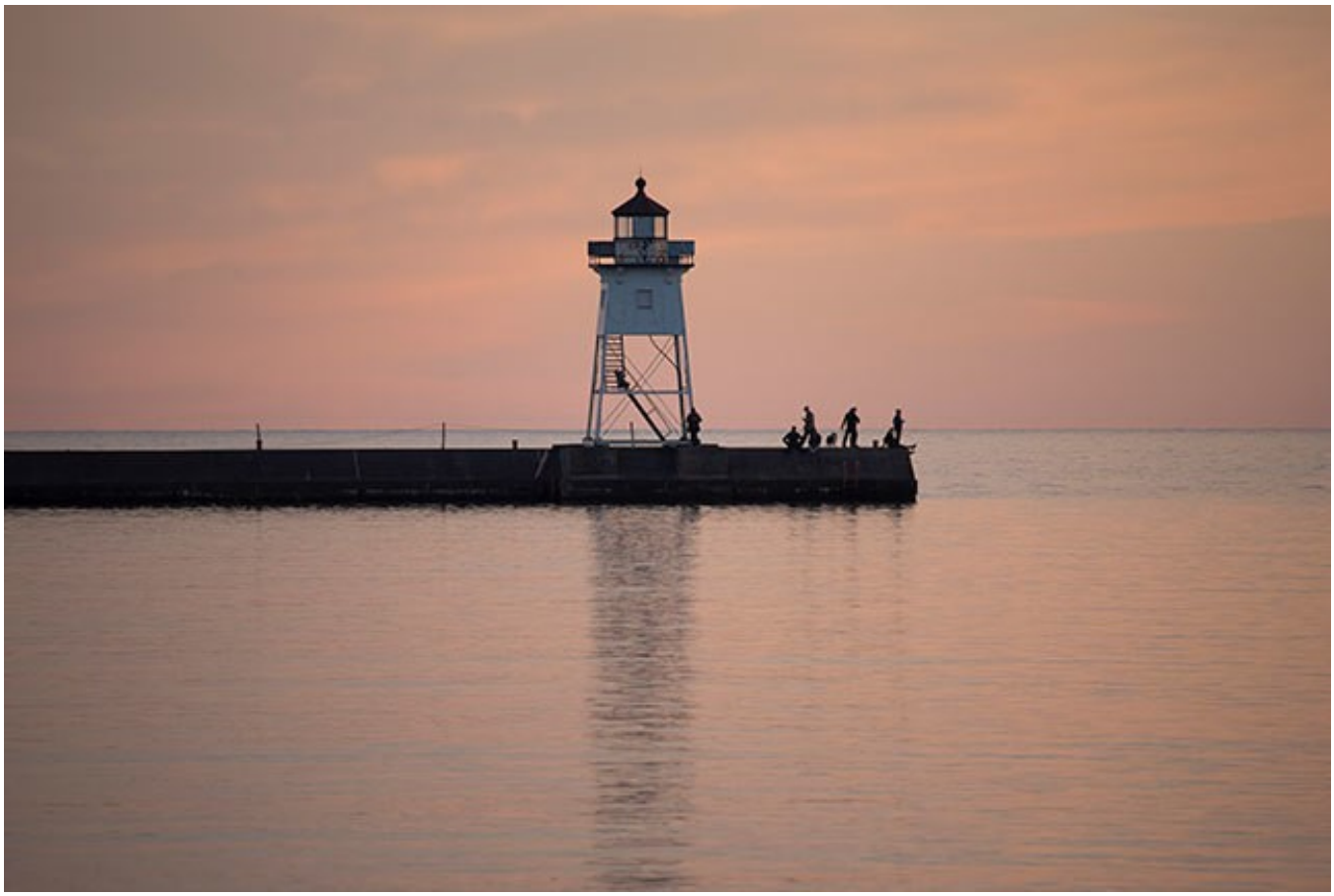
DEPARTMENT OF NATURAL RESOURCES

Great Lakes- St. Lawrence River Basin Water Resources Compact

Water Conservation and Efficiency Program Annual Assessment



State of Minnesota, December 2, 2021

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Cover photo: Grand Marais Harbor, Lake Superior in Minnesota, Deb Rose, Minnesota Department of Natural Resources.

Water Conservation and Efficiency Program Report Purpose

Each Party shall submit a report to the Council and the Regional Body detailing its Water Conservation and Efficiency Program to satisfy obligations included in the Great Lakes-St. Lawrence River Basin Water Resources Compact.

This report includes new actions that were started or accomplished during calendar year 2021. For previous water management, water conservation and sustainability programs, please see earlier reports. Although the Minnesota Department of Natural Resources (DNR) submits this report, we have captured some of the highlights from our cooperating partners including other governmental and non-governmental groups involved in managing and conserving Lake Superior and other Minnesota water resources.

Minnesota Highlights:

Drought - 2021 was the second consecutive dry year in much of the Lake Superior Basin in Minnesota. On August 12, all water suppliers in the Western Lake Superior Watershed received notices that 63% of the watershed was in severe drought. This moved all communities in the watershed to the Drought Warning Phase and water use restrictions were required. Over the summer, stream flows dropped below minimum protective flow levels throughout much of the basin, resulting in temporary permit suspensions. Moderate to Extreme drought conditions persisted through October.

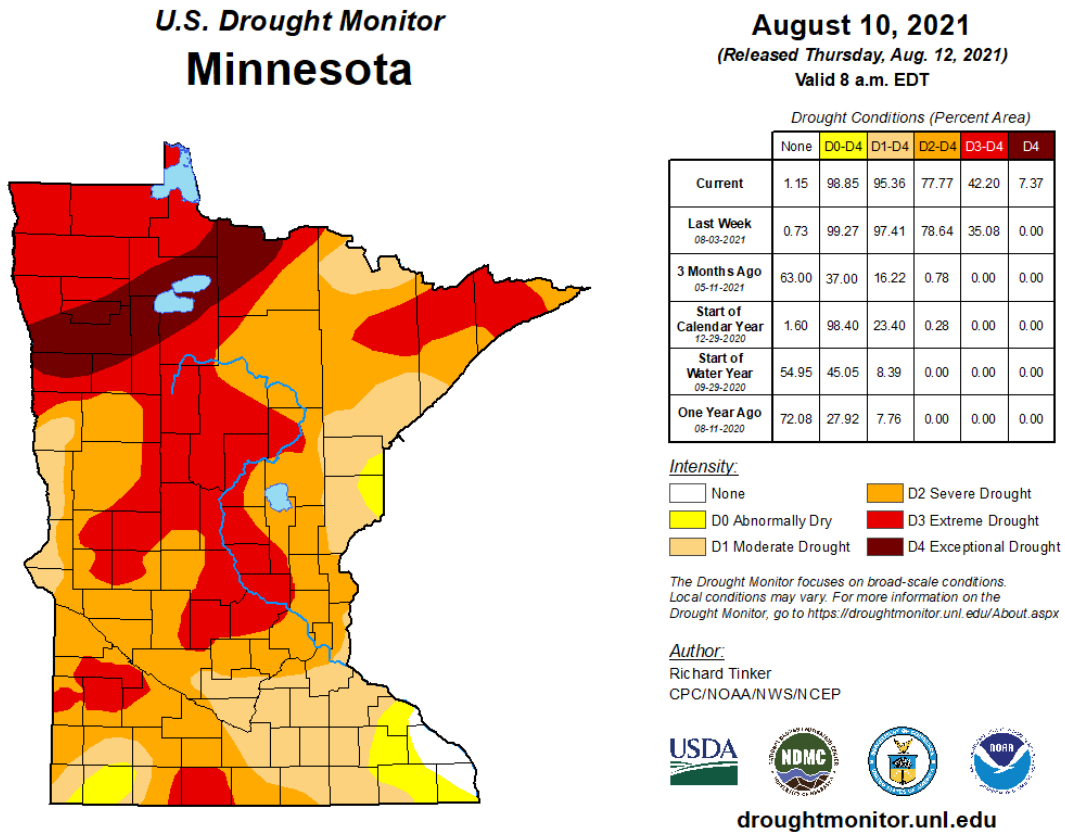

Figure 1. Minnesota Drought Map August 10, 2021 shows the Arrowhead region in moderate to extreme drought.

Water Conservation – As required by the State Drought Plan, all public water suppliers in the watershed were asked to implement water use reduction actions with a goal of reducing water use to 50% above January levels. Cities serving over 1,000 people were required to implement demand reduction measures from their Water Supply Plans. Major water conservation accomplishments and innovations include expanding the DNR Water Conservation Reporting system to include agriculture, as well as cities and industries. The University of Minnesota Turf Extension office promoted efficiency and water conservation solutions to reduce lawn watering.

Note: All underlined items are linked to the referenced websites

Lead agency and contacts

Minnesota Department of Natural Resources, Ecological and Water Resources Division (EWR) is the lead agency responsible for Minnesota's water quantity management and water conservation and efficiency programs. Contacts are:

- Tim Walz, Governor of Minnesota
- Jess Richards, DNR Assistant Commissioner jess.richards@state.mn.us 651-259-5025
- Randall Doneen, Conservation Assistance and Regulations Section Manager randall.doneen@state.mn.us 651-259-5674
- Carmelita Nelson, Water Conservation Consultant carmelita.nelson@state.mn.us 651-259-5034

Status of Minnesota's water conservation and efficiency goals and objectives consistent with Basin-wide goals and objectives

Compact § 4.2.2 calls for each state to develop goals and objectives. Minnesota has adopted the Compact's goals and the Council's objectives and satisfies this aspect of Compact § 4.2.2.

