
HEAVY DUTY TELESCOPING "D" STYLE NET.	2
Large spatulas or metal spoons for disturbing substrate	3
soft bristle hand brush for cleaning rocks of macro invertebrates	2
Sieve bucket-three-gallon (12-liter)	1
Bottle, Polyethylene, Widemouthed, with screw-on lid. 1 gal. For transfer of samples from sieve bucket	2
Plastic one gallon water jugs w/ tops cut to backwash "D" nets and sieve buckets. General purpose use.	2
masking tape for labeling bottles, trays, etc. (or benthic sample labels)	1
Indelible (Sharpie) markers-for labeling items. Fine pt.	2
Indelible (Sharpie) markers-for labeling items. Ultrafine pt.	2
Observation trays (12x18"-white): samples are spread on trays for observation, picking	2
Bausch & Lomb 2X - 6X Sight Savers Rectangular Handheld Magnifier with Acrylic Lens, 4 x 2 Inches	6
STUDENT FORCEP (straight).	6
Microchemistry Pipets, Small Graduated, 3.0 mL Capacity, Length 5 1/2"	10
Medicine Dropper, Plastic, 1 ml nipple, 3.5"	6
Plastic spoons- for sorting macroinvertebrates (100/box)	10
Petri Dishes, Polystyrene, Disposable, Sterile, 100 x 15 mm, Pk 20	20
BINOCULAR STEREO MICROSCOPE. Model ESH200.	1
Wash Bottle-water	2
Blank labels of waterproof paper for inside jars	2
Scissors	1
roll of scotch tape in disposable dispenser for attaching labels to bottles	1
CLEAR PLASTIC COLLECTING CONTAINERS (clear plastic specimen jars, 16 fluid ounces).	3
CLEAR PLASTIC SNAP CAP VIALS (40 dram, 12 per package).	2
CLEAR PLASTIC SNAP CAP VIALS (12 dram, 12 per package).	6
Specimen Jars, Glass, Screw-Cap, 3-3/4"-H x 2-1/4"-D. Cap Diameter. With 58 mm cap	2
Specimen Jars, Glass, Screw-cap, Tall Form, 2 oz, Pk 12. 3-1/4"-H x 1-1/2"-D. With 38 mm cap	10
Glass screw top vials w/ polyseal cap, 2 dram, 17 x 60 ml	20
Ethyl Alchohol, 95%, Laboratory Grade, pint in wash bottle (seal w/ parafilm)	1
Wash Bottle-ethyl alcohol for preserving samples	1
Parafilm for sealing vials after preservative added to samples	1

[1]Procedures, checklist, and field sheet based on protocols from Dr. Andre DeLorme, Valley City State University.

River Field Data Sheet

SITE #:	LOCATION:	
GPS READINGS OF THE X SITE: LAT: _____ LONG: _____	DATE:	
FORM COMPLETED BY:	DATE: _____ TIME: _____ AM PM	WEATHER CONDITIONS:

MULTIHABITAT COLLECTION	
SAMPLE COLLECTION	**How were the samples collected?** ☐ wading ☐ from bank ☐ from boat **Indicate the number of jabs/kicks taken in each habitat type.** ☐ Cobble_____ ☐ Snags_____ ☐ Sand_____ ☐ Vegetated Banks_____ ☐ Submerged Macrophytes_____ ☐ Other ( )_____
TIME	**Time started: _____ Time ended: _____**
GENERAL COMMENTS	

Photo log		
Photo #	**Photo Subject**	**Notes**
1	X cross section	
2	Downstream of X	
3	Upstream of X	

Stream Depth (reference is looking downstream)			
	DS	**X SITE**	**UPS**
1/4 from left bank			
Middle			
3/4 from left bank			
Thalweg			

[1]Procedures, checklist, and field sheet based on protocols from Dr. Andre DeLorme, Valley City State University.

Following is example of documentation of sample sites and flow data if available. If flow data not available, record tape down stage level from documented reference point.

As shown on map above, the sites marked Upstream (US) and Downstream (DS) are the sites where multi-habitat macroinvertebrate samples will be collected for identification using D-frame nets. The red lines on the map demark a 100 meter reach (50 m on each side) where sampling is to occur. The red mark is the regular sampling location of WRNC29 on the Wild Rice River.

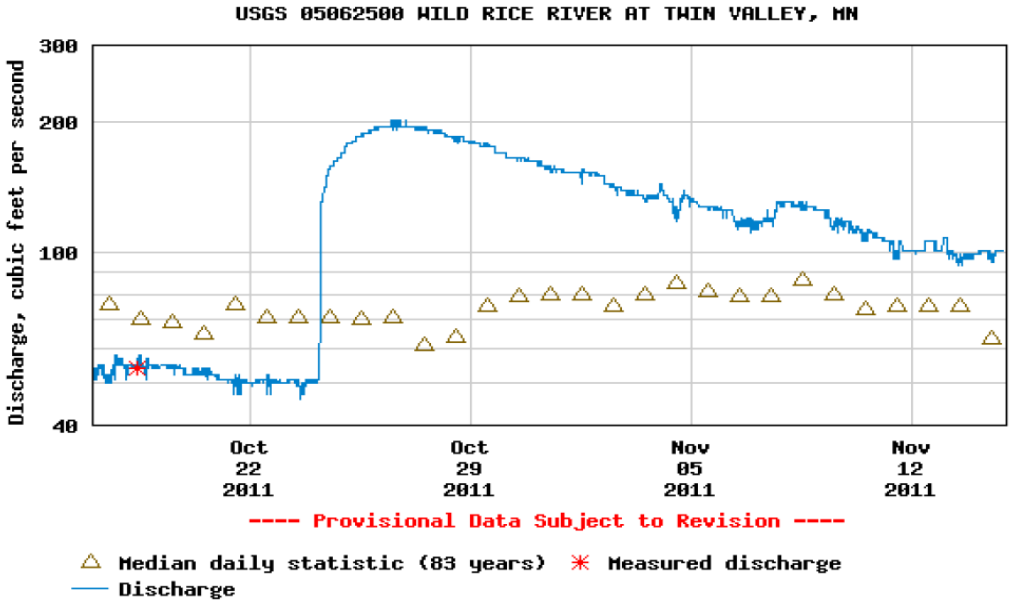
Sample Site Hydrograph and discharge history

