Great Lakes - St. Lawrence River Basin
Water Resources Compact

Annual Water Conservation and Efficiency Assessment
November 22, 2016
1. Lead agency/agencies and contact person(s).

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2. Status of Minnesota’s water conservation and efficiency goals and objectives consistent with the Basin-wide goals and objectives.

Minnesota’s water conservation and efficiency goals and objectives are consistent with the Basin-wide goals and objectives. While our current laws, rules and policies address all of the Goals and Objectives identified in the Compact, Sustainable Water Resources Agreement, and of the Basin-wide Conservation and Efficiency Initiative, we are implementing additional management tools to enable the state to achieve a more sustainable use of its limited water resources as we face water resource management challenges. The laws cited and programs described in Item 3 a) and b) provide a framework for sustainable water management that promotes efficient use of the state’s water resources. Minnesota’s DNR applies an adaptive approach to its water management, so that expanding scientific knowledge and improvements in technology lead to improvements in natural resource use and protection.

The Minnesota part of the Lake Superior Basin encompasses portions of Aitkin, Carlton, Cook, Itasca, Lake, Pine and St. Louis Counties, covering approximately 6,200 square miles. Major watersheds in the basin include the Cloquet, Nemadji and St. Louis River systems, as well as the North Shore tributaries to Lake Superior.

Figure 1 The Lake Superior Basin is Minnesota’s only basin that is on a Great Lake coastline.

a) Citations to implementing laws, regulations and policies.
The statutes and rules listed below are available at http://www.leg.state.mn.us

Primary:
- Minnesota Statutes, chapter 103A. Water Policy and Information
- Minnesota Statutes, chapter 103G. Waters of the State (DNR’s primary regulatory statute for management of water resources)
- Minnesota Statutes, chapter 103G. 271 Appropriation and Use of Water
- Minnesota Statutes, section 103G.801, Great Lakes – St. Lawrence River Basin Water Resources Compact

Related:
- Minnesota Statutes, section 103B. Water Planning and Project Implementation
- Minnesota Statutes, section 103F. Protection of Water Resources
- Minnesota Statutes, chapter 103H. Groundwater Protection
- Minnesota Statutes, chapter 103I. Wells, Borings and Underground Uses
- Minnesota Statutes, section 116B.01 Environmental Rights
- Minnesota Statutes, chapter 116D. Environmental Policy

b) Summary of program elements both mandatory and voluntary.
Minnesota’s water conservation program is integrated with permitting and planning requirements.

Mandatory:
- A water appropriation (use or withdrawal) permit is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year. The efficient use of water can be required through the permitting process (Minnesota Rules, part 6115.0770).
- Water users must measure water volumes appropriated within 10% accuracy. Flow meters are required, but other fairly accurate methods, such as timers or electrical use meters, can be approved for smaller water users.
- Preliminary approval from the DNR is required before drilling a well that will need a water use permit (will be used to withdraw more than 10,000 gallons of water per day or 1 million gallons per year). The DNR informs the applicant whether the anticipated water use request is likely to meet the applicable requirements in law. This process helps prospective well owners to make informed decisions by providing relevant information prior to their financial investment in equipment and well construction.
- Public Water Suppliers must meet demand reduction measures:
  - Public water suppliers serving more than 1,000 people are required to prepare a Water Supply Plan every ten years that is approved by the DNR. In these plans, suppliers identify water demand projections, development plans, water sources, and demand reduction and conservation measures. All public water utilities along Lake Superior serving more than 1,000 people will have their 10-year Water Supply Plan due to the DNR by Dec. 31, 2016. Water supply plans for inland communities within the basin, in the “Range” cities, will be due Oct. 15, 2018. The DNR has held workshops with these
communities with training that includes greater emphasis on water conservation and efficiency.

- Before requesting approval to construct a public water supply well or to increase authorized water volumes, demand reduction measures must be employed by the public water suppliers. A demand reduction measure serves to reduce water demand, water losses, peak water demands, and nonessential water uses. Demand reduction measures must also include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction.

- Benchmarks for public water suppliers were developed in consultation with the Minnesota Section of the American Water Works Association. The benchmarks, which include standards for unaccounted water, per capita use, rate structure and peak demand, guide the review of water supply plans and water appropriation permits. These are now incorporated into the 10-year plan as community goals.

- **Minnesota's buffer law** establishes new perennial vegetation buffers of up to 50 feet along rivers, streams and ditches that will help filter out phosphorus, nitrogen and sediment. The law provides flexibility and financial support for landowners to install and maintain buffers.
  - The DNR's role in Minnesota's buffer law is to produce and maintain a map of public waters and public ditch systems that require permanent vegetation buffers.
  - The DNR released the buffer protection map in July, 2016. The map will help guide the implementation of Minnesota's buffer law by landowners with the help of the Board of Water and Soil Resources (BWSR), Soil and Water Conservation Districts (SWCDs), Drainage Authorities and other local governments.
  - While the Buffer Law is primarily intended to improve surface water quality in the agricultural areas of the state, there may be some improvements in the water quality of tributaries entering into Lake Superior.

- **Water Deficiency Ordinance** - in April 2016, the DNR worked with the League of Minnesota Cities and Minnesota Rural Waters to develop a new Water Deficiency Ordinance template, to help cities establish their authority to restrict water use in times of drought. The template is now available on all three web pages. As part of the Water Supply Plan, all cities are required to adopt a water deficiency ordinance.

- **Landscape irrigation systems** that operate automatically are required to have technology that inhibits or interrupts operation during periods of sufficient moisture.

- **Minnesota Statutes** establish water use priorities for the allocation of waters during periods of limited supplies. Non-essential uses are the lowest priority and are subject to restrictions prior to other higher priority uses [**Minnesota Statutes, section 103G.261**].

- **Minnesota’s Statewide Drought Plan** provides a framework for preparing for and responding to droughts including steps for public water suppliers to take for reducing water use.

- Groundwater withdrawals for once-through HVAC systems are prohibited. Large existing systems have been converted to water efficient systems. Smaller systems cannot be expanded and must convert to a water efficient alternative within the design-life of existing equipment.

