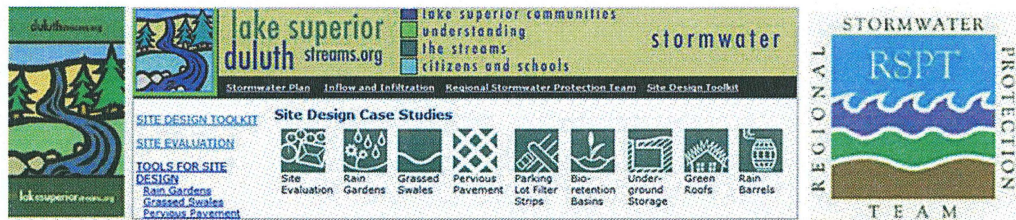


Conservation Design Toolkit for Lake SuperiorStreams.org

Stormwater Pollution Prevention Pilot Project



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NRRI Technical Report
NRRI/TR-2006/19

Primary funding: Minnesota Pollution Control Agency
Pollution Prevention Program

Secondary funding: Minnesota's Lake Superior Coastal Program
Minnesota Department of Natural Resources

In-kind match: Natural Resources Research Institute, University of Minnesota-Duluth
Minnesota Sea Grant, University of Minnesota-Duluth
South St. Louis Soil & Water Conservation District
Minnesota Pollution Control Agency – Duluth Office
Facilities Management, University of Minnesota-Duluth
Minnesota Department of Transportation – Duluth Office

I. Background:

Duluth, Minnesota has 43 named streams, 12 trout streams, and borders both pristine Lake Superior and the Duluth-Superior-Harbor Area of Concern. Duluth's storm water infrastructure includes 93 miles of streams and wetlands, and urbanization and rural development impact these waters by increasing runoff and velocity, temperature, turbidity and sediment, road salt, organic matter and nutrients. In 2002, an EPA (Environmental Monitoring for Public Access & Community Tracking) grant established a Partnership called *DuluthStreams* between the City of Duluth, University of Minnesota-Duluth professionals at the Natural Resources Research Institute and Sea Grant Program, and the Minnesota Pollution Control Agency and Western Lake Superior Sanitary District. Their goal was to enhance public understanding of streams and their connections to watershed land use by using real-time data and interpretive materials to illustrate the nature and consequences of degraded stormwater and its real costs to society.

This has included issues associated with too much runoff such as flooding, with a key issue in the region being sanitary sewer overflows from infiltration and inflow (I&I). These events have imposed risks to public health and environmental risks to the coastal zone of Lake Superior and the Duluth-Superior Harbor, and required costly programs to reduce stormwater flows from key neighborhoods and construct storage tanks for temporary storage of stormwater enhanced sanitary sewer flows. The consequences of excess water and peak flows have also included excess sediment and turbidity, and potentially excess nutrients and pathogens. High salt concentrations for significant periods in late winter and early spring runoff from winter road and parking lot de-icing can present additional stress to trout and their prey. Increasing impervious surface and direct and indirect removal of riparian vegetation increases peak temperatures, especially during base flow periods creating additional periods of stress to cold water species with the additional potential stress of lowered dissolved oxygen.

In 2003, sixteen governments and groups in the North Shore Region joined to form the Regional Stormwater Protection Team (RSPT). The Team's mission is to protect and enhance the region's shared water resources through stormwater pollution prevention by providing coordinated educational programs and technical assistance. One of the vehicles that the RSPT has harnessed for its stormwater education campaign is the *DuluthStreams* website as part of a regional effort to provide water pollution information to the public. The project has now expanded to now include 22 communities, agencies and organizations. In 2005 the website was re-named *lakesuperiorstreams.org* to reflect the broader geographic region that it represents in terms of climate, soils, quality of life, natural resources, the Lake Superior watershed, and culture. The website now averages more than 300,000 "hits"/month and >75,000 "page requests"/mo with a national target audience that includes: the general public; students and teachers; contractors, consultants and developers; decision makers; and agencies (local, state, and federal). Additional information is best found by examining <http://lakesuperiorstreams.org>.

II. Goals & Objectives

In May 2004 the Minnesota Pollution Control Agency (MPCA) provided grant funding to

the *DuluthStreams.org* (now *LakeSuperiorStreams.org*) project from its EPA Pollution Prevention Program (P²) Grant with the following *Pilot Project Goals*:

- To create an internet-based “toolkit” for developers and local governments that provides information and resources on environmentally sustainable development approaches and best management practices.
- To build awareness and understanding within the development/construction community of practical strategies and techniques for design and implementation of alternative stormwater management systems, “low-impact development” site design options (e.g. clustered development), centralized and decentralized wastewater treatment system options, and alternatives to impervious pavement.
- To initiate outreach around the toolkit to the development/construction community and build capacity within the assistance provider network to promote the toolkit’s resources and increase adoption rates of these practices.

This Conservation Design Toolkit would expand these ongoing regional stormwater education efforts in the Duluth-Superior and North Shore Lake Superior region by developing a comprehensive set of internet-based tools and resources for promoting environmentally sensitive, conservation design approaches to development and construction projects. NRRI was to serve as the technical lead in developing this toolkit in collaboration with MPCA staff, Minnesota Sea Grant staff/Northland NEMO and related activities, and the Regional Stormwater Management Team. The toolkit was to be specifically tailored for industries, governmental entities, and individuals engaged in development and construction activities and/or oversight and its target audiences would include:

- Private Developers/Builders/Contractors
- Designers/Architects/Landscape Architects/Planners/Engineers
- Local units of government, with an emphasis on new MS4 permittees
- Homeowners/Homebuyers/Realtors

Supplemental funding was granted in May 2005 to further the development of the Toolkit including an evaluation component. Key elements of the work plan were to:

- adapt new guidance materials developed by the Northland NEMO team and incorporate them into the web site, including sample ordinances for local communities to help them develop natural resource inventories and review concept designs and site plans.
- adapt new Minnesota Sea Grant materials, developed for the highly successful *View from the Lake* (VFTL; <http://www.seagrants.umn.edu/vfl/>) educational cruises on western Lake Superior, to add to the *LakeSuperiorStreams* website. The audience for VFTL is local officials, teachers, residents, and tourists and the goal is to improve their understanding of the land use – water quality relationship.
- establish a section that would house descriptions of BMP performance data and evaluations of BMP effectiveness in the western Lake Superior Region from

University of Minnesota – Twin Cities studies funded via an LCMR grant to the MPCA.

