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April 25, 2018

Attn: Chris Steller  
Legislative Reference Library  
645 State Office Bldg.  
100 Rev. Dr. MLK Jr. Blvd.  
St. Paul, MN 55155

Re: Annual Report as per reporting requirements for:  
Red River Basin River Watch CWF MPCA Grant #: 101156

Dear Mr. Steller,

Enclosed, please find copy 2 of 2 of the final report for the 2016-2017 Red River Basin River Watch project. This report fulfills the reporting requirements for the Clean Water Legacy River Watch Project through April 2018. The Red River Watershed Management Board is the project sponsor with lead coordination and project management provided by the International Water Institute.

Thank you,

A handwritten signature in cursive script that reads 'Danni Halvorson'.

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International Water Institute  
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April 25, 2018

# Red River Basin River Watch Annual Report 2017

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**Red River Basin River Watch** partners with K-12 and community education staff, resource management professionals, higher education institutions and other non-profits to create opportunities for citizen engagement in surface water quality issues in the Red River Watershed through data collection and field experiences.

**Danni Halvorson**  
Director - Education  
International Water Institute

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## Introduction

This report fulfills the final reporting requirement for the Clean Water Legacy River Watch Project from January 2017 through April 2018. 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 2016 – 2017 Clean Water Fund Work Plan.

## Program Overview

The International Water Institute (IWI) River Watch (RW) program enhances watershed understanding and awareness for tomorrow's decision-makers through direct hands-on, field-based experiential watershed science. Schools throughout the Red River of the North Basin participate in a variety of unique and innovative watershed engagement opportunities suited to their school, community, and watershed needs.

**Water Quality Monitoring:** Collect and record conditions at local rivers and streams using state-of-the-art scientific methods and equipment.

**Biological Monitoring:** Macroinvertebrate monitoring provides additional insights on watershed health.

**River Explorers:** Guided kayak excursions on local rivers to observe and document watershed conditions.

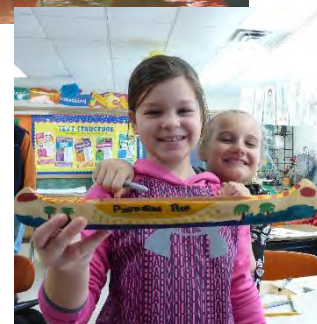
Ongoing **Teacher Training** provides access to resources and experts in current watershed issues.

**River Watch Forum:** Annual opportunity for students to share and learn about emerging watershed issues.

### *New to River Watch 2018*

**Real-Time Monitoring:** Students build, deploy and maintain real-time water quality monitoring stations. Data analyzed and used to characterize stream water quality.

**River of Dreams:** Introducing elementary students to watershed science and terminology through geography, reading, writing, and art.



The remainder of this report discusses the project progress in meeting the tasks and measureable outcomes of the River Watch activities from January 2017 through April 2018 (16 months). The budget summary provided provides financial performance information encompassing the same time period.

## Project Progress

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

### Work tasks/Measureable outcomes:

- 1A Develop a standard biological monitoring process for RW teams in the Red River Basin.**
  - 1A1 Resources developed and/or adapted to connect biology with chemical and hydrological conditions for training RW leaders and teams. Completed June 2016.*
  - 1A2 Training for education staff on use of new resources and presentation techniques for biological monitoring. Completed August 2016.*
  - 1A3 14 classroom sessions (7 sessions in 2016/ 7 in 2017) presented to RW teams to review role of biological monitoring and materials, equipment and process that will be used by team with staff assistance to monitor their respective sites. Completed September 2017.*
- 1B Establish and monitor biological reference locations at 14 stream locations in the Red River Basin.**
  - 1B1 Biological reference locations scouted and established. Where logistically feasible sites will be co-located with existing Intensive Watershed Monitoring locations. Completed September 2016 (7 sites) and September 2017 (7 sites).*
  - 1B2 Biological monitoring field collection of specimens and documentation of conditions at reference locations. Completed November 2016 (7 sites) and November 2017 (7 sites).*
  - 1B3 Classroom/Lab sessions with RW teams to identify and score collected biological specimens. Enter biological scores into RW database. Completed November 2016 (7 sessions) and November 2017 (7 sessions).*
  - 1B4 Teacher evaluation of implementation, problems, and highlights of biological reference site activities, as well as pre/post surveys of students. Completed December 2017. Results will be reported as part of Final Report due June 30, 2018.*

### Objective 1 Progress:

- Biological reference sampling sites were established at fourteen (14) locations. All of the sites selected are within proximity to or are co-located with an established MPCA Intensive Watershed Monitoring location. A list of sites selected including detailed location information is included in *Appendix A*.
- Classroom/lab sessions and field activities were held at five (5) locations in 2017. Locations where specimen collection occurred in 2017 are included within the summary of selected monitoring sites in *Appendix A*.
- Field activities in 2017 fell short of the target of seven (7) classroom and field collection events. The entire calendar period was targeted for specimen collection and identification but scheduling activities with schools outside of the school year window was difficult.
- An overview for the introduction of the River Watch biological monitoring program to students and teachers was created in presentation format and is also included in *Appendix A*.
- Teacher evaluation of the biological monitoring framework and associated activities is included within the overall program evaluation presented in *Appendix E*.

**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.

**Work tasks/Measureable outcomes:**

- 2A Expand capacity and structure of Red River Explorers Paddling Program to allow RW teams and community members to safely explore and document river conditions, including development of online reports to share information about river conditions.**
  - 2A1 IWI paddling staff scout rivers at different water levels to assess safety and water levels needed for safe passage by RW student exploratory teams. Ongoing through 2017.*
  - 2A2 Additional features and information that might be collected will be reviewed with watershed district managers and research scientists to maximize utility of data collection from river trips. Equipment and materials purchased for documenting field conditions. Completed July 2017.*
  - 2A3 On-line map and multimedia reports shared with the public via the IWI website and linked to the RRWMB website. Ongoing through 2017.*
- 2B Lead six guided river ecology excursions in both 2016 and 2017 on various reaches of rivers in the Red River Basin.**
  - 2B1 Twelve guided river ecology excursions in the Red River Basin, all utilizing GPS and mapping/photo documentation of baseline geomorphology and recreation conditions. Completed November 2017.*
  - 2B2 Share information from river trips on IWI website. Based on applicability to each river reports may include the following; number of trip participants, river route and reaches covered, photo-documentation of river conditions, and a summary of observations by trip participants on river conditions and recreation suitability. Completed December 2017.*
  - 2B3 Final Report to include link to all of trip reports and responses from local resource managers and research scientists as to utility of reconnaissance information provided about watershed conditions, completed June 30, 2018.*
- 2C Watershed Connections: Stream tables, groundwater models, and outreach.**
  - 2C1 Provide stream and ground water resource materials and equipment for eight site visits with assistance from IWI staff. Ongoing over contract period, completed January 2018.*
  - 2C2 Evaluation (self-reported) of changes in knowledge, attitude and perceptions of local rivers after stream table and/or groundwater model exposure. To be completed January 2018 and included in Final Report due June 30, 2018.*
  - 2C3 Produce and distribute a quarterly electronic newsletter that promotes watershed education and awareness in the Red River Basin. 8 newsletters developed over the contract period. Completed December 2017.*

**Objective 2 Progress:**

- River Explorer kayak trips were taken with eight (8) different groups in 2017, involving 125 total participants paddling a total of 369 river miles on seven (7) different rivers and one (1) lake in eight (8) separate watersheds in the Minnesota portion of the Red River Basin. The groups, rivers and watersheds involved, miles and total participants are summarized in *Appendix B*.
- Trip reports including photos and documentation were created for the five (5) trips that were taken with individual school groups.
- A standard method for reporting to resource managers in the respective watersheds was created. The detailed reports are now housed in a centralized location on the web at:  
<http://www.arcgis.com/apps/PublicGallery/index.html?appid=ca0fbbcd2511445b80c762c6c9c844b1>
- Summary reports can be downloaded from the web and are included as separate documents in *Appendix B*.



- Three stream tables and two ground water models have been made available to the River Watch schools for classroom use. IWI staff assist the schools in their use when requested. Resources and information relating to the stream tables and groundwater models are available for use by participating schools.
- Four (4) newsletters were published and distributed in 2017. River Rendezvous editions can be viewed on the IWI website at: <http://iwinst.org/mesmerize/river-rendezvous-newsletter/>
- Teacher evaluation of the associated watershed connection activities is included within the overall program evaluation presented in *Appendix E*.

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

## Work tasks/Measureable outcomes:

- 3A 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 interpretation will be held for RW teachers and youth leaders. Summer training sessions will be held for teachers to provide extended learning opportunities on watershed topics such as river ecology, watershed connections, and biological monitoring.**
- 3A1 2-3 regional fall kick-off events in both 2016 and 2017; and one summer teacher training session. Summary reports 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. Completed December 2017.*
- 3B 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.**
- 3B1 River Watch Forum presented in March 2016 and 2017 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. Completed April 2017.*
- 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 June 30, 2016 and June 30, 2017 and included in Final Report due June 30, 2018.*

## Objective 3 Progress:

- Three (3) regional fall kick-off events were held across the basin in September 2017. River Watch teams were introduced to the River Watch Forum 2018 Team Challenge and the activities at each kick-off event prepared the attending teams for the planning of a service learning project and developing video presentations. One-hundred nine (109) MN students and fourteen (14) teachers attended these events. Students and teachers received training on how to develop a service project centered on a local waterway and paddled a guided trip on the closest river with Wilderness Inquiry. All of the information related to the 2017 kick-off events is included in *Appendix C* or can be viewed on the web at: <http://iwinst.org/mesmerize/watershed-education/river-watch/forum-resources/2018-forum-resources/>
- One (1) River Watch teacher summer workshop “Do It-Yourself (DIY), Real-Time, Low Cost Environmental Sensing Networks to Support Citizen Science” was held June 21-22, 2017 at the University of Minnesota, Crookston. Workshop presenters were from the Stroud Water Research Center; Dave B. Arscott, Ph. D., Director and Shannon Hicks, Research Engineer. Ten (10) watershed educators from across the basin received 16 hours of training in hands-on activities learning how to build, deploy, and maintain a real-time water quality station. The agenda for the DIY workshop is included in *Appendix C*.
- The 2017 River Watch Forum was held March 15th at the University of Minnesota – Crookston. The Forum theme was “Water – Any Career Any Day”. Each student selected a session to attend from eight (8) different ‘College and

Career Tracks’ that were offered. Professionals from each career track talked about what their job entails and how they prepared themselves for that kind of work. Career track presentations included personal stories, a discussion on day-to-day tasks for their job, and tips for students to succeed at the next level. In the large group assembly Mike Jacobs, former Editor and Publisher of the Grand Forks Herald, was the keynote speaker. 2017 marks the 20th anniversary of the 1997 Flood. Mike talked about the 1997 Flood and how it affected his life and career. Over 200 students and teachers from 25 Red River Basin schools were in attendance. Highlights from the proceedings for the day were covered in our March 2017 newsletter and are included with the 2017 River Watch Forum Agenda in *Appendix D*.

- In conjunction with the 2017 River Watch Forum Governor Mark Dayton proclaimed March 12 – 18, 2017 to be “River Watch Week” in the State of Minnesota. The proclamation celebrates the International Water Institute’s Red River Basin River Watch program entering its 23<sup>rd</sup> year of Watershed Education programming in the Red River of the North Basin. See *Appendix D*.
- Evaluation of the STEM education and engagement opportunities is included within the overall program evaluation presented in *Appendix E*.