- Applicants for water appropriation permits may be required to provide alternatives to proposed actions, including conservation measures to improve water use efficiencies and reduce water demand [**Minnesota Statutes, section 103G.301, subd. 1 (b) (3)**].
• Applicants for wastewater discharge permits are required to evaluate potential reuses of the discharged wastewater [Minnesota Statutes, section 115.03, subdivision 1, item (e), sub item (10)].

• Surface water use can be and has been suspended during low flow periods in Minnesota, based on water use priorities stated in law [Minnesota Statutes, section 103G.261]. Published procedures lay out when surface water users will be suspended. The current standard is that when flow in streams and rivers reach or fall below a flow rate that is exceeded 90% of the time (the Q90) for that watercourse, all direct appropriation must be suspended. Ecologically-based low flow thresholds can and have been developed for some surface waters.

Voluntary:

• In March 2016, law and policy experts from throughout the Upper Great Lakes in both the U.S. and Canada met in Duluth, Minnesota, to discuss current and emerging issues — from contaminants and climate change to aquatic invasive species, water diversion and indigenous rights. Most of the presentations delivered at that gathering, the Upper Great Lakes Law and Policy Symposium, are now available online.

• Many public water suppliers provide water conservation information to customers. For example, the City of Cloquet has a simple but concise water conservation webpage.

• Minnesota Statutes require demand reduction measures for new public water supply wells or increased water volumes. The statutes also provide consideration for voluntary programs to retrofit water fixtures. Some local governments have partnered with private industry to offer water-saving fixtures and other items such as soil moisture sensors.

• Minnesota Statutes encourage the reuse of non-consumptive water and the evaluation of reuse options as part of applications for water discharge permits.

• Minnesota Statutes waive water use fees to encourage the use of storm water runoff.

4. Identify how the State/Provincial program is consistent with the regional objectives:

   A tapestry of efforts are underway at all levels of government, educational institutions, nonprofit organizations, business and industrial sectors, to guide Minnesota toward long-term sustainable water use, especially in the Lake Superior basin. As shown below, Minnesota’s program is consistent with the regional objectives in the promotion of environmentally sound and economically feasible water conservation measures.

OBJECTIVE 1: Guide programs toward long-term sustainable water use.

Conservation of Pristine Estuary

• The Lake Superior National Estuarine Research Reserve (NERR), the most recent addition to the National Estuarine Reserve System, is one of 28 areas across the country designated for long-term research on coastal resources and the human populations those resources support.
The Lake Superior NERR is located along a river-to-lake gradient at the confluence of the St. Louis River and Lake Superior, the largest and most pristine of the Great Lakes. The Superior-Duluth harbor is one of the largest ports in the U.S. The Reserve works in partnership to improve the understanding of Lake Superior freshwater estuaries and coastal resources and to address the issues affecting them through an integrated program of research, education, outreach and stewardship.

The Reserve is composed exclusively of public lands and waters and contains ~16,000 acres of representative terrestrial and aquatic habitats, including riparian and riverine habitat; riverine islands; emergent freshwater marshes, interdunal wetlands and scrub swamp; aspen, dry and hardwood forests; and open sand beach and dunes.

Planning

The Lake Superior North One Watershed One Plan is now complete: http://www.bwsr.state.mn.us/planning/1W1P/1W1P_Lake_Superior_North_Fact_Sheet_Fall_2015.pdf. This plan is highly focused on ecosystem protection, which feeds indirectly into sustaining the surface water sources that most people use for drinking water in the region. The Board of Soil and Water Resources is taking the lead in this planning effort.

The Minnesota’s Lake Superior Coastal Program (at MN DNR) has invested a substantial amount of time to support One Watershed One Plan by using GIS, Participatory GIS, and serving on the Technical Team.

In October 2016, The City of Duluth Parks and Recreation division invited the public to comment on a revised draft of the St. Louis River Estuary National Water Trail Master Plan that has undergone a nine-month long planning process. The Plan is a unique opportunity to recognize one of the world’s largest freshwater estuaries as a premier paddle destination. The rich history of this river as a significant waterway for Native Americans and Voyageurs and as a working river serving the twin ports of Duluth and Superior, combined with the expansive natural resources surrounding the estuary, provide a tremendous opportunity to showcase this amazing resource to the community.

May-July 2016 MDH and DNR staff made revisions to Wellhead Protection guidance documents to now include two pages of water conservation measures. Water conservation projects will now also be eligible for MDH wellhead protection implementation grants.

Minnesota agencies coordinate with each other and with local governments to protect drinking water, preserve habitat and maintain recreational opportunities. These agencies were active partners in preparation of “Beyond the Status Quo: 2015 EQB Water Policy Report” developed under the guidance of the Minnesota Environmental Quality Board (EQB). This report identifies four goals to ensure that our fish are safe to eat, that our water is safe to drink and our lakes are safe for swimming.
MPCA’s Watershed Restoration and Protection Strategy (WRAPS) process integrates land and water planning. The MPCA employs a watershed approach to restoring and protecting Minnesota's rivers, lakes, and wetlands. Money to accelerate efforts to monitor, assess, and restore impaired waters, and to protect unimpaired waters was funded by the Minnesota Clean Water Legacy Act.

- There are 80 major watersheds in Minnesota. Intensive water quality monitoring and assessments will be conducted in each of these watersheds every 10 years.
- Lake Superior N & S and the St. Louis River WRAPs have been started.
- During the 10-year cycle, the MPCA and its partner organizations work on each of the state’s 80 major watersheds to evaluate water conditions, establish priorities and goals for improvement, and take actions designed to restore or protect water quality. When a watershed’s 10-year cycle is completed, a new cycle begins.
- The primary feature of the watershed approach is that it focuses on the watershed's condition as the starting point for water quality assessment, planning, implementation, and measurement of results.
- MPCA produced a new four-part video series on Minnesota's watershed approach to restoring and protecting the state’s water quality.