- evaluate the effectiveness of the toolkit and other educational materials on the *LakeSuperiorStreams.org* website.

The accomplishment of these goals and objectives depended on contemporaneous funding from Minnesota's lake Superior Coastal Program (MLSCP) administered by the Minnesota DNR via grants to the City of Duluth (subcontracted to NRRI-UMD; MLSCP Project No. 306-12-06 entitled *DuluthStreams.org: Regionalizing Surface Water Education and Outreach*) and in-kind match efforts from several RSPT members as part of the MLSCP; it also depended on grant funding from the MLSCP to the South St. Louis SWCD for developing several Contractor Training workshops (*Contractors/Developers Curriculum and Workshops for Construction Site Stormwater Pollution Control Final Report June 30th, 2005*), and to the U. of Minnesota Sea Grant program for developing the *View from the Lake* series of educational watershed-water quality-habit oriented public education cruises on Lake Superior in 2004, 2005 and 2006. RSPT partners of particular note include:

- the University of Minnesota-Duluth's Stormwater Planning Program (PIs Axler, Schomberg and Hagley are on the Steering Committee)
- the City of Duluth's Stormwater Utility team
- the South St. Louis County Soil & Water Conservation District
- the Minnesota Pollution Control Agency –Duluth Office (J. Dexter)

2. Low impact site design BMPs are described in detail with links to regional and local examples - <http://www.duluthstreams.org/stormwater/toolkit/tools.html>

SITE DESIGN TOOLKIT

SITE EVALUATION

TOOLS FOR SITE DESIGN

- [Rain Gardens](#)
- [Grassed Swales](#)
- [Pervious Pavement](#)
- [Parking Lot Filter Strips](#)
- [Bioretention Basins](#)
- [Underground Storage](#)
- [Green Roofs](#)
- [Rain Barrels](#)

Stormwater: Site Design Toolkit, RSPT, permits...

Focus: Low impact and conservation designs, regional case studies and contractor training

3. A library of local/regional Case Studies, with contact information was developed and installed at <http://www.duluthstreams.org/stormwater/toolkit/casestudies.html>

Case Study: North Shore Community School Rain Garden

North Shore Community School
5926 Ryan Road
Duluth, MN 55804

During the spring of 2005, the NSCS watershed learned about stormwater runoff and its effects on our water. They took a tour around the School, noticed places where there was erosion, puddle water, and pollution from water runoff. They decided to take action, and they came up with the idea of treating runoff from the classroom building and parking lot by building a Rain Garden. A Rain Garden is a flat spot to slow down the flow of water and prevent it from running off into the street.

Case Study: Glensheen Parking Lot

Glensheen Historic Estates
University of Minnesota Duluth
3300 London Road
Duluth, MN 55804

[official website](#) (opens new window)

The Issues:

- Erosion problems along shoreline
- Runoff from parking lot
- Protect integrity of historical property

"Dan (McIelland) recognized the connection between runoff and shoreline protection, and wanted to protect the integrity of this historic property. Dan wanted to clean up the water use native plants, and try out a new approach" -R.C. Boehm, South St. Louis Soil and Water Conservation District Manager

"The Project also prepares us for the future, when the rest of the parking lot is paved. This will make sure that we're cleaning the additional water as well." -Dan McIelland

4. Contractor Training materials were adapted from several RSPT presentations and developed into a Toolkit subsection at <http://www.duluthstreams.org/stormwater/toolkit/contractor/contractor.html>.

This section of the Lake Superior Streams website is currently under construction. It is being designed to provide information relevant to northland region contractors and related businesses, but should also be of interest and use to agency staff, consulting firms and businesses and individuals that are responsible for the actions of hired contractors.

Contractor Erosion and Sediment Control Training

Ten to more than a hundred times the polluting sediment can be washed into our streams and lakes from construction sites that are not properly protected or if their erosion and sediment control measures aren't maintained. This section includes links to current rules, guidelines, and local, regional and state sources of information to specifically help contractors.

- [Erosion Prevention/Erosion Control](#)
- [Stormwater management](#)
- [Permitting Issues](#)
- [Working near Special Waters](#)
- [Maintenance and Inspection](#)
- [Common Compliance Issues](#)
- [Success & Failure Photos](#)
- [Frequently Asked Questions](#)
- [Quiz - Test Your Knowledge](#)
- [Related Contractor Information and Tools](#)

The screenshot shows the website header with navigation links: Stormwater Plan, Inflow and Infiltration, Regional Stormwater Protection Team, and Site Design Toolkit. The main content area is titled 'Success & Failure Photos' and includes a list of 'TOOLS FOR SITE DESIGN' such as Rain Gardens, Grassed Swales, and Silt Barrels. It also features a grid of photos comparing 'Successful' and 'Unsuccessful' construction practices.

This grid contains six images:

- Top-left: 'Successful Construction Practices' showing a site with perimeter control, erosion protection, and a silt trap.
- Top-right: 'Construction Practices to Avoid' showing a site with exposed soil and no erosion control.
- Middle-left: A site with a grassed swale for water management.
- Middle-right: 'Construction Practices to Avoid' showing a site with a steep, eroding bank.
- Bottom-left: 'Sequencing Construction...' showing a site with timely stabilization and BMPs.
- Bottom-right: 'Construction Practices to Avoid' showing a site with a large, uncontrolled sediment discharge.

