A Water (Supply) Planning Atlas for the Twin Cities Metropolitan Area

Regional and subregional information for sustainable water planning

John Clark & Henry McCarthy: Water Supply Planning

TAC – August 16, 2022

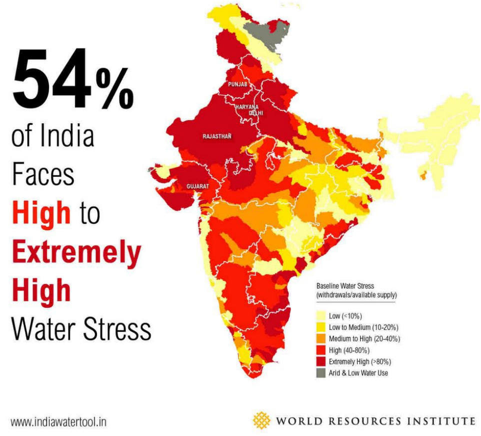
Background & Motivation

What is a water atlas?

- A compendium of water data and information
- A visual and narrative way to communicate technical and geographic information

Purpose: outreach and engagement

- Develop a tool to:
  - Promote a shared understanding of water and water supply planning
  - Better understand regional and subregional challenges
  - Aid communications with new audiences



Audiences

Anyone interested in learning about water and water supplies

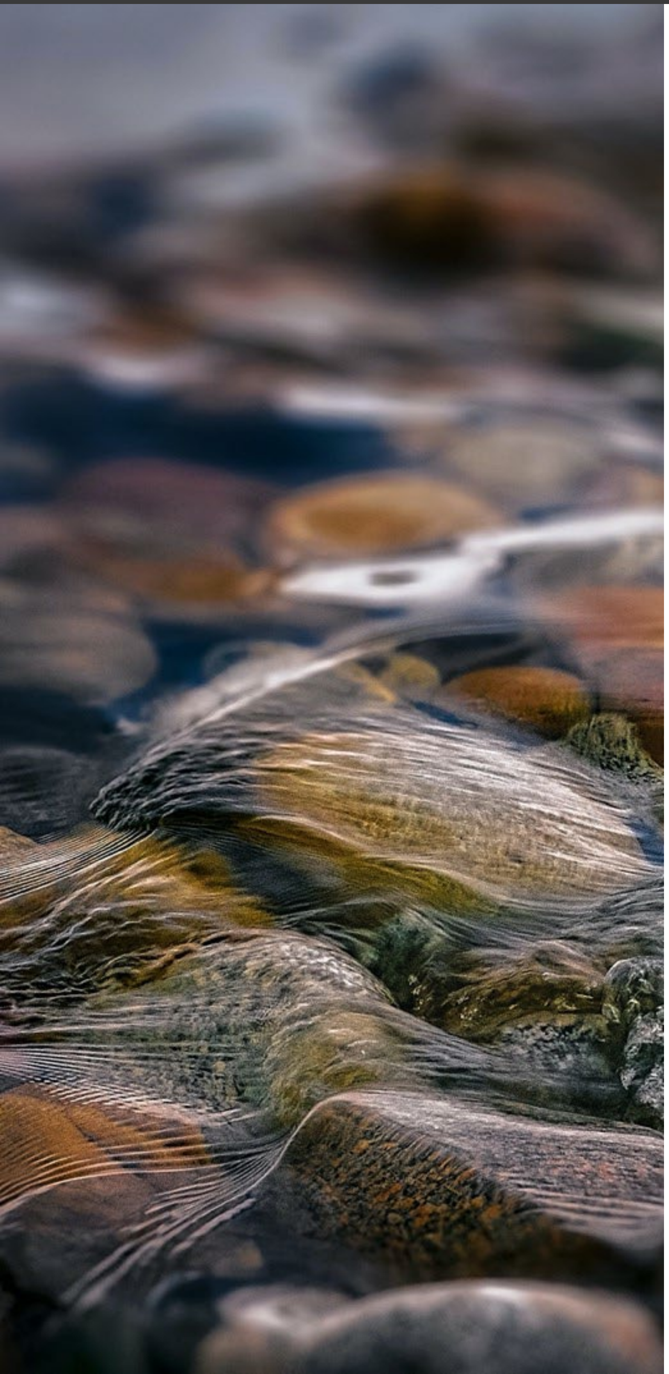
Municipal / public water suppliers

- Engage communities around their local perspectives of water challenges to provide relevant content and inform the development of the next regional plan

Others

- Neighborhood groups, educators & students, advocacy groups..

How can the atlas be used?



By communities and other stakeholders:

- Communicate with residents about water issues and services
- Build support (value) for water and water services
- Engage with neighboring communities around water supply planning challenges
- Educate students and others about water and water planning

By the Council:

- Engage communities around their local perspectives of water supply challenges
- Develop sound data and information to inform regional plan development
- Engage internal audiences to better connect water supply planning to other Council planning efforts
- Reach out to new and non-technical audiences

Challenges

Water supply data is varied and comes from many sources

- Collate data from cities, regulators, watersheds, academia, agencies, Met Council, and others.

How do we describe challenges that cross 186 political boundaries?

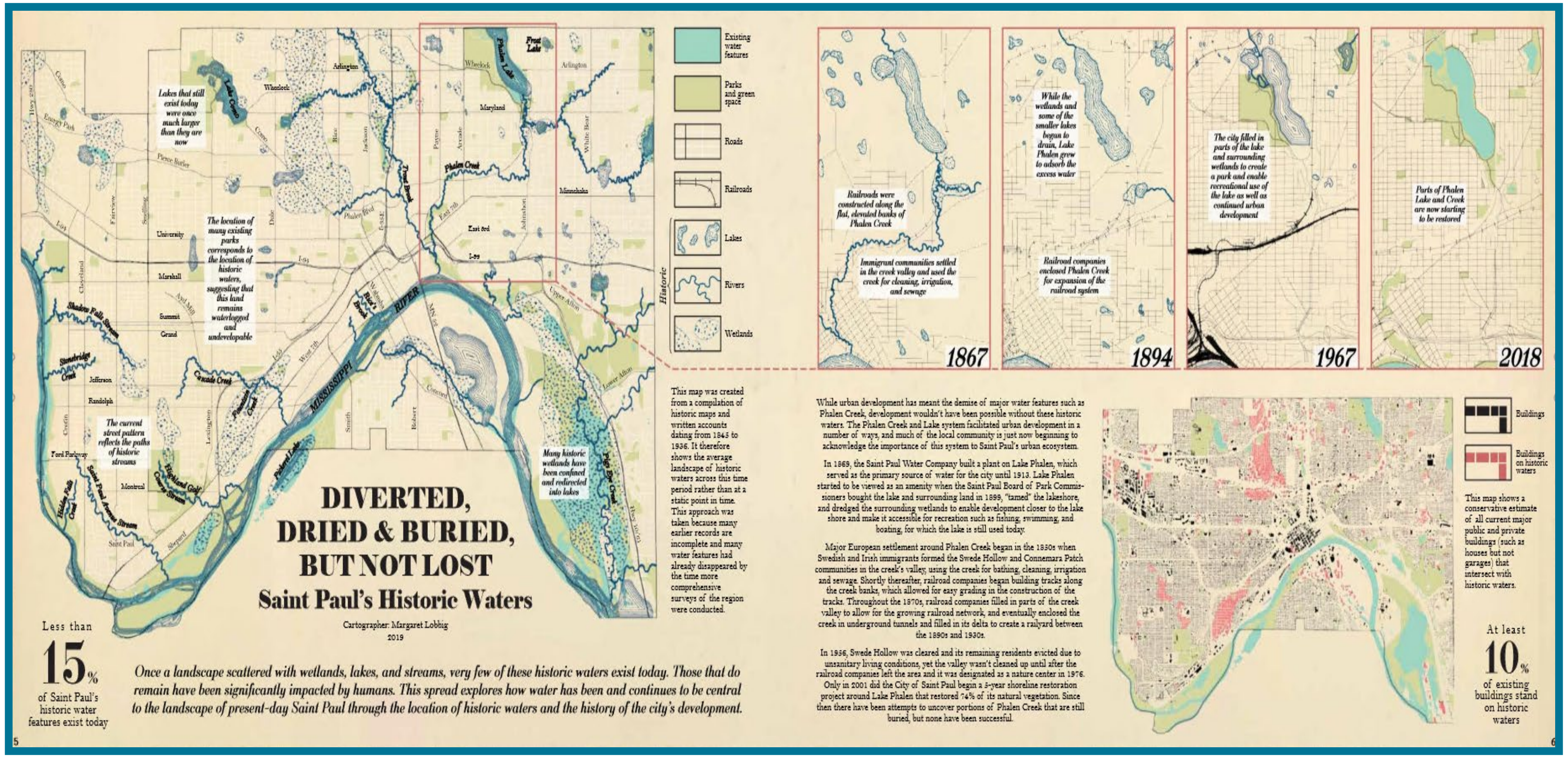
- Water resource and supply system sustainability can't be fully addressed within single political units.

Water supply information can be complex and highly technical

- We need to be able to communicate with folks who don't do this everyday if we want people to value water and water services and engage in water supply challenges.

Design

- Inspired by large library atlases
- Combines maps, graphics, charts, and other figures.
- Can be updated as new data and information becomes available
- Currently in PDF format but aim is to have a more interactive online format in the future
- Pages are 11” x 17”



Metropolitan Council

Draft Atlas Contents

Regional Setting

- Regional background
- Regulatory roles & regional planning
- Water planning & governance
- Land use, development, & growth
- Water resources

- Water challenges overview
- Water use
- Water demand
- Water efficiency
- Climate & weather
- Source water protection & contamination
- Resource connections & interactions
- Water values & equity

7 Subregional Settings

- Subregion background
- Land use & development
- Water resources
- Water supply systems & treatment

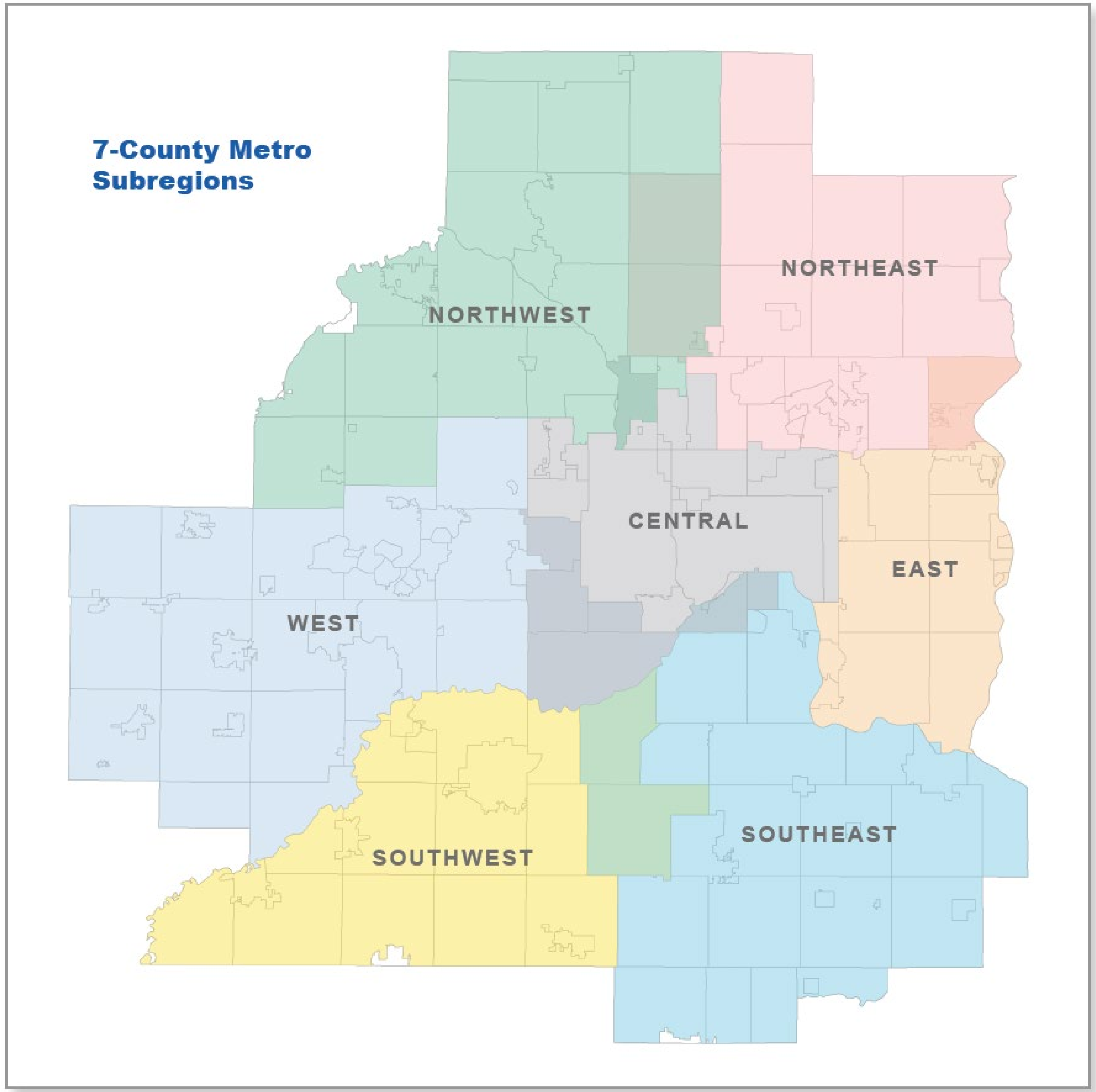
- Water use
- Growth & demand
- Water efficiency
- Climate & weather
- Source water protection & contamination
- Resource connections & interactions