Water conservation goals in Compact Section 4.2.1 have been adopted in Minnesota Statutes section 103G.801. These goals include:

1. Ensuring improvement of the waters and water-dependent natural resources.
2. Protecting and restoring the hydrologic and ecosystem integrity of the Basin.
3. Retaining the quantity of surface water and groundwater in the Basin.
4. Ensuring sustainable use of waters of the basin.
5. Promoting the efficiency of use and reducing losses and waste of water.

Water conservation objectives in Compact Section 4.2.1 have been adopted in Minnesota policy. These objectives include:

1. Guiding programs toward long-term sustainable water use.
2. Adopting and implementing supply and demand management to promote efficient use and conservation of water resources.
3. Improving monitoring and standardizing data reporting among state and provincial water conservation and efficiency programs.
4. Developing science, technology, and research.
5. Developing educational programs and information-sharing for all water users.

Minnesota is actively moving forward with an increased emphasis on water conservation, not only with current water law, rules, policies and their implementation, but also with improvement plans that further both state and Compact goals. The laws cited and programs described below provide a framework for sustainable water management that promotes efficient use of the state's water resources. Statewide programs that monitor and protect water resources are managed by several Minnesota agencies, including the DNR, the Pollution Control Agency, the Department of Health, the Department of Agriculture, and the Board of Water and Soil Resources. The 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.

Water Conservation and Efficiency Program Overview

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 (primary regulatory statute)
- Minnesota Statutes, chapter 103G.271 Appropriation and Use of Water
- *Minnesota Statutes*, section 103G.801, Great Lakes – St. Lawrence River Basin Water Resources Compact
- *Minnesota Rules*, parts 6115.0600 – parts 6115.0600 – 6115.0810. Water Appropriations and Use Permits and Use Management Plans

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

Since 2015, the DNR has had a full-time Water Conservation Consultant developing and implementing the statewide water conservation program consistent with laws, the Great Lakes Compact, policies and management objectives. Minnesota's water conservation program is integrated with permitting and planning requirements.

Mandatory

- **Permits:** 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 is required through the permitting process (*Minnesota Rules,* part 6115.0770). Applicants 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).

- **Accuracy:** Water users must measure water volumes appropriated within 10% accuracy. Flow meters are required but other methods, such as timers or electrical use meters, can be approved for smaller water users.
- **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. The 2016-2018 plan template has a stronger emphasis on water conservation and efficiency. All Water Supply Plans for public water utilities along Lake Superior and from the inland communities within the basin were due October 15, 2018.
- **Low Flow Suspensions:** Surface water use can be and has been suspended during low flow periods in Minnesota, to protect downstream water needs and resources. Published procedures lay out when surface water users will be suspended. The DNR considers suspension of surface water appropriation permits within 81 watersheds when the average daily flow has been at or below Q90 in the respective major watershed Minnesota for 120 hours. Decisions about suspensions consider, but are not limited to, whether the use is consumptive, the priority of the use, and the extent to which the use is contributing to the flow in the watershed. Ecologically-based low flow or water level thresholds can be and have been developed for some surface waters.

Voluntary

- The Water Conservation Reporting system is voluntary, with all municipalities (large and small), commercial, industrial and institutional, and irrigators and agricultural users asked to report their conservation efforts.
- Most public water suppliers provide water conservation information to customers on their webpage, through newsletters and other outreach and educational materials.
- Cities are encouraged to become U.S. EPA WaterSense Partners.
- *Minnesota Statutes* that require demand reduction measures for new public water supply wells or increased water volumes.
- Some local governments have collaborated 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.
- On the DNR webpage, public water suppliers and the public are referred to the water conservation toolbox 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.

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

Many efforts are underway in all levels of government, educational institutions, nonprofit organizations, business and industrial sectors, and the grassroots level to guide Minnesota toward long-term sustainable water use. As shown below, Minnesota's program is consistent with the regional objectives in the promotion of environmentally sound and economically feasible water conservation measures.

Summary of Significant Water Conservation Accomplishments in the past year

Compact's Water Conservation and Efficiency Objectives	Summary of Minnesota's 2021 Efforts
1. Guide programs toward long-term sustainable water use.	• Trends in water use are declining for industry and remain constant for water suppliers (residential/non-residential). • Duluth finds high lead levels; currently in compliance. • Duluth hires first sustainability officer. • Habitat restoration work was completed at Kingsbury Bay and Interstate Island in the St. Louis River Estuary. • Many remediation and restoration projects underway. • Summer wildfires may impact water quality by flushing ash and sediment loads into streams and rivers.
2. Adopt and implement supply and demand management to promote efficient use and conservation of water resources.	• Water conservation notices were sent during drought. • Pandemic impacts businesses and water use. • Lake Superior municipalities continue to improve efficiency and reduce water loss. • Surface water suspension occurred as a result of low flows. • As of 2021, over 81% of the 16 cities in the Lake Superior watershed with populations over 1,000 have submitted their Water Supply Plan and had them approved. • Water efficiency grant program continues to provide residential assistance. • MnTAP sponsors interns to assist industries with water conservation and sustainability.
3. Improve monitoring and standardize data reporting within water conservation and efficiency programs.	• The statewide Water Conservation Reporting System is now fully developed and able to collect data from all 10,000 water permit holders on their water conservation and efficiency improvements. • MN Permitting and Reporting System (MPARS) update. • Monitoring and Surveys Unit and Groundwater Unit expanded and improved monitoring systems and increased data reports during the drought.

	• Lake level monitoring show that November is the third straight month that Lake Superior has been below average.
4. Develop science, technology and research.	• Many Coastal Program Grants to benefit public. • Digital Coast technology is a valuable resource. • UMN-Duluth research on preventing algal blooms. • Assist with several University research projects.
5. Develop education programs and information-sharing for all water users.	• Award-winning water conservation documentary. • UMN Mobile Turfgrass Irrigation Efficiency Traveling Trailer • The We Are Water traveling exhibit continues touring the state. • New online water education materials available. • Updated Drought webpage and GovDelivery information.

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

Sustainable water use involves ensuring there are adequate supplies of fresh clean water for present and future generations and for the environment. It addresses all basin waters from stormwater - carried as surface water in rivers, creeks and held in reservoirs and dams - and underground water resources.

Overview of Water Use Minnesota's Great Lakes Basin

- There are currently 151 active water appropriation permits in the Minnesota Lake Superior Basin.
- Minnesota is one of three Great Lakes states that reported 100% compliance in 2020 water use data reporting.
- Most of Minnesota's water use in the Great Lakes Basin is for industrial uses, power generation and Public water supply.
- Over the past three years, water use (withdrawals) for industrial and power generation purposes has declined markedly, while public water supply withdrawals remained fairly constant.
- Minnesota's non-hydropower withdrawals totaled 218 million gallons per day.
- Minnesota's diversions outside the basin totaled 15 million gallons per day. Most of these were grandfathered in since they were in place before the compact was signed. The water is withdrawn for mining tailings ponds at three facilities.
- Minnesota uses coefficients to calculate consumptive use for each reporting sector. For withdrawals and diversions, we use reported values from each water permit holder. For consumptive use, we take those measured values and estimate the consumptive portion using a calculation based on one coefficient for each reporting sector.

Notable changes from 2019 water use by Minnesota facilities include:

- A 50 percent (32 mgd or 120 mld) decrease in water use for thermoelectric power production (once-through cooling) due to decreased use at two utilities, consistent with standard fluctuations and market demand.
- A 16 percent (28 mgd or 197 mld) decrease in self-supply industrial sector water withdrawals, with corresponding decreases in consumptive use (3 mgd or 11 mld decrease). This reduction is largely attributed to reduced water use for mining.

- A 19 percent (391 mgd or 1480 mld) decrease in withdrawal for off-stream hydroelectric power production, a change resulting from normal fluctuations in river flow.

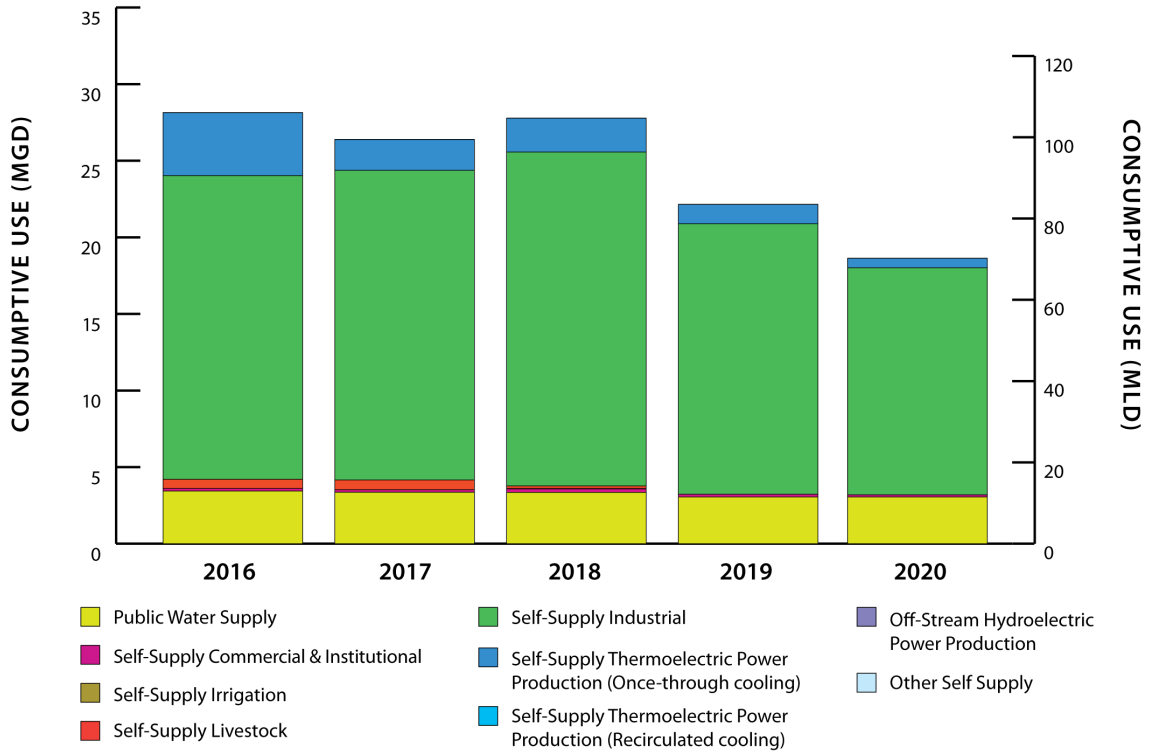

Figure 2. Minnesota consumptive use by sector the last five years.

