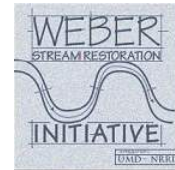


## Weber Stream Restoration Initiative Progress Report, July 2008



### Background

In 2005 Mr. Ron Weber provided a gift to the University of Minnesota Duluth's (UMD) Natural Resources Research Institute (NRRI) to fund activities to improve the water quality of Lake Superior tributary streams. The Weber Stream Restoration Initiative (WSRI) is dedicated to implement best management plans, provide information on stream conditions to resource managers and the public, and to evaluate policies and opportunities that lessen the impact of human development within North Shore watersheds. *The goal of the Weber Stream Restoration Initiative is to enhance habitats and biodiversity in Lake Superior tributary streams by protecting and restoring watersheds along Minnesota's North Shore.*

Since its inception the Weber Stream Restoration Initiative has been guided by the principle that protection and restoration of North Shore streams will only be successful if both the root causes of damage, as well as the symptoms of disturbance are addressed. Therefore, one of the driving forces behind the Weber Initiative has been the **North Shore stream consortium**, which has successfully engaged a variety of professional resource managers, academic scientists, and the public in cross-disciplinary communication about ongoing activities in North Shore watersheds. This collaboration has raised awareness of specific disturbances and is charged with developing long-term solutions for restoring the habitat and biodiversity of Lake Superior tributary streams. To that end, projects have been initiated to:

- implement solutions to specific disturbances in the Lester-Amity and other North Shore watersheds, and evaluate the effectiveness of individual practices,
- develop a comprehensive database of past studies of North Shore streams to provide historic context and reduce duplication of effort,
- collect new data to fill knowledge gaps, and
- engage the public in a campaign to communicate links between human activities and water quality impacts.

### Summary of Current Projects

Externally funded grants (>\$700K) support the following activities (projected end date):

- assessment of home owner storm water runoff reduction practices (June 2011)
- education and outreach activities via lakesuperior.org website (ongoing)
- community planning and zoning: comparing visions of the future under different water resource protection regimes –(December 2008)
- Duluth and North Shore Superior trout stream real-time monitoring (July 2009)
- Superior trout stream water quality, habitat, and invertebrate monitoring for State impairment assessment (July 2009)
- predicting the impacts of development on Lake Superior North Shore streams using high resolution GIS spatial data (June 2009)
- evaluating road construction practices (September 2008)
- Amity Creek bank stabilization – awaiting preliminary engineering survey and securing permits (ongoing and monitoring has begun)
- Graves Road Creek retrofit and bank stabilization - awaiting budgetary approval from City of Duluth (monitoring has begun)

## **2008 Weber Stream Restoration Initiative Activities at a Glance**

The long-term success of the Weber Initiative is notably linked to further developing the stream consortium composed of local units of government, resource management agencies, citizens, and academic scientists involved in the study and management of aquatic resources in the region. The cumulative resources and knowledge provided by these organizations are essential for identifying impairments and evaluating potential management options, prioritizing and implementing management actions, securing funds, and evaluating the success of each project. The Weber Initiative has been instrumental in pursuing funding requests and supporting partner organizations in their areas of expertise. As of July 2008, eight awards totaling more than \$700K have been received, a majority of which are currently underway.

Weber Initiative accomplishments go beyond securing outside resources made possible by leveraging the endowment dollars and in-kind support. NRRI scientist's involvement in local water boards and technical committees as Weber Initiative representatives reflect our goal of working on water quality issues over a broad scale. The willingness of local organizations to partner on projects, reflected by the more than 60 letters of support that have accompanied the 21 proposal submissions since 2005, is a testament to our continued dedication of improving North Shore stream conditions.

Achieving and sustaining water quality improvements in North Shore streams will be accomplished by taking a systematic, watershed-scale approach that first addresses the fundamental causes of damage, then implements site-specific restoration and mitigation strategies in a watershed context. This approach is recommended by the National River Restoration Science Synthesis<sup>1,2</sup>. Providing local units of government and the public with information and alternative management tools will help protect small tributaries and streams that flow into Lake Superior. A summary of current and past projects is provided below.