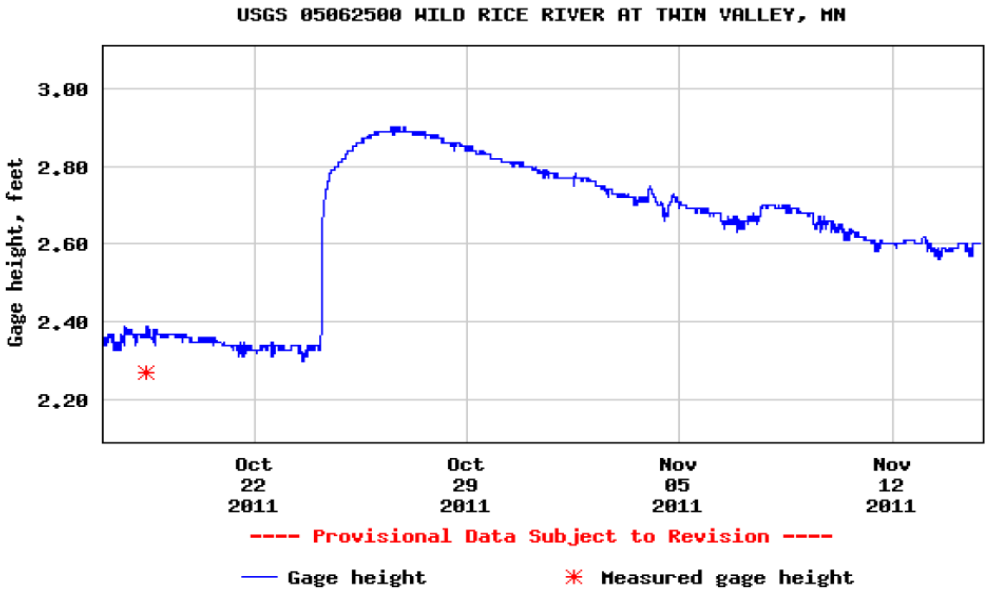
Sampling occurred on November 2, 2011. Following are the discharge and gage height spanning this sample date (Oct. 22-Nov. 14, 2011).

Daily discharge statistics, in cfs, for Nov 14 based on 83 years of record more

Min (1935)	25th percentile	Median	Most Recent Instantaneous Value Nov 14	75th percentile	Mean	Max (2001)
9.00	34	63	101	129	130.	1180

[1]Procedures, checklist, and field sheet based on protocols from Dr. Andre DeLorme, Valley City State University.

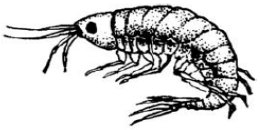




[1]Procedures, checklist, and field sheet based on protocols from Dr. Andre DeLorme, Valley City State University.

Appendix D: River Watch - Macroinvertebrate Monitoring Workshop

River Watch
Engaging citizens and communities in local watershed stewardship



River Watch - Macroinvertebrate Monitoring Workshop

Tuesday, August 7, 2012 9:30-3:30 Red Lake Falls, MN

LOCATION AND LOGISTICS ~ see next page

AGENDA: (subject to change)

9:30 Welcome & Introductions

9:40 Macroinvertebrates—Overview

- Why Monitor Macroinvertebrates—what they can tell us
- Macroinvertebrate Functional Feeding Groups
- Stream Continuum ~ Where you are in your watershed

BREAK

- Identification ~ What is IT?
- Monitoring Methods ~ When/How To Monitor
- Macroinvertebrate kit availability

11:45 LUNCH (provided)

12:30 Field collection: monitoring methods applied

Sorting, identification, and analysis

3:00 Discussion of macroinvertebrate monitoring "fit" w/ school schedule

- Final Questions, Suggestions, and Evaluation

3:30 Pack up and Head Home!

CLEAN WATER LAND & LEGACY AMENDMENT

Project dollars provided by the Clean Water Fund (from the Clean Water, Land and Legacy Amendment)

InternationalWaterInstitute
Flood research and watershed education for the Red River Basin

Macroinvertebrate Monitoring Workshop ~ August 7, 2012 ~ Red Lake Falls, MN

LOGISTICS: We will meet in the morning at a community meeting room in the "Mall" on the south edge of Red Lake Falls—adjacent to MN Hwy 32. The community meeting room is next to Joe Dimaggio's Sports Café in the mall. We'll have some snacks and refreshments available throughout the day and cover noon lunch.

For the afternoon session we'll be based at a city park along the Clearwater River in Red Lake Falls. There are bathroom facilities available at the park nearby.

If you have your own waders, please bring them so you know they'll fit. Otherwise let us know your shoe size and we'll see what we can do. Or bring "river shoes" that can get wet—if it's a hot day, this may be the way to go—the river is currently shallow. Otherwise be prepared for outdoor activity in/along a river—sunscreen, bugspray, hat, water bottle, etc.

We'll have vouchers on hand for you to fill out to cover your mileage. This training is being provided through a new Clean Water Legacy grant which doesn't allow payment of stipends. Perhaps your local watershed district would cover that if requested.

Wayne Goeken cell: 218-280-0516
Danni Halvorson cell: 218-280-0515

Clearwater River in Red Lake Falls where we'll be on "Macroinvertebrate Safari!"

Appendix E: Nikon CooPix SOPforGeoTagImages

Nikon Coolpix AW100: Procedures for Geotagged Photos and Route Logs

Andrew Ulven - June 20, 2012 (Updated August 7, 2012)

Basic operation of the Coolpix is much the same as other digital cameras. This protocol document will focus on the process of geotagging and exporting geotagged images and route logs. For more information on basic controls, reference the Quick Start Guide or the Reference Manual disc which both come with the camera.

Important before beginning!
Download the ViewNX 2 software which came with the camera. Also, if you intend to export images to Google Earth, download GeoSetter, a freeware program which can be downloaded at http://www.geosetter.de/en/download/.

Setting up Camera for Geotagging and Route Logging

1. Turn the camera on.
2. Press the only button on the left side of the camera when the screen is facing you.

3. A map of the world will appear. Press the "menu" button below the arrow keys.

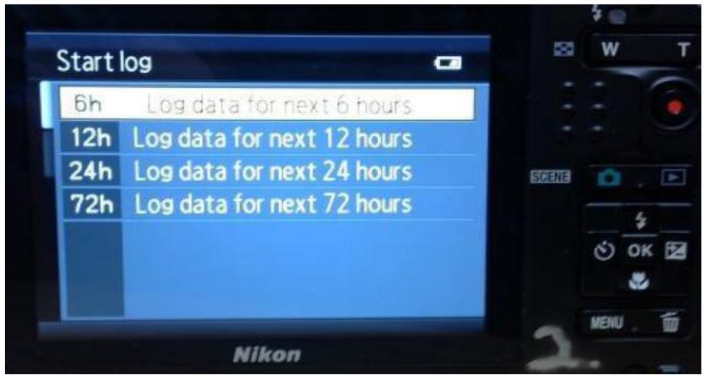
4. On the subsequent "Map menu" screen, scroll up to the "GPS options" at the top of the menu.