Plan Inflow and Infiltration Regional Stormwater Protection Team Site Design Toolkit

Frequently Asked Questions

These FAQs were answered using information from the [MPCA](#). Also see the [MN Extension Service FAQs](#).

1. Do I need a permit?
 - o You need an NPDES/SDS permit if you are the owner or operator for any construction activity disturbing:
 - One acre or more of soil.
 - Less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre.
 - Less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources.
 - [Click here](#) for more.
2. How do I close my permit when I finish a project?
 - o A Notice of Termination can be applied for in two cases:
 1. Final stabilization has been achieved on all portions of the site for which you are responsible.
 2. For residential construction only -- You have provided temporary erosion control and down gradient perimeter control, transferred ownership, and distributed the [MPCA Sediment and Erosion Control for New Homeowners fact sheet](#).
3. Where can I get more info?
 - o The [MPCA Construction Stormwater website](#)

This screenshot shows the 'Working near Special Waters' section, which lists 12 trout streams in the Duluth city limits and provides information on how to identify them. It includes photos of these streams and a link to an 'Overview of Special Waters in Northeast Minnesota'.

This block contains several informational items:

- 'Construction Stormwater Permitting Wizard (NW-WI)'
- 'Do you need a Permit? (Wisconsin)'
- 'Stormwater 101 for Builders & Developers' brochure
- 'Common Compliance Problems at Construction Sites' graphic
- South St. Louis logo

5. A Certification exam developed for an RSPT sponsored Contractor Training Erosion and Sediment Control Workshop was installed on the website. An answer sheet was developed with links to detailed information, and where relevant to examples of water quality impacts using the interactive data animation developed for the DuluthStreams project; <http://www.duluthstreams.org/stormwater/toolkit/contractor/quiz/quiz.html>

lake superior duluth streams.org | lake superior communities understanding the streams citizens and schools | **stormwater**

Stormwater Plan | Inflow and Infiltration | Regional Stormwater Protection Team | Site Design Toolkit

SITE DESIGN TOOLKIT

SITE EVALUATION

TOOLS FOR SITE DESIGN

- Rain Gardens
- Grassed Swales
- Permeous Pavement
- Parking Lot Filter Strips
- Bioretention Basins
- Underground Storage
- Green Roofs
- Rain Barrels
- Stream Buffers

APPLICATION

- Single Unit
- Subdivision
- Commercial

POLICY

- Community Planning
- Economic Aspects
- Model Ordinances

CONTRACTOR TRAINING

CASE STUDY INDEX

RESOURCES

Contractor Training

Use this quiz to test your knowledge of Stormwater BMPs.

Correct!
Find out more about [watersheds](#).
Your score is 100%.
OK

1. What is a watershed?

- A. ? All the land right next to a stream or lake
- B. ? All the land areas that drains to a stream or lake
- C. ? Lowland areas surrounding a lake or stream
- D. ? None of the above

2. Nonpoint Source pollutants include:

- A. ? Pathogens, Sediment, and Temperature
- B. ? Sediment, Nutrients, and Groundwater

Correct!
Find out more about [erosion](#).
Your score is 50%.
OK

23. Erosion is the influence of water on the earth's surface.

- A. ? Rain
- B. ? Wind on the surface of the earth
- C. ? Snow melt on the surface of the earth
- D. ? All of the above

24. Factors that influence erosion include:

- A. ? Rainfall/climate

WATER QUALITY IMPACTS

- Bacteria
- Erosion
- Impervious surfaces
- Lawn care
- Motor oil
- Pet waste
- Road salt
- More road salt

Follow a storm through 1
Over 12,000 pounds of mud came past our sensors this storm...

1/3/05

STORMWATER

RSPT

PROTECTION

TEAM

Erosion and Sediment Workshop for Contractors and Developers.

Date: January 14th, 2005
Time: 7:30am-3:30pm
Place: Hermantown Public Safety Building
5111 Maple Grove Road
Hermantown, MN

[Get the details and registration form \(new window\)](#)

Erosion and Sediment Control Workshop for Contractors and Developers (01/20/05)

The SWCD, in partnership with the [Regional Stormwater Protection Team](#), hosted an erosion and sediment control workshop in Hermantown Minnesota. The workshop had 68 attendees, of which 69% were local contractors and engineers. Almost 40% of attendees said this was their first training on construction site erosion/sediment control. Speakers included Jay Michels from the Minnesota Erosion Control Association (MECA), local experts Todd Campbell (MnDOT) and Jim Dexter (MPCA), and John Jerezek (WI DNR) provided some differences for contractors working in Wisconsin.

Presentations (in .pdf format):

- [Land Use and Water Quality](#), Jesse Schomberg, Minnesota Sea Grant
- [Minnesota's Construction Stormwater Program](#), Jay Michels, MECA
- [Tools in the Toolbox](#), Jay Michels, MECA
- [Appendix A Waters](#), Jim Dexter, MPCA
- [Evaluation and feedback](#)
- [Workshop photos](#)
- [Final Test](#)

Energy and Design Conference & Expo (03/15/05) and Association of General Contractors Duluth Safety Day (02/08/05)

Regional Stormwater Protection Team members presented seminars on Construction Stormwater and Erosion and Sediment Control.

Presentations (in .pdf format):

- [Storm Water 101 for Builders and Developers](#)

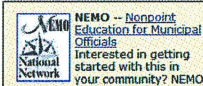
6. Minnesota Sea Grant *View from the Lake* and MN Northland NEMO materials were described and installed on the site

NEMO: <http://www.duluthstreams.org/stormwater/toolkit/policy/planning.html>

Seek out your local government's planning commission or watershed management organization and help to incorporate the following natural resource-based planning methods into your community's planning process.