## **OBJECTIVE 4:** Project Management and Reporting

### **Work tasks/Measureable outcomes:**

#### **4A Track project grant-related expenditures. Compile and organize invoices, pay bills and submit for expense reimbursements in a timely manner.**

*4A1 Grant-related expenditures tracked, bills paid and expense reimbursements submitted at least quarterly.*

#### **4B 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:**

- 4B1*
- 1. Interim report of project status and budget to MPCA by December 31, 2016.*
  - 2. Interim report and initial evaluation to Commissioners of Education, MPCA and Legislative and Education Committees by February 15, 2017.*

*Final report of project outcomes, budget, and final evaluation results by June 30, 2018 to all entities receiving February 15, 2017 report noted above.*

### **Objective 4 Progress:**

- This interim report was submitted to the MPCA project manager December 30, 2016.
- Interim report and initial evaluation was submitted February 10, 2017 to the Commissioners of Education and MPCA and the Legislative and Education Committees.
- This report satisfies final reporting requirement listed above.
- Invoices have been submitted quarterly. Below is a summary of the project budget covering January 2017 through April 2018.



Project Budget	MPCA Grant Funds Available	Total MPCA Funds Expended	Total Remaining Balance	% Budget Expended
Objective 1: Rigor	\$44,441.64	\$44,439.76	\$1.88	100%
Objective 2: River Recon	\$87,081.43	\$87,081.43	\$0.00	100%
Objective 3: Educate and Engage	\$52,681.93	\$52,681.93	\$0.00	100%
Objective 4: Project Mgmt. & Reporting	\$15,795.00	\$15,795.00	\$0.00	100%
<b>TOTAL PROJECT BUDGET</b>	<b>\$200,000.00</b>	<b>\$199,998.12</b>	<b>\$1.88</b>	<b>100%</b>

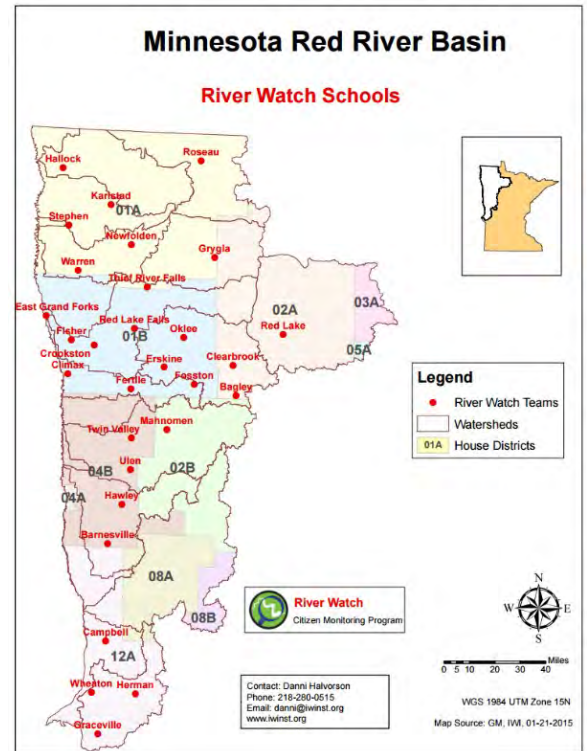
### Program Evaluation

Twenty-two (22) educators that were involved with the River Watch program during both the 2016 and 2017 project years were provided an opportunity to give responses to a couple of program evaluation pieces. The first was to provide written responses to questions related to how River Watch programming is used and suggestions for improvement, the second was to complete an online survey. Fifteen (15) educators responded to the written directive and twenty-two (22) completed the online survey. Overall the educators are pleased with the program and the educational offerings. Individual responses to the written survey and a summary of the online survey are provided in *Appendix E*.

## Summary

Support for the Red River Basin RW program is provided by the Red River Watershed Management Board, local watershed districts, and other regional partners. This collaboration has built a sustainable watershed education foundation across the Red River Basin. The RW program provides training to students who monitor physical and chemical conditions of local rivers using standard operating procedures. RW teams have collected data at 150 sites totaling over 10,000 visits to rivers, streams, and agricultural ditches in the Red River Basin. Data are used by the MN Pollution Control Agency to complement the state's assessment of surface waters.

Clean Water funds enable the IWI to build on this watershed education foundation by providing learning opportunities not afforded with traditional funding, specifically Biological Monitoring, River Explorers, Teacher Training, and River Watch Forum activities. Funds secured for 2018 will expand River Watch offerings to include Real-time monitoring and River of Dreams. These new activities will expand the educational opportunities and provide a more comprehensive understanding of watersheds, promoting land and water stewardship to protect and improve Minnesota's valuable natural resources.



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Red River Basin Macro Sites					
School	X-site Latitude	X-site Longitude	Stream	Co-located with MPCA site (Y or N)	MPCA Field Number
Red Lake County Central	47.82158	-96.00967	Hill River	Y	14RD221
Clearbrook Gonvick	47.67280	-95.17312	Clearwater River	Y	10EM085
Red Lake Falls	47.88609	-96.27689	Clear Water River	Y	94RD512
SAC	48.33775	-96.81145	Middle River	Y	93RD417
WAO	48.19101	-96.78466	Snake River	Y	15EM080
Fertile	47.52814	-96.41203	Sandhill River	Y	11RD016
Crookston/Fisher	47.77666	-96.63169	Red Lake River	Y (near the site)	12RD004
Herman-Norcross	45.87294	-96.12934	Mustinka River	Y	10RD036
Wheaton	45.71716	-96.34882	East Branch Twelvemile Creek	Y	10RD059
C-T	46.02660	-96.37187	South Fork Rabbit River	Y	10RD013
Barnesville	46.55613	-96.45573	Lawndale Creek	N (2 miles DS)	09RD056
Hawley	46.86077	-96.40885	Buffalo	Y	09RD042
KCC	48.73130	-96.68278	S. Branch Two Rivers	Y	10EM192
NCE	47.26452	-96.24462	Wild Rice River	Y	05RD115
Classroom/Field/Lab Activities in 2017					

Biological reference locations were established at the listed fourteen (14) locations.

"Chemical measurements are like taking snapshots of the ecosystem, whereas biological measurements are like making a videotape."

Prof. David M. Rosenberg PhD, Univ. of Manitoba and the Freshwater Institute, DFO, Winnipeg.

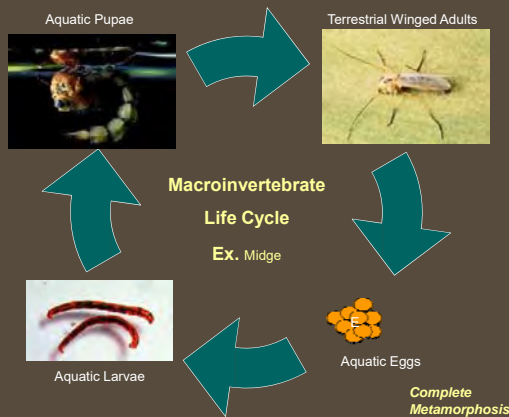
## Red River Basin River Watch

River Watch students have been collecting water chemistry data at stream sites throughout the Red River Basin since 1995. In an effort to provide students with a more complete understanding of the condition of our streams a biological monitoring program focusing on the collection of **Macroinvertebrates** has been set up for teacher/student use. The following is a presentation that discusses macroinvertebrates, habitats, data collection, bug identification and water quality assessment.



## What is a Macroinvertebrate?

- Let's break down the term. "macro" means big (or big enough for us to see without using a microscope) and "invertebrate" means without a backbone.
- So a macroinvertebrate is a bug that we can see with our naked eye.



## MACROINVERTEBRATES AND STREAM HEALTH

*Can be used as bio-indicators, used to assess the stream environment and changes through time.*

- Spend up to one year in the stream.
- Have little mobility
- Generally abundant
- Primary food source for many fish
- Good indicators of localized conditions
- Diversity = healthy stream
- Easy sampling techniques
- Potential threats to macroinvertebrate diversity
  - Sedimentation
  - Habitat loss
  - Chemical pollution

## MACROINVERTEBRATES AND STREAM CHEMISTRY

*A pH range of 6.0 to 9.0 appears to provide protection for the life of freshwater fish and bottom dwelling invertebrates.*

*Dissolved Oxygen levels > 5 mg/l are necessary to support a wide variety of freshwater fish and bottom dwelling invertebrates.*

## pH and Aquatic Life

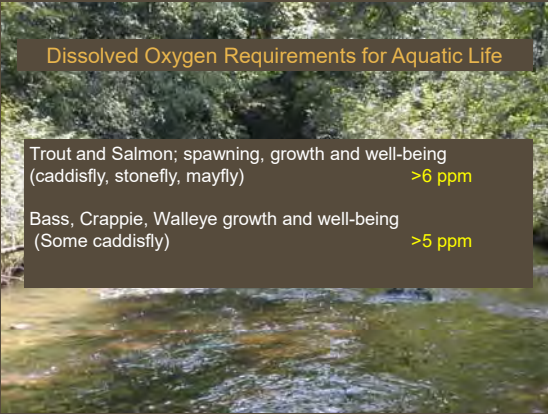
Limiting pH Values		Effects
Minimum	Maximum	
3.8	10.0	Fish eggs could be hatched, but deformed young are often produced
4.0	10.1	Limits for the most resistant fish species
4.1	9.5	Range tolerated by trout
---	4.3	Carp die in five days
4.5	9.0	Trout eggs and larvae develop normally
4.6	9.5	Limits for perch
---	5.0	Limits for stickleback fish
5.0	9.0	Tolerable range for most fish
---	8.7	Upper limit for good fishing waters
5.4	11.4	Fish avoid waters beyond these limits
6.0	7.2	Optimum (best) range for fish eggs and <b>most mayfly, stonefly, and caddisfly nymphs</b>
---	1.0	Mosquito larvae are destroyed at this pH value
3.3	4.7	Mosquito larvae live within this range
7.5	8.4	Best range for the growth of algae



**Dissolved Oxygen Requirements for Aquatic Life**

Trout and Salmon; spawning, growth and well-being (caddisfly, stonefly, mayfly) **>6 ppm**

Bass, Crappie, Walleye growth and well-being (Some caddisfly) **>5 ppm**



**WHERE THEY LIVE = PHYSICAL HABITAT**




- Shallow, fast moving, rocky bottom areas known as **riffles**.
- Deeper, slower moving sandy and gravel bottom areas know as **runs**.
- And deep, slow moving muddy-bottom areas know as **pools**.

**WHERE THEY LIVE = PHYSICAL HABITAT**



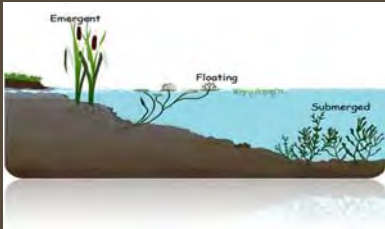
- Within the 3 general stream habitat areas there are smaller habitat areas where the macroinvertebrates live.
- **Hard Bottom, Aquatic Vegetation, Under Cut Banks, Snags and Leaf Packs.**

**PHYSICAL HABITAT ~ HARD BOTTOM**



- Hard bottom (riffle/cobble/boulder): This category is intended to cover all hard, rocky substrates, not just riffles.

**PHYSICAL HABITAT ~ AQUATIC VEGETATION**



- Submerged/emergent vegetation: Includes all submerged vegetation but only submersed portions of emergent vegetation.

**PHYSICAL HABITAT ~ UNDERCUT BANKS/OVERHANGING VEGETATION**



- In-bank or near-bank habitats, shaded areas away from the main channel that typically are buffered from high water velocities



### PHYSICAL HABITAT ~ SNAGS/ROOTWADS



- Snags include any piece of large woody debris found in the stream channel.

### PHYSICAL HABITAT ~ LEAF PACKS



- Leaf packs are dense accumulations of leaves. They are found in deposition zones, generally near stream banks, around logjams, or in current breaks behind large boulders.