**Project Funding**

- Duluth was awarded a 2016 EPA water improvement grant. The $58,000 grant is to install three large rain gardens in Park Point. Park Point forms a part of the Great Lakes Area of Concern and parts of the longest freshwater sandbar in the world. It’s the overlap between Lake Superior’s natural ecosystems and Duluth’s urban industrial waterfront, according to the Park Point Urban Impact Study. The projects include other components such as trenches and meadows to enhance water quality and beach safety.
- The City of Duluth continues to make major investments in their water supply system and distribution infrastructure. Since implementing a new Street Improvement Program in 2008, they have been able to fix more than 74 miles of city streets. In the process of repairing streets, they also inspect, repair or replace water mains and water system pipe as needed. They have also made great strides with their utility infrastructure. The new elevated water storage tank and pumping station improvements will ensure reliability in the Duluth Heights and Mall area neighborhoods. Duluth has all but eliminated their sanitary sewer overflows into beautiful Lake Superior, thanks to the completion of the sanitary sewer overflow holding tanks. The City of Duluth sees protecting Lake Superior as the city’s most sacred responsibility.
- Due to stream erosion from the summer 2012 flood, Duluth continues to improve long-term bank stability by funding additional restoration projects to enhance Duluth trails and stream habitat. During June and July 2016, contractors worked to stabilize stream banks and restore trails in Chester Bowl Park and Congdon Park.
- Later in the fall of 2016, Flood restoration work along Chester Creek was undertaken. This restoration work is part of the ongoing 2012 flood repairs necessary to preserve critical trout habitats and stabilize the stream banks. A $3.5 million grant from the Board of Water and Soil Resources and the Minnesota Department of Natural Resources is funding this work. Contractors will work to stabilize the stream banks at eight locations north and south of the Thom Storm Chalet to improve trout habitats.
• Additional disaster relief projects that focus on large-scale stream restoration can be found at [St. Louis SWCD](#).

### Permitting

• The DNR Water Regulations Unit is working with a group of stakeholders to develop a draft general permit to simplify and streamline water appropriation permitting for stormwater reuse.
  
  o Stormwater collected in ponds and tanks is increasingly being used for outdoor irrigation of landscaped areas, golf courses and athletic fields, and there is interest in using stormwater for other uses such as fire suppression or vehicle washing.
  
  o Minnesota law already waives the water use permit fee for installations and projects that use storm water runoff. The proposed general permit would allow MS4 communities (cities, watershed districts, other local government entities and institutions) to report basic information on the locations of and water use by individual projects and installations within their jurisdictions.
  
  o The Stormwater General Permit is currently out for review. Comments are due to the DNR by November 30.

• The DNR Water Appropriation Permitting program received 1,530 new permit applications for water use (groundwater and surface water use) throughout the state over the last fiscal year (July 2015 – June 2016). The 2016 growing season was a relatively wet year throughout the entire state. With the exception of the beginning of July, stream flows and water levels in lakes and other water resources have been normal or above normal.

• It took DNR hydrologists typically 25 days to issue a permit for water use; General Permit authorizations keep this number relatively low because these can usually be issued within five days. 71 permit applications took longer than 150 days to issue, likely due to potential impacts to sensitive water resources such as trout streams, wetlands, calcareous fens and others. These decisions take longer because other technical staff typically need to review and analyze the potential impact of pumping on the sensitive water resources.

### Mapping Efforts

• The state’s geological county atlases and hydrologic mapping efforts have been accelerated by legislative investments. The DNR partners with the Minnesota Geological Survey (MGS). The MGS maps the geology of a county to publish Part A; the DNR uses information from Part A and analyzes groundwater sensitivity to contamination to publish Part B. Carlton
County geologic atlas is complete for parts A and B for St. Louis and Lake County maps, part A is in progress and is being completed by MN Geologic Survey. MN Geological County Atlases

OBJECTIVE 2: Adopt and implement supply and demand management to promote efficient use and conservation of water resources.

Ski Resort Efficiency

- Spirit Mountain Winter Recreation Area near Duluth, Minnesota, recently doubled their snowmaking capacity and significantly reduced the water demand for treated water purchased from the City of Duluth. Spirit Mountain, which opened its hills in 1974, traditionally supplied their snowmaking machines with treated water from Duluth, purchasing 65-70 million gallons of potable water per year. But the water was actually too clean for snowmaking, and often put pressure on the city system and required 16 miles of pipeline. Recently, Spirit Mountain installed a one-mile pipeline that draws water from nearby St. Louis River at a rate of 4,000 gallons per minute. In addition to conserving potable water sources, the new water infrastructure is reversible and helps solve a historic streambank erosion problem. When snow is needed on the hill, the infrastructure will convey water from the St. Louis River up to snowmaking machines on Spirit Mountain. Then, when the snow melts in springtime, the infrastructure will reverse directions and help return the snowmelt to the river. New collection systems help separate the sediment from
snowmelt, protecting fish and wildlife in the nearby estuary that has filled with sediment over the years. Details at Snow in half the time.

**Municipal Efficiency**

- All communities are being encouraged to make use of the AWWA Water Audit Software to reduce their water losses. Water efficiency benchmarks are used for evaluating water supply plans, permit actions and well installation requests. A DNR-approved plan is necessary to apply for Drinking Water Revolving funds or to apply for an appropriation permit amendment.

- The City of Carlton has already submitted their draft Water Supply Plan; this is the first plan they have been required to submit. They recently merged with the City of Thompson for supplying water, which now puts them over 1,000 people. Prior to that, they were under 1,000 and not required to have a WSP. Here are some actions listed on the City of Carlton draft WSP:
  - Implementation of tiered conservation rate structure.
  - Replacement of all water meters in town within last 4 years.
  - Leak detections of water distribution system.

- The City of Carlton is drawing their drinking water from a well that is within the mapped St. Louis River watershed, a HUC 8 that drains to Lake Superior. It is in the area mapped for the Great Lakes Basin for the Great Lakes Compact.

- The City of Duluth has historically had some of the highest water loss rates in the state, due to aging infrastructure and steep terrain that causes pressure problems. Duluth Water Works has been working with consultants to locate leaks and is using new PPE Piping to make repairs in many areas. Duluth also sells water to Proctor and Hermantown.

- In July 2016, the City of Duluth undertook repairs to water main breaks around town and conducted needed maintenance on a transmission line that is a feeder to all lines serving the city of 86,000 residents. During the repairs, the City asked all residents to conserve water and avoid using major water using appliances. Star Tribune Article.