Water Supply Planning Subregions

Criteria:

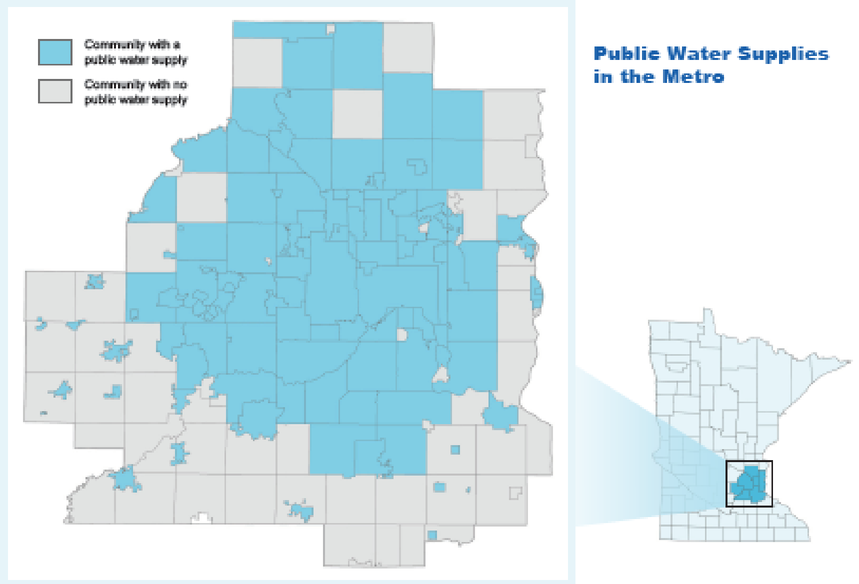
- Started with existing subregional working groups
- Inclusive of the entire metro
- Looked at broad geologic and hydrologic characteristics
- Shared water source and supply challenges

Note: Some communities are in multiple subregions. This is traditional for some communities, and we want to be flexible.



Water Supply in the Twin Cities Metropolitan Region

The Twin Cities Metropolitan Planning Region (Metro) consists of the seven counties that surround Minnesota's two largest cities of Minneapolis and St. Paul. About 58% of the state's population lives, works, recreates, and relies on the water resources in the Metro. Drinking water is supplied by a combination of over 100 public water suppliers, shared community systems, and private wells.

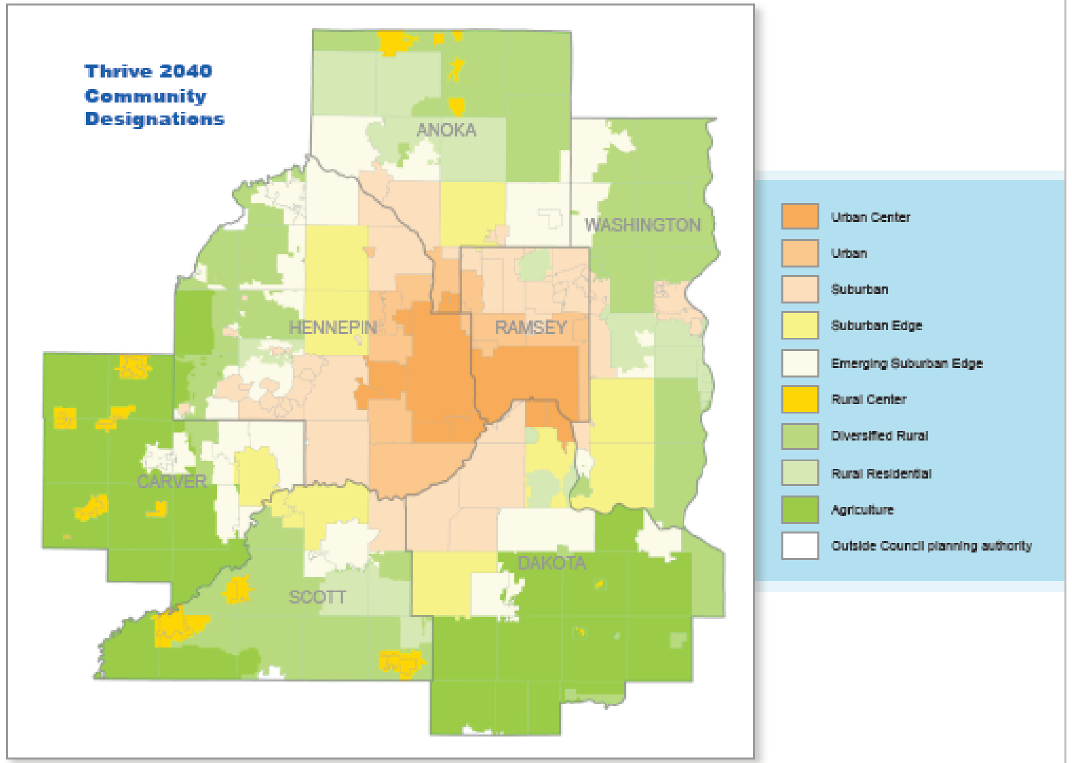


Public Water Supplies in the Metro

Public water supply systems are mostly operated by individual communities although in some areas water pumped and treated by one community may be sold or delivered to another. For example, the cities of Minneapolis and St. Paul provide water to some neighboring communities. Residents and businesses not served by municipal or public water supplies rely on private wells for their drinking water. Farms, industries, even recreational land like parks and golf courses rely on the same water sources that provide drinking water. Private wells and those operated by commerical interests are the responsibility of the individual owner's or business.

Growing Population

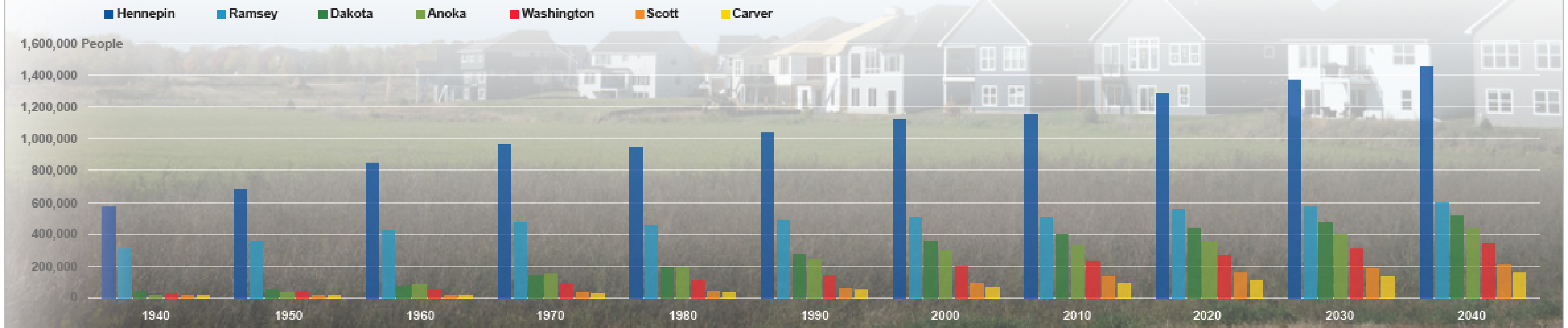
The region's populations continues to grow as more people choose to live, work, and play in the area. By 2040 the population of the region is expected to increase to 3.7 million people. More people and development means more water is needed. To meet current and future water demands we must understand the challenges of the past and the present, think holistically and invest strategically in our water supply systems. We lower risk by planning and preparing for future stresses that will be placed on drinking water resources and on our water supply systems.



The seven-county region consists of many different communities, from farming-based townships to densely developed urban areas. Recognizing that one size does not fit all, the Council uses community designations to group communities with similar characteristics in order to plan more sustainably. Preparing for future growth and development requires considering the water resources, water systems, and water service providers in order to ensure the needs of communities, businesses, and residents will be met and that resources will be available for future generations.

The Council uses these community designations to:

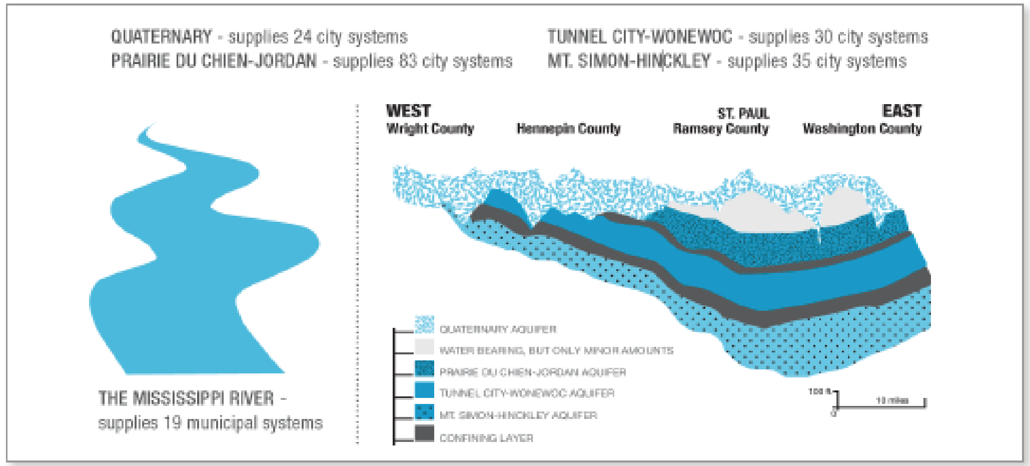
- Guide regional growth and development to areas that have urban infrastructure in place and the capacity to accommodate development and redevelopment.
- Establish land use expectations, including overall densities and development patterns, for different community designations.
- Outline the respective roles of the Council and the individual communities and strategies for planning for forecasted growth.
- Understand how the resources needed to sustain growth are utilized and impacted locally and regionally.



Water Resources

Water Use

The large cities of Minneapolis and St. Paul, and communities they serve, rely on the Mississippi River for their water supply. In the case of St. Paul that water from the river enters a series of lakes north of the city before it is treated and delivered to customers. Deep groundwater aquifers are usually used as the source for public water supplies, as well as industrial, commercial, and agricultural uses outside of the urban center.