### Collection & Identification of Macroinvertebrates



### RIVER WATCH MACROINVERTEBRATE SAMPLE SITE SELECTION

- IWI staff worked with the MPCA Bio-Monitoring unit to identify sites (co-located with MPCA sites where possible) for schools to monitor.
- IWI staff will provide the stream reach to be monitored along with a completed MPCA Habitat Assessment worksheet for reference.

### RIVER WATCH ADAPTED MPCA STREAM MONITORING PROTOCOL

Follow procedures outlined in the monitoring protocol. The protocol is available online: [PROTOCOL](#)



### MACRO MONITORING SUPPLIES



- D-frame dipnets with 500 micron mesh nets
- Cloth tape
- Forceps (plastic)
- Toilet scrub brush
- Large plastic funnel
- Flags
- A bucket with 500 micron sieves
- A 5 gallon bucket
- Pencil (no ink)
- Rite-in-the-rain paper for labels
- 95% Ethanol
- Plastic wide-mouth one liter screw top jar
- Rain-gear (optional)
- Chest-high waders (optional)

Monitoring Kits are available for check-out from IWI

# RIVER WATCH MACRO MONITORING PROTOCOL

Collect a composite sample from up to five different habitat types such that it is representative of the invertebrate community for a particular reach.

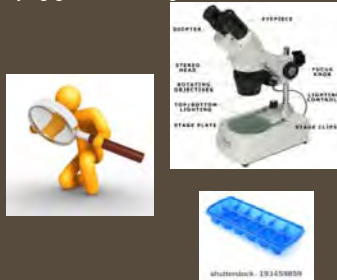
- Identify how many of the 5 habitats exist within your reach
- Take 10 samples, divided equally among however many habitats exist (target is 50 individuals/habitat)
- Once all 10 samples have been collected, thoroughly rinse them into a plastic jar and preserve with 95% Ethanol

## BUG IDENTIFICATION AND IBI SCORING ~ OBJECTIVES





- Identify individual bugs collected to the Family level using the Family ID Guide or other reference
- Assign pollution tolerance level based on Hilsenhoff Family Biotic Index (FBI)
- Use organisms as indicators of organic pollution, calculate the Biotic Index (FBI) and rate stream water quality
- Enter FBI scores to RW database, use scores for comparison in subsequent years

## BUG ID TOOLS

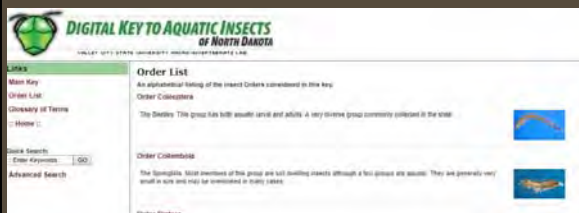
- Stereo scopes, magnifying glasses, sorting vessels
- Family ID Guide
- Web Resources
- Attention to detail
- Patience



## BUG ID TOOLS: FAMILY ID GUIDE

Macroinvertebrate Family Identification				
Common Name	Family Name	Tolerance Value	Identification	Photo
Dobsonflies	Corydalidae	0	<ul style="list-style-type: none"> <li>• large head</li> <li>• filaments on sides of body</li> <li>• hooked claws on end of legs</li> <li>• two pairs of claws on end of abdomen</li> </ul>	
Stoneflies	Petridae	1	<ul style="list-style-type: none"> <li>• Two tails</li> <li>• Shaggy gills on underside of thorax</li> <li>• Long antennae</li> </ul>	
Damselfly/Dragonfly	Aeshnidae	3	<ul style="list-style-type: none"> <li>• No tails</li> <li>• No visible gills</li> <li>• Large eyes</li> <li>• Long cylindrical body</li> </ul>	
Crickets	Tipulidae	3	<ul style="list-style-type: none"> <li>• Worm-like</li> <li>• No legs</li> <li>• Head usually concealed</li> <li>• Terminal gill filaments</li> </ul>	

## BUG ID TOOLS: WEB REFERENCES



VSCU Water Bug Key: <http://www.waterbugkey.vcsu.edu>

## BUG ID TOOLS: WEB REFERENCES



Stroud Center Bug Key: <https://stroudcenter.org/macros/key/>

## FBI SCORING ~ WORKSHEET

### Hilsenhoff Family Biotic Index (FBI)

The FBI is calculated by multiplying the number in each family by the tolerance value for that family (Table 1), summing the products, and dividing by the total arthropods in the sample (Hilsenhoff 1988).

Use the numbers from Table 1 and Table 2 to complete the equation below:

$$FBI = \frac{\text{Total}^{\text{FBI}}}{\text{Total}^{\text{Arthropods}}} = \frac{\text{Family Biotic Index}}{\text{Degree of Organic Pollution}}$$

Table 1. Tolerance values for families of stream arthropods in the western Great Lakes region (Hilsenhoff 1988).

Order	Family	Tolerance Value (a)	Tally (b)	Product (a x b)
Plecoptera	Perlidae	1		
Ephemeroptera	Baetidae	4		
	Caenidae	7		
	Heptageniidae	4		
	Leptophlebiidae	4		
Odonata	Aeshnidae	3		
	Zygopteridae	1		

The tolerance value is based on field and laboratory responses of these organisms toward organic pollution and is the average pollution tolerance scores for a family.

Low value = Pollution Sensitive

High value = Pollution Tolerant

## FBI SCORING ~ RATE QUALITY

Amphipoda	Gammaridae	4		
Isopoda	Asellidae	8		
		Total <sup>FBI</sup>		Total <sup>Arth</sup>

Table 2. Evaluation of water quality using the family-level biotic index.

Family Biotic Index	Water Quality	Degree of Organic Pollution
0.00-3.75	Excellent	Organic pollution unlikely
3.76-4.25	Very Good	Possible slight organic pollution
4.26-5.00	Good	Some organic pollution probable
5.01-5.75	Fair	Fairly substantial pollution likely
5.76-6.50	Fairly poor	Substantial pollution likely
6.51-7.25	Poor	Very substantial pollution likely
7.26-10.00	Very poor	Severe organic pollution likely

Using your calculated FBI score and Table 2 rate the water quality of your site.

## SUBMIT DATA

river watch  
efforts science & water quality data

Red River River Watch > Submit Data

### Submit Data

Select a data entry template from the projects listed below:

Macroinvertebrates

Red River Gorge macroinvertebrate sampling

Physical and Chemical (RRB)

Red River Gorge River Watch water quality sampling (RRB/RRB)

Enter your FBI scores and Water Quality ratings online:

[https://river.watch/reports/new?project\\_id=macroinvertebrates](https://river.watch/reports/new?project_id=macroinvertebrates)

RIVER EXPLORERS TRIP SUMMARY 2017					
<u>Date</u>	<u>Group Name</u>	<u># in group</u>	<u>Water Body</u>	<u>Individual Miles</u>	<u>Total Miles</u>
5/16/2017	Campbell-Tintah	16	Rabbit River	5.2	83.2
6/11/2018	4H Camp	21	Sand Hill Lake	2.0	42
6/20/2017	RLCC	7	Clearwater River	4.2	29.4
6/21/2017	EnviroDIY Teachers	11	Red Lake River	3.2	35.2
6/29/2017	White Earth	32	White Earth Lake	1.5	48
9/28/2017	Hawley RW	17	Buffalo River	4.1	69.7
9/29/2017	Stephen Argyle RW	11	Tamarac River	2.9	31.9
10/11/2017	Herman Norcross RW	10	Mustinka River	3.0	30
	<b>Totals</b>	<b>125</b>		<b>26.1</b>	<b>369.4</b>



## Campbell-Tintah River Explorers

On May 16, 2017, the Campbell-Tintah High School River Watch Team participated in a paddling trip that was 5.18 miles long, beginning on the Rabbit River and ended on the Bois de Sioux.

### Watershed Context:

The paddle trip began at Wilkin County Rd 9 west of Campbell, MN, on the lower Rabbit River. The river confluences with the Bois de Sioux River within 2 miles of our launch site after collecting water from over 320 square miles of land in Wilkin, Otter Tail, Traverse, and Grant Counties. Both rivers are influenced by dams or impoundment projects upstream.

### Habitat and Wildlife:

Very little natural habitat exists along this 5.18 mile reach. Given the agricultural land use which predominates, the narrow bands of habitat along the banks actually provide some of the best refuges for animals in the watershed. Additionally, many invasive plants were observed during the paddle trip. Common tree species were green ash and box elder.

### Recreation:

Though the Rabbit and Bois de Sioux Rivers are not managed chiefly for recreational enjoyment, students and staff alike had a blast on this trip! Taking water samples from area bridges gives one view of a watershed; paddling between them provides a completely different perspective.

### Water:

The observed water appearance was muddy on both the Rabbit and Bois de Sioux Rivers, with secchi tube readings of 7 cm on the Rabbit and 13 on the Bois De Sioux. The paddle crew had to get out and walk over several low riffle areas. The river is viewed locally as an agricultural drainage conduit.

### Trip Conclusions:

Though muddy, extensively altered by humans, and not the most scenic of paddling reaches, the route explored with Campbell-Tintah was surprising in numerous ways. Perhaps most surprising was how much enjoyment the Rabbit and Bois de Sioux Rivers were able to provide to the students who have likely passed by them every day. With land management, water quality, and river access improvements, this reach could develop into an asset to the residents of Campbell and Tintah.



### River Explorers programming provides students the opportunity to:

- Connect to their local rivers and lakes by paddling, strengthening a local sense of place
- document and share riverine conditions with resource managers and the public at large
- discover, inquire, learn, and get involved in local watersheds

Appendix B



# Hawley River Explorers

On September 28th, 2017, the Hawley River Watch Team participated in a paddling trip on the Buffalo River in Hawley, MN.

## Watershed Context:

Hawley sits right on the Buffalo River in the Buffalo River Watershed. The Buffalo River's headwaters are in Tamarac Lake and it flows into the Red River.

## Habitat and Wildlife:

A variety of native plants were seeded into the restoration area (between Cederberg Bridge and the golf course). Kentucky bluegrass occupies a significant chunk of land directly adjacent to the stream. Cottonwoods, green ash, and box elder trees are the most common. Trees and prairie grasses provide the best habitat for animals in this reach. A variety of ducks (especially wood ducks), green herons, songbirds, and other birds were glimpsed on this run down the river.

## Recreation:

The Buffalo River in this reach is a challenging trip for beginners. We had a blast! Tight meanders with debris in the channel and a few narrow rapid passages present obstacles. For intermediate to advanced paddlers, the river presents an enjoyable trip not often considered.

## Water:

The secchi tube reading on the day of our trip was 24 cm, which appeared cloudy from the bridge. The clarity was reduced due to recent rain amounting to 2". Readings are typically closer to 80 cm. Some trash and debris were observed along the paddle trip. The golf course features the river on several of its holes as an aesthetic feature.

## Trip Conclusions:

Despite some challenges, the paddling trip was deemed a success!! The River Watch Team paddled about four miles down the Buffalo River!



## River Explorers programming provides students the opportunity to:

- Connect to their local rivers and lakes by paddling, strengthening a local sense of place
- document and share riverine conditions with resource managers and

Appendix B



**Watershed Context:**  
Pine Ridge Park is positioned in the upper-middle portion of the Mustinka River watershed. The river’s headwaters are Lightning Lake; its mouth is at Lake Traverse, west of Wheaton, MN.

**Habitat and Wildlife:**  
The surrounding landscape is largely composed of row crop agriculture with pockets of wildlife management areas, wetlands, and residential land usage. Particularly along the south shore, Pine Ridge peninsula, and in the upstream wetland area, substantial habitat for waterfowl, mammals, and other animals can be found. The dam limits fish passage to upper reaches of the Mustinka. Varieties of willow, maple, and oak trees were observed, as well as a stand of Norway pine. Ducks, small fish, and a pheasant were present.