**Sewer Improvements**

- The MN State Auditors Infrastructure Stress Transparency Tool has mapped sewer infrastructure needs at: [https://www.auditor.state.mn.us/maps/](https://www.auditor.state.mn.us/maps/). The goal of these comprehensive maps is to improve public policy/long-term financial planning and asset-management planning for our civil infrastructure throughout Minnesota's 853 cities and other local governments. By improving transparency of our infrastructure needs, all residents, local elected officials, legislators and governors will have a more comprehensive understanding of the total need over the next few decades statewide. This understanding can accelerate better planning, stabilize rates for users, and avoid major service disruptions.
due to inaction. The Auditors Office plans to complete a similar inventory of the state’s water infrastructure and there are already some basic water data on the City Info tab.

- Duluth has 376 total miles of sewer system. Approximately 60% (225 miles) of their sewer system is more than 50 years old (more than double the state average).
- Two Harbors only has 20 miles of sewer system, but 80% or 16 miles of the system are more than 50 years old. Silver Bay has nine miles of sewer system, and 100% of the system is more than 50 years old.
- Grand Marais has a newer system with only three of its 16 miles of sewer system more than 50 years old.
- Beaver Bay has 50% of its sewer lines between 30-50 years old and the remainder is less than 30 years old.

Figure 5 MN State Auditors Infrastructure Stress Transparency Tool has mapped sewer infrastructure need

Reuse

- The DNR is participating in an interagency workgroup that will be developing recommendations for best practices and policies for water reuse in Minnesota.
  - The workgroup is examining opportunities for reuse of treated wastewater, graywater, stormwater and rainwater, as well as subsurface water discharged for dewatering purposes.
  - The workgroup has been researching existing policies, guidance and regulations from states and municipalities throughout the nation as well as internationally.
The Water Reuse Interagency Workgroup has completed their six month update; [http://www.health.state.mn.us/divs/eh/water/dwp_cwl/reuse/update060116.pdf](http://www.health.state.mn.us/divs/eh/water/dwp_cwl/reuse/update060116.pdf). The Project Manager for this group is based in Duluth.

Water reuse will be an increasingly important part of managing our water resources as demands on our water supplies continue to grow due to population increases, urbanization, climate change, and changes in water use.

There are scattered examples of reclaiming municipal wastewater, stormwater and graywater systems in Minnesota. However, those interested in reuse often run into regulatory roadblocks, technical challenges, or lacking and inconsistent regulations and standard practices.

Recommendations will be published in the early summer of 2017. Recommendations will include both regulatory and non-regulatory approaches to successful implementation of water reuse. Recommended revisions to the state plumbing code are anticipated. Law changes in 2014 provide an incentive to use storm water runoff ([Minnesota Statutes 103G.271, Subd. 6 (g)](http://www.health.state.mn.us/divs/eh/water/dwp_cwl/reuse/update060116.pdf)). Plumbing codes allowing additional rainwater use without a variance went into effect Jan. 16, 2016.

**Supply and Demand Management**

- The DNR works with large water-using industries in the Great Lakes basin in Minnesota to transition to a sustainable water supply. Lutsen Mountain Corporation (LMC), Sappi Paper, and many mining companies are being encouraged to incorporate innovative water conservation strategies into their operations.

- The DNR is developing thresholds that identify negative impacts to surface waters from groundwater withdrawals. These thresholds will inform water allocation decisions.

- The DNR can establish groundwater management areas (GWMAs) to address difficult groundwater related resource challenges. A groundwater management area plan is developed through a collaborative process with affected water users. The plan describes actions that the DNR will take to evaluate water availability in a defined area and adjust authorized water withdrawals to ensure that demand doesn’t exceed supply or harm ecosystems. Three groundwater management areas have been established; none of these is within the Great Lakes Basin.

- The DNR encourages innovative management practices by promoting aquifer water use management planning. This concept involves the definition of a management area and the involvement of a wide range of interests in the development of a plan. Two groundwater management areas have been established and one is in progress. Although a groundwater management area has not been started within the Great Lakes Basin, the principles that are being developed may help us with decisions in the Great Lakes Basin in the future.
OBJECTIVE 3: Improve monitoring and standardize data reporting among State and Provincial water conservation and efficiency programs.

New Statewide Water Conservation Tracking System

- The DNR has embarked on developing a water conservation tracking system. This system will be similar to the existing Minnesota energy conservation tracking program. The system will establish uniform water conservation and efficiency measure definitions, methods of measurement and reporting formats. The system is cloud-based for easy data entry and record management. The conservation reporting system will have a soft launch in July 2017.

Cook County SWCD Monitoring Along the Lake Superior Shoreline

- Cook County Soil and Water Conservation District collected water samples near shore along Lake Superior at five locations in and around the Grand Marias Harbor. The SWCD is tracking non-point source pollutants to determine if there is a water quality impact from stormwater runoff. The five sites are stormwater outlets from the City of Grand Marais and have been tested and modeled in the past. Volunteers collected samples twice per month at each location. The SWCD sent them to a lab for analysis.
- The water column at each site was monitored for pH, temperature, dissolved oxygen and conductivity. The column was sampled with a two meter integrated sampler. The water was tested for chloride, total suspended solids, total volatile solids, e. Coli, phosphorus, chlorophyll-a, nitrogen, nitrate, and nitrite. Volunteers also recorded weather and waves at each site.
- The Cook County SWCD submitted the data collected to the EQuIS database with the MPCA. WTIP radio featured the project on a local program. [https://soundcloud.com/wtip-community-radio/near-shore-monitoring](https://soundcloud.com/wtip-community-radio/near-shore-monitoring)

Professional Science Symposium

- In Jan. 2016, The University of Minnesota-Duluth hosted a Minnesota Lake Superior Watershed Stream Science Symposium II. During the symposium, researchers, managers, agency staff, tribal authorities, and staff from natural resource NGOs:
  1. Presented the latest Lake Superior stream and watershed research
  2. Shared data and data gaps
  3. Discussed management issues, objectives, and strategies
The symposium presentations identified important stressors on Lake Superior tributaries and to help focus research, management, funding, and decisions on wise use of limited resources to best benefit tributaries, maintain or improve watershed health and biotic integrity.