### **Restoration**

*Amity Creek bank stabilization* - Eroding banks on the East Branch Amity Creek within the Duluth city limits were identified based on initial surveys by NRRI scientists. South St. Louis Soil & Water Conservation District, a member of the North Shore Stream Consortium, is leading an effort to mitigate the eroding bank. Multiple agencies are providing in-kind support to approach the problem and reduce soil erosion. Project plans, surveys, and permits are underway. Engineering plans must be completed and the appropriate permits must be approved before construction can commence. This project was personally initiated by Mr. Weber. Project estimates for materials alone exceed \$25K. NRRI secured funding to generate baseline water quality, sediment load, and biological monitoring data at the site to assess project results and cost-effectiveness.



*Graves Road Creek restoration* – Just upstream from the WSRI automated water quality sensors on lower Amity Creek, a small tributary has discharged a muddy plume during rainstorms and snowmelt runoff for decades since Graves Road was destroyed and abandoned after a flood. Another consortium partner, the city of Duluth, has scheduled a three-phase restoration project on the tributary including new culverts, flow rerouting, bank



slope reductions, and sediment stabilization. Survey and design elements are being outlined by city engineers, with construction and implementation awaiting appropriation by city of Duluth utilities operations.

*Monitoring effectiveness of best management plans (BMPs)* - NRRI received a monitoring grant award in 2007 from the Environmental Protection Agency and Minnesota Pollution Control Agency to evaluate the biological and water quality

improvements following implementation of restoration actions at the sites described above. A second objective of that project is to evaluate the effectiveness of a sediment trap installed on Miller Creek in 2004 behind the Miller Hill Mall.

### Citizen Action

*Lakeside residential runoff* - Two neighborhoods that drain into the Graves Road tributary offer another potential solution to the Amity Creek turbidity problem. NRRI and the Duluth stormwater utility recently began working on a residential BMP designed to reduce storm water runoff to Amity Creek via storm sewers that empty into the Graves Road tributary. A paired neighborhood project is being conducted in which one neighborhood will make no changes to their properties, while residents in the other will be offered incentives to implement BMPs that reduce storm water runoff. Monitoring equipment has been installed to measure the reduction in storm water flow, and any differences in the temperature and turbidity (muddiness) of water in the storm sewers of the two neighborhoods. The results will be showcased via multiple outlets and made available to the general public and businesses via the website [www.lakesuperiorstreams.org](http://www.lakesuperiorstreams.org) (LLS). Initial contact with neighborhood residents indicates a willingness to participate in the program.



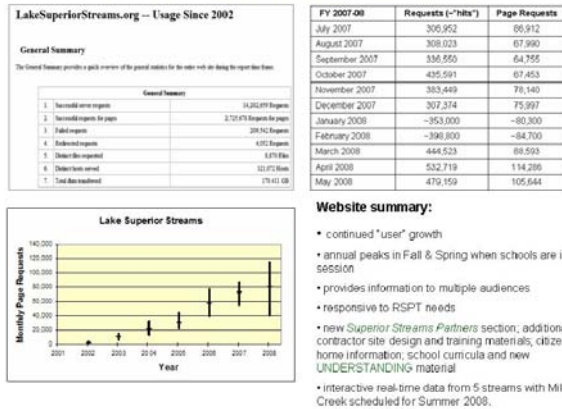
### Public Access to Information and Educational Materials



The [lakesuperiorstreams.org](http://lakesuperiorstreams.org) website continues to be a primary outlet for current data and educational information regarding Lake Superior tributaries, stormwater information, and water pollution in general. With support from the city of Duluth, NRRI, Sea Grant, Minnesota's Lake Superior Coastal Program, and WSRI, the website continues to grow and is heavily used by regional stormwater managers and educators (dozens of regional high school and middle school teachers use the website for their environmental units).

Spring 2008 use exceeded 500,000 requests per month and the 20-25% bumps in use each spring and fall suggest heavy use by students and teachers. The use of real-time stream water quality data provides a better understanding of how landuse changes and potentially, restoration efforts, affect stream water quality and habitat.