**Recreation:**  
Pine Ridge Park is utilized as a recreational hub for the region. Several campsites are available within the compound, and fishing near the dam is a popular activity. During the summer, the beach is a good place to swim. The beach also serves as an access point for paddlers.

**Water:**  
Samples from the morning revealed secchi tube readings of 70 cm at the upstream BdS01 sampling site and 40 cm at the downstream BdS8 sampling site. Water levels are kept higher in the upstream reaches due to the dam’s presence. Water flowing out of the dam moves at swift velocities, causing erosion downstream. Culverts cause several “blow-outs” between the park and Norcross.

**Trip Conclusions:**  
Students: “We crashed into each other on the water, but no one got wet. It was cold and windy, but it was all beautiful.” A picnic grill-out boosted energy prior to the trip. We had a great time exploring this often-overlooked park in western MN!

# HNCS River Explorers

On October 11, the Herman-Norcross River Watch team joined IWI for a paddle trip on the Mustinka River Flowage, beginning and ending at Pine Ridge Park near Norcross, Minnesota.



**River Explorers programming provides students the opportunity to:**

- Connect to their local rivers and lakes by paddling, strengthening a local sense of place
- document and share riverine conditions with resource managers and the public at large
- discover, inquire, learn, and get involved in local watersheds
-



# RLCC River Explorers

On May 20, 2017, the Red Lake County Central (RLCC) High School River Watch Team participated in a paddling trip that was 4.2 miles long on the Clearwater River.

## Watershed Context:

The Clearwater River runs from near Bagley, MN to Red Lake Falls, MN where it confluence with the Red Lake River. Our trip at Plummer was in the last 25 miles of the river and was just upstream of the confluence with the Lost River.

## Habitat and Wildlife:

This section of river is heavily forested along the riparian corridor and feels like it has been left untouched with only a few areas of visible farmland. The beauty in this river is the diversity of wildlife. Many birds were spotted, including a great blue herons were looking for fish along the edges of the channel. Many large mussel shells were observed on the river bottom.

## Recreation:

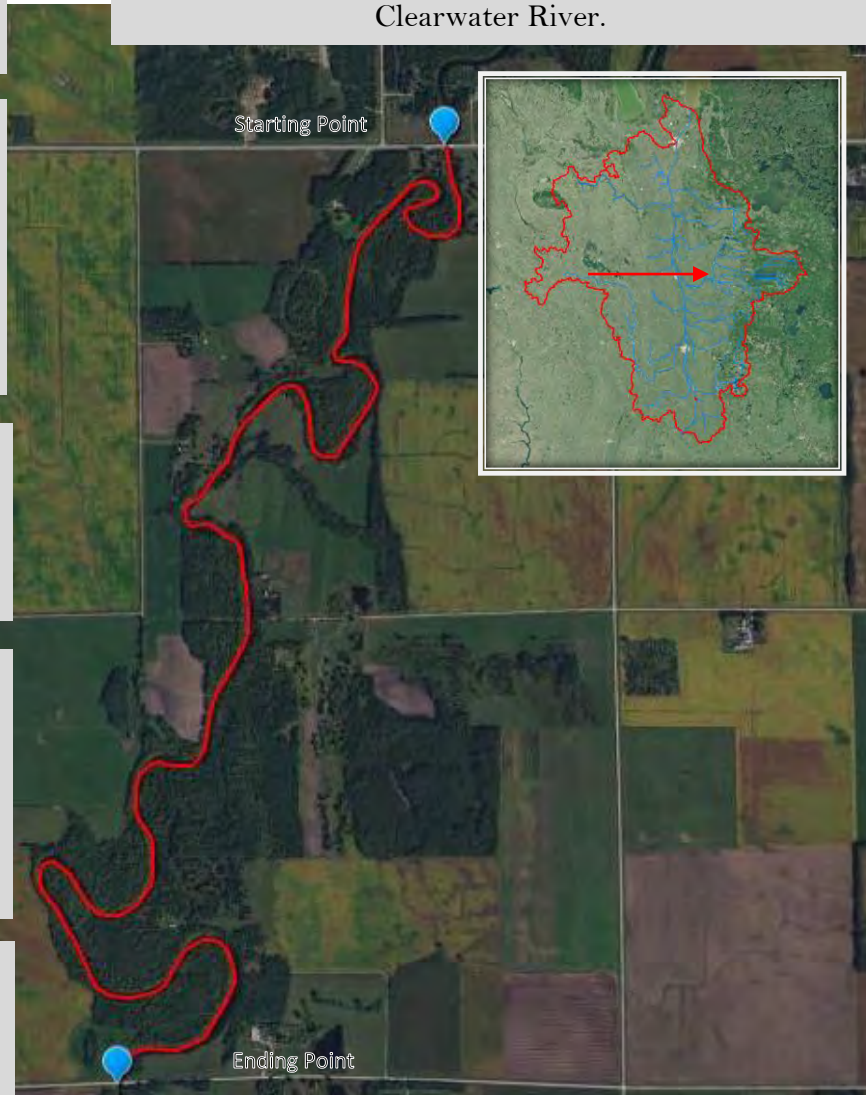
Everyone enjoyed paddling on the Clearwater River and would be ready to paddle again at the next opportunity. Even though there weren't docks or official boat landings it was very easy to get on and off the river at this water level.

## Water:

The Clearwater River earned its name for a reason. Near Plummer the water is still crystal clear when at baseflow- during storm events the water gets muddy. In some portions of this reach there was a lot of submerged vegetation and algae growth. As the water warms up this vegetation and algae may cover the water's surface.

## Trip Conclusions:

This reach of river is one of the nicest to paddle in the Red River Basin. With low water levels it is very easy for beginner paddlers and they are able to experience a very natural habitat where the water beneath them is clear to the bottom of the channel.



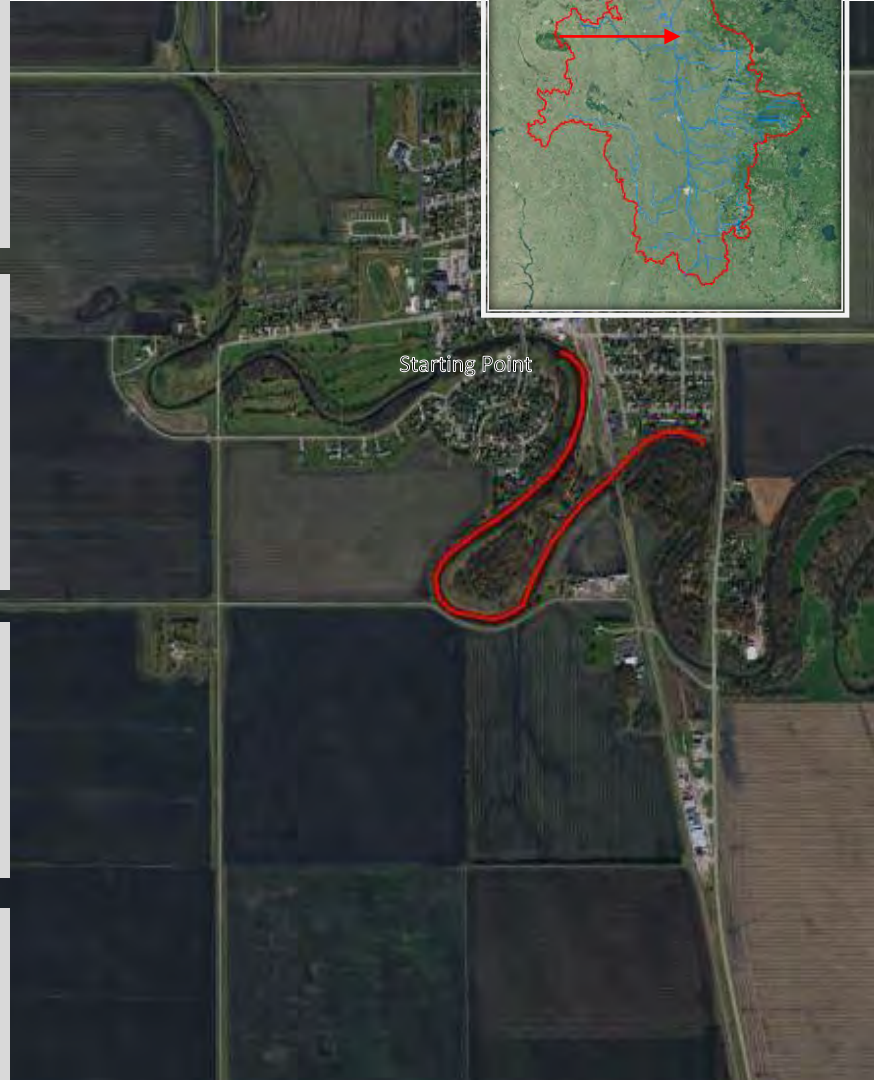
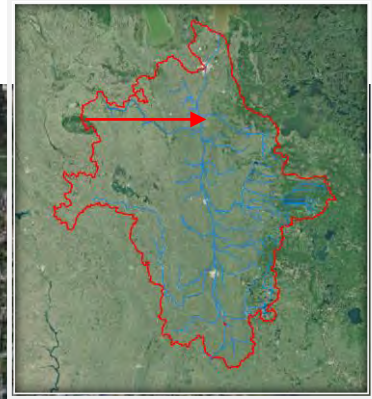
## River Explorers programming provides students the opportunity to:

- Connect to their local rivers and lakes by paddling, strengthening a local sense of place
- document and share riverine conditions with resource managers and



# SAC River Explorers

On September 29th, 2017, Stephen Argyle Central River Watch Team participated in a River Explorers trip, beginning and ending their paddle at Pioneer Park.



## Watershed Context:

Stephen sits on the Tamarac River, in the Tamarac River Watershed. Stephen is on the western half of the watershed, downstream from the head of the river. The headwaters begin in the Nelson slew and flow to the Red River.

## Habitat and Wildlife:

A majority of the paddling trip took place within the city, with a small portion of the paddle being surrounded by fields; making the trip primarily through human altered landscape. The river itself contained a large quantity of duckweed, lily pads, and some wild rice. Turtles and birds were the primarily observed wildlife.

## Recreation:

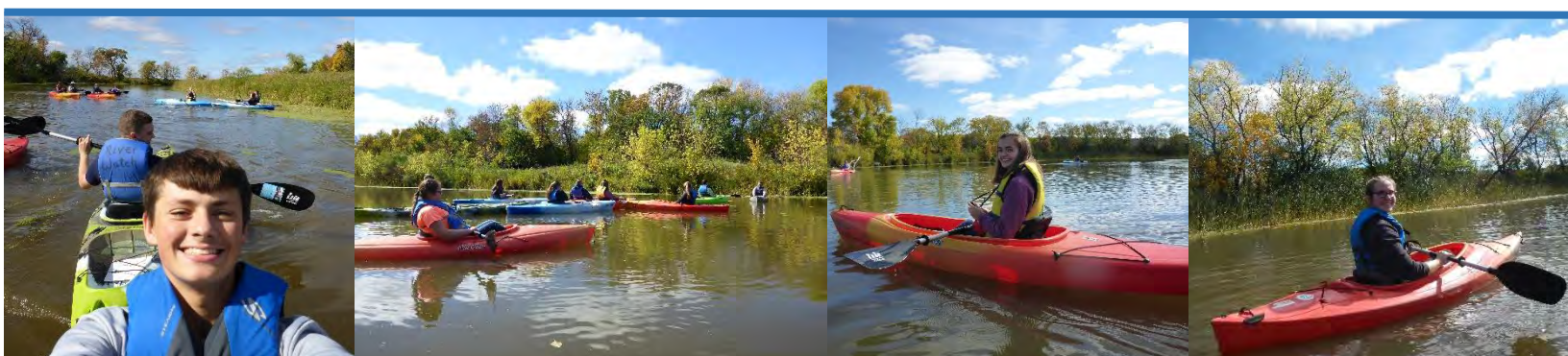
Great opportunities for recreation, not only accessible for kayaks but also larger boats and jet skis. There are many opportunities for the community to get out on the water, but more advertising and communication within the community would be helpful; it would benefit the overall community if there was more awareness about how family friendly recreating on the Tamarac River is!!