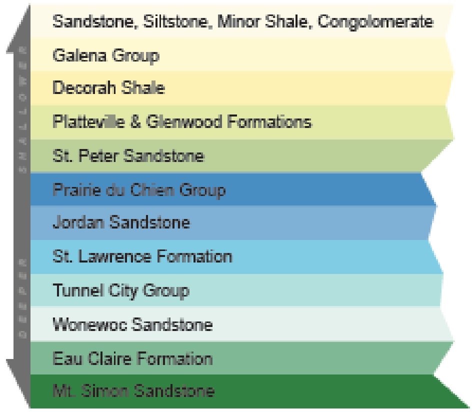


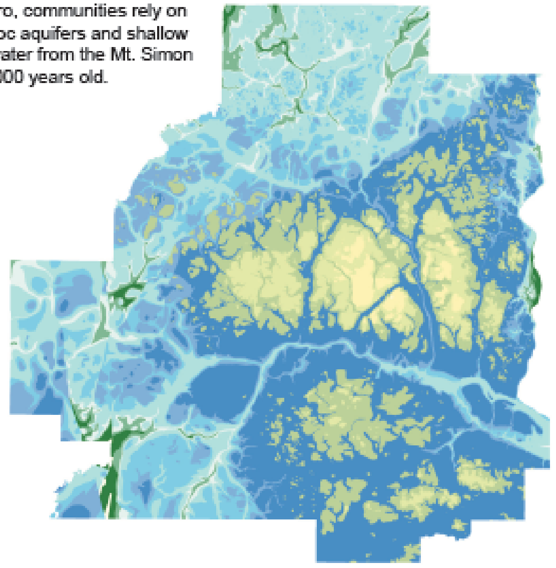
Many communities, farms, and private residents with private drinking water wells rely on shallow sandy sediments to provide their water supply. Public water suppliers also use these shallow groundwater sources in communities where highly-productive aquifers are more difficult to access. Those near-surface sediments are the first to be impacted by contamination from the surface or during periods of drought.

Bedrock Geology

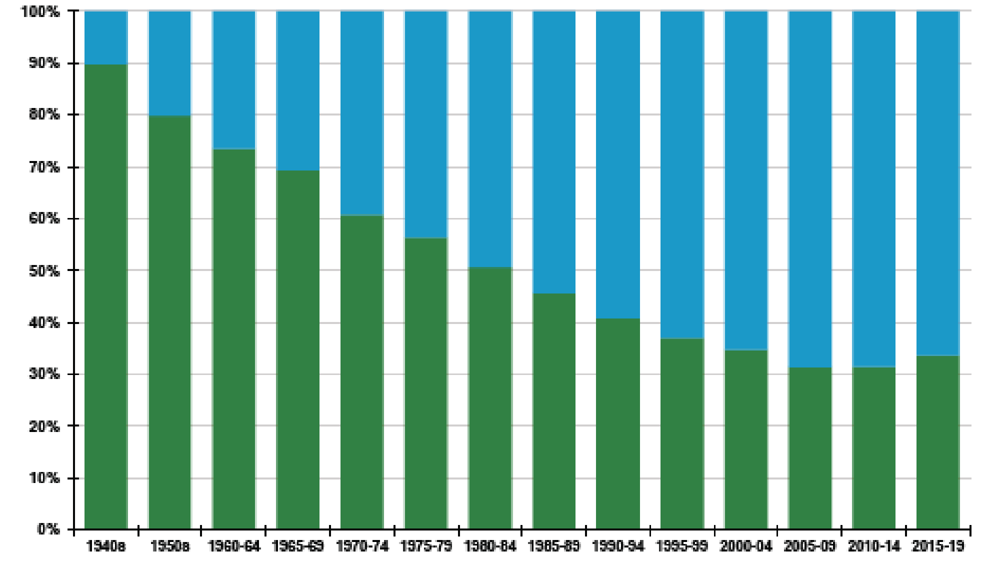
Deep groundwater aquifers are usually used as the source for public water supplies, as well as industrial, commercial, and agricultural uses outside of the urban center. Private drinking water wells are usually in shallow (Quaternary) sediments deposited when continental ice sheets retreated 18,000 years ago.

The Prairie du Chien and Jordan (PDCJ) bedrock aquifers are highly-productive water sources and cover much of the Central, East and Southern portions of the metro. In the Western and Northern part of the metro, communities rely on some combination the deeper Tunnel-City and Wonewoc aquifers and shallow sandy (sedimentary) aquifers. The deepest wells pull water from the Mt. Simon aquifer, whose water has been dated to be 6,000 - 30,000 years old.



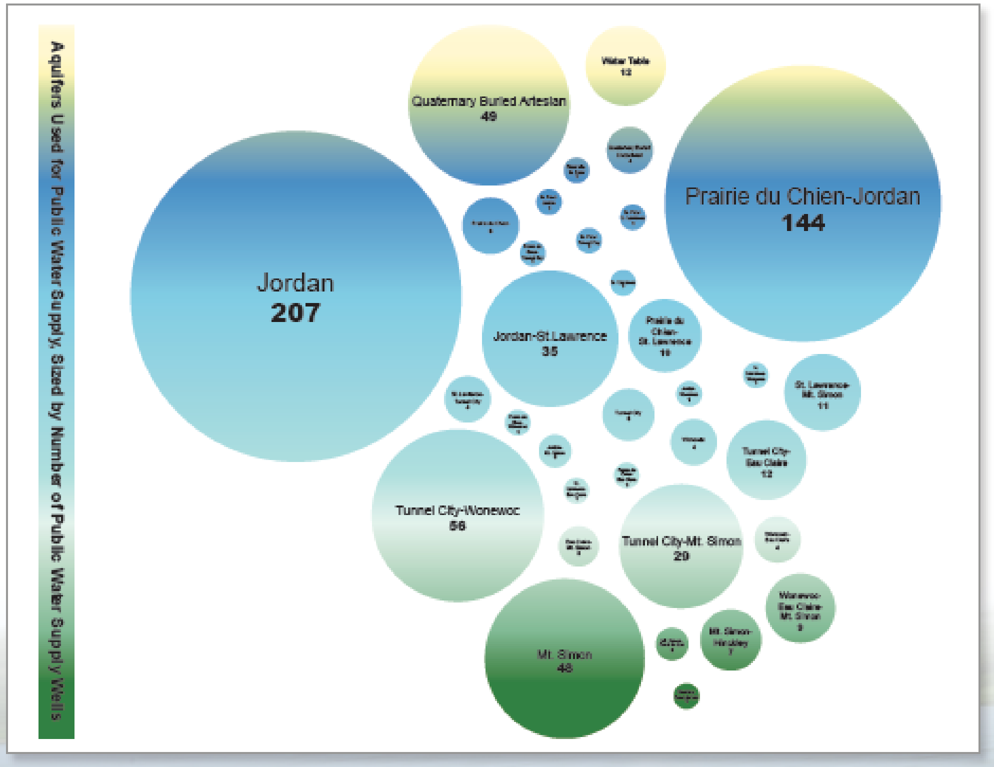


Changing Water Sources in the Metro



Groundwater pumping has driven regional water use trends over recent decades. In the early 1980's, as more suburban communities developed and built water treatment facilities to serve their residents, more groundwater than surface water was pumped for the first time. That trend has continued over the past 40 years as the suburban areas of the metro continue to grow.

Aquifer Use



The Prairie du Chien and Jordan bedrock aquifers are the most heavily used in the metro. Communities that have access to these aquifers don't have to drill as deep as other communities to access productive aquifers. However, because those aquifers are closer to the surface and used by many communities these sources may be more easily stressed during periods of high-use and when contaminants enter the ground.

Water Challenges

Public and private water supplies in the Twin Cities Metro region face a variety of challenges that can limit the availability of plentiful, clean drinking water. The challenges may be local or regional and can occur over long or short periods of time. The sustainability of drinking water resources and water infrastructure is an essential consideration as the metro region continues to grow, weather patterns shift, and economic downturns create budget constraints. While we cannot predict exactly what is to come, we are able to use our past experiences and sound technical information how to protect our water resources and use them efficiently. Water supply issues generally fall into 2 categories: Quantity and Quality. Having enough water now and in the future is essential to the health, well-being, and economic vitality of metro region.

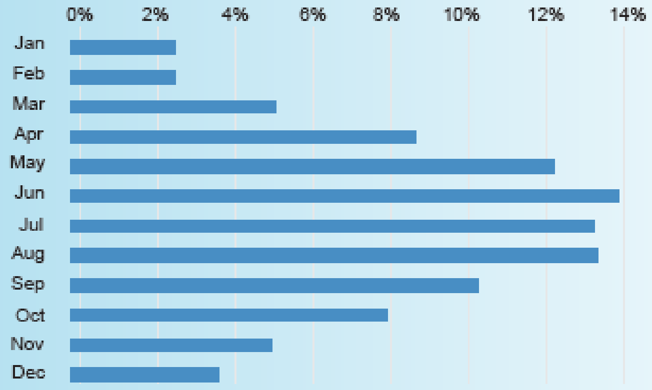
Estimated 2040 Aquifer Conditions Based on 2010 Observed Pumping

The regional groundwater model was developed and run to estimate what the future might look like for the region's groundwater aquifers. Looking out to the year 2040, if groundwater pumping were to increase by 20%, further aquifer declines would be expected across the metro. Understanding what the future might look like is essential to sustainably plan for the region's future water needs. Understanding where and why water supply resource challenges might occur helps the region and individual communities to be proactive rather than reactive.

Climate & Weather

Changes in global climate influence local weather, which impact water resources and water supply systems. While we don't know exactly what the future will look like, we can expect increases in temperature and precipitation. We also should be prepared for greater variability in our weather patterns and extended periods of drought. A less predictable future increases the challenge of maintaining safe and reliable drinking water supplies. These challenges require resilient water resources and infrastructure.

In recent years, increased storm intensity, longer periods of drought, and warmer winter nights have been occurring more frequently. These changes are likely extending the growing season, increasing demand, and raising the risk of contamination and infrastructure damage due to flooding. In the past, long and intense drought periods have occurred leading impacting water availability and quality.