Page 1

5. Click the OK button.
6. Select the first option, "Record GPS data," and hit OK while "On" is highlighted by the yellow indicator.

7. This will return you to the "GPS Options" menu. Click the left arrow to get back to the "Map menu."
8. Scroll down to "Create log" and hit the OK or right direction button. Select "Start log" if no log is active (otherwise end the current log to start a new one).

9. Select the number of hours you wish to have the camera track your location. 6 hours is the least amount of time available as an option and suffices in most situations.



10. Your camera will now geotag your images.
11. Hit the "menu" button to return to the map. Then hit the button on the left side of the camera to return to the camera lens view. You should see a GPS satellite icon and the word "LOG" to the left of it.

12. From this point, use the camera as you would any other camera. Try taking an underwater image if you are willing to get wet!
13. Because the GPS function consumes battery quickly, turn the camera off when not in use. The log will continue to track your location.

14. When you have finished acquiring images for the day, save your log and turn off the GPS. To save the log, return to the map screen by pressing the side button (as in steps 2 and 3). Press the menu button then navigate to "Create log." Move down to the "End log" option and press OK. On the

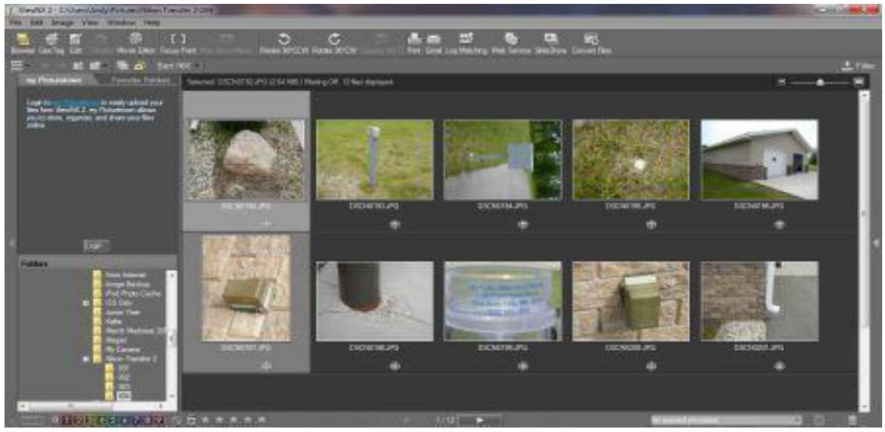
subsequent screen, select "Save log." Your log will now be saved to the SD card. To turn off GPS, return to the Map menu and scroll up to "GPS options." Select this option then select "Record GPS data" on the subsequent menu. Move down to "Off" and press OK. Turn the camera off; you are done with this portion.

Exporting images from camera to your computer

There are actually 2 ways to export your data: via USB and via SD card. Those who are more familiar with removing SD cards and inserting them into computer ports may find that to be the best option.

1. Connect your Coolpix camera to a computer with the included USB connector. Pictured below is the location where you can plug the USB cable into the camera.

2. Open the ViewNX 2 program downloaded at the beginning.



3. Turn camera on. Click transfer (represented by a camera icon) near the top left of the screen.
4. Click on AW100 (or Removable Disk if you inserted the SD card) in the "Source" tab on the top half of the screen.

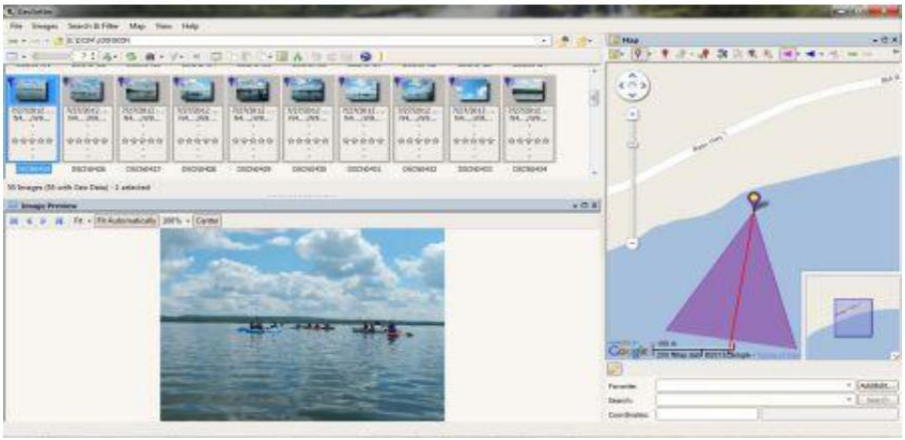
5. Below, select the images, logs, and videos you wish to transfer. (All files will be selected initially)
6. Click "Start Transfer" at the bottom right of the screen. If you've taken a lot of photos this may take several minutes—be patient—don't get click happy!
7. The files will be saved to a numbered folder listed under a "Nikon Transfer" or "Nikon Transfer 2" on folder on your computer, most likely under "My Pictures." Change the numbered folders to more uniquely titled folders for your own organization. REMEMBER WHERE YOU SAVE YOUR IMAGES.
8. If you wish to rename images to say something more useful than "DSCN..." do so at this time.
9. With your transferred images, look for globe icons listed below each. If the icon is present, the image was properly geotagged. If the icon is not present, you either missed a step in the protocol or your camera was unable to get a GPS satellite lock when you recorded the image.
10. Click on the "Geo Tag" option at the top left of the screen (next to "Browser"). This will open a view of Google Maps with your geotagged images at the bottom of the screen.

11. Click on a pushpin to select an image below. Notice that when you click on a pushpin it is replaced by a yellow circle indicating the bearing from which the image was taken.
12. If you click on the yellow circle a pop-up bubble will show your image in the "Photo" tab. In the "Metadata" tab you will find information about your image.

Exporting geotagged images to Google Earth

*ViewNX 2 does not have a built in way to export geotagged images as a Google Earth file. For this, we need to use a freeware program called GeoSetter (downloaded earlier).

1. Open GeoSetter.
2. Navigate to the images you just transferred via ViewNX 2. (It is important to remember where the images were saved!)