## Water:

The water appeared muddy and with the presence of duckweed it was difficult to see through the water. Adding to the concerns about the quality of water, is the presence of erosion along the banks and storm sewers flowing into the river.

## Trip Conclusions:

10 out of 10 would recommend padding on the Tamarac! The weather was great, the paddle was fun, and the river was accessible!!!



## River Explorers programming provides students the opportunity to:

- Connect to their local rivers and lakes by paddling, strengthening a local sense of place
- document and share riverine conditions with resource managers and

**2017 Fall Kick Off Attendees**

EGF		TRF		Moorhead	
Grand Forks Mid School	9	Stephen-Argyle	9	Herman-Norcross	12
Cavalier	9	Warren Alv Oslo	12	Wheaton	0
Valley-Edinburg	9	Crookston	4	Norman Co East	6
Larimore	9	Grygla	0	Hawley	13
Minto	8	Red Lake	0	Barnesville	0
EGFSH	7	Red Lake Falls	9	Campbell-Tintah	8
Fisher	9	RLCC	8		
Climax		WinEMac			
		Clearbrook	5		
		Hallock (KCC)	0		
		Fertile	6		
		MCC	10		
IWI WI	11	IWI WI	11	IWI WI	11
Total	71	Total	74	Total	41
	<b>Denotes MN School in attendance.</b>				



## 2017 River Watch Fall Kickoff Schedule Sept 12<sup>th</sup> in East Grand Forks (Fairfield Inn)

Fairfield Inn  
514 Gaetway Dr NE  
East Grand Forks, MN 56721

Eagle Point Park  
1<sup>st</sup> Street Southeast  
East Grand Forks, MN 56721



Time	Group 1	Group 2
9:00	Arrive at Fairfield Inn	Arrive at Fairfield Inn
9:15	Depart for Eagle Point Park	RW Introductions, Info about program
9:30	At landing for safety talk, boat captain introduction, life jacket sizing, etc	River Rap
9:45	River Talk	Presentation on presentation resources
10:00	Launch Boats (Paddle on Red Lake River)	Assignment Overview
11:00	Return to Landing	Worksheet w/team
11:15	Lunch at Park	Depart for Eagle Point Park
11:45	Depart Park for Hotel	Lunch at Park
12:00	RW Introductions, Info about program	At landing for safety talk, boat captain introduction, life jacket sizing, etc
12:15	River Rap	River Talk
12:30	Presentation on presentation resources	Launch Boats (Paddle on Red Lake River)
12:45	Assignment Overview	
1:00	Worksheet w/team	
1:15		
1:30	Depart from Fairfield Inn	Return to Landing
		Depart from Park





## 2017 River Watch Fall Kickoff Schedule Sept 13<sup>th</sup> in Moorhead (Hjemkomst Center)

Hjemkomst Center  
202 1st Ave N  
Moorhead, MN 56560



Time	Group 1
9:00	Arrive at Hjemkomst Center
9:15	RW Introductions, Info about program
9:30	River Rap
9:45	Presentation on presentation resources
10:00	Assignment Overview
10:15	Worksheet w/team
11:15	Lunch
11:45	At landing for safety talk, boat captain introduction, life jacket sizing, etc
12:00	River Talk
12:15	Launch Boats (Paddle on Red River)
12:45	
1:00	
1:15	Return to Landing
1:30	Depart from Hjemkomst Center





## 2017 River Watch Fall Kickoff Schedule

### Sept 11<sup>th</sup> in Thief River Falls (Red Lake Watershed District)

RLWD  
1000 Pennington Avenue South  
Thief River Falls, MN 56701

LaFave Park  
Taft and Crocker Ave  
Thief River Falls, MN 56701



Time	Group 1	Group 2
9:00	Arrive at RLWD	Arrive at RLWD
9:15	Depart RLWD for LaFave Park	RW Introductions, Info about program
9:30	At landing for safety talk, boat captain introduction, life jacket sizing, etc	River Rap
9:45	River Talk	Presentation on presentation resources
10:00	Launch Boats (Paddle on Thief River and Red Lake River)	Assignment Overview
		Worksheet w/team
11:00	Return to Landing at LaFave Park	Lunch at RLWD
11:15	Travel from LaFave Park to RLWD	
11:30	Lunch at RLWD	Depart RLWD for LaFave Park
11:45		At landing for safety talk, boat captain introduction, life jacket sizing, etc
12:00	RW Introductions, Info about program	River Talk
12:15	River Rap	Launch Boats (Paddle on Thief River and Red Lake River)
12:30	Presentation on presentation resources	
12:45	Assignment Overview	
1:00	Worksheet w/team	
1:15		Return to Landing at LaFave Park
1:30	Depart from RLWD	Depart from boat landing

## 2018 River Watch Forum Assignment

Create a plan for a service project centered around stewardship of a local waterway. All teams must craft a project proposal which includes: (1) clear project description, (2) benefits the project will provide a local waterway, and (3) a plan of action to ensure it is completed. Projects should be scheduled for implementation during the 2017-2018 school year. They should be creative and attainable.

The service project must connect broadly to water stewardship. The only limitation is your imagination!

There is no poster requirement for the Forum this year. Instead, you must identify a project partner which may support and enhance your plan of action. You must pitch the project to this group - a local unit of government, service organization, school board, etc. The medium used to present your pitch can take any form, including (but not limited to): video, poster, PowerPoint, Prezi, Google Earth, or ArcGIS Online.

Two (2) submissions are required for judging: a project proposal and a **3-5 minute video** detailing the need for your service project and how it can be implemented. The provided rubric will be used to evaluate each video and project proposal by a panel of judges.

Please review the rubric carefully and plan accordingly as you prepare your submissions.

### Deliverables and Timeline

September 29, 2017: Outline of project proposal due. Send to your River Watch staff for feedback and guidance.

December 20, 2017: Draft of project proposal and video due

January 22, 2018: Final Project Proposal and Video due. Send final submissions to [danni@iwisnt.org](mailto:danni@iwisnt.org).

**February 7, 2018**: River Watch Forum at the Alerus Center Grand Forks, ND

## WORKSHOP AGENDA:



### Do-It-Yourself (DIY), Real-Time, Low Cost Environmental Sensing Networks to Support Citizen Science and Primary and Secondary Education

Presented by:



Hosted By:



Location:

Owen Hall 205 & Bergland Lab  
University of Minnesota, Crookston

June 21-22, 2017

AGENDA

Day 1 - Wednesday 6/21/17 (8:30 am- 5:00 pm)

Day 2 - Thursday 6/22/17 ( 8:30 am- 4:30 pm)

#### Presenters from Stroud Water Research Center:

- Dave B. Arscott, Ph.D., Director and Research Scientist - <http://www.stroudcenter.org/about/arscott.shtm>
- Shannon Hicks, Research Engineer - <http://www.stroudcenter.org/about/hicks.shtm>

#### Hosts from International Water Institute:

- Danni Halvorson, Director of Education and Monitoring, [danni@iwinst.org](mailto:danni@iwinst.org), 218-280-0515
- Danielle Yaste, Mapping and Outreach, [danielle@iwinst.org](mailto:danielle@iwinst.org), 320-216-5154

**Day 1 - Wednesday 6/21/17 (8:30am- 5:00 pm + dinner and paddle)**

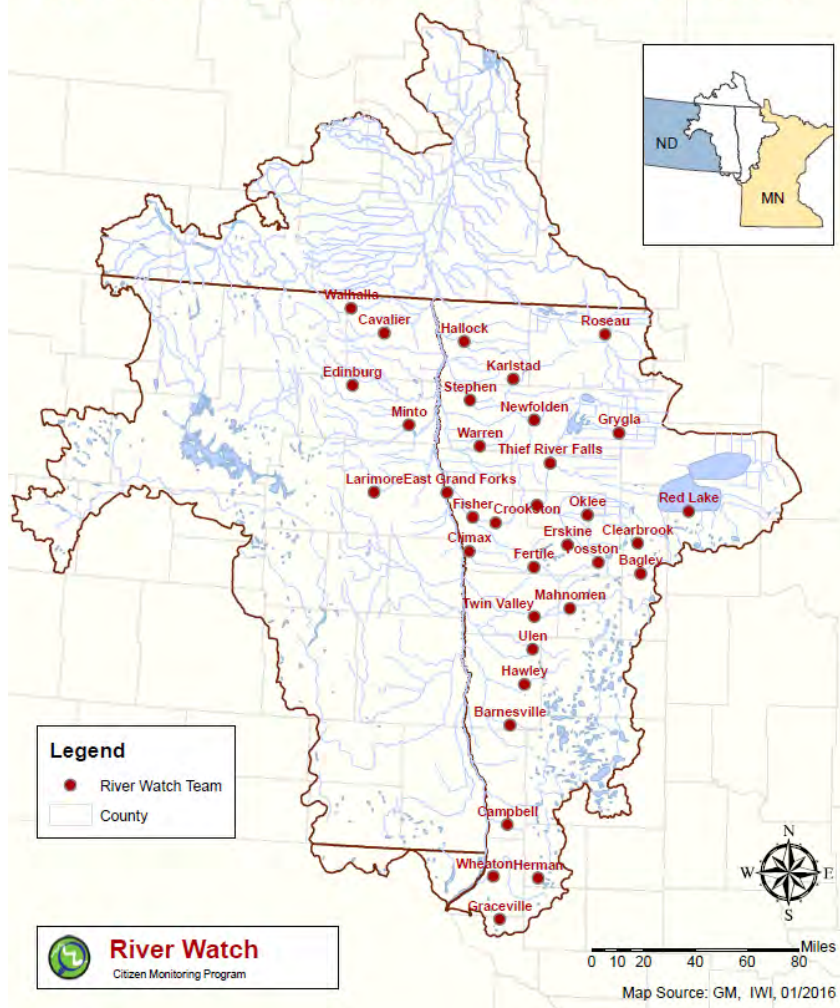
- Part 1: Introduction and general overview
  - 8:30-9:00 - Informal discussions and breakfast
  - 9:00-10:00 - Introductions & overview of workshop
  - 10:00-10:30 - Sensor station basics
  - 10:30-11:00 - Introducing the Mayfly Microprocessor and Data Logger Board
  - 11:00-11:30 - Intro to the Arduino software and coding/programming basics
- Lunch and formative assessment -
  - 11:30-12:00 - Lunch - (Lunch at Brown Dining)
  - 12:00-12:15 - Feedback time!
- Part 2: Hands-on Arduino & Mayfly data logger programming experience; real-world experience with sensor station deployment (in Red Lake River at Crookston)-
  - 12:15-12:30 - Introduction to computer setup
  - 12:30-1:45 - Plug in logger board & communication with sensors
  - 1:45-2:00 - Break
  - 2:00-2:30 - Sensors used in field deployments
  - 2:30-3:30- Building Sensor Stations: assemble box, connect sensors, weatherproofing
  - 3:30-5:00 - Deploy demo station for use overnight (in RLR)
  - 5:00-6:30 - Paddle trip on Red Lake River (snacks and water?)
  - Cook out at Central Park (Q&A; review; Feedback time!)