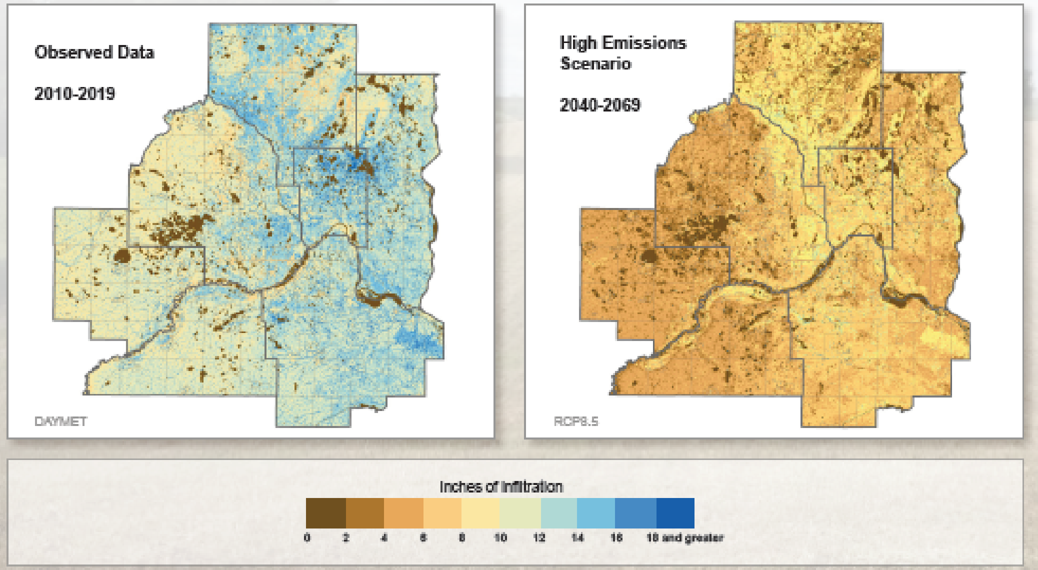
Precipitation Trends

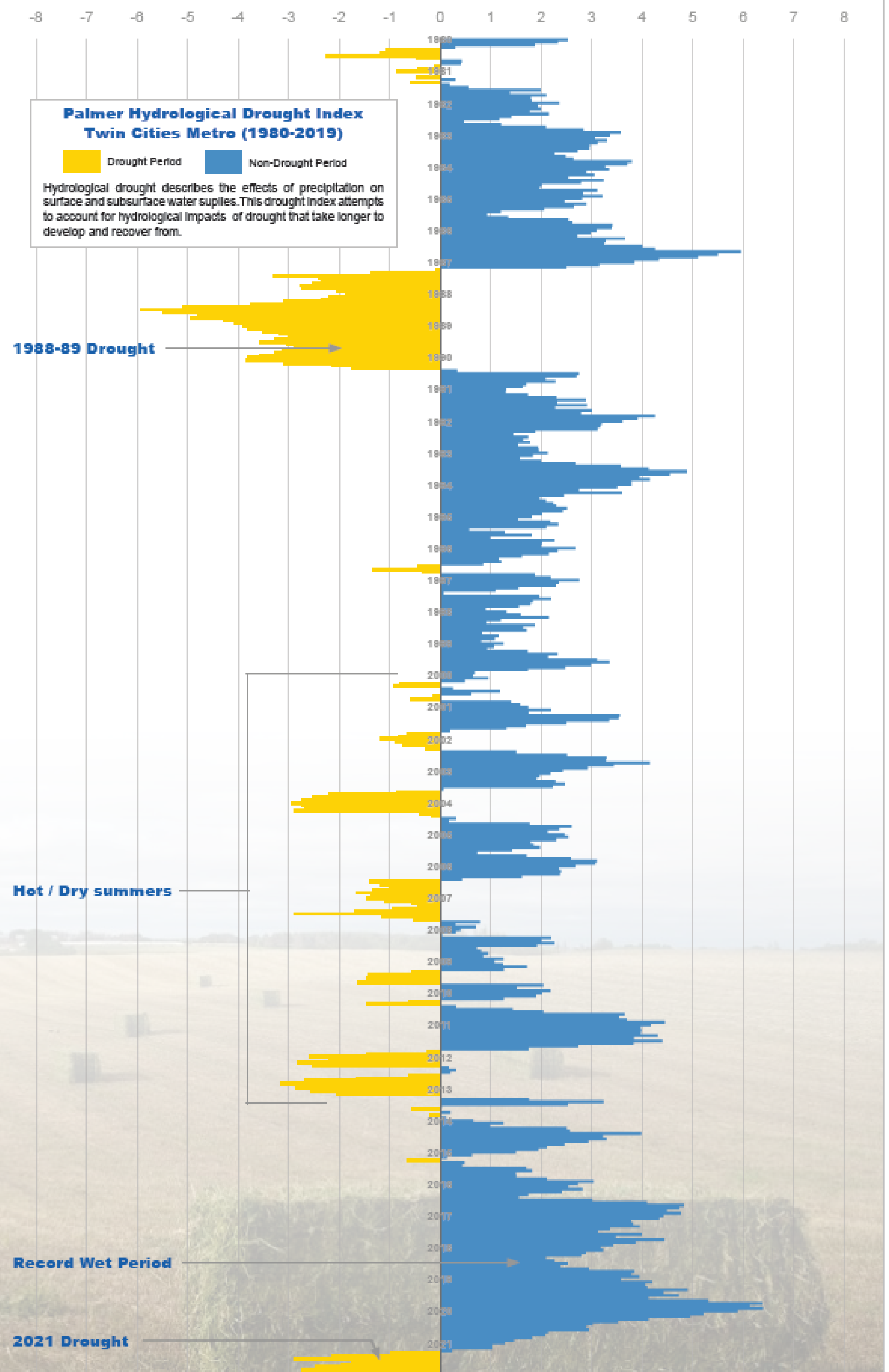
Over the past 40 years the average annual precipitation is about 35 inches. Most precipitation runs off or is stored temporarily in surface waters or shallow groundwater. Only about 1/3 of precipitation is available to replenish groundwater aquifers. Groundwater replenishment has not kept up with use over the past 150 years.

Most precipitation in the metro area falls during the late spring and early summer months, with May and June accounting for about 26% of the year's total. Significant periods of drought in the 1930's, 70's, and 80's have had large impacts on water resources and policies. During periods of drought there is greater water demand and less aquifer recharge.

Climate Modeling: Annual Infiltration

We can use models of future climate conditions to estimate what groundwater recharge might be like in the future. A future with more greenhouse gasses and a warmer atmosphere generally results in less water being available to recharge groundwater aquifers in the future. While models are not a crystal ball that predicts the future, they do provide us a reasonable picture of what the future might look like.





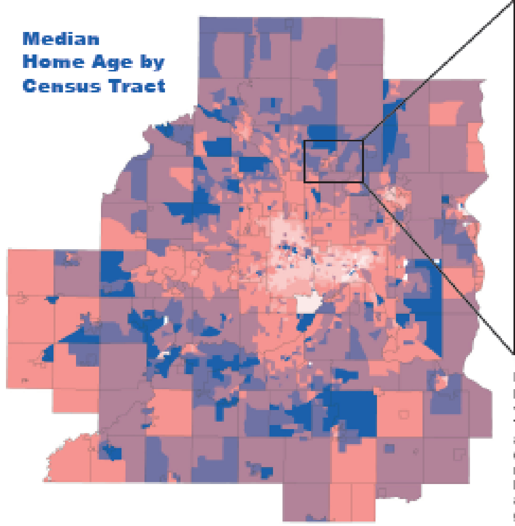
Water Efficiency

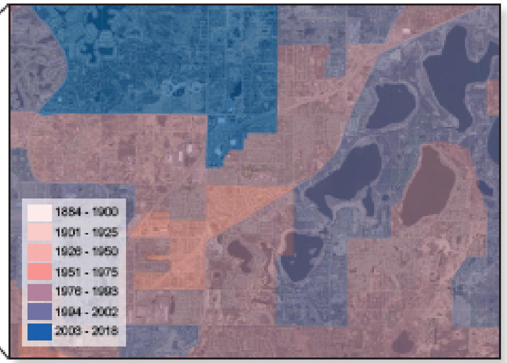
Many factors influence how much water is used. Weather, home type and size, the age of infrastructure, and the number of people using water are all related to how much water needed and used. In many homes and facilities more water is used than is necessary to meet the needs of residents and businesses. Efficient water use is the combination of strategies, practices, and equipment that limit excessive water use.

Indoor Efficiency

As buildings and infrastructure age, new technologies come online, and construction codes change the amount of water being used by individuals and equipment can be more than is needed. Indoor efficiency increases when equipment in homes and businesses is replaced by more efficient versions and/or water use practices change (i.e. taking shorter showers or changing a manufacturing process). As new buildings are built and older buildings are retrofit efficiency is gained.

Median Home Age by Census Tract



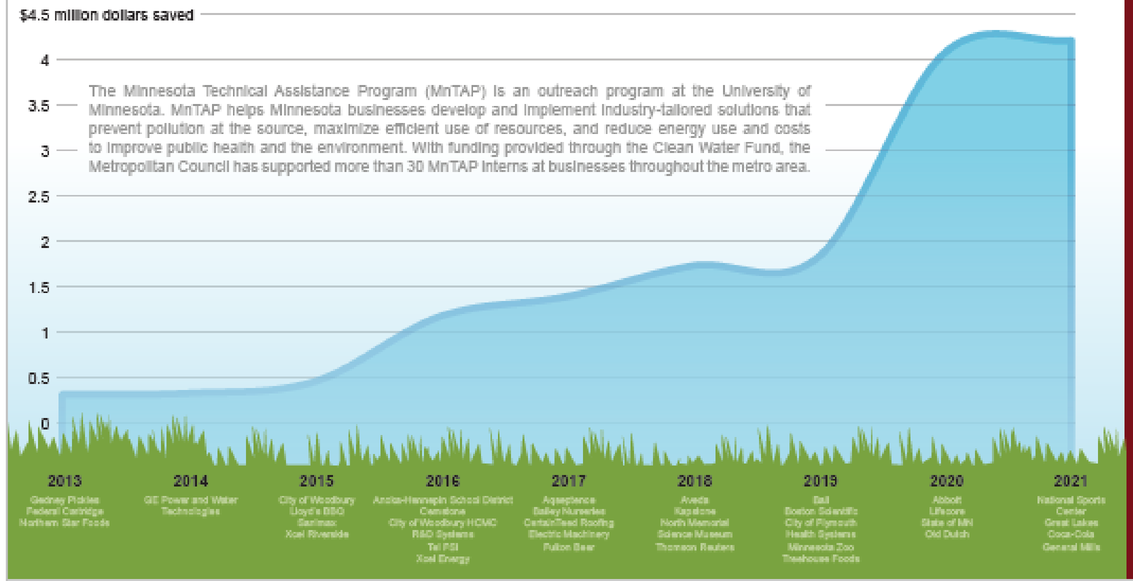


Newer home builds tend to have more energy and water efficient appliances and plumbing. As equipment in older homes ages it too is replaced with current, more efficient versions. The Energy Policy Act, signed into law in 1992, took effect on January 1, 1994. This legislation set new federal efficiency standards for many sectors including home appliances and water. Installation of toilets that used more than 1.6 gallons per flush was outlawed. New plumbing and home appliances can be costly, particularly for low income residents. Renters and those living in multi-unit dwellings often don't have control over how their homes are managed. Larger lots tend to have more area dedicated to grass and landscaping. Smaller lot sizes tend to be in more highly developed areas with less grass and landscaping that's irrigated during the summer months.

In communities where efficient water use for residential homes and lawns has been promoted, more water may be conserved by helping local industries, commercial properties, and multi-unit residential facilities to be more efficient water users.

MnTAP and Metropolitan Council Partnership Cumulative Dollars Saved 2013-2021

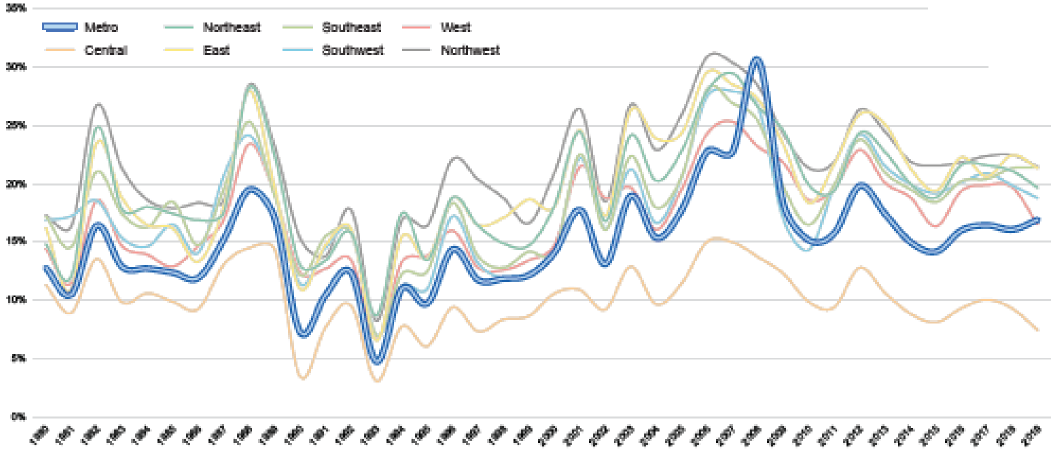
By 2021, cumulative water savings from the MnTAP and Metropolitan Council partnership exceeded 300 million gallons.



Outdoor Use

About 15% of all water used in the metro is for outdoor purposes like lawn irrigation. This use almost exclusively occurs during the summer months and more water is used outdoors in communities that rely on groundwater for their drinking water. These areas tend to have larger lot sizes than others and newer homes that have irrigation systems installed.

Outdoor Water Use as Percent of Whole



Irrigation audits employ several techniques to identify inefficiencies in home and commercial irrigation systems. Leaks, broken sprinkler heads, and placement issues can lead to excessive use and water being used on pavement rather than on the lawns and plants that need it.

Modern irrigation system controllers often referred to as "smart" offer a number of improvements over previous technologies. Using data from weather stations and soil moisture sensors these controllers can better determine how much water is needed for lawns and landscaping lowering outdoor water use and costs for homes and businesses.

