Maximizing Water Efficiency for Minnesota Turfgrass

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Shane Evans, M.S.

TURFGRASS SCIENCE

METROPOLITAN COUNCIL

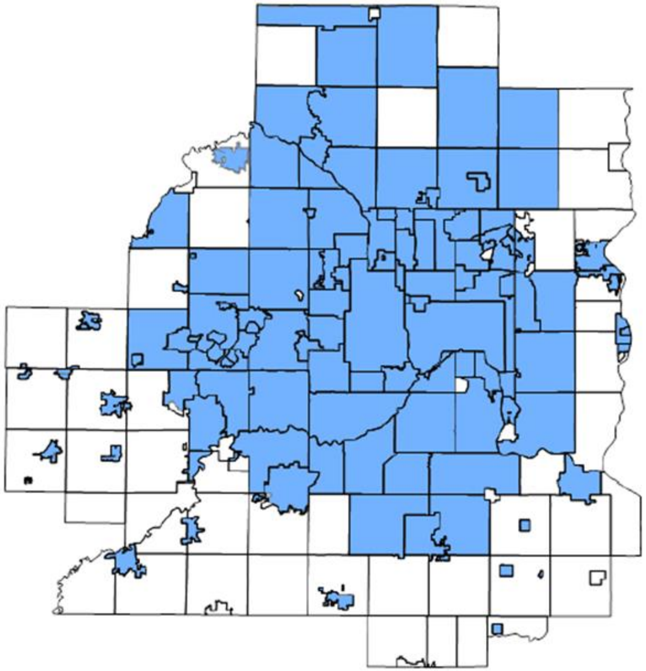
CLEAN WATER LAND & LEGACY AMENDMENT

UNIVERSITY OF MINNESOTA
Driven to Discover®

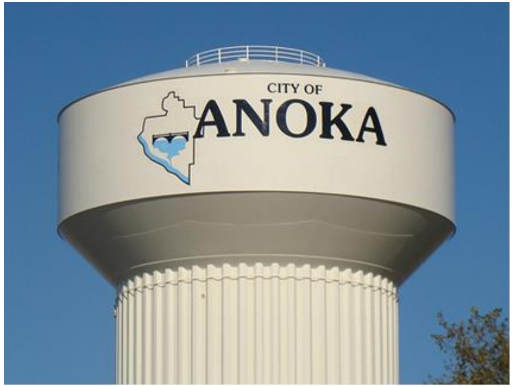
METROPOLITAN COUNCIL

Metro Area Water Supply

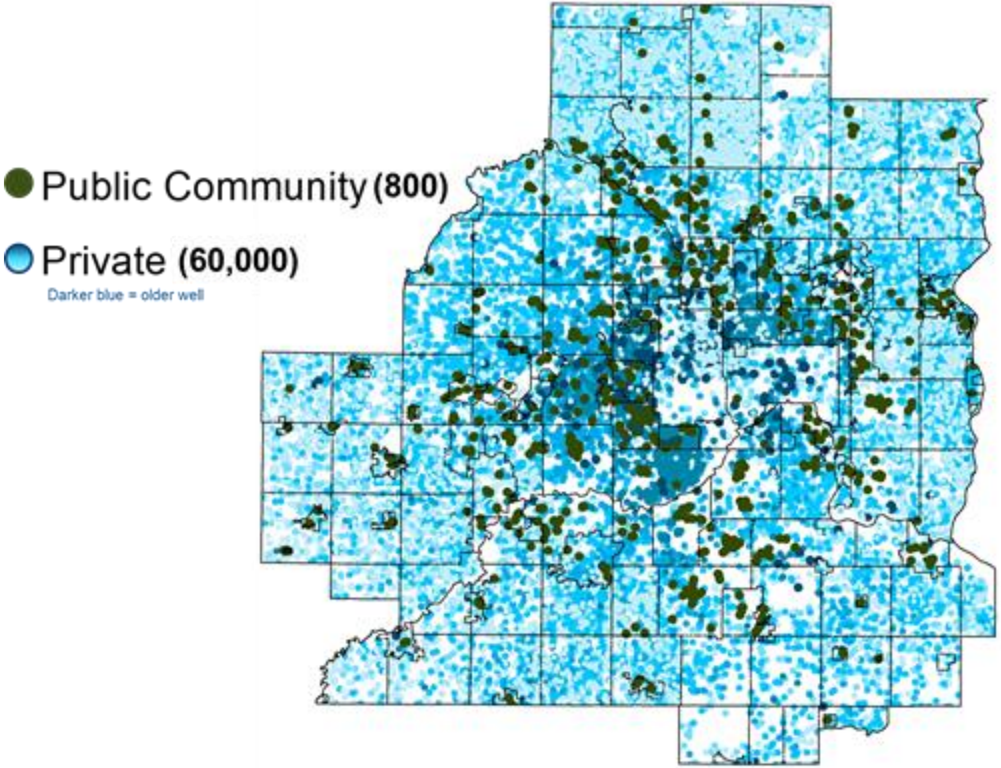
- 3.2 million people
- 106 water suppliers
- 75% groundwater
- 300 MGD now
- 450 MGD in 2040



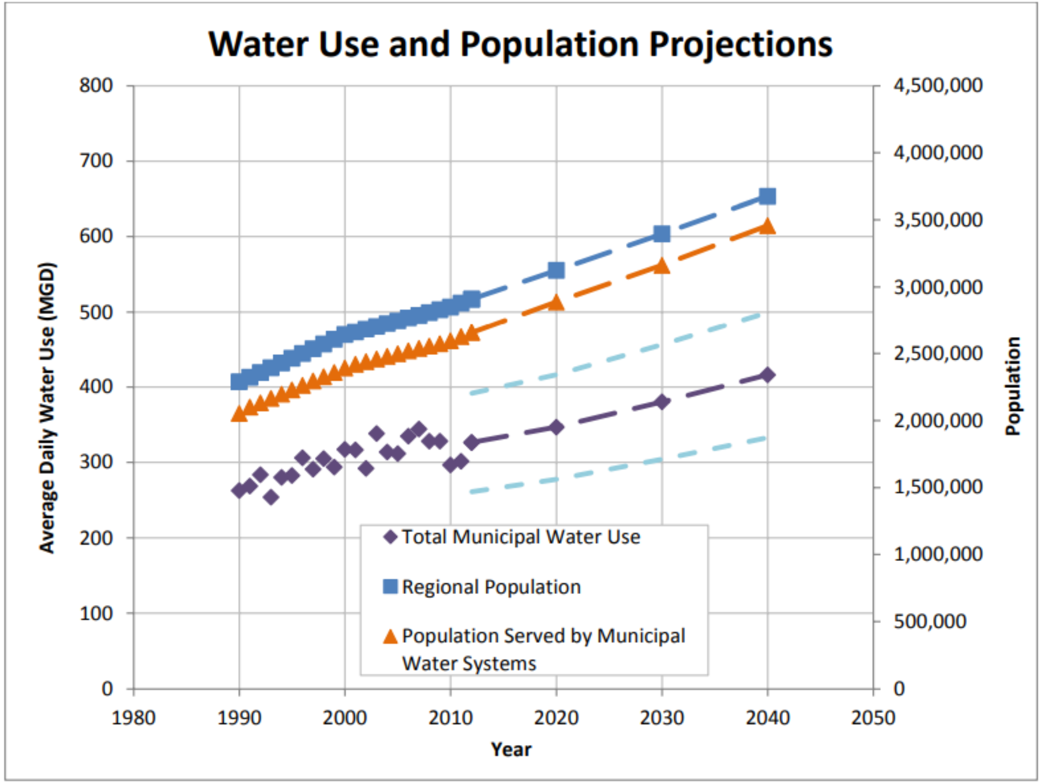
We Are Different



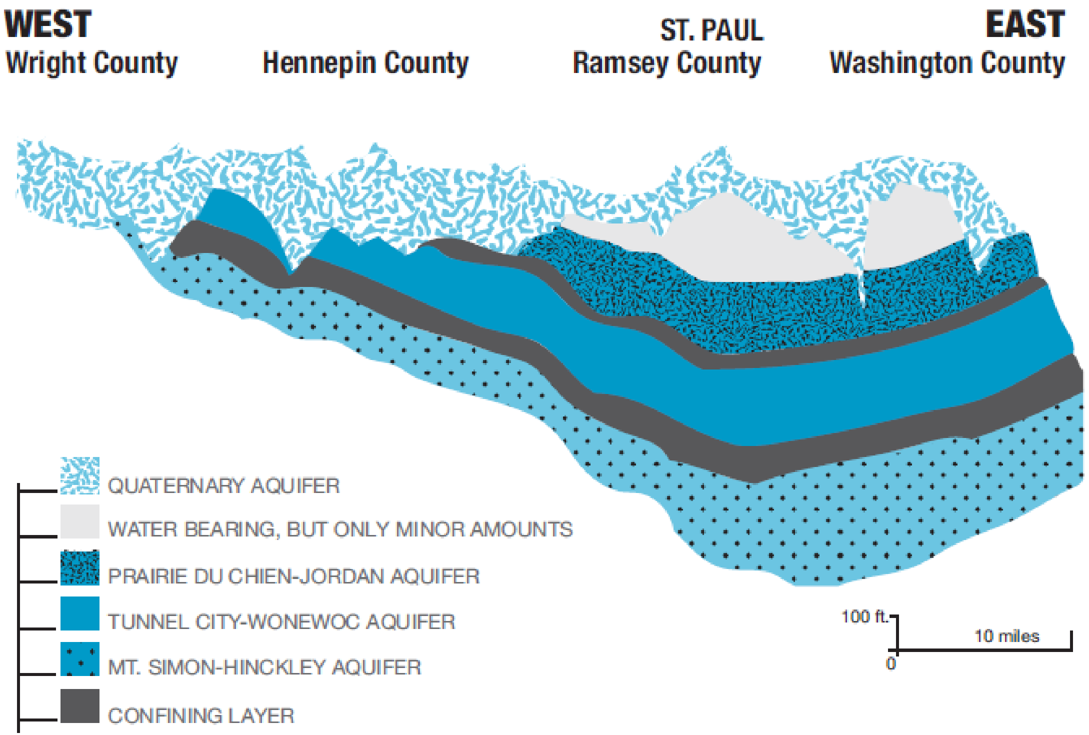
More than 800 Public Community Wells



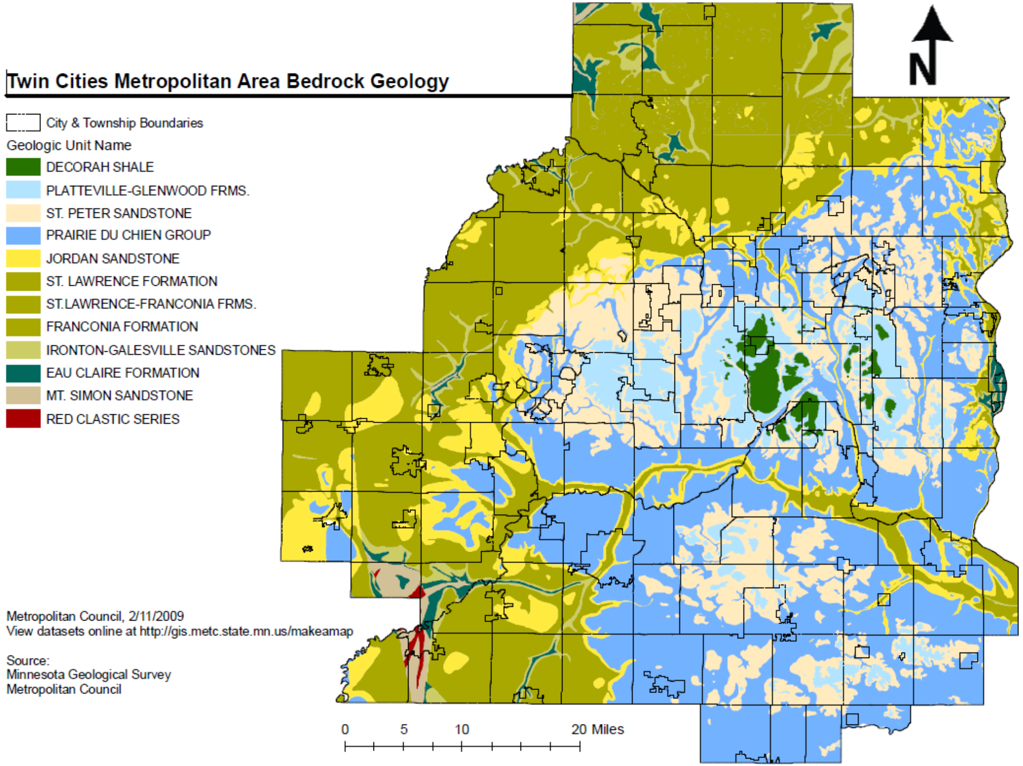
Water Demand Through 2040



Aquifers


WEST
Wright County
Hennepin County
ST. PAUL
Ramsey County
EAST
Washington County
QUATERNARY AQUIFER
WATER BEARING, BUT ONLY MINOR AMOUNTS
PRAIRIE DU CHIEN-JORDAN AQUIFER
TUNNEL CITY-WONEWOC AQUIFER
MT. SIMON-HINCKLEY AQUIFER
CONFINING LAYER
100 ft.
0
10 miles