The LSS website has received multiple regional, state, and national awards for its science-based, creative linking of environmental education to real-time data to inform citizens, teachers, students, contractors, development interests, agencies, and scientists about the connections between land activities and the condition of surface waters. Most recently it received the 2007 Environmental Stewardship Award in the Community/Organization category for the United States from the Lake Superior Binational Forum and was a finalist (with the Superior Regional Stormwater Protection team) for the Minnesota Environmental Initiative 2007 Education Award. It strives to emphasize the positive personal actions that can reduce nonpoint source pollution. New innovative elements involve applying our data visualization utilities to agency bacteria and temperature data and developing novel interactive web utilities for citizen and school monitoring.



News for residents of the Lester-Amity rivers watershed



**Spring 2008**

In this issue:

- Can you make a difference for cleaner streams?
- Beyond rain barrels
- Lessons learned from Miller Creek
- Bank stabilization project

[Download](#) (4 page pdf file, 370 KB)

*Stream-Line news* – This newsletter was created to connect watershed residents to the condition of the Lester River and Amity Creek and to efforts underway to restore the streams. The color newsletter is published twice a year (issue 4 is now being developed) by NRRI with help from many Consortium partners. Stories feature projects and ways for the general public to help reduce degradation of the streams. Although Lester-Amity is the focus, stories involve the many related efforts occurring in other Lake Superior watersheds. It is mailed to over 2,000 watershed residents and consortium partners, and is downloadable from the

website at [www.duluthstreams.org/weber/StreamLine.html](http://www.duluthstreams.org/weber/StreamLine.html).

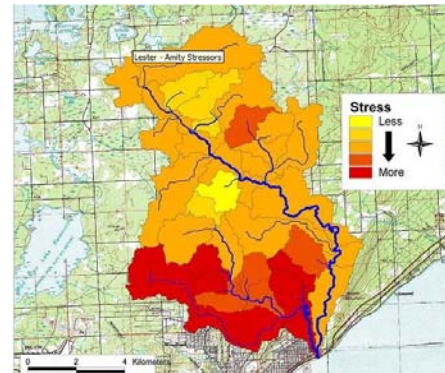
**Infrastructure Improvements**

*Roadway ditches* - Roadways are engineered to efficiently remove storm water from the surface into the adjacent ditch. Unfortunately, large volumes of water are concentrated in ditches, and often overflow directly into small tributaries and streams. These receiving systems are experiencing water quality problems and erosion due to increased peak flows. To compound the problem, current construction standards are incompatible with the North Shore's unique geology; therefore specifications tailored to North Shore watersheds are needed. NRRI recently received a small award to facilitate a working group to assess ditch problems in the region, establish a plan to showcase alternative ditch construction design and alternative maintenance procedures, and to generate the information necessary to submit a request to fund a ditch workshop. The work group met this spring and is currently compiling a list of problem areas while also generating topics for the workshop program.

*Protecting the headwaters* – NRRI is finalizing work on the Community Futures project which uses GIS maps to demonstrate methods for protecting important aquatic resources. Using the Lester-Amity watershed, Lakewood Township, and the town of Two Harbors as examples, the effects of projected community development over the next 50 years are being assessed. A mapping program will depict the consequences of current zoning regulations on the condition of aquatic resources, versus a zoning technique with the same amount of development but using a process that includes protective measures and practices that lessen the impact on streams. Once completed, the two scenarios will be presented to local planning agencies and officials to help them make decisions on long-term watershed protection.