Inefficient lawn and landscape irrigation contribute to excessive use. Smart irrigation controllers for homes, apartment complexes, and commercial lots help people to use only the water needed to maintain grass and plants, and can lower water bills for some users.

Grass Type		Positives	Negatives
Kentucky Bluegrass	The most popular turfgrass in the northern US, Kentucky Bluegrass is used for lawns, golf courses, parks, and fields.	Valued for its aesthetics, recuperative ability, winter hardiness, mowing quality, and seed or sod	Shortcomings of Kentucky Bluegrass include its dormancy during drought, heat stress intolerance, generally poor shade performance, and disease susceptibility
Perennial Ryegrass	Perennial Ryegrass is commonly used for home lawns, parks, and golf fairways.	Valued for its quick germination, establishment, and endophyte infection	Shortcomings of Perennial Ryegrass include its winter hardiness and summer stress tolerance
Tall Fescue	First introduced in the US as a forage grass, use of Tall Fescue as a turf began in the 1940s and 1950s.	Valued for its drought avoidance, wear tolerance, and disease resistance	Shortcomings of Tall Fescue include its susceptibility to ice cover damage, leaf texture, slow green-up, and perceptions.

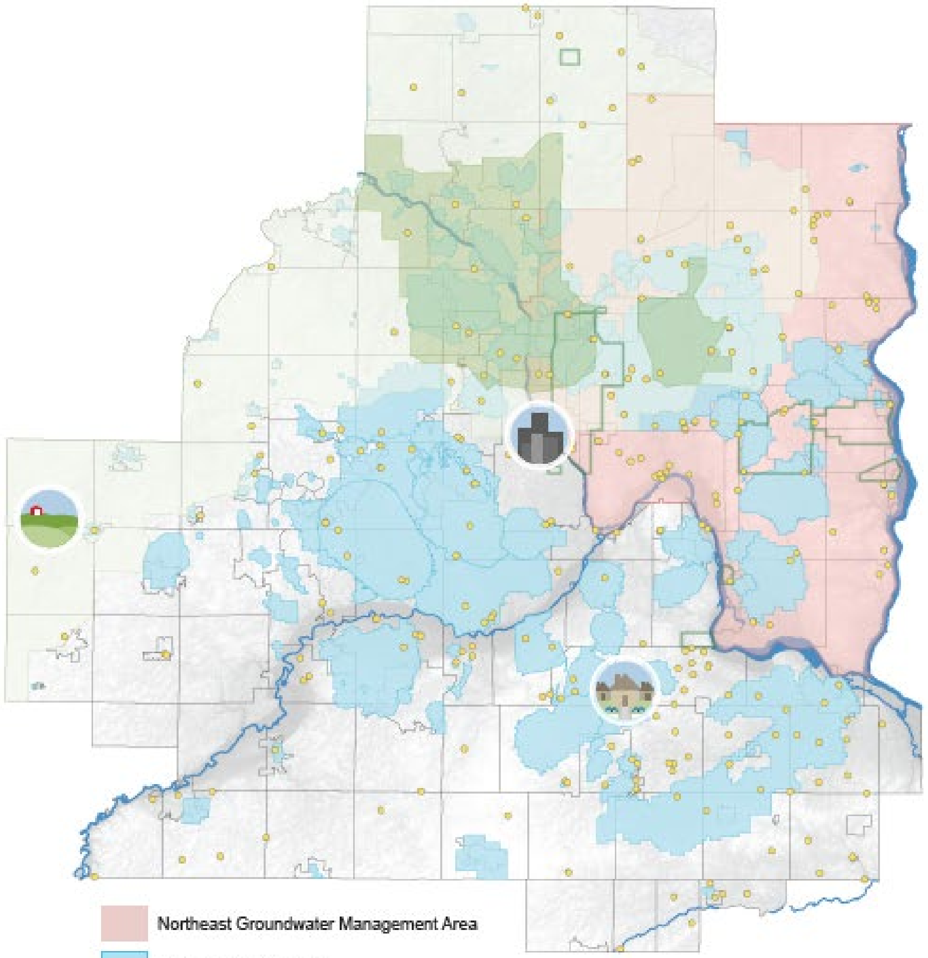
Fine Fescues — Fine Fescues are a group of grasses being researched at the University of Minnesota. These are versatile grasses with greater drought tolerance and the ability to grow well in sun and shade. The two main types of Fine Fescues are bunch and rhizomatous. Common fine fescues that form bunches are Hard Fescue, Chewings Fescue, and Sheep Fescue. Rhizomatous Fine Fescues include Strong Creeping Red Fescue and Slender Creeping Red Fescue.

Source Water Protection

Water suppliers, MPCA, and MDH work to ensure that our water resources, water supply wells and distribution systems, and citizen health are protected. There are extensive well and drinking water testing programs and monitoring requirements that protect drinking water supplies in Minnesota.

Other areas are identified due to specific resource management concerns. Those concerns may be related to water availability or contamination concerns that need to be considered to ensure safe and reliable drinking water supplies. However, there are long-term and short-term drinking water challenges in all parts of the metro.

Across much of the metro there are drinking water management areas for wells and surface water supplies. These areas are identified to help protect and manage water resources. However, many of the areas extend beyond the political boundaries of the communities they are meant to protect. This presents a management and planning challenge that requires collaboration between communities and state agencies.



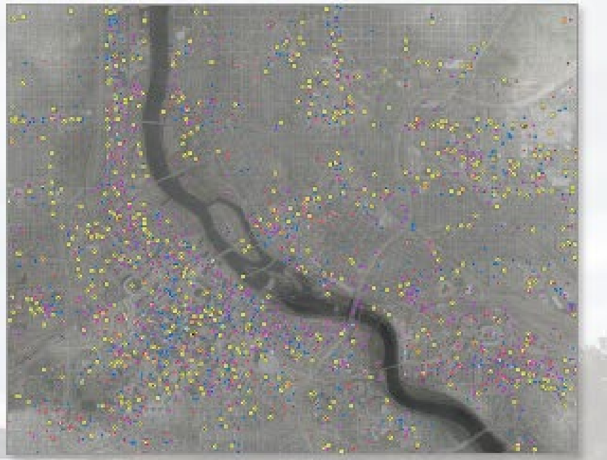
- Northeast Groundwater Management Area
- Groundwater DWSMA
- Surface Water DWSMA - Priority Area A
- Surface Water DWSMA - Priority Area B
- Special Well Construction and Boring Area
- DNR Monitoring Well
- Major River

Groundwater Drinking Water Supply Management Areas (DWSMAs) represent the 10 year time of travel to public water supply wells. Wellhead protection planning in these areas helps to ensure that contamination at the surface doesn't reach public drinking water supplies.

MPCA What's in My Neighborhood?

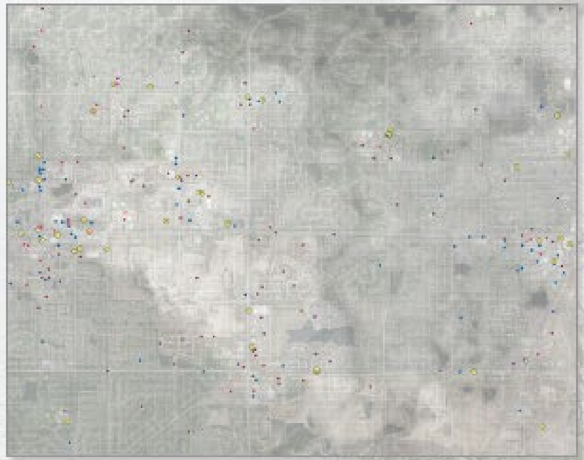
URBAN

Contamination sites in urban parts of the metro area are diverse in type. The map to the left shows parts of downtown and northeast Minneapolis. Hazardous waste, investigation and cleanup, tanks, and multiple program sites are concentrated in this area.



SUBURBAN

Contamination sites in suburban parts of the metro area are less concentrated than in the urban core. The map to the left shows suburban development in Dakota County. Contamination types in this map are similar to those above, but include more stormwater sites.