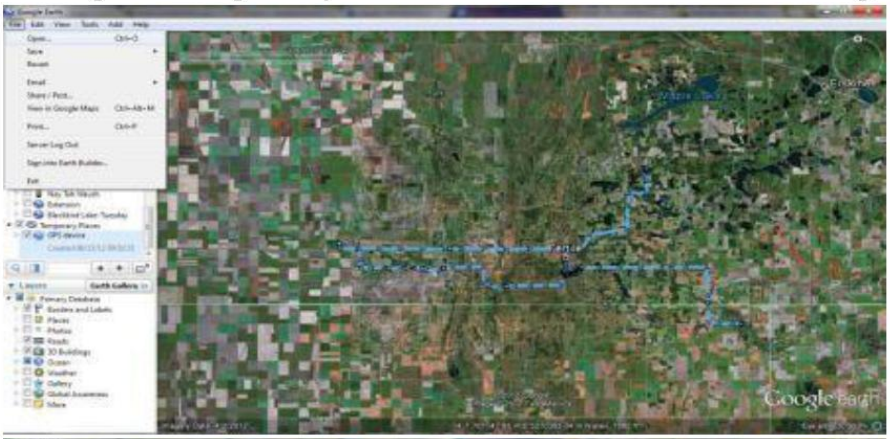
3. Select the images you wish to export to Google Earth.
4. Click the Google Earth Icon just above the thumbnail displays of your images (or access it from under the "Images" tab). You should see a menu title "Export to Google Earth."

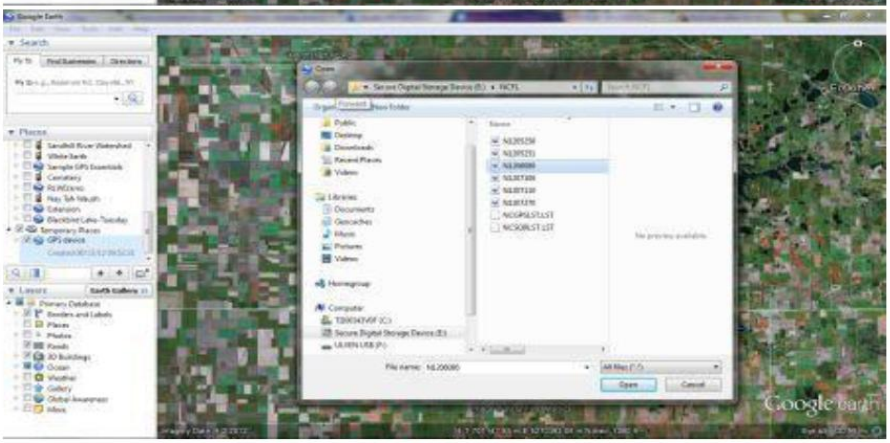
5. Chose what you wish to use from the menu. A few pointers: change the "Thumbnail Size" to 500; change "Thumbnail Quality" to 100; check the box for "Export Taken Date/Time"; under "Marker Settings" select "GeoSetter Icon" (not imperative); check boxes for "Taken Date," "Altitude," and "Megapixels" from "Info Fields." These are all just suggestions.
6. Once you accept the options shown, you will be prompted to save the .kmz file to your hard drive. Label it clearly in an accessible folder.
7. GeoSetter will ask to open the .kmz file once it is saved. Click "Yes" and ensure everything is to your liking.
8. One may edit the bubbles to their heart's desire and combine files for final export.

Log import to Google Earth

The easiest way to do this is by inserting your SD card into a computer with Google Earth.

1. Open Google Earth. You should have already imported your images as a .kml or .kmz file.
2. Go to "File" > "Open." Navigate to your SD card or other file folder where .log files are stored.





3. Select "All files" in the box next to "File name" at the bottom of the dialog box. If you do not do this, the .log files will not appear.
4. Select the track you wish to view. It should be named something similar to "N1206080." Click "Open."
5. Your track should now appear in Google Earth! You can save the track to your "Places" panel by right clicking on it and selecting "Save to My Places." Then you can merge the track into a folder with your geotagged photos by dragging it into the same folder. This allows all the data to be bundled together in one .kml file.

Appendix F: REJournal~Thief River~081712

Red River Basin River Explorer's Journal **River Explored: Thief River**

Recorder Name: Wayne Goeken Email: wrg@gvtel.com Phone: 218-574-2622 Trip Date: 8/17/2012

Name of Paddle Team Leaders Present Wayne Goeken, Joe Courneya, Asher Kingery

Number of Youth Paddlers (under 18 years) 4 Number of Adult Paddlers (18 and over) 7

Names of Paddlers: Wayne Goeken, Joe Courneya, Asher Kingery, Andy Ulven, Isaac Kvasager, Danielle Kvasager, Michelle Olson, Alexis Moe, Chelsey Limesand, Billy Landsrud, Bryanna Grefthen

Starting Point: 9.5 miles NNE of Thief River Falls @ Marshall CoRd 12 crossing of Thief R
Ending Point: 6.0 miles NNE of Thief River Falls @ Marshall CoRd 2 crossing of Thief R
River Miles Explored: 5.0 miles

Nearest USGS Gaging Station Location:Thief R near Thief River Falls-USGS 05076000 Stage:4.94ft Discharge:45 cfs
The median flow for this date-8/17, is approx. 12 cfs based on 96 years of record, thus "normally would not have enough flow at this time of year to paddle the Thief R.

Start Time: 12:55 End Time: 16:55 Stop Time: 0:30 Paddling time: 3:30 Total time: 4:00

Weather conditions **(circle one in each box)**

Sunny	Hot (>80°F)	Windy	No rain in past 24 hrs (trace)
Partly Cloudy	Warm (60-80°)	Breezy	Some rain in past 24 hrs (<1in)
Overcast	Cool (<60°F)	Calm	Heavy rain in past 24 hrs (>1in)

Watercraft used: (circle) # Canoes: 0 # Kayaks: 11 Purpose of trip (check all that apply): _X_Scouting; _X_Recreation; _X_Watershed Science; _____Other:_____

Comments on Paddling Conditions (water level, tree snags, rocks in channel, etc.) Water level was good, very slow current. Only one spot where if 2-3" lower would have had to get out and drag kayaks through. No tree snags covering width of river. Some large rocks above and just under surface, but no problem getting through.

Comments on river bank conditions (steep bank, bank slough, drainage ditch confluence, etc.) Bank work done within past year on one side along several areas—steep in these areas—vegetation still re-establishing after banks were apparently stripped and reshaped. Took photos of culverts. Some bank sloughing on side with trees, but not massive amounts. Sand/gravel bar at confluence with Marshall Co.Ditch 20.