**Day 2 - Thursday 6/22/17 (8:30 am- 4:30 pm)**

- Part 3: Retrieval, Reading, Upload and Sharing of data -
  - 8:30-9:00 - Informal discussions and breakfast
  - 9:00-9:15 - Q&A, topics to review/reinforce from Day1
  - 9:15-9:25 - Introduction to Day 2 activities and goals
  - 9:25-10:00 - Look at data from overnight demo
  - 10:00-10:15 - Ways to access data - demonstration of processes; Data sharing and visualization;
  - 10:15-10:30 - Break
- Part 4: Sensor Station site selection, maintenance and quality control/assurance
  - 10:30-10:50 - Site selection strategy: stream reach or other environment
  - 10:50-11:30 - maintenance and QA/QC
  - 11:30-12:15 - Lunch (Lunch at Brown Dining)
  - 12:15-12:30 - Feedback time!
- Part 5 - Curriculum ideas for use in classroom
  - 12:30-2:30 - introduce potential STEM topics/units and forthcoming resources
    - Engineering and technology, computer science, environmental science and math units
  - Break - 2:30-2:45
  - 2:45-3:15 - field measurements at sensor stations to enhance data and learning opportunities and pairing field data with sensor data (also data management)
  - 3:15-4:00 - discussion on maintenance and upkeep of your station
  - Part 5: Wrap-up,
    - 4:00-4:30 - Q&A and general info; post-workshop survey in 2 weeks



## US - Red River Basin River Watch Schools



## River Watch Forum Sponsors

~ THANK YOU ~

The Nature Conservancy  
Moore Engineering  
Houston Engineering, Inc.  
Sand Hill River Watershed District  
Buffalo-Red Watershed District  
Minnesota Pollution Control Agency ~ Detroit Lakes  
North Dakota Department of Health  
HDR Engineering  
Paul Swenson  
Polk County AIS



## 22<sup>nd</sup> Annual River Watch Forum

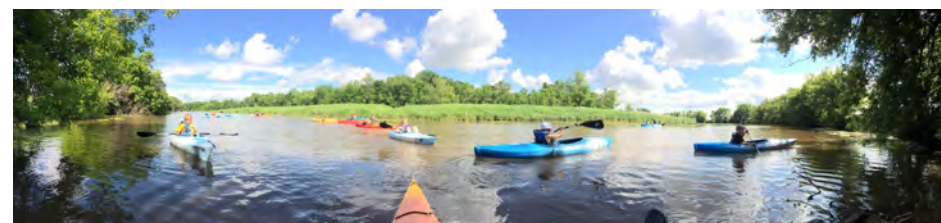
Theme: *Water – Any Career Any Day*

March 15, 2017

University of Minnesota-Crookston Campus

Exciting News!!

Minnesota Governor Mark Dayton  
declares March 12-18, 2017 as  
***River Watch Week***  
in the State of Minnesota!



Funding Provided by:



United States  
Department of  
Agriculture

Red River Joint Water  
Resource District



Red River Watershed  
Management Board



## 2017 River Watch Forum Agenda

Appendix D

- 8:30 Registration & Poster Viewing  
 9:30 Welcome & Opening Remarks  
     ~~~ Keynote Address ~~~  
 9:45 Mike Jacobs: *How Water Affected My Career*  
     Former Editor & Publisher of Grand Forks Herald  
 10:15 What's Your Watershed IQ?  
 10:35 Announcements and Door Prizes  
 10:45 College and Career Tracks  
 12:00 Lunch-Brown Dining Hall  
 12:45 Team Photos w/poster & Staff-Bede Ballroom  
     1:10 River Watch Team Captain Recognition  
     1:15 LIVE River Watch Final Jeopardy  
 2:00 Final Door Prize Drawings  
 2:05 Awards  
 2:30 Adjournment

College & Career Track	Presenters	Affiliation/Organization
Culture, Community, and Public Service	Shannon Stassen Leroy Stumpf	City of Crookston Retired State Senator
Education and Advocacy	Christine Holland Shawn Dekayser	River Keepers NDSU Natural Resource Management
Public Health, Nursing, and Emergency Response	Kirsten Fagerlund Jenilynn Marchand	Polk County Public Health MN Dept of Health
Natural Resource Sciences	Andy Butzer Katie Engelmann	MN Pollution Control Agency Private Land Consultant
Engineering and Design	Dave Jones Matt Enriquez	Natural Resource Conservation Service Houston Engineering
Agriculture and Landowners	Robin Brekken Rob Sip	Robin Brekken Farms Inc MN Dept of Agriculture
Computer Science & Technology	Andrew Sheppard Brandi Jewett	Houston Engineering SkySkopes
Business and Leadership	Amanda Lien Bob Borash	Crookston Chamber and Visitors Bureau RMB Environmental Labs

## Notes

Keynote Address:

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College & Career Track:

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Jeopardy:

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River Rendezvous #28

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## River Rendezvous

Promoting watershed education and awareness in the Red River Basin



### You will Always Live in a Watershed

Each spring, the International Water Institute hosts a River Watch Forum for students and teachers in the program. This day is meant to showcase the students' work and to connect those students to other schools and professionals. The theme for the 2017 Forum was 'Water – Any Career Any Day,' designed to show students how many different career paths interact with water in some way. As part of this year's challenge, each River Watch team made a video detailing the unique watershed lesson they developed and delivered to 4<sup>th</sup> and 5<sup>th</sup> graders at their respective schools.

The day started with a keynote address from Mike Jacobs, who spent 35 years at the Grand Forks Herald in various positions, ending his career as Publisher. Mike spoke about memories of water during his childhood and how that connection with water and rivers has stuck with him. It was very fitting to have Mike talk about the 1997 Flood as it is the 20<sup>th</sup> anniversary of that historic and memorable event. Rising water is normal in the Red River Valley, but in 1997, it kept rising. After being moved to the Manvel school, Mike and his team continued to publish papers so that local residents could stay informed. There were no apps and the internet was young. But after covering this devastating flood, the Grand Forks Herald was rewarded with a Pulitzer Prize for Public Service. The photos that Mike shared caught everyone's attention; some in attendance remembered those days, but all of the current River Watch students were born after 1997. It was a great way to start the day showing the connection between various careers and between all residents in the Red River Basin and water.



This year, students attended one of eight 'college and career tracks'. Each session had two presenters who discussed what they do for work and the steps they took along the way to get to their present

position. Career tracks ranged from community service to education to computer science, and professionals explained how their skills and passion have led to their success. Students learned a great deal and were surprised to learn that all of these professionals are involved with water in some manner. Computer programmers work to allow water quality data entry and reporting while those in public service must represent all of their constituents' interests. Connecting students to their watersheds and to the people who live and work in those watersheds was a great way to enforce that everyone will always live in a watershed.

*-Asher Kingery, Project Specialist*



### Awards and Recognition





(Clockwise from left): Larimore took home the top Judges' Select award; Fisher received the top People's Choice award; Jessica Ross received a Partnership award; Katie Melgaard is this year's Voyageur award recipient; Beau Lofgren received a Partnership award; and Stephen-Arglye received the Managers' Choice award.

### **Mark your Calendar:**

June 21-22: Stroud Water Research DIY Teacher Training

September 11-13: River Watch Fall Kick-Offs



# Why River Watch?

engaging  
Natural resources  
new connection  
mouthpaddling  
kayaking  
Riverwatch  
H2O  
opportunity  
adventures  
FUN  
Life-changing  
fish  
pollution  
entertaining  
Eye opening  
Flooding water  
Turbidity  
education  
DO



Name: Tyra  
School: Win-E-Mac  
Years Participating in River Watch: 4  
Why River Watch?  
“The river went from just being a river to having so much more value. I understand turbidity and I know how to use the tools and how important the rivers are outside of recreational activities.”

Name: Jaden  
School: Warren-Alvarado-Oslo  
Years Participating in River Watch: 3  
Why River Watch?  
“We just turn on our water, and we don’t care, but we need to think about where it’s coming from—that’s why River Watch is important.”



Name: Lexi  
School: Stephen-Argyle  
Years Participating in River Watch: 1  
Why River Watch?  
“My favorite part about River Watch was teaching the fourth graders. . . I learned a lot from the older students as we taught the younger students.”



Name: Emiliana  
School: Fertile Home-school  
Years Participating in River Watch: 3  
Why River Watch?  
“River Watch is really eye-opening; learning all about the river. It’s weird how much you don’t know, how much you should know, and how much there is to know.”



Name: Josie  
School: Red Lake Falls  
Years Participating in River Watch: 1  
Why River Watch?  
“It’s fun, it’s educational, and it’s needed. I love it.”





The Crew (l-r): Michael Knudson, Andy Ulven, Ashley Hitt, Chuck Fritz, Danielle Yaste, Danni Halvorson, Laura Bell, Asher Kingery

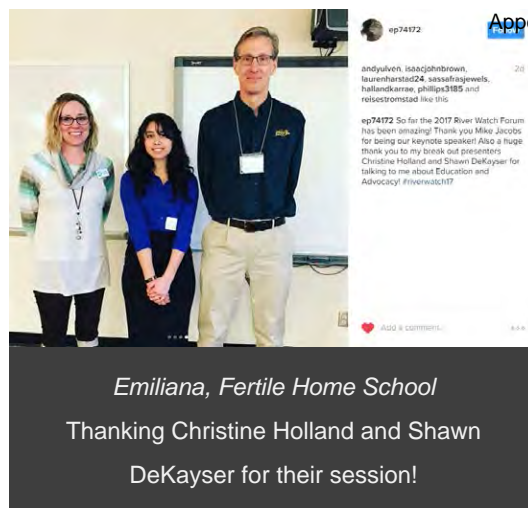
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## Social Spotlight





Issue #28



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## STATE of MINNESOTA

# Proclamation

WHEREAS:

The Red River Basin River Watch program, which is administered through the International Water Institute, is entering their 22<sup>nd</sup> year of Watershed Education providing watershed and river basin awareness; and

WHEREAS:

River Watch continues to involve 28 to 32 schools per year, and has included over 4,000 students in the Red River of the North Basin throughout the years; and

WHEREAS:

River Watch involves students in a variety of unique and innovative watershed engagement opportunities suited to their school, community, and watershed needs; and

WHEREAS:

Support from the Red River Watershed Management Board, local Watershed Districts, and regional partners across the Red River of the North Basin has helped establish a unique program, training students in monitoring physical, and chemical, and hydrologic conditions of local rivers and watersheds; and

WHEREAS:

The scientific data gathered by River Watch Students are used by state agencies to assess the state's surface waters and used by the National Weather Service to better predict and forecast flooding in the Red River basin; and

WHEREAS:

The River Watch program will continue to be a significant contributor in the goal of improving the water resources in the Red River basin into the future.

NOW, THEREFORE, I, MARK DAYTON, Governor of Minnesota, do hereby proclaim the week of March 12-18, 2017, as:

## RIVER WATCH WEEK

in the State of Minnesota.



IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Minnesota to be affixed at the State Capitol this 10<sup>th</sup> day of March.