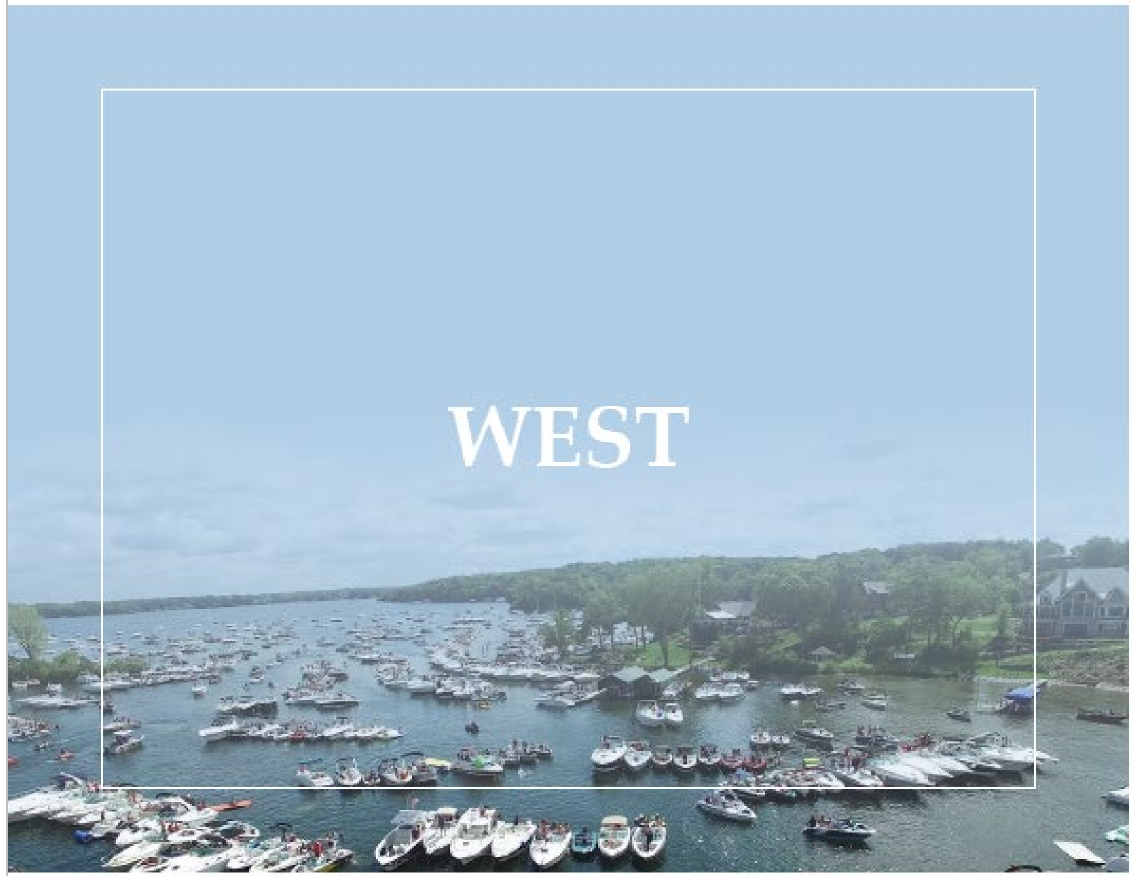


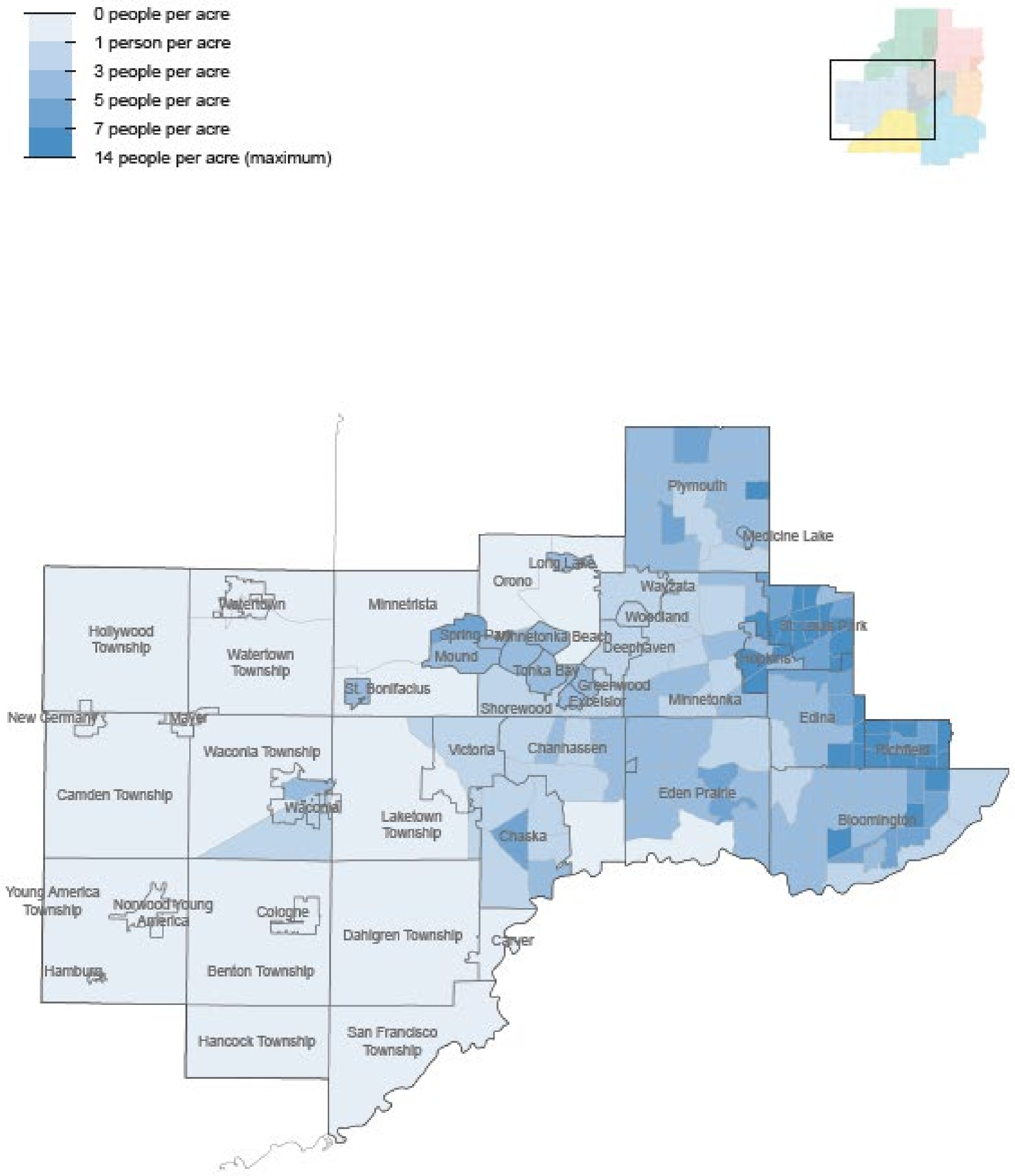
RURAL

Contamination sites are least dense in rural parts of the metro. The map to the left shows part of western Carver County. Since agriculture is the dominant land use type in this area, feedlots are by far the most common contamination site, but other contamination types are present as well.

Multiple Programs	Feedlots	Investigation and Cleanup	Solid Waste	Tanks
Air Quality	Hazardous Waste	SSTS	Stormwater	Water Quality

WEST





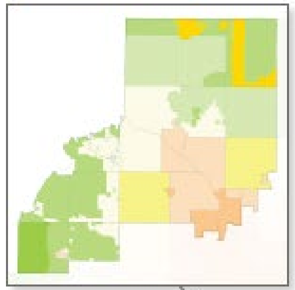
The Western water supply planning area spans a large area of the metropolitan planning region stretching from the near western suburbs bordering Minneapolis and the communities around Lake Minnetonka to the more rural areas of western Hennepin and Carver Counties. Density in this part of the metro generally follows growth and development patterns, with the most dense areas being older suburban areas near Minneapolis and areas further west that have seen consistent growth over the past few decades.

Water resource and supply system challenges exist in all communities and are as diverse as the areas the West Subregion spans. Small towns or rural centers face some challenges that are very different than growing suburban communities or more highly developed areas. The Minnesota and Crow Rivers, Lake Minnetonka, Minnehaha Creek and other streams and wetlands are important social, cultural and economic parts of the West Metro landscape. Many of these features are connected to groundwater aquifers and supported by upwelling groundwater.

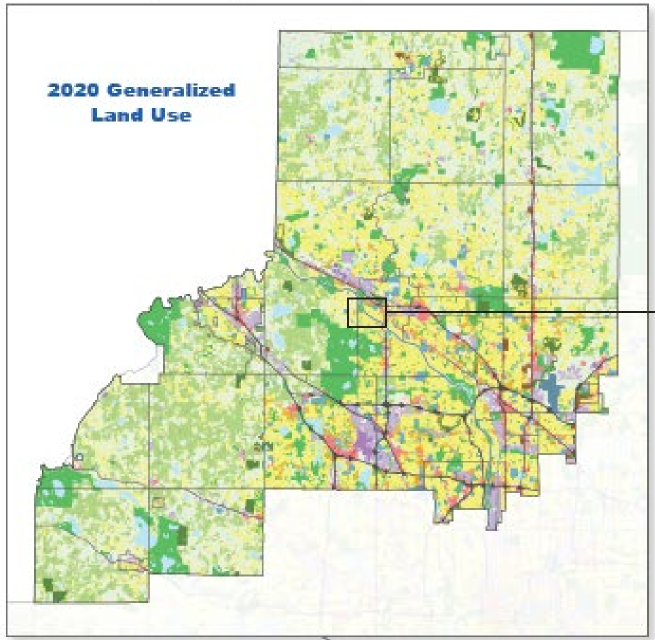
Land Use & Development

The Northwest subregion is covers a large portion of the metro planning area with a variety of community types ranging from urban to rural. This subregion is bisected by the Mississippi River, which flows from the northwest portion of the subregion to the more urban and highly developed southeast. A mix of single family detached housing, industrial areas, parks, and commercial corridors line both sides of the river. In addition to parks along the Mississippi River, there is extensive, and fairly evenly distributed parkland in this subregion, often surrounding large wetland and lake complexes. Many communities in this subregion are designated as suburban edge or emerging suburban edge, meaning this is a growing subregion. Agriculture in this subregion is less densely concentrated than in other parts of the metro, and is instead interspersed with undeveloped land and housing. As growth continues agricultural and natural areas will likely be converted into more urbanized landscapes.

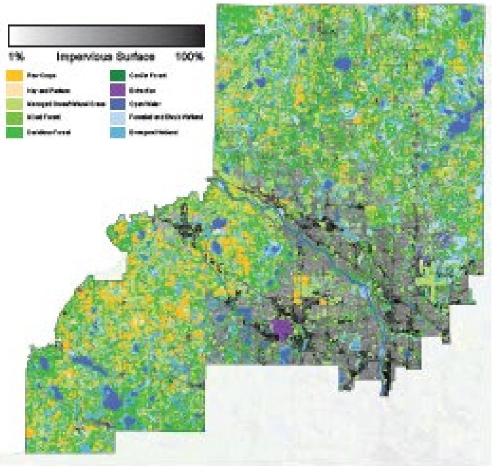
Thrive MSP 2040 Community Designations



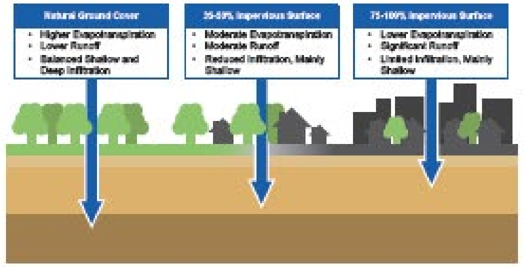
2020 Generalized Land Use



Impervious Surfaces and Runoff



An impervious surface is an area where water is unable to pass through into the ground (typically a water-resistant, artificial structure like a sidewalk). Impervious surfaces increase the volume and speed of runoff and limit groundwater recharge, which can negatively impact water resources and ecosystems. In the Northwest subregion, most impervious surfaces are concentrated in and around urban and suburban development. As the region continues to grow and develop more land conversion to impervious surface is likely.

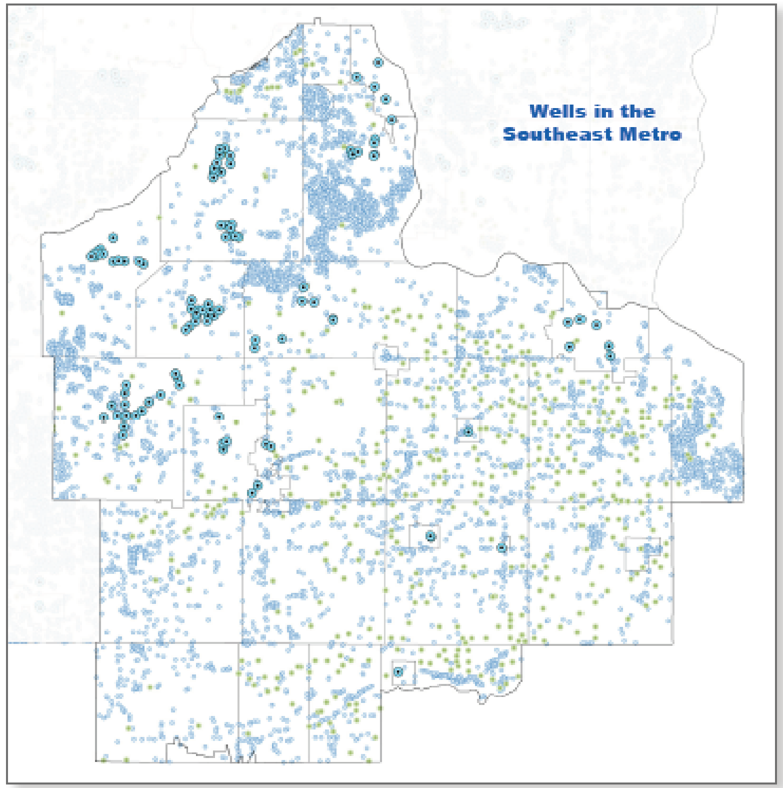


This photo shows parts of Dayton and Champlin in 1945. Roads cut across the photo on both sides of the Mississippi River through almost exclusively agricultural areas. Small farm houses can be seen as well as periodic forested areas.

This photo show parts of Dayton and Champlin more recently, in 2016. Unlike 1945, this area of Dayton and Champlin in 2016 has been extensively developed to include suburban residential developments, athletic fields, golf courses, and more. Water use in the 1945 photo would have been limited to agriculture, but in 2016 there are many uses for water.

Water Supply Systems & Treatment

Many Southeast Metro residents receive treated groundwater from a municipal/public water supplier. Water suppliers go through many steps to access water sources and then treat that water to ensure their customers are able to have clean and safe drinking water. Many people also own and operate individual private wells. Those residents are responsible for their own infrastructure and any water treatment in their homes. Businesses may receive water from a water supplier or have individual permits to pump water for agricultural or golf course irrigation or other commercial and industrial purposes. To be sustainable communities and the region must consider how growth, land use changes, climate impacts, inequity, and other challenges stress water resources and supply systems.

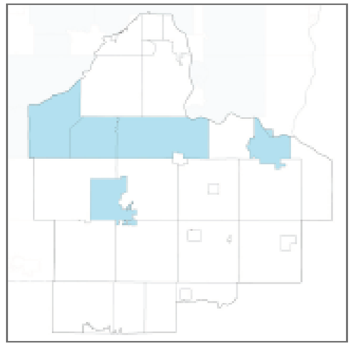


Municipal Water Supply Well · Domestic Well · Irrigation Well

As the Southeastern Metro continues to grow, more people will begin to rely on municipal/public water supplies for their water needs. To deliver service to more homes and businesses, communities may need new infrastructure like additional wells and new service lines. Expansion of water supply systems comes with costs and is not without financial, social, or environmental risk.