List any exotic and/or invasive species (document w/picture): none that were observed

Were sandbars/beaches present for rest stops? Yes or No If so, give location(s): just downstream of confluence with Marshall Co.Ditch 20, but this was the only spot, thus limited options for stopping.

General comments on river: water quality, recreational suitability, hazards in channel, plants, animals: Water clarity very good, 90-100cm(secchi tube). Tea/bog stain brown appearance. Good for recreation/body contact. No hazards in channel. Many mussels along reach. Much wildlife: eagle, kingfishers, great blue herons, ducks, coyote, fisher, raccoon tracks, many other birds. Crayfish, water scorpions, mayflies, stoneflies, riffle beetles, etc.

Advice for others looking to paddle this river reach: Definitely a good reach for a safe, easy paddle. Not much current at this water level so can't just float and make time. No official access—used road crossings—not ideal, but worked OK. If during cooler weather, wear waders to get in/out of river.

Grygla River Watch Paddle Exploration (alternative "narrative" format)

Location: Thief River on Friday, August 17, 2012

Participants: (7 adults, 4 students)Wayne Goeken and Asher Kingery from International Water Institute; Joe Courneya and Andy Ulven from UofMN-Extension; Isaac Kvasager-Grygla Science Teacher/River Watch Advisor; Danielle Kvasager-Oklee; Michelle Olson-East Grand Forks; Grygla RW students: Alexis Moe, Chelsey Limesand, Billy Landsrud, Bryanna Grefthen

Conditions: Partly cloudy, temps in low 70s, light breeze. USGS gaging station on Thief R at time of paddle approx. 44 cfs and 4.94.'

Route: All on the Thief River starting at Thief R crossing of Marshall CoRd12 and ended at Thief R crossing of Marshall CoRd2—approx. 5.0 river miles, also approx. 5.0 road miles between these two crossings. (Had planned to go about half mile further to CoRd 44, but ran late so W.Goeken paddled ahead and picked up vehicle and met group at CoRd 2 to save some time.)

Timing: Started paddling at 12:55 pm and at end point at 4:55 with one half hour break at sandbar. Prior to sandbar very leisure paddle—faster pace after rest stop due to getting late.

Access: *Put-in:* muddy at Marshall CoRd12 put-in—able to get in off rocks under bridge. Mowed area on north side of river/west side of bridge that worked well for parking vehicles and staging area (believed to be public ROW. *Take-out:* muddy and awkward exit at Marshall CoRd2 bridge.

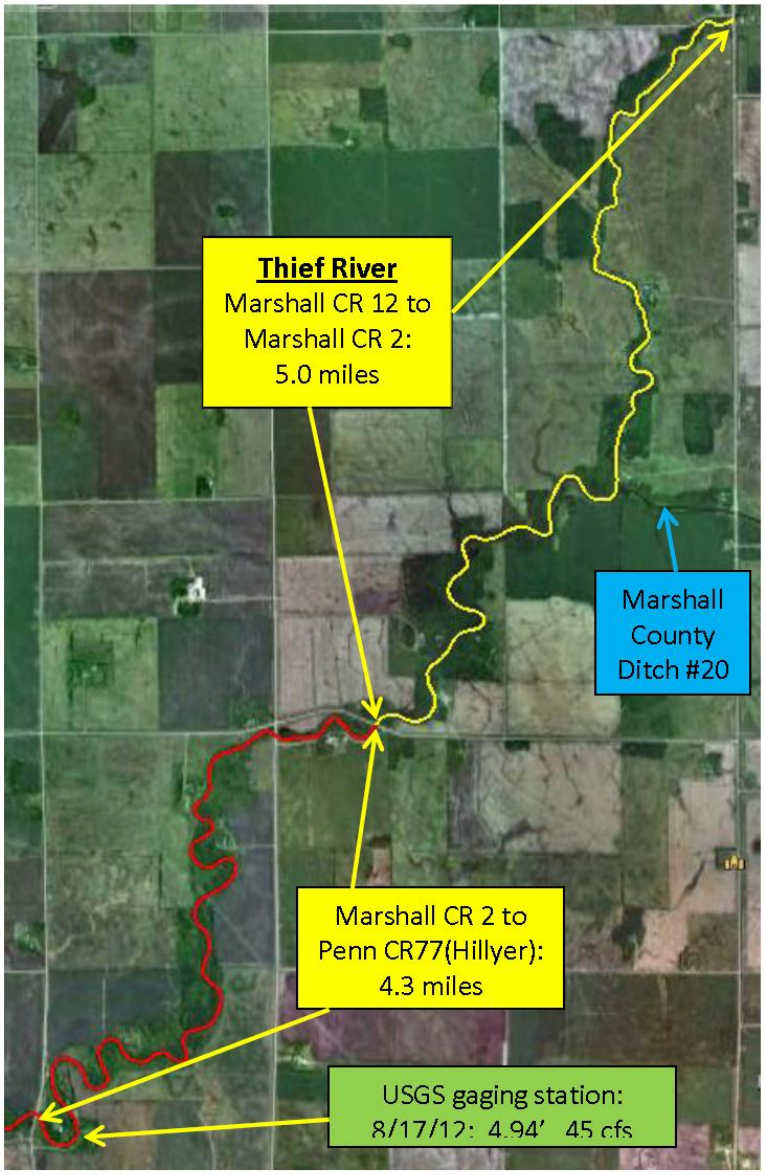
Trip Notes: Set-up two iPads w/ 3G gps functionality for students to use to document river conditions. Isaac also had iPad w/ BadElf device for gps capacity. Also several Nikon Coolpix digital cameras set up for geotagging images and tracking route. Documented culverts, especially along reach of river that had banks resloped within past couple years. Trees nearly all stripped from this area.

Water level was low but worked out well. If 2-3 inches lower water there would have been one spot where paddlers would have had to get out and drag kayaks through (between CoDitch 20 and CoRd2). Some boulders above water and some just under surface, but all easy to navigate around as current was slow to virtually non-existent at lower end of reach. No tree snag barriers across the river. Had three first-time kayakers, so very good reach of river to start on.

Water appearance was tea/bog stain brown, but very clear—excellent recreation suitability, cooler than expected, but still comfortable to wade in. Lots of mussels along river bottom throughout the trip. Stopped at small sandbar just below confluence with Marshall Co.Ditch 20—the only suitable spot to easily get out and take a break. Used a kicknet to do some macroinvert sampling. Not a good riffle area for macros, but did find some in vegetation along shoreline—water scorpions, mayflies, stoneflies, scuds, dragonfly nymph, riffle beetles, etc. Didn't find any macroinverts when overturning rocks at mouth of CD20—no flow from CD20. Water clarity very good, >100 cm with secchi tube.