### Watershed Impacts

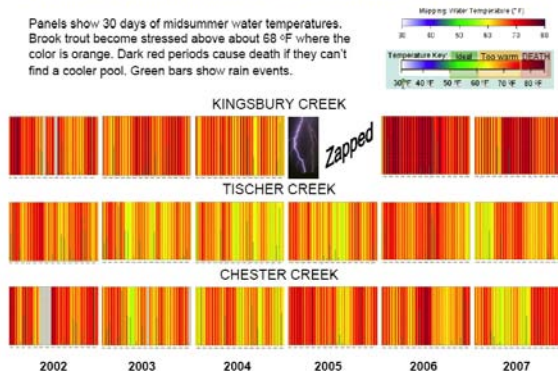
*Landscape scale* - NRRI received two awards designed to improve understanding of a process to remotely identify problematic areas along stream corridors, which will help define the appropriate specifications for data collections, including the amount of detail and the minimum size of the objects being mapped. Statistical models will be developed to predict how human activities in the watershed influence the water quality and biology of North Shore streams. Newly derived methods for characterizing the proximity of watershed activities relative to sampling location in the stream will be compared to the more commonly used models that do not incorporate exact location of human activities. Since activities that occur adjacent to the stream are likely to have a greater impact than those occurring farther away, improvements could be made in deciding where and what type of activities should occur in the watershed. A second field season is underway with UMD students and staff evaluating the effects of development on stream temperature, ecosystem metabolism, water quality, and estimates of primary (algae) and secondary (bugs) production in North Shore streams.



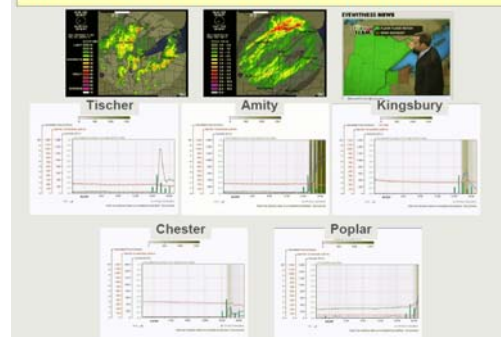
### Stream Monitoring

As North Shore watersheds increasingly experience human development impacts, baseline information describing a stream's health is essential for managers and stakeholders to make informed decisions. Urban streams are not only faced with landscape manipulations and habitat destruction, but also receive harmful chemicals, which can have a profound impact on stream conditions. One of the first projects related to Weber Initiative activities

**A Tale of 3 Duluth, Minnesota Lake Superior Trout Streams**



**Rain on snow 2007: Which creeks are Impaired?**



was an effort to provide real-time data to estimate temperature and the sediment, nutrient, and mercury concentrations in North Shore streams and their loads to Lake Superior. Relationships were developed between flow, sediment, nutrient, and mercury concentrations and loads for three urban (Duluth) and two North Shore streams (Amity and Poplar). The results have also shown the need for such automated in-stream sensors to capture short-term/"flashy" events and for multiple years of monitoring for multiple streams because of high variability among streams and large year-to-year weather differences.

Data quality and quantity are important factors when questions are raised concerning the condition or health of a water body. NRRI is involved in:

- filling data gaps for determining the condition of more than 20 North Shore streams from Duluth to north of Grand Marais. Sampling includes water quality, biological communities, pathogen indicator bacteria, and habitat information via grant from the MPCA Surface Water Assessment Program;
- contributing to the state's total maximum daily load (TMDL) process on several impaired streams by assessing invertebrate (bug) communities and fish habitat for the sediment impaired Poplar River and Knife River, and recently completing field sampling for temperature impairments at five Miller Creek locations in Duluth.

## References

- <sup>1</sup> National River Restoration Science Synthesis (NRRSS). *River Restoration in our Nation: A Scientific Synthesis to Inform Policy, Grassroots Actions, and Future Research*. <http://nrrss.nbio.gov/>
- <sup>2</sup> Bernhardt, E. S., M. A. Palmer, J. D. Allan, G. Alexander, K. Barnas, S. Brooks, J. Carr, S. Clayton, C. Dahm, J. Follstad-Shah, D. Galat, S. Gloss, P. Goodwin, D. Hart, B. Hassett, R. Jenkinson, S. Katz, G. M. Kondolf, P. S. Lake, R. Lave, J. L. Meyer, T. K. O'Donnell, L. Pagano, B. Powell, and E. Sudduth. Synthesizing U.S. River Restoration Efforts. 2005. *Science*: Vol. 308. no. 5722, pp. 636 – 637 (29 April 2005).

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