MINNESOTA WATER CONSERVATION REPORT 2018

DEPARTMENT OF NATURAL RESOURCES

ESPWater™

November 4, 2018

Contents

Figure 1. Water is essential to all living things. Using this precious resource wisely is everybody's responsibility.

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This information is available in an alternative format upon request.

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- American Water Works Association
- Alliance for Water Efficiency
- Legislative Citizens Commission on Minnesota Resources
- League of Minnesota Cities

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- Eden Prairie Utilities Division
- Montrose Public Works
- Rochester Public Utilities
- Shoreview Utilities Division

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Figure 2. Four cities pilot tested the new Water Conservation System and offered valuable suggestions.

Executive Summary

The Minnesota Department of Natural Resources (DNR) is responsible for managing the use of water throughout the state. A DNR water appropriation permit is required to appropriate more than 10,000 gallons per day or one million gallons per year.

This report is the first comprehensive effort to monitor water supplier conservation efforts from source to consumption, with the goal of determining the impact of conservation efforts in the state.

The Minnesota Water Conservation Reporting system, developed by Energy Savings Platforms LLC (ESP) under contract with the DNR, is an online reporting system that collects annual data from Minnesota water suppliers (utilities), stores the results in a central database in the Cloud, and enables statewide analysis of conservation efforts. The Water Conservation Reporting system is powered by ESPWater™ software.

While the collection of data in a central location provides value to DNR and stakeholders, the Water Conservation Reporting system also provides value back to the utilities in exchange for their data entry effort. This system:

- Allows utilities to view information supplied by other utilities *(what are others doing?).*
- Creates a common "schematic" of water flow metrics to allow utility-to-utility comparison *(a shared perspective of water management).*
- Includes a simple dashboard to indicate the utility's performance relative to DNR conservation goals noted below *(how are we doing?).*

The Water Conservation Reporting system is now the primary state repository for water conservation metrics that apply to community water suppliers.

In early 2018, the DNR/ESP team rolled the Water Conservation Reporting system out to 348 Minnesota utilities, provided training and gathered 2017 utility operational data. This report includes an analysis of the results.

Relative to the DNR's conservation goals, the 2017 data indicate:

- In total, statewide utilities have a water loss of 8.88%, meeting the DNR conservation goal of no more than 10% water loss.
- The statewide value for residential consumption, Gallons Per Capita per Day (GPCD) is 52 gallons, meeting the DNR conservation goal of no more than 75 GPCD.
- Peak Daily Use (maximum gallons per day during the year, divided by average daily use) is 2.36, meeting the DNR conservation peaking factor goal of no more than 2.6.

These data indicate good performance overall for Minnesota utilities in 2017. Of course, some utilities met these goals and others did not. These data will help utilities better understand where to focus their conservation efforts to meet these water conservation goals and further improve statewide performance.

Background

The Need for Conservation in Minnesota

Minnesotans have historically benefited, and continue to benefit, from the state's abundant water supplies. In some areas of the state, however, supplies are becoming increasingly limited by constraints on quantity and/or quality. Causes of water supply limitation may include:

- population increases
- economic trends
- uneven statewide availability of groundwater
- groundwater being withdrawn at a faster rate than recharge can occur
- climatic changes
- degraded water quality

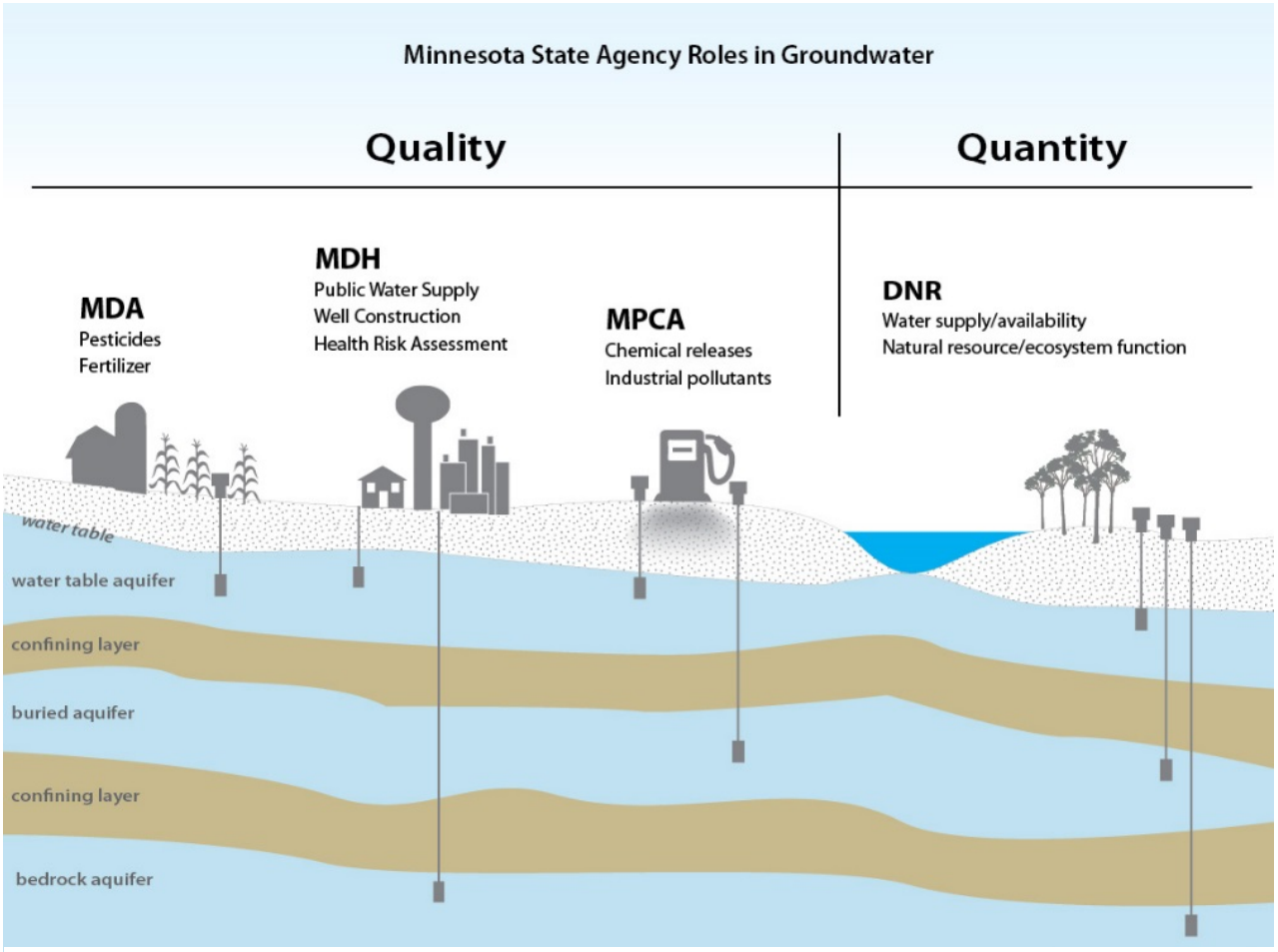


Figure 3. In Minnesota, multiple state agencies have responsibilities for water resources. The DNR is responsible for water use.

Water Regulation

Although several state agencies are responsible for water regulation (Figure 3), the DNR is the only state agency responsible for regulating water use and is mandated by statute to insure the sustainability of

water resources. The DNR uses seven core strategies to ensure water resources are used sustainably. One of the seven strategies is *promoting the wise use of groundwater and implementation of water conservation practices*. The DNR will collect water conservation achievements from water suppliers on an annual basis as part of this strategy.

The DNR influences water use through its permit programs, information collection and analysis activities, law enforcement responsibilities, education and technical assistance. The law requiring demand reduction measures was revised during the 2012 legislative session to require public water suppliers serving more than 1,000 people to implement measures that reduce the demand for water in their community (see Minnesota laws here). Implementing these measures reduces water losses, peak water demands and nonessential water uses. Without these measures in place, a public water supplier cannot get approval to drill new wells or increase their permitted water volume. Public water suppliers' 2016 Water Supply Plans include these conservation requirements.

Relevant Legislation

Several statutes and rules require water conservation, efficiency and sustainable water use. The DNR is continually seeking to improve water management, to help ensure a sustainable future where everyone can count on reliable water resources.

Primary Legislation:	
Water Policy and Information	Minn. Stat. chapter 103A
Waters of the State	Minn. Stat. chapter 103G
DNR to develop a water conservation program	Minnesota Statutes § 103G.101
Assurance of supply	Minnesota Statutes § 103G.265
Appropriation and Use of Water	Minnesota Statutes § 103G.271
Water Supply Planning and Demand Reduction law	Minnesota Statutes § 103G.291
Water Appropriations and Use Permits and Use Management Plans	Minn. R. parts 6115.0600 –6115.0810
Related Legislation:	
Water Planning and Project Implementation	Minn. Stat. chapter 103B
Protection of Water Resources	Minn. Stat. chapter 103F
Groundwater Protection	Minn. Stat. chapter 103H
Wells, Borings and Underground Uses	Minn. Stat. chapter 103I
Environmental Rights	Minn. Stat. chapter 116B
Environmental Policy	Minn. Stat. chapter 116D

- There were 9,707 active water appropriation permits at the end of 2017.
- There are 680 municipal/public water supply permits using more than 10,000 gallons per day or 1 million gallons per year.
- 96% of public water supply permits have groundwater as their source of water. Some large communities, including Minneapolis, St. Paul, Duluth and St. Cloud rely on surface water.

Ten-Year Water Supply Plans

Beginning in the 1990s, Minnesota water suppliers serving more than 1,000 people have been required to submit a Water Supply Plan every ten years to the DNR (Minn. Stat. § 103G.291). Water Supply Plans provide a means for communities to be proactive in their management of sustainable drinking water for citizens, businesses and industry. In the current round of updates, communities are submitting Water Supply Plans between 2016 and 2018.

In their Water Supply Plans, communities are asked to describe their existing and planned water supply, and to develop emergency and conservation plans. From 2015-2017, DNR staff met with water suppliers all over the state to discuss water supply planning and water conservation. At these workshops, water suppliers shared tips and suggestions with each other about how to improve their water supply systems and reduce water loss. Many water suppliers said they needed more information on water conservation.

The Water Conservation portion of the Water Supply Plan identifies objectives that all water suppliers must address to meet the statutory requirements for demand reduction measures. The Water Supply Plan template identifies objectives for each ten-year period, to promote efficient use of water and provide a water conservation plan for each utility. These objectives are:

- Objective 1: Reduce unaccounted water loss to less than 10%.
- Objective 2: Achieve less than 75 residential gallons per capita per day (GPCD) of water use.
- Objective 3: Achieve at least a 1.5% annual reduction in non-residential per capita water use.
- Objective 4: Achieve a decreasing trend in total per capita per day.
- Objective 5: Reduce ratio of maximum day to the average day demand to less than 2.6.
- Objective 6: Implement demand reduction measures.
- Objective 7: Implement strategies to reduce water use and support wellhead protection planning.
- Objective 8: Identify how success in meeting these objectives will be monitored and tracked over the next ten years.

In previous decades, DNR staff followed up on conservation efforts whenever a water supplier needed to add a well or increase their volume as required in statute. DNR staff would refer to the supplier's Water Supply Plan to see if they were implementing demand reduction measures. If not, the DNR worked with them prior to approving a permit amendment

Figure 4. Statewide, water supply may be limited by population increases, economic trends, uneven statewide availability of groundwater, climate change and degraded water quality.

The Need for the Water Conservation Reporting System

DNR saw a need for a more coordinated, accessible approach to reporting water conservation. The Water Conservation Reporting System was developed to enhance suppliers' ability to evaluate, manage and measure their water conservation efforts. Stakeholders were engaged at the beginning of the development process, to ensure achievable measures and enhance stakeholder buy-in and compliance. This system will address the following water conservation needs.

- Utilities, the DNR and stakeholders need information on water use and trend analysis to manage the resource.
- Utilities lacked an easy way to learn from other utilities. The Water Conservation Reporting System connects utilities with data and insight from other utilities.
- Better management of resources will help water suppliers prepare for droughts and water emergencies.
- Over time, trends will provide valuable insight on water suppliers' water use and conservation.
- Better water management will contribute to sustainable aquifer levels, avoiding well interference and water use conflicts and reducing the need to drill new wells or expand system capacity.
- Data will help inform policy decisions on Minnesota's water resources.

Now, for the first time, the DNR has a system for compiling the conservation efforts and tracking success on a statewide basis. The Water Conservation Reporting System will assist water suppliers as well as the DNR in assessing successful implementation of Water Supply Plans.

Data Collection Design

Water Conservation Reporting Goals

The Water Conservation Reporting System provides monitoring, tracking and standardized data reporting among permit holders for water conservation and efficiency. The Water Supply Plan – Part 3, "Water Conservation," is a key driver. The goals of Water Conservation Reporting are to:

- Measure the impact of conservation efforts in Minnesota over time.
- Encourage and enable best practices in water management.
- Analyze trends.

Measure the Impact of Conservation Efforts in Minnesota over Time

To measure conservation impact, basic water accounting data will be gathered from each water utility each year.

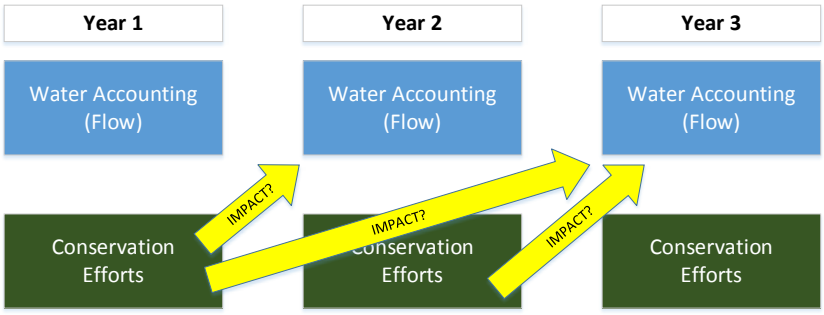


Figure 5. Conservation efforts in one year can affect water use in future years. If reasonable data can be gathered, water losses isolated, and weather and population normalized, one can measure the accumulated impact of conservation over time.

If the water accounting data are accurate over time, it is possible to normalize water usage by weather and population. Best practices meter management can isolate unreported water loss. The remaining change in water usage over time is attributable to conservation efforts.

Encourage and Enable Best Practices in Water Management

The utilities' ability to manage water has a significant impact on one of Minnesota's most important resources. The Water Conservation Reporting system will help utilities improve by providing:

1. A common data structure (or perspective) that shows their water management performance.
2. A statewide view of utility performance and conservation ideas and actions[1].
3. A utility dashboard with key performance metrics defined by the Water Supply Plan[2].

Analyze Trends

Ideally, future versions of the Water Conservation Reporting system will provide individual utility feedback and recommendations on the web site, along with an annual data summary and trend analysis.

[1] Each utility on the Water Conservation Reporting system can view peer utility data across Minnesota.
[2] DNR Water Supply Plan Template link here.

Data Collection Design Goals

For long-term success, the Water Conservation Reporting system features:

- An online website with authenticated access for water suppliers to enter their data.
- A centralized, structured database in the cloud.
- Convenient 24/7 access.
- User-friendly data entry.
- Saving partial data entry for later completion.
- Automatic calculation of derived values.
- A dashboard with key performance metrics.
- Easy interface to ask questions of DNR or Water Conservation Reporting system staff.
- Defined data collection periods.
- A comprehensive rollout and training plan to reach 348 water supplier organizations.
- A convenient link from MPARS or the webpage ESPWater to access the Water Conservation Reporting System.
- Individualized water supplier reports.

Figure 6. There were 348 utilities invited to participate. 94% created an account and entered data.

Scope of the Data

Targeted Utilities

The target utilities are those permitted water suppliers that serve more than 1,000 customers. These are the same utilities that are required to submit a Water Supply Plan.

Data to Collect

Collection of numeric data, rather than text, enables meaningful analysis. The data are split into three different groups:

- Water Accounting
- Conservation – Direct
- Conservation – Indirect

Water Accounting

Basic water flow data are collected from each utility. Figure 7 depicts the high-level flow model, beginning with the water source and ending at consumption.

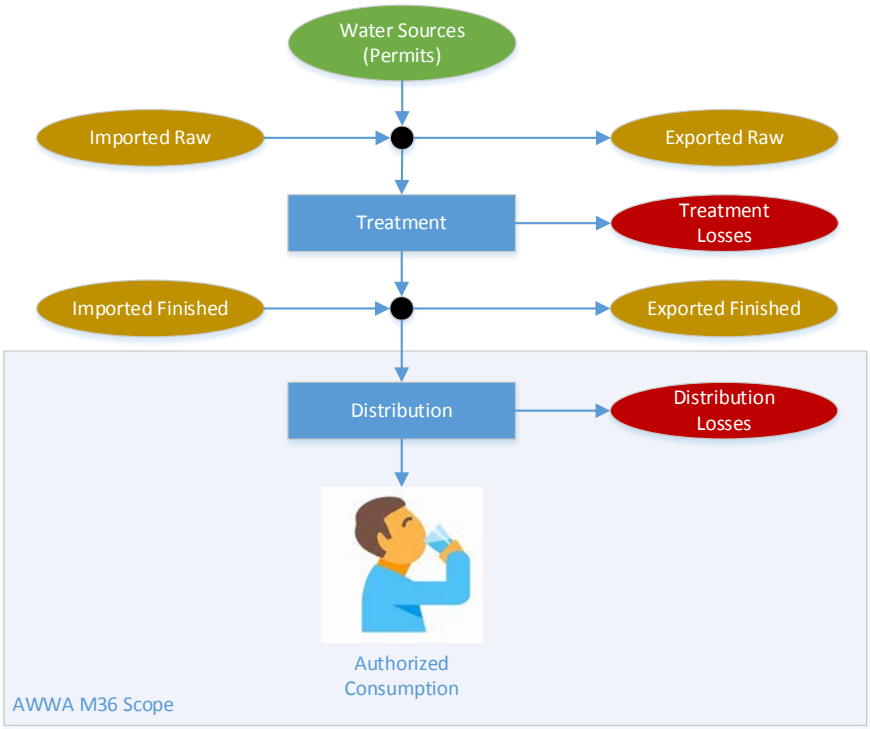


Figure 7. The scope of the water accounting data entry starts at the water source and ends at consumption. Water is typically pumped from a natural resource (ground water or surface water). This raw water is passed through a treatment process to produce finished water, which is distributed to utility customers.

The water accounting data definitions start with the basic water accounting categories gathered by the American Water Works Association (AWWA) M36 Water Audits and Loss Control programs. The AWWA software helps utilities discover how much water the utility is losing due to leakage, meter error or water theft. It also helps them learn how to determine the cost of uncaptured revenue. AWWA's fourth edition M36 manual and software provides water audit methodology and some of the best loss control techniques. The AWWA water audit scope is the physical utility distribution system.

Data fields were added to include:

- Annual water pumped from the sources
- Annual
    - Imported raw (untreated) water from each source
    - Exported raw water to each source
    - Imported finished (treated) water from each source
    - Exported finished water to each source
    - Peak day flow
- Monthly
    - Flow into distribution
    - Metered water for residential use
    - Metered water for non-residential use

Water losses are not reported directly but are derived from the data gathered above.

Conservation – Direct

The Conservation – Direct category is designed to collect numeric information about applied conservation efforts that have measurable results. These conservation efforts are broken into projects occurring before the customer meter and projects occurring after the customer meter.

Conservation – Indirect

The Conservation – Indirect category is designed to collect numeric information about conservation efforts that do not result in easily measurable savings, such as ordinances, education and outreach efforts.

Figure 8. Direct Conservation projects are efforts undertaken to reduce water loss, improve efficiency or reuse water where the gallons saved can be measured or estimated.

User Input and Interface Design

Stakeholder Meetings

A series of stakeholder meetings was held to refine the data to be collected from each utility, the data definitions and to guide development of a new dashboard page.[3] Meeting attendees included representatives from institutional stakeholders, large metro water utilities and rural utilities. Based on feedback, a help system was also created and integrated into the site, including comprehensive definitions for each data field, to ensure that users entered the correct data.

Pilot

A pilot data entry effort was launched in late 2017, with the following utility volunteers:

- Eden Prairie Utilities Division
- Montrose Public Works
- Rochester Public Utilities
- Shoreview Utilities Division

The pilot included:

- Testing the batch account creation process that is designed to "onboard" 348 utilities.
- Testing the technical and policy support desks.
- Testing data entry integrity, including opening and closing the window for editing on the site.
- Analyzing preliminary data.

Based on the results and feedback from the pilot, the site was further refined and prepared for the January 2018 rollout.

First Annual Data Collection

Organization, permit number and contact information for each utility was imported into the Water Conservation Reporting system from MPARS. In December 2017, three training webinars were held and a video recording was posted online. Following the training, invitations were sent to 348 utilities to set up system passwords and begin data entry.

The site opened for data entry on Jan 2, 2018. The reporting deadline was March 15, 2018. During the reporting period, water accounting data entry was monitored. Utilities that had entered obviously incorrect data were contacted to help them improve their data quality.

After the deadline, the data set was analyzed. Twenty-four water suppliers had entered obviously incorrect data and were contacted to help improve data quality. The editing window on the site was reopened for these utilities to update their data, and most fixed the errors on the web site.[4]

[3] See Acknowledgements.

[4] Each utility is the only organization allowed to edit data on the web site, and their editing scope is limited to their own data.

Reporting Utilities

Out of a total of 348 reporting utilities, 327 created an account and entered data. This represents a 94% participation rate.

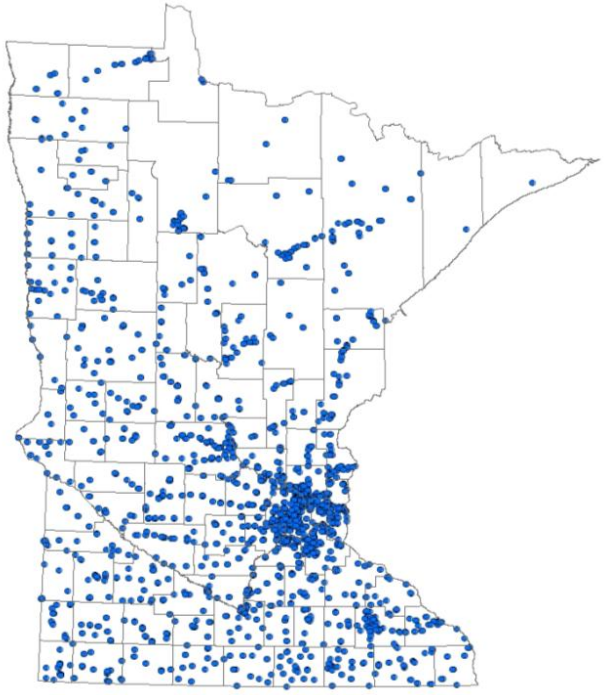


Figure 9. Water Supplier Locations. There are 680 municipal/public water supply permits. Only communities serving more than 1,000 people reported conservation efforts in 2017. Smaller communities will begin reporting conservation efforts in 2019.

Results

Water Accounting

Data Set

Some of the data entered by utilities are obviously not right. For example, some utilities entered flow metrics that resulted in negative treatment or distribution losses, both of which are impossible. Thirty-four percent, or 118, of the utilities were removed from the statewide water accounting analysis. The criteria for removal are:[5]

Rejection Criteria	# Utilities	%
Negative Treatment Loss	34	10%
Treatment Loss > 50%	8	2%
Negative Distribution Loss	70	20%
Zero Authorized Consumption	28	8%
Zero Gallons from Sources	17	5%
Distribution Loss Ratio > 0.5	19	5%

The water accounting analysis is based on data from the remaining 230 utilities. These utilities account for 79% or 134,216 million gallons of the water withdrawn by all 348 utilities (170,290 million gallons). The utilities that were removed generally recognize a need for improved water meter maintenance or water accounting.

These 230 utilities will be referred to as the **"filtered set of utilities"** for purposes of the Water Accounting Analysis. Note that the "Conservation – Direct" and "Conservation – Indirect" sections use the entire set of 348 reporting utilities.