1. **Inventory** the natural resources
2. **Assess and Prioritize** the natural resource functions and values
3. **Incorporate** the assessment into your community's comprehensive land use plan
4. **Implement** the comprehensive land use plan with tools including education, regulation, and incentives
5. **Review** site plans to evaluate compliance and impacts

While most communities have a comprehensive plan, few take the critical steps outlined above to maintain and protect the important natural resources within their community. Skipping this process fails to set the stage for effective protection of critical habitats, desired open spaces, viewsheds, and recreational opportunities that are vital to maintaining a community's character and quality of life. What are the important resources in your community? Are they identified in your comprehensive plan? Are any protections in place to maintain these resources into the future?



NEMO -- Nonpoint Education for Municipal Officials
Interested in getting started with this in your community? NEMO can provide you and your town with the information and tools you need to make the best decisions possible to protect the resources in your community.

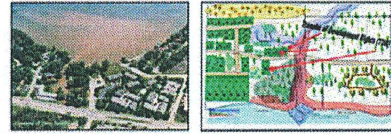
To learn how this program can help your community, contact Northland NEMO for help in setting up a presentation on how land use decisions today can affect your future water quality.



Model Ordinances

Ordinances regulate the range of land uses, including a variety of residential, commercial, and water dependent uses that may or may not be consistent with the community's water quality needs or goals. This section provides examples of stormwater ordinances and related tools to help citizens and municipal officials address their stormwater issues. No single, ideal set of rules can be applied to all communities.

The underlying principle for managing stormwater impacts is to maintain or restore the area's original hydrologic connections.



Legal Basis for Land Use Regulation

Cities and Townships - Minnesota Statutes, Chapter 462
County - Minnesota Statutes, Chapter 394
Counties, cities, and townships, through MN statute, have the right and responsibility to enact, out ordinances in place, and enforce them.

Northland NEMO Model Ordinances prepared for MPCA using the City of Plymouth, MN in the west metro area of Minneapolis - 2004

Implementing the MODEL STORMWATER ORDINANCE To meet your community's water quality goals
2004 Produced for Northland Nonpoint Education for Municipal Officials (NEMO) Program
[Download Here](#)

Incorporating MODEL SUBDIVISION LANGUAGE To meet your community's water quality goals
2004 Produced for Northland Non-point Education for Municipal Officials (NEMO) Program
Ordinance Language addressing:
Street design and impervious surface
Lot layout
Green infrastructure

A community's subdivision ordinance includes provisions outlining when and how the subdividing of lots is allowed. The subdivision ordinance identifies the threshold size where the subdivision regulations are applicable, the information

POLICY
Community Planning
Economic Aspects
Model Ordinances
[CONTRACTOR TRAINING](#)
[CASE STUDY INDEX](#)
[RESOURCES](#)

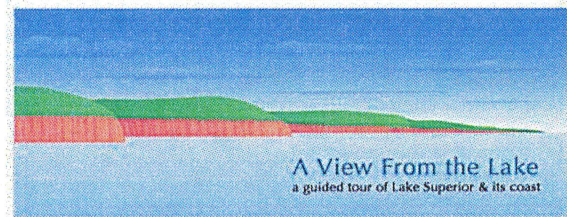
Model Ordinances
Stormwater
Subdivision
Shoreland
Erosion & sediment control
NEMO
Resources

Northland NEMO Brochure
MS Word Doc (2,107 KB)
Northland NEMO Program Summary
PDF (69 KB)

Project NEMO (Nonpoint source pollution Education for Municipal Officials) is a nationally recognized educational program for land use decision makers that addresses the relationship between land use and natural resource protection.
The basic NEMO educational presentation - Linking Land Use to Water Quality - explains the links between land use, water quality, and community character. Beyond the basics, Northland NEMO works with the community through additional presentations, materials, and guidance to help move forward on the two major aspects of natural resource-based planning: planning for areas to be preserved, and planning for developed or developing areas.

Conservation Design Low Impact Development Smart Growth Sustainable Development
[LINKS](#)

Map Symbol	Identification	Meaning	Natural Resource Questions to Ask
	Existing site topography (10 ft vertical intervals). The closer the lines the steeper the slope, the farther the lines the flatter the grade. Calculate the percent slope by taking the change in elevation over a selected distance using the map scale and multiplying by 100.	Shows existing elevation of landscape prior to development. Watershed areas should also be included.	<ol style="list-style-type: none"> 1. How does the water naturally drain through the site? 2. How much runoff can one expect in typical vs. a flood storm event (i.e., 2-year vs. 100-year 24-hour rainfall). 3. Where does erosion occur now and does this impact nearby waterbodies.
	Proposed site topography after development (grading plan). The solid lines are the new contours after grading. The closely marked	Shows permanent landscape changes that will occur with construction.	<ol style="list-style-type: none"> 1. What is the extent of environmental disturbance? 2. What is the extent/amount of fill (where from)? 3. What is the extent/amount of cut (where will it go)?



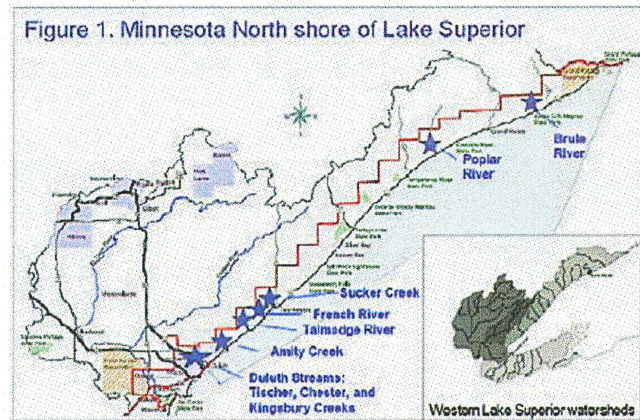
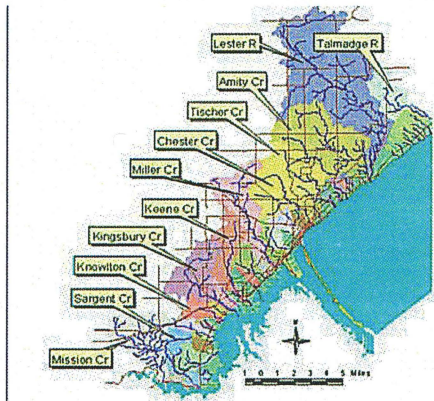
Discover A View From the Lake

Throughout the summer, a series of Lake Superior boat trips will be offered aboard the L.L. Smith, Jr. Research Vessel that will allow residents from Bayfield to Grand Marais to view their community from the water. more...