Communities Planning for New Well Infrastructure by 2040

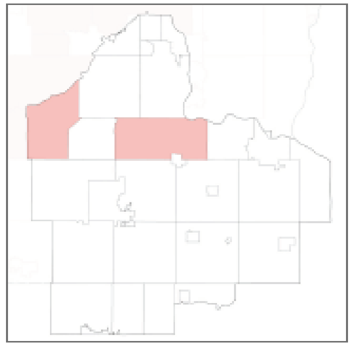
as of 07/2019



Burnsville
Apple Valley
Rosemount
Hastings
Farmington

Communities Planning for New Treatment Infrastructure by 2040

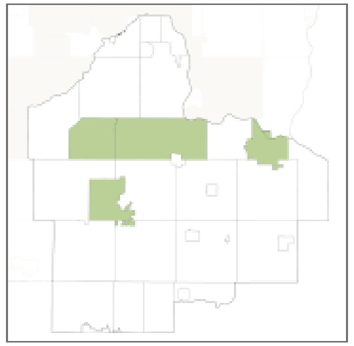
as of 07/2019



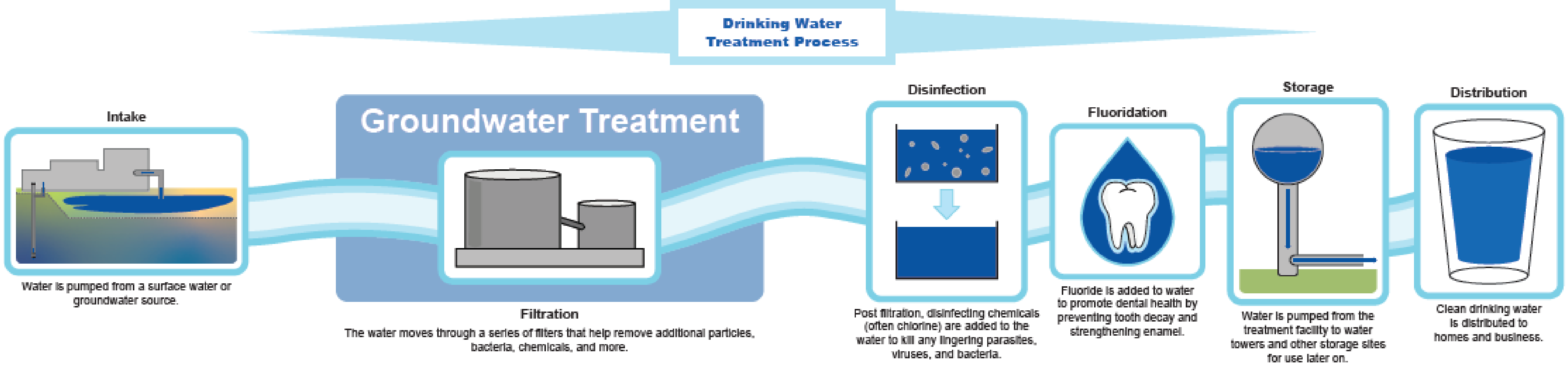
Burnsville
Rosemount

Communities Planning for New Distribution Infrastructure by 2040

as of 07/2019



Apple Valley
Rosemount
Hastings
Farmington



Water Use

Many factors influence the amount of water pumped for municipal / public water supplies. The number of homes and businesses connected to the system, weather conditions, use behaviors, and other factors all influence water demand. By looking at historical pumping and use trends we can understand how water demand is influenced by these factors and better prepare for the future.

Water Use Trends

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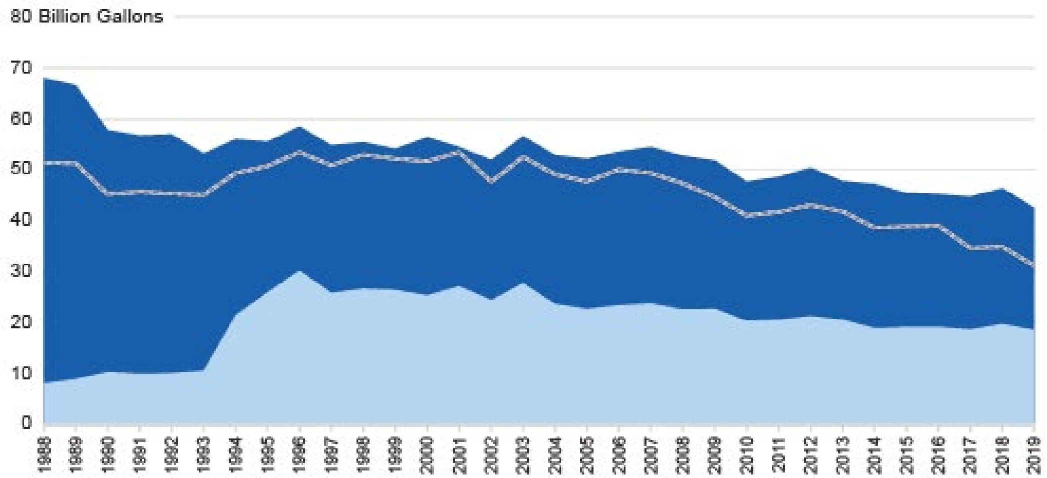
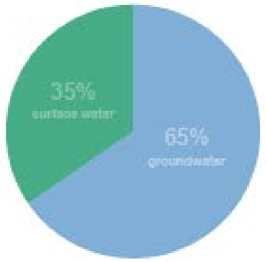


- Annual Gallons Pumped
- Total Gallons Delivered
- Residential Gallons Delivered

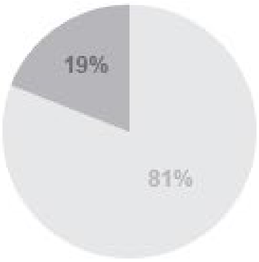
Peak pumping in the Central subregion occurred during the late 1980's reaching a peak of over 68 billion gallons per year. Pumping lessened slightly during the 1990's but remained relatively steady over the next 20 year period even as the area continued to develop and grow in population. Pumping has continued to slowly decline over the last decade. At present, about 10 billion gallons less are pumped in the Central subregion than in the 1980's.

Regional Municipal/Public Pumping by Source



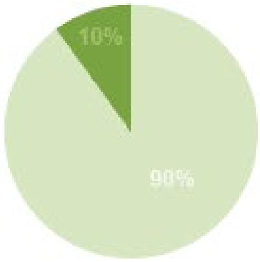
Across the metro, about 65% of all water extracted by municipal/public water suppliers is groundwater. Surface water use is concentrated in the central metro.

Percent of Groundwater Pumped by Subregion



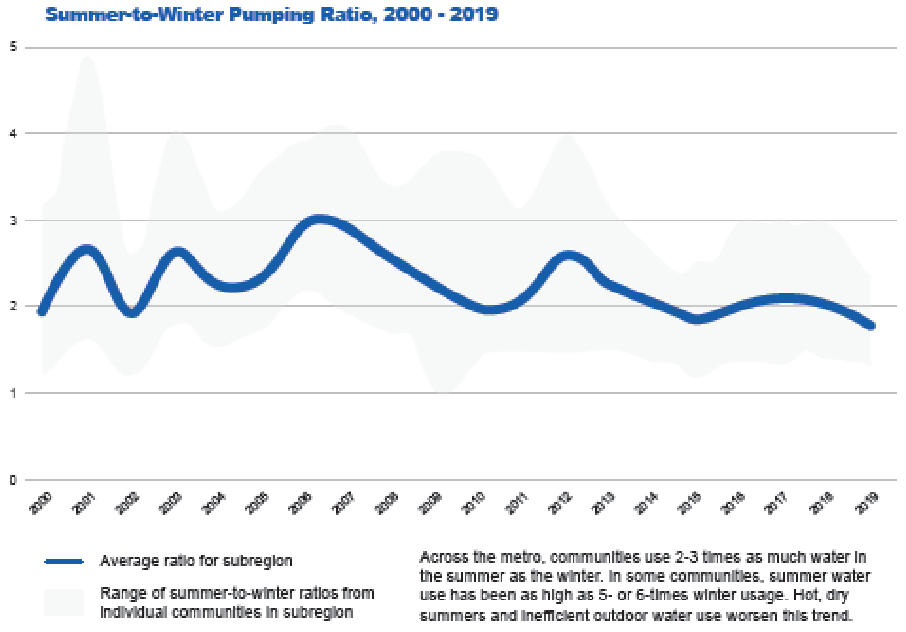
Central communities pump about 19% of all groundwater pumped by municipal/public water suppliers across the metro region. 100% of surface water is pumped in the Central metro although some other communities use water from sources that are treated as surface water.

Outdoor Use Percent of Subregion Pumping



About 10% of water pumped in the Central subregion goes to outdoor uses.

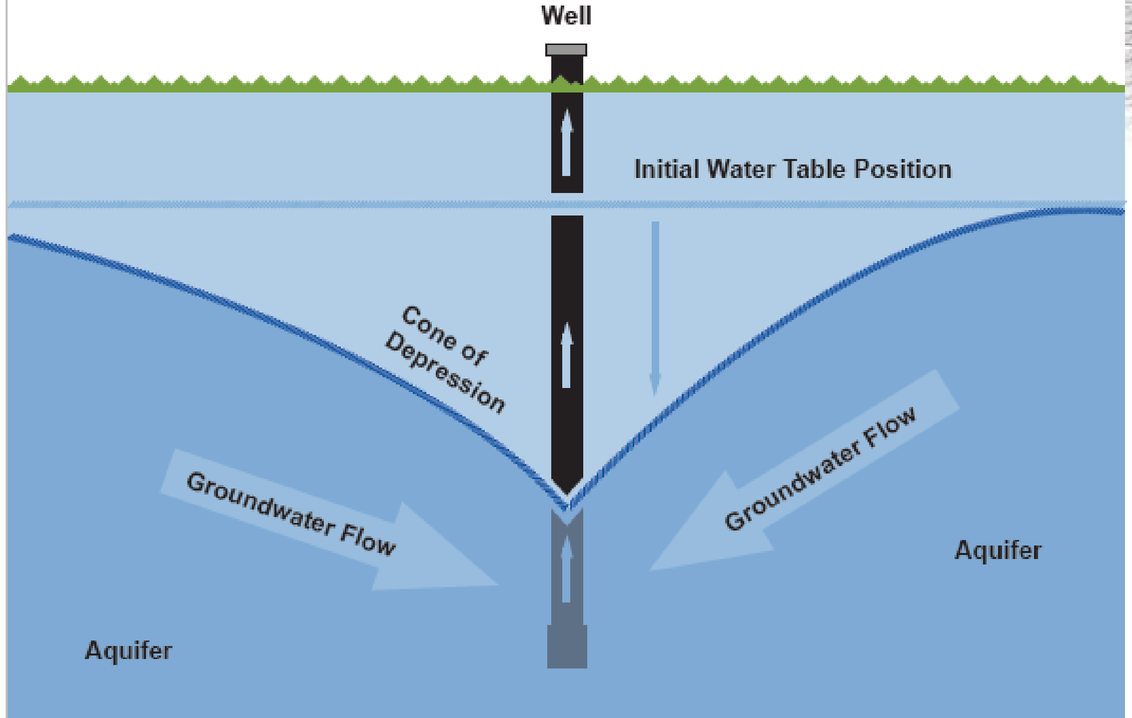
Climate & Weather

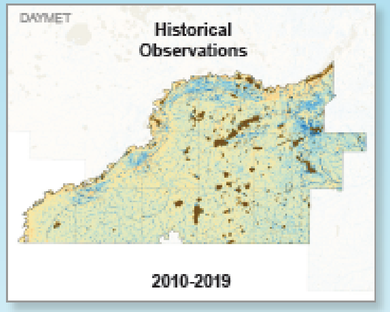


Across the metro, communities use 2-3 times as much water in the summer as the winter. In some communities, summer water use has been as high as 5- or 6-times winter usage. Hot, dry summers and inefficient outdoor water use worsen this trend.