Figure 10. Water treatment facilities can range from simple to extremely complex operating systems. In total, they do meet the key water conservation objectives. Photo of Eden Prairie facility.

Water Accounting Model

The following water flow schematic describes the relationships between the accounting fields that are collected:

[5] Some utilities met more than one of the rejection criteria, so the total number of excluded utilities does not equal the sum of the numbers in this chart.

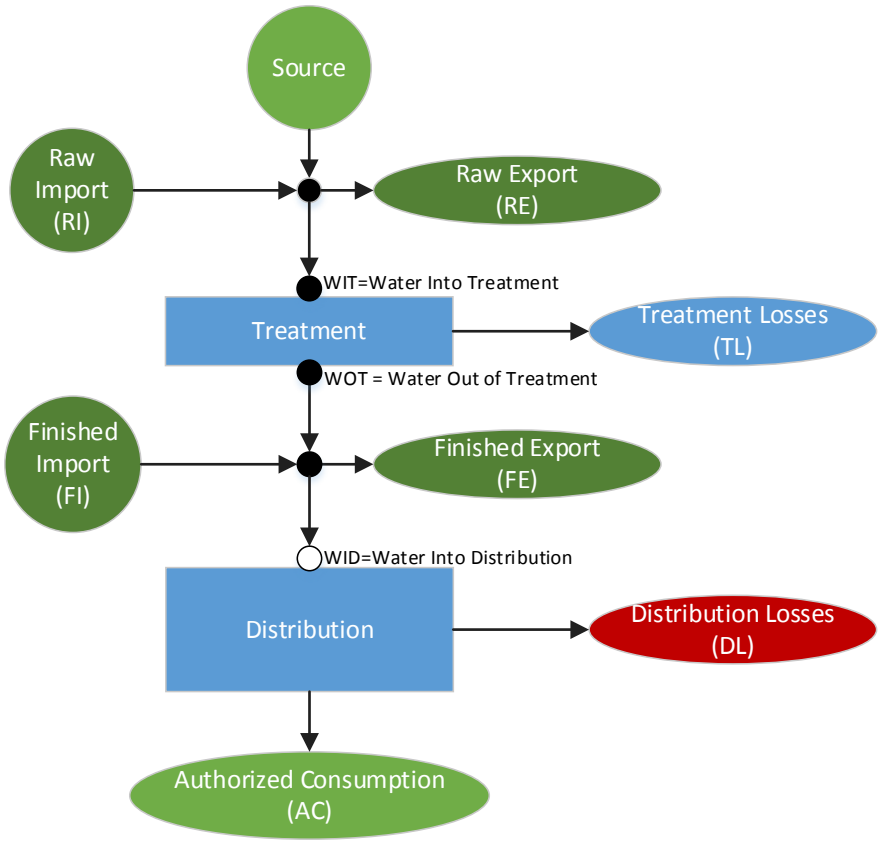


Figure 11. The Water Conservation Report accounts for all water taken into a system, through treatment, and then to distribution to customers, including water losses.

Terms and Formulae:

Source	**Sum of permit sources**	**Entered**	**List total**
RI	Raw Imported Water	Entered	
RE	Raw Exported Water	Entered	
WIT	Water Into Treatment	Derived	WIT = Source + RI – RE (if Source Total is null, or there is a RI or RE that is null, value is null)
WOT	Water Out of Treatment	Derived	WOT = WID + FE – FI (not shown; if WID Total is null, or if there is an FI or FE that is null, value is null)
FI	Finished Imported Water	Entered	
FE	Finished Exported Water	Entered	
WID	Water Into Distribution	Entered	List total
AC	Authorized Consumption	Entered	List total
TL	Treatment Losses	Derived	TL = WIT – WOT (if WIT or WOT is null, value is null)
DL	Distribution Losses	Derived	DL = WID – AC (if WID Total or AC Total is null, value is null)
TotL	Total Losses	Derived	TotL = TL + DL (if TL or DL is null, value is null)
WLP	Water Loss Percent	Derived	WLP = DL / WID (if DL or WID is null, value is null)

State Water Balance

Much like a financial accounting system, the water metrics that are collected must "balance." Each snapshot in time of the water system must account for the total water in the system.

The water balance total changes when water is imported into or exported from the system. The water balance illustration in Figure 13 shows the traditional AWWA M36 water balance perspective plus pre-distribution.

The statewide water balance illustration below is constructed by aggregating all the data provided by the filtered set of utilities.

The AWWA M36 water balance is limited to the distribution system and is shown in light green.[6]

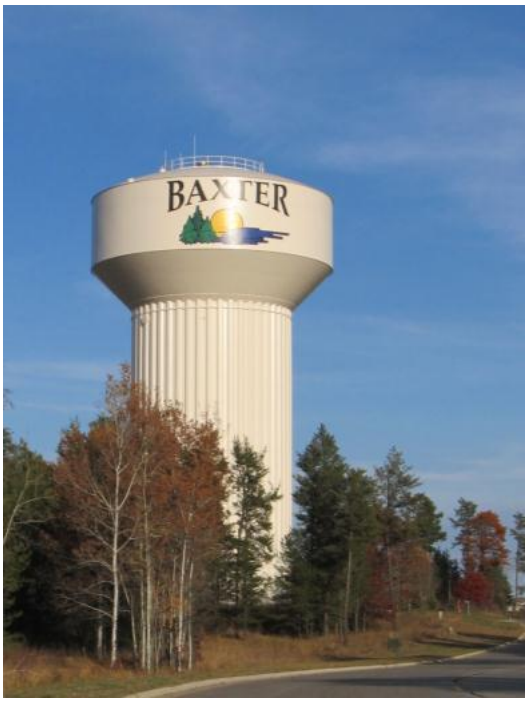


Figure 12. The Water Conservation Report tracks water use from the source collection point to distribution to customer meters.

[6] We unintentionally omitted "Reported Breaks and Lines" from the data collection in 2017. We will update the site for the next round of data acquisition (note that only a few of the larger utilities have undertaken the AWWA M36 process to date).

Water Balance

Millions of Gallons

<table>
<tr><td rowspan="3">Own Sources
130,028</td><td colspan="2">Exported Raw 293</td><td rowspan="8">Water Into Distribution
122,340 (100.0%)</td><td rowspan="4">Authorized Consumption
111,482 (91.1%)</td><td>Billed Metered 106,086 (86.7%)</td><td>Revenue Water
106,242 (86.8%)</td></tr>
<tr><td rowspan="3">Water Into Treatment
130,018</td><td>Treatment Loss 3,815 (3.1%)</td><td>Billed Unmetered 156 (0.1%)</td></tr>
<tr><td>Exported Finished 5,682</td><td>Unbilled Metered 3,360 (2.7%)</td><td rowspan="8">Non-Revenue Water
16,098 (13.2%)</td></tr>
<tr><td rowspan="2">Imported Raw
283</td><td rowspan="3">Water Out of Treatment
126,203</td><td>Unbilled Unmetered 1,881 (1.5%)</td></tr>
<tr><td rowspan="5">Distribution Loss
10,858 (8.9%)</td><td>Unauthorized Consumption 199 (0.2%)</td></tr>
<tr><td></td><td></td><td>Meter Accuracy Loss 1,231 (1.0%)</td></tr>
<tr><td></td><td>Imported Finished
1,819</td><td>System Data Handling Discrepensy 41 (0.0%)</td></tr>
<tr><td></td><td></td><td>Reported Breaks and Leaks</td></tr>
<tr><td>130,310</td><td>130,310</td><td>137,812</td><td>122,340</td><td>122,340</td><td>Unreported Loss 9,387 (7.7%)
122,340</td><td>122,340</td></tr>
</table>

*Figure 13. This is the total water balance for the **filtered** set of utilities reporting 2017 data, shown in millions of gallons. A superset of the AWWA water loss data is collected to account for water from source to consumption. AWWA water balance is shown in light green. Each column within the pre-distribution (white) section matches. Each post-distribution (light green) column total matches, which represents the AWWA water balance standard. This year "Reported Breaks and Leaks" was not collected, which would have reduced the total unreported losses (although most utilities are unfamiliar with the AWWA M36 methodology and did not report Unauthorized Consumption, Meter Accuracy Loss or System Data Handling Discrepancy).*

Raw Water Sources and Inter-Utility Connections

Importing and exporting water with other water suppliers is not a common practice in Minnesota and has never been tracked before at a statewide level. Interconnections are frequently between a larger community and smaller communities. The larger supplier may provide some or all of the water for the smaller community. In some cases, two neighboring communities have interconnections for emergency preparedness, routine maintenance, peak summer water use or because of aquifer issues.

Figure 14 shows the gallons of imported and exported water reported by the filtered utility group and the percentage of the total pumped from permitted sources (Own Sources).

Import/Export Water	Gallons	% of Pumped
Imported Raw	282,645,000	0.211%
Exported Raw	292,847,948	0.218%
Imported Finished	1,846,923,810	1.376%
Exported Finished	5,682,273,121	4.234%

Figure 14. This table shows the gallons of imported and exported water reported by the filtered utility group and the percentage of the total pumped.

Reasons that imports and exports do not balance are:

- Only utilities serving > 1,000 customers reported; exported water could have gone to smaller cities.
- Some smaller utilities had been filtered out, due to incorrect data entry.
- Many small utilities may import their finished water from local, larger utilities[7].
- Water may be pumped into or out of Minnesota.

35 Water Suppliers import or export water from other communities. Prior to the Water Conservation Reporting System, import/export data could not be tracked.

Treatment Losses

In the water model, treatment losses are derived from the following data points[8]:

- Water into Treatment
- Imported Finished Water
- Exported Finished Water
- Water into Distribution

Of the filtered set of utilities, 169 reported zero treatment loss. Some utilities reported zero treatment loss because they do not have meters to measure raw water into distribution, and simply used the pumped water values for both water into treatment and water into distribution. The total treatment

[7] Some of the organization names in the right-most column are structured data (a known reporting permittee) and some are user-entered data. Users had an option to select from the list of permittees or enter a new source/destination organization.
[8] See Water Accounting Model.

losses for the filtered set of utilities is 3.1%. Of those in the filtered group that reported positive treatment losses, treatment losses equaled 4.8% of water into distribution.

Figure 15 presents the distribution of treatment losses, as reported by the filtered set of utilities.

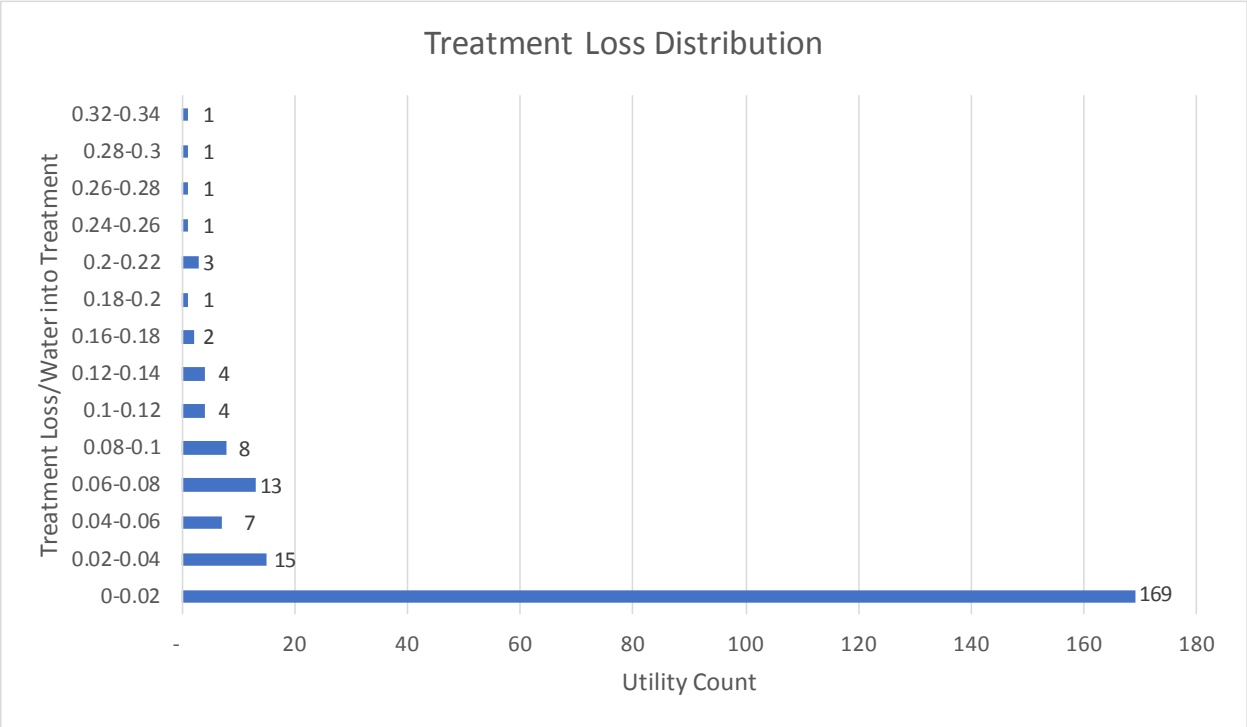


Figure 15. Of the filtered set of utilities, 169 reported zero treatment loss. This may be because they have minimal treatment, simply adding chlorine and fluoride and therefore have very little loss, or there may be meter issues.

Objective 1: Distribution Losses

Distribution Losses or the Water Loss Factor represents the amount of water lost while distributing water to customers. Water loss from failing infrastructure, faulty metering and theft costs money, and can mean lost revenue for utilities and higher rates for water users. It is difficult to quantify specific unmetered water use, such as that associated with firefighting and system flushing or system leaks. This report will add guidance and consistency to statewide reporting.

Water Loss Factor is calculated using the following formula:

Water Loss Factor = (Water into Distribution - Authorized Consumption) / Water into Distribution

The Minnesota Water Loss Factor goal for each utility is <10%.

By reducing water loss, utilities can save themselves and their community money in the long run, while protecting water resources. Another reason to fix infrastructure leaks is that it will also reduce the amount and cost of energy needed for water production and distribution.

OBJECTIVE 1

Reduce Unaccounted Water Loss to Less Than 10%

The total water loss factor for Minnesota utilities is 8.88% of water supplied to distribution (treating the filtered utility set as one large utility).

Meters are needed to accurately account for water use. The MN Rural Water Association, the Metropolitan Council and the Department of Natural Resources recommend metering all water uses. Metering can help identify high-use locations and times, along with leaks within buildings that have multiple meters. An effective metering program relies upon periodic performance testing, repair, and maintenance or replacement of all meters.

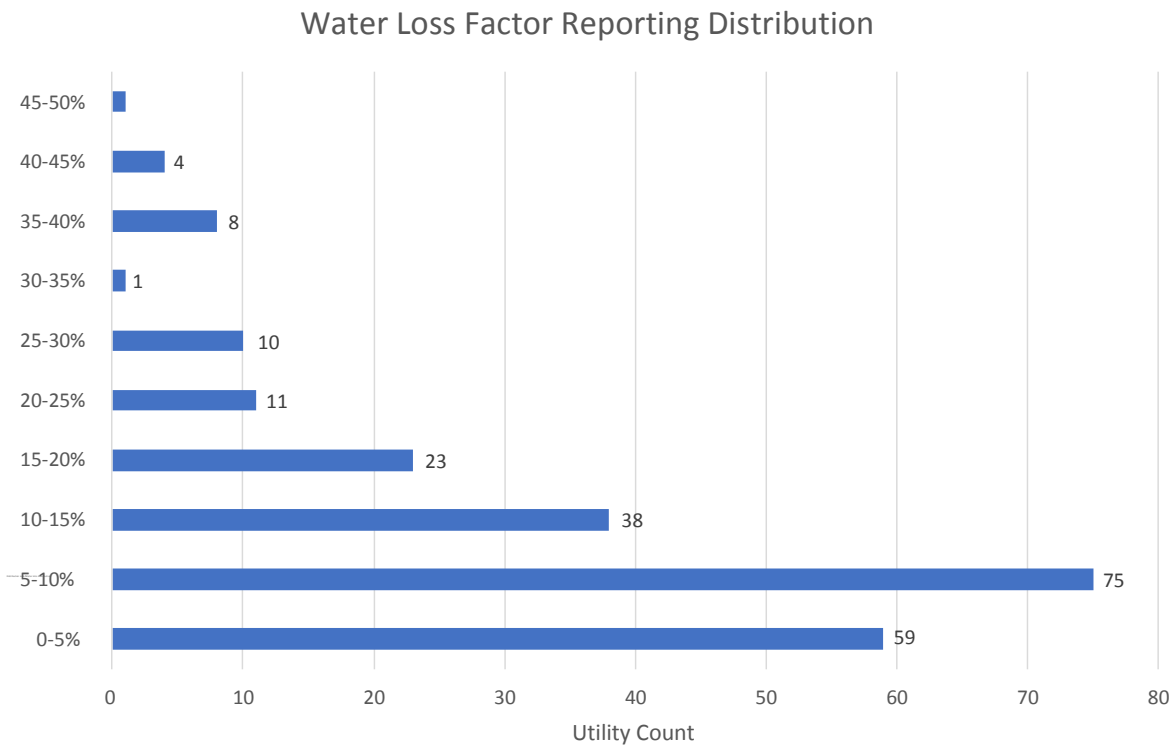


Figure16. Water Loss Factor represents the amount of water lost while distributing water to customers. It is calculated by the formula: (Water into Distribution - Authorized Consumption) / Water into Distribution. Data shows that 75 water suppliers have 5%-10% water loss and 59 utilities have less than 5% water loss.

The AWWA M36 process includes a way of accounting for a portion of the distribution losses and assumes that the remainder are leaks in the distribution system. A few of the larger utilities have learned and adopted the M36 best practices.

Demographic Data

A total population of 3,424,690 is served by the filtered set of utilities.

There are 2,491,932 metered residential connections in this dataset with 1.37 persons/metered connection, which seems low.

One possible explanation for a low ratio of population/meters is that utilities reported inactive meters.

Figure 17 presents the distribution of population served/metered residential connections for the filtered set of utilities.

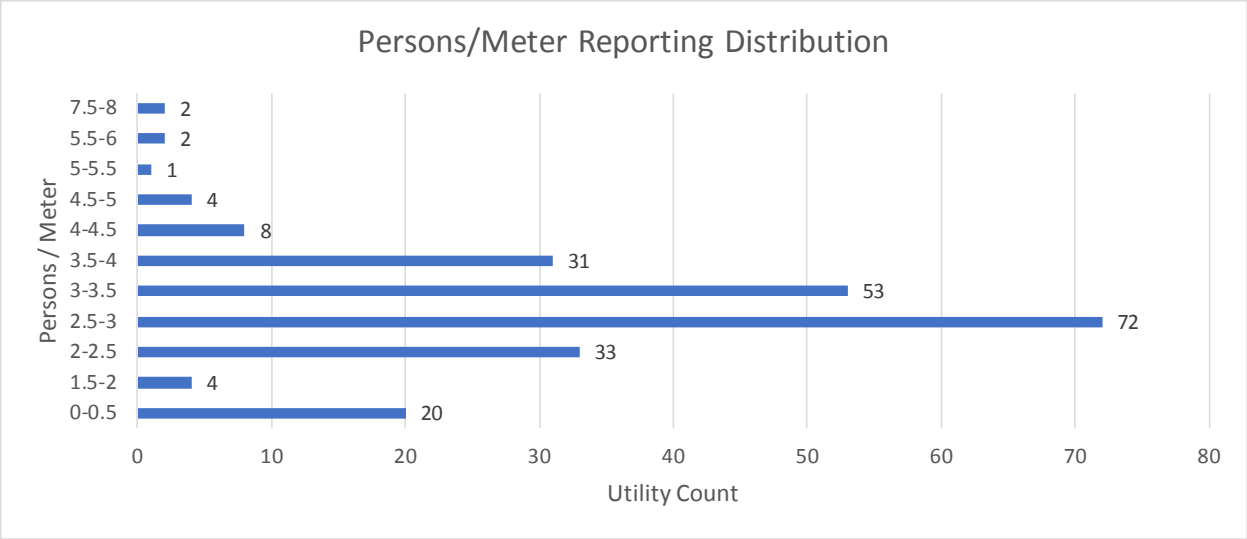


Figure 17. This table show the number of persons / meter. For example, 72 utilities have 2.5-3 persons / meter.

Objective 2: Residential Gallons Per Capita per Day (GPCD)

Residential GPCD provides a means for households and individuals to track and compare their own conservation efforts. The GPCD metric is easy to understand and it allows for meaningful comparisons between one's own use of water with others in the country, state, county and at the community level. GPCD is also a useful tool in estimating future water demand as population increases. GPCD is calculated using the formula:

GPCD = Residential Authorized Consumption/Population Served/365 days

The statewide GPCD calculated from the filtered data set is:

65,098,125,826 gallons/3,424,690 people /365 days = 52 GPCD

OBJECTIVE 2

Achieve Less Than 75 Residential Gallons Per Capita per Day (GPCD)

The total statewide GPCD (treating the filtered utilities as one large utility) is 52 GPCD

208 utilities of the filtered set (90%) met the state GPCD goal (Figure 18).

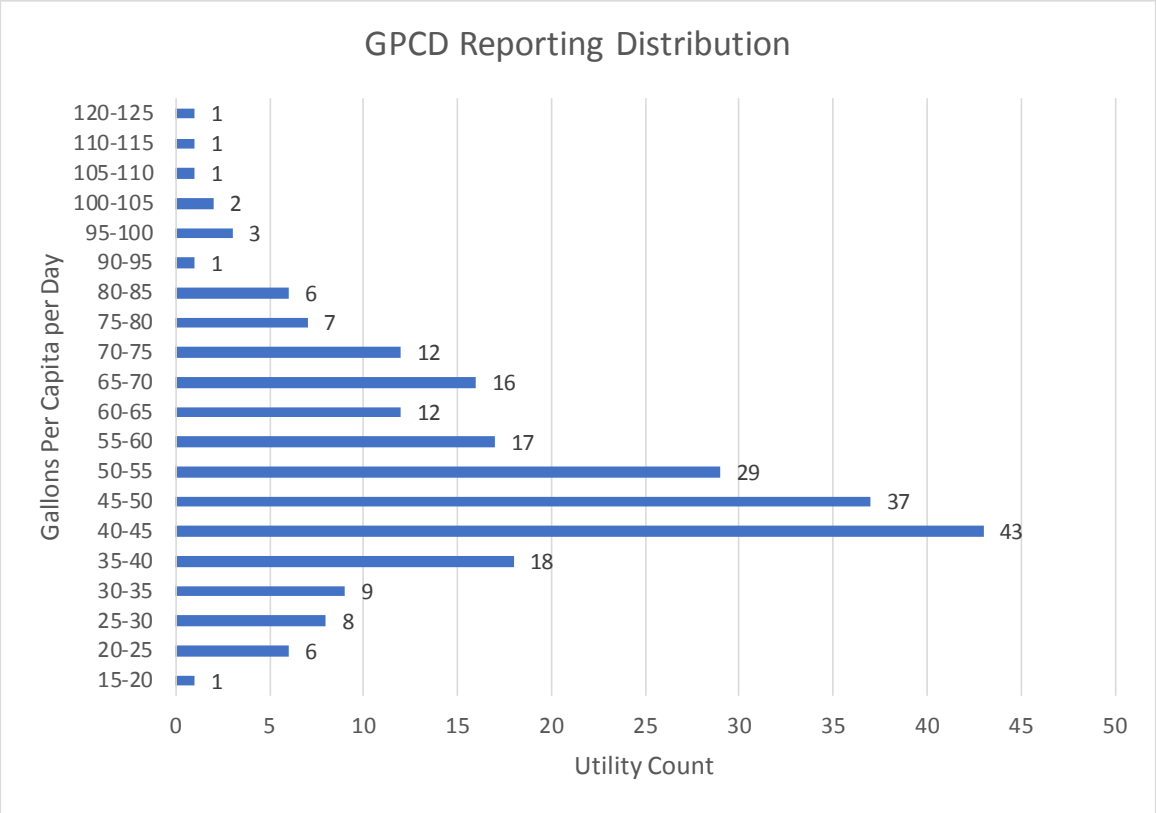


Figure 18. 208 utilities of the filtered set met the state Gallons per Capita per Day goal (90%).