IV. Progress Assessment results

The following narrative provides brief descriptions of the tasks accomplished as outlined by Objective in the Grant Agreement (MPCA No. A62748/A61895).

Geographic Focus: The project was initiated as a demonstration project for the North Shore/Lake Superior region, with assistance from MPCA's North Shore Team. Future phases of this could be used for other geographic focus areas of the state experiencing increasing development pressures, including the Brainerd/Baxter and Rochester areas, and the Crow River watershed project. Because of the ecological and cultural integrity of the western portion of the Lake Superior Basin, and the inclusion of the City of Superior, WI and staff from the U. of Wisconsin Superior Extension Service in the RSPT Partnership, the project was re-named *LakeSuperiorStreams.org* in 2005. As the project has further expanded to include North Shore community information and comprehensive trout stream sections with intensive, real-time water quality data and GIS/Maps and interactive tools, provisions have been made to incorporate similar information for the Wisconsin South Shore should funding be acquired in the future.



Objective 1: *Solicit input and assistance from an Advisory Group of stakeholders and interest groups with experience in stormwater management and/or the development and construction industry.*

This is an ongoing process. Team members continue to actively participate on technical committees for the RSPT, UMD Stormwater Pollution Prevention Plan (SWPPP) Executive Steering Committee, Project NEMO, and more recently on north shore TMDL related activities for the Amity Creek/Lester River system (<http://www.duluthstreams.org/weber/index.html>) and the Poplar River (under construction at <http://www.duluthstreams.org/northshore/poplar.html>). Therefore, our input regarding what to include has chiefly come from

(1) RSPT meetings (members listed at http://duluthstreams.org/stormwater/rspt_contact.html) and attended regularly (~ 6 times/yr) by the project PIs;

(2) Project NEMO discussions and meetings with SeaGrant staff; and

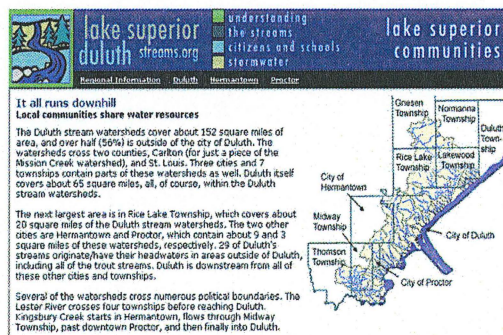
(3) participation in local BMP/Erosion Control, Sediment/Erosion Control, NPDES Stormwater Rules, MPCA-Stormwater Manual and MS4 NPDES Phase II workshops held in June 2004, January 2005, May 2005, January 2006 and March 2006 in Duluth and organized by RSPT partners South St. Louis County SWCD, MN Sea Grant and the City of Duluth. From contacts made and discussions held at these meetings we learned of a number of local projects that were subsequently featured.

MPCA Project Liaison Emily Stern (she left MPCA in December 2005) was also very helpful in sending us solicited and unsolicited informational materials that have been included in the Toolkit section of the website.

Objective 2: Develop and refine an internet-based framework for the Toolkit.

Two major changes to the website were accomplished with help from this grant. First, the site will be re-named *LakeSuperiorStreams.org* in order to regionalize it as described previously. Sections for the original RSPT 2003 MS4 permittees were installed in the **Communities** section which was re-named **Lake Superior Communities**. This, in turn, is now divided into Duluth Area, North Shore, Superior Area, and South Shore sections.

Each of these sections includes additional information and links to local resources such as agencies, rules and regulations, water bodies, reports, etc. However, all will share the data, understanding, public and formal education, and stormwater management sections of *LakeSuperiorStreams* which will continue to evolve. Our intent is that communities may elect to simply link to the comprehensive website or develop websites of their own that link back to ours. For this reason we will also maintain “ownership” of the *duluthstreams.org* URL as well as *superiorstreams.org* and *lakesuperiorstreams.org*.



RSPT membership discussed specific information that they would generate for the sections most relevant to their communities for inclusion on the website. Progress in this area has been much slower than anticipated, largely because of limited time available to members and the lack of pre-existing community websites except in a few cases. There are now considerable materials available regarding water resources relevant to Superior, WI and Hermantown, MN and the latter has actually now created their own stormwater section on their City page (which we link to and have reviewed for them). Most recently we developed an original section for Cloquet, MN (<http://www.duluthstreams.org/communities/cloquet.html>) and included within it a section for the Fond du Lac Band of the Lake Superior Chippewa reservation (<http://www.duluthstreams.org/communities/fondulac.html>). If desired we will include their section within the list of communities and are awaiting their review and response.

The new Site Design Toolkit resides within the main STORMWATER MANAGEMENT section and can be accessed directly from the homepage. Its major subsections are listed below and screen captures of most are inserted in the previous section of this report:

- o **Site Evaluation and Design**
- o **Tools for Conservation Design** (includes 9 design BMPs, with all but Stream Buffers now completed)
- o **Application** (Single Unit, Subdivision, Commercial) – this is a “placeholder” for a section that cannot be completed at this time
- o **Policy** (Community Planning, Economic Aspects, Model Ordinances)
- o **Contractor Training**
- o **Case Study Index** (10 examples have been drafted; the RSPT will continue to photo-document regional projects exemplary of low impact, conservation, and better site designs considered helpful to *Smart Growth* that minimizes stormwater impacts.
- o **Resources** (a reference list, primarily available from the web and from websites least likely to become “deadlinks”). Especially relevant new reports or website sections are advertised in the **WHAT’s NEW** section of the website at the bottom of every page.