Culvert Inspection and Surveys

- The St. Louis County Culvert Projects (Phases 1-4) inventoried road and driveway culverts in central St. Louis County, Minnesota. The goal of the project is to inventory all the County’s culverts within the coastal area. The inventory includes size, location, elevation, composition, photos, and any defects. The County planners will use the inventory to enhance hydrologic models within the watershed basins of Lake Superior. The County also uses the inventory of the culverts as a basis for a proactive culvert maintenance program.
The project, Phases 2 and 3, traveled approximately 218 miles of road and collected photos and inventory data on 822 centerline and 909 driveway culverts.

The Lake County Highway Department will gather field data of in-place roadway structures that fall within the coastal area of Lake County, Minnesota. Two interns will collect physical information on culverts (e.g., pipe length, type of end section) along certain county, CSAH, forestry and township roads (not T.H. 61). Lake County and other natural resource managers will use the data to determine whether the culverts are: adequately sized; correctly placed; meet stream bank full width; perched; impede or prohibit fish passage; impede or prohibit natural sediment transport; and/or contribute to sediment loading.

Enhancing the Lake Superior North and South Watershed Assessments

- Minnesota’s Lake Superior Coastal Program staff and The Lake Superior Binational Program Coordinator are working in collaboration with multiple partners to provide critical data and tools useful in the development of watershed restoration and protection strategies (WRAPS) for the coastal zone’s two major watersheds – Lake Superior North and Lake Superior South. Much of the work has focused on creating and analyzing GIS data and gathering culvert information. Information derived from this task will be instrumental in developing strategies and actions aimed at achieving and maintaining water quality in both watersheds.
  1. **Red Clay Bank Analysis** – Staff have worked with NRCS staff to combine SSURGO soils and US Forest Service soils data to create a Lake Superior clay data layer. This data has been combined with the Minnesota LiDAR derived Digital Elevation Model to create a clay soils data layer describing clay soils data into three slope classes; Stable Slopes 0-8%, Bank creep and tansilatory slides 8-15% and Actively unstable >15%.
  2. **Update DNR 1:24,000 stream data** - Using State LiDAR data, Minnesota’s Lake Superior Coastal Program worked with the DNR Resource Assessment office to create a new stream alignment for the Lake Superior North and South watersheds. Through consultation with the DNR Geospatial Water Resource Team, they created the DNR’s Next Generation Hydrography data standard.
  3. **Using our pass through grant program and collecting existing inventories**, Minnesota’s Lake Superior Coastal Program has been working to compile culvert and bridge inventories. This project also includes funding to the DNR to create a public facing mobile application to collect culvert inventory and inspection data.
  4. **Riparian Area Delineation** – Minnesota’s Lake Superior Coastal Program worked with the DNR’s Resource Assessment office to create topographic riparian area data for ten streams listed as priorities in the Lake Superior North and South WRAPS and Lake Superior North One Watershed One Plan process.
  5. **Riparian Health Assessment** – Using the data collected in this project, research is underway to assess the health of one cold water stream. This portion of the project will draw on the knowledge of researchers and resource managers in the area.

Duluth Area Watersheds Protection Framework

- The Natural Resources Research Institute at the University of Minnesota-Duluth will collect and analyze water samples on seven streams and operate five real-time stream flow monitoring stations. The Minnesota Pollution Control Agency, one of the state’s networked partners, has contracted with Tetra Tech to apply the data in HSPF models. They will also use
the results in developing the Duluth Area Urban Watersheds Restoration & Protection Framework.

Pollution Monitoring

- The Minnesota Pollution Control Agency intensive watershed monitoring efforts began in 2011. An assessment of all relevant data was completed in 2013 and those waterbodies identified as not meeting designated uses were added to the Draft 2014 Impaired Waters list. Additional study began in 2013 to identify stressors contributing to the impaired waters. A Monitoring and Assessment Report was completed in 2014. Next steps included completing restoration and watershed modeling (2015), total maximum daily load (TMDL) studies (2016) and completion of a restoration and protection study and implementation plan (2016).

- The MPCA has invested or committed to spend more than $500,000 in state funding to extensively monitor a subset of urban streams and to complete a geomorphic re-assessment and stressor identification process. This project will substantially improve parts of that work, helping to identify priorities and inform local planning. In addition, it will help in locally implementing the Minnesota Water Quality Framework, a multi-agency collaborative perspective on managing Minnesota’s water resources that went into effect with the passage of Minnesota’s Clean Water Legacy Act.

- Data generated from the project will be incorporated into the MPCA’s water quality database, and will also be accessible via the Lake Superior Streams Org (LSS) website. The automated real-time flow and water quality data can then be viewed on-line using the LSS interactive data visualization tools.

- The St. Louis River – U.S. Steel is a Superfund Site. USEPA completed a proposed cleanup plan for the site's remaining contaminated sediment. The comment period closed Sept. 25, 2016. The site is approximately 600 acres (500 land and 100 river sediment). It is located 4 miles southwest of the Duluth central business district and adjacent to the neighborhood of Morgan Park. The U.S. Steel Site has 18 Operable Units (OU) and two areas identified within the 1989 Record of Decision (ROD) for remedial action. Current work on this site is focused on the identification and cleanup of the sediments in the St. Louis River and follow up actions from the 2013 Five-Year Review. Most land-based contamination has been addressed as specified in the ROD.

Ongoing Monitoring and Data Reporting

- Minnesota tracks the effectiveness of water conservation measures through annual water use reporting. Public water suppliers report water use by customer categories and the amount of water pumped is compared to the amount of water distributed to help assess system losses. Information on water rates and peak use volumes is also requested.

- Groundwater and surface water monitoring improvements have occurred due to the influx of funding from the state’s dedicated Clean Water Funds. Since 2010, the DNR has added 233 stream gauges and 466 water level monitoring wells to the state networks, bringing the current total to 309 stream gauges and 1,030 monitoring wells. We use this information to better understand the hydrology of watersheds in our state. Live readings from several gauging stations in the Great Lakes Basin can be seen on DNR’s website.
Three years ago, the DNR launched its online system for water use reporting, water permit applications and change requests. The Minnesota DNR Permitting and Reporting System (MPARS) is designed to provide a simple, convenient and easy-to-use system that standardizes information collection and data reporting. The system reduces data entry errors and makes monitoring data more readily available, enabling evaluation of impacts from projects.