Objective 3: Non-Residential Water Use

Although this objective is not reported in 2018, it is plain from Figure 22 below that promoting water conservation to non-residential water use customers should be a targeted effort for water suppliers. Statewide, approximately 38% of the water distributed by water suppliers is to non-residential water users.

> OBJECTIVE 3
>
> **Achieve At Least 1.5% Annual Reduction in Non-residential Per Capita Water Use**.
>
> Reporting will begin next year.

Objective 3 was originally in the draft reporting system. During a feedback session, however, the pilot cities said this was too hard to do in the first year. They recommended that Objective 3 start during the second year of reporting. In the past, MPARS has not collected this data by month. The previous Water Supply Inventory worksheet in MPARS collected data on Gallons Delivered, Total number of Connections and number of Metered Connections by year.

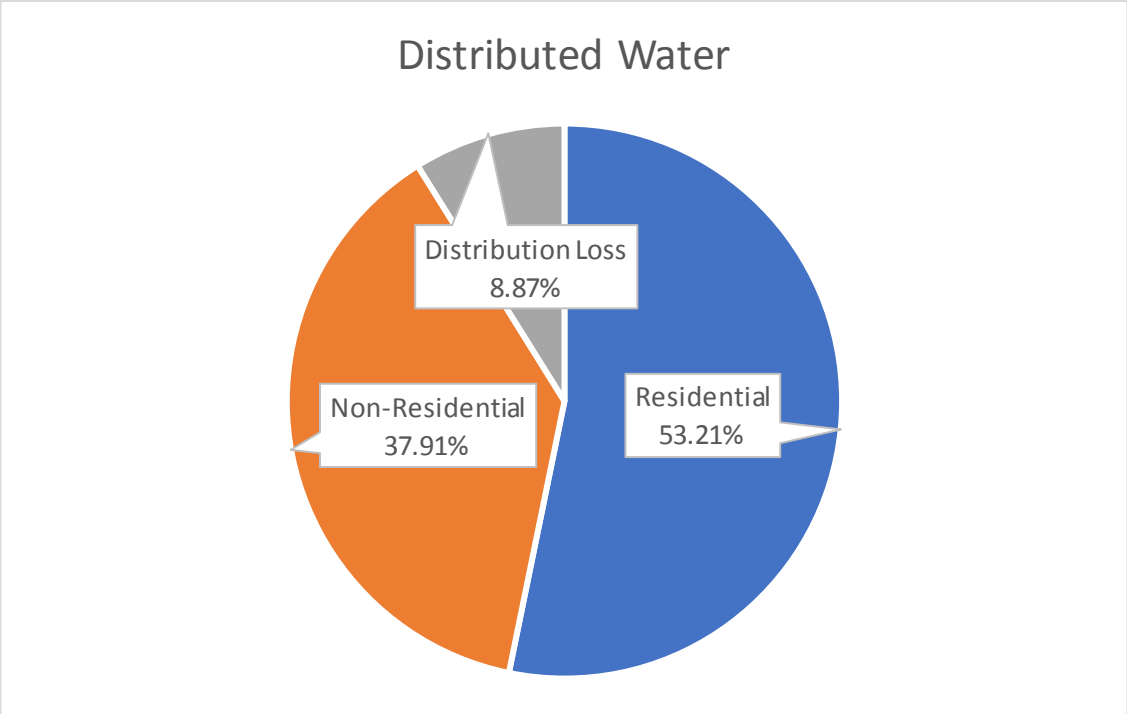


Figure 19. Of the reporting utilities, 53% of the water is distributed to residential users and nearly 38% is distributed to non-residential users. The amount of water lost in the distribution process is less than 9%.

Objective 4: Total Water Use

A minimum of two years of data is needed for trend analysis. This measure will track the total number of gallons of water pumped from water treatment facilities on a per capita per day basis for all uses (residential, commercial or industrial). Since total water consumption tends to increase as the population grows, Gallons Per Capita per Day (GPCD) numbers will allow water suppliers to better analyze and compare water use efficiency in different years.

OBJECTIVE 4

Achieve a Decreasing Trend in Total Per Capita per Day.

Reporting will begin next year.

The calculation for the total GPCD measurement is the total amount of water pumped at water treatment facilities during a fiscal year, divided by the service area population and then divided by 365 days. The Minnesota Water Supply Plan does not set a specific annual goal for this measure because the measurement will be higher where higher volumes of water are provided for commercial, industrial and institutional use. Rather than the measured data, the trends over time provide the useful information for total GPCD. Growing economic activity may be balanced by use of water efficiency technology and best practices. Therefore, even with growth a municipality could see a downward trend or at least a steady value for its total GPCD. To offset possible lower revenues from reduced consumption, municipalities will need to develop financial strategies, such as increased fixed fees and a reduced reliance on volumetric fees.

Objective 5: Daily Peak

A municipality's daily water use varies over the course of a year. Except for some highly unusual event, the highest water use will occur on a hot summer day. The ratio of this highest use to the annual use averaged over 365 days provides information about discretional water use that water suppliers could target for reduction to meet water conservation goals.

The peak day use to average day use ratio of 2.6 was calculated in 2003 from the average peak day use of the communities in the Twin Cities metro area compared to the average daily use of these communities.

By reducing the peak day use, communities can also reduce the amount of infrastructure required to meet the peak day use. This infrastructure includes increased pipe sizing, new wells and new water towers.

OBJECTIVE 5

Reduce Ratio of Maximum Day to Average Day Demand to Less Than 2.6.

The total daily peaking factor for the filtered set of utilities is 2.37.

172 (75%) of the filtered set met the 2.6 peak day use (Figure 20).

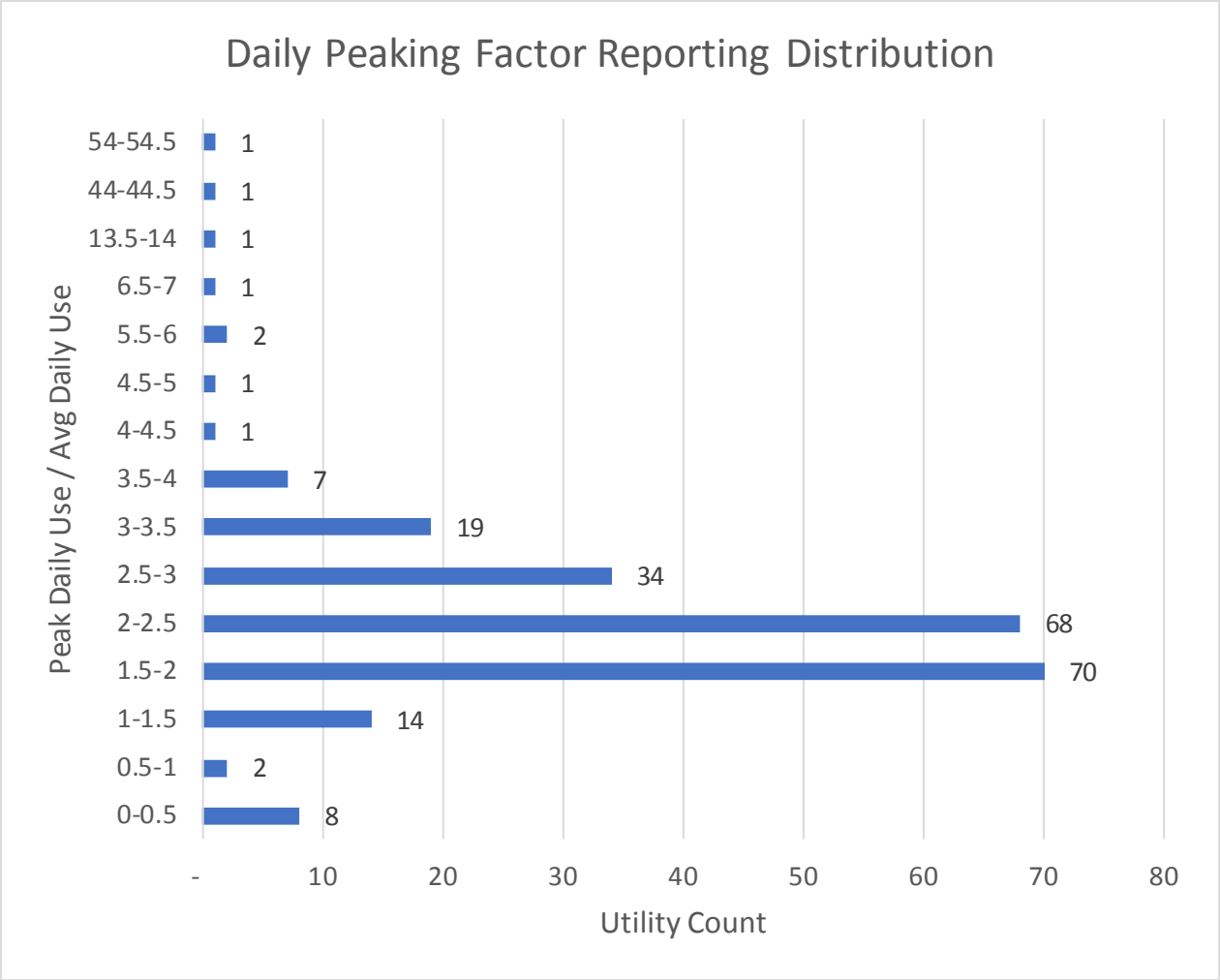


Figure 20. Daily peaking ranges as reported by utilities.

Meter Technology

The primary reason for customer meters is to determine billing charges. A secondary reason is to track water use to ensure that there is no excessive waste or leakage in the distribution system. In addition, when customers are billed for the exact amount of water used, they have an incentive to use water wisely. The following instructions are provided to water suppliers in the Water Conservation Reporting System*:*

"Water meter technology is changing rapidly. Unmeasured or inaccurate flow results in significant revenue loss for the Utility. Regardless of the type of meter, regular testing is needed to insure accuracy and optimize revenue."

Utilities are asked about the technology they use to read their meters, to learn the state of meters in Minnesota.

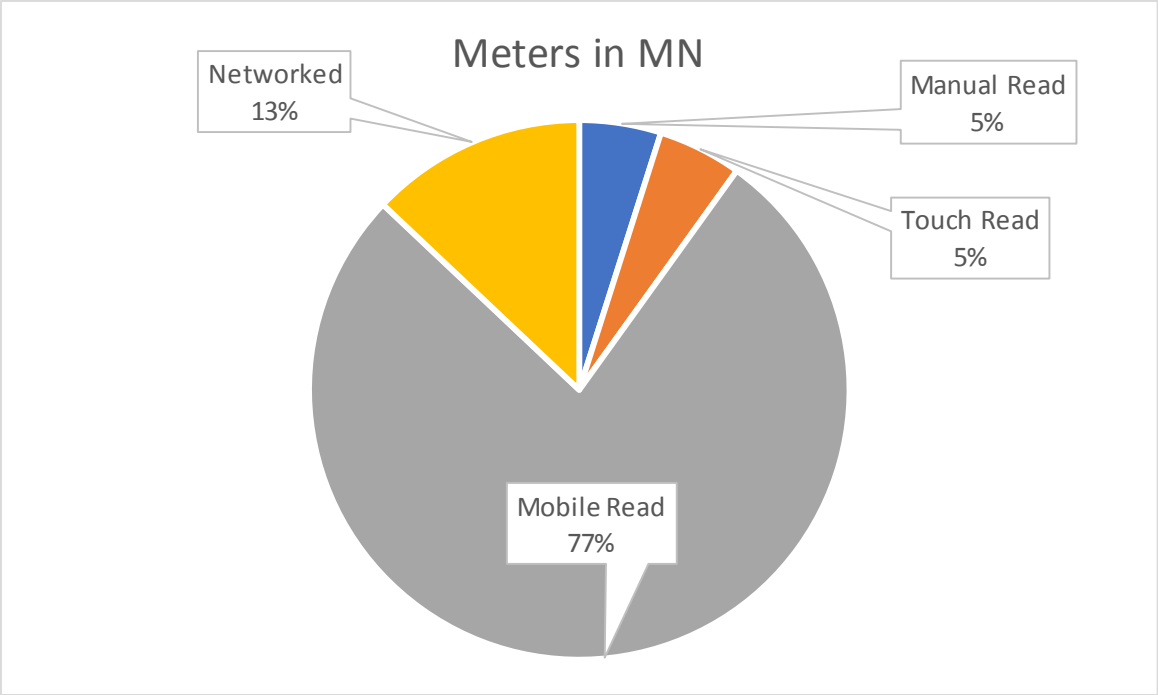


Figure 21. 77% of the water suppliers report using Mobil Read Meters (also called Automatic Meter Reading/AMR). This allows utility workers to automatically read meters from the safety of their vehicle and transfer the data to a central database for billing and analysis. 13% of water suppliers' use Networked meters (also called Advanced Metering Infrastructure/AMI).

Although there are expenses associated with changing meters, there are good reasons for a utility to upgrade to networked meters:

- Fast alerts to problems (some utilities reported reading their meters every quarter, which is a long time to be unaware of problems).
- Behavioral feedback to consumers.
- Real-time diagnostics for customer service.

Objective 6: Demand Reduction

Water Infrastructure Conservation – Direct

Data Set

The "Conservation – Direct" and "Conservation – Indirect" sections use the entire set of 348 reporting utilities.

System Conservation Efforts (Before the Customer Meter)

Instructions: "Enter savings for each system project type in gallons saved and project costs in US dollars. In future reports, you will be able to view the previous years' data. Add any project types needed to enter your savings activities.

Leak detection and repair is a key water efficiency strategy. Age of pipes and storage facilities, the pipe materials and construction quality, the valves, meter accuracy and pumps all matter. Soil types also affect system efficiency, as corrosive soils reduce pipe life. High operational pressure and variations in hilly areas can further strain distribution system components."

OBJECTIVE 6

Implement Demand Reduction Measures

211 utilities (61%) reported direct conservation projects before the customer meter.

These include leak detection and repair, meter and hydrant repair and replacement.

Figure 23 and the table that follows identify the reported projects, their associated water savings and costs[9]:

Figure 22. Fixing water main breaks is the most common direct conservation effort undertaken by Minnesota water suppliers.

[9] Some utilities reported cost but not savings and vice versa.

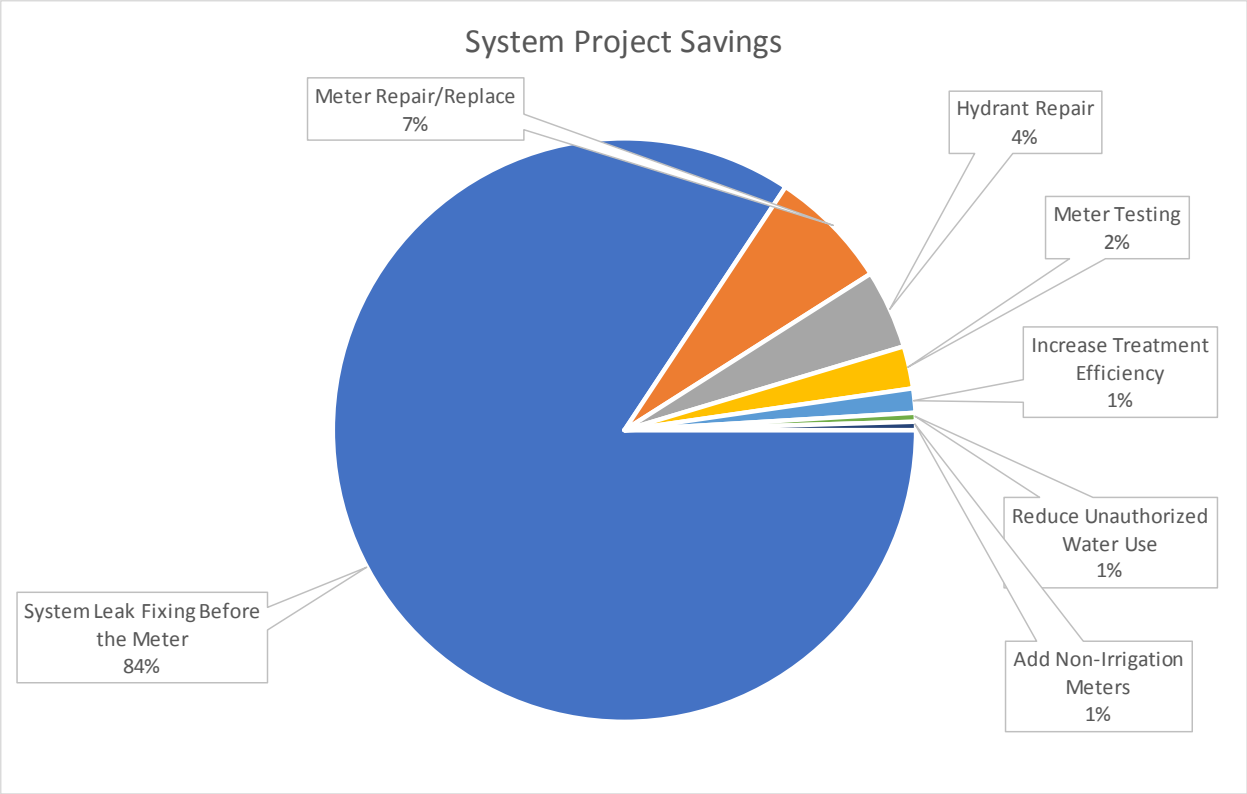


Figure 23. 211 utilities (61%) reported direct conservation projects before the customer meter. This figure demonstrates the percentage of utilities implementing a specific type of direct conservation project. For example, 84% of utilities that reported indicate they implement fixing a system leak before the meter.

System Project	Savings (Gallons)	Cost	Cost/Gallon
System Leak Fixing Before the Meter	1,773,143,757	$ 16,001,290	$ 0.009
Meter Repair/Replace	140,484,676	$ 16,562,421	$ 0.118
Hydrant Repair	91,946,238	$ 2,107,398	$ 0.023
Meter Testing	49,302,282	$ 218,237	$ 0.004
Increase Treatment Efficiency	28,162,183	$ 7,421,688	$ 0.264
Reduce Unauthorized Water Use	10,355,420	$ 171,048	$ 0.017
Add Non-Irrigation Meters	9,620,002	$ 61,472	$ 0.006
Pressure Control	6,025,804	$ 96,067	$ 0.016
Add Irrigation Meters	5,475,647	$ 2,335,056	$ 0.426
Storage Mixing	4,346,001	$ 255,284	$ 0.059

Customer Conservation Efforts

Instructions: "In this section, list the quantity of water saving devices funded or partially funded by the city. Incentive programs and cooperative projects with energy utility companies, SWCDs or other organizations may also apply. Example: units installed in a cost-share program for 200 rain barrels.

Water suppliers willing to collaborate with their electric and/or natural gas utility can receive assistance through the Saving Watts & Drops program from the Clean Energy Resource Teams (CERTs), Saving Watts and Drops. The program guides you through selecting an item to distribute, getting bids from vendors, determining how to distribute items in the community, and creating customized educational materials to accompany items.

For many of the categories, a unit water savings in gallons is already provided. These unit savings are based on research by the AWWA, EPA WaterSense and/or the Alliance for Water Efficiency.

If no unit gallons of savings value is provided, please enter your best estimate based on the product purchased and the item that is being replaced."

190 utilities (55%) reported direct conservation efforts after the customer meter.

In the following presentations of project types,

- SF = Single-Family
- MS = Multi-Family
- CII = Commercial, Industrial and Institutional
- LF = Low Flow
- ET = Evapotranspiration
- HE = High Efficiency

Figure 24 presents the measures reported, by count and the Table that follows shows estimated water savings.

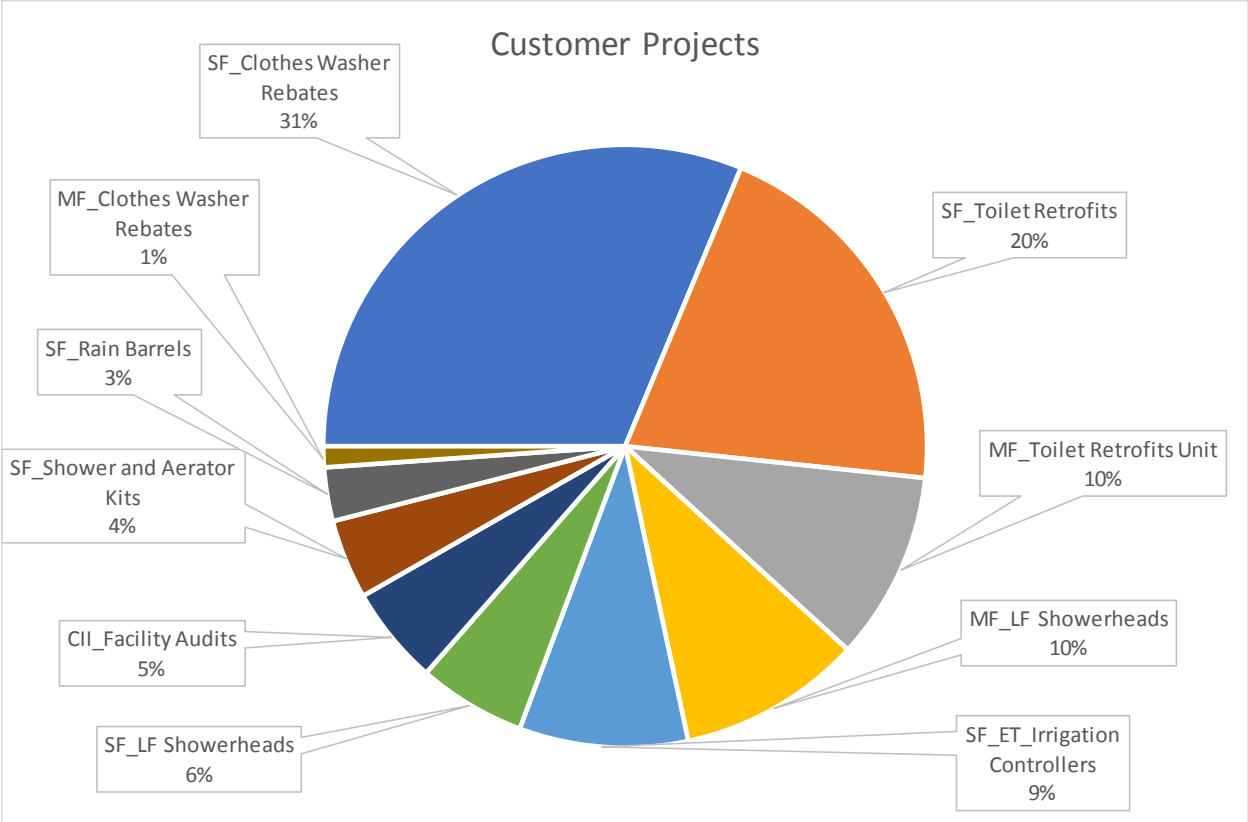


Figure 24. 190 utilities (55%) reported direct conservation efforts after the customer meter. This demonstrates the type of projects implemented by the reporting utilities and the percentage of utilities implementing a particular project. For example, 31% of reported projects were rebates for single-family washing machines.

Customer Project	Qty.	Savings (Gallons)
SF Clothes Washer Rebates	2,703	5,524,932
SF Toilet Retrofits	1,765	16,910,465
MF Toilet Retrofits Unit	874	8,373,794
MF Low Flow Showerheads	851	1,615,198
SF ET Irrigation Controllers	781	19,678,100
SF Low Flow Showerheads	499	1,028,938
CII Facility Audits	456	55,200
SF Shower and Aerator Kits	369	1,851,642
SF Rain Barrels	249	208,911
MF Clothes Washer Rebates	97	1,062,150
CII Toilet Retrofits	29	275,210
MF CII Large Landscape Projects	28	9,455,000
CII Automatic Faucets	20	325
MF Showerhead and Aerator Kits	19	95,342
CII Dishwashers	14	808,598
MF CII ET Irrigation Controllers	7	3,000,280
SF HE Water Softeners	5	2,500
CII Laundromats	2	60,000

CII Spray Rinse Valves	2	56,570
SF Rainwater Harvesting Rebates	2	15,768
MF CII Rainwater Harvesting	1	75,080
TOTAL	**8,773**	**70,154,003**

Of the 26 types of Customer Conservation Efforts listed in the Reporting system, all but five are being implemented by at least one community. This illustrates a great breadth of conservation activities. Considering that Minnesota has not experienced a significant drought in recent years, this is an impressive proactive approach that some cities are implementing.