Objective 3: *Collect, assemble, and integrate information and resources for the internet-based toolkit:*

This is an ongoing process and was discussed previously in this report with screen captures in the **Deliverables** section III.3. Of particular interest is the **CASE STUDIES INDEX** with examples of local/regional BMPs and low impact design developments and the **RESOURCES** section which will be updated with relevant study reports, guidance manuals, websites, and newsletters. Relevant cold climate projects written up in trade magazines and newsletters will be advertised in the **WHAT’s NEW** section of the website at the bottom of every page. Additional noteworthy web sections that were created or adapted as part of this project:

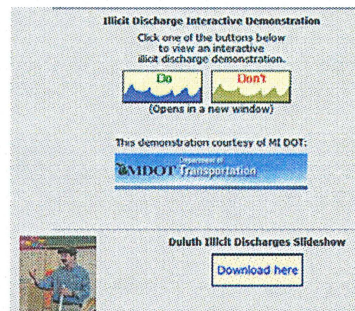
- o **North Shore Communities** section that includes detailed information for Two Harbors, Beaver Bay, Silver Bay and Grand Marais. These sections are now in review by the Lake and Cook County Water Plan Coordinators and will be augmented with additional photos, water resource information and stream data reports, GIS/Map data, and public education materials related to pollution prevention (funding: MN LSCP)
- o A **Frequently Asked Questions** section (**FAQ**) for contractors:
<http://www.duluthstreams.org/stormwater/toolkit/contractor/faq.html>
- o A downloadable **CONSTRUCTION STORMWATER PERMITTING FLOWCHART** (developed by South St. Louis County SWCD):
<http://www.duluthstreams.org/stormwater/toolkit/contractor/resources/PermittingFlowchart.pdf>)

- o **Working near Special Waters (trout streams, wetlands, Lake Superior, etc)** (<http://www.duluthstreams.org/stormwater/toolkit/contractor/waters.html>)
- o Inclusion of a set of **BMPs and Fact Sheets** developed by UMD for **training** Facilities Management staff to reduce thermal, sediment, and chemical impacts on 5 trout streams, and the Lake Superior shoreline affected by UMD activities (<http://duluthstreams.org/stormwater/toolkit/contractor/info.html>). Two UMD stormwater mitigation projects received State and Regional awards in 2006 and are included in the Case Study Index.
- o The **STORM WATER MANAGEMENT PLAN** section (http://www.duluthstreams.org/stormwater/duluth/stormwater_plan.html) was extensively modified and now features **Minimum Control Measures** that link back

Addressing the Minimum Control Measures

1. [public education](#)
2. [public involvement](#)
3. [illicit discharges](#)
4. [construction controls](#)
5. [post construction controls](#)
6. [housekeeping](#)

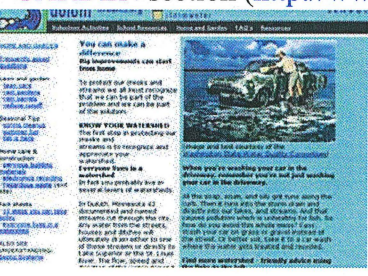
to the appropriate sections of the website or to other resources for more detailed information. For example **Illicit Discharges** includes local examples, a training slideshow developed by the Duluth Stormwater Utility, an interactive demonstration animation developed by Michigan and coming soon, a video clip of the “sewercam” used by the City of Duluth to identify problems in underground pipes.



- o The **INFLOW & INFILTRATION** section of the **STORM WATER MANAGEMENT PLAN** section (<http://www.duluthstreams.org/stormwater/inflow.html>) was revised and now includes extensive homeowner information and material describing Duluth’s **Sanitary Sewer Overflow** problems and what is being done to address it. The section was extensively reviewed by both the City Stormwater and Sanitary Sewer Utility and Western lake Superior Sanitary District staff. The problem description also links to rain barrel and rain garden sections that provide ways for homeowners to help address **I&I** problems.

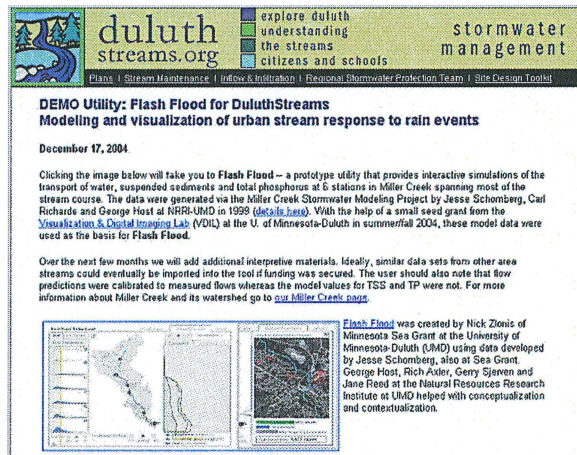


- o The **CITIZENS AND SCHOOLS** major section includes an expanded **HOME and GARDEN** section (<http://www.duluthstreams.org/citizen/action.html>) that includes extensive material about **rain gardens, rain barrels, and pervious building materials**. This Citizen Action section also includes other pollution prevention information such as **recycling hazardous and electronic waste, septic systems, and low**