City of Duluth Discovering High Lead Levels

There are approximately 28,000 water customers in Duluth and there are 4,600 city-owned lead service lines. This spring, testing in Duluth, found elevated lead levels in some homes built before 1930. Duluth tested lead levels in drinking water in 102 homes; 30 had lead levels above the current EPA limit of 15 parts per billion (ppb), and 49 homes were at levels above 10 ppb. City officials are asking residents who have or may have lead service lines to run a faucet for a few minutes every morning or buy a filter. A new EPA standard that will be enforced starting in 2024 will set 10 ppb as the trigger level, which would mandate the city add more thoroughly treat its water supply. Duluth is currently in full compliance with EPA and state regulations and the quality of the drinking water has not changed. However, recent testing provides information that would put the city out of future compliance when the EPA lowers its maximum lead threshold in a few years. According to census figures, 43% of Duluth homes (17,000 properties) were built before 1939. The number of properties with private lead service lines is unknown. The average cost of replacing the public and private connections is $8,000 and the city is anticipating needing $40 million to completely remove all lead service lines.

City of Duluth Hires first Sustainability Officer

Sustainability has long been an important value in the City of Duluth. Previous and current efforts include elimination of sanitary sewer overflows, a carbon reduction goal (80% reduction of carbon from city operations by 2050), the establishment of an Energy Fund, creation of a Natural Resources Management Program Plan, improving access to the outdoors through trail and park systems, and engaging in watershed outreach to protect

our streams and Lake Superior. Sustainability Officer Mindy Granley started with the city in January of 2021. Previously, Mindy served for 12 years as Sustainability Director at the University of Minnesota Duluth (UMD).

Minnesota Pollution Control Agency (MPCA) and DNR complete remediation and restoration projects in the St. Louis River Area of Concern and Estuary

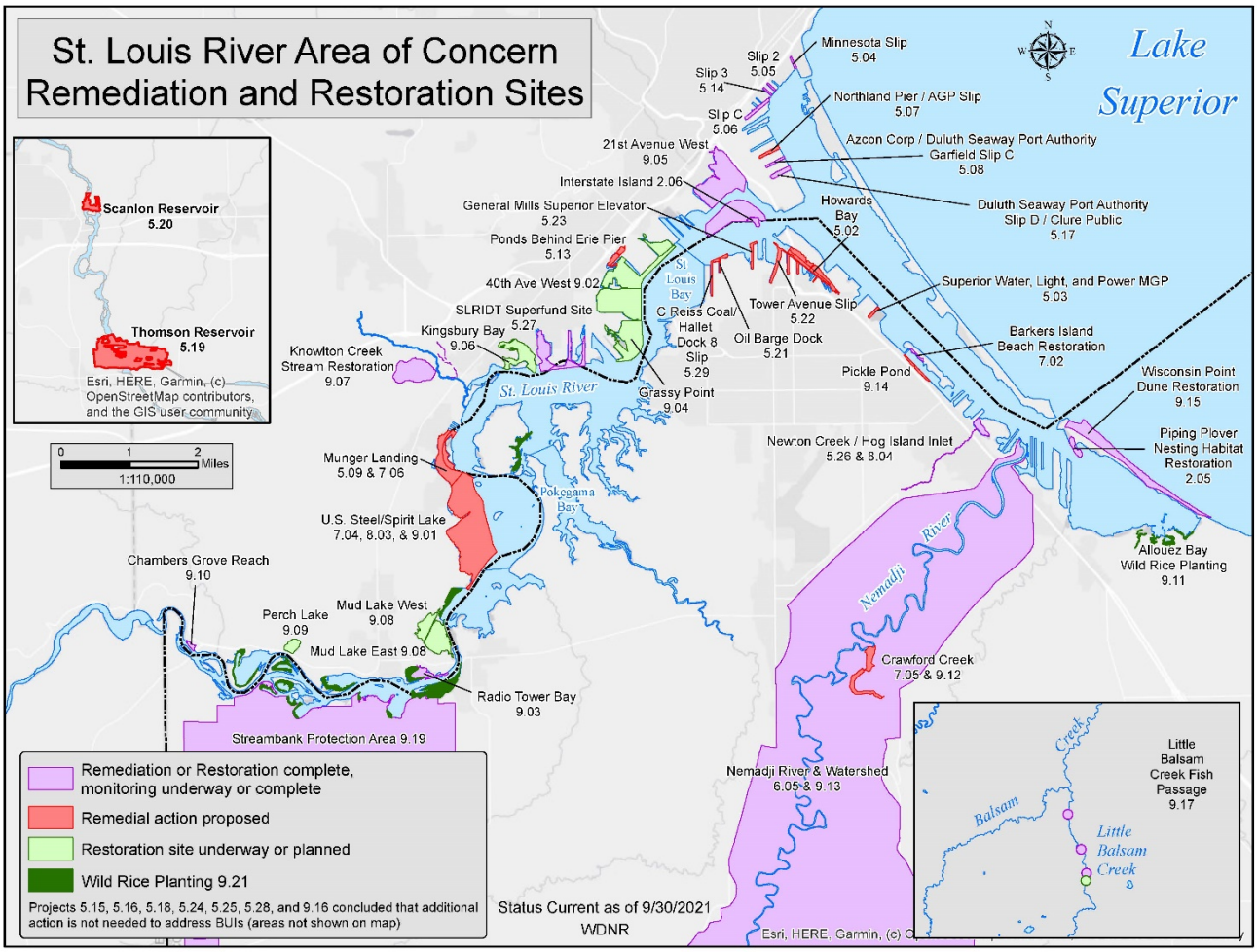

Figure 3. Map of the St. Louis River and estuary remediation and restoration sites.

Four important habitat restoration projects were completed in 2021 within the St. Louis River Area of Concern (SLRAOC) near Duluth. Over the last three years, about 230 acres of coastal wetland habitat were restored by the DNR at the Kingsbury Bay and Grassy Point sites, at a combined cost of $18 million.

Grassy Point restoration required the removal of approximately 130,000 yards of wood waste that was deposited into the river from two historic mills. The clean wood was used to construct an island to restore shallow-sheltered bay conditions there.

Figure 4. Sediment dredging and coastal marsh habitat restoration work at Kingsbury Bay was completed in 2021.

At Kingsbury Bay, approximately 140,000 yards of excess sediment deposited by upstream erosion was removed, along with about 16 acres of non-native vegetation, to create deep overwintering fish habitat and restore coastal marsh habitat.

At Interstate Island, the island was enlarged to add stopover habitat for Piping Plover and protected nesting habitat for the Common Tern was created, at a cost of $2.8 million. In April, common tern habitat restoration work was completed on Interstate Island. The now-rare common tern nests on this island comprise one of only two tern colonies remaining on Lake Superior. Interstate Island is a small island in Lake Superior that sits directly on the Minnesota and Wisconsin border, running through the Duluth-Superior harbor.

Figure 5. The Great Lakes common tern population is threatened or endangered in most of the Great Lakes states. Restoration at Interstate Island will improve nesting habitat. Photo by Carrol Henderson.

At 21st Avenue West, underwater shoals had been constructed to cap low-level contamination while restoring shallow, sheltered-bay habitat. This MPCA-led project was determined to be complete in 2021 after an

assessment of benthic habitat showed an improving trend. The cost of the 21st Avenue West project was $12.9 million, which included the value of the clean dredge material obtained at no cash cost to the project to create the shoals.

More detail and pictures about each project can be found in their story maps at St. Louis River Area of Concern: Addressing the Loss of Fish and Wildlife Habitat.

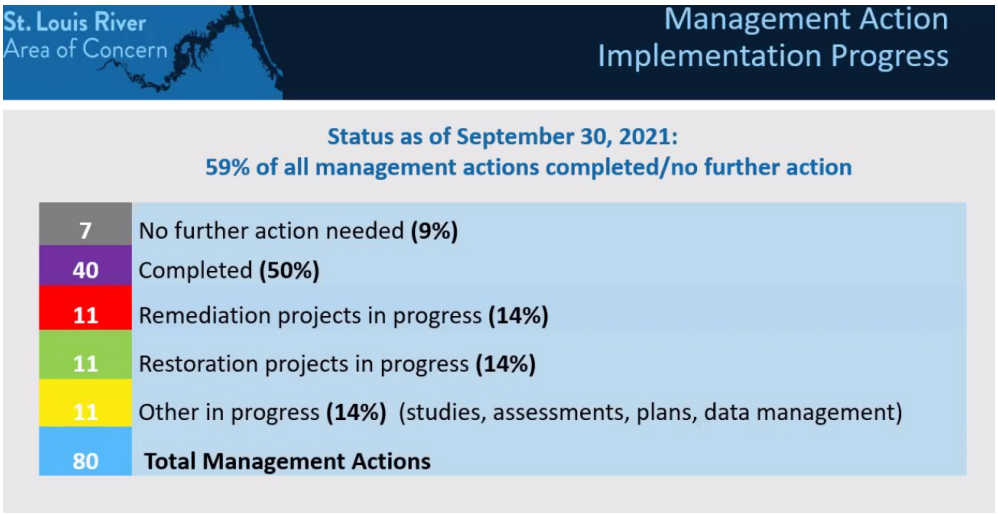

Figure 6. The multi-year, multi-agency efforts to clean up and restore the St. Louis River Area of Concern (SLRAOC) are showing tremendous progress.