Several dozen communities received water efficiency grants from the Metropolitan Council for implementing rebate programs. Unfortunately, the Metropolitan Council did not receive additional funds during the 2018 legislative session, but they intend to request funds to implement a water efficiency grant program in future years.

Rochester is one of the state leaders in offering rebate programs. In 2017, they reported:

- 1,473 Single-Family Clothes Washer Rebates
- 777 Single-Family Toilet Retrofits

Eden Prairie reported 801 Multi-Family Toilet Retrofits.

New Brighton reported 277 Single-Family Toilet Retrofits.

Water Reuse Projects

Utilities reported 13 water reuse projects that resulted in 74,925,501 gallons saved in 2017. The gallons saved are estimated, because some projects are installed for stormwater management purposes and the gallons saved are not reported. Using stormwater runoff to irrigate athletic fields or golf courses reduces the need to use drinking water for turf irrigation.

The public water suppliers that reported water reuse projects included Circle Pines, Hugo, Keewatin, Red Rock Rural Water, Waconia, Watertown and Woodbury. In 2017, Woodbury reported saving 60 million gal/yr. with reuse. Although costs are reported, they are not listed in the Table below, due to complexity of initial project costs, current costs, and comments. See ESP Water

Figure 25. The purple pipes indicate reuse water. A Plumbing Board variance is required for indoor water reuse other than non-potable rainwater catchment systems. This reuse system is located at the new Vermillion State Park sanitation building and is used for toilet flushing.

Figure 26. A great way to reuse water is irrigating large areas of turf such as at golf courses or ball fields. The small town of Watertown (pop. 4,205) constructed a water reuse soccer field irrigation project. This photo of Mystic Lake Golf Course shows reuse of treated wastewater effluent to irrigate the golf course.

Water Supplier	Project Name	Annual Gallons Saved	Acres (if applicable)
Circle Pines	Baldwin Reuse System	1,200,000	3
Hugo	Beaver Ponds Park & Soccer Fields	236,000	6
Hugo	Water's Edge Reuse	4,360,500	25
Keewatin	Rain Water	10,000	--
Red Rock Rural Water	Backwash Rapid Infiltration Basins	5,800,000	2
Waconia	10th Street Reuse	1,819,000	12
Waconia	Brook Peterson Park	Not complete	35
Watertown	Soccer field irrigation	1,500,000	10
Woodbury	Windwood Passage Park	stormwater	7
Woodbury	Eagle Valley Golf Course	22,500,000	60
Woodbury	Prestwick Golf Course	17,500,000	75
Woodbury	Health East Sports Center	20,000,000	80
Woodbury	Summit Pointe Park	stormwater	5
Total		**74,925,500**	**320**

Objective 7: Reduce Water Use and Support Wellhead Protection

Conservation – Indirect

For Objective 7, strategies to reduce water use and support wellhead protection planning utilities are reporting indirect conservation efforts.

Conservation Indirect includes the following sections:

- Ordinances
- Education and Outreach
- Collaboration Efforts

Water conservation can be the result of customer behavior changes due to:

- Compliance with local law
- Incentive programs
- Peer influence
- Belief in the importance of conservation

Research shows peer networks and social experiences with family, friends and neighbors have the greatest influence on human behavior.

Indirect conservation programs help change the culture of water consumption.

OBJECTIVE 7

Strategies to Reduce Water Use and Support Wellhead Protection Planning

257 utilities (74%) reported having one or more conservation-related ordinances.

203 utilities (58%) reported collaboration activities.

The agency that most water suppliers collaborate with is the Minnesota Department of Health.

Figure 27. Indirect Conservation are efforts and activities that promote water conservation but cannot be measured in gallons saved. One example of an indirect conservation project is the 'Make every drop count!' message on the side of a Lakeville vehicle.

Ordinances

257 utilities (74%) reported having one or more conservation-related ordinances (Figure 28). It is likely that almost all cities have some local law related to water conservation and efficiency, but they are not reported this first year.

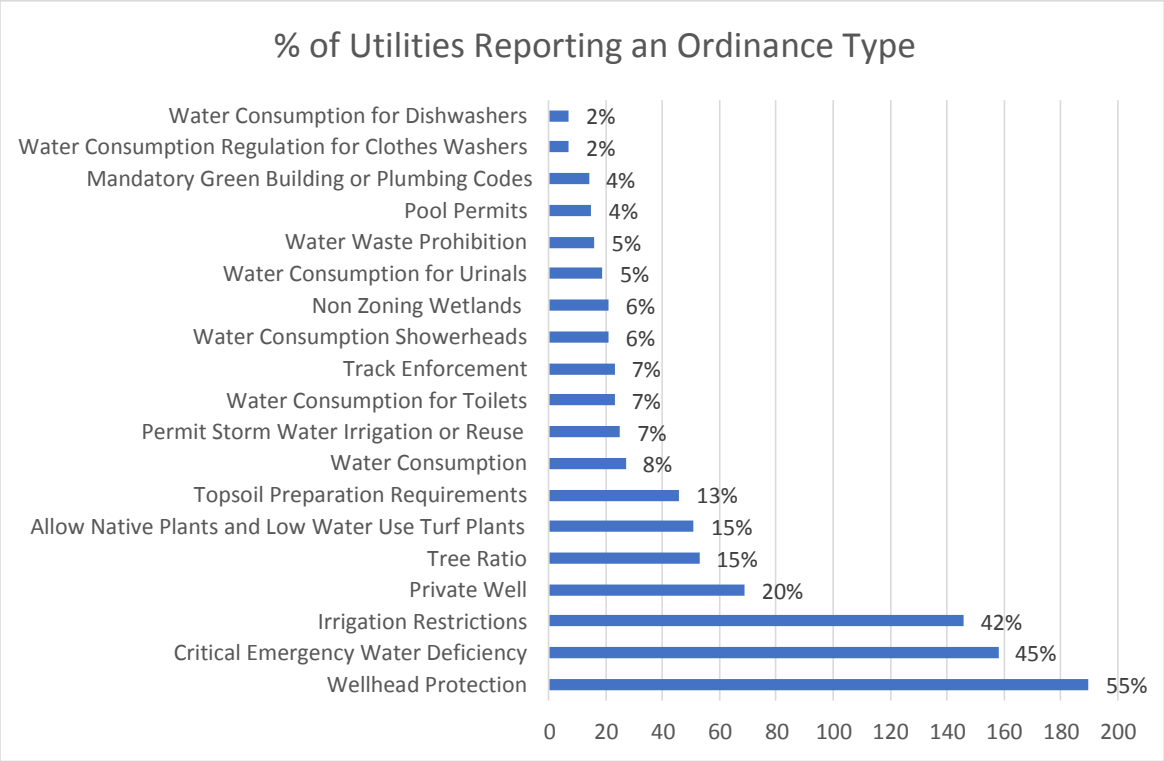


Figure 28. 257 utilities (74%) reported having one or more conservation-related ordinances.

Figure 29. Irrigation ordinances are the third most common type of conservation ordinance.UMN recommends: Water in early morning; Use rain/soil sensors and smart controllers on automated irrigation systems; Water deeply, but less often, to encourage root growth and drought tolerance. Odd-Even ordinances do not necessarily promote water conservation.

.

Education & Outreach

Instructions: "Only include education and outreach activities if the city funded or partially funded the program or offered other services or incentives related to the program. The key message of these programs should be efficient and wise use of water, rather than conservation.

The goal of a communications campaign is to make water conservation a social norm, so that customers will automatically use water wisely. Similar examples include the ways people automatically fasten seat belts, sort recycling from trash or conserve energy. Very few communications campaigns will use all of the communication channels below.

Because there are many factors that influence the actual number of people who may receive your water conservation education and outreach message, simply list the number of efforts, not individuals. For example, you do not need to count everyone who came to a water festival, simply list one Community Event."

Note: It is clear from the data entered that some utilities misunderstood the intent of these questions (for example, instead of entering "12" for a year of bill inserts, they entered the total number of bills). So, the number of events in the table below is sometimes artificially high.

Figure 30. Water Conservation can be fun, as illustrated in this comical display at Eden Prairie's Water Treatment facility where school groups tour the facility annually.

Figure 31. Water Education and Outreach Activities can be simple or complex. Website information, facility tours, staff training and newsletters are commonly used tools.

Education/Outreach Activity	# Events	Utility Count
Consumer Confidence Reports	1,188	257
Website	1,771	139
Facility Tours	556	122
Staff Training	309	110
Community Newsletters	340	107
Billing Inserts Or Tips Printed On The Actual Bill	56,875	99
Social Media Distribution	494	93
Information Kiosk At Utility And Public Buildings	753	70
Press Releases To Traditional Local News Outlets	160	65
Displays And Exhibits	160	60
Presentations To Community Groups	116	54
K12 Education Programs, Project Wet, Drinking Water Institute Presentations	107	48
Community Events, Children's Water Festivals, Environmental Fairs	66	46
Notices Of Ordinances	309	45
Paid Advertisements	844	39
Marketing Rebate Programs	871	38
Water Week Promotions	42	29
Targeted Efforts Large Volume Users With Large Increases	6,798	26
Public Service Announcements	58	21
Cable TV Programs	396	19
Emergency Conservation Notices	64	19
Direct Mailings	36	15
Demonstration Projects: Landscaping Or Plumbing	25	15
Community Education Classes	16	8

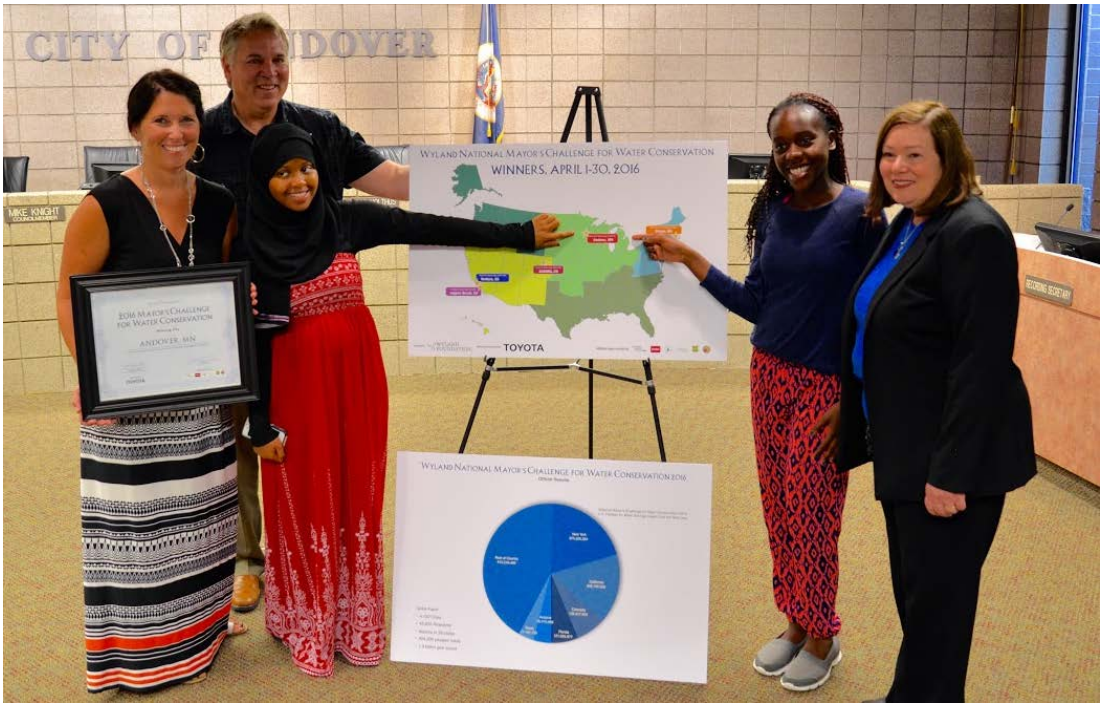


Figure 32. Collaboration can lead to amazing results. Two ninth grade Andover students encouraged the mayor to help promote the Wyland National Water Conservation Challenge. The city finished in first place for conservation pledges for their population category.

Collaboration Efforts

Instructions: "What collaborative efforts has your city participated in to manage groundwater or surface water withdrawals? (Check all that apply)"

Collaborating on conservation projects and water management can address common needs, better leverage resources and potentially lower costs. Efforts may include workforce development, disaster preparedness, or education and outreach.

These risks can often be avoided with collaboration and wise, sustainable use of water. Collaboration may be between:

- communities
- local partners
- regional agencies
- state agencies

Figure 33. Watershed districts are local units of government that work to solve and prevent water-related problems and manage surface and groundwater. The boundaries of the districts follow those of a natural watershed (an area in which all water drains to one point). Minnesota has 46 watershed districts. In the seven county metro area there are also mandatory Watershed Management Organizations that manage surface water issues.

Partners who work together to solve water supply problems include the Metropolitan Council, MN Rural Water Association, Minnesota Chapter of American Water Works Association, League of Minnesota Cities, Regional Development Commissions (10 planning and development organizations in greater Minnesota), University of Minnesota, Minnesota Department of Agriculture, Minnesota Department of Health, Minnesota Department of Commerce, Minnesota Board of Water and Soil Resources, the Minnesota Pollution Control Agency, municipal water utilities, and other water conservation organizations. In 2017, 208 utilities reported collaborations on water conservation. The number and percent of partners with which utilities reported collaborations are presented in the Table below and in Figure 35.

Figure 34. 203 utilities (58%) reported collaboration activities. The agency that most water suppliers collaborate with is the Minnesota Department of Health.

Collaboration	# Utilities
MDH	166
Watershed Groups	97
Lake Associations	49
SWCD or NRCS	47
DNR	40
Others	34
MDA	33
Neighbors	20

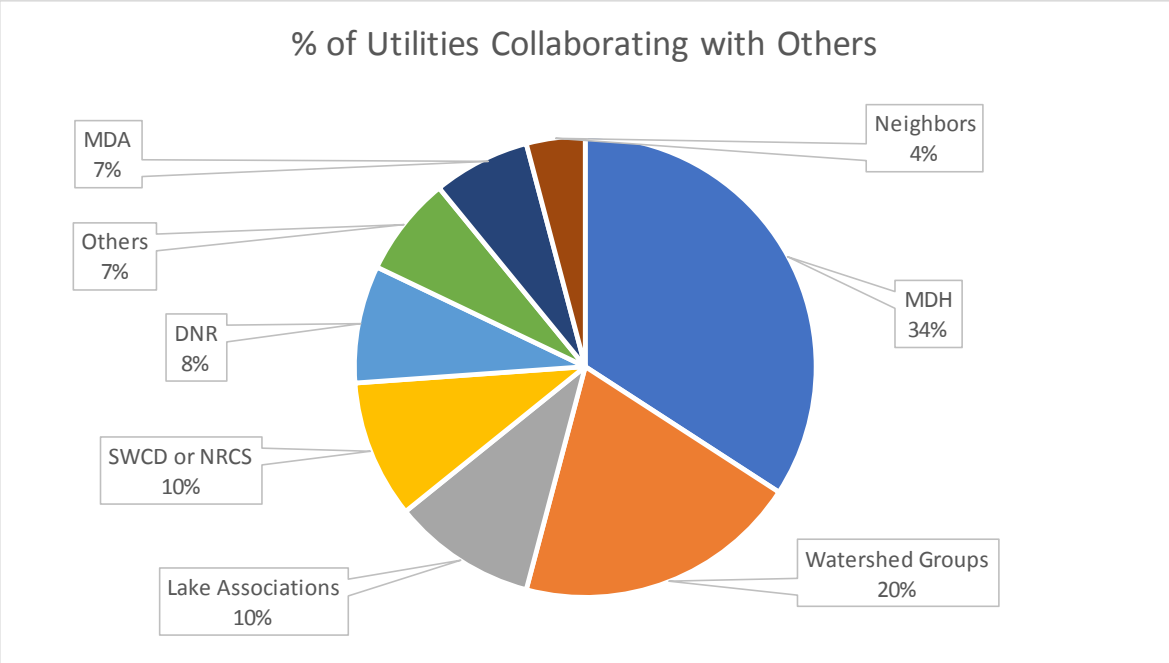


Figure 35. 203 utilities (58%) reported collaboration activities. This figure demonstrates the percentage of utilities collaborating with various organizations on water/conservation efforts. For example, 34% of utilities that reported they collaborate with MDH.

Rates

Municipal water suppliers serving more than 1,000 people are required to adopt demand reduction measures that include a conservation rate structure or a uniform rate structure with a conservation program that achieves demand reduction. (Minn. Stat. § 103G.291, subd. 3 and 4).

Utility rates must be set to collect the revenue needed to operate the utility, invest in infrastructure and protect public health. Rates can also have a significant impact on water consumption.

Utility rate information was provided by 292 (84%) of the public utilities. Use of different types of rate structures is described in Figure 36. Descriptions of the rate structures is provided below.

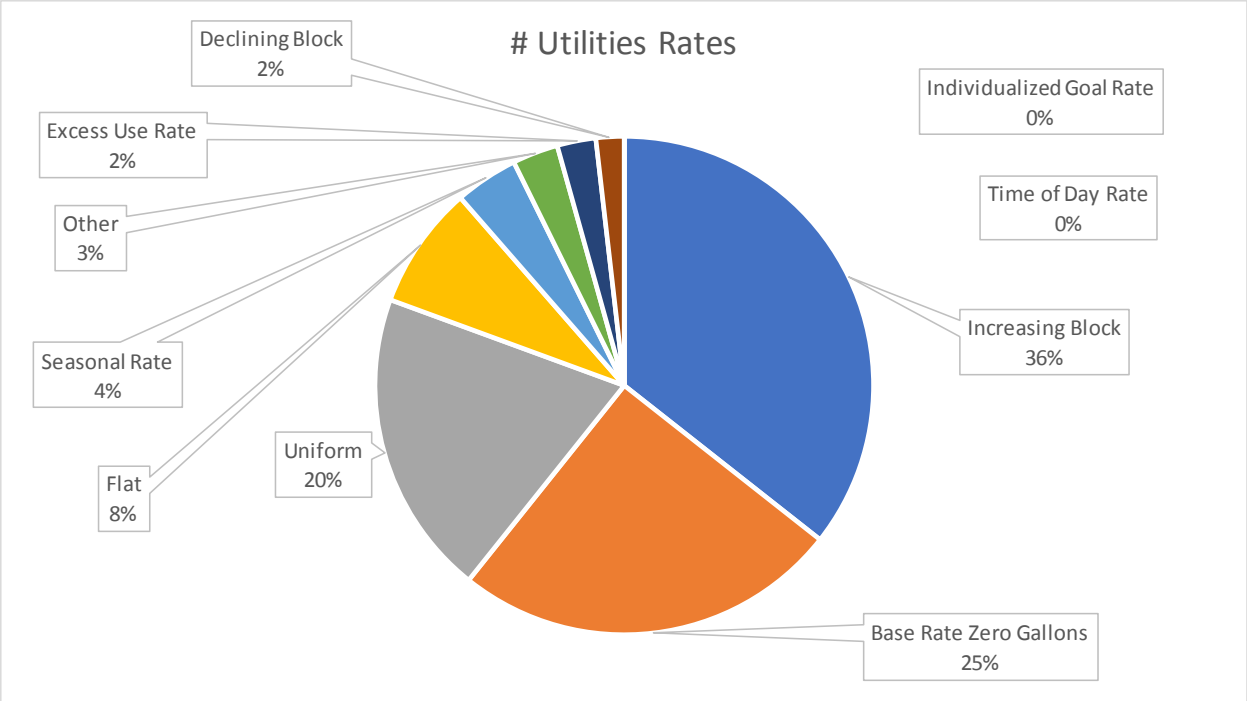


Figure 36. More than 84% of the utilities reported rate information. This figure demonstrates the percentage of utilities reporting a specific type of water rate. Note: more than one rate may be used in each community. For example, a city may have an increasing block rate and also have a base rate of zero gallons (meaning even if a customer uses no water, they still pay the base rate).

Rate Structure components that may promote water conservation:

- **Base Rate zero gallons:** a base rate or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate.
- **Increasing block rates (also known as a tiered rate structure):** Typically, these have at least three tiers:
    - The first tier is for the winter average water use.
    - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
    - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Seasonal rate:** higher rates in summer to reduce peak demands.
- **Time of Day rates:** lower rates for off-peak water use.
- **Bill water use in gallons:** this allows customers to compare their use to average rates.
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals.
- **Excess Use rates**: if water use goes above an agreed upon amount, this higher rate is charged.
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought.
- **Use water bill to provide comparisons**: Although not a "rate," this strategy includes a graphic in the water bill comparing individual use over time or comparing individual use to others.

- **Emergency rates:** a community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help protect city budgets during times of significantly less water usage.

****Conservation Neutral****

- **Uniform rate**: rate per unit used is the same regardless of the volume used.
- **Odd/even day watering:** this approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****

- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last five years.
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Objective 8: Monitor and Track Water Conservation Success

In the Local Water Supply Plan, municipalities are asked how they will track or measure success through the next ten years. Rather than waiting for a decade, the thought at the time was that the DNR Area Hydrologist would call or visit every community every few years to check on progress.

By completing the annual Water Conservation Reports municipalities and hydrologists can track their success and use the reports to guide future water conservation actions. They can quickly and easily review and note trends in total per capita water use, residential per capita water use, and business/industry use.

OBJECTIVE 8

Requires Water Suppliers to Identify How They Will Monitor and Track Success in the Next ten years.

This objective is accomplished by the utility entering annual data into ESPWater.

Discussion and Recommendations

General Observations

It became abundantly clear during this round of data collection that Minnesota utilities are strongly dedicated to providing safe drinking water to customers without interruption. Every interaction with utilities demonstrated their intent to provide accurate data to the Water Conservation Reporting system and their interest in the results.

"The report definitely has given me plenty to think about and ways to expand on what we are currently doing. Just wanted to say thanks, too, for conducting the webinar multiple times. It really did help."
Cara Hess – Buffalo, MN

Recommendations to Utilities

Water loss due to leakage and meter error is a common problem across the United States. In aggregating the statewide data and looking through individual reports, it became clear that meter data is less reliable than anticipated. 2017 data indicate that many utilities in Minnesota have meter and water accounting issues. The first step in properly managing water use is to measure the use accurately.

Recommendations for improvement include:

1. ***Manage and maintain meters so water use is measured as accurately as possible.***
    a. *Each utility should have a meter management plan, to ensure the accuracy of the data (for example AWWA M36).*
    b. *Accelerate technology adoption to build efficiency and improve water service.*
2. ***Enhance water systems.***
    a. *Develop and implement a leak detection and repair plan.*
    b. *Sustain adequate funding for water infrastructure.*
    c. *Implement measures that increase water system productivity and efficiency.*
3. ***Focus on conservation projects.***
    a. *After the meter, especially outdoor use.*
    b. *Adopt conservation ordinances.*
    c. *Advance local and regional collaboration on water management.*

Based on these results, the most significant water savings to be achieved for Minnesota utilities will be found in repairing and enhancing water delivery systems (fixing leaks) and using best practices to maintain meters, so water delivery and use can be accurately measured.

Many water suppliers are aware of these issues and are working to correct the problems as funding becomes available.

Each city should have a leak detection plan and a meter maintenance plan. Ideally, in future reporting years, 100% of the water suppliers will have valid water accounting data. The DNR, AWWA, Metropolitan Council and MN Rural Water Association are exploring options to provide training on AWWA M36 and best practices adoption.

Conservation efforts on the customer side of the meter are light, in that not all cities have customer rebate programs or other water conservation incentives. This is expected, until utilities have implemented best practices to focus on water management and meter accuracy.

Municipal staff commonly reported that completing this report got them working together on billing, meter readings, ordinances and educational efforts. While this report does include reporting collaboration with other utilities, ideas for improving water efficiency can also be found within the utility.