Prairie du Chien - Jordan Aquifer

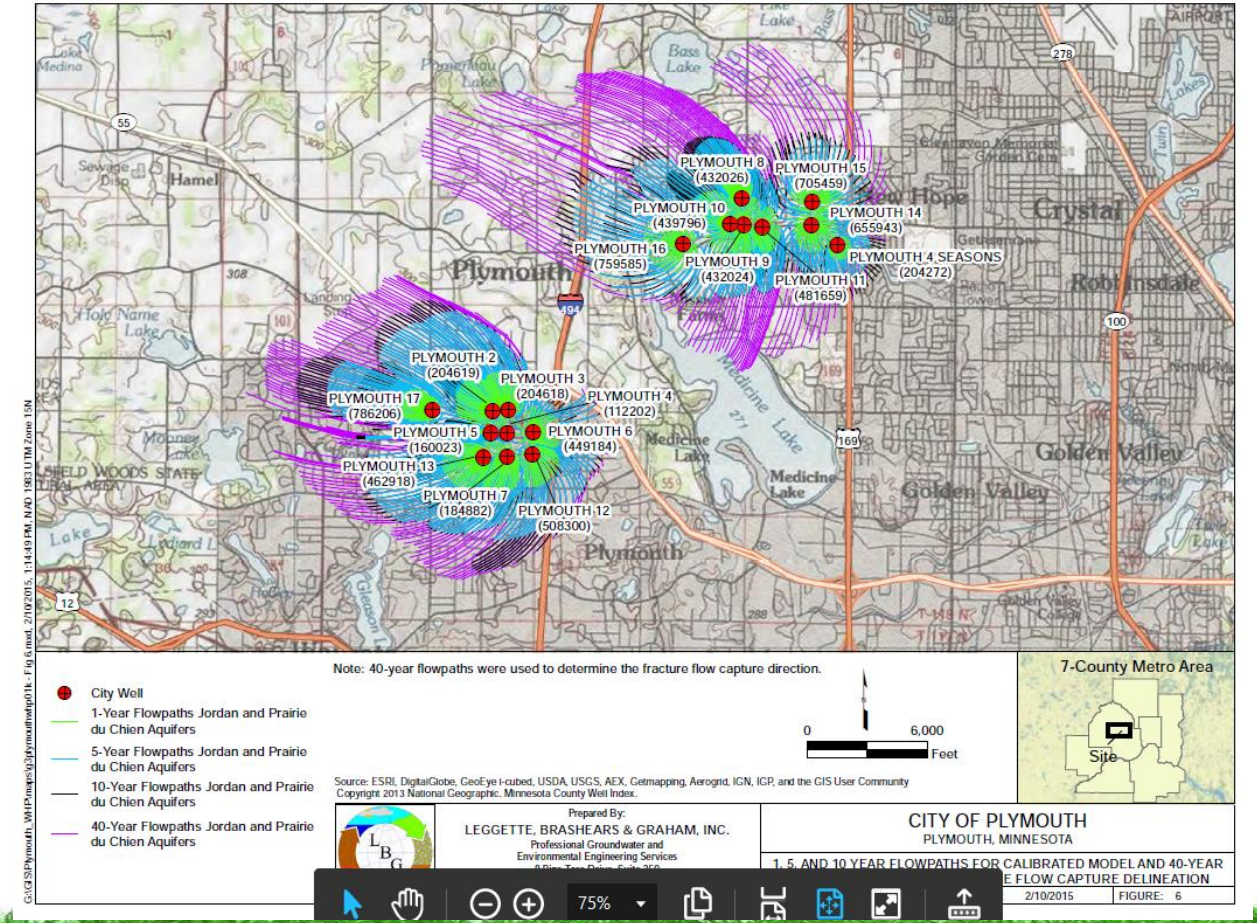


Wells

Table 6. Water sources and status

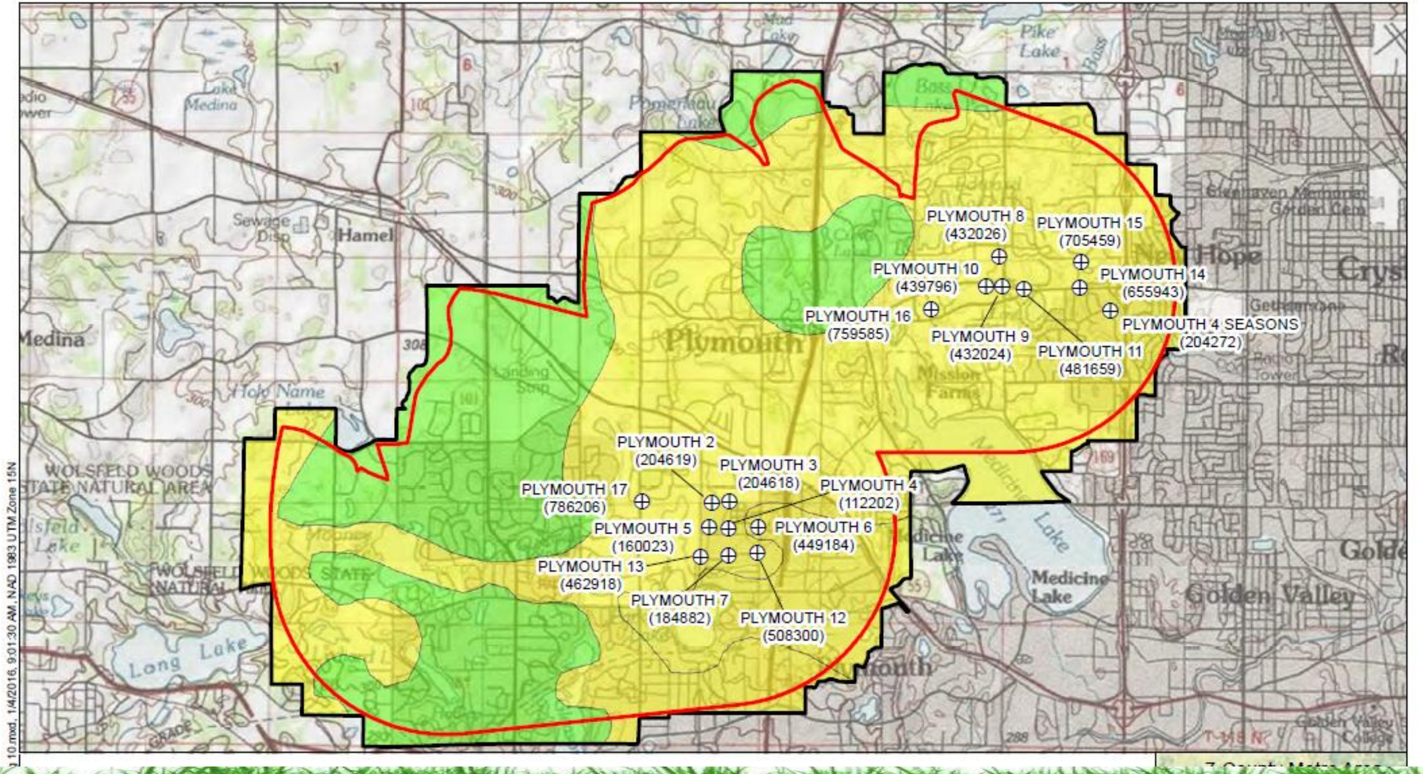
Resource Type (Groundwater, Surface water, Interconnection)	Resource Name	MN Unique Well # or Intake ID	Year Installed	Capacity (Gallons per Minute)	Well Depth (Feet)	Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection))	Does this Source have a Dedicated Emergency Power Source? (Yes or No)
Groundwater	Well 1	00204617	1961	1000	505	Emergency	No
Groundwater	Well 2	00204619	1970	1800	409	Active	Yes
Groundwater	Well 3	00204618	1972	1500	448	Active	Yes
Groundwater	Well 4	00112202	1975	1200	470	Active	Yes
Groundwater	Well 5	00160023	1979	0	437	Standby	NO
Groundwater	Well 6	00449814	1980	2000	417	Active	No
Groundwater	Well 7	184882	1982	1700	455	Active	No
Groundwater	Well 8	432026	1987	1900	416	Active	No
Groundwater	Well 9	432024	1987	1900	420	Active	Yes
Groundwater	Well 10	439796	1988	1900	353	Active	No
Groundwater	Well 11	481659	1993	1300	380	Active	Yes
Groundwater	Well 12	508300	1990	1600	302	Active	No
Groundwater	Well 13	462918	1991	2000	473	Active	Yes
Groundwater	Well 14	655943	2004	2000	405	Active	Yes
Groundwater	Well 15	705459	2004	2000	405	Active	Yes
Groundwater	Well 16	759585	2012	2000	398	Active	Yes
Groundwater	Well 17	786206	2012	2000	423	Active	Yes
Groundwater	Four Seasons	204272	1966	1000	390	Emergency	Yes

Wells



PLYMOUTH 8 (432026)
PLYMOUTH 15 (705459)
PLYMOUTH 10 (439796)
PLYMOUTH 14 (655943)
PLYMOUTH 16 (759585)
PLYMOUTH 9 (432024)
PLYMOUTH 4 SEASONS (204272)
PLYMOUTH 11 (481659)
PLYMOUTH 2 (204619)
PLYMOUTH 3 (204618)
PLYMOUTH 17 (786206)
PLYMOUTH 4 (112202)
PLYMOUTH 5 (160023)
PLYMOUTH 6 (449184)
PLYMOUTH 13 (462918)
PLYMOUTH 7 (184882)
PLYMOUTH 12 (508300)
Plymouth
Crystal
Robbinsdale
Golden Valley
Medicine Lake
Hamel
City Well
1-Year Flowpaths Jordan and Prairie du Chien Aquifers
5-Year Flowpaths Jordan and Prairie du Chien Aquifers
10-Year Flowpaths Jordan and Prairie du Chien Aquifers
40-Year Flowpaths Jordan and Prairie du Chien Aquifers
Note: 40-year flowpaths were used to determine the fracture flow capture direction.
0 6,000 Feet
7-County Metro Area
Site
Source: ESRI, DigitalGlobe, GeoEye i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community
Copyright 2013 National Geographic. Minnesota County Well Index.
Prepared By:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Groundwater and Environmental Engineering Services
CITY OF PLYMOUTH
PLYMOUTH, MINNESOTA
1, 5, AND 10 YEAR FLOWPATHS FOR CALIBRATED MODEL AND 40-YEAR
E FLOW CAPTURE DELINEATION
2/10/2015
FIGURE: 6
75%

DWSMA


PLYMOUTH 8
(432026)
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(449184)
PLYMOUTH 13
(462918)
PLYMOUTH 7
(184882)
PLYMOUTH 12
(508300)
Plymouth
Medina
Hamel
Medicine Lake
Golden Valley
Long Lake
Pike Lake
WOLSFELD WOODS STATE NATURAL AREA

Water Treatment

Table 4. Water treatment capacity and treatment processes

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Volume of Residuals (MG)	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Zachary Treatment Plant	2006 (Expansion)	17,000,000	Filtration, chem addition, disinfection	Fe/Mn removal, $KMnO_4$, chlorination, fluoridation, orthophosphate	15	Sanitary Sewer	95%
Central Treatment Plant	2006	13,000,000	Filtration, chem addition, disinfection	Fe/Mn removal, $KMnO_4$, chlorination, fluoridation, orthophosphate	15	Sanitary Sewer	95%
Total	NA	30,000,000	NA	NA	30	NA	

Water Treatment

Water Source
The City of Plymouth uses 17 wells, ranging from 302 to 473 feet deep to draw drinking water from groundwater sources – Prairie Du Chien-Jordan, Prairie Du Chien Group and Jordan aquifers.