Figure 7. The Fond du Lac Band of Lake Superior Chippewa, the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency and the Wisconsin Department of Natural Resources are the four coordinating agencies leading the St. Louis River Area of Concern work. The St. Louis River Alliance is the designated citizens' action committee for the SLRAOC that works to protect, restore and enhance the St. Louis River.

Other Restoration and Sustainability Projects

- In January 2021, EPA and MPCA signed a $16 million project agreement to remediate contaminated sediment in the ponds behind Erie Pier, two backwater ponds surrounded by shallow marsh wetlands in Duluth. The sediment cleanup will address a century's worth of contamination and protect public health and aquatic life. The project began in the summer of 2021 with the help of the U.S. Army Corps of Engineers. The project will remove approximately 45,000 cubic yards of contaminated sediment in the two ponds. This project is part of the larger effort to restore and protect the Great Lakes.

- Manoomin Restoration – Manoomin/Psiŋ (wild rice) is a sacred plant for Native peoples throughout the Great Lakes region. Manoomin has been declining due to multiple environmental stressors. Wild rice restoration continued this summer across the St. Louis Estuary. Project partners include the Fond du Lac Band of Lake Superior Chippewa, 1854 Treaty Authority, St. Louis River Alliance, Wisconsin DNR and Minnesota DNR. In 2021, it was difficult to harvest rice due to the drought. Partners were not able to seed as much as they hoped, but they were still able to seed about seven acres with 863 pounds of seed. The ultimate SLRAOC objective is to establish 275 acres of self-sustaining rice for habitat and food sources. *Kawe Gidaa-naanaagadawendaamin Manoomin* (First We Must Consider Manoomin/Psin) is a collaboration among tribes, intertribal treaty organizations and University of Minnesota faculty, staff and students that prioritizes tribal views on the cultural significance and ecology of Manoomin/Psiŋ (Wild Rice), and the policies related to it.
- Work continues on the U.S. Steel/Spirit Lake Site, where there are several areas of contamination to be remediated and several types of habitat to be restored across the project site. Funding is through the Great Lakes Initiative/Legacy Act and partnership with US Steel.
- Watershed restoration projects are taking place on several cold-water trout streams in Duluth. Amity Creek and Tischer Creek are impaired due to excess turbidity and efforts are underway by multiple agencies to determine the sources and solutions.
- Sea Lamprey control work resumed this summer. In 2021, we have seen that wounding rates are holding steady for lake trout and other species. All captured sea lampreys were placed in garbage bags and disposed of on the day they were collected. Granular lampricides were applied in streams during 2021, specifically to protect lake sturgeon.
- The DNR received $1.122 million in federal funding from NOAA on July 1, 2021. With it, the Coastal Program will deliver data and climate change technical assistance. The DNR will be supporting six pass-through projects:
    - The Arrowhead Regional Development Commission and partners will update the map layer documenting coastal erosion hazard areas for the entire coastline.
    - The Science Museum of Minnesota and partners will do research into didymo, a microscopic algae, on the North Shore.
    - The University of Minnesota and partners will identify conditions contributing to bacterial hazards in Lake Superior streams and beaches.
    - The University of Minnesota and partners will build a mobile stormwater testing laboratory to test filter materials for treating urban runoff.
    - The South St. Louis Soil and Water Conservation District will correct a fish migration barrier to Tischer Creek in Hartley Park and add a fishing path and platform near the site.
    - Hamline University and partners will expand education on water quality and climate resilience.
- The DNR received $306,650 in Great Lakes Restoration Initiative funding for a project to adapt living shorelines to the Great Lakes. The DNR will be piloting natural shorelines at four sites in the area – a state park, wayside rest, SNA, and public water access. A guide for native plant selection for shoreline restoration projects will also be developed.
- Great Lakes Restoration Initiative Funding - In early 2021, USACE received Great Lakes Restoration Initiative funding to lead a multi-agency, multi-year effort to forecast a range of future conditions (including water levels, wind, surge and ice conditions) that could inform detailed vulnerability assessments and resilient designs. In 2022, USACE in partnership with the Great Lakes states intend to initiate a larger regional watershed assessment, known as the Great Lakes Coastal Resiliency Study, to identify vulnerable resources, evaluate measures to improve resilience and develop a watershed plan to inform future investment.

- After restoration projects are completed, partner agencies continue to conduct post-construction monitoring to make sure sites are becoming viable.
- The South St. Louis County Soil and Water Conservation District is leading the St. Louis River One Watershed One Plan effort to develop a comprehensive watershed management plan that targets projects to protect and restore the watershed's most valuable resources.
- The MPCA has initiated the process to develop a mercury Total Maximum Daily Load (TMDL) for the St. Louis River Watershed. This TMDL will determine the mercury reductions needed for lakes and rivers in the St. Louis River watershed, to meet the water quality standard for mercury and support healthy consumption of fish.
- In association with the Lake Superior Lakewide Action and Management Plan (LAMP), MPCA staff are coordinating with the U.S. Geological Survey to monitor mercury in 21 U.S. tributaries to Lake Superior. Also, mercury isotopic analysis will be conducted in soil, leaf litter, and wet depositional areas across the U.S. portion of the basin. MDH secured funding to analyze fish for PFAS in water bodies within the Lake Superior Basin. Also, a proposal to monitor PFAS and other contaminants in Lake Superior tributaries was awarded to USGS with monitoring to begin in the fall of 2021. Evaluation of contaminants in Lake Superior sediments was funded for 2021; the University of Minnesota Duluth's Natural Resources Research Institute will lead this effort. Sediment sampling is underway, with analysis to follow into 2022.
- A grant for improving aquatic passage on a tributary to Lindstom Creek, a climate resilient tributary to the Baptism River, was funded by the National Fish Passage Program.
- A $701,000 Focus Area 3 proposal was funded under GLRI to upgrade stormwater infrastructure in Two Harbors, MN.

Figure 8. John Ek fire in the BWCA. August 2021.

Fires and Water

There were over 1,900 wildfires in Minnesota in 2021, contributing to 20 air quality alerts including unprecedented particulate readings at 422 micrograms per cubic meter in late July. In the Lake Superior basin, there were several significant forest fires in this highly forested area of the state. The Greenwood Lake fire (26,797 acres), the Whelp fire (50 acres) and John Ek fire (1,357 acres) all remained active for weeks. With the fires and the drought, the U.S. Forest Service closed the Boundary Waters Canoe Area Wilderness (BWCAW) for several weeks. Firefighters often rely on area lakes for firefighting and during active burning, ash settles on streams and lakes. There were no large rainstorms this fall, but spring melt may flush ash and sediment loads into streams and rivers. Timely rains in the region prevented a serious fall fire season.

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

Water Conservation During Severe Drought

2021 was the second consecutive dry year in much of the Lake Superior Basin in Minnesota. On August 12, 2021 all water suppliers in the Western Lake Superior Watershed received notices that the 63% of the watershed was in severe drought. This moved all communities in the watershed to the Drought Warning Phase and water use restrictions were required. Public water suppliers implemented water use reduction actions with a goal of reducing water use to 50% above January levels. Moderate to extreme drought conditions persisted through October.

Pandemic, Business, and Water Demand

- The pandemic caused unprecedented market decline for specialty paper company Verso Corp., causing the company to idle the plant and lay off 225 workers. Verso Paper mill was a major water user in Duluth. The mill was acquired by ST Paper, who received financial aid, and will be converting the mill to produce tissue.
- Counties along Lake Superior report another record-breaking year for tourism in spite of the continuing pandemic. With the exception of the two weeks when the Boundary Waters Canoe Area Wilderness was closed due to fire, the hospitality industry along Lake Superior has been exceptionally busy. Challenges remain with increased demand for outdoor destination, evolving COVID restrictions and an overall shortage of workers.
- Silver Bay reported that local industrial water use was down for several months due to COVID. However, 20 vacant homes were purchased and are now occupied. Commercial accounts are metered while residential accounts are billed at a flat rate.