Improvements to the Reporting System

In the process of rolling out the new water conservation reporting system, there were constructive suggestions for improvements for next year. Here are several:

- Provide formatted form printouts to share with city staff completing portions of the report.
- Improve dashboard with trend analysis.
- Reduce confusion by clarifying directions and information in the help tabs.
- Provide previous years' data for comparison.
- Improve the print function of the final report.
- Improve querying function to allow utilities to ask questions of the statewide data.
- Add operational recommendations to the site for each utility, based on entered data (create a report to take to the council to justify water system improvements).

We plan to implement as many of these suggestions as we are able.

Next Steps

- Encourage water suppliers to review their data and submit corrections if needed.
- Encourage peer learning.
- Make requested improvements to the Water Conservation Reporting System and improve quality control as feasible.
- This system, as well as MPARS, will require maintenance and improvements.
- Work with commercial, industrial and institutional permittees to begin reporting.
- Work with partner agencies and organizations to provide AWWA Water Audit M36 training.
- Work with MnTAP and others to provide information and education about how to improve water efficiencies and conservation for commercial, industrial and institutional water users.

Appendices

Appendix A: List of Participating Utilities

Filtered Utilities Included in Water Accounting Analysis ("filtered set of utilities")		
Aitkin, City Of - Public Utilities	Fridley, City Of	Oak Park Heights, City Of
Albany, City Of	Fulda, City Of	Oakdale, City of - Public Works Dept.
Andover, City of	Gaylord, City Of	Olivia, City Of
Annandale, City Of	Gilbert, City Of	Orono, City of
Arlington, City Of	Glencoe City of	Oronoco, City of
Atwater, City Of	Glenwood, City Of	Ortonville, City Of
Bagley, City of	Goodhue, City Of	Osakis, City Of
Baudette, City of	Goodview, City Of	Otsego, City of
Baxter, City Of	Grand Forks, City of	Owatonna Public Utilities
Becker, City Of	Grand Marais, City Of	Park Rapids, City of
Belle Plaine, City Of	Grand Meadow, City Of	Parkers Prairie, City Of
Bemidji, City of - Public Works	Grand Rapids, City Of	Paynesville, City Of
Blaine, City of	Green Lake Sanitary Sewer & Water	Pelican Rapids, City Of
Blooming Prairie, City Of	Hamburg, City Of	Pine Island, City Of
Braham, City of	Hastings, City Of	Pine River Area Sanitary District - Pequot Lakes
Brainerd, City of	Hawley, City of	Pipestone, City Of
Buffalo, City Of	Hayfield, City Of	Plainview, City Of
Buhl, City of	Hector, City Of	Prior Lake, City Of
Burnsville, City Of	Hinckley, City Of	Ramsey, City Of
Byron, City of	Hopkins, City Of	Red Lake Falls, City Of
Caledonia, City Of	Hugo, City Of	Red Rock Rural Water
Cambridge, City of	Hutchinson, City Of	Red Wing, City Of - Public Works
Canby, City Of	International Falls, City Of	Redwood Falls, City Of
Cannon Falls, City of	Inver Grove Heights, City of	Renville, City Of
Carlton, City Of	Isanti, City of	Rice, City Of
Carver, City of	Jackson, City Of	Rich Prairie Sewer & Water District
Centerville, City of	Janesville, City Of	Richfield, City Of
Chanhassen, City Of	Joint Powers Water Board	Richmond, City of
Chaska, City of	Jordan, City of	Rochester Public Utilities
Chisago City, City of	Kasson, City of	Rockford, City Of
Circle Pines, City of	Kenyon, City of	Roseau, City Of
City of Ada	La Crescent, City of	Rosemount, City Of
City of Anoka	Lake City, City of	Royalton, City of
CITY OF BIG LAKE	Lake Crystal, City Of	Rush City, City Of
City of Bloomington-Public Works	Le Center, City Of	Rushford, City Of
City of Breckenridge	Lexington, City Of	Sandstone, City of
City of Dassel	Lino Lakes, City Of	Sauk Centre, City Of
City of Eagan	Litchfield, City of	Sauk Rapids, City Of

Filtered Utilities Included in Water Accounting Analysis ("filtered set of utilities")		
City of Eden Prairie	Little Falls, City Of	Shafer, City Of
City of Edina - Public Works	Long Lake, City of	Shakopee Public Utilities Commission
City of Howard Lake	Lonsdale, City of	Sherburn, City Of
City of Maple Grove	Loretto, City of	Silver Bay, City Of
City of Maple Lake	Luverne, City Of	South St Paul, City Of
City of Perham	Madelia, City Of	Spring Lake Park, City Of
City of Plymouth	Madison, City of	Spring Valley, City of
City of Robbinsdale	Mahnomen, City of	Springfield, City Of
City of Starbuck	Mahtomedi, City of	St Anthony, City Of
City of Tonka Bay	Mankato, City Of	St James, City Of
City of Waterville	Mantorville, City Of	St Louis Park, City Of
City of White Bear Lake	Maple Plain, City Of	St Paul Park, City Of
Cohasset, City Of	Mapleton, City Of	St Paul Regional Water Services
Cokato, City Of	Mayer, City Of	St Peter, City Of
Cold Spring, City Of	Medford, City Of	Stacy, City Of
Columbus, City Of	Menahga, City Of	Staples, City Of
Cottage Grove, City Of - Public Works Dept.	Milaca City Of	Stillwater, City of-Board of Water Commissioners
Cottonwood, City of	Minneapolis, City of - Public Works Dept.	Tower-Breitung Water Board
Crosby, City of	Minnetonka Beach, City Of	Tracy, City Of
Dawson, City of	Minnetonka, City Of	Truman, City of
Detroit Lakes, City of	Minnetrista, City Of	Two Harbors, City Of
Dodge Center, City Of	Montgomery, City Of	Vadnais Heights, City Of
Duluth, City Of - Public Works Dept.	Monticello, City Of	Virginia Public Utilities
East Bethel, City Of	Montrose, City Of	Wabasha, City Of
East Grand Forks, City Of	Moorhead Public Service	Waconia, City of
Eden Valley, City Of	Moose Lake, City Of	Wanamingo, City Of
Edgerton, City Of	Morris, City Of	Waseca, City of
Elbow Lake, City Of	Mounds View, City Of	Watertown, City Of
Elk River Municipal Utilities	Mountain Iron, City Of	Wells, City of
Elko New Market, City Of	Mountain Lake, City Of	Wheaton, City of
Empire Township	New Germany, City of	Willmar, City of
Eveleth, City of	New Ulm, City Of	Windom, City Of
Excelsior, City Of	New York Mills, City Of	Winnebago, City Of
Eyota, City of	Newport, City of	Winona, City Of
Fairfax, City Of	Nicollet, City Of	Winsted, City Of
Fairmont, City of	North Branch, City Of	Winthrop, City Of
Farmington, City of	North Mankato, City Of	Woodbury, City Of
Foley, City Of	Norwood Young America, City Of	Wyoming, City Of
Frazee, City Of	Oak Grove, City Of	

Utilities Excluded from Water Accounting Analysis		
Adrian, City of	Equity Lifestyle Properties dba MHC Property Management LP	New Trier, City Of
Alexandria, City of	Faribault, City Of - Public Works Dept.	North St Paul, City of
Appleton, City Of	Fergus Falls, City Of	Northfield, City of
Aurora, City Of	Forest Lake, City Of	Pathfinder Village
Austin Utilities	Fosston, City Of	Pine City, City of
Avon, City Of	Glyndon, City Of	Preston, City of
Babbitt, City of	Granite Falls, City Of	Princeton Public Utilities Comm
Barnesville, City Of	Greenfield, City Of	Randolph, City Of
Bayport, City Of	Hampton, City Of	Rock County Rural Water
Benson, City of	Harmony, City of	Rockville, City of
Bird Island, City Of	Hazelden Foundation	Rogers, City Of
Biwabik Public Utilities	Hibbing Public Utilities	Sartell, City of
Blue Earth, City Of	Keewatin, City Of	Savage, City Of - Public Works
Brooklyn Center, City of	Lake Elmo, City Of	Shoreview, City Of
Brooklyn Park, City of - Public Works Dept.	Lakefield, City of	Shorewood, City of
Carleton College	Lakeland, City of	Slayton, City Of
Centennial MHP	Le Sueur, City Of	Sleepy Eye, City Of
Champlin, City of	Lester Prairie, City of	Spring Grove, City of
Chatfield, City of	Lewiston, City of	Spring Park, City Of
Chisholm, City Of	Lincoln-Pipestone Rural Water	St Bonifacius, City Of
City of Albert Lea	Lindstrom, City Of	St Charles, City of
City of Apple Valley	Long Prairie, City Of	St Cloud, City Of
City of Lakeville	Lutsen Mountains Corporation	St Francis, City Of
CITY OF MOUND	Madison Lake, City Of	St Joseph, City Of
Clara City, City Of	Marine on St Croix, City Of	Stewartville, City of
Clearwater, City Of	Marshall Municipal Utilities	Superior Water Light & Power Co.
Cloquet, City Of	Medina, City Of	Thief River Falls, City Of
Coleraine, City of	Melrose, City of	US Dept. of Justice - Sandstone
College Of St Benedict	Minneota, City Of	Vermillion, City Of
Cologne, City Of	MN Dept. of Corrections - Faribault	Victoria, City Of
Coon Rapids, City Of	MN Dept. of Corrections - Lino Lakes	Wadena, City Of
Crookston, City Of	MN Dept. of Corrections - Stillwater	Waite Park, City Of
Crown College	MN Dept. Of Military Affairs	Walker, City Of
Dayton, City Of	Montevideo, City of	Warren, City Of

Utilities Excluded from Water Accounting Analysis		
Delano, City of	Mora, City Of	Warroad, City of
Dundas, City of	Nashwauk, City Of	Waverly, City of
Eagle Lake, City Of	New Brighton, City Of	Wayzata, City Of
Elgin, City Of	New Prague, City Of	White Bear Township
Ely, City of	New Richland, City of	Worthington, City Of - Engineering

Appendix B: Site Data Entry Forms

Dashboard

Dashboard - Water Summary - 2017

These numbers will auto populate once the water accounting page is complete.

Metric	Value	Goal
Unaccounted Water Loss [UWL]	Incomplete	< 10%
Residential Gallons per Capita Demand (GPCD) Daily.	Incomplete	< 75
Total Peaking Factor.	Incomplete	< 2.6

Comments

Save Revert

Instructions

Welcome to ESP Water

Thank you for your water conservation efforts! You are instrumental in protecting one of Minnesota's most valuable resources. A growing population is increasing the demand for water resources in Minnesota and putting additional stress on aging infrastructure. To protect the environment and human health, we need to use less water and we need to use what water we do have more efficiently. Water Conservation generally refers to a reduction in the amount of water used. Water Efficiency generally refers to conserving water with water-saving technologies.

Logging In

Point your browser at ESPWater.org.

Enter your email and password.

Entering and Saving Your Work

To enter your data into ESPWater, we suggest starting with the Water Accounting tab, then work through the Conservation - Direct and Conservation Indirect tabs.

You can save each section on a page individually. It's a good idea to save your work as you go. Each section has a Revert and a Save button. The Revert and Save buttons will be enabled if you have edited any data in the section.

After you have entered and saved all your data, you are done. **There is NO Submit or Send button needed to finish reporting your data.**

You can log back in, edit and save any values at any time, until the data entry deadline.

Water Accounting Tab

The Water Accounting tab at the top of the page will lead you through data entry regarding your water system. Questions about your water supply infrastructure are grouped by: Inputs, Treatment, and Distribution. Click on any symbol to see additional information about an item.

On the Water Accounting tab, click on the schematic icon in relevant section headers to see an illustration of the conceptual water system

Once you have entered sufficient data on the Water Accounting page, the metrics on the Dashboard tab will appear.

Conservation Reporting

All entries should be a result of your efforts to conserve water for the past calendar year. There is no need to estimate water conservation activities that happen indirectly or as a result of city code/ordinance. All reported conservation activities should have been initiated by the water supplier.

Conservation - Direct Tab

Direct Conservation refers to activities with measurable water savings. You should enter all of the conservation efforts with reasonably predictable water savings on the Conservation Direct Tab. The Conservation - Direct tab contains several sections, with help icons ⓘ along the way.

Conservation - Indirect Tab

Indirect conservation efforts are activities that may have an impact on water usage but the water conserved is not readily quantifiable. You can add any activities that are not listed.

Units

All water and water savings units are in gallons.

Cost units are US dollars.

All percentages are entered as whole numbers (e.g. 50%).

Definitions

Residential: Includes Single Family and Multi-Family

SF: Single family residential

MF: Multi-family residential – includes apartments, duplexes, and mobile home parks

Non-Residential: Commercial, Industrial, Institutional (CII) and Agricultural

Accounts

Accounts are created in ESP Water through invitations. While any account can view any reporting organization, an account may also have rights to edit several organizations.

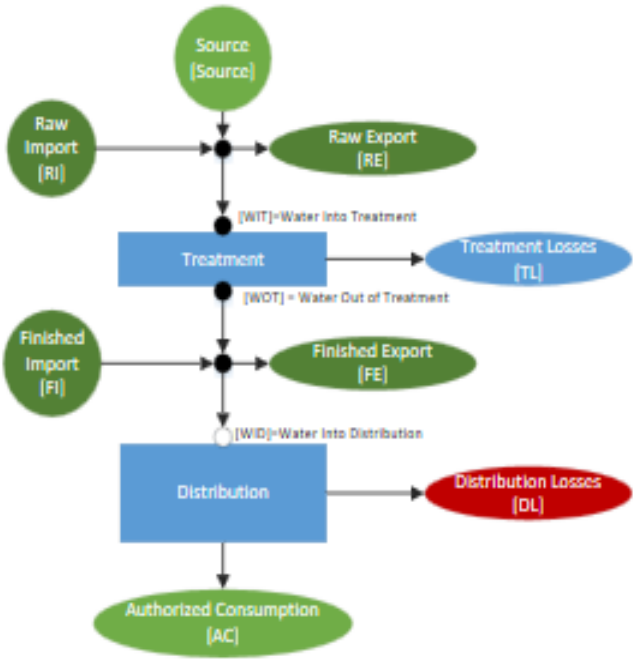
A user with administrative privileges in an organization can invite other users into that organization in ESP Water. Please restrict invitations to members of the organization.

Training Webinar

Watch the ESP Water training webinar here.

Calculations

Water flow schematic:



Terms and Formulae:

Term	Name	Entered or Derived	Formula / Description
Source	Own Sources	Entered	Total (Own Sources)
RI	Raw Imported Water	Entered	Total (Imported Raw Water)
RE	Raw Exported Water	Entered	Total (Exported Raw Water)
WIT	Water Into Treatment	Derived	WIT = Source + RI – RE
WOT	Water Out of Treatment	Derived	WOT = WID + FE – FI
FI	Finished Imported Water	Entered	Total (Imported Finished Water)
FE	Finished Exported Water	Entered	Total (Exported Finished Water)
WID	Water Into Distribution	Entered	"Billed Metered" + "Billed Unmetered" + "Unbilled Metered" + "Unbilled Unmetered"
AC	Authorized Consumption	Entered	Total (Residential Monthly) + Total (Non-Residential Monthly)
TL	Treatment Losses	Derived	TL = WIT – WOT
DL	Distribution Losses	Derived	DL = WID – AC
TotL	Total Losses	Derived	TotL = TL + DL
UWL	Unaccounted Water Loss	Derived	UWL = DL / WID

Help

For technical assistant on the site call 866-258-6913 during business hours, or email espwater.support@energyplatforms.com

For DNR policy questions contact Carmelita Nelson carmelita.nelson@state.mn.us

Water Accounting

Water Accounting

Water Supplied To Treatment

Enter values in gallons.
Click on the box to the right to see what part of the water system is being addressed.

2017

Own Sources

Source corresponds to MPARS permitted installation (water use location).

PIT (Permit 1962-0182)

Total Volume [Source]

Imported Raw Water [RI]

Add any external raw water sources.

Add New

Exported Raw Water [RE]

Add any raw water export destinations.

Add New

Total Water Supplied to Treatment [WIT]

Comments

Save Revert

Finished Imported Water [FI]

Enter values in gallons.

2017

Add any external finished water sources.

Add New

Comments

Save Revert

Water Supplied to Distribution (Monthly)

Enter values in gallons.

	2017
Monthly Total Supplied to Distribution	
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	
Total Water Supplied to Distribution [WID]	
Max Gallons per Day Supplied to Distribution	
Peak Date	
Comments	

Save Revert

Authorized Consumption

Enter values in gallons.

2017

Finished Exported Water [FE]

Add any finished water export destinations.

Add New

Distribution

	Residential	Non-Residential
Number of Connections (#)	0	0
Number of Metered Connections (#)	0	0
Billed Metered (Gallons)		
Billed Unmetered (Gallons)		
Unbilled Metered (Gallons)		
Unbilled Unmetered (Gallons)		
Authorized (Gallons)		
Total Authorized Consumption (Gallons) [AC]		

Monthly Metered Distributed

	Residential	Non-Residential
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Total Metered Gallons		
Comments		

Save Revert

Water Losses

Enter values in gallons.

Treatment Losses = (Own Sources + Imported Raw Water - Exported Raw Water) - (Water Supplied to Distribution + Exported Finished Water - Imported Finished Water).

Distribution Losses = Water Supplied to Distribution - Authorized Consumption.

Total Losses = Treatment Losses + Distribution Losses.

Losses are made up of Apparent Losses (meter errors and unauthorized consumption) and Real Losses. Real Losses are equivalent to leakage.

Real Losses - Volume of water lost through all types of leaks, breaks and overflows on mains, service reservoirs and service connections, up to the point of users metering.

Apparent Losses - apparent losses, which are also called commercial losses, include all types of inaccuracies associated with customer metering as well as data handling errors (meter reading and billing), plus unauthorized consumption (theft or illegal use).

	2017
Treatment Losses [TL]	
Distribution Losses [DL]	
Total Losses [TotL]	

Apparent Losses

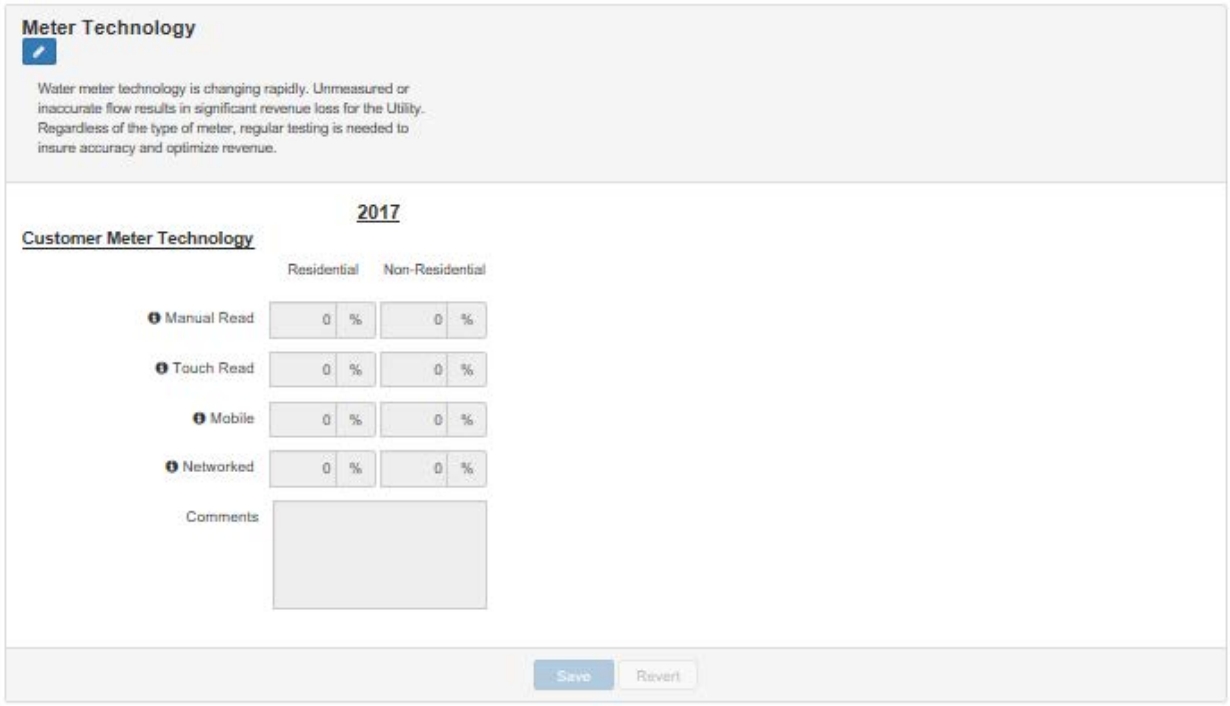
Unauthorized Consumption	0
Meter Inaccuracies	0
Systematic data handling errors	0
Apparent Losses	0
Real Losses	
Comments	

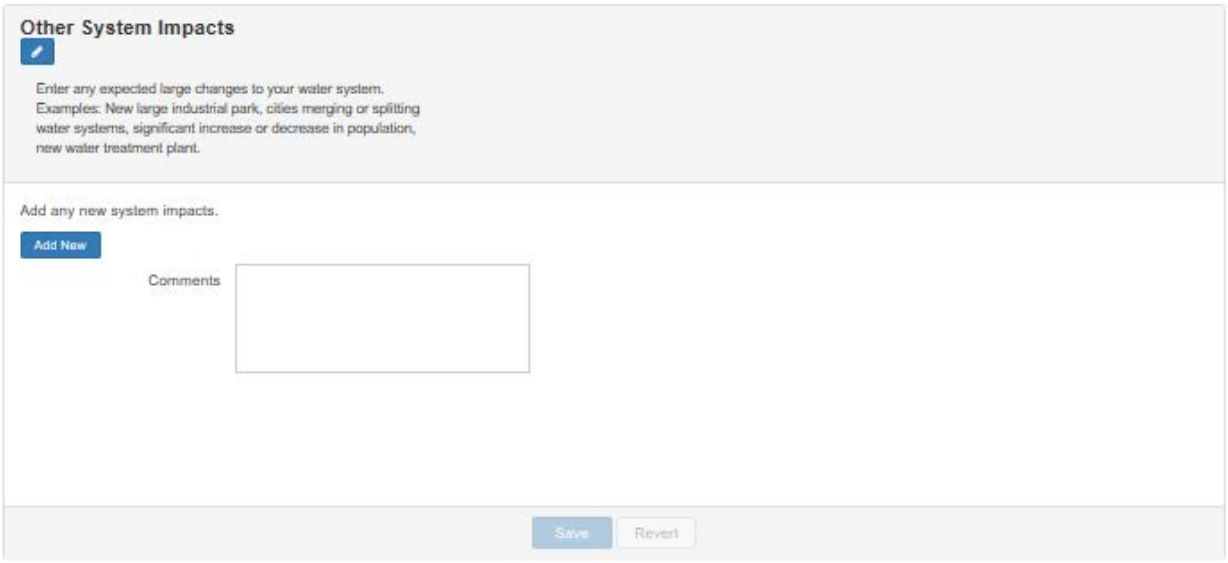
Save Revert

Demographic Data

	2017
Population Served	
Data Source	Select a Data Source
Other	
Comments	

Save Revert


Meter Technology
Water meter technology is changing rapidly. Unmeasured or inaccurate flow results in significant revenue loss for the Utility. Regardless of the type of meter, regular testing is needed to insure accuracy and optimize revenue.
2017
Customer Meter Technology
Residential
Non-Residential
Manual Read
Touch Read
Mobile
Networked
Comments
Save
Revert


Other System Impacts
Enter any expected large changes to your water system. Examples: New large industrial park, cities merging or splitting water systems, significant increase or decrease in population, new water treatment plant.
Add any new system impacts.
Add New
Comments
Save
Revert

Conservation – Direct

Conservation - Direct

Conservation Projects - Water Supply System (Before the Customer Meter)

Enter savings for each system project type in gallons saved and project costs in US dollars. In future reports you will be able to view the previous years data. Add any project types needed to enter your savings activities.

Leak detection and repair is a key water efficiency strategy. Age of pipes and storage facilities, the pipe materials and construction quality, the valves, meter accuracy and pumps all matter. Soil types also affect system efficiency, as corrosive soils reduce pipe life. High operational pressure and variations in hilly areas can further strain distribution system components.