Step 1: Remove Iron and Manganese
Sodium permanganate is used remove iron and manganese from the water.

Step 2: Filter
Water is run through filter cells containing sand media to filter out iron and manganese particles, which attach to the sand in the filters.

Step 3: Prevent Pipe Corrosion
Zinc orthophosphate is used to prevent corrosion of pipes.

Step 4: Improve Dental Health
Fluoride is added to improve dental health, per Minnesota Department of Health mandate.

Step 5: Disinfect and Kill Bacteria
Water is treated with sodium hypochlorite to disinfect and kill bacteria and other microbes that can cause illness.

English

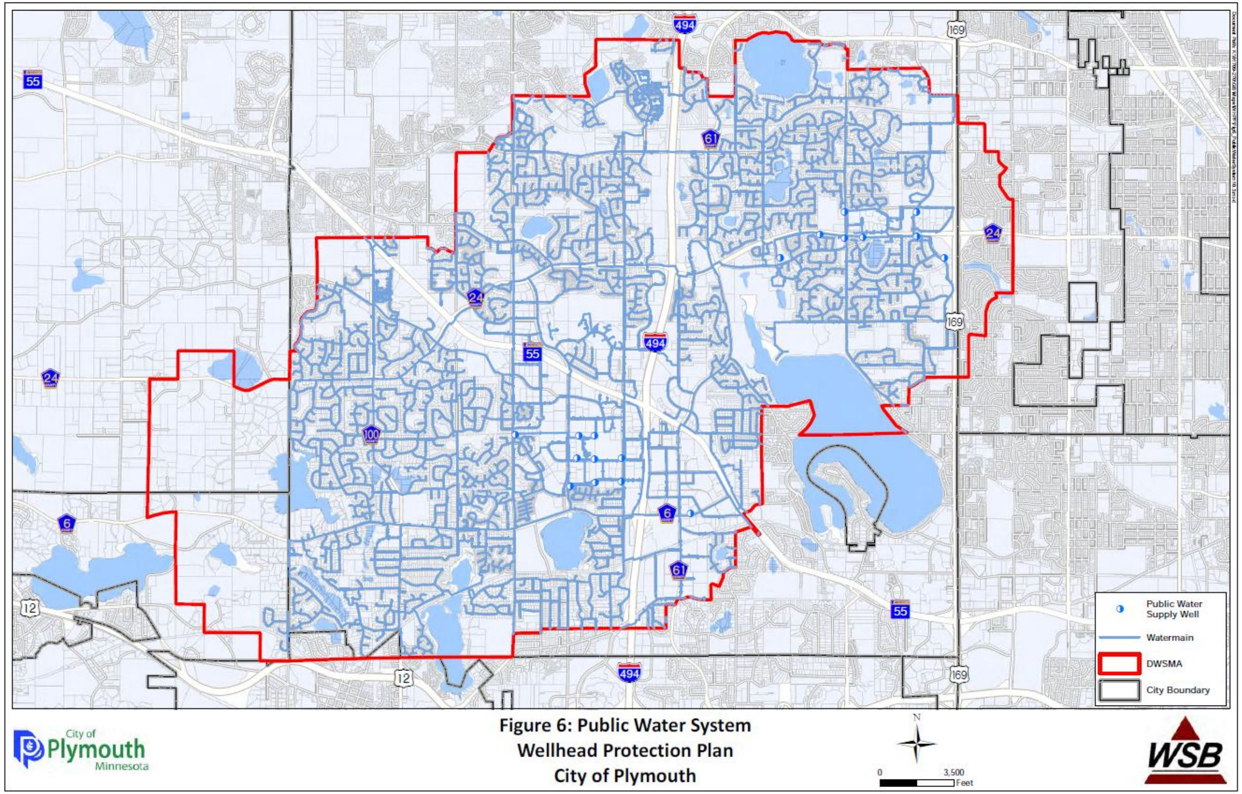
Water Storage

Table 5. Storage capacity, as of the end of the last calendar year

Structure Name	Type of Storage Structure	Year Constructed	Primary Material	Storage Capacity (Gallons)
Zachary Tower	Elevated storage	1975	Steel	2,000,000
Central Tower	Elevated storage	1970	Steel	1,000,000
MIP Tower	Elevated storage	1959	Steel	500,000
Highway 101 Tower	Elevated storage	1990	Steel	3,000,000
Vicksburg Below-Ground Reservoir	Ground storage	2005	Concrete	6,000,000
County Road 6 Standpipe	Standpipe	1976	Steel	1,000,000
Total	NA	NA	NA	13,500,000

Water Storage

Water Distribution

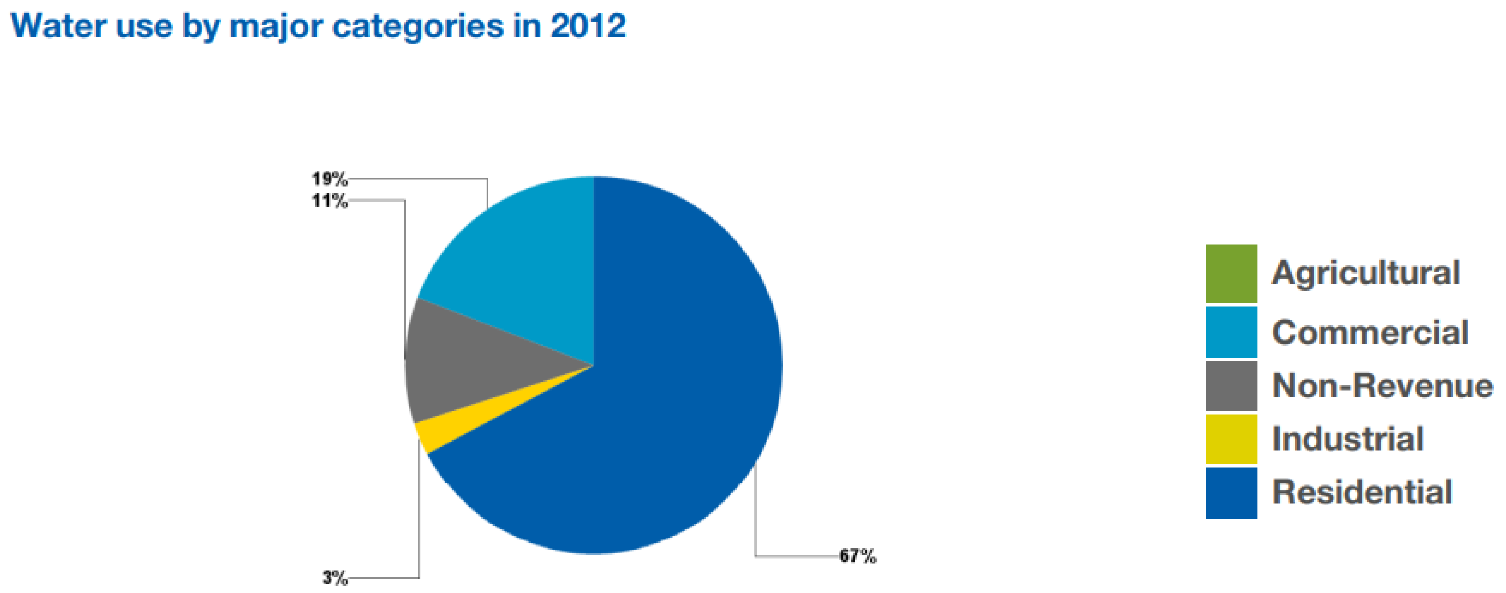


Interconnections

Water Supply System	Capacity (GPM/MGD)	Note any limitations on use
Maple Grove (5)	3.6 MGD (2-16", 1-12", 1-6" unmetered)	Emergency use only. The City has previously purchased water from Maple Grove.
Minnetonka (4)	Unknown (2-12", 2- 6" unmetered)	Emergency use only. Minnetonka's water towers are at a lower elevation than Plymouth's.
Wayzata (1)	Unknown (1-6" unmetered)	Emergency use only. This area of Wayzata is served by Minnetonka (see above for limitations).
St. Louis Park (1)	Unknown (1-8" unmetered)	Emergency use only
Medina (2)	Unknown (2-8" unmetered)	Emergency use only

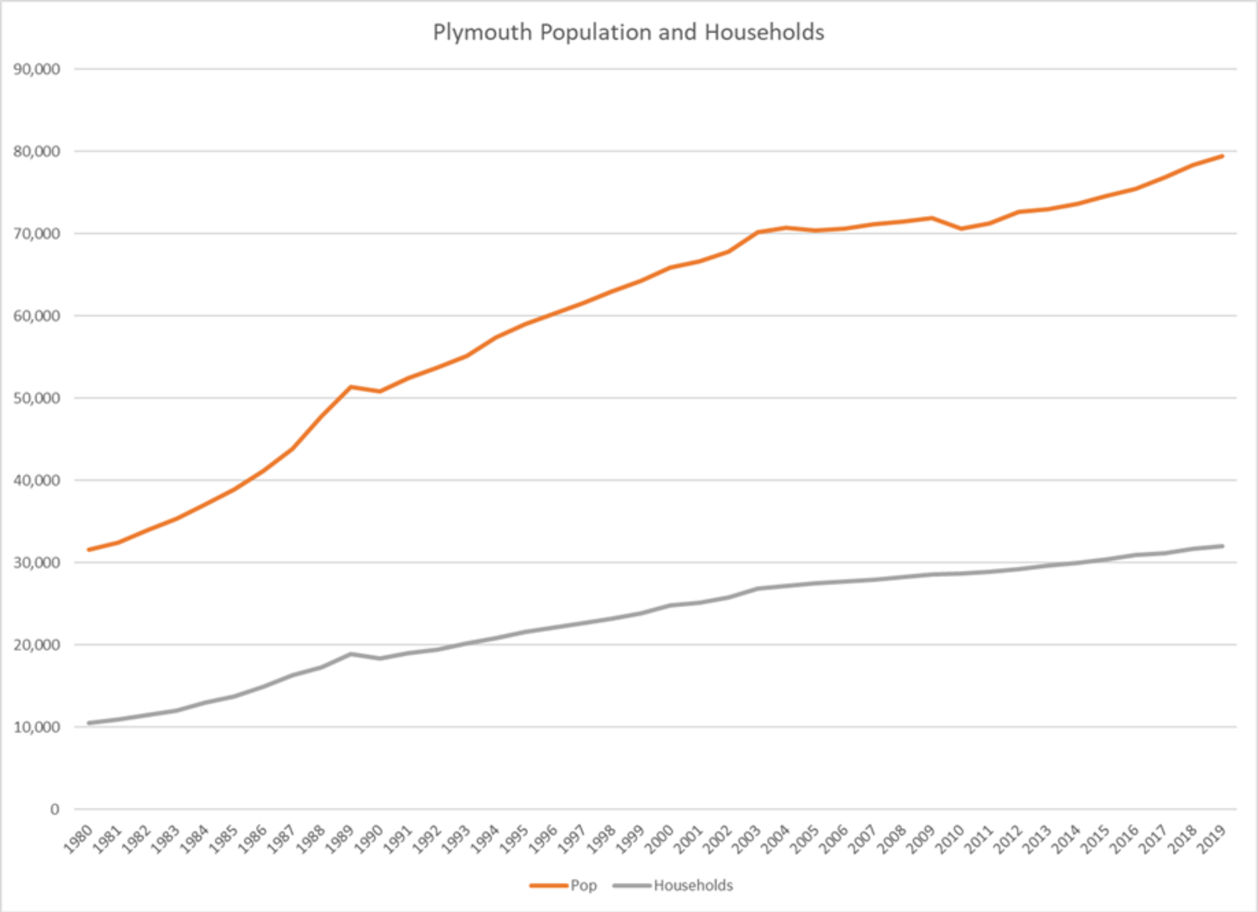
GPM – Gallons per Minute MGD – Million Gallons per Day