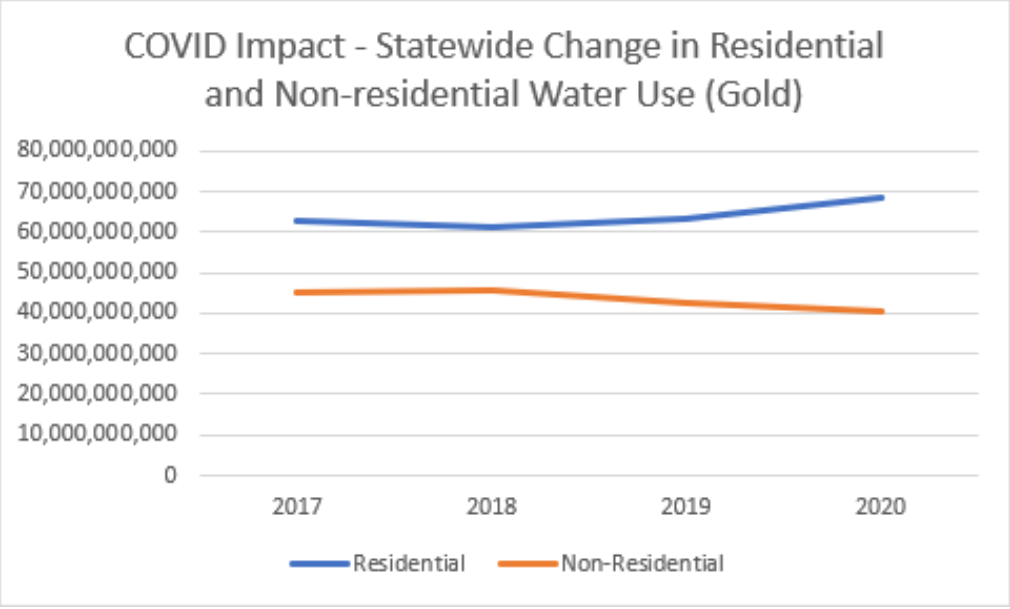

Figure 9. Statewide, non-residential water use is always less than residential use, but the change in water use patterns during the pandemic is fairly dramatic. From 2019 to 2020, residential water use increased approximately 8% in Minnesota and non-residential water use decreased nearly 5%. (For trend analysis, "Gold" indicates data from the cities that provided reasonable data all four years).

Lake Superior Municipal Water Supplier Efficiency Improvements

- The City of Grand Marais continues to work on water main replacements and is in the process of having AMI system meters installed. These improvements will reduce water loss and improve water accountability. Grand Marais also reports spending $350,000 repairing water system leaks saving six million gallons of water annually. Fire hydrant repairs are estimated to save an additional 10,000 gallons annually.
- Silver Bay reported the opening of a new municipal campground with 29 sites in June, 2020. Meters were installed but malfunctioned. Water usage was estimated per engineer's calculation. The RV dump station usage increased due to the new campground and increased RV travel in area. The city plans to install a meter.
- Two Harbors reports that they do an entire water leak analysis on their system and fix leaks that are found. The City knows that the majority of their water losses are due to the railroad being unmetered, as well as a leaking Pressure Reducing Valve (PRV) station. The leaking PRV station was fixed in fall of 2020, and they are watching to see how much water that saves annually as it was a large leak. The City will be looking at getting the railroad metered. Two Harbors has been awarded a $4.2 million Water Infrastructure Fund (WIF) grant from the state and will be working on a water treatment plant project to be bid in fall 2021.

Figure 10. During the drought of 2021, Gooseberry Falls was at very low flow in September. Photo by Michele Walker

Surface Water Suspensions During Drought

In order to safeguard water availability for natural environments, fish and wildlife habitat and downstream higher priority users, Minnesota law requires the DNR to limit consumptive appropriations of surface water under certain low flow conditions. The Minnesota DNR has developed guidelines for surface water appropriation permit suspensions during low and minimum flows in 81 major watersheds throughout the state. In order to reinstate surface water permits, at a minimum, river flows need to above the threshold flow for three consecutive days, but the flow must be high enough so all surface appropriations do not reduce the flow back below the minimum flow. Precipitation forecasts are also considered when determining whether permits should

be re-instated. These careful evaluations help to avoid re-suspending permits shortly after having them reinstated.

Here is the summary of surface water suspensions and reinstatements in the Lake Superior major watershed during 2021:

- Lake Superior – North watershed: Two surface water appropriation permit suspensions – golf course irrigation and sand and gravel washing suspended on August 17, 2021 and reinstated on October 14, 2021.
- St. Louis River watershed: Six surface water appropriation permit suspensions for golf course irrigation on June 22, 2021. These permits are still suspended as flows in the watershed continue below the minimum flow threshold (Q90). Four water appropriation permit holders (two wood products processing, one mine processing and one snow making) are implementing a contingency plan either through appropriating an alternate source of water or reducing their pump rate while flows in the watershed continue to be below the minimum threshold in the St. Louis River watershed.

Municipal Water Supply Plans

The DNR works directly with cities and towns throughout greater Minnesota to ensure their water supply plans emphasize water conservation and efficient use. Minnesota has 16 water suppliers in the Lake Superior Watershed that are required to complete Water Supply Plans. In the Lake Superior basin, over 81% have been approved. Staff continue to work with cities to make final edits, since an approved Water Supply Plan is needed for MDH funding or prior to modifications to a DNR water appropriation permit. Thirteen cities have approved Water Supply Plans, including Duluth, the largest city. Only one community has not submitted a water supply plan yet. The remaining communities are in the final editing phase.

Status of review and approval of 10-Year Water Supply Plans for the Lake Superior Watershed

City	Approved Y/N	Date of last action or approval
Aurora, City Of	Y	3/22/21
Babbitt, City of	N	Edits sent back 10/15/2019
Carlton, City Of	Y	12/19/16
Chisholm, City Of	N	Nothing received yet. Reminder sent 8/8/19
Cloquet, City Of	Y	6/22/18
Duluth, City Of - Public Works Dept.	Y	1/30/17
Eveleth, City of	Y	03/06/20
Gilbert, City Of	Y	1/8/2020
Grand Marais, City Of	Y	6/14/17
Hibbing Public Utilities	Y	7/8/2020
Hoyt Lakes, City of	Y	8/20/19
Mountain Iron, City Of	Y	10/15/19
Silver Bay, City Of	N	2/28/20 second draft received
Superior Water Light & Power Co.	Y	12/31/2019
Two Harbors, City Of	Y	12/19/16
Virginia Public Utilities	Y	5/22/19

Water Efficiency Grant Program

The Metropolitan Council was awarded a second water efficiency grant of $375,000 for 2020-2022. In 2021, there are 38 communities in the seven-county metropolitan area are currently participating. The funding goes to

communities to replace older, less efficient products with EPA WaterSense and DOE EnergyStar labeled products. Examples of qualifying products include irrigation controllers, toilets, spray sprinkler bodies, irrigation system audits, and EnergyStar clothing washers. Last year, the program replaced 1,914 devices for an estimated water savings of 43 million gallons/year. The Metropolitan Council's Water Efficiency Grant Program provides incentives to encourage efficient water use and conservation. Funding is provided by the Minnesota Clean Water, Land and Legacy Amendment funds. At this time, there is no water efficiency grant program available in Greater Minnesota.

Efficiency in the Commercial, Industrial and Institutional Sector

The Minnesota Technical Assistance Program (MnTAP) is an outreach program at the University of Minnesota that helps businesses develop and implement industry-tailored solutions that reduce water use, prevent pollution, and reduce energy use and cost to improve public health and the environment. The 2021 cohort of 15 young professionals is comprised of students from University of Minnesota, Twin Cities; University of Minnesota, Duluth; University of Wisconsin, Madison, and St. Thomas University. These interns bring expertise from the fields of Chemical Engineering, Chemistry, Mechanical Engineering, Bioproducts and Biosystems Engineering, Biomedical Engineering, Computer Science and Political Science/Sustainability Studies. By implementing the recommendations identified by the 2021 interns, host companies could realize 24 million gallons of water saved.

Figure 11. In 2021, MnTAP interns recommend water efficiencies that would result in 24 million gallons of water saved. (MnTAP photo)

Here are several projects with significant water efficiency components:

- **General Mills** in Golden Valley hosted an intern to lead a project to reduce water use at a food R and D center.
- **Great Lakes Coca-Cola** in Eagan hosted an intern to identify water conservation opportunities at a beverage bottling facility.
- **JIT Powder Coating** in Farmington had the intern identify ways to manage water and wastewater at a powder coating manufacturing operation.
- **MnTAP** hosted an intern focused on developing a database and related search protocols to implement a searchable, web-based water conservation/efficiency tool.
- **National Sports Center** in Blaine had the intern identify water and energy efficiencies at a Minnesota sports complex.

- **Living Greens Farm** in Faribault focused on projects to improve on water efficiency, energy conservation, and waste reduction.
- **Faribault Woolen Mills** in Faribault mapped how water is used in their process and identify opportunities to decrease process water intensity.

OBJECTIVE 3: Improve monitoring and standardize data reporting among State and Provincial water conservation and efficiency programs

Water Conservation Reporting System Fully Developed

The DNR has significantly improved the measurement and evaluation of water conservation and water use efficiency through a contract with Energy Systems Platform (ESP) to develop a new Water Conservation Reporting System. To our knowledge, it is the first and only statewide water conservation reporting system in the nation. The system is cloud-based for easy data entry and record management. The Minnesota Water Conservation Reporting System's annual reports help various sectors to learn more efficient and cost-effective ways to conserve our water resources. The data will continue to guide water use decisions in the future. As our population grows and climate changes, we may experience increased use and seasonal intensity of use in some parts of the state. Our efforts to strive for water efficiency and conservation in all sectors will help protect Minnesota's water supplies, industry, economies and natural resources well into the future.

Water Conservation Trends Data for Lake Superior Basin Communities

In the Lake Superior basin, 14 of the 16 communities in the have been voluntarily reporting their water conservation data. Only Aurora and Hoyt Lakes have not completed a report yet. Cities serving over 1,000 people began reporting water conservation efforts in 2018 (2017 water use) and communities serving under 1,000 people began reporting in 2020.

The following four year trend data show the need for some additional water accounting training, system leak fixing, and installation of meters, meter testing and repair.