  
GOVERNOR

  
SECRETARY OF STATE



## River Watch Teacher Survey 2017

### 1. Is River Watch an extracurricular activity or part of your course curriculum at your school?

#### Please Explain.

- ✓ Depends. This year, I had an hour in my day to teach EnviSci/River Watch. Next year is like last year (15-16). This is no spot and so it will be extracurricular.
- ✓ It has become an extracurricular activity this year. This allows participation on a voluntary basis and brings students from multiple grade levels.
- ✓ It is considered extracurricular. 6 juniors/seniors to be a part of it.
- ✓ Kind of extracurricular, teacher's own time without pay. Kids fit it in with other activities.
- ✓ Course curriculum .25 credit. Kids spend so much time out of school/missing classes they deserve part of a credit for it.
- ✓ Extracurricular, there is no room in our class schedule to place it as a course. Easier to be selective on who can be in it.
- ✓ Part of course curriculum, we integrate RW into our science program.
- ✓ Course work.
- ✓ Extracurricular the students have to fill out a questionnaire and then are chosen to be in the program.
- ✓ Extracurricular. I have students from grades 9-12 apply for participation. However, I certainly use the knowledge I gain from RW while teaching classes such as Earth Science.
- ✓ Curriculum. The program was set up prior to me becoming the new science teacher. I have considered extracurricular but worry about the time it would take outside of school.
- ✓ Extracurricular.
- ✓ Extracurricular, 9 – 12 grade. However, I use my experience with RW in 8<sup>th</sup> grade earth science.
- ✓ Extracurricular students must write an essay to be on the team. We meet after school as needed.
- ✓ Both, extracurricular in the fall and part of EnviSci class in spring.
- ✓ This coming year will be the first at our school. It will be an extracurricular activity first, but could transition into my course curriculum.
- ✓ Extracurricular.
- ✓ Extracurricular activity that I try to gear toward students who are interested in majoring in some area of science.
- ✓ Both, semester I and II for credit.
- ✓ Started as EnviSci elective but now extracurricular after class ended.
- ✓ Extracurricular.
- ✓ Both, they sign up as an extracurricular with limited space. We do meet during school hours (home room). I am not sure if they get credits.
- ✓ Planning on it being part of EnviSci for next year, but would also have it available to other students. That might be interesting.

**2. Please provide any suggestions related to IWI's watershed education program. For example, what needs do you have as a participant, are there any products (curriculum, guidance manual, etc.) that may be developed to better serve you.**

- ✓ I would like to be able to do the other programs/studies such as snow study/macros for example.
- ✓ A web page with refreshers on snow studies/measurements would be useful or a possible blog.
- ✓ It would be useful to have a guidance manual for the equipment we use.
- ✓ IWI is able to help us with what we need, I appreciate the greater flexibility in the past few years.
- ✓ Curriculum would be good. Help us find ways to get this info out the greater community.
- ✓ I have been very satisfied with education program thus far.
- ✓ We miss Wayne.
- ✓ A guidance manual with all the procedures for calibrations, data collection, ect. For everyone to go by.
- ✓ I would find some power points or even just pictures that teachers could implement into curriculum very useful. I often see excellent pictures at forum/trainings and wish I had those photos to show students.
- ✓ I think curriculum would be great. Being thrown into such new territory as a first year teacher is difficult. Even in my second year I still struggle to make a complete class out of it just because of my lack of knowledge and experience.
- ✓ If it could be part of the curriculum we would get better participation. Kids I have are involved in everything.
- ✓ I wish I could integrate all aspects of RW (RODs, Macros, Snow Study, Monitoring, etc) into an elective class for 10 – 12 grade.
- ✓ My school's watershed has limited info and it is always challenging to find answers to a lot of the questions for posters.
- ✓ Perhaps yearly hands-on training on how to sample in the early fall.
- ✓ In my situation it would be nice to have some sort of curriculum to have or guide my team. It would help in maybe making points of emphasis when we are conducting sampling, kayaking, or working on the forum project.
- ✓ I would like to learn more about macro sampling and then add that to my EnviSci class curriculum.
- ✓ Major and minor areas of education concept implies. Support and guidance on chemicals in water. Descriptions of dioxins, mercury, etc...
- ✓ Perhaps more along the lines of today's student activities – connections to careers other than water quality/resource management areas. There are a lot of related areas.
- ✓ Is there information on the IWI site for high school education? Ex: Lake Agassiz, river geomorphology that is accessible?
- ✓ Keep up the good work. RW Staff very supportive.
- ✓ I would like any and all kinds of guidance.

**3. Do you have any suggestions for the 2017-18 River Watch Forum assignment and assessment?**

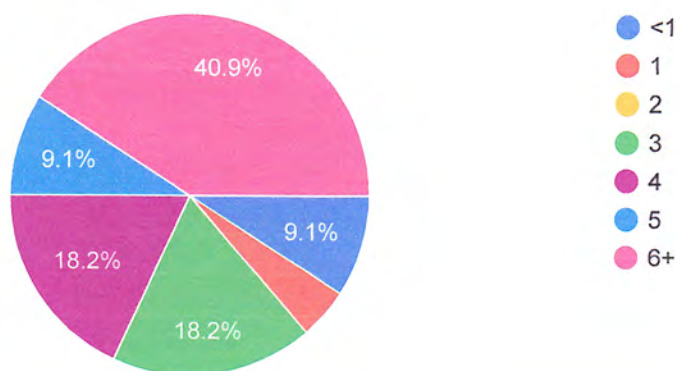
- ✓ Clarity on judging. (Video and poster together or just video or video must include poster).
- ✓ Assessing the health of our subwatershed.
- ✓ I liked the video production this year. I would suggest we make a video again next year.
- ✓ Videos allowed for more standardized assessment, much more relaxed forum day. Suggestions River of dreams with younger grades. 1. I liked this year's assignment very much, elementary teachers struggle with science content and it allowed us to help out. 2. Quick overview of water laws? Clean Water Act? And implementation in watershed. 3. Watersheds teaching us lessons on things in watersheds like; what do they do? How boards work? Studies that are going on?
- ✓ What is unique about your local river? Make it a part of a presentation to a local elementary school. And help us find was to get this info out to the greater community.
- ✓ Effect of farming practices on our watersheds. How have our watersheds changed (geographically) over time. What is the history of your watershed (Mill use, Fur Trade, Local economy)?
- ✓ Go back to the presentation format.
- ✓ Just for FYI. Larimore is going to buy 8-10 pairs of waders that schools can use in our area. They just need to call. We are going into Scheels & Cabelas this spring to ask for discounts.
- ✓ A bit random perhaps... Could students use cheap and easy to program electronics (ie arduino) to learn how to build a monitoring station. This would give a better grasp of the technical aspects of the sonde. There are many guides on the internet that are easy to follow that show how to do this, and it is not very expensive. Obviously these would not be as precise, that would not be the goal. The goal would be an understanding of the technology. Not sure this is a good fit for all schools.
- ✓ I enjoyed working with the younger kids. We try to incorporate that into class anyway. So it was nice that it was the assignment. The video was fun, but took a lot of class time.
- ✓ I think it is valuable information we gather for the watershed. I not a big fan of having to make the poster.
- ✓ I really like the idea of students becoming familiar with the history of their area. All aspects. How has the past shaped the present and how may your present impact your future? Floods and droughts historic.
- ✓ I like the video and lesson plan for 5<sup>th</sup> graders this year. My students remained much more engaged and excited about the project. It would be nice to get the assignment earlier if we are working with younger students because we would have more options for outdoor activities.
- ✓ Really liked the video aspect. Also liked that not too much background knowledge was needed.
- ✓ I really enjoyed the last 2 RW forum assignments. Making them hands-on and less abstract are vital in member engagement. It is nice to have the rubric, but also flexibility. I still would like to see some kind of presentation at the forum given by the students. You simply can't beat putting "live" pressure to perform and it would give each RW team a "voice" at the forum.
- ✓ No you do a fantastic job with that. I will say that I am torn about whether or not I like creating the video or giving the presentation more. I thought the kids enjoyed making the video and it was certainly easier for me and them. I like the challenge of having the students present their poster thought. I thought they missed out on that opportunity this year.
- ✓ How do you know a River is Healthy? Is your watershed/river healthy?

- ✓ Economic impact of water resources on the subwatershed area. Arts connecting photo/drawing – painting/music. Kayak/canoe races.
- ✓ I liked the poster/video combo this year.
- ✓ I liked the video/poster format.



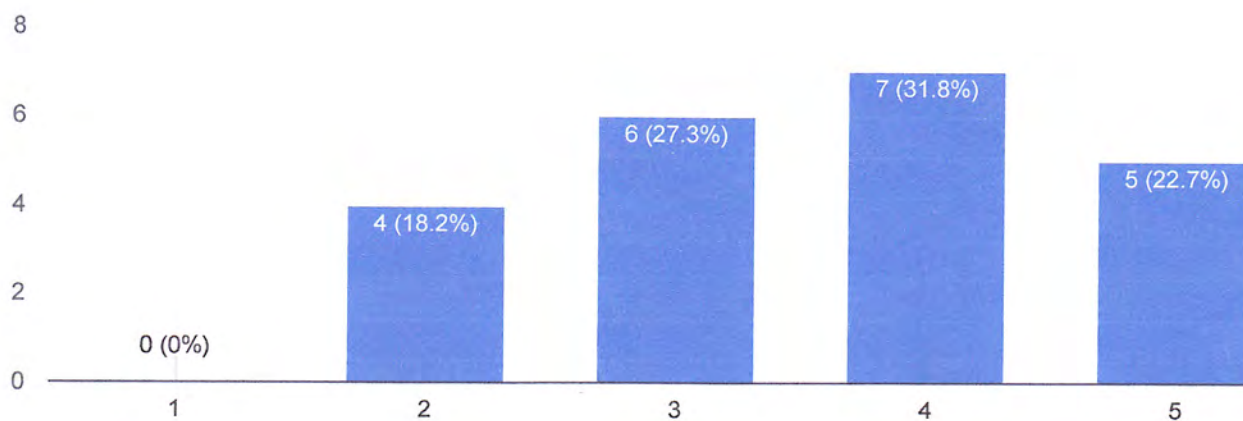
## How many years of River Watch experience do you have?