Plymouth Municipal Water Use

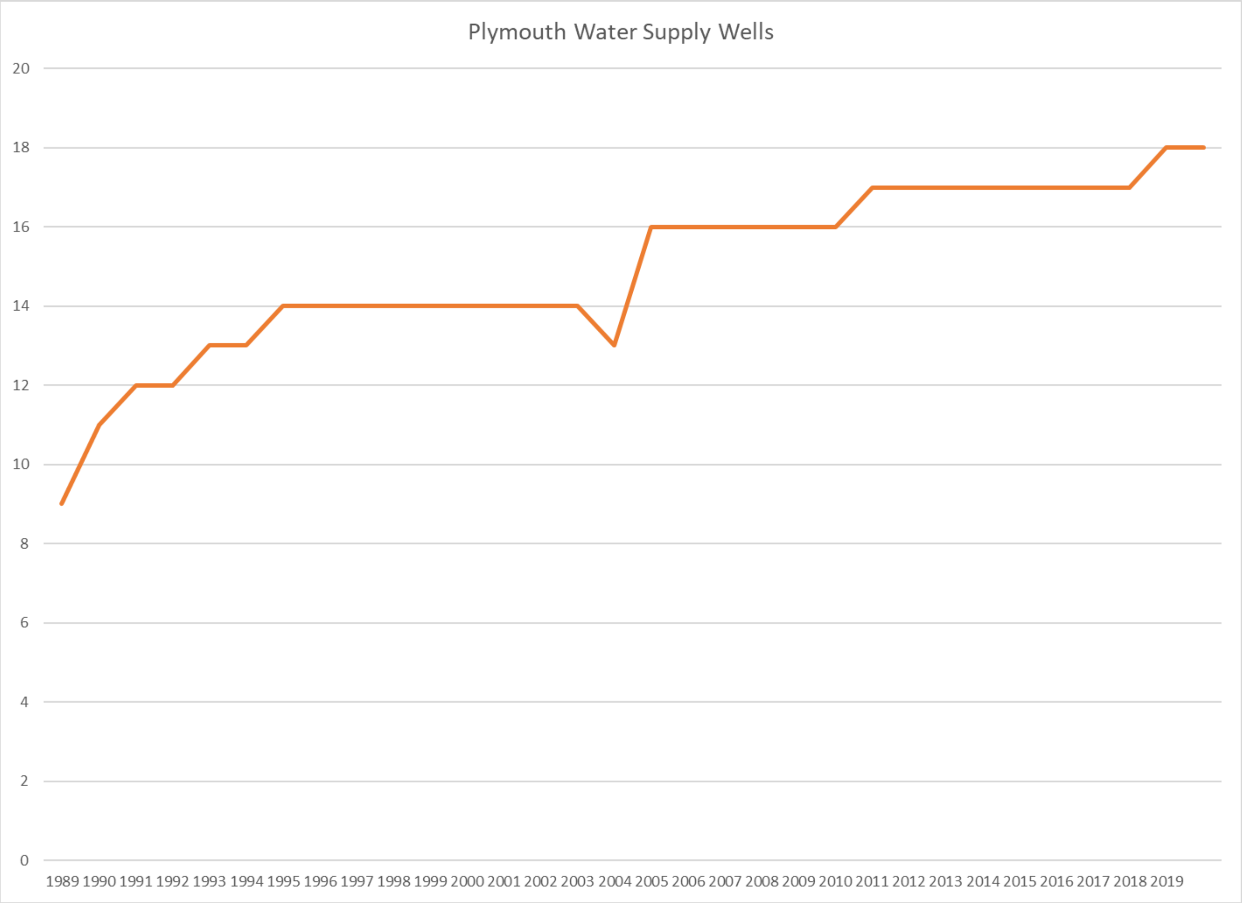


Plymouth Large Water Users

Customer	Use Category (Residential, Industrial, Commercial, Institutional, Wholesale)	Amount Used (Gallons per Year)	Percent of Total Annual Water Delivered	Implementing Water Conservation Measures? (Yes/No/Unknown)
1. MEDIVATORS	INDUSTRIAL	496,854,609	18.1	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
2. WAYZATA	INSTITUTIONAL	94,597,394	3.5	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
3. AACRON	INDUSTRIAL	92,638,060	3.4	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
4. HONEYWELL	INDUSTRIAL	58,766,420	2.1	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
5. AGA MEDICAL	COMMERCIAL	33,973,352	1.2	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
6. REGENCY PLYMOUTH VENTURES	COMMERCIAL	30,863,081	1.1	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
7. LIFETIME FITNESS	COMMERCIAL	28,905,415	1.1	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
8. WAGNER SPRAY TECH	INDUSTRIAL	19,672,505	0.7	YES TIERED BILLING, RESTRICTIONS, EDUCATION
9. BOSTON SCIENTIFIC	INDUSTRIAL	19,429,837	0.7	YES, TIERED BILLING, RESTRICTIONS, EDUCATION
10. HENNEPIN COUNTY	INSTITUTIONAL	11,608,043	0.4	YES, TIERED BILLING, RESTRICTIONS, EDUCATION

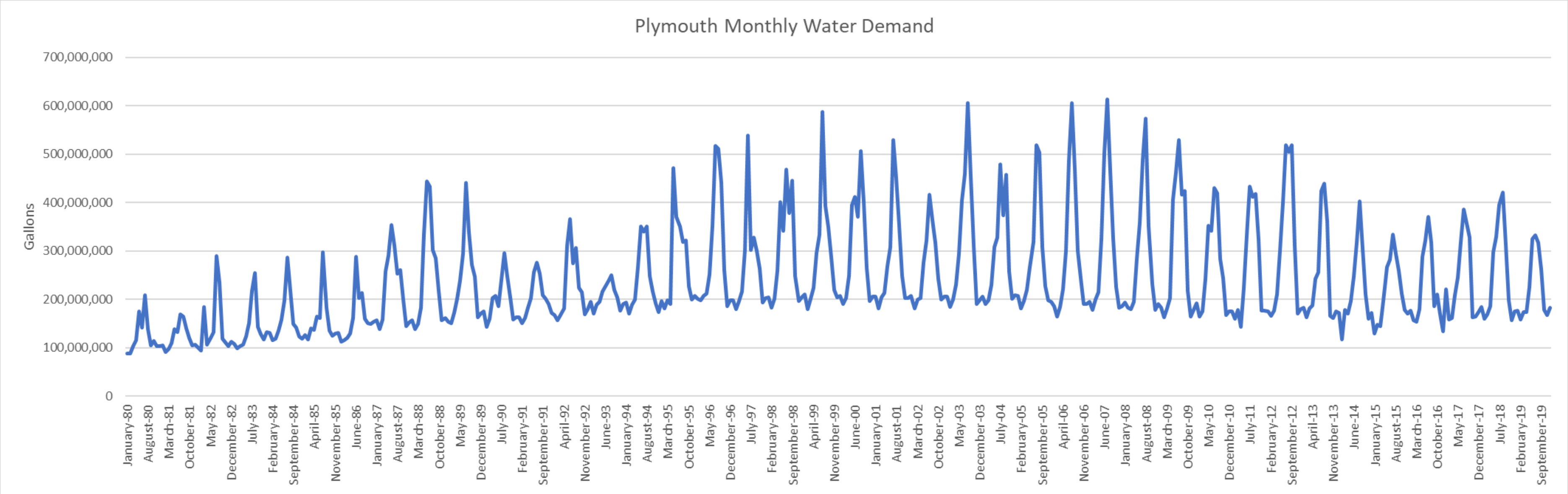


Plymouth Population and Households
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Pop
Households



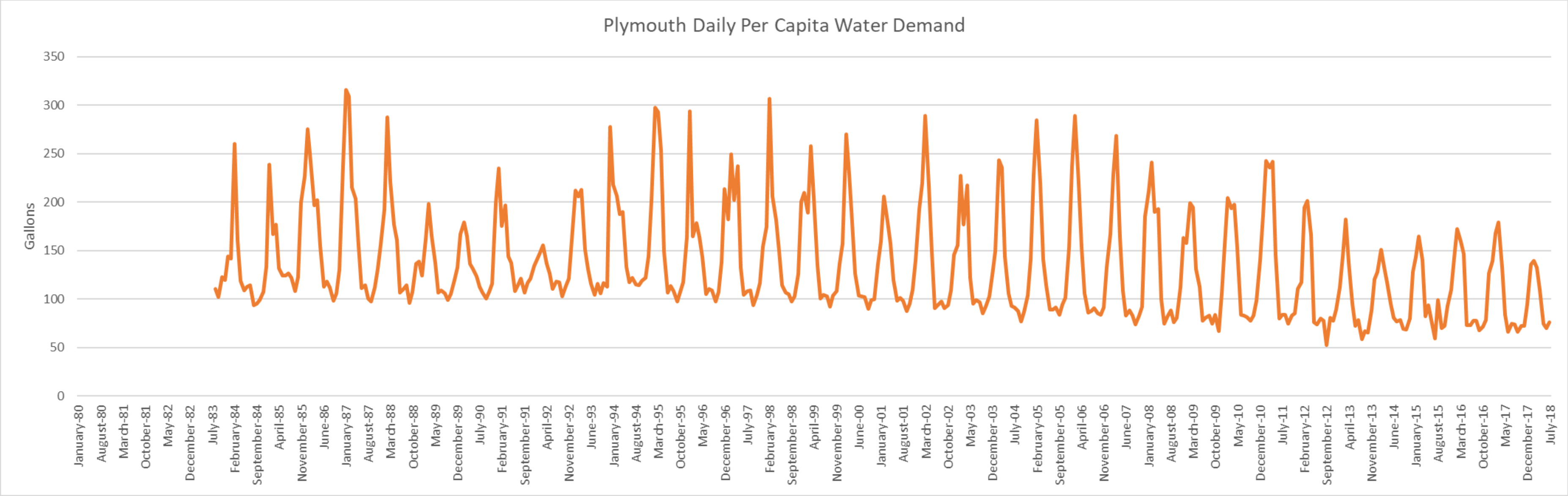
Plymouth Water Supply Wells
20
18
16
14
12
10
8
6
4
2
0
1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

Plymouth



Plymouth Monthly Water Demand
Gallons
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
0
January-80
August-80
March-81
October-81
May-82
December-82
July-83
February-84
September-84
April-85
November-85
June-86
January-87
August-87
March-88
October-88
May-89
December-89
July-90
February-91
September-91
April-92
November-92
June-93
January-94
August-94
March-95
October-95
May-96
December-96
July-97
February-98
September-98
April-99
November-99
June-00
January-01
August-01
March-02
October-02
May-03
December-03
July-04
February-05
September-05
April-06
November-06
June-07
January-08
August-08
March-09
October-09
May-10
December-10
July-11
February-12
September-12
April-13
November-13
June-14
January-15
August-15
March-16
October-16
May-17
December-17
July-18
February-19
September-19