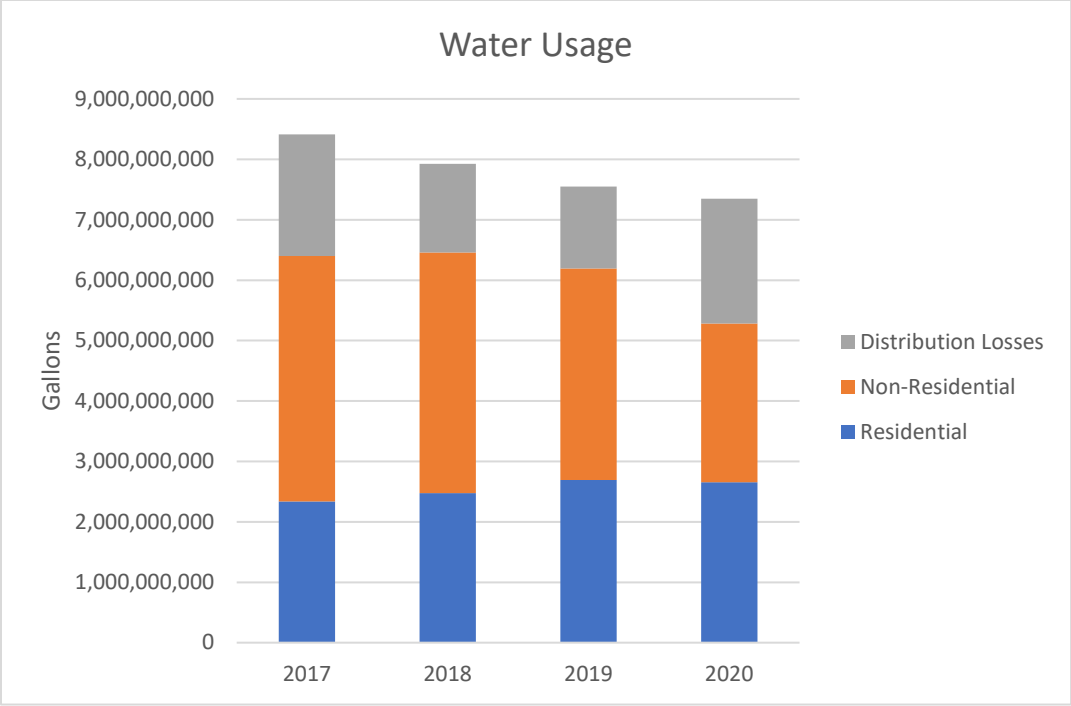

Figure 12. Communities in the Great Lakes basin have steadily reduced their total water use over the past four years. Residential use has increased slightly and non-residential water use has decreased.

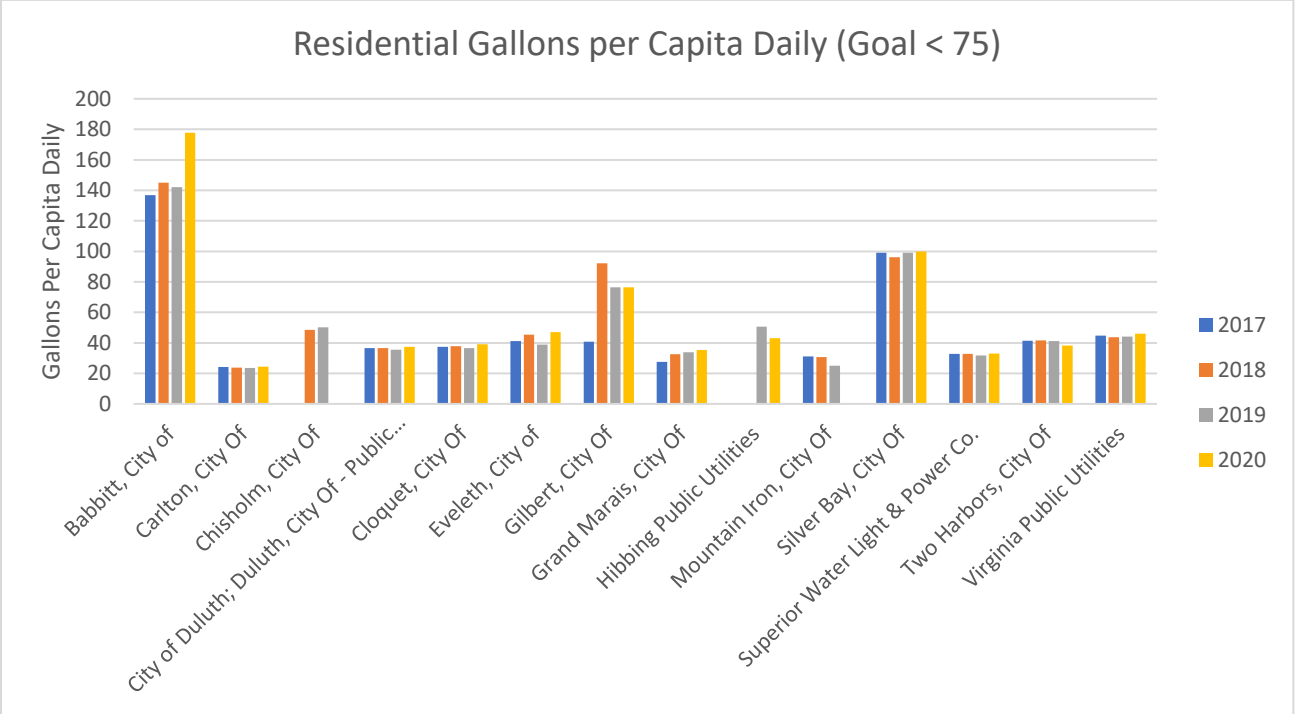

Figure 13. Most communities in the Great Lake basin do meet the goal of less than 75 gpcd. Note that the cities of Babbitt, Gilbert and Silver Bay do not have any residential water meters, so their numbers are likely an overestimation.

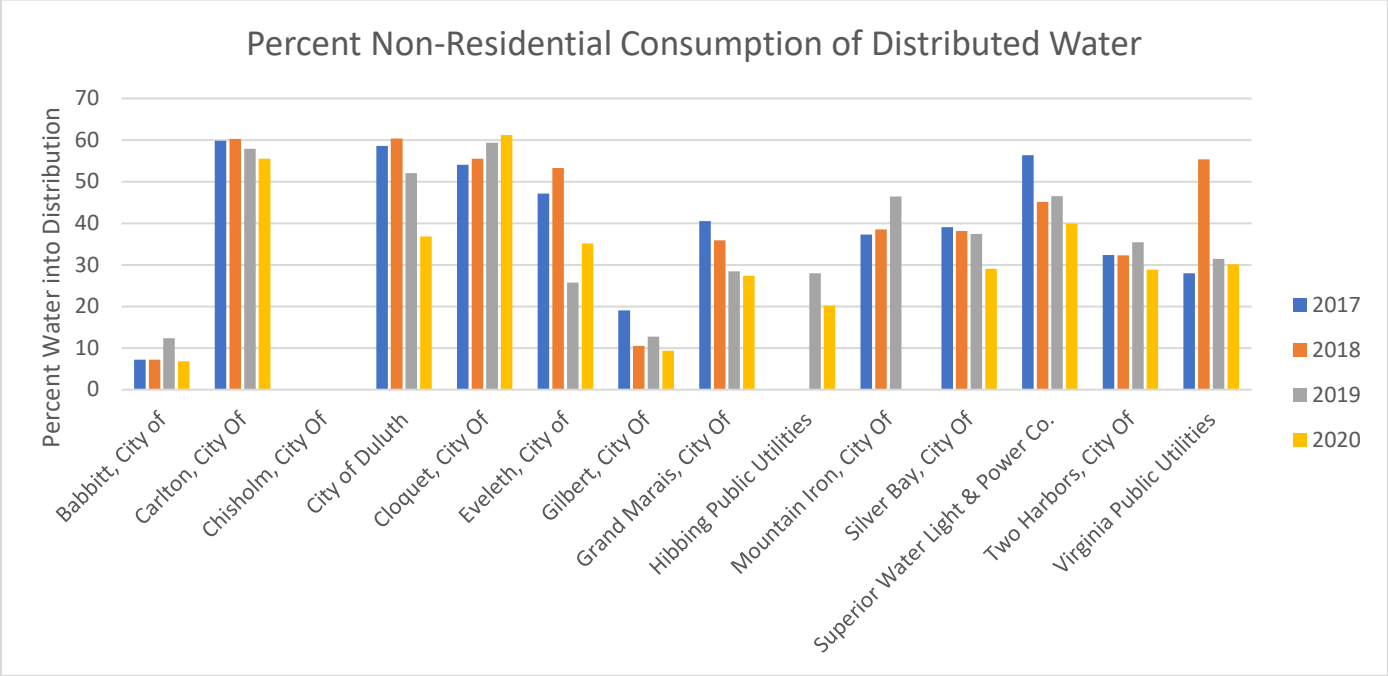

Figure 14. Statewide, non-residential water use is approximately 34%. In the Lake Superior Basin, over half of the communities have higher than the statewide average for non-residential water use.