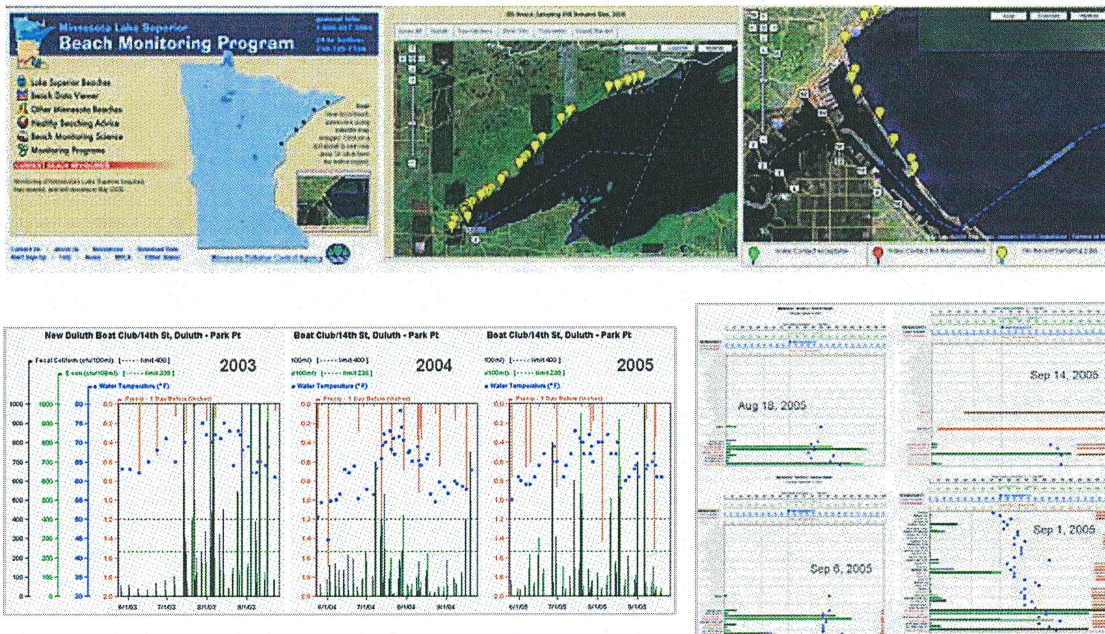
impact lawn care tips to reduce runoff and fertilizer and pesticide use. Much of this information is taken from the U. of Minnesota Extension website so it will be relevant and current.

- A new **Thermal Impacts** section was added to the **UNDERSTANDING** section that uses real data from our creeks to illustrate thermal shocks from summer rainstorms (see duluthstreams.org/understanding/impact_temp.html)
- A prototype flash animation tool was developed to provide interactive simulations of the transport of water, suspended sediments and total phosphorus at 6 stations in Miller Creek (an Impaired stream for turbidity and temperature) spanning most of the stream course (<http://duluthstreams.org/stormwater/simulation.html>). The data was generated via the Miller Creek Stormwater Modeling Project by J. Schomberg, C.Richards and G. Host at NRRI-UMD in 1999. With the help of a small seed grant from the Video Digital Imaging Lab (VDIL) at UMD in summer/fall 2004, these model data were used as the basis for *Flash Flood*. Ideally, similar data sets from other area streams could be imported into the tool if funding was secured. The user should also note that flow predictions were calibrated to measured flows whereas the model values for TSS and TP were not.



- The RSPT agreed to collaborate with Fortin Consulting which recently received a grant to teach winter maintenance best management practices for businesses that maintain parking lots and sidewalks. Recent studies indicate 7% of all chlorides and an undetermined amount of sediment and other pollutants, entering our water, come from parking lots. Fortin, working with the City of Duluth Stormwater Utility and UMD Facilities Management will hold 6 training sessions, two per year for each of the three years of the grant (2006-2008). This will be marketed by the RSPT for the region with a maximum of 30 people per training session.
- We also collaborated with MPCA’s Lake Superior Beach Monitoring Program staff to create a specialized website (<http://minnesotabeaches.org> and <http://mnbeaches.org>) that focuses on beach pathogens and human health risks and to develop and implement interactive online tools for viewing lake and estuary indicator bacteria data with a new perspective. This data visualization tool was installed on the www.lakesuperiorstreams.org website with appropriate links from the Lake Superior Beach Monitoring website (www.mnbeaches.org) to allow users to visualize changes in bacteria counts over time compared to temperature, precipitation, wave height and wind direction. The tool enhances the use of ambient surface water (MPCA program

priority #4) data by professionals at resource agencies, consulting firms, NGOs and universities; by teachers and students, and by the general public. It assists the Lake Superior Beach Monitoring Program in achieving its goal of providing data and education to the water recreating public. The project was funded by a MN LSCP STAR grant to G. Host and R. Axler in 2005. We are pursuing funding to more fully develop this tool to display the long-term data set available for St. Louis River stations and for other streams where there are historical data or from more recent monitoring programs. The website is currently generalizable to all State of Minnesota beaches and contains links to the complementary Wisconsin program.



Objective 4: Conduct outreach, marketing, and capacity-building activities around the toolkit.

This is an ongoing part of the Team’s efforts, particularly SeaGrant staff. After the Toolkit has been reviewed by the complete RSPT (to be demonstrated at the August 30, 2006 meeting) and evaluated by selected user groups (see below) we will develop a press release and seek media coverage. We will also publicize the feature at professional and trade meetings. We previously developed a “Marketing Plan” for the *DuluthStreams* project (February 2004) which also applies to this objective. We expect considerable assistance from MPCA as well, and will assist them by providing training regarding website features and developing slideshows.