Large mature bald eagle kept flying ahead of group for most of the trip. Many birds—great blue heron, ducks, kingfishers, shorebirds, and more. Coyote, deer, fisher among mammals seen.

Overall, very good outing—mostly sunny, mid 70's temp, light breeze and water level was just enough to comfortably get through. Upper reach above Marshall CoDitch20 had riverbank work done in past couple years with the re-sloping being fairly steep. Trees/vegetation had been stripped for re-sloping and vegetation still re-establishing. Lower reach was more scenic with tree canopy over river in spots.



Logistics: Thief River 8/17/2012

About 28 miles from Grygla to CR12

About 5 road miles from CR12 to CR2

11:40 Met at CR12 put-in; dropped kayaks/gear off at start point

12:00 Drove to CR2 endpoint and left a vehicle that had room to transport drivers back to start after paddling. Back to put-in for final trip prep.

12:25 Met Grygla crew w/ gear at CR12 put-in, unload, pre-trip equipment prep/fitting, electronic gear set-up, app entries, get everyone in boats on water, trip log entries and comments

12:55 Disembark (with keys to downstream vehicle!)

~Data collection and river explorations with one stop along way at confluence with Marshall Co Ditch 20

4:55 Reached endpoint-CR2. Drivers drove back to get vehicles while crew cleaned out boats and got them up to roadside

Load boats/gear. Final thoughts/eval

5:30 Head home

Appendix G: River Reach Reports

Red Lake River: Scouting paddle from Polk CoRd15 (Fisher) to MN220 (east of EGForks)

Sept. 29, 2012 paddle from Polk CoRd15 (Fisher) to MN Hwy 220 (about 5 river miles east of confluence with Red River in East Grand Forks). Approx. 22 river miles. On river at 9:30 a.m. and off at 5:40 p.m.—8 hrs 10 min total on water—paddling a bit harder than average pace due to low water very little current assist. Used 16' Sawyer Summersong solo canoe—good choice for this reach as didn't have tree snags or rocks to contend with, thus lightweight and speed of more importance than durability and maneuverability. Used hip waders which were convenient when needed to get out and drag through shallows but could have gotten by with wet shoes and shorts as it turned out to be a very warm day hit 80°F air temp).

10:30 am: In first reach near Fisher 4-wheeler tracks in riverbed due to being so shallow. At estimated RM24 osprey flew off—other birds along the way so far: great blue heron, kingfisher, Canada Geese, and crows. Golden yellow fall leaf color predominate—very nice. Had to get out and walk through three shallows in river so far—at least bottom is firm thus far.

12:10 pm: Stop just past RM20 so took just over 2.5 hrs to go ~7.5 miles or about 3 mph. Many sediment "shelves" along edges where river drops to deeper thalweg—need to pay attention and find these "deeper" channels at outer edges and follow river meanders. More Canada Geese. Found bison bones and horn. Motorboat moored along river ahead—maybe river will be deeper from here onward. 12:30 pm back on river paddling.

1:55 pm: Stop-saw some large bank beaver holes. One large snapping turtle and one painted turtle. Mature bald eagle took flight at stop area—was on big cottonwood overlooking 2 small American flags stuck in river bank. South breeze ~8-10 mph. 2:15 pm back on river paddling.

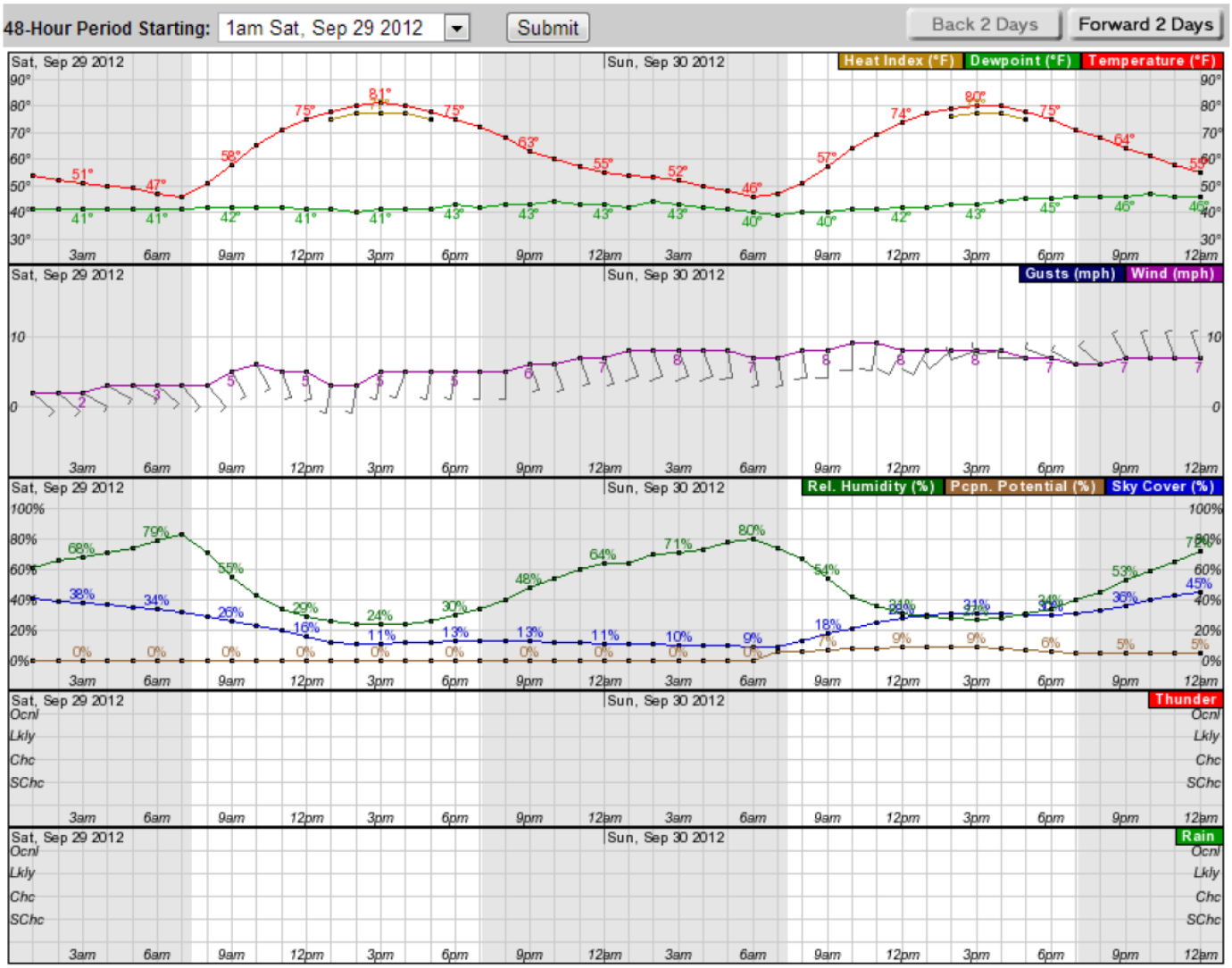
4:40 pm: Next stop—but didn't get out of canoe due to very muddy—no longer sandy depositional areas—deeper waters . A fish jumped and hit the canoe in previous reach. Saw deer and mink/fisher/otter? Was paddling harder to cover ground but still photodocumenting conditions. 4:50 resumed paddling.