Pumping Impacts on Groundwater

When wells are pumping they are using energy to pull water from underground aquifers. Hotter summers and extend periods of drought can lead to increased groundwater demand and aquifer drawdown creating ever larger cones of depression. Excessive groundwater pumping can lead to well conflicts, where one well is pumping so much that it's cone of depression impacts neighboring wells. If new wells need to be dug deeper to access water this increases costs to communities and private well owners, making our water resources less resilient and increasing energy use.



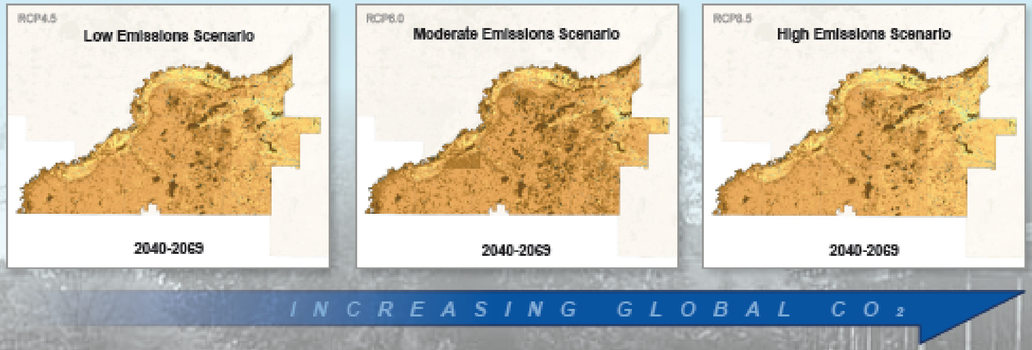


Climate Modeling: Annual Infiltration

Whatever the future weather, recharge will be impacted. More precipitation does not necessarily mean more recharge, as growing seasons extend and rain events are less frequent. Recently, global climate models were used to estimate future weather conditions in the metro region. Modeling of the water available to recharge groundwater aquifers under these future climate scenarios generally shows that recharge would be lower in most places.

Inches of Infiltration

0 2 4 6 8 10 12 14 16 18 and greater



Extreme Weather and Changing Climate

Climate and weather are always changing but over recent decades the impacts of ever-increasing greenhouse gasses have been felt locally. Across the state we are seeing less extreme cold and a warming of winter nights. Winters are becoming shorter, extending the growing season. More precipitation is falling in the form of rain, but it's happening more during intense storms and there seems to be more variability (less predictability) with our weather.

These changes create challenges for water resources and drinking water suppliers. Less predictable weather means demand is less predictable. Increases in storm intensity and frequency means a greater chance of flooding, stormwater issues, and increases the opportunity for wells to be overtopped and contaminated. During extended wet periods, rising water tables can cause localized flooding impacting homes, infrastructure, and public spaces.

Average Temperature Change in the Metro Region

Summer Maximum Temperature		Winter Minimum Temperature	
1981-2010	81.1 °F	1981-2010	7.6 °F
2050-2070	88.7 °F	2050-2070	17.2 °F
Projected Change	+7.7 °F	Projected Change	+9.6 °F

Average Precipitation Change in the Metro Region

Early Summer Precipitation		Early Fall Precipitation	
1981-2010	4.4"	1981-2010	2.9"
2050-2070	5.0"	2050-2070	2.9"
Projected Change	+0.6"	Projected Change	0

Changing Seasons

Temperature and precipitation trends tell us that the metro region is generally getting warmer and wetter and will continue to do so in the future. However, these temperature and precipitation changes are not evenly distributed throughout the year. Although we are getting warmer overall our winter lows are rising faster than our summer highs. Similarly, we seem to be getting wetter during some parts of the year and drier during others. These changes along with greater weather variability are making water demand predictions more difficult and increasing the stresses on our drinking water resources and supply systems.

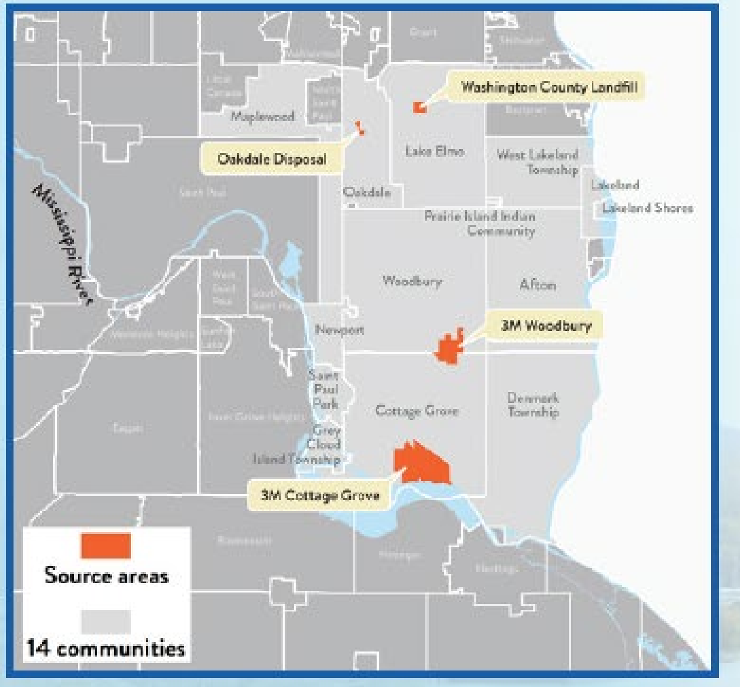
Source Water Protection

Protection of drinking water starts by protecting our water sources and is everyone's responsibility. This means everything from properly disposing of household chemicals and waste like motor oil to cleaning up sites contaminated by past industrial and commercial activities. It also means being aware of our current activities and how they might impact water resources. Road salt, fertilizers, and pesticides all infiltrate the ground and find their way to our wetlands, lakes, rivers, streams, and groundwater aquifers. Once these pollutants get into the environment they can be very difficult to remove. Limiting our use and instituting best management practices helps to protect our drinking water supplies.

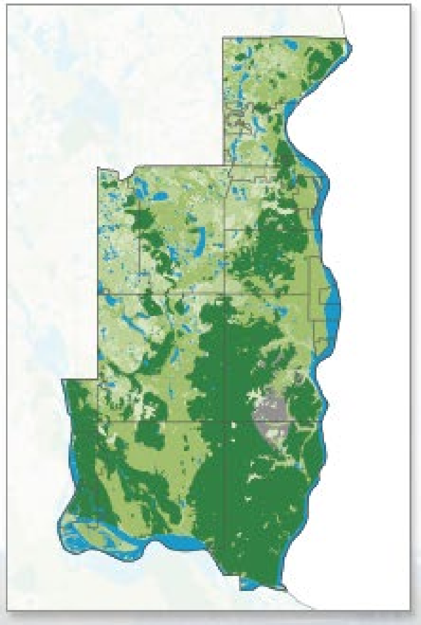
Any chemicals we spill or intentionally add to the world around us in excess can contaminant surface and ground waters. Everyday activities like using salt in the winter on our roads and sidewalks, spilling the gasoline or oil we use in our lawn and automotive equipment, fertilizing lawns and crops, or spraying pesticides can contaminate water. Being responsible water stewards means limiting our use of potential contaminants, using safe alternatives when feasible, and considering best management practices when applying or disposing of chemicals.

Groundwater Contamination in the East Metro

PFAS contamination of ground and surface waters in the East Metro has created public health concerns and water treatment challenges for public suppliers and private well owners. PFAS chemicals can be long-lived in the environment, requiring significant time and financial resources to remediate.



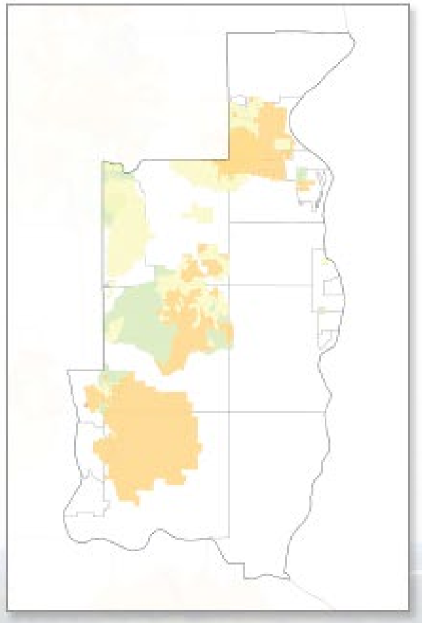
Pollution Sensitivity to Near Surface Materials



High · Moderate · Low · Very Low · Karst · Water · Bedrock at or near surface

This map of pollution sensitivity shows many areas where the nature of the geologic material indicates groundwater may be more susceptible to contamination. Glacial sediments are shallow across much of Washington County making groundwater more vulnerable to contaminants. Bedrock valleys, faults, and karst in the South and East parts of the subregion have created preferential flow-paths to deeper aquifers making groundwater in these areas more susceptible to potential pollution.

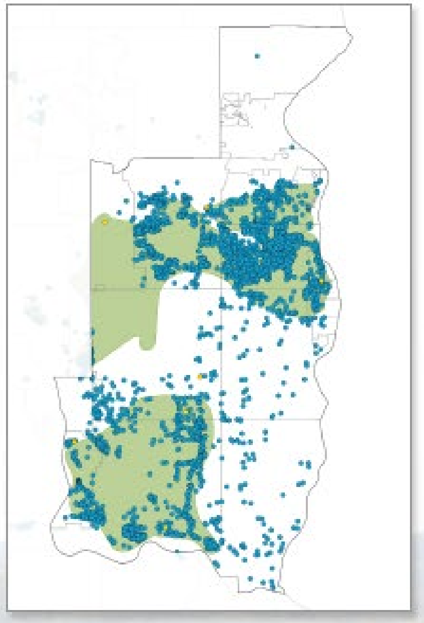
Drinking Water Supply Management Area Vulnerability



Very High · High · Moderate · Low · Very Low

Drinking water supply management areas represent the land area that contributes water to public water supply wells over 10 years. Contaminants entering the ground have a greater chance of making their way to public drinking water wells. These areas often extend beyond political boundaries and overlap creating management challenges that require communication and collaboration between communities.

Contamination Sites and Areas



Monitoring well showing area of groundwater contamination · Cleanup Site · Contamination Area

Known contamination sites that are actively managed by communities and the MPCA are identified on this map. Each contaminant and site presents its own unique challenges, but with proper clean-up, management, and remediation activities water resources and human health can are protected.

From the Minnesota Pollution Control Agency:

Per- and polyfluoroalkyl substances (PFAS) are a large group of nearly 5,000 different synthetic chemicals that are resistant to heat, water, and oil. Invented in the 1930s, PFAS have been used since the 1940s and are still commonly used for their water- and grease-resistant properties in many industrial applications and consumer products such as carpeting, waterproof clothing, upholstery, food paper wrappings, cookware, personal care products, fire-fighting foams, and metal plating. A few of the most studied PFAS are known to be hazardous to human health. Some manufacturers have chosen to stop using them and EPA has established rules on some of their uses, but generally speaking PFAS continue to be used widely in industrial applications and consumer products.

PFAS

1940s	2002	2003-2004	2007	2010	2018	2021
Manufacturing and widespread use begins	3M notifies MPCA PFAS was detected in a Cottage Grove production well	MPCA detects PFAS at disposal sites and identifies an area of 150 square miles of groundwater contamination	Superfund program initiated	State of MN sues 3M	3M and state agree to settlement	State drinking water plan for the East Metro is finalized

Next Steps

Summer – Fall 2022	**Seek draft content feedback**
Fall – Winter 2022	**Revise draft content**
Spring – Summer 2023	**Prepare to publish**

Seek draft content feedback

- Internal: water resources planning staff
- External: public water suppliers
  - Working with EOR and Young Consulting to facilitate conversations

Revise draft content

- As input and/or new data comes in update content
- Our intent is to update this content on an ongoing and as needed basis

Prepare to publish

- Print, digital, web, etc.