Plymouth


Plymouth Daily Per Capita Water Demand
Gallons
350
300
250
200
150
100
50
0
January-80
August-80
March-81
October-81
May-82
December-82
July-83
February-84
September-84
April-85
November-85
June-86
January-87
August-87
March-88
October-88
May-89
December-89
July-90
February-91
September-91
April-92
November-92
June-93
January-94
August-94
March-95
October-95
May-96
December-96
July-97
February-98
September-98
April-99
November-99
June-00
January-01
August-01
March-02
October-02
May-03
December-03
July-04
February-05
September-05
April-06
November-06
June-07
January-08
August-08
March-09
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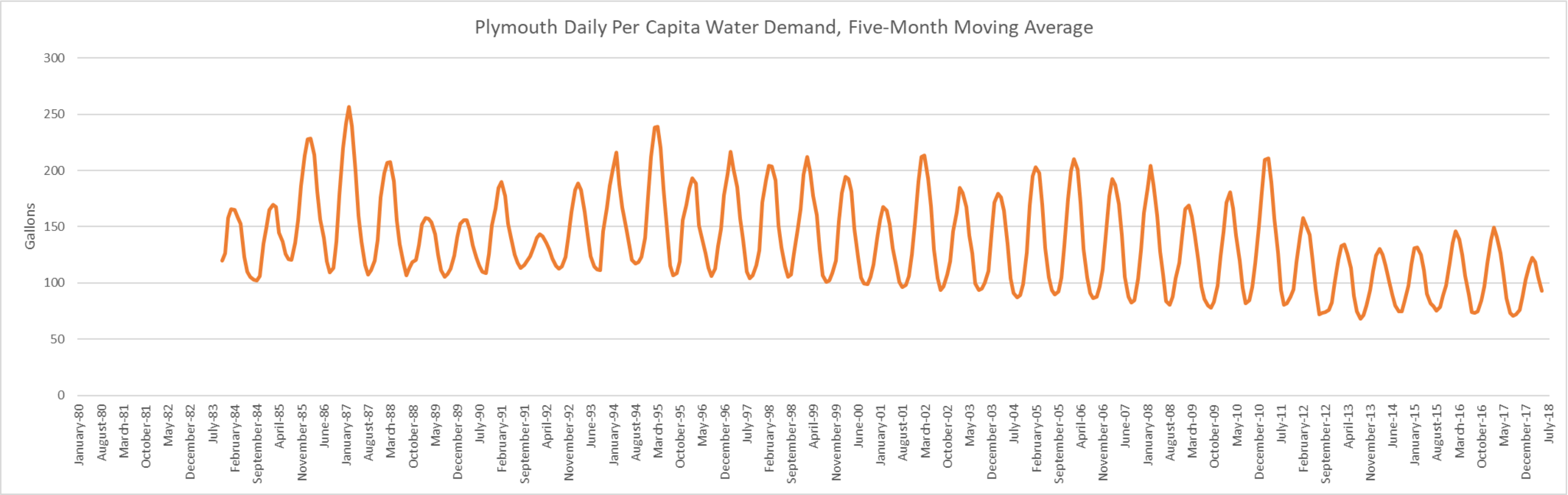
May-10
December-10
July-11
February-12
September-12
April-13
November-13
June-14
January-15
August-15
March-16
October-16
May-17
December-17
July-18

Plymouth



Plymouth Daily Per Capita Water Demand, Five-Month Moving Average
Gallons
300
250
200
150
100
50
0
January-80
August-80
March-81
October-81
May-82
December-82
July-83
February-84
September-84
April-85
November-85
June-86
January-87
August-87
March-88
October-88
May-89
December-89
July-90
February-91
September-91
April-92
November-92
June-93
January-94
August-94
March-95
October-95
May-96
December-96
July-97
February-98
September-98
April-99
November-99
June-00
January-01
August-01
March-02
October-02
May-03
December-03
July-04
February-05
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December-10
July-11
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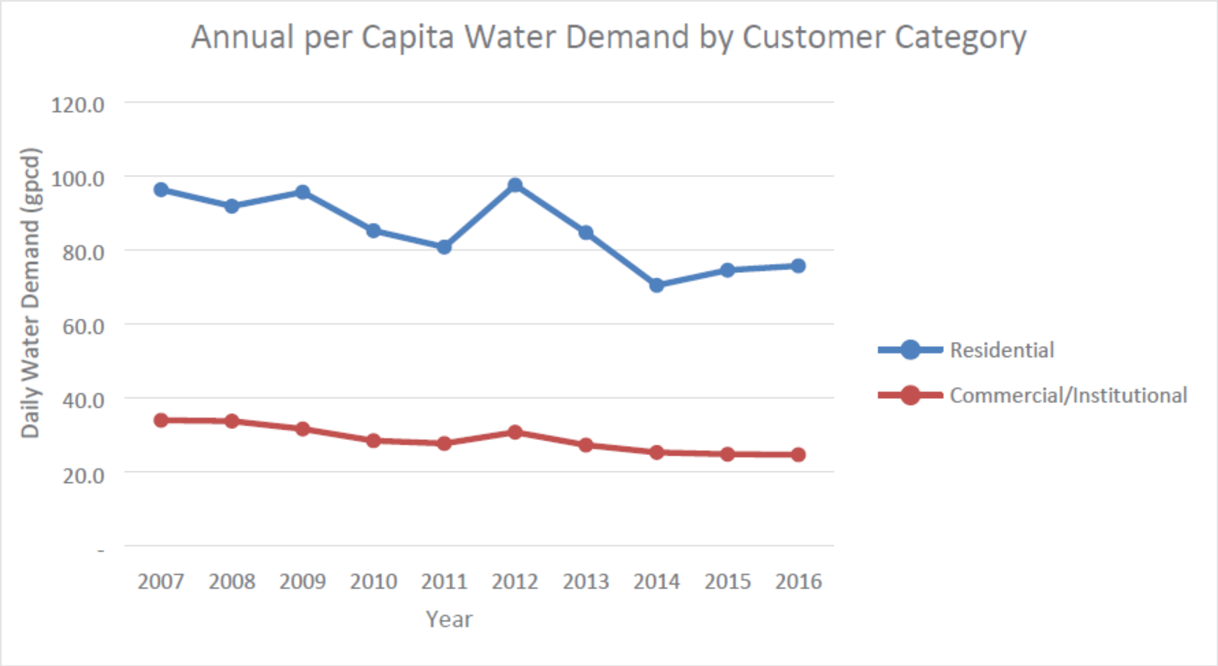
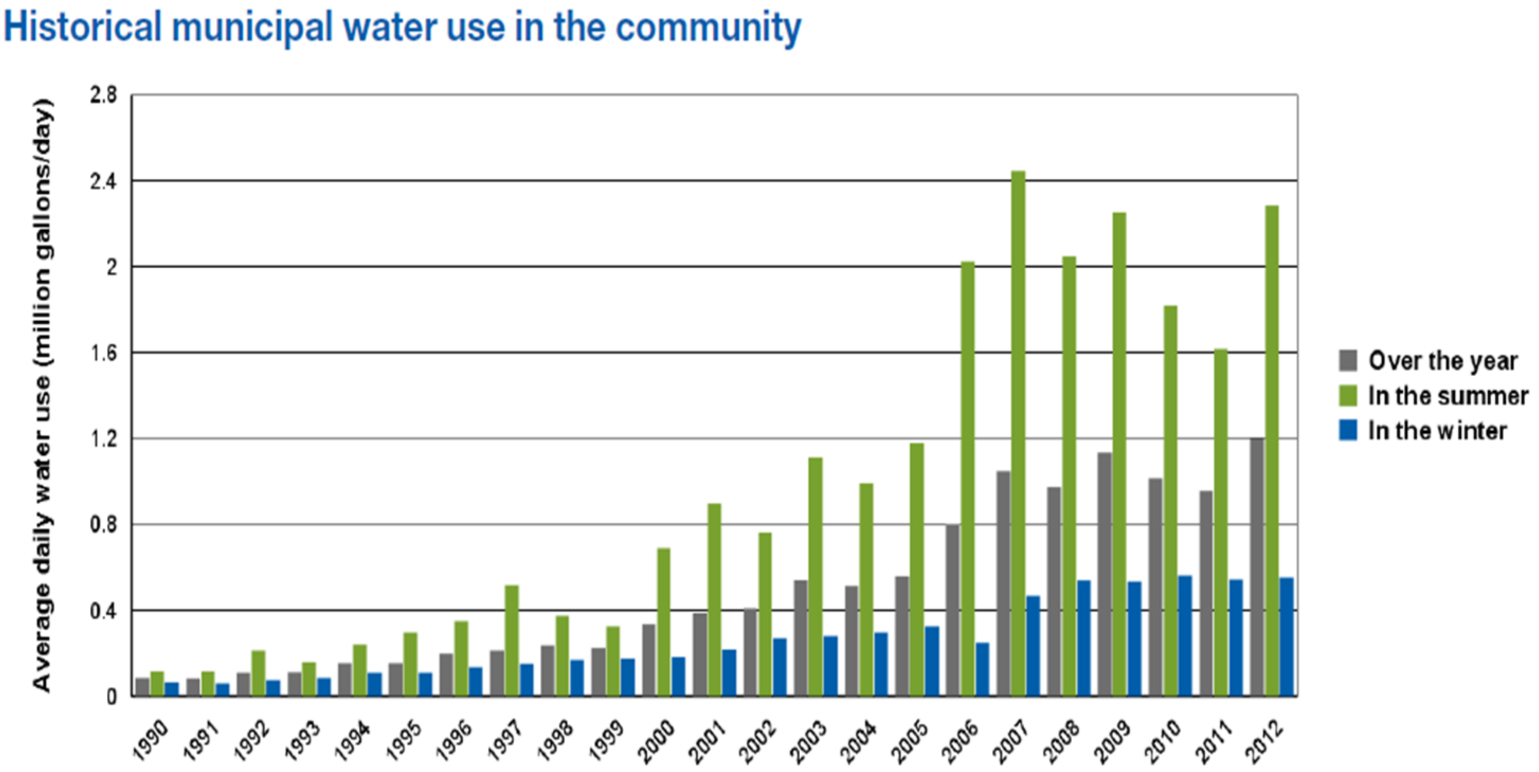
March-16
October-16
May-17
December-17
July-18

Plymouth



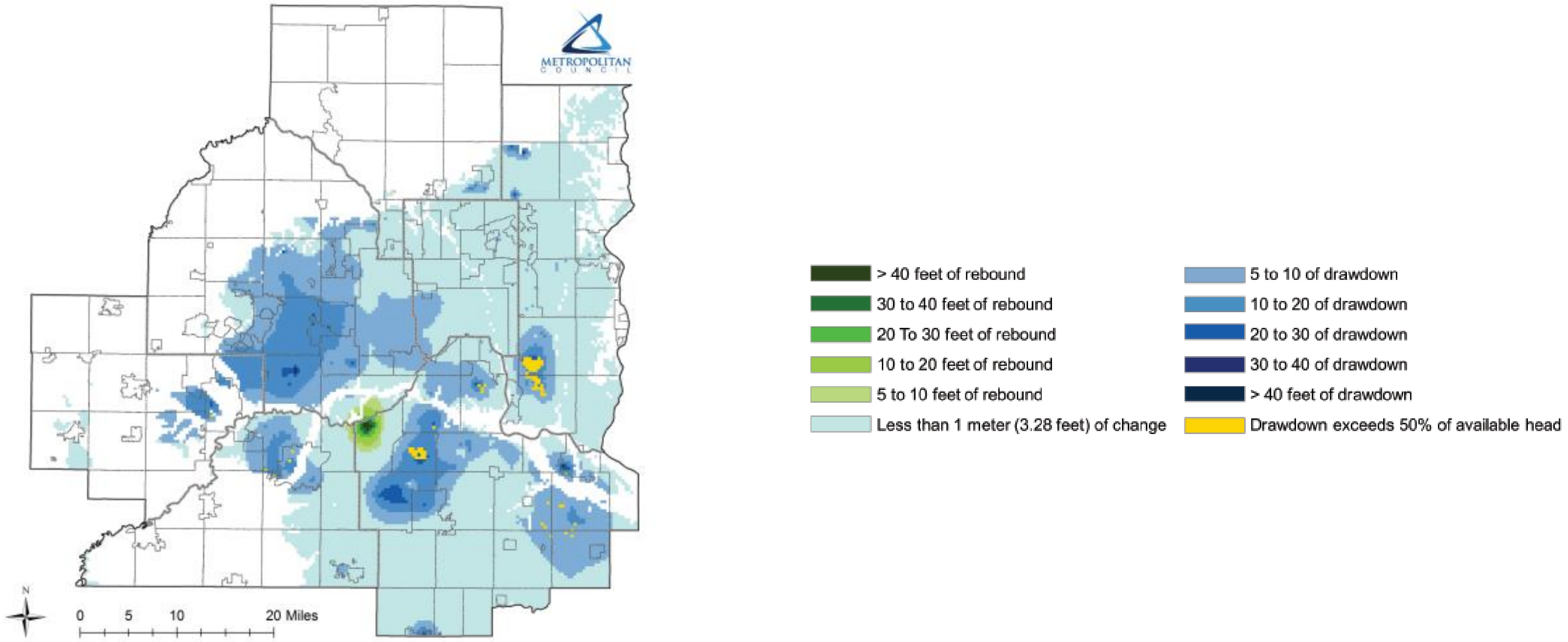
Annual per Capita Water Demand by Customer Category
Daily Water Demand (gpcd)
120.0
100.0
80.0
60.0
40.0
20.0
-
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
Residential
Commercial/Institutional

Summer Peaking Factors



Prairie du Chien - Jordan Aquifer

A) Drawdown in the Prairie du Chein-Jordan aquifer under average projected pumping.