OBJECTIVE 4: Develop science, technology and research.

Ecological Limits of Hydrologic Alteration (ELOHA)

- How will climate change affect Minnesota’s Lake Superior tributaries? How can water resources managers in the area prepare for climate change and protect the conditions that support fish and other aquatic life?
  - A partnership of agencies and academics dove into these questions and has developed an approach to defining and managing the ecological limits. This report details that research. It also helps to move the research into practice, providing management recommendations that can help protect fish and aquatic life into the future.
  - Project activities included:
    1. Development of models that predict stream flow and ecological response based on climate, land use, and other physical inputs
    2. Analysis of flow-ecology relationships
    3. Identification of management strategies to enhance stream resilience based on these models
    4. Development of outreach materials and workshops to inform restoration and management actions. Information produced by the project is designed to be shared with “decision makers” (defined as those who work on the ground, creating and implementing management strategies).
    5. Project Homepage: [http://www.dnr.state.mn.us/eloha/index.html](http://www.dnr.state.mn.us/eloha/index.html)
    6. Final Project GIS Data: [http://data.nrri.umn.edu/data/dataset/eloha](http://data.nrri.umn.edu/data/dataset/eloha) *(final products are undergoing QA/QC)*

Lake Superior Geomatics Workgroup

- DNR staff have been working with a binational team to integrate spatial data standards, methodologies and geomatic products to help identify and prioritize sites for habitat protection and rehabilitation. Geomatics is the process that gathers, stores, processes, models, analyzes and delivers spatially referenced or location information.
- Although there are many geomatics data products and projects occurring around the Lake Superior Basin, most of these projects and data are funded for individual state/provincial use and needs or sectoral environmental objectives specifically. These data can often be 'pulled together' under the context of Binational Lakewide Management, however, the metadata management logistics and matching the scale of the data to differing locations and jurisdictional resource capacities ultimately degrades the ability to use such data for truly lakewide decision making.
• Lakewide management needs data collection and analysis efforts that not only match the information needs of lakewide objectives but can be carried out by a truly binational team of researchers.

• The purpose of this group is to apply the above rationale to existing geomatics projects and potential pilot projects that are more directly aimed at supporting lakewide management goals and objectives. The last meeting in Grand Marais, Minnesota discussed and shared the projects and datasets that currently exist at the watershed, and cold-water stream scales, to gain an understanding and data gap analysis of common data. Second, we explored collaboration proposals and data collection/analysis pilot projects that would be geared directly to lakewide management goals and objectives, and executed by a truly binational team of technicians and researchers from Canada and the United States. The meeting produced potential Lakewide Geomatics projects that tie directly to lakewide management objectives.

Hydrometric Map and Data Viewer

• The [Great Lakes Water Level Viewer](#) of the U.S. National Oceanic and Atmospheric Administration puts Lake Superior at just less than one foot above the long-term average and exactly one foot less than the all-time recorded high, as reported Sept. 28, 2016.

  o An interesting tool, which has been added to the InfoSuperior website, is the Hydrometric Map and Data Viewer. This tool allows site visitors to view water levels in all major Canadian rivers flowing to Superior—in real time. The tool is provided by the Weather Office of Environment and Climate Change Canada.

  o By clicking the icon for a particular river, viewers are led to a page providing water levels and temperature information for that particular river. This page provides the GPS coordinates where the river water gauge is located and the gross drainage area of the watershed in question.

• See [InfoSuperior](#) for more information.

Lake Superior NERR Research Goals

• The four goals stated below are research priorities of the Lake Superior National Estuarine Research Reserve NERR.

  To engage in research activities that:

  o Provide a better understanding of the biophysical processes and socio-economic benefits freshwater estuaries

  o Examine the effects of climate change, pollutants and invasive organisms on freshwater estuary biophysical and socio-economic structure and function

  o Study the progress of environmental restoration projects and the status of species of special interest (rare and threatened species and species of cultural significance)

  o Provide relevant and high quality information for education, stewardship and management activities and provide citizens with research opportunities

NSF Research Request

• Five U.S. senators, including Amy Klobuchar from Minnesota, have written to the National Science Foundation (NSF) requesting to know how the organization will incorporate Great
Lakes research and education in current initiatives and support such work in the future. The senators’ letter makes the following points:

- The $5.8 trillion economy of the Great Lakes region is a strong driver for the North American economy.
- The Great Lakes fishery alone is worth an annual $7 billion.
- Research to better understand the Great Lakes ecosystem is already being carried out in the fields of biology, chemistry, physics and geology.
- NSF already supports Great Lakes initiatives such as the Coastal Science, Engineering and Education for Sustainability program.

The senators’ assertion that the “overlap in research questions” between the oceans and Great Lakes means that the lessons of the recent “Sea Change” report may apply equally to the Great Lakes. The senators conclude by asking for “information on the investment the NSF has provided in recent years to support basic research and education activities related to the Great Lakes and information on future opportunities available to support Great Lakes related research and education activities.” Full letter: Great Lakes Research Priorities.

Yellow Submarine

- In September 2016, EPA and UMD researchers launched a yellow submarine, actually an unmanned “glider” which is being used to carry out research beneath the waters of Lake Superior. Gliders are becoming the standard tool for oceanographic research.
- The September launch started in Michigan’s Whitefish Point and concluded in mid-October near McQuade Small Craft Harbor, north of Duluth.
- Although hundreds of gliders are used in the oceans, only three gliders have been built for freshwater, and two of them are in Duluth. UMD has been operating the Gichigami glider for seven years. The EPA has owned the other glider called Nakomis for three years. A Lake Superior Glider YouTube Video can be viewed here.
- In 2016, UMD and the EPA have deployed the gliders seven times on Lake Superior, totaling more than 100 days spent collecting data in the water. Staff spend the winter analyzing the data and writing scientific papers.
- The University of Minnesota-Duluth, the Large Lakes Observatory and the U.S. Environmental Protection Agency are some of the organizations cooperating on this effort, which utilizes National Science Foundation funding. The glider collects data deep within the lake at locations that would otherwise be inaccessible.
  - Various glider models can remain in motion in Lake Superior from 25 to 100 days. The glider is given GPS coordinates telling it points to visit and the eventual point of retrieval.
  - U.S. EPA in Duluth says use of the glider is part of the Binational Partnership (federal, provincial and state agencies cooperating to restore and protect Lake Superior) Coordinated Science and Monitoring Initiative (CSMI). This initiative entails a year of more intensive environmental monitoring carried out on a rotating, annual basis in each of the Great Lakes, including Superior.