	2017	
Category	Annual Savings (Gallons)	Cost ($)
System leak fixing (before the meter)		
Meter Repair/Replace		
Hydrant repair		
Reduce unauthorized water use		
Meter testing		
Add irrigation meters		
Add non-irrigation meters		
Increase Treatment Efficiency		
Storage Mixing		
Pressure Control		
Water Supply Projects Subtotal	0	0

Add New

Last System Loss Audit Date

Percent of System Audited %

Comments

Save Revert

Conservation Measures - Customer (After the Customer Meter)

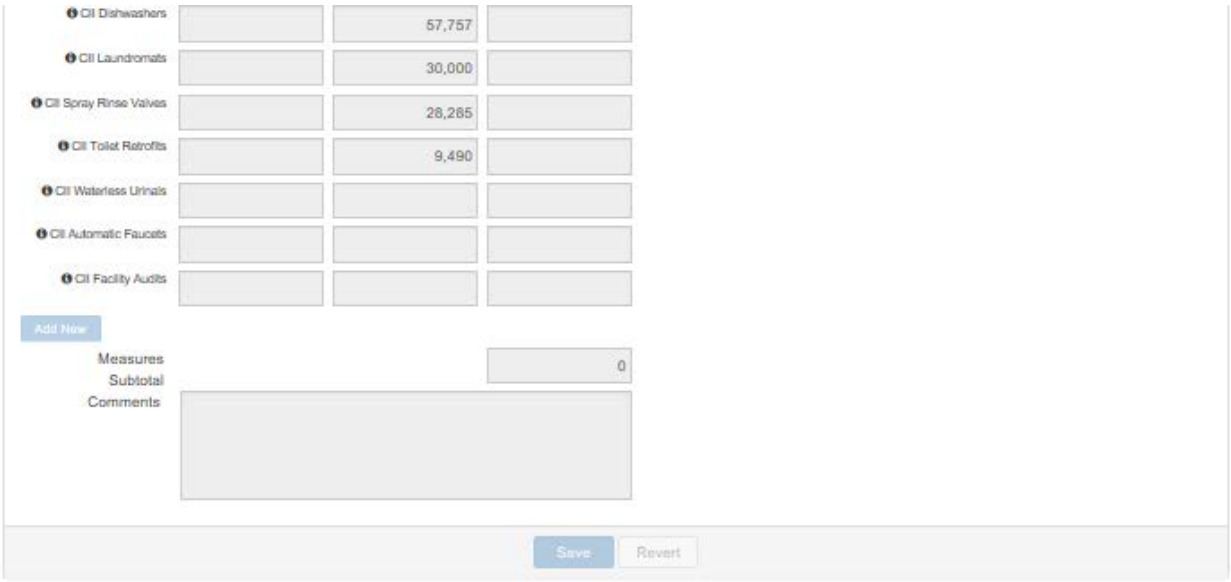
In this section, list the quantity of water saving devices funded or partially funded by the city. Incentive programs and cooperative projects with energy utility companies, SWCDs or other organizations may also apply. Example: units installed in a cost-share program for 200 rain barrels.

The Saving Watts & Drops program is an excellent resource for water suppliers. This program allows you to get multiple bids on bulk purchases for no charge and no obligation. See www.quantityquotes.net.

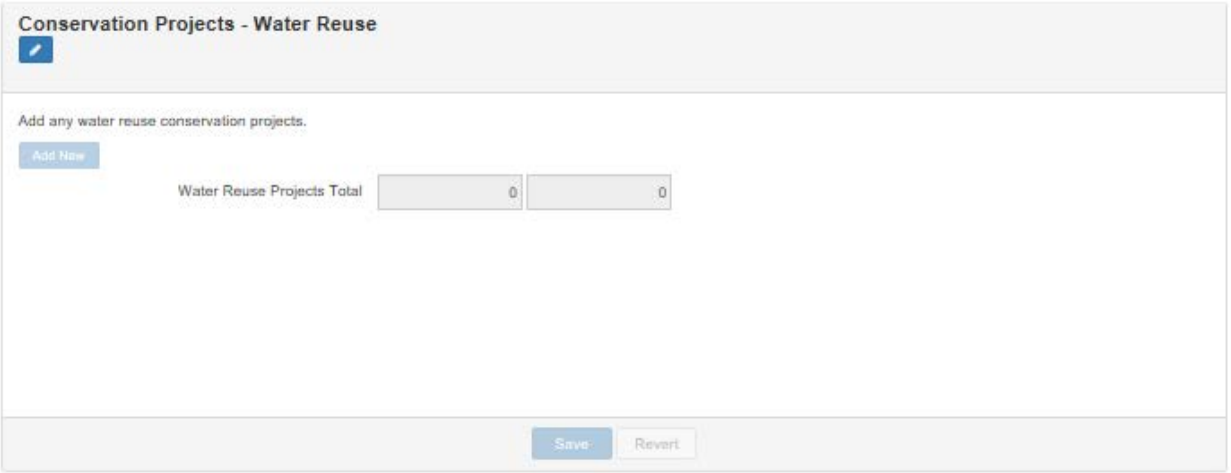
For many of the categories a unit water savings in gallons is already provided. These unit savings are based on research by the AWWA, EPA WaterSense and/or the Alliance for Water Efficiency.

If no unit gallons of savings value is provided, please enter your best estimate based on the product purchased and the item that is being replaced.

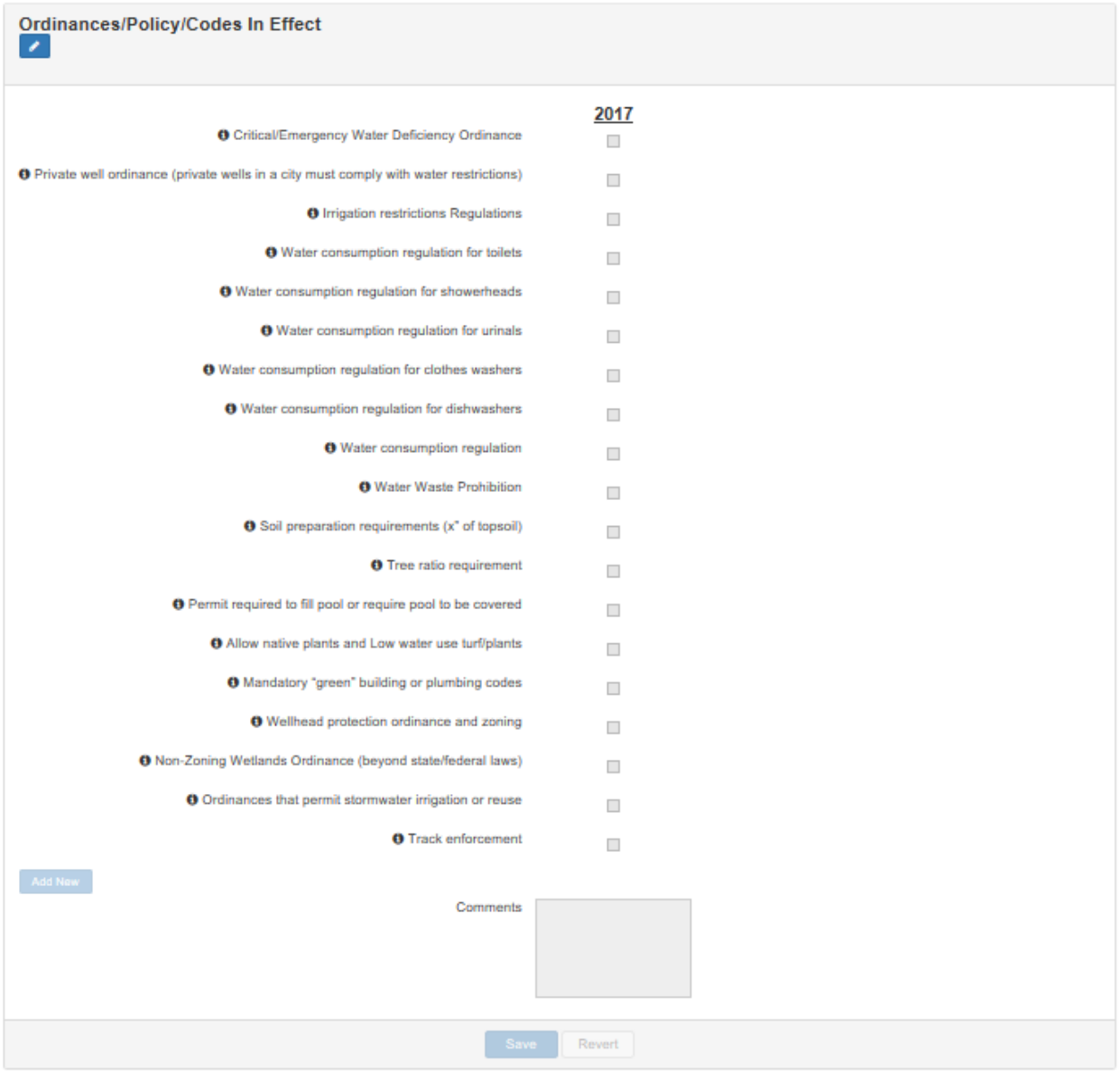
	2017		
Description	Quantity	Unit Savings (Gallons)	Total Savings (Gallons)
SF Toilet Retrofits		9,581	
SF Rainwater Harvesting Rebates		7,884	
SF Shower and Aerator Kits		5,018	
SF LF Showerheads		2,062	
SF Clothes Washer Rebates		2,044	
SF Rain Barrels		839	
SF HE Water Softeners			
SF ET Irrigation Controllers			
SF Efficient Irrigation Nozzles			
MF/CII Rainwater Harvesting		75,080	
MF Clothes Washer Rebates		10,950	
MF Toilet Retrofits (Unit)		9,581	
MF/CII Coin-Operated Clothes Washer Rebates		8,760	
MF Showerhead and Aerator Kits		5,018	
MF LF Showerheads		1,898	
MF Toilet Retrofits (Common Area)			
MF/CII Large Landscape Projects			
MF/CII ET Irrigation Controllers			
CII Food Steamers		81,500	


CII Dishwashers
57,757
CII Laundromats
30,000
CII Spray Rinse Valves
28,285
CII Toilet Retrofits
9,490
CII Waterless Urinals
CII Automatic Faucets
CII Facility Audits
Add New
Measures Subtotal
0
Comments
Save
Revert


Conservation Projects - Customer (After the Customer Meter)
Enter savings for each project. Do not duplicate measure savings above.
Add any conservation projects.
Add New
Customer Conservation Projects Total
0
0
Save
Revert


Conservation Projects - Water Reuse
Add any water reuse conservation projects.
Add New
Water Reuse Projects Total
0
0
Save
Revert

Conservation - Indirect



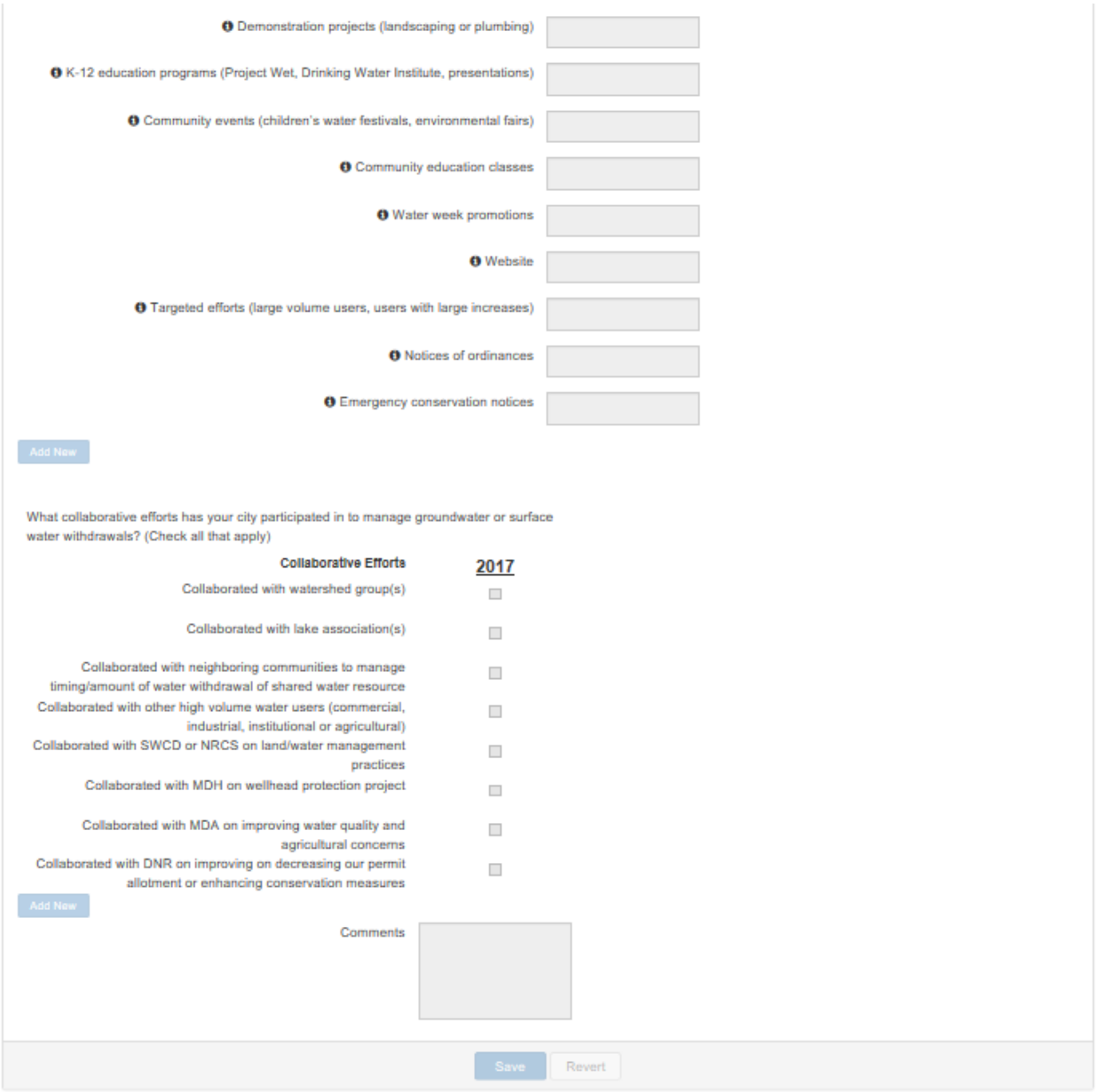
Education & Outreach

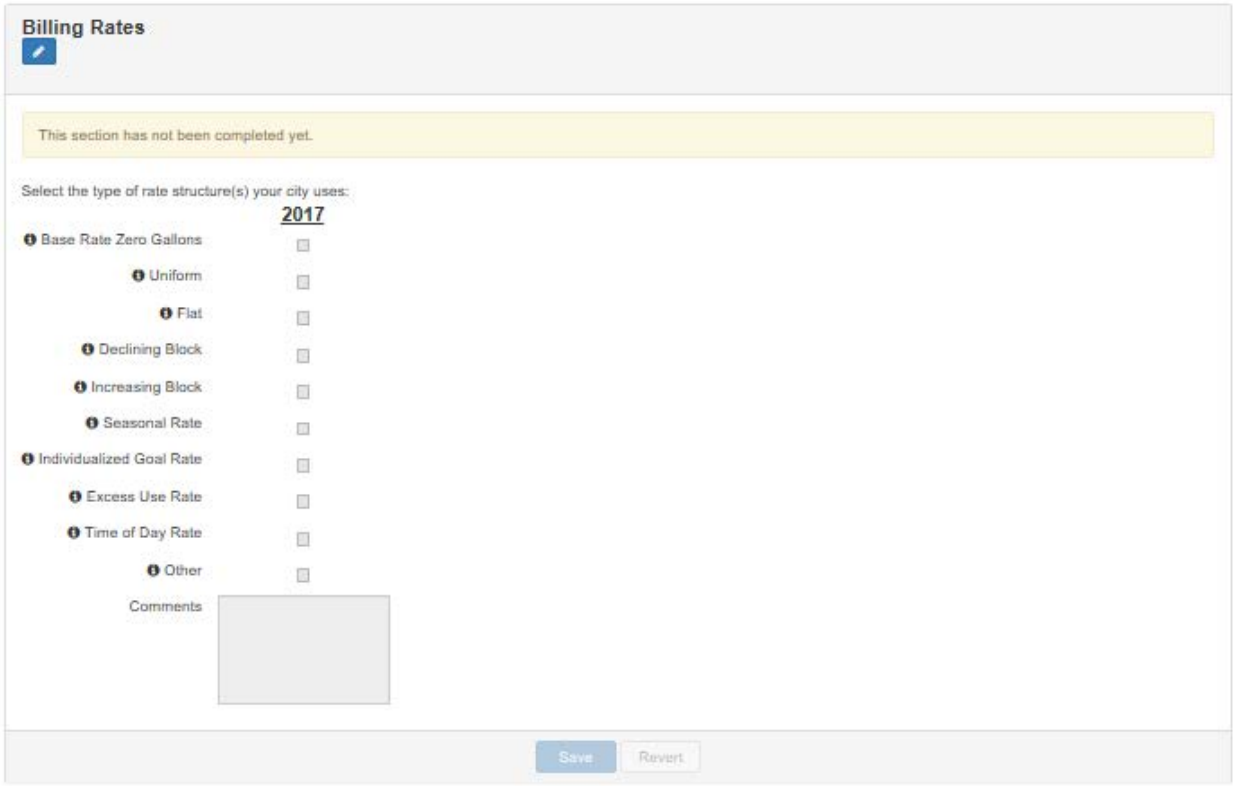
Only include education and outreach activities if the city funded or partially funded the program, or offered other services or incentives related to the program. The key message of these programs should be efficient and wise use of water, rather than conservation.

The goal of a communication campaign is to make water conservation a social norm so that customers will automatically use water wisely, much like citizens automatically fasten their seat belt, recycle trash, or conserve energy. Very few communications campaigns will use all of the communication channels below.

Because there are many factors that influence the actual number of people that may receive your water conservation education and outreach message, simply list the number of efforts, not individuals. For example, you do not need to count everyone that came to a water festival, simply list 1 Community Event.

Education Methods	# in 2017
Billing inserts or tips printed on the actual bill	
Consumer Confidence Reports	
Press releases to traditional local news outlets (e.g., newspapers, radio and TV)	
Social media distribution (e.g., emails, Facebook, Twitter)	
Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.)	
Presentations to community groups	
Staff training	
Facility tours	
Displays and exhibits	
Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices)	
Community news letters	
Direct mailings (water audit/retrofit kits, showerheads, brochures)	
Information kiosk at utility and public buildings	
Public service announcements	
Cable TV Programs	


Demonstration projects (landscaping or plumbing)
K-12 education programs (Project Wet, Drinking Water Institute, presentations)
Community events (children's water festivals, environmental fairs)
Community education classes
Water week promotions
Website
Targeted efforts (large volume users, users with large increases)
Notices of ordinances
Emergency conservation notices
Add New
What collaborative efforts has your city participated in to manage groundwater or surface water withdrawals? (Check all that apply)
Collaborative Efforts
2017
Collaborated with watershed group(s)
Collaborated with lake association(s)
Collaborated with neighboring communities to manage timing/amount of water withdrawal of shared water resource
Collaborated with other high volume water users (commercial, industrial, institutional or agricultural)
Collaborated with SWCD or NRCS on land/water management practices
Collaborated with MDH on wellhead protection project
Collaborated with MDA on improving water quality and agricultural concerns
Collaborated with DNR on improving on decreasing our permit allotment or enhancing conservation measures
Add New
Comments
Save
Revert


Billing Rates
This section has not been completed yet.
Select the type of rate structure(s) your city uses:
2017
Base Rate Zero Gallons
Uniform
Flat
Declining Block
Increasing Block
Seasonal Rate
Individualized Goal Rate
Excess Use Rate
Time of Day Rate
Other
Comments
Save
Revert

Appendix C: Imported and Exported Water

This table shows which utilities reported import or export raw water or treated "finished" water and what source they are connected to. Note that some cities export water to multiple communities.

Imported and Exported Water in Gallons						
OrganizationName	**Raw Import**	**Raw Export**	**Finished Import**	**Finished Export**		**Connected Organization**
Brainerd, City of				112,000	To	Baxter, City Of
Burnsville, City Of				7,424,000	To	Lakeville/Eagan
Burnsville, City Of				663,169,000	To	Savage, City Of - Public Works
City of Bloomington			1,085,515,000		From	Minneapolis, City of - Public Works Dept
City of Eagan		-			To	Met Council (Plant Waste)
Dayton, City Of			13,128,000		From	Champlin, City of
Dayton, City Of			44,497,000		From	City of Maple Grove
Grand Forks, City of	282,645,000				From	Red River of the North
Greenfield, City Of			8,000		From	Rockford, City Of
Greenfield, City Of				115,000	To	Rockford, City Of
Hutchinson, City Of		228,000			To	Bulk Water Station
Joint Powers Water Board			94,933,000		From	Joint Powers Water Board ASR
Joint Powers Water Board				91,615,000	To	Joint Powers Water Board ASR
Keewatin, City Of				-	To	KEEWATIN WASTE WATER
Keewatin, City Of				35,000,000	To	KEEWATIN
Lake Elmo, City Of			63,842,000		From	Oakdale, City of - Public Works Dept
Lexington, City Of		39,439,416			To	Blaine, City of
Luverne, City Of			254,510,240		From	lewis & clark
Maple Plain, City Of				-	To	Medina, City Of
Medina, City Of		-			To	Enclave hunter well#8
Medina, City Of		-			To	Enclave At Hunter well #7
Minneapolis, City of				29,011,616	To	Hilltop
Minneapolis, City of				57,741,967	To	Edina - Morningside
Minneapolis, City of				376,353,646	To	Metropolitan Airports Commission
Minneapolis, City of				493,959,853	To	Columbia Heights
Minneapolis, City of				706,254,476	To	New Brighton
Minneapolis, City of				1,085,506,563	To	Bloomington
Minneapolis, City of				2,084,869,000	To	Joint Water Commission (Golden Valley, New Hope and Crystal)
Minneota, City Of			27,578,000		From	Lincoln-Pipestone Rural Water
MN Dept of Corrections - Lino Lakes			NULL		From	Lino Lakes, City Of
Moorhead Public Service		33,032,398			To	Golf Courses
Moorhead Public Service				-	To	City of Dilworth
Morris, City Of				-	To	Alberta
New Brighton, City Of			710,303,135		From	Minneapolis, City of - Public Works Dept
Northfield, City of	52,343,999				From	Northfield Well No. 6 (Permit Amendment Pending)
Oakdale, City of				22,414,000	To	Landfall
Oakdale, City of				63,842,000	To	Lake Elmo, City Of
Prior Lake, City Of			269,906,000		From	Shakopee Public Utilities Commission
Red Rock Rural Water			5,073,000		From	City of Balaton
Red Rock Rural Water			5,632,000		From	Lincoln-Pipestone Rural Water
Red Rock Rural Water			37,922,670		From	St James, City Of
Red Rock Rural Water			42,120,000		From	Windom, City Of
Redwood Falls, City Of		47,858,000			To	Backwash and RO process Loss to sewer
Rock County Rural Water	-				To	none
Rock County Rural Water			79,606,150		From	Lewis and Clark rural water
Savage, City Of			655,981,911		From	Burnsville, City Of
Shakopee PUC	-				To	Savage, City Of - Public Works
Shakopee PUC			15,660,000		From	Savage, City Of - Public Works
Shorewood, City of	2,248,936				From	Excelsior, City Of
Shorewood, City of	3,638,000				From	Chanhassen, City Of
St Francis, City Of				21,478,000	To	Oak Grove, City Of
St Paul Regional Water Services				-	To	Little Canada, MN
St Paul Regional Water Services				-	To	Roseville, MN
Virginia Public Utilities		172,290,134			To	z_Test_Organization1
Virginia Public Utilities			8,073,900		From	Eveleth, City of
Wayzata, City Of				7,507,000	To	Orono, City of
Wayzata, City Of				10,321,000	To	Minnetonka, City Of
Worthington, City Of			229,622,000		From	Lincoln Pipestone Rural Water
	340,875,935	**292,847,948**	**3,643,912,006**	**5,756,694,121**		

Appendix D: Selected Utility Comments

The following list of comments are compiled from all sections of the Water Conservation Reporting System. Comments such as N/A or none have not been included. Listings are in alphabetical order. Some cities are listed as "City of…"so, if you are looking for particular city, check there, too.