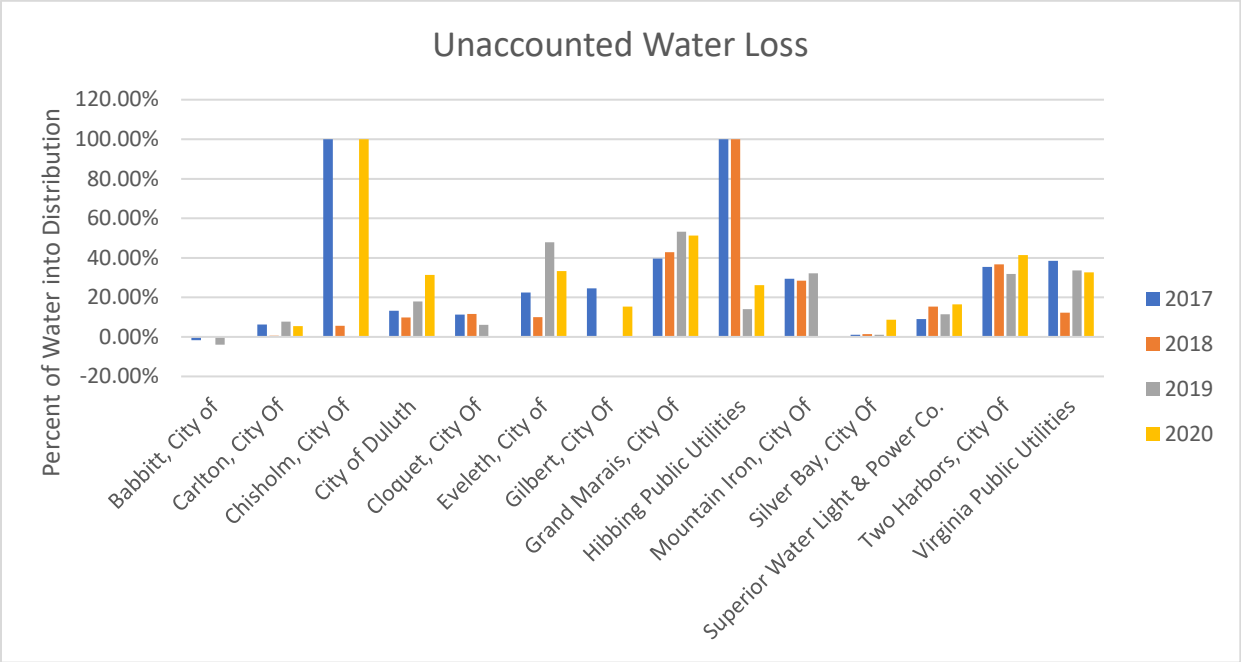

Figure 15. The goal for unaccounted for water loss is less than 10%. This graph shows that many of the communities in the Lake Superior basin need to tighten up their water accounting, increase leak repairs, check their meters and/or install additional meters.

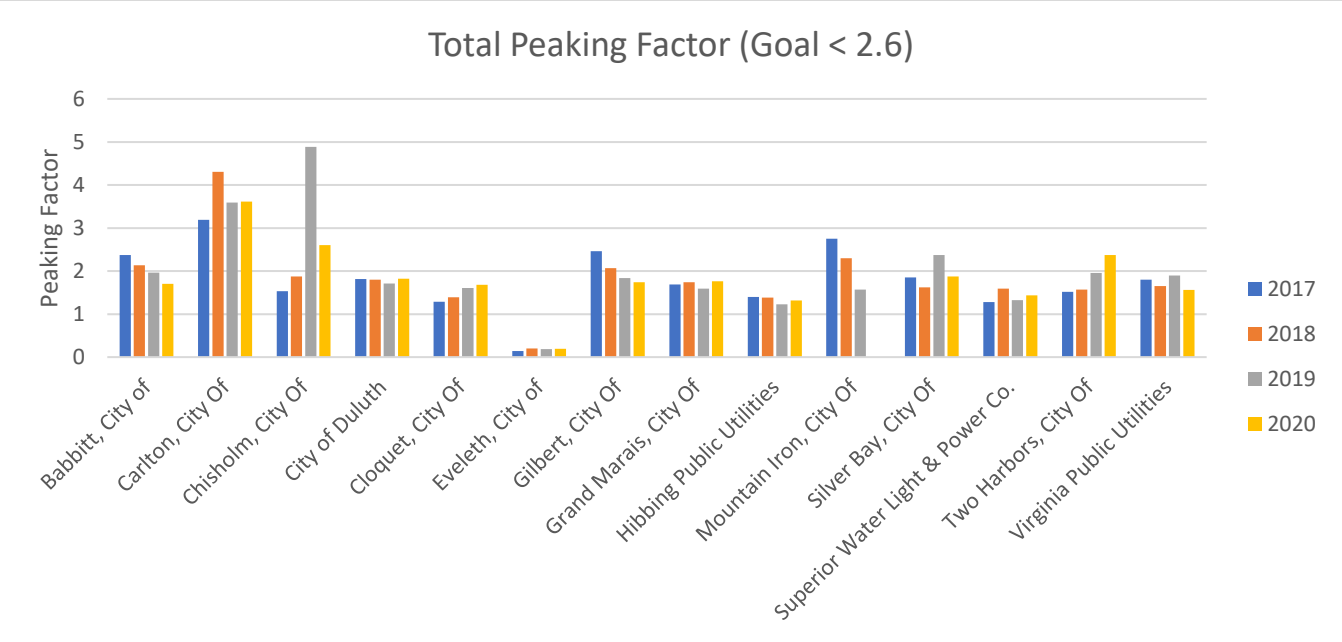

Figure 16. Cities in the Lake Superior basin do a great job keeping summer water use low relative to their winter use.

Minnesota Permitting And Reporting System (MPARS)

Minnesota tracks water use from the 'water use reports' entered by water appropriation permit holders into the Minnesota DNR Permitting and Reporting System (MPARS). This information is used to compile the withdrawal, consumptive use and diversion information reported to the Great Lakes Regional Water Use Database. For the broader Minnesota extent, the water use information is used in aggregate and detail form for planning, trend and change analysis purposes by DNR staff and other state and federal agencies.

Water Monitoring and Surveys Data

After a late start in fieldwork, the DNR Water Monitoring and Surveys Unit continued to collect data and provide information about stream flows and groundwater levels in Minnesota. This information helps the DNR and others carry out statutory responsibilities and water management strategies and programs. The team accesses and interprets data from approximately 270 stream flow network gauges and more than 1,100 groundwater observation wells.

Products related to the stream flow monitoring work include:

- Production and distribution of weekly statewide stream flow conditions reports during the open water season (typically April through October).
- Production of stream discharge and elevation hydrographs.
- Technical reports analyzing hydrology for special projects.
- Technical guidance materials explaining stream flow measurement techniques.
- Production and distribution of daily stream flow conditions reports during severe drought or flood events.

Several gaging stations in the Great Lakes Basin have been improved. Live readings from these gaging stations can be seen on the DNR's Cooperative Stream Gaging website.

Cooperative Groundwater Monitoring Program

The Cooperative Groundwater Monitoring (CGM) Program is a DNR network of over 1,100 water-level observation well (obwell) across the state. The DNR is working to increase the number of continuously monitored wells with hourly measurements, with the goal of addressing all active wells in the state. The DNR obwell network collects static groundwater-level data to assess groundwater resources, determine long term trends, interpret impacts of pumping and climate, plan for water conservation and evaluate water use conflicts.

Lake Superior is Below Average Lake Level

Due to the drought and low stream flows, Lake Superior dropped below its average water level during October 2021, falling two inches compared to the average monthly decline of about 1.2 inches. Since 2014, lake levels on Lake Superior have been above average. However, November 2021 is the third-straight month of being well below average. The lake usually declines from September to April and then rises over the summer. Lake Superior is now 2.4 inches below the average for Nov. 1 and is 11.4 inches below the lakes level in 2020.

OBJECTIVE 4: Develop science, technology and research

Coastal Program Grants

The DNR provided two funding programs for projects to protect and enhance Lake Superior. The STAR grants are small ($2,500 - $10,000) and grantees have six months to complete their projects. Projects must benefit the public. The Coastal Program can help with the costs to host or attend online conferences or training. Events must enhance coastal management skills for staff, boards or elected officials.

Digital Coast

This summer, NOAA's Office for Coastal Management gave a public presentation on using the Digital Coast resources. Digital Coast offers training, tools and resources for coastal communities, professionals and stakeholders. At the training, participants learned about what tools and data are available for the Great Lakes, saw demonstrations of using the site, and learned about available support for communities and stakeholders. The event was hosted by CHAOS (Coastal Hazards of Superior), a community for sharing knowledge and resources about natural hazards that affect Lake Superior's coastal communities.

UMN Duluth Studies Blue-Green Algae Blooms

Early July 2021 found microbiologist and aquatic ecologists at the University of Minnesota Duluth collecting samples and documenting new blue-green algae blooms at several locations along Park Point. Lab results confirmed it was cyanobacteria, which forms harmful algal bloom. The first documented blue-green algae bloom on Lake Superior formed in 2012 after massive flooding in the region. There was another large bloom in 2018. So far researchers have not found evidence of toxicity in any of the blooms on Lake Superior but extensive research is underway looking at causes and possible solutions.

Great Lakes Cities Coastal Resiliency Project

DNR staff assisted University of Michigan researchers in examining current coastal resiliency planning and implementation along with administrative, financial and political barriers to implementation. The aim is to identify gaps between community concerns for climate-induced changes to coastal areas and the resources available to these communities. The research also examines how social equity considerations are currently integrated into municipal resiliency planning, and how to strengthen these plans to better address how climate change exacerbates social inequities.

Economics of Great Lake Compact study

University of St. Catherine, economics class conducted research on the economic impacts of the Great Lakes Compact. Research involved policy models, multijurisdictional enforcement, and potential impacts of climate change, future diversion proposals, and the shipping industry.