Other Research and Technology Efforts

- A Clean Water Funded project is underway to assess channel stability and stressors, with an emphasis on hydrologic impacts caused by various in-channel and watershed based
impairments.

• The DNR is collaborating with a number of other agencies to advance improved ways to display existing conservation plan priorities in a GIS format. This can lead to land management choices that integrate multiple conservation objectives (e.g., habitat protection, water quality restoration, etc.). In addition, the DNR has advanced additional GIS data for watershed health scores, and work is underway to deliver these spatial source data to field staff and the public via the Watershed Health Assessment Framework.

• The DNR is evaluating lake level and streamflow data to better understand the characteristics of various lake types and streams. This evaluation provides the basis for DNR to set protection levels for individual streams and basins based on sensitivity to reductions in water levels or flows. By developing a water budget the DNR can establish withdrawal limits to protect surface waters from negative impacts of groundwater pumping.

OBJECTIVE 5: Develop education programs and information sharing for all water users.

Assistance to City Utilities

• The University of Minnesota, MPCA and DNR have cooperated to compile a Homeowner Water Conservation Guide for city utilities. The guidebook provides tools and tips on how to engage citizens in water conservation, with a particular emphasis on lawn care. The data are based on previous GreenStep City projects compiled by a University of Minnesota intern. New materials were also added to supplement the document. The graphics and accessibility standards are being finalized, and the document should be available soon on the PCA and DNR websites.

• In July 2016, DNR assisted a University of Minnesota research intern working for the Minnesota Pollution Control Agency (MPCA) GreenSteps program. Together, we developed a Water Conservation Education Guide for GreenStep cities, with a focus on lawn irrigation. The Guide is now complete and will be posted on the agency webpages after graphic design work is complete.

• Minnesota Rural Water Association provides water conservation promotional pieces for cities on their webpage, provides assistance with audits, sample ordinances and other assistance to rural cities

• Minnesota’s Lake Superior Coastal Program is a voluntary federal-state partnership dedicated to the comprehensive management of our coastal resources. The Program provides technical and financial resources for local communities in the Lake Superior coastal area.

• The DNR is a Promotional Partner in EPA’s WaterSense Program, which seeks to promote water efficiency and water efficient products.

• The DNR is working with MPCA and other partners to link water conservation strategies into the Minnesota GreenSteps Cities Program for a more effective outreach and support to communities on both energy and water conservation efforts and various efforts to promote the EPA Water Sense Program. Duluth, Two Harbors, Grand Marais, Chisolm, Hermantown, Mountain Iron, are among the 69 Minnesota cities in the program.
Several energy companies are now offering water conservation kits and appliance rebates to residents on municipal water supplies to reduce water and energy use. For example, Minnesota Power in Duluth offers a $40 rebate on Energy Star clothes washers and offers a free SmartPak if customers have an electric water heater. The SmartPak include a water-saving showerhead, two faucet aerators, a shower timer, water temperature gauge, instructions and additional water saving tips. Heating water represents 15% of a typical home’s energy usage.

The DNR is also working with the Minnesota Department of Health to promote grants that can assist with source water protection, water conservation, and improvements in water quality and sustainability.

All public water suppliers and the general public are referred to a website developed by the Metropolitan Council, in cooperation with the DNR, which contains water conservation tips and resources for individual water users and program guidance for public water suppliers.

Classroom Programs and Materials

- **SWCD provides staff to visit school classrooms and hold annual Envirothon events.** Every spring, the Soil and Water Conservation Districts in northeast Minnesota hold a popular environmental competition for high schoolers called the Envirothon. Students visit six stations to test themselves on: water quality, wildlife, forestry, soils, and a current environmental issue. At each station, students have the chance to speak with local natural resource professionals about their careers and are then required to complete a 20-point test specific to that station’s topic. Students are also required to prepare and give a 10-minute oral presentation on that year's current events issue at a sixth station. This year’s current issue is Invasive Species and the event was held on May 2nd at the Cloquet Forestry Center. More than 100 students from around the region attend this event every year, and the winners go on to the State competition with the opportunity to advance to a National Envirothon with scholarships awarded to top teams.

- **Minnesota Project WET (Water Education for Teachers)** is an international, interdisciplinary water science and education program for formal and non-formal educators of K-12 students. It trains classroom and other educators in hands-on, interactive lessons that are focused on water and encourage critical thinking. By providing training, materials and support to these educators, MN Project WET works to improve Minnesotans' understanding of our water resources. Educators from the Basin have participated in these lessons.
• Project Wet has developed a new watershed “board” game directed toward school kids. It takes 45 minutes to play. Project WET also worked with EcoLab to create curriculum materials focused on clean water and conservation.

• The Regional Stormwater Protection Team (RSPT), a network of 25 agencies and local governments in and around Duluth, provides coordinated educational programming on polluted runoff and technical expertise to members on Municipal Separate Storm Sewer System (MS4) compliance.