5:40 pm. Getting off the river on south side of river at MN Hwy 220 bridge crossing. Not a real easy exit and a very long haul of gear up to car parked along bridge on south side. Should check to see if north side is more advantageous. Saw a sitting bench on north side so maybe a trail is developed to river. In this last reach some garbage along shore and more evidence of people using river. One couple out in motorboat fishing.

SUMMARY: Very nice reach of river—wide and safe, no tree snags or rapids. USGS gage at Fisher in morning was 69 cfs w/ gage height reading of 9.08' (though actual water depth at Fisher was more like one foot. RLR at Crox USGS gage was 44 cfs/2.55'—2.5' in 1936 was lowest in history so water levels were near historic low. Main issue for use by RW team is lack of access points to allow paddling shorter reaches. There were erosion areas and one spot where river just about cut through a meander which will result in new oxbow soon. Garbage in spots also—especially closer to EGF.

Photos from trip and maps generated from Google Earth in separate folder. Red Lake River Canoe and Boating map available for Red Lake River through MN DNR, online version available at http://files.dnr.state.mn.us/maps/canoe_routes/redlake.pdf.

Following are forecasted weather conditions for the 9/29/12 paddle day.



Wild Rice River: Scouting paddle from Mahnomen CoRd 2 to Mahnomen CoRd 10

April 20, 2012 paddle from Mahnomen CR2 (east of Mahnomen) to Mahnomen CR10 (just south of Mahnomen at city park). Approx. 13 river miles. On river at 1:50 and off at 6:00 p.m.—4 hrs 10 min. on water—not paddling hard, but also no stops other than working through tree snags. Joe Courneya in Perception Sport Sundance 9.5' kayak and Wayne Goeken in Pelican Ultimate 100 10' kayak—perfect small maneuverable craft for conditions found. Both in hip waders which proved to be very appropriate footwear for needing to get out in cold water and drag/work through several tree snags.

River Access	River miles cumulative	River miles intervals	Time cumulative	Time intervals	NOTES
Mahnomen CR 2	0	0	0	0	Good parking at Mahnomen Rod & Gun Club parking lot just north of river on west side of road, put in at downstream south side of bridge
Mahnomen CR 131	1.94	1.94	0:45	0:45	3-4 whole river tree snags-went around
Mahnomen CR 135	3.86	1.92	1:35	0:50	3-4 whole river tree snags
MN Hwy 200	8.93	5.07	3:10	1:35	1 major tree snag just downstream of cattle and suspension bridge. Nice reach otherwise, some rock rapids
Mahnomen CR 25	11.20	2.27	3:50	0:40	1 tree snag crossing river needed to negotiate. Otherwise nice reach w/ some rock rapids
US Hwy 59	11.81	.61	3:58	0:08	Clear. Urban visuals of back of Shooting Star Casino
Mahnomen CR 10	13.00	1.19	4:10	0:12	Clear. Got out at park, easier access than at CR 10 crossing

Wildlife observed: deer, mink (2), Canada Geese, wood ducks, mallards, mergansers, eagle, warblers, hermit thrush, songbirds,

Met two paddlers, Michael and Leigh, when we were coming off—they were going to paddle next reach to CR5 w/ sit-on top Pelican kayaks. Joe had worked at summer science camp in 2011 w/ Michael who is GIS person w/ White Earth Tribal College.

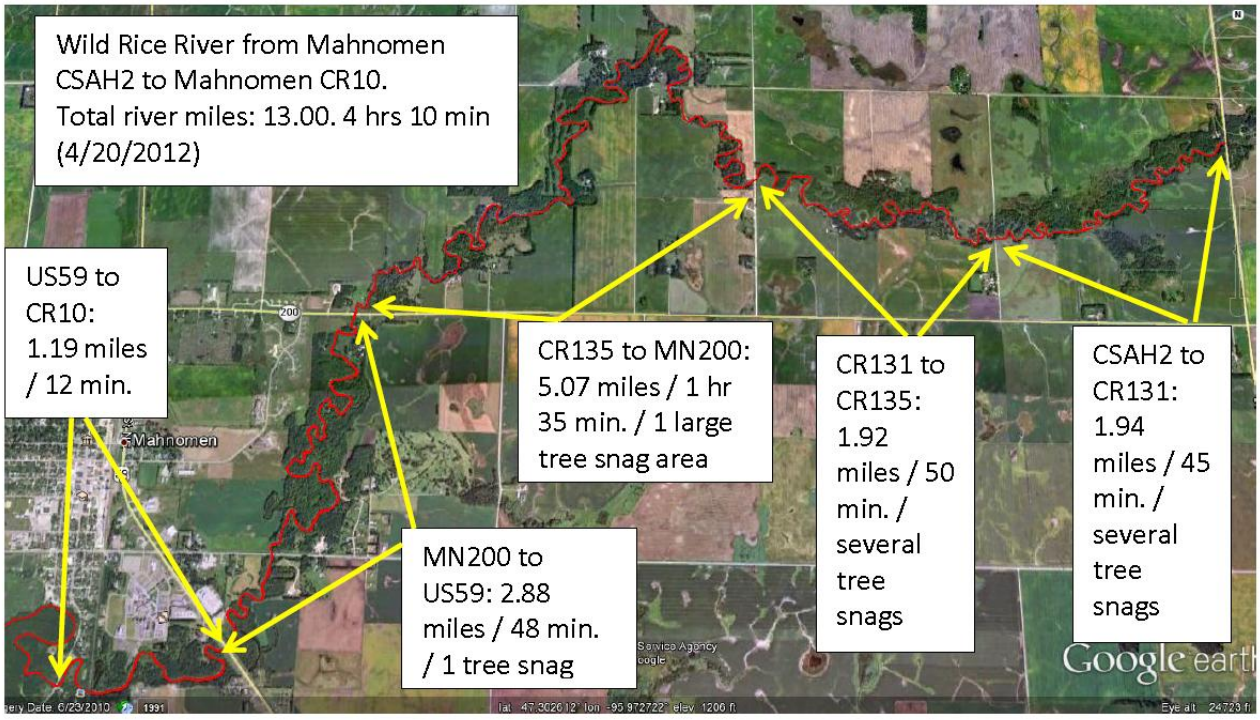
Snags in upper reaches would be a lot of work to clear. If the one by the cattle and suspension bridge was cleared that would open up that reach. Otherwise, the most accessible for public use would be the reach from MN Hwy 200 to the City Park on CR10.