Dashboard Comments

Comments are presented as submitted and are not edited.

Water Supplier	***Dashboard Comment***
Alexandria	I am very proactive in water conservation and education, as well as continuously educating myself on becoming a knowledgeable WW & WTP operator. That is why I decided to go to secondary school for Water Environmental Studies. My personal opinion is that Cities don't have the personnel or the time to do many of the somewhat redundant lengthy reports. I can easily see these costs have to get passed along onto ALL of the residents of each city in higher taxes and rates (I don't think any of us want that)? It's not that I am not supportive of the goals, I am. I am Just stating a shared thought by many. After coming to Alexandria 6 months ago, what I am seeing is a problem with the Chloride levels (as well as other constituents) that are being discharged here from the ALASD into the chain of lakes (Natural Resources) that surround The City of Alexandria, (I am aware of the majority of these sources). There is also Magellan Co. that stores, transports and distributes petroleum products with millions of gallons of storage sitting above, and pipe lines running right through our source water here. I am hoping that our states, and your priority #1 is for protecting the source first by implementing extreme measures on this industry as well as developing A plan were we can limit the degradation to this areas chain of lakes and water supply without bankrupting everybody. Thank You, and let's make it a great year ahead.
Andover	We believe the water loss of 1% is in error. The water loss of 1% is based off of the water to distribution and water sold. Would it be better to base the water loss % off of the water pumped from the source (wells) and the water sold. If that were the case the water loss % would be 3% in our case. I like the 1% but there is 2% of the water pumped from the source unaccounted for.
Atwater	I hope there is some leverage due to the fact this is the first year we are doing this report so detailed.
Braham	The City of Braham experienced 4 major water main breaks/leaks in 2017 which were a major contributor to the water loss. Backwashing at the Water Treatment Plant was metered at 2,447,000 gal. Other major contributors would be hydrant flushing, flooding the skating rink, and watering the Rose Garden, which aren't metered. We are reluctant to put a meter on the hydrant at the Rose Garden for when the Garden Club waters the garden for fear of vandalism or theft of the meter.
Brainerd	Thank you. Our report is complete.
City of Ada	We will work more on conservation in the future!
Excelsior	Much of the information in the conservation portion of the report was not tracked for 2017. Plans for 2018 are to more adequately track this information for submission next year.

Water Supplier	***Dashboard Comment***
Faribault, City Of - Public Works Dept.	Negative water loss % is due to meter inaccuracies as noted in the accounting section. We are experiencing issues with water meters speeding up and causing inaccurate readings. We replaced all residential meters in 2013, but did not replace the commercial meters. We have tested various commercial meters and have found that they have a build-up on the internal components causing them to read high. We are in the process of identifying and replacing several commercial meters. We are aware of the issue this causes with our water loss ratio and are working to correct the meter inaccuracies.
Grand Marais	Currently the water loss ratio value is not correct. Needs to be % adjusted. Also, the residential gallons per capita demand value is not correct. Needs to be divided by 365 days/year. Opinion remarks, the water loss ratio should be based on the water supplied to treatment not the supplied to the distribution system because. One, this is the volume of water that we pay for and secondly the water needed to treat the water should not be treated as water loss. It is needed for production. And lastly we pumped 78 mg of water out of Lake Superior at the WTP and put back 204 mg of water into Lake Superior at the WWTF. This is a net increase to the lake of 126 mg. Maybe the DNR should pay Grand Marais the difference?
Keewatin	We are not metered with our water
Lino Lakes	My mouse Icon only shows a red circle with a slash through it when I try to input info. - Note: Dashboard numbers are auto-populated.
Medina	Water loss seems off a bit according to my calculations it might have something to do with our irrigation figures and raw water. Also Medina has three separate systems and two of them are neighborhoods. It seems maybe they should be separate or just use the Hamel system to simplify and keep our larger system more accurate. Just a thought.
Melrose	2.1% water loss; don't know why it didn't calculate.
MN Dept. of Corrections - Faribault	Just starting conservation program in earnest.
Morris	I know my individual well meters are not accurate. I know my meter from the finished water to the tower is accurate. I pumped 247,000,000 with the well meters added up. This is why I am at a 29.1% loss. If you use the finished water meter, which is calibrated yearly I would by around 4% loss. There is nowhere for the water to go other than to the wells to the plant (raw water).
New Ulm	I have done some pump gpm comparison testing. I averaged out the percent differences and multiplied them against last year's individual well totals. It seems that we owe you some money or the DNR. I have changed the water accounting to reflect my testing. Joel E. Johnson, Plant Operator, New Ulm, MN.
Owatonna Public Utilities	I rechecked our water accounting figures multiple times to verify that the water loss numbers were accurate and it appears to be.

Water Supplier	***Dashboard Comment***
Pine City	We made an error and added the Fire Department and Public Works unaccounted water into the total. This was 931,060 gallons.
Prior Lake	What makes up the Total Peaking Factor?
Rogers	Hopefully data is entered correctly. Just learning.
Shakopee Public Utilities Commission	3/8/18 - I believe this is complete.
Vadnais Heights	If any questions, please call Mark Graham at 651.204.6050 or email me at mark.graham@cityvadnaisheights.com
Victoria	Completed 3-28-18
Wabasha	We experienced several large water main leaks in 2017 which would account for a large portion of the water loss. There were also several leaks that were discovered and repaired in early 2018 that were leaking prior to 2018.
Waverly	We are currently under 1000 person served but will be over shortly. Under distribution losses section; the possible negative numbers could be due to pipe flow design. Short flow distance in pipe may change how meter reacts to water current in pipe system. Flow meters have been tested and show to be accurate. Looking into adding more straight-pipe to the system, and also adding a clamp on meter downstream on pipe to see if there is any change in readings.
Woodbury	Monthly Total Metered Distributed: some customer classes are only metered once or twice a year, or quarterly. This may explain why there are drastic differences between certain months. Apparent Loss: not estimated. Conservation projects: gallons are not estimated and cannot be accurately accounted. For example, we do not have a good way to measure how much water is "saved" when responding to water main breaks. Or the gallons "saved" by replacing meters at the end of their lifecycle, the replacement program we run replaces the oldest meters, resulting in improved accuracy but that doesn't equate a savings in gallons. Reuse: systems that were designed and implemented for stormwater management do no equal a gallons savings. They were not installed to replace a potable water supply, but they are a stormwater best management practice and have positive results to the downstream water bodies and may add infiltration to the area. Systems that do replace potable water supply use for irrigation are not metered. And when stormwater is mixed with water from an irrigation well, it is very difficult to measure the water source savings and use.
Worthington, City Of - Engineering	Water loss appears to be a gain due to the purchased water from +A1:B28Lincoln Pipestone Rural Water and the calibration issue with the effluent meter. When comparing water loss to the newer influent meter at the plant our water loss calculates out to 7.8% and with losses in treatment should be a bit better than that.

Water Accounting Comments

Most of the water accounting comments were in direct reference to the data they input and do not make sense out of context. Only a few comments are listed here. These are presented as submitted.

Water Supplier	Water Accounting Comments
Alexandria	I have had a pleasant conversation with Leo Steidel (ESPWater) and have decided since that phone conversation that I will be having all of the flow meters at ALP WTP calibrated including all well meters. I had also informed Leo on that I will, (and am) doing for major maintenance throughout all wells and WTP, so all numbers can be easily correlated throughout the entire well field, the plant, and into the ALP Distribution system. I started here in Sept of 2017 and one of the first things that I noticed (as well as many other things) is that the numbers and records that have been being recorded needed immediate attention from start to finish.
Appleton	We do not have meters/do not read at the following: City Shops-2 sites City Office-houses City offices, library & regional development commission 52 Wing-houses day care center, pre-school & community activities Parks-sprinkler systems Campground-12 hook up sites, shower house Fire Hall Swift County Fairgrounds Skating Rink Ambulance Building
Atwater	Water tower was cleaned in May, thus huge usage on usual slow month.
Avon	Because of our computer program for meter reading we cannot separate residential and non-residential monthly totals. We can only do this yearly. I divided the residential and non- residential year end totals by 12. At the current time this is our best solution.
Bayport	Meter inaccuracies may play a part in the negative water balance. Meters at all three wells and air stripper are due for testing in 2018.
Belle Plaine	None of the City Buildings are metered including the fire hall. The Unmetered water use is way higher than I estimate.
Brainerd	New 500000 gal elevated water tower in 2017.
Brooklyn Park	Brooklyn Park Utilities notes the metering discrepancy. A meter upgrade has occurred for well #10 and SCADA improvements are planned for 2018. Brooklyn Park Utilities Dept. Bills quarterly, not monthly. The customers' bills are read remotely every three months by geographic districts. The districts are not uniform in their composition between residential and non-residential customers.
Cambridge	Unauthorized consumption, est. 3% of billed unmetered. Meter inaccuracies, estimated 5% pumped. Systematic errors, 1% of billed metered. Replacing several blocks of aging infrastructure and streets this summer 2018. Working on replacing all Sensus meters with Neptune.
Carlton	Contractors taking water without communicating that they took it.
City of Eden Prairie	This section (authorized consumption) is very difficult to track. We do not track our metered distributed water by month. We read meters quarterly on different days each month.
City of Lakeville	During 2017, approximately 325 meters were replaced due to malfunction. We estimated 7,000 lost gallons per meter.
City of White Bear Lake	We have 5 Water main interconnects for emergency. (WBT 3, Vadnais Heights 1, & Mahtomedi 1) We did not use them in 2017

Water Supplier	Water Accounting Comments
College Of St Benedict	The Colleges system does not meter any connections so I cannot put a sum on Treatment losses other than an estimate. We do not meter or charge for our campus water services.
Detroit Lakes	Unbilled and Unmetered sources are flushing of meters, dead end flows, construction, cold weather bypasses.
Elk River	98 new connections in 2017
Ely	Unauthorized water includes illegal bypasses and water taken from parks, cemetery and outside spigots by seasonal residents. We assume the meters are 2% inaccurate. The remainder of the loss is bypasses in homes, bypasses on dead end lines and hydrant flushing by City staff and fire department.
Faribault	Issues with Sensus water meters over-spinning and reading fast. Meter replacement plan is in process.
Frazee	Extreme water main flushing was conducted during the week of 11/12/2017 through 11/15/2017 due to a Total Coliform bacteria issue, the city had after some extensive main replacement during the 2017 construction season the city had done.
Glencoe	Glencoe had a lot of Construction Projects during 2017. The City had a 15 Block total Street reconstruct Project (Baxter Ave Project). There was a County Jail Project, High School Addition, and Hospital Addition. All of these Projects had new water mains and service lines installed which required flushing.
Glenwood	We have had radio read meters for 17 years. We are experiencing the battery life failure this past December and are in the process of replacing meter heads. We are also looking at new technologies for remote reading as we are concerned that some of the loss is in the synchronizing of the meter program to the billing program. We are in process of metering the parkland watering, and replacing and testing meters.
Grand Marais	Population doubles is summer do to tourism
Hastings	In 2017 the city did a city wide leak detection study and found 6 main leaks that were repaired. In the fall of 2017 the city started a city wide meter replacement program
Hutchinson	Meter inaccuracies estimated at 3% of Total Metered Distributed. We've done some testing and found older meters are 3%-8% slow on low flows. Meter replacement is coming soon.
Jackson	Have an interconnect system with Red Rock Rural Water for emergency use only. No use for 2017.
Joint Powers Water Board	Aquifer Storage & Recovery (ASR) Injection Process MN Variance TN 4771 EPA Permit # MN-171-5R21-0002
Lake Crystal	5 million gallons of the Unbilled Metered is used for backwashing filters at the Water Plant
Le Sueur	We currently do not separate residential and non-residential. We will be working towards that for 2018. 2017 finished a whole system meter change out program and installed all remote read meters.
Lexington	The cities of Blaine and Lexington have interconnected water systems, with water from both cities being pumped into it. The above calculation reflects the difference between all the water Lexington supplied into the system and the water delivered to Lexington residents as indicated by metering data.

Water Supplier	Water Accounting Comments
Lindstrom	More was sold than what was pumped from the wells because of a major high usage meter (local High School) had technical difficulties when the register for the meter caught up in usage after a couple of quarters of it reading zero usage.
Long Lake	Implemented AMR system in 2017 - of the total residential/business connections, only 23 (3.5%) residential and 2 (1.9%) business connections remain manual read.
Mahtomedi	Mahtomedi supplies water to the City of Willernie who bill their own customers. Willernie reported selling 15,306,324 gallons of water to their 229 billing customers. We are in the process of replacing all meters in the city to an AMI Radio Read system. This is a 5 year project.
Mankato	In 2016 we completed a reclaim project where we reclaim the membrane backwash water that is pulled from the distribution system.
Mantorville	These metered amounts entered are for both Residential and Commercial usage. We did not separate out usage in our reports for 2017 but will in the future.
Marshall	The numbers supplied for this section (water supplied to distribution) are the same for total meter distributed. The meters measuring flow out of the plant into the distribution system have never been accurate. They measure less the water sold. Two years ago we invested in new mag meters for the outgoing plant water and experienced the same issue. We rely on the raw water meters and there is very little loss of water in the treatment process. Things like filter backwash and press water are sent back to the reclaim basin
Minneapolis	Used default 0.25% from AWWA Water Audit for Unauthorized Consumption and Systematic Data Handling Errors. Above it seems that Total losses are added to apparent losses to get real losses; this does not seem correct. Our 7 wholesale customer meters are manually read each month.
Minnetonka Beach	According to Metropolitan Council, our population estimate is 539 but they estimate 42 people live in a neighborhood of 15 homes that do not receive water from the city. Therefore, we are using 497 as our population served.
Minnetrista	Most of the water lose was from the startup of the treatment plants. A large number of gallons were used to sanitize new filters and lines and during initial start. Hydrant flushing due to poor water quality was a secondary factor.
MN Dept. of Corrections - Faribault	Prison is currently expanding the meter system.
Montevideo	Haven't done any studies in this area, we know our meters are 35+ years old. Goal is to have a new meter and billing system in place in the next 5 years.
Moorhead	In February 2016 MPS began using its newly constructed High Service Pump Station, which greatly decreased the number of water main breaks, leading to less water loss.
Moose Lake	2750 is the population of Moose Lake. The Minnesota sex offender program and the Department of Corrections inmates are included in the total population but the city of Moose Lake doesn't supply water to either one of the facilities. In the past 2 years the city has taken place in leak surveys and have repaired leaks and damaged pipes to lower total water usage.
New Brighton	The City of New Brighton's water treatment facility is shut down for upgrades to address contaminates of emerging concern. All water sent to New Brighton's

Water Supplier	Water Accounting Comments
	distribution system is supplied via an interconnection to the City of Minneapolis water storage reservoirs.
Newport	When flushing water mains twice per year over 7,000,000 gallons over the average daily use were used. Water main breaks and sanitary sewer flushing not included in those numbers
Oak Grove	The treatment losses is the water used to backwash the filters. Also we had an issue during 2017 with a 3" meter used for billing, it has since been corrected.
Oak Park Heights	Oak Park Heights reads meters on a quarterly basis. The totals reflect a quarterly total divided by 3. Also, Park shelter water use has not been tracked, flooding rinks, flushing hydrants, flushing towers and well pump to waste was not metered in 2017. Better tracking is planned for 2018. Ames/Lunda hydrant meter discovered broken but was used for 2 months. Estimated usage was 1 million gallons. In recent years OPH replaced about 1/3 of the City with new water main. This, no doubt has impacted water usage as staff has been flushing more often to remove sand/debris from pipes. Water usage from flushing hydrants has not been tracked and only has been estimated in the past, but tracking will begin in 2018.
Oakdale	1% meters are not working accurately with our AMR system as of yet.
Ortonville	Beginning in Jan. of 2018 we no longer supply big stone city
Otsego	Water is billed out the 15th of every month so January is December 15th 2016-January 15th 2017 and December 2017 ends with the 15th of the month.
Pipestone	One new company say they will use more water next year.
Ramsey	Several new large developments. New large industrial park.
Red Lake Falls	All meters read manually except for 7 radio reads.
Red Rock Rural Water	All metered water is registered under residential use. This is not completely true. As a rural water distribution entity, we deliver water for livestock use. At this time, we are not able to quantify livestock use which should be recorded under non-residential. Also included are 11 small cities we serve bulk water to. New Badger cell phone technology AMR meters are being installed at the rate of approximately 300 per year. The City of Heron Lake began purchasing water in January of 2018 which could increase the usage by 40 MGY.
Rockford	The city is going to replace the well house meters or have them calibrated this year, 2018.
Rush City	We got new radio read meters and had issues with changing out the old with the new for the most of this.
Sandstone	For now a hospital facility moved to the new business park so the new facility is more water efficient creating a negative affect but a new assisted living opened up also in the business park creating a near wash in usage. As the park fills in with new business we may recognize an increase
Sartell	The City of Sartell is planning to have the Well/influent meters cleaned, checked, and re-calibrated. Billing clerk converts meter readings, which are in cubic feet to gallons. We also bill 1 time per 2 months, which is why the gallons are the same for 2 months in a row.

Water Supplier	Water Accounting Comments
Sauk Centre	We are currently replacing every meter in our Water system. 3 year project to complete AMI. Started in Dec of 2017-2020
Sauk Rapids	We only have 5 meters that are not changed to Radio Read.
Shakopee	We use touch readers and then manually enter the meter readings. Another 500 accounts are possible.
Sherburn	Constructed a new water treatment plant with a reverse osmosis system along the drilling of a new well.
Silver Bay	Our residential accounts are not metered. They are charged a flat rate.
Spring Lake Park	We are unable to provide monthly totals as we record meter readings and bill City utility accounts on a quarterly basis. All water meters are equipped with a radio receiver to transmit data to a laptop in the Public Works vehicle to automatically collect meter readings, which then can be downloaded to the utility accounts. We have a new senior community under construction which will be 194 units opening in 2018 and a new Hy-Vee store to hopefully open in 2019.
St. Cloud	We currently read only half of the City each month, alternating monthly, except industrial users are read monthly.
Superior Water Light & Power Co.	We are in the process of changing out all of our water meters to AMI meters.
Tower-Breitung Water Board	We will be expecting a fairly large development project within 5 years to be adding approximately 40 connections.
Two Harbors	We have a large municipal campground that is unmetered and has the potential to be a significant contributor to our total losses. We also have a large underground tank leaking at the water treatment facility which is being looked at for replacement in the 5 year plan. This also would be another large contributor to water losses.
Vadnais Heights	Quarterly reads are for total water. No breakdown for residential and commercial.
Virginia	Raw water is drawn from the system prior to the finished water. It is used in the power plant for cooling. The distribution system had water losses of 3,085,528 gallons (estimated) due to breaks.
Wabasha	December is higher for non-residential because of snow making at ski hill. We experienced several very large water main breaks that were repaired in 2017 as well as 4 that were leaking in 2017 but repaired in early 2018. Found major water leak in December that was hard to locate in the year of 2017 once it was found the system production fell back in line.
Wanamingo	Monthly total metered distribution was completed by the yearly reports divided by 12. City had issues with replacing residential water meters. The residential totals were estimated and could be low. 8 new homes were built in 2017 where there was some usage before billing. Water meters in town are 15+ years old and are slowing down and starting to fail. The City replaced a dozen failing meters in 2017. City has had 12 new homes in the last two years. Existing commercial expansions have been steady since 2014.
Waseca	This printing company was founded in 1957. Resulting job loss of 365 positions. Change in water delivered is an estimate.

Water Supplier	Water Accounting Comments
Watertown	Staff needs to get meters in the city owned buildings and the sprinklers that are ran by city. Also meter Hockey rink flooding
Waverly	2018 water main extension around east side of lake, to tie well # 3 system into rest of system. New housing starting possible 30 homes, also private wells will be sealed along main expansion. 18 new services will be added mostly seasonal homes.
Wheaton	New automated meters will be installed within next two years, awaiting funding.
White Bear Township	White Bear Township utility billing is invoiced quarterly. 2017 invoices covered the time frame of Mid-November 2016 through November 2017. Variance is due to timing of White Bear Township utility billing, which is not on a calendar year. Quarterly billing in March, June, September, December. We have 2 residential accounts that do not have water meters installed. Homeowners will not respond or provide access to install water meters in house.
Willmar	We have just implemented an AMI meter reading program. This technology has already helped us catch leaks after the meter sooner. This has saved money for the customer and reduced water waste. New Industrial Park with more water users coming in. In the planning stages for water treatment plant changes to improve distribution water quality and reduce flushing requirements.
Winona	The City has started to make Metron meters with Verizon plans available. The customer then pays for a ten year plan where they can access their portal and monitor consumption. There are 134 meters like this set.
Woodbury	Woodbury continues to grow each year, especially in the residential and commercial sectors. In 2017, 345 new connections were added to the City distribution system.
Worthington	This number is skewed by the effluent meter being out of calibration. A new meter will be installed in June of 2018. Lewis and Clark Regional Water is expected to come on line in November of 2018. Our allocation from them is up to 1.904 MGD.

Conservation – Direct: Water Supply System Projects and Customer Conservation Project Comments

Conservation-Direct comments are highlighted in green and white; Conservation-Indirect comments are highlighted in blue and white.