• Lake Superior Streams is a Community Partnership for Understanding Water Quality and Stormwater Impacts at the Head of the Great Lakes (http://lakesuperiorstreams.org). University of Minnesota-Duluth, Duluth, MN. Sponsoring organizations include the Natural Resources Research Institute and Sea Grant College, University of Minnesota-Duluth and City of Duluth Stormwater Utility. Their webpage offers many educational and volunteer opportunities including a 5th grade curriculum specifically geared toward water conservation. http://www.lakesuperiorstreams.org/citizen/stowecurriculum.html

• The MN Ground Water Association (MGWA) is developing a whitepaper on the groundwater education gap. This information will be valuable for K-12 educators in the Minnesota Great Lakes Basin area. Once gaps are identified, additional curriculum and activities can be developed. Objective include:
  o Identifying the basic level of knowledge about groundwater that high school graduates should have to function as informed citizens when groundwater management issues may impact them.
  o Describing the gap in current K-12 education requirements that limit a high school graduate’s ability to meet the above objective and identify potential options for filling this gap.
  o Identifying the core curriculum and skills that a post-secondary student majoring in a groundwater related field should have to meet the needs of public and private sector employers.
  o Describing the gap in post-secondary education system that hampers Minnesota’s college graduates from being hired for in-state entry-level groundwater-related positions.
  o Incorporating the findings from the other four objectives into a discussion of alternatives that that may be used individually or incorporated into a statewide strategy for closing the gap.
Professional Training and Information Efforts

- Minnesota participates in the Coastal States Organization, a network of the nation’s thirty-five coastal states, commonwealths and territories supporting the sound management of coastal, Great Lakes and ocean resources. Minnesota contributed by:
  - Financially supporting the 2016 St. Louis River Estuary Summit and the 2016 St. Louis River Quest.
  - Engaging stakeholders regarding information needs for managing future coastal water resources in Minnesota.
  - Providing groundwater education workshops through the DNR, MASWCD and the Freshwater Society. One of the workshops was held in Duluth in Sept. 2016. They have also surveyed 359 SWCD staff to find out what they know about groundwater.

Figure 7 SWCD Training on Geologic Atlas

Publicity & Webpages

- Governor Dayton declared July “Smart Irrigation Month” and also proclaimed Water Action Week April 17-23 Gov. Dayton Water Action Week which included events and activities promoting water conservation.
- KARE 11 did a feature on irrigation efficiency July 2-3 Grow with KARE: Irrigation
- The DNR’s website devotes a page for Great Lakes Compact information and links.
- The DNR refers water suppliers and water users to the newly updated Metropolitan Council website’s Water Conservation Toolbox. The toolbox provides tips and resources for residents and businesses, suppliers, communities and learners. The water conservation toolbox offers everything from games and fun activities for kids to resources for elected officials and planning departments.

Business and Industry Education

- The Minnesota Technical Assistance Program (MnTAP) is an outreach program at the University of Minnesota that helps Minnesota businesses develop and implement industry-tailored solutions that prevent pollution at the source, maximize efficient use of resources, and reduce energy use and cost to improve public health and the environment.
- The DNR is also working with the MN Golf Course Superintendents’ Association on a Golf Environmental Stewardship Certification Program to educate and promote water efficiency on golf courses around the state.
5. Description of Minnesota’s conservation and efficiency program implementation timeline and status.

DNR Timeline and Status
The Minnesota DNR has a fulltime Water Conservation Consultant who works with staff, other state agencies, and organizations to direct and coordinate water conservation and efficiency efforts. Although a comprehensive water conservation plan has not been written for the state, a strategy is in place and is being implemented.

Water conservation in Minnesota is built on a foundation of knowledge about water use. The existing MPARS system and the soon to be implemented water conservation tracking system will provide a robust supply and demand assessment of end-use customers and businesses.

Data sources include Local Water Supply Plans (WSPs), consumption records, population demographics and business types. Since municipal water supplies are the largest water users, initial conservation and efficiency programs are being implanted in this sector. In the coming years, efforts will also be targeted at agricultural irrigation and industrial sectors. Below are some of the short-term program strategies and actions.

2015-2018 Water Supply Planning
Over the past two years, efforts have focused on providing workshops to the 360 water suppliers around the state serving more than 1000 people. The last series of workshops will be concluded in April, 2017. Water conservation training includes municipal leak detection and repairs, encouraging improved local ordinances, incentive programs, rate review, peak demand reduction and smart irrigation, and educational efforts. Water conservation goals have been set for all water suppliers. Completed water supply plans are due over a period of three years, with the last round due Oct. 15, 2018.

2015-2018 Water Efficiency Education and Outreach
An interagency task force meets five times per year to share success stories, network and develop new strategies for K-12 education and target audience outreach efforts. Planned actions include development of classroom curriculum, short videos, posters, web resources and displays.

2016-2018 Integration of Water Conservation into GreenSteps Cities Program
Initial steps have begun with this effort. Future actions include producing web materials and training for GreenSteps Cities.

2016-2018 Implementation of water conservation tracking system
Compliance assessment will be achieved with the new conservation tracking system. As part of their annual water use reporting, water suppliers serving more than 1000 people will have to submit an additional report that will track progress toward established water conservation goals.
2016-2018  Reuse Improvements
Interagency work will continue to clarify, modify, and improve water reuse codes, best practices, and health and safety guidelines.

2015-2018  Integration with Wellhead Protection
In Minnesota, wellhead protection planning is under the purview of The Minnesota Department of Health, while water supply planning and water conservation is under the DNR. These planning efforts are closely intertwined. Staff from both agencies are working to align requirements, funding, and priorities.

2018-2019  Comprehensive Planning
The process of creating a Water Use Efficiency Master Plan is challenging, complicated and costly. Development of a comprehensive water plan is estimated to take 10-16 months to complete, with the active involvement of a number of stakeholders, including:
- DNR Staff
- PCA, MDH, MDA and other Agencies Staff
- Elected Officials
- City Representatives
- Environmental Representatives
- Public Works and Watershed Representatives
- Business and Service Representatives

2018-2020  Irrigation and CII Conservation
Following the completion of water supply plan training, efforts will begin to work with the agricultural irrigation sector, which is the fastest growing water use sector in Minnesota. In several years, the DNR will concentrate water conservation programs with the state’s Commercial, Industrial and Institutional sectors (CII) in conjunction with the University of Minnesota Technical Assistance Program (MnTAP).

University of Minnesota Sea Grant Timeline and Status
- In April 2016, The University of Minnesota Sea Grant Program announced it is planning to fund six new research projects spanning the next two years. The program’s $1.5 million investment, which includes support for six graduate students, comes through the National Oceanic and Atmospheric Administration’s Sea Grant Program and is matched by the University of Minnesota. The funded projects address regional economic and environmental challenges relevant to Lake Superior and Minnesota’s coastal communities. Project summaries are at SeaGrant UMN