Invention is the Mother of Necessity

http://www.municipalwellandpump.com/welldrilling.cfm

Toro

Old Technology Meets Artificial Scarcity

Rachio

The Grass is Not This Thirsty

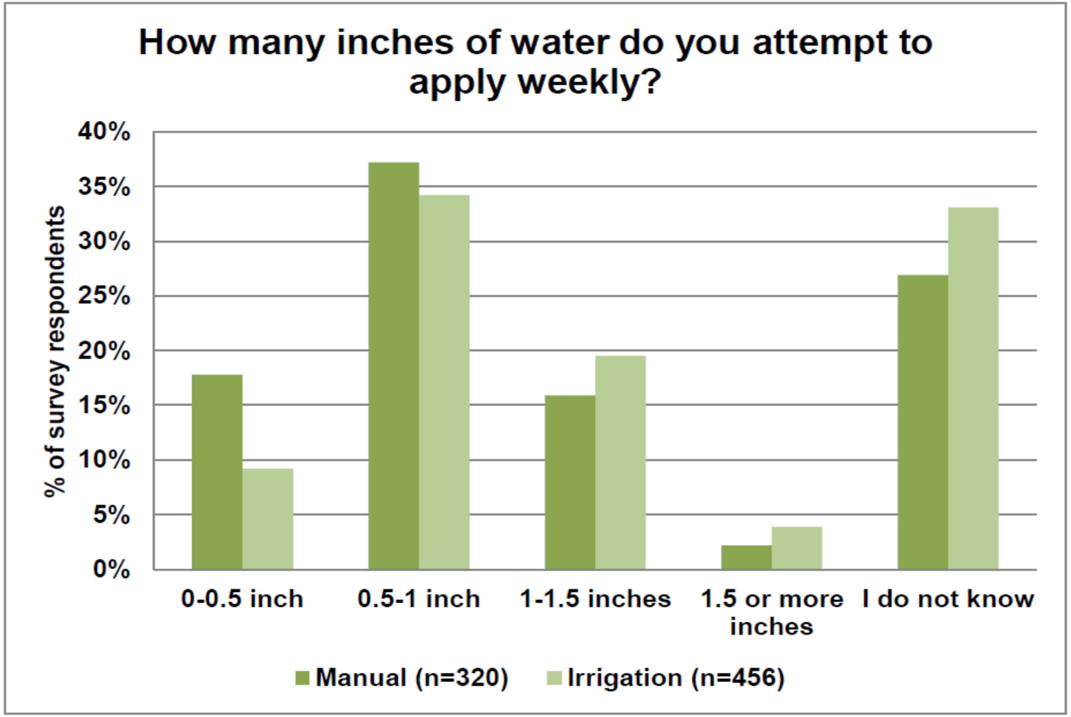
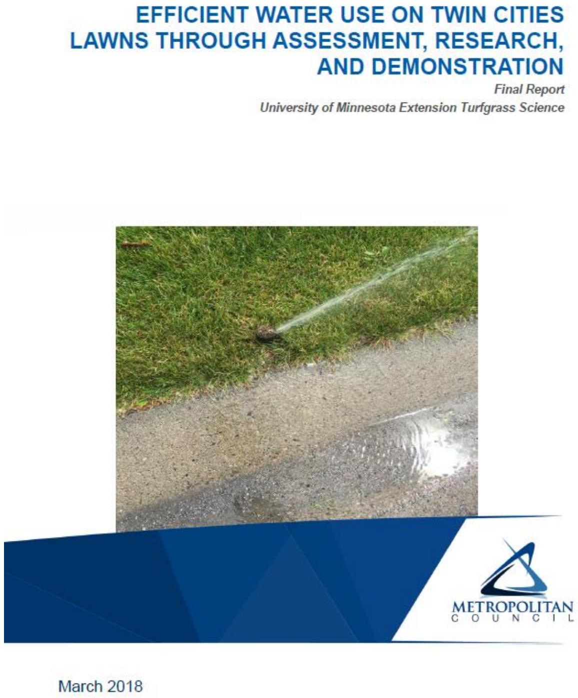


Figure 12: Inches of water applied on a weekly basis



https://metrocouncil.org/Wastewater-Water/Publications-And-Resources/WATER-SUPPLY-PLANNING/Twin-Cities-Lawn-Irrigation-System-Surveys-And-Ass.aspx

The Leakiest Appliance at Your House!

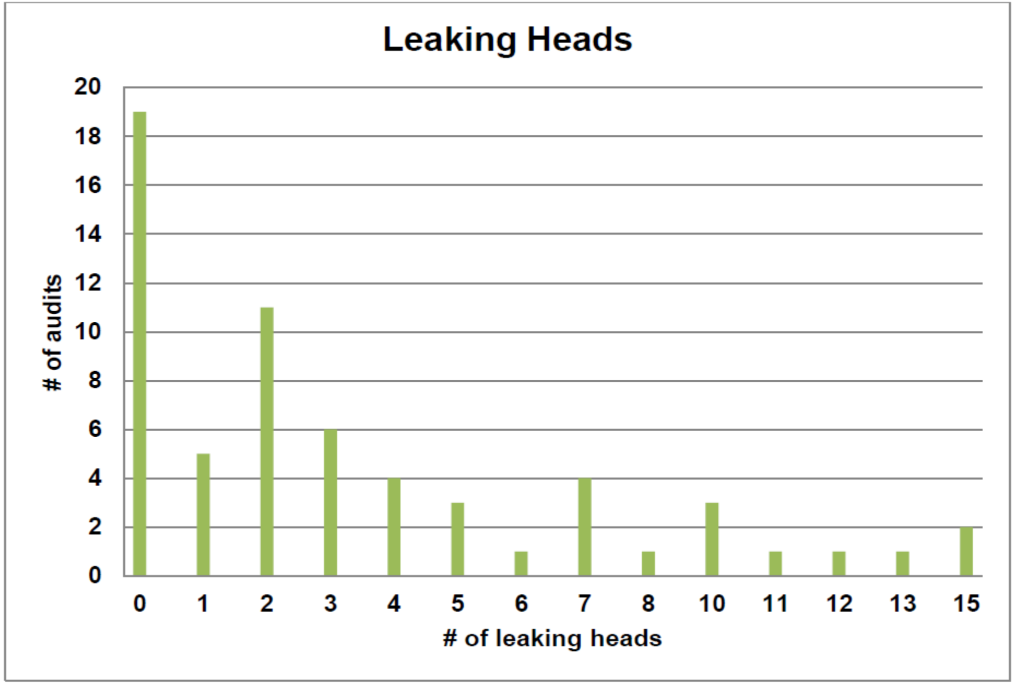


Figure 31: Distribution of leaking heads

Lawns & Irrigation

- **Outdoor water use is visible to public**
  - Irrigation during rain
  - Irrigation runoff onto impervious surfaces
  - Broken sprinkler heads & nozzles



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LOCAL

Turf war: Overwatering our lawns is sucking up our water supply

Researchers are looking at changes because current water use rates mean aquifer levels in some areas could drop more than 40 feet by 2040, according to Met Council estimates.

By Hannah Covington Star Tribune | AUGUST 21, 2016 — 12:15PM

ELIZABETH FLORES

Jonah Reyes, a research scientist at the University of Minnesota, placed cups on a resident's lawn in Rosemount to measure water from the irrigation system.

Getting her first $300 water bill was all it took for Hollie Jones to yank the plug on her automatic sprinkler system.

"It blew me away," said Jones, who was new to yard upkeep when she moved into her Brooklyn Park home four years ago. "I was wasting tons of water and turning my yard into a jungle."

For Jones, the decision to start running her sprinkler system on an as-needed basis made financial sense, but scientists say this kind of tweak in lawn care could yield crucial benefits in water conservation. During the summer months, water use in the metro area surges, in some places tripling compared with the amount of water pulled from rivers and aquifers in the winter. And that seasonal gap is widening.

Researchers from the Metropolitan Council and the University of Minnesota Extension suspect bad watering habits are largely to blame. So they've been

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STATE + LOCAL

Overwatering lawns — and pavement — is the norm in the Twin Cities

A survey of 1,000 homeowners shows thirsty turf is sucking down the metro's water. On average, residents watered 500 square feet of pavement.

By Josephine Marcotty Star Tribune | OCTOBER 3, 2017 — 10:32AM

JERRY HOLT – STAR TRIBUNE

Sam Bauer, who studies lawns and grasses checked a water meter while working in the experimental growing fields at the UMN St. Paul campus Monday October 2,2017 in St. Paul, MN.

Most homeowners overwater their lawns — to say nothing of their pavement — and have a love affair with a type of grass that doesn't really belong in Minnesota.

That's the wrap-up from a survey of 1,000 Twin Cities residents conducted in an effort to reduce the pointless lawn watering that is draining the metro area's aquifers and was one of the major issues behind a legal battle over shrinking White Bear Lake.

Conducted by University of Minnesota researchers and the Metropolitan Council, the survey found that more than half of homeowners leave their sprinkling systems on the automatic cycle. That means their lawns get watered whether they need it or not.

Three-fourths of the systems had at least one leaking sprinkler head.

On average, residents watered 500 square feet of pavement — which doesn't need it and increases runoff and water pollution.

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EDITORIAL

Sprinkling sidewalks: Hey, watch where you're pointing those things

Think of the waste. Think of pedestrians.

By Editorial Board Star Tribune | JULY 12, 2019 — 6:15PM

As Twin Cities residents who variously walk, bike, drive, and ride transit, members of the Star Tribune Editorial Board are sometimes amused, sometimes alarmed by the factions that arise in support of favored activities. We think it takes all these things to make a metro, although occasional adverse experiences with each allow us to understand how tensions originate.

Into this simmering stew we'd like to add our own flavor of peevishness — a complaint against homeowners who heedlessly water sidewalks and streets along with their lawns. Such behavior wastes a resource and, depending on the spray, antagonizes pedestrians, forcing them either to test their agility or navigate a dry perimeter, perhaps one less protected from traffic.

We do appreciate people who take care of their properties — this also makes communities desirable. We're not about to tell anyone to give up their Kentucky bluegrass, though we'd note that a lush carpet is not the only pleasing kind of lawn and that making some of it less water-intensive is worth a thought.