Organization	Water Supply System Projects	Customer Conservation Projects
Andover	We complete a leak assessment every year and replace older water meters with new as much as possible. We have no means of knowing how much water is saved or the cost associated with this.	The City of Andover has not participated in any incentive programs with residents on water conservation items.
Atwater	In 2015 we purchased brand new meters for every residential and commercial connection that was 5/8 inch. Also we did a Comprehensive Streets management Report in 2017 rating streets and underground utilities for future replacement.	Being a small town of 1133 most of these are not in our wheel house. We have raised rates and still can deliver and take away a person's water for about eight-tenths of a cent per gallon in Atwater.
Avon	We do not have a date for last system audit.	None of above done in 2017

Organization	Water Supply System Projects	Customer Conservation Projects
Bagley	Water leaks repaired, meter replacement and AMR project costs for water system, repaired damaged fire hydrant.	2017 data tracked with our electric conservation incentive program.
Baxter	The city implemented a monthly water audit city wide in 2017.	
Braham	The system loss is determined annually with the DNR Water Use Reporting.	No programs
Cambridge	Information from our wellhead protection plan, metered accounts, flow meters and estimates.	
Carlton	Leak Detection on all 75 hydrants. We mix 24/7 with re-circulation pump.	We do not have any programs in place
Centerville	We have 9 meters that are specifically for irrigation for townhome associations. We have irrigation system in our 1 of our Parks that is connected to storm water ponds.	
City of Anoka	Going to do another audit in 2018	
City of Big Lake	Leak Detection on distribution system	Per Plumbing Code
City of Bloomington-Public Works	Conservation project information is not currently available in this format or has not been recorded for 2017.	
City of Breckenridge	We have replaced several meters and 1 hydrant but I am unable to quantify gallons and dollars with any lever of confidence.	
City of Eagan	One quarter of the City is done each year.	
City of Eden Prairie	We repair numerous hydrants and leaks in the system routinely. However, we do not track the annual gallon savings or cost associated with the repairs. The City of Eden Prairie replaced 592 residential meters in 2017. The majority of those meters replaced was due to an aging battery, not due to meter inaccuracies.	
City of Maple Grove		City provides toilet insert kits for SF and MF, however does not track by type of land use.
City of Maple Lake	Home owner pays for them	
City of Robbinsdale	We use AMR and have since 1996.	
City of White Bear Lake	System fixing is based on 16 water main breaks with a 1/2" hole that took 1 day to find each = 1 MGal. Audit is our annual report to DNR through total production and total sales	Information provided the City's Environmental Specialist (Connie Tailon)

Organization	Water Supply System Projects	Customer Conservation Projects
Cloquet	The extent of Cloquet's audit would be our yearly unaccounted water report.	
Dayton	Our system is relatively new the oldest part was installed in 2000 so we have experienced minimal infrastructure leaks or repairs	
Dundas	Annually	All water conservation requirements are per state, plumbing and UBC building codes.
Edgerton		We have offered these in the past but no longer do because people were no longer using them.
Ely	Leak audit planned in 2018	
Empire Township	Just started program in 2018 and we hope to do about a third each year as we see needed.	
Eveleth	Irrigation system is metered	
Eyota	Leak detection is performed yearly on 100% of the water system. No leaks were found in the water system in 2017.	
Faribault Public Works Dept.	Issues with Sensus water meters over-spinning and reading fast. Meter replacement plan is in process.	
Frazee	City is in the process of doing a lot of meter change outs. Any money for this effort would be appreciated.	
Fridley	Two water service leaks six hydrant repairs.	
Gilbert	We have been researching total new meter replacement.	
Glencoe		In 2018 with our Well Head Protection we will be doing some kind of low flow shower head rebate program or other water saving programs.
Glenwood	We have the system surveyed and do an audit yearly.	
Goodview	2 hydrant leaks and 2 service leaks found during audit, estimated volume, replaced approx. 100 residential meters.	City goes by state code for plumbing efficiency
Grand Meadow	We just started this program in November 2017	
Grand Rapids	Replaced 2940 LF of 8-inch pipe Water Leak Study June 2017 AMI Water Meter Project 2017-2020	

Organization	Water Supply System Projects	Customer Conservation Projects
Granite Falls	At this time we are not implementing any of these measures except adding irrigation meters when requested, testing meters when requested, and replacing meters and hydrants as needed. No costs available.	There are no programs in place to incent people to conserve on water usage.
Hastings	2017 City wide water leak survey performed. Three main leaks and 5 hydrant leaks were found and repaired at a cost of $13491 including audit bill.	
Hawley	The City of Hawley has never conducted a water audit.	The City of Hawley has not participated in any water saving fixtures or devices.
Hector	Projects totals $75,000 spent in 2015 to install remote meters. Saved approximately 25 man hours each month or 300 hours/$6600 dollars. 2015-2017. Hydrants 31 EA=$144,700, 6" WM-$374,724, 8" WM 2987 LF=$92,597, 10" WM-3127 LF=$109,445, (122) 6" GV=$173,240, (20) 8"GV=$39,000, (16), 10" GV $43,200. Water Treatment Plant upgrades: $773,961.40 and new water tower: $714,000.	
Hopkins		Audits are completed monthly by the automated meter reading software which alerts the City of unusual water usage.
Hugo	These items are done on an "as-needed" basis. We do not track costs for each individual item.	MF/CII Large Landscape Projects, Irrigation Controllers, and Facility Audits water savings have been left blank - there is no way to measure savings.
Inver Grove Heights	We do annual leak detection on our entire system every June. We have been using Water Conservation Service, Inc.	
Keewatin	We do not have metered water.	Unable to get number because we are not metered with water as I have stated.
Lake Elmo		All new homes constructed are to include water efficient fixtures. Approx. 250 homes were constructed in Lake Elmo in 2017.
Le Sueur	In 2017 completed a multi-year city wide water meter replacement program. Our past data collection is inaccurate so we cannot compare water usage after meter replacement as well as revenue lost before replacement.	We do not fund any water saving devises.

Organization	Water Supply System Projects	Customer Conservation Projects
Lewiston	We have a large street project coming up in 2018 replacing old infrastructure on 4 streets.	
Litchfield		Energy Star Rebates are given to the public through the membership of the City in its JAA Power Supplier, which is Southern Minnesota Municipal Power Agency (SMMPA). SMMPA quantifies the power and water savings each year.
Madison	Self-audit performed once a month to monitor water loss.	
Mahtomedi	In the process of replacing all the meters in the City. 550 are complete of approx. 2700 meters. In 2017 we replaced 432 meters. We repaired 6 water main breaks in 2017.	The City replaced 6 irrigation controllers with more efficient water controllers at a cost of $3300.
Mankato	We have mixers in all reservoirs and towers, but I do not see how it saves gallons?	None of the above measures met in 2017. We are working on a few for 2018.
Mapleton	Westrum Leak Detection	
Marshall Municipal Utilities	Most of our distribution system is PVC or poly and isn't able to be leak detected	
Mayer	City had a leak study survey done on the entire system. Found three significant water leaks all of which have been fixed.	
Medina	Meter replacement unknown savings at this point but should be around 8-10 % on those 80 meters	We have no way of knowing any of this.
Milaca	System audit unknown. I am new to the position and am unable to find that information.	As far as I am aware none of these have been implemented but I look forward to trying to implement some in 2018.
Minneapolis Public Works Dept.	Above answer refers to the leak assessment performed during 2015.	
Minnetonka	In September of 2017 the entire water system was surveyed for leaks. This survey identified 20 potential leaks. After additional investigation, 9 fire hydrants and 7 underground water leaks were repaired.	
Minnetrista	Sixteen fire hydrants were repaired throughout the City. Amount of gallons of water saved - unknown.	

Organization	Water Supply System Projects	Customer Conservation Projects
MN Dept. of Corrections - Faribault	No audit has been performed	Prison just setting up programs
Montgomery	Increase Treatment Efficiency- had Gary Ruhland replace two broken water valves in Pretreatment I figure this will save use about 6,346,800 gallons per year and next year we will use about 1,677,600 gallons at the WWTP.	Average household person in Montgomery, MN uses 42.8 gallons a day. I have asked them to think about putting something out in the bill to help motivate people to use water saving devices. But we cannot afford to give rebates our water bills are high even already.
Montrose	Water Conservation Services conducted full system leak survey on the distribution system	
Mountain Iron	100 new residential meters installed during 2017	
North Branch	System has not been audited since before Jan.1,2008	
North Mankato	Our last audit identified 5 hydrant leaks and 1 private service leak. We also had 27 meters replaced in 2017. It is difficult to say how much water was lost. I used a leak calculator that figured a broken water service line at 15 gpm. for the service leak and hydrant leaks and a 10% loss over a year for the meters.	
Oak Park Heights	I have no data for any of the above categories. The City installed a new PRV in or around 2014. A City wide meter replacement project is in the planning phase now.	
Oakdale Public Works Dept.	Going to start more complete system Audits ... Our facility has a small staff and it is at times hard to move forward. Doing the best we can on this report.	We have a smaller staff and it is challenging to accomplish most of these things. However, We do continue to look for ideas to make steps in the direction to support our residents more.
Owatonna Public Utilities	We have a meter testing program, meter repair/replace program, hydrant repair and have storage mixing but have no idea how to quantify it for cost or savings.	We have rebate programs for our C&I customers but were not taken advantage of in 2017. We do not gather information currently on SF vs MF applications for rebate programs.
Pine City	To our knowledge we have never done a loss audit.	Currently the City does not subsidize any of the above items.
Pine River Area Sanitary District	Leak detection service was contracted out.	

Organization	Water Supply System Projects	Customer Conservation Projects
Princeton Public Utilities Comm.	Survey completed - 5 leaks were found	
Red Lake Falls	The city is small enough to monitor the water system as a whole. As leaks are detected they are repaired.	City currently does not provide any rebates or incentives for updating or installing water efficient appliances or retrofits.
Red Rock Rural Water		Spraying water control valves are supplied to members at little cost. This limits over filling crop spray tanks.
Red Wing Public Works		Many of these activities are occurring, but the city does not have any financial assistance program to help with the installation cost.
Rochester Public Utilities	In 2017 water leak detection surveys completed 59.7% of the water distribution system. A total of 9 leaks was detected. It is estimated that a total of 42,907,000 gallons was lost to these leaks at an estimated incremental cost of $10,571.	
Rock County Rural Water	PVC system very hard to audit	rural system
Rockford	56 homes have installed irrigation meters in 2017.	
Rosemount		Water Rebate Program
Sauk Centre	Leak Detection on 305 Hydrants. If an issue was found then went to gate valves and curb stops to narrow down where leak was located at.	
Sauk Rapids	We had a leak detector go through our entire water system. They discovered 6 leaks.	
Savage Public Works	Storage Mixing cost part of Increase Treatment Efficiency Cost, Project #15-13 Treatment Plant 2 Improvements	
Shakopee Public Utilities Commission	We have 10 AMI irrigation meters installed. We instantly found a 100,000 gallon leak/year.	EPA WaterSense estimated savings number was used for smart irrigation.
Silver Bay	Commercial meters were replaced 10 years ago. Hydrants are being replaced one at a time. Water restrictions for watering lawns are implemented in the summer months using the odd/even house number system. A new meter was installed on the high school football field for when the fields are watered only.	

Organization	Water Supply System Projects	Customer Conservation Projects
Spring Lake Park	The City routinely replaces older water meters and radio receivers on a regular basis along with a couple hydrants.	We haven't funded any of the items listed above. We have provided information on CenterPoint's Home Efficiency Programs for free products such as energy saving showerheads & faucet aerators. We also require all commercial/industrial properties to have rain sensors on their irrigation systems and all new fixtures & appliances must be in compliance with current building codes & the 1992 Federal Energy Policy Act.
Spring Park	We compare our water distributed to customers/metered water with the water leaving our treatment facility quarterly when meters are read. That is our audit.	
Springfield		No program at this time working on setting one up.
St Bonifacius	Plan to do leak detection again in 2018	
St Charles	Yearly system leak detection, no leaks found. Above system leak and water main break.	
St James	We had 17 water main breaks in 2017 and replaced 11,500 feet of water main in the town	
Stewartville	In 2016 we had the whole town checked for water leaks in our system and found a few hydrants with very little leaks and repaired immediately. Whenever we have a water break in our system we immediately repair them. Also the City has a Capital Infrastructure Improvement Project every year when a section of street and water and sewer mains are repaired if necessary.	We offer no water rebates at this time
Superior Water Light & Power Co.	We have not done a system loss audit. We are a privately owned water utility in Wisconsin who gets there water from lake Superior in Minnesota waters and are not required by Wisconsin to do this.	we do not monitor these
Tracy	97 new water meters, 15 new fire hydrants. Replaced water main on E. Hollett Street, 4th Street East, and Emory Street.	
Truman	Leaks based off of estimate	
Two Harbors	We hire a water leak detection company to test the entire system for leaks annually	We do not have any of these programs in place. Water conservation is important and should be taken seriously. The City if Two Harbors does not support water waste or unnecessary consumption

Organization	Water Supply System Projects	Customer Conservation Projects
		by its residents or its commercial customers. That being said, water is a valuable tool for the WASTEWATER COLLECTION SYSTEM. By using low flow toilets, shower heads, and other low flow appliances this contributes a significant problem to the collection system. Collection systems are designed and need X amount of water flow to keep solids in suspension and deliver them to the wastewater treatment facility. There are areas in town where there is not enough water use where we need to flush hydrants into sewer systems or take tanker trucks and flush pipes to move solids downstream. This negates any conservation achieved through using these devices, contributes to unmetered water loss, and actually costs the city money by using staff hours to perform these tasks that would otherwise be unnecessary with correct water use. It should also be noted that the City of Two Harbors has moved its water consumption from over 300 million gallons annually to 172 million gallons annually from the 1980s to today. This is a significant amount of savings and has come from multiple avenues such as adding meters, increased rate structures, water audits/leak detection, advancements at the water treatment facility, and public education.
Vadnais Heights	No system loss audit has been completed that I know of.	We have no City involvement or record keeping in private property conservation measures
Victoria	Repaired 5 curb stops Replaced water meters meter testing annual at WTP.	
Wabasha	There were 8 major water main breaks repaired in 2017. This is an estimate of water loss as there is no way of knowing exactly how much water was lost due to the water main breaks.	

Organization	Water Supply System Projects	Customer Conservation Projects
Wadena	We use a mobile listening devise to try and detects leaks in various parts of town	
Waseca	Beginning in 2018, we will perform a water audit and leak detection survey of our entire distribution system annually.	
Watertown	Need to hire leak detection person and go over all of our mains. We flush annually and notice that the hydrants do not leak.	How am I supposed to know this when homeowners do it on their own. The city promotes water conservation but has nothing for sale
Waverly		Customers are doing this on their own.
Wayzata	Found 2 leaks, both on fire hydrants below grade.	
Willmar	Because of lead concerns in old meters, we are currently replacing meters with new and not rebuilding and testing old meters. Non-irrigation meters are included in meter repair and replacement. We have tank mixers but there use is to prevent ice accumulation and not for water quality. The cost of the mixers is part of a maintenance contract and hard to quantify.	
Winsted	General system audit took place when reporting to MPARS for 2016 gallons pumped and sold.	

Conservation – Indirect: Water Conservation Ordinances, Education and Billing Rates Comments

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
Atwater			$2.85 per thousand for water and $2.00 per thousand for sewer.
Austin Utilities	Critical/Emergency Water Deficiency Ordinance currently pending City of Austin review and approval. Wellhead Protection Program currently into Phase 2 of development.		
Avon			Raised rates.
Bagley			built in $.10 increase on water and sewer charges at beginning of year

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
Caledonia			We charge a base rate and a rate per 1000 gal. of usage.
Bagley		City Planner sits on County Water Task Force. City continues to update DNR of conservation efforts.	
Carlton	We have a Well head protection plan.		
Centerville	Water bans - odd/even		We have a flat rate fee and charge per 1000 gallons on a tier system.
Champlin			Fines for ordinance violations.
City of Big Lake	Increased Water and Sewer Rates 2%.		Two step rate.
City of Bloomington-Public Works	Water consumption regulations on consumption for plumbing fixtures are based on State Plumbing Code.		
City of Eden Prairie			Eden Prairie reevaluates its billing methodology every 5 years. In 2017, we performed an exhaustive utility rate study resulting in significant adjustments to our customer water rates. Based on past rate adjustments, we believe this will lead to even greater conservation.
City of White Bear Lake	Soil Prep is only on New Commercial Construction. Tracking Enforcement is only tracked on written warnings, not verbal.		
Cottage Grove Public Works Dept.	Implemented a watering ban for the summer.		
Cottonwood			Also charge $4.60 per 1,000 gallons used.
Dodge Center	Wellhead is a plan only.		

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
Dundas	Conservation practice thru ICVO and State code guidelines.		Irrigation rate increased over general water rate.
East Grand Forks		Crystal Sugar usage	
Equity Lifestyle Properties			We do not bill for water. Included in lot rental.
Frazee	Frazee is in the process of adopting, the critical emergency water deficiency ordinance.		
Goodview	City council discretion determining emergency water deficiency		
Grand Rapids	Consumption Regulations, irrigation and vehicle washing.		
Granite Falls			MDH charge of 6.36 each June to all customers. City collects and submits to the MN Health Dept.
Hawley	Wellhead protection plan is in progress now.		
Hugo	Water consumption for appliances are contained in building codes.		
Hutchinson			Rate Structure has 3 tiers: Residential =< 150,000 gallons per month Commercial = 151,000 - 3,000,000 gallons per month Industrial => 3,000,000 gallons per month.
Keewatin	We don't have the personal power to regulate or have laws in place.		
Lewiston		We run a water conservation brochure on our cable channel year round.	We have a water base rate plus actual water usage rate and a tiered system for sprinklers.

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
Lindstrom			We have a base fee with covering the debt service of the water/sewer system. Within the base fees also lies the state testing fee, street lighting fee, and stormwater. Usage above and beyond the base fee is the increasing block depending on how many gallons were used.
Mantorville			Bulk rate is in effect for bulk rate users.
Medina	Our plumbing code follows state regulations	We are a growing community so decreasing our permit is highly unlikely. However we always teach conservation.	The block rate works well for us.
Minneapolis	Above reflect responses from Water Supply Plan.		
Minnetonka		The city of Minnetonka has water meters that have leak detection monitoring capabilities. The city bills residential water users quarterly and all other users monthly. While only quarterly water meter readings are needed for residential billing, Minnetonka reads all water meters monthly to capture leak detection flags on all residential accounts. This effort requires the collection of an additional 41,260 meter readings annually. In 2017, 6583 Potential leak Notice post cards were mailed out to all users indicating that their water meters flagged a potential leak condition. Users are given a Leak Line phone number with self-help	

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
		information to identify and remedy potential leak sources. If users require additional assistance, they are able to continue on to speak with a Utility Account Technician to assist. If users require additional assistance a Utility technician will be sent out to their home to audit their system for leaks. In 2017, 168 site leak audits were performed by Utility employees.	
MN Dept. of Corrections - Faribault	prison	prison	
Montgomery	We don't have any of these but water use is 42.8 gallons a day per person. Water Rates are high so people don't use water.	We renewed our well head protection plan. This year. 2018	
Pine River Area Sanitary District			Base rate with volumetric increase.
Pipestone	Our metering system has a leak detection system. Customers are called if they appear on the leak report.		
Red Rock Rural	Limited use of 4,000 gallons per day per connection. WPA Agreements allow restrictions in use due to unforeseen circumstances. Elimination of Pre-Pay due to lack of Meter reading by members allows better accountability of water use.		
Rochester		RPU meets quarterly w/MN DNR to discuss Water Sustainability in Rochester.	
Rockford		Completed WHP and WSP in 2017.	
Sauk Centre			$ 3.82 per Thousand gallons.

Organization	Ordinance, Policy, &Codes	Education & Outreach	Billing Rates
Silver Bay			Commercial accounts are metered while residential accounts are billed a flat rate.
Spring Lake Park	We have an Emergency Ordinance in place, an Ordinance to address irrigation restrictions which we also publish in the newsletters and efficient plumbing fixtures are required and lastly that a building permit is required for all pools in excess of 500 gallons.	Spring Lake Park is currently in the process of implementing its Wellhead Protection Plan to protect local drinking water wells & the aquifers that serve those wells. The City is also in the process to review and replace the water meters for all high-end water users.	The City has a six-tier water conservation rate for all users.
St Anthony			Tier rates
Stacy	We do have water conservation rates structure.		Tier structure
Superior Light and Power	We do not track of enforce any of these.	We are privately owned	
Two Harbors	We do not have these in place currently, however, the utility committee is working on a water irrigation policy for the summer of 2018.	We do not have a need for collaboration at this time.	Most of the town that is metered is on an increasing block rate, conservation billing plan.
Wells			Water rate is uniform, but sewer rates increase with total gallons used.
Willmar	Regulations for toilets, urinals, and shower heads comes from the city adopting the building State and National building codes.		

Appendix E: Why Water Conservation

We are fortunate in Minnesota to have an ample supply of water. Sometimes, there is too much precipitation and runoff, and we have to work hard to get rid of it. Despite this apparent abundance, there are many reasons to conserve water. We need to understand the consequences of excessive groundwater pumping and the impacts on our groundwater and surface water supplies. We need to manage water use differently, to ensure we have enough clean water for future generations. Conserving and being much more efficient with water use is the most important and easiest first step.

Using less water is important for many reasons:

A Limited Resource

- Only 3% of the earth's surface water is drinkable. Water is a precious resource that we should not waste.
- About 75% of Minnesota drinking water comes from groundwater, and it is also the backup supply for surface water in case of drought. This is an increase in dependence on groundwater systems.
- Western Minnesota receives much less precipitation than other areas of the state.
- Shallow aquifers are easiest to access, but there isn't always water present in abundant supplies. Available water often has contaminants that have seeped down from above.

Figure 4. Only 3% of the earth's surface water is drinkable. Water is a precious resource that we should not waste.

- Central Minnesota has a lot of shallower aquifers, but other parts of the state have very limited easy-to-access water supplies.
- Much of the state only has solid bedrock with some cracks and fractures that do not provide reliable supplies of water.

Clean Drinking Water Availability

- The southeast part of the state has multiple layers of sedimentary rock that can supply water, but these layers are susceptible to contamination.
- When we look at groundwater contamination susceptibility, we see that most of Minnesota is leaky, so groundwater is easily contaminated.
- Agricultural runoff and other forms of pollution in some regions are exacerbating the scarcity of water that is clean enough for human and industrial use.
- Once we contaminate our groundwater systems, it becomes very difficult and extremely expensive to try to clean up the water.

The Water-Energy Nexus

- It takes a considerable amount of energy to treat and deliver the water you use every day.
- Water has a high heat capacity, meaning it takes a lot of energy to make hot water.
- Energy is needed to pump water from aquifers to irrigated fields.
- Energy is needed to treat wastewater before it is returned to the environment.
- Tremendous amounts of water are used to keep power plants cool enough to function.
- Water is also used for renewable energy, including hydropower, solar power, geothermal and bioenergy.
- Energy and water are needed to keep buildings and equipment at safe, comfortable temperatures.

Land and Water Conflicts

- Minnesota once had a lush vegetated filter over the entire state that helped create the clean water we are now removing from the ground in greater and greater amounts.
- Except in northeast Minnesota, almost all of the native vegetation has been removed and replaced with urban/residential areas or intensive agricultural row crops, which reduces the amount of water recharging aquifers.
- Low water tables can lower the water level in lakes, streams, springs and wetlands.
- With more water being pumped, water levels are lowered and existing wells and surface waters lose their source of groundwater for longer periods of time.
- Areas of concentrated high volume pumping can collectively lower water tables for entire seasons or years, creating multiple problems.

Climate Change

- Changes to precipitation patterns, including both prolonged periods of drought and more intense—though less frequent—periods of rain will be among the first and most critical impacts of climate change.
- Higher temperatures increase electricity demand which, in turn, requires more water for cooling processes.
- As average temperatures and intense heat waves increase and the growing season continues to expand, there will be increased demands on state water supplies, especially for irrigation.
- High-intensity rain events cause more water to runoff faster, creating floods and leaving less time for the water to soak back in to the ground and recharge groundwater supplies.
- Severe weather can threaten critical water and energy infrastructure.

Business & Industry Need Water

- A larger global population and growing economies are placing bigger demands on water supplies.
- Water scarcity may raise prices or increase regulations for businesses that use water. To continue operating, companies in many sectors may need to learn how to do more with less.
- Many companies are developing products and services that can help business and industry increase their water efficiency and productivity.
- In agriculture, improved irrigation technologies and plant-management techniques are yielding “more crops per drop.”
- New approaches will help mines, utilities, beverage companies, technology producers and others use water more efficiently.
- Many water conservation investments yield positive returns in just two to three years.

Appendix F: Water Supply System Inventory Form

Former Water Supply System Inventory in the Minnesota Permitting and Reporting System (MPARS). Now replaced with the Water Conservation Reporting System.

MNDNR

Minnesota Department of Natural Resources

Water Supply System Inventory - Side A

Permit Number	
Water Use Year	
Page	1 of 2

Permit: Permittee:

Please keep this information for your records.

Permit Numbers	

What is the population served by your water supply system (*make a reasonable estimate if population is unknown*)?	

What is the source of this population estimate?

☐ US Census ☐ Local Census ☐ Metropolitan Council ☐ State Demographic Center

☐ Other (describe) _____

What is the year of the population estimate?	

Water Supply System Connections

Enter the amount of water used for the following categories.
Note: Connections should be the total number of connections in each category.
Metered connections are the number which are individually measured.

Water Use Category	Gallons Delivered	Total # of Connections	# of Metered Connections
Residential - Water used for normal residential purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, watering lawns and gardens.			
Commercial - Water used for motels, hotels, restaurants, office buildings, commercial facilities, and institutions both civilian and military.			
Industrial - Water used for thermoelectric power (electric utility generation) and other industrial uses such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.			
Agricultural/Irrigation - Water used for crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.			

Appendix G: Ways the Water Conservation Data Have Been Used as of 6-18-18

- Provided the North Mankato City Council with a per capita water use comparison data spreadsheet for communities of similar size and geography.
- Preliminary results were presented at the March MN Rural Water Association Technical Conference and the SE AWWA Conference.
- Used the data to give a presentation on water conservation to the North & East Metro Groundwater Management Area (GWMA) Advisory Team Meeting.
- Provided the Metropolitan Council staff the seven-county raw data.
- Provide the Ontario Ministry of the Environment and Climate Change with the ordinance results from the Water Conservation Report for research they are conducting on Great Lakes conservation.
- Provided an article for the Legislative Water Commission newsletter on the preliminary results and training for third party users.
- Clean Energy Resource Team (CERT) manager used the data to see if Thief River Falls has done any customer-sided conservation measures (they have).
- Compiled a complete conservation analysis of Paynesville and Glenwood's water conservation efforts and recommendations for the Bonanza Valley GWMA project manager.