Downstream USGS gaging station at Twin Valley was at about 2.95' with discharge of 240 cfs at time of this paddle. Low for this time of year. Scraped bottom in spots. 6" less water would have been possible

but 1' less would likely make this reach difficult. Lower reach from MN 200 to park access on CR10 likely good though at lower water levels yet if one snag cleared.

Some farming in this reach down to edge of river. Cattle access to river in spots. Some spots of garbage in river along bank.

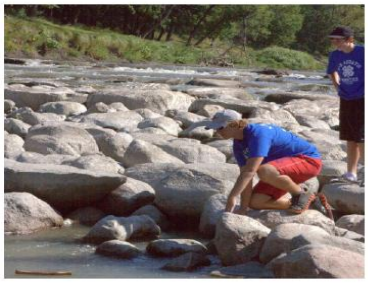
Photos from trip of tree snags and conditions in separate folder.



Appendix H: River Watch Fall Team Kick-Offs

FALL TEAM KICK-OFF!

InternationalWaterInstitute
Flood research and watershed education for the Red River Basin



River Watch
Citizen Monitoring Program

Dates: TRF, Oct. 9th, 2012 Best Western (Hwy 32 S.)

Rydell NWR, Oct. 16th, 2012

Bois de Sioux Watershed District Dec. 12, 2012

8:45 am	Arrival
9:00 am	Welcome
9:15 am	Team activity – Watershed Science?
9:45 am	Geospatial Data Visualization
	- RW website, KMZ file generation, Google Earth
10:45 am	Watershed and Natural Resource Projects:
	- Presentations by Natural Resource Professionals
11:45 am	Lunch
12:30 pm	Drought Forecasting Tool
	-RW Project updates
1:00 pm	RW Forum Theme Introduction and team challenge
	-Poster development
1:30 pm	Wrap-up and depart

Appendix I: 2013 River Watch Forum Assignment

2013 River Watch Forum Team Challenge

♦Natural Resource Project Profile
♦Drought Planning Tool
♦Designated Use Support Assessment

Assignment Summary

- Natural Resource Project Profile – Project description and Map of affected area. Short summary listing the need for the project, project goals, effectiveness, and implementation steps.
- Drought Planning – Identify your drought planning station(s) and plot 2012 flows verses 1988 flows; create a monthly sub-basin forecast conditions water report. Short summary of comparison between 1988 and 2012 flows along with discussion of sub-basin report findings.
- Designated Use Assessment. Table or graph of results with short written summary. Create a map illustrating use assessment rankings for your sites based on transparency readings.

*Optional: Other water quality research or watershed awareness activities you are involved with

*All components part of 3'x 4' poster to be printed for your RW team.

Natural Resource Project Profile

- Identify a project that has been, or is being, implemented and research why it is taking place and what was/is involved in regards to constructing it. Website help:
- SWCD projects http://www.bwsr.state.mn.us/SWCD/Guidebook/index.html
- Watershed district projects http://www.bwsr.state.mn.us/publications/WD_Guidebook/index.html
- Questions to answer:
  1. The need for the project and where it is located.
  2. Affected area above and below the project (MAP of Area!).
  3. Project goals, effectiveness, and impacts.
  4. Steps for Implementation; Funding (costs), Permits, Planning, and Land Acquisition.
  5. Project road blocks or hurdles.

Red River Basin Drought Planning Tool

The Regional Drought Decision Support System (RDDSS) for the Red River Basin http://www.rrbdin.org/hydrologic-data provides access to a common base of drought related information for the Red River Basin of the North.

- Plot the stream flow values for the drought planning station nearest your sample area for March thru August 2012. Be sure to include the comparison to the 1988 drought flows on your graph.
- Based on your plot explain how 2012 stream flows compare to the 1988 flows for your station.
- State how the drought indices might compare between 1988 and 2012.
- Create a monthly sub-basin forecast conditions water report for the modeled sub-basin closest to your locale.
- Explain what a Decile rating is. Hint: See http://www.rrbdin.org/subbasin-reports (RDDSSTechnicalHelp)

- What is the stream flow Decile rating for your sub-basin and what does it mean in regards to precipitation expected?
- What does UZTWC stand for and what is the UZTWC Decile rating for your sub-basin?
- How would you use this forecast report if you were a drought planner?

Designated Use Support Assessment

Compare data from all your monitoring sites to following MN State Standards criteria (Class 2B waters):

- Dissolved Oxygen: not less than 5mg/l
- Turbidity: not more than 25 NTUs
- Transparency tube not less than 20 centimeters
- pH: between 6.5-8.5

Determine Use Support - Compare your data to the state standards

- < 10% of values exceed criteria = Fully Supporting
- 10-25% of values exceed criteria = Partial Support
- >25% of values exceed criteria = Non-Support

Display Results graphically and Geospatially

- Create a table or graph with your use assessment results
- Table should include; Site Name, number of samples, and assessment percentage.
- Create a map of your assessment sites which illustrates Use Assessment rankings for each site based on Transparency readings. http://riverwatch.wq.io/

****

References

- Natural Resource Projects
  www.bwsr.state.mn.us/SWCD/Guidebook/index.html
  www.bwsr.state.mn.us/publications/WD_Guidebook/index.html
- River Watch Database: riverwatch.umn.edu
- Drought Tool www.rrbdin.org/rddss
- RDDSSTechnicalHelp www.rrbdin.org/subbasin-reports
- Designated Use Information: www.pca.state.mn.us/water/tmdl/tmdl-publications.html
- KML (Google Earth) file generation http://riverwatch.wq.io/

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Poster Development Timeline:

February 25th --1st draft due to danni@iwinst.org
February 26th – 27th IWI staff review of posters.
March 1st – Comments sent back to schools.
March 11th -- final draft due to danni@iwinst.org for printing.