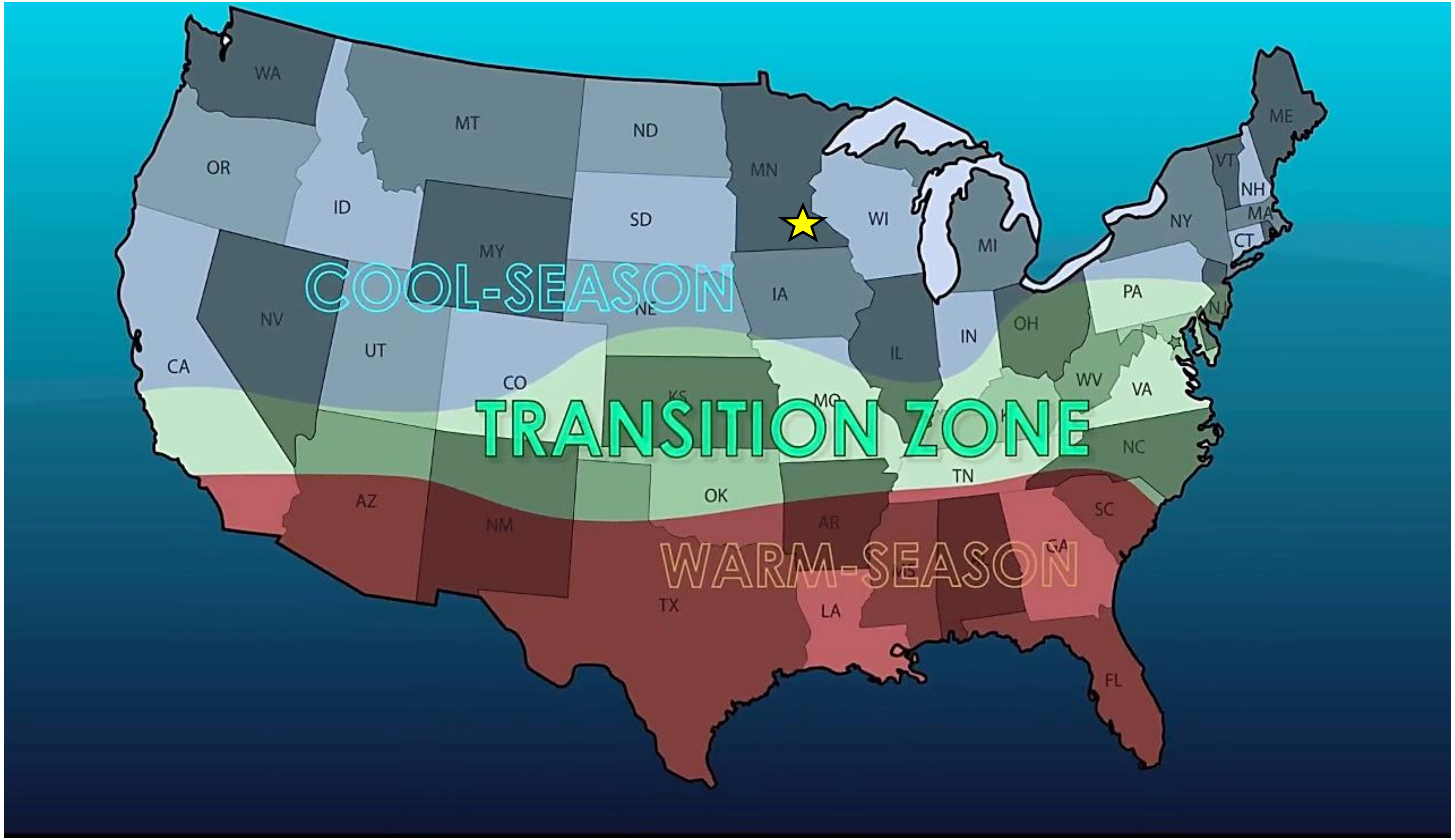
But, again, the pavement. It's been estimated that half the irrigation used on landscapes is ineffective. To that we'd add (without even getting into the issue of runoff) that any water trained on a nonporous surface is woefully deployed unless you're hoping one day to grow moss.

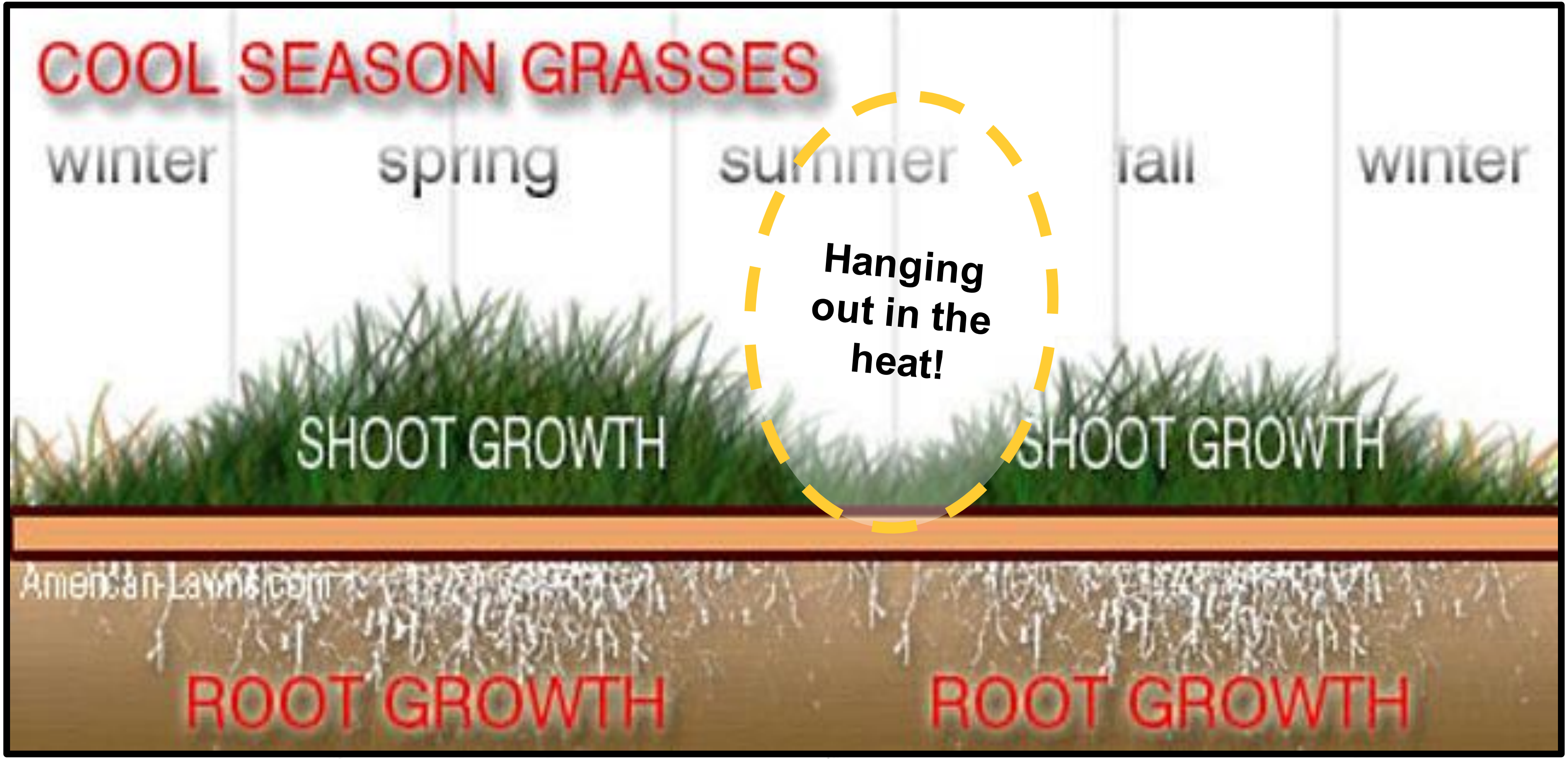
The water supply may not seem like much of a problem in our region just now. In recent months, an abundance has fallen from the sky, with consequences including flooding and delayed planting. In general, though, we're lucky to live in an area that dependably turns green in the springtime and presents only occasional, terminable droughts. But much of the world suffers more tenuous patterns of replenishment. In India, the metropolitan area around Chennai, home to 9 million people, has been watching wells run dry. In California, a multiyear drought contributed to wildfires that killed more than 100 people last fall. (If you have concerns about how human behavior might alter our own aquatic bounty, you may mentally add them here.)

So watch where you point that water. Also, it wouldn't be wrong to be aware of bicyclists and pedestrians when you drive, follow expectations no matter your mode of movement, make eye contact at intersections, and always clean your plate.

Effective Water Efficiency in Lawns

- ✓ **Proper turfgrass species** selection and using drought-resistant varieties
- ✓ **Smart Irrigation practices**: annually auditing sprinkler systems and using new technologies to increase water efficiency
- ✓ **Correctly following cultural practices**: mowing, fertilization, cultivation, pest management


COOL-SEASON
TRANSITION ZONE
WARM-SEASON
WA
OR
CA
ID
NV
MT
MY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MI
IN
OH
TN
PA
WV
VA
NC
SC
GA
FL
NY
VT
NH
ME
MA
CT

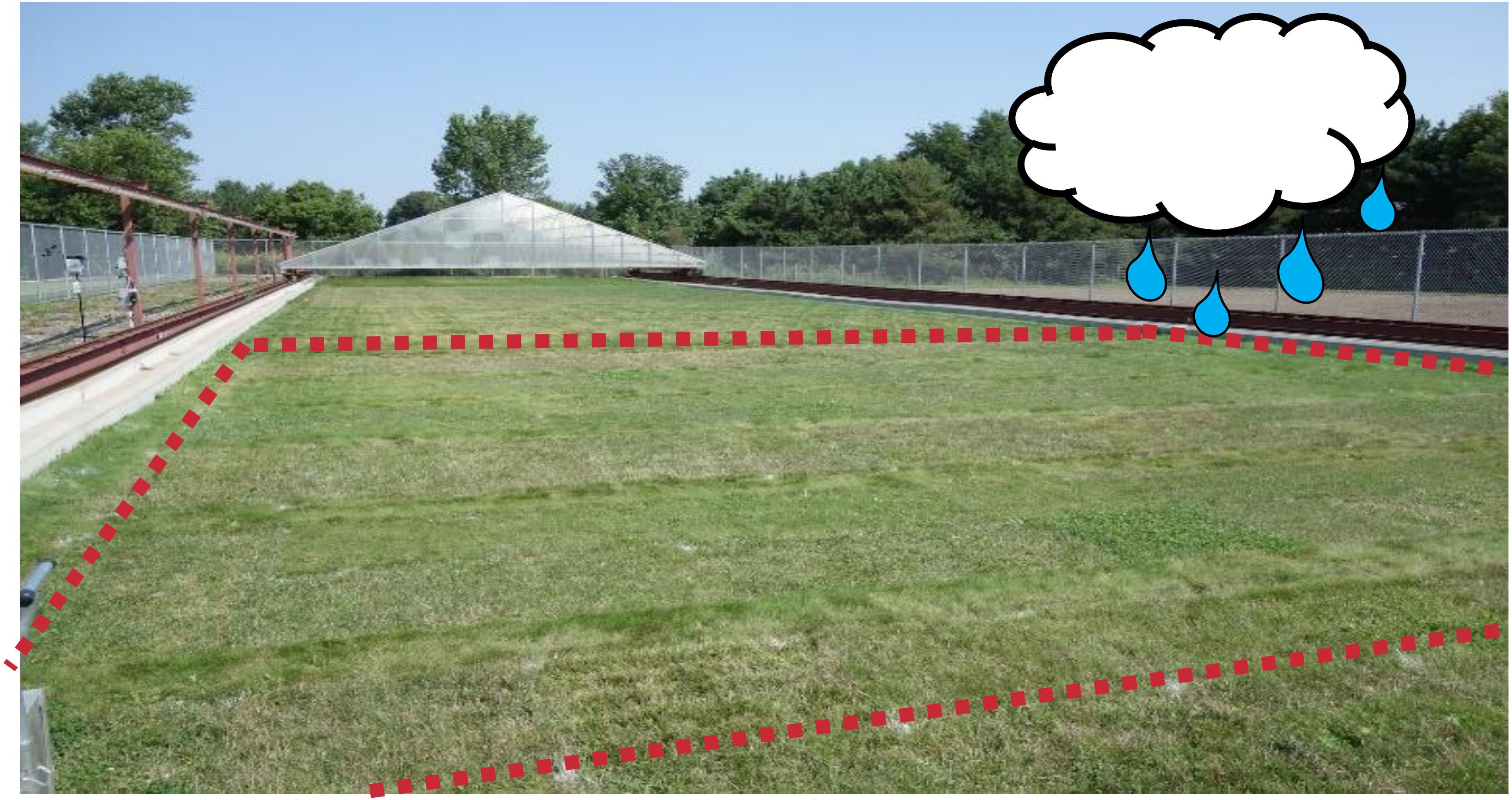

COOL SEASON GRASSES
winter
spring
summer
fall
winter
Hanging out in the heat!
SHOOT GROWTH
SHOOT GROWTH
AmericanLawns.com
ROOT GROWTH
ROOT GROWTH