22 responses



## How does the River Watch program offerings help meet your educational teaching requirements?

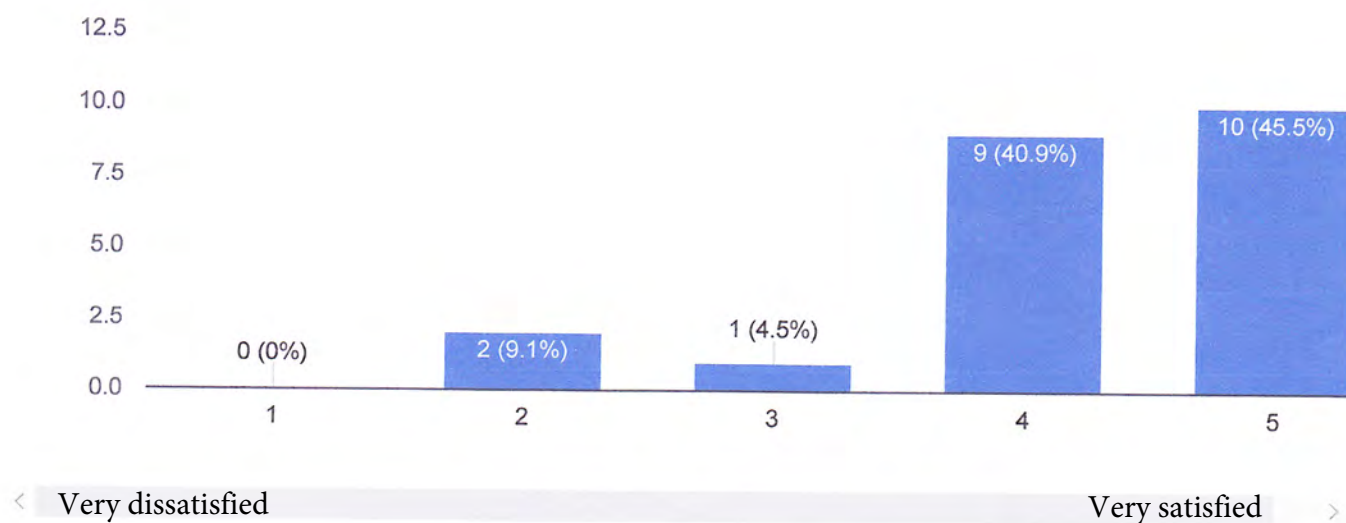
22 responses



< Not at all Exceeds >

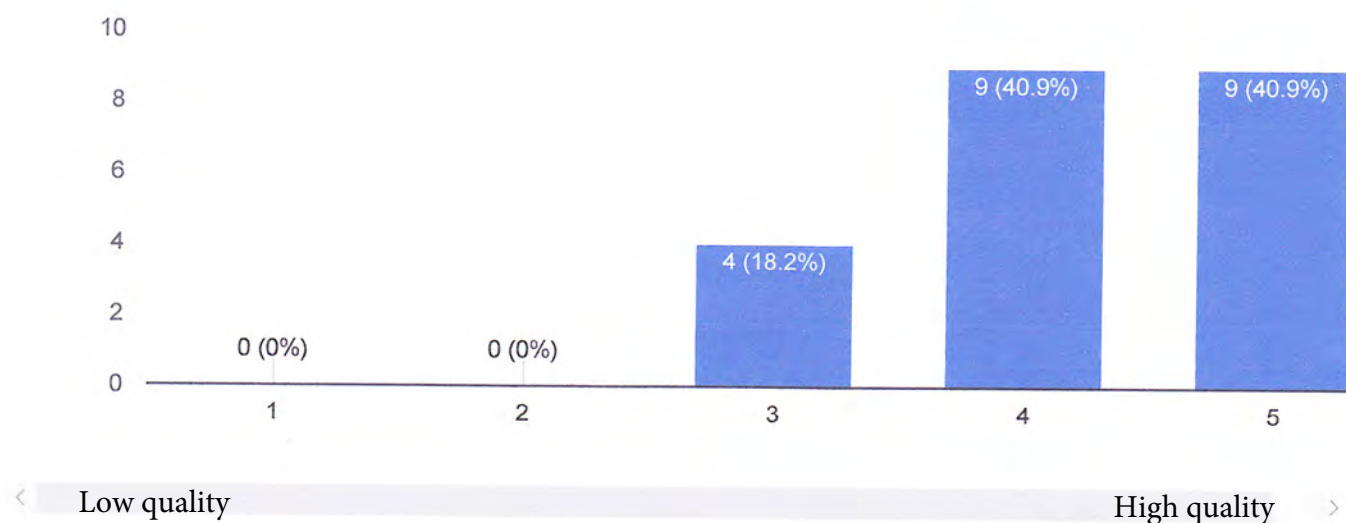
## Overall, how satisfied or dissatisfied are you with the River Watch program offerings?

22 responses



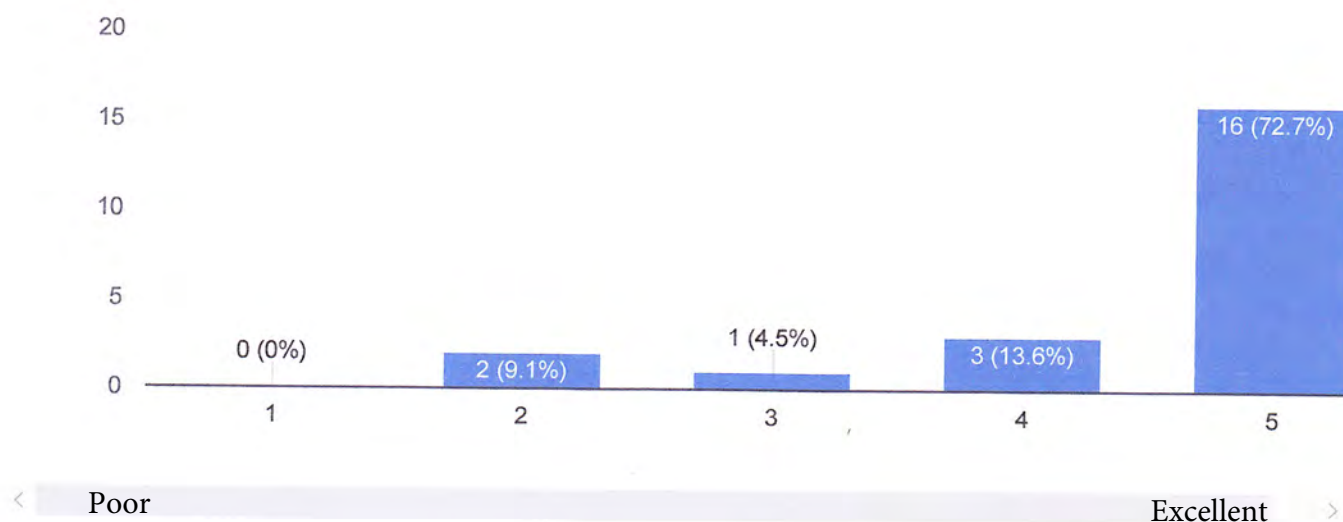
## Please rate the quality of the watershed science activities offered by River Watch?

22 responses



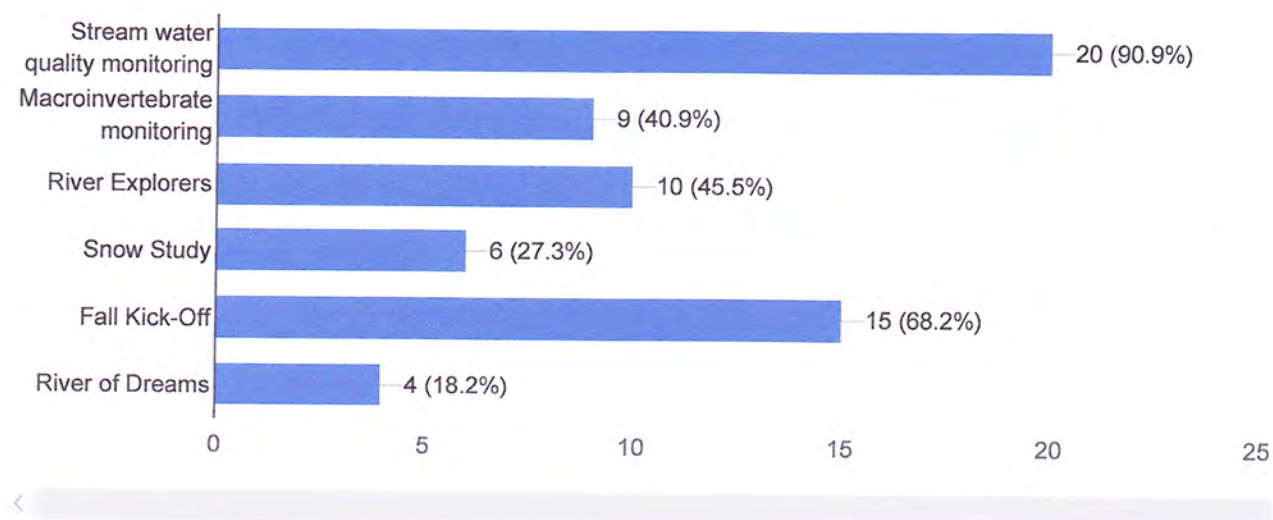
## Please rate the staff that assist you with your River Watch activities?

22 responses



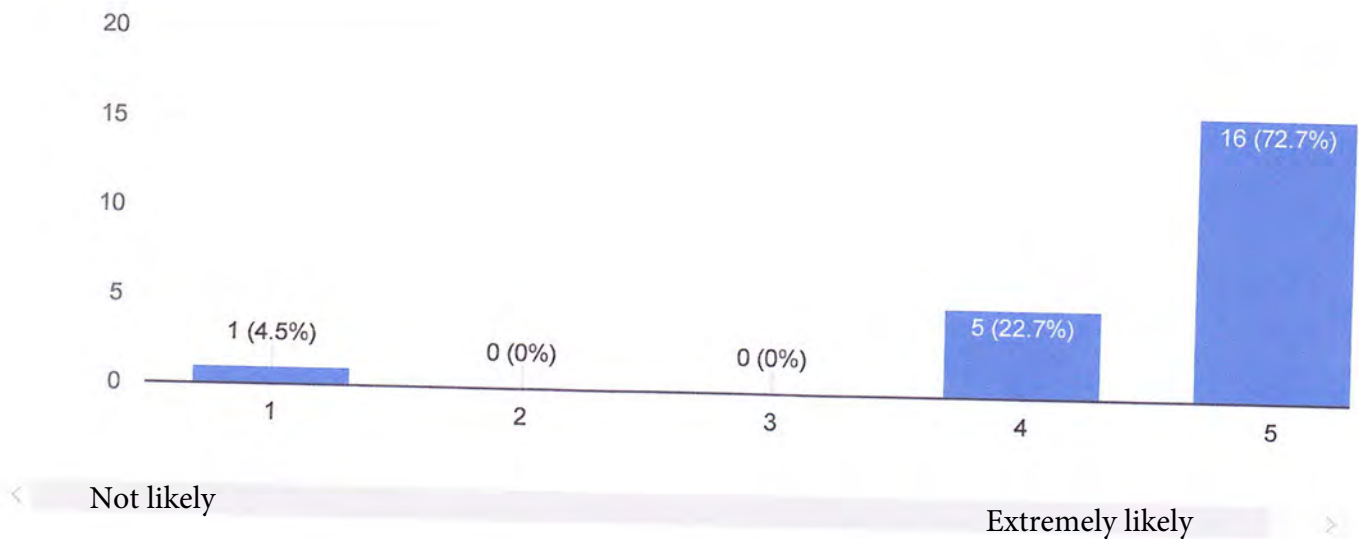
## In 2017, which of the following River Watch program offerings have you participated in? (check all that apply)

22 responses



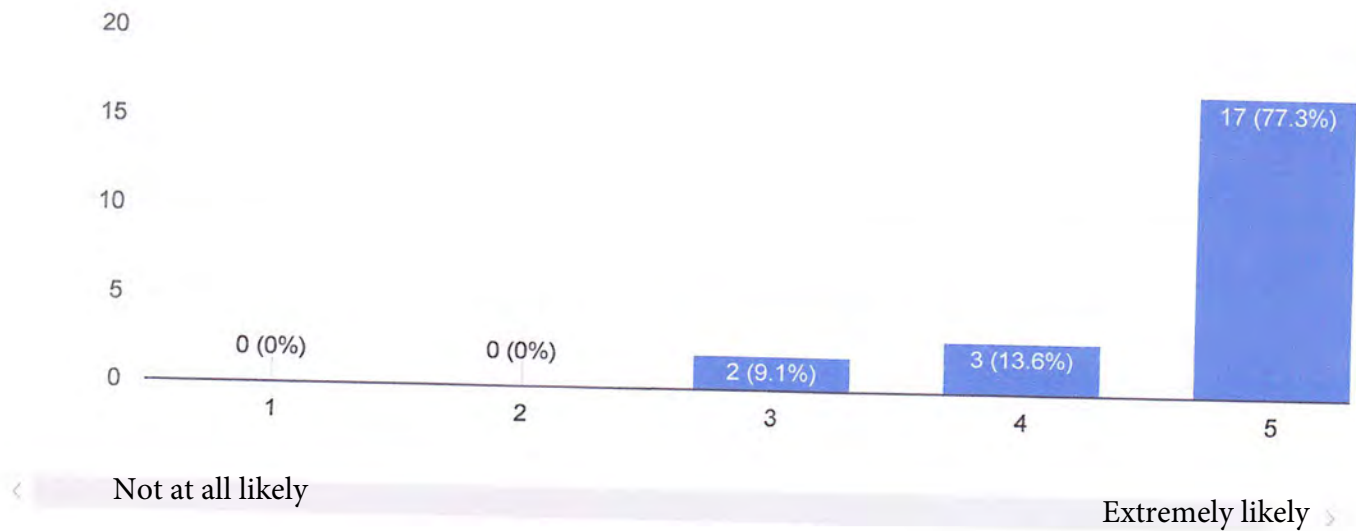
### How likely are you to continue utilizing the River Watch programs?

22 responses



### How likely is it that you would recommend River Watch to a colleague or neighboring school?

22 responses





## Which do you prefer as a requirement for the River Watch Forum assignment?

22 responses