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

There are numerous educational programs dedicated to water conservation education and outreach for all water users in Minnesota.

Award Winning Water Conservation Documentary

The South Washington County Telecommunications Commission won an Upper Midwest Emmy for their film about water conservation, called "Water: the Oil of Our Century." Several DNR staff and other state and local water experts were interviewed throughout the film. The film also won an Award of Excellence at the NATOA Government Programming Awards. Here's a link to the video.

We Are Water MN Traveling Exhibit

The popular We Are Water MN traveling exhibit and community engagement project invites visitors to reflect on the experiences of local community members and come to a deeper understanding of what taking care of water means to people. Science and history are also included via a 1,000-square foot, hands-on exhibit created by the Minnesota Humanities Center, MPCA, Minnesota Historical Society, and Departments of Health, Agriculture and Natural Resources. Demand and enthusiasm for the We Are Water traveling exhibit remains high and cities are willing to make accommodations to make the exhibit available. Exhibit space has been modified to allow room to space the exhibit for effective social distancing. Many events have moved online or are self-guided outdoors. The online story collection remains popular and educator resources have been expanded. A virtual training session and special COVID Handbook were created for docents and educators, including social distancing activities. The host sites are responsible for enacting social distancing guidelines.

Figure 17. In continued adaptation to the pandemic, the We Are Water traveling exhibit created an outdoor version that was hosted by the Hmong Museum in St. Paul.

The exhibit finished its 2020-2021 tour across Minnesota in four locations.

- Jan. 7 – March 8, 2021 - Hmong Museum in St. Paul
- March 11 – May 10, 2021 –Rochester Art Center
- May 13 – July 12, 2021- Minnesota Discovery Center in Chisholm
- July 15 – Sept. 13, 2021 - Meinders Community Library in Pipestone

Six additional tour locations have been selected for 2022, including the State Capitol January 20-Februray 28, 2022.

New Turfgrass Research and Education Trailer

The newest activity for the University of Minnesota Turfgrass Irrigation Efficiency Project is a research and demonstration area at the Minnesota Arboretum. The area has turfgrass and four different controllers. The goal is to show people how to program controllers and how to conduct irrigation audits. On the Metropolitan Council website, there are signs that communities can download and edit to spread the word on these activities. The UMN Turfgrass staff and others hosted a booth at the Minnesota State Fair Horticulture Building to share findings.

The latest water conservation education effort is a mobile turfgrass irrigation efficiency trailer to be used for mobile education. The trailer displays promote choosing optimal turfgrass species for a Minnesota lawn, discussing the many available irrigation technologies to help reduce water use, using proper mowing practices, and many other best practices. Their goal is to inspire change by teaching these simple practices.

Figure 18. The University of Minnesota Turfgrass Research Group, in conjunction with the Metropolitan Council, is offering onsite visits with their new mobile educational trailer. This trailer is designed to promote turfgrass irrigation efficiency best management practices. (UMN/Met Council)

New Online Water Educational Resources

- Project WET 2.0 training became available online in 2021. **Project WET** (**W**ater **E**ducation for **T**oday) is an international, interdisciplinary water-science education program used by a variety of water users. It is estimated over 20,000 Minnesotans annually use the Project WET resources in a multitude of ways, complementing other watershed programming. This award-winning, hands-on program is administered through the DNR by the Minnesota Project WET Coordinator.
- Rochester created excellent online water educational resources as part of hosting the traveling exhibit We Are Water Rochester MN.
- The St. Louis River Estuary National Water Trail received national designation in the fall of 2020. Maps and movie clips are now available. National Water Trail Info is available at St. Louis River National Water Trail

Drought Communications

As the extent and severity of drought expanded in Minnesota, the DNR quickly expanded its drought and water conservation communications. DNR staff developed a communications plan to specify processes, procedures, and current and reliable content. The Drought Preparedness and Response Communications Plan also include a proactive timeline of outreach and education. Education and information outreach included:

- Internal DNR Weekly Drought Updates began in early April.
- A public Weekly Drought Update. The updates included current drought classifications, streamflow and watershed reports, gage measurements at Mississippi River dams, fire danger and burning restrictions, sample lake levels and five-day precipitation forecasts. The DNR encouraged government, media and affected individuals to sign up to receive the email updates. These were published from early July to early November.
- Frequent media inquiries and interviews. Beginning in mid-June and throughout the summer months, drought and water conservation were frequent topics for many media outlets. Designated DNR subject matters experts fielded numerous daily media inquiries about climatology, changing lake and river levels, water conservation, regulations, and potential impacts on wildlife and recreation. These were coordinated with other agencies and organizations as needed.
- News releases about the initial drought warning phase and subsequent restrictive phase, regulations and water conservation measures concurrent with those phases, convening the State Drought Task Force, and impacts on businesses and recreation.
- Weekly social media posts on Facebook and Twitter featuring water conservation messages from July through mid-September.
- Extensively expanding the DNR Drought Webpage to present user-friendly drought information and links to water conservation measures.
- Water conservation email notices to all industrial and agricultural sector permittees, in addition to water conservation notices that were sent to cities in the basin. The Mississippi River Low Flow Management Plan was also implement and there were frequent communications with dam operators.
- Articles in specialty newsletters and magazines, including WaterTalk, the Irrigators Association of Minnesota, the Minnesota Rural Water Association, the Golf Course Superintendents Association and the MDH Community Public Water System newsletter.
- Convening the State Drought Task Force when the state reached the Drought Warning Phase, as required by the Statewide Drought Plan. The purpose of the Task Force is to provide a forum for information sharing, identification of needs, and coordination of actions in response to drought. The Task Force is made up of 34 representatives from state, federal, tribal and local agencies. The State Drought Task Force met via WebEx four times July through October. Meeting agendas and summaries were posted on the drought webpage and sent to the 1,500 subscribers to the drought email list.

- Weekly drought meetings with the Governor's Office and frequent communications with the U.S. Army Corps of Engineers, Departments of Agriculture and Health.

Presentations and Conferences

The August 2021 Minnesota Rural Water Association Conference became the first large in-person water conference since March 2020 and the pandemic. DNR staff presented water conservation and drought information at this conference and also at the October Minnesota chapter of American Water Works Association operators' school. Additional water conservation presentations were given at virtual events including the University of Minnesota Water Resources Conference. All state employees have been instructed to maximize telework until further notice and will continue to give presentations on various online platforms.

Description of Minnesota's conservation and efficiency program implementation timeline

Minnesota continues to explore opportunities to expand our water conservation efforts, empower and inspire people to save water, and seek new ways to conserve water in all sectors of society. Water conservation in Minnesota is built on a holistic foundation of knowledge about comprehensive water use. The DNR partners with other organizations to promote sustainable water use and provide clear information about how much water we have, how much water is used, and how to safeguard surface and groundwater availability.

The state has water conservation measures that are currently in place and integrated with the water appropriations permit program. Water supply plans, for public water suppliers serving over 1,000 people, have been updated and include new and improved water conservation, monitoring and management standards. State law requires water conservation rate structures for public water suppliers within the Basin or a water conservation plan.

Ecological and Water Resources Division Strategic Plan 2018-2028

The Division's 10-year plan has a **water resources goal** of "Minnesota water resources will be managed and used sustainably and the water quality will be improved and protected."

Relevant strategies to accomplish our water resources goal include:

- Collecting, analyzing and sharing important data on the status and trends of Minnesota's waters and their use to support decision-making, permitting and awareness.
- Engaging water users and other stakeholders to address challenges and opportunities in water use, watershed function and impaired waters.
- Using a systems-based approach for water management and conservation.
- Ensuring our permitting responsibilities are carried out efficiently, effectively and consistently with regulatory authority.

Minnesota Water Conservation and Efficiency Program Strategies

Timeline is until 2025 unless noted otherwise.

Strategies for Municipal Water Suppliers serving over 1,000 people

- Expand Water Loss Control education and outreach.

- Encourage improved metering and advanced metering infrastructure (AMI).
- Investigate time-based rates during peak demand periods.
- Support additional building codes and irrigation ordinances that promote demand reduction.
- Promote education and behavioral water efficiency strategies.
- Revise the Statewide Drought Plan to better align with the Water Supply Plan.

Strategies for Commercial, Industrial, and Institutional Sector

- Advocate for advance metering and additional sub-metering.
- Encourage technology upgrades to most water efficient technology – greening the grey infrastructure.
- Support building and water management improvements to capture water efficiency opportunities.
- Encourage adoption of commercial building water BMPs and benchmarking.
- Work with partners to expand and improve water efficiency and water reuse options.
- Encourage CII to integrate water storage and demand response where practical.

Strategies for Smaller Public Water Suppliers

- Participate in the Water Conservation Reporting System.
- Expand Water Loss Control education and outreach.
- Provide water conservation educational resources.
- Revise the Statewide Drought Plan to better prepare and assist small communities.

Strategies for Agriculture, Irrigation and Other Sectors

- Participate in the Water Conservation Reporting System.
- Promote agricultural water efficiency best practices.
- Promote golf course, sod production, and other irrigation efficiency practices and reuse.
- Encourage technology upgrades to most water efficient technology.
- Revise the Statewide Drought Plan to better prepare and assist the agricultural sector.

Strategies for Local Planning, Collaboration and Action

- Coordinate and promote water efficiency – showcase best practices.
- Continue to define local thresholds for surface and groundwater resources.
- Leverage sources of funding for implementation.
- Resilience Planning, Adaptation Training, and increased understanding of the implications of the Water-Energy Nexus and climate change.
- Advance local water conservation planning and implementation.
- Pursue near-term actions at the local level – rebate programs, etc.