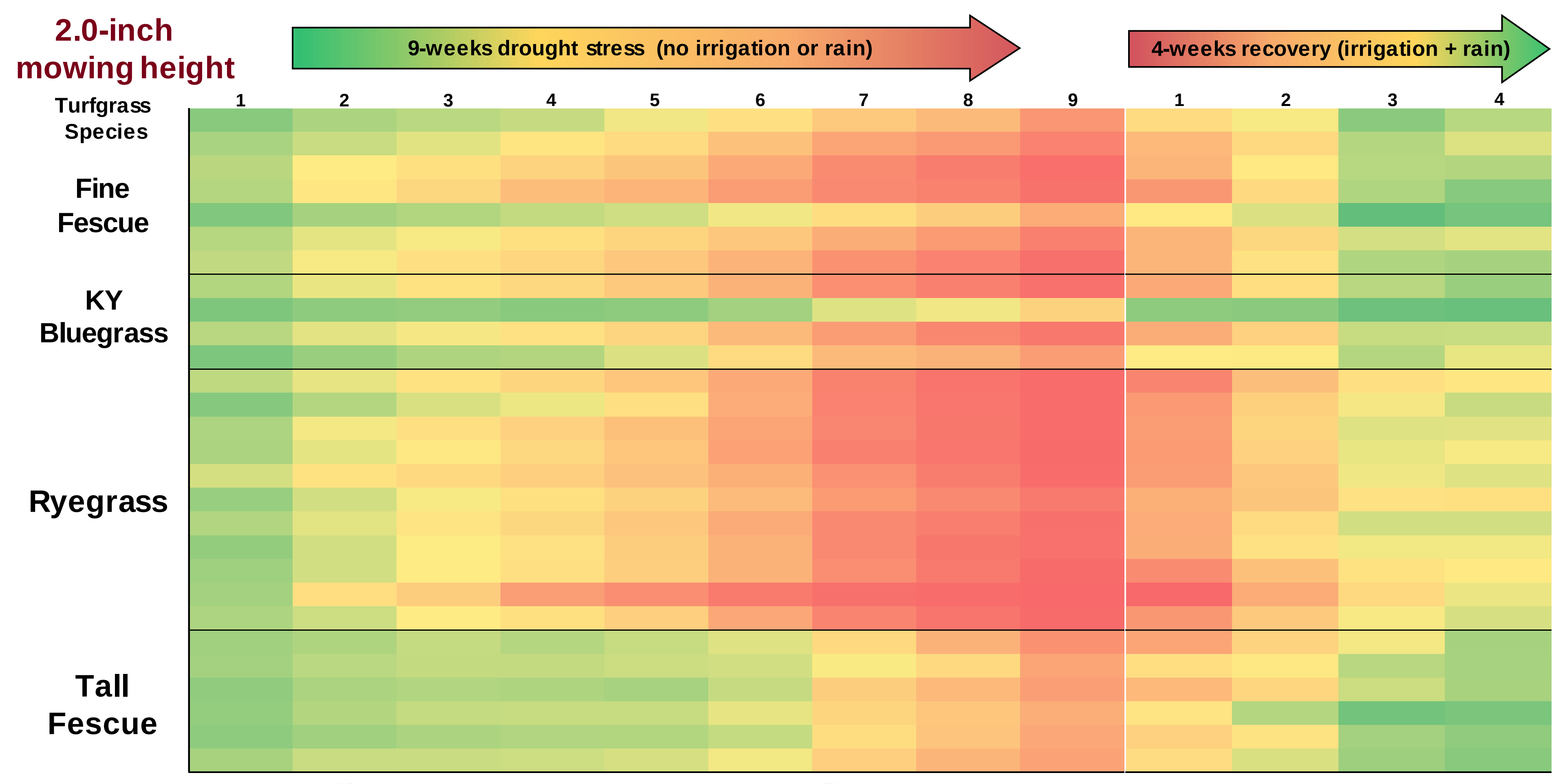
Cool Season Turfgrasses for Minnesota Lawns

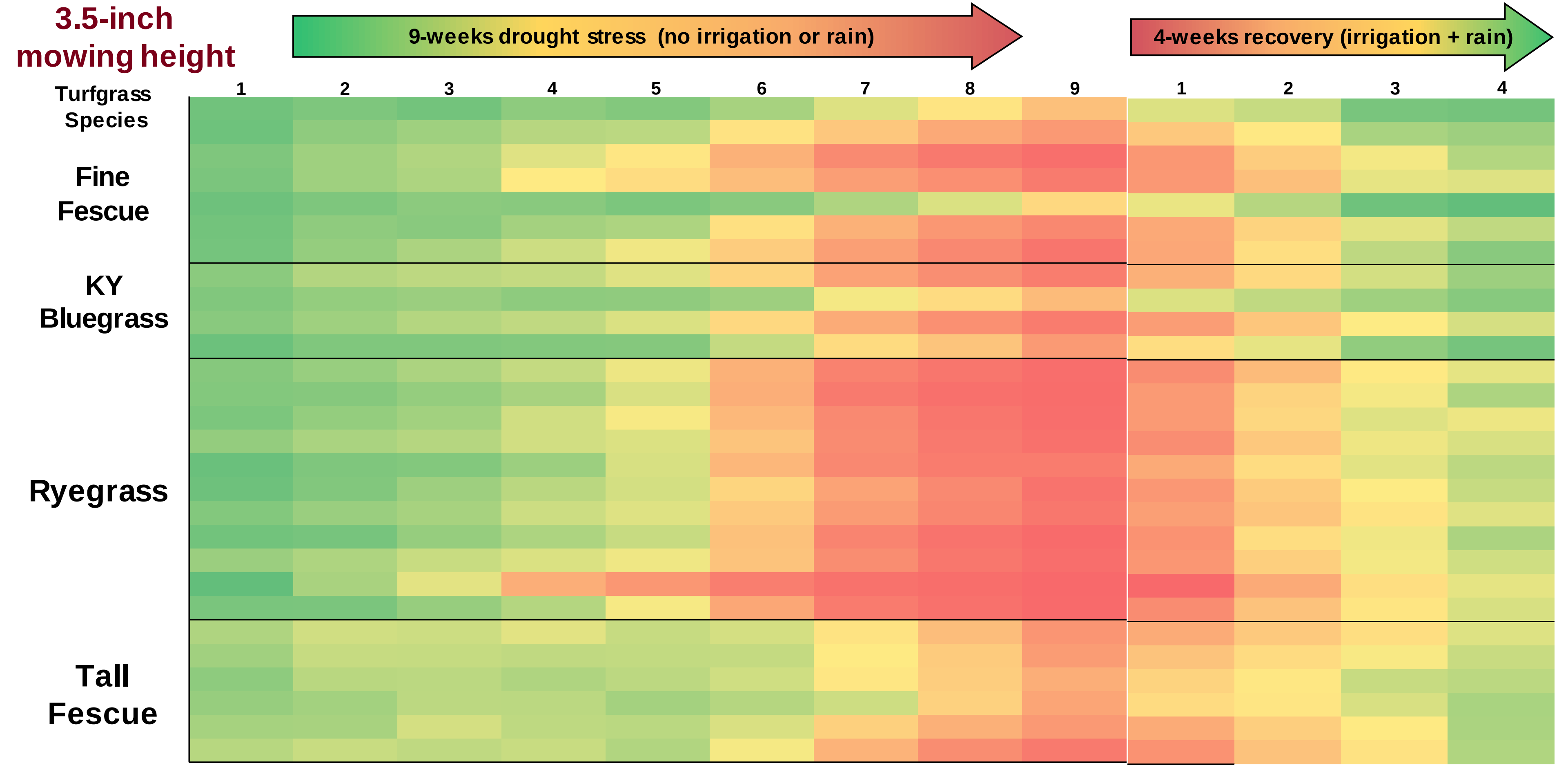
- **Perennial ryegrass**: great for quick establishment
- **Kentucky bluegrass:** traditionally-used MN lawn turf; requires routine mowing and seasonal irrigation and fertilizing

---

- **Tall fescue:** very drought and shade-tolerant, also high wear tolerance, lower maintenance required compared to bluegrass
- **Fine fescues**: very low-maintenance, drought and shade tolerant, very little mowing and fertilizer required




2.0-inch mowing height
9-weeks drought stress (no irrigation or rain)
4-weeks recovery (irrigation + rain)
Turfgrass Species
1
2
3
4
5
6
7
8
9
1
2
3
4
Fine Fescue
KY Bluegrass
Ryegrass
Tall Fescue


3.5-inch mowing height
9-weeks drought stress (no irrigation or rain)
4-weeks recovery (irrigation + rain)
Turfgrass Species
1
2
3
4
5
6
7
8
9
1
2
3
4
Fine Fescue
KY Bluegrass
Ryegrass
Tall Fescue

Consumer-Available Turfgrass Mixtures under Drought Stress and during Recovery

Perennial ryegrass dominant mixture

14 DAI **60 DAI** **28 DAR**

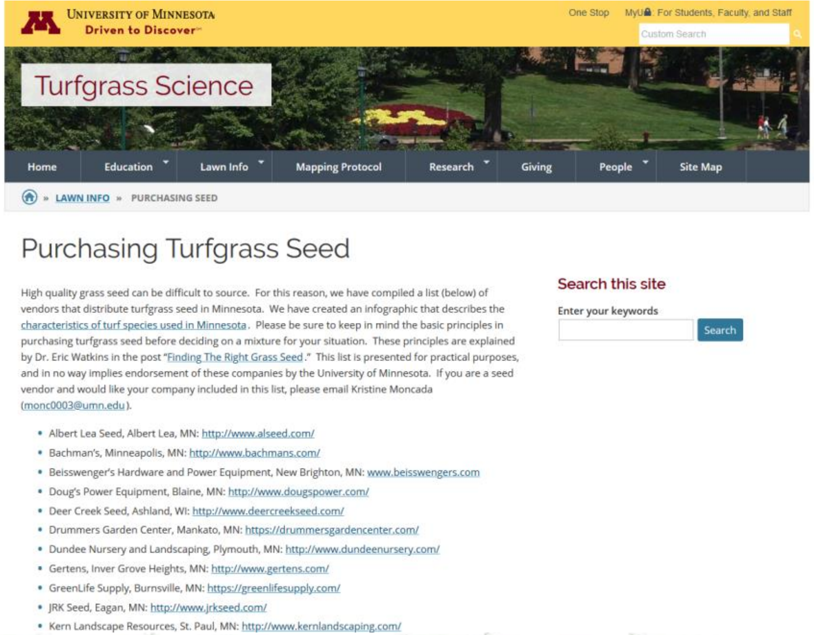
Tall Fescue dominant mixture

14 DAI **60 DAI** **28 DAR**

Days after drought initiation **(DAI)**
Days after recovery from drought **(DAR)**

Find the Right Turfgrass Seed

- https://turf.umn.edu/lawn-info/purchasing-turfgrass-seed



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Custom Search

Turfgrass Science

Home | Education | Lawn Info | Mapping Protocol | Research | Giving | People | Site Map

» LAWN INFO » PURCHASING SEED

Purchasing Turfgrass Seed

High quality grass seed can be difficult to source. For this reason, we have compiled a list (below) of vendors that distribute turfgrass seed in Minnesota. We have created an infographic that describes the characteristics of turf species used in Minnesota. Please be sure to keep in mind the basic principles in purchasing turfgrass seed before deciding on a mixture for your situation. These principles are explained by Dr. Eric Watkins in the post "Finding The Right Grass Seed." This list is presented for practical purposes, and in no way implies endorsement of these companies by the University of Minnesota. If you are a seed vendor and would like your company included in this list, please email Kristine Moncada (monc0003@umn.edu).