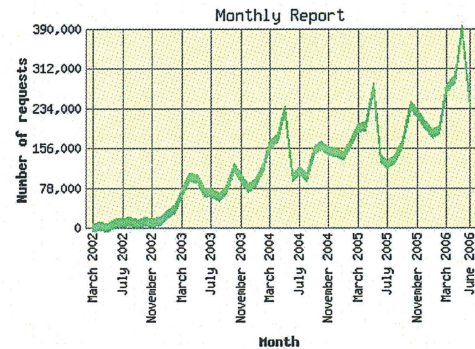
The website is also marketed via presentations by *LakeSuperiorStreams.org* Project Principal Investigators (R.Axler, M.Lonsdale, J.Schomberg, C.Hagley, G.Host at national and international scientific meetings, Great lakes regional meetings, state and local workshops, and a variety of public meetings. The project won a number of awards in the past two years including:

- 2004 APEX Award of Excellence - Communications Concepts, Inc - award to the related DuluthStreams website - special purpose video and electronic publications category
- 2005 Environmental Leadership Award at the 4th Annual Road Salt Symposium in St. Cloud Minnesota for the feature “How much salt is a problem”.
- 2005 Technical Excellence Award in recognition of "Outstanding Research in Stream and Lake Restoration, Protection and Management" from the North American Lake Management Society (NALMS)
- Website of the month in December 2005 by the Great Lakes Information Network (GLIN)
- 2005 Media award from the St. Louis River Citizens Action Committee
- Nominated: 2006 Great Lakes State of the Lakes (SOLEC) Success Story Award
- Nominated: 2006 National Association of Flood and Stormwater Management Agencies (NAFSMA) “Excellence in Communication” Award

Objective 5: Ensure effective project tracking (evaluation)

We are evaluating the project’s effectiveness in several ways:

1. We track website usage at ~ 6 month intervals and as of June 30, 2006 we had received a peak of 388,179 website requests (“hits”) I for the month of May 2006 and the more informative value of 76,977 “page requests” for the same month. There may be some useful measures from the website tracking software that we have not yet explored although we will primarily depend on direct evaluations by interviewing targeted user groups (see below).



2. Now that the Toolkit has been completed along with related website sections, we are developing an evaluation instrument that will survey:
 - a small number of targeted user groups regarding, for example, familiarity with and use of the site, knowledge of conservation and low-impact design techniques and use of these techniques in their work; and perceptions of acceptance of conservation design techniques by homeowners. This survey would be used as a baseline to evaluate changes in attitudes and practices for similar surveys to be conducted in future years, as funding allows;
 - a focus group, made up of the types of people we are trying to reach with the conservation design toolkit and additional materials described here (e.g., contractors, local government, educators, consultants, trade associations, etc) to review web site content (1) Clarity of purpose (i.e., Do focus group members recognize the web site as being targeted to their user group?); (2) Objectivity

(i.e., Do focus group members believe that the content reflects a bias? Is the bias explicit or hidden? How does the perceived bias impact the usefulness of the information to the various users?); (3) Appropriateness and relevance (i.e., Is the content appropriate for the different user groups? Is the reading level appropriate for the user groups? Is the content accurate, complete, well-written? Is the content relevant to various user groups' questions and information needs?); (4) Clarity (i.e., Is the information clearly presented? Is the text neat, legible and formatted for easy reading? Do the graphics add to the content or distract? Are the pages well organized? Can users find information relevant to their needs?); (5) Accessibility (Can users get into the site? Does the site load quickly on the types of systems they are working on? Can users move around the site easily?; Can materials be downloaded easily enough?).

The Survey has been drafted and is being reviewed by the project team. The topic was discussed at the August 30, 2006 RSPT meeting and a near-final draft will be presented at their January 31, 2007 meeting. We will then form a small subcommittee to assemble a list of individuals for each user group who will receive the survey. The timetable for disseminating the Survey has not been finalized but will likely occur after in February 2007.

3. Workshop evaluations of the knowledge and attitudes of contractors with regard to stormwater management.
 - o Post workshop/conference attitude surveys of attendees (contractors in particular; at least one RSPT sponsored workshop in the region), including their sense of personal responsibility for improving stormwater management. At the January 2005 Erosion and Sediment Control Workshop sponsored by the RSPT, a pilot survey yielded a 55% response rate and good information for developing a more comprehensive questionnaire.
 - o An on-line test, based on the one developed for contractors at the RSPT Erosion and Sediment Control workshop held in Hermantown (just outside of Duluth) in January 2005. We re-formatted the test administered to attendees to obtain a Certificate of Attendance, and then created a comprehensive answer sheet that allows test takers to view the answers while taking the test and not only see the correct answers, but also find links to appropriate sections of the website (or to others, such as the MPCA's) for more information about each question. The on-line test can be considered a pilot for potential use as part of a future state certification process.
4. It is expected that the MPCA P² team and/or their consultants will also have a role in providing ideas for long-term evaluation of website information as well as other educational formats. The RSPT and NRRI have each submitted several proposals involving Lake Superior Streams and/or RSPT activities over the past 3 years with components involving formal evaluation but none have been funded.

Overall, all indications are that the project has been extremely successful.

Objective 6: Timely and effective project management

This Final report, a previous interim report, responses solicited by the sub project manager (E. Stern) including a draft LOGIC model format for the project over short and long time scales in 2004, several conference calls, and our final invoices constitute our fulfillment of this Objective.

V. Conclusions & Recommendations

The largest impediment to the continued success of the *LakeSuperiorStreams.org* project is the lack of base funding to support (1) programming and website graphic design; (2) a part-time person to manage the website for adding new materials derived from RSPT and MPCA- P² partners; and (3) field and laboratory support of the *in-situ* stream water quality sensor network. The project was initiated by a large US EPA grant but that program has since been eliminated. It initially benefited greatly from a concomitant large grant to its “mother” curriculum project *WaterontheWeb.org* that was funded by the National Science Foundation. *LakeSuperiorStreams.org* has depended upon continued grant writing by the PIs for relatively small amounts of funding over short time frames. This will be problematic over longer time frames since the trend has been for greatly decreased federal grant opportunities and smaller funding amounts, and an expectation that projects with intensive real-time data collection needs become self-sustaining.

VI. Acknowledgements:

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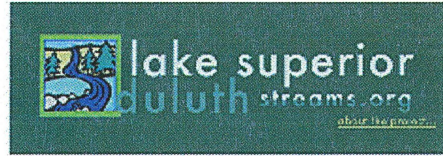
We thank the following individuals for their significant contributions to the development of the Toolkit in particular:

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Erik Larson, U. of Minnesota-Duluth Facilities Management
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Minnesota Pollution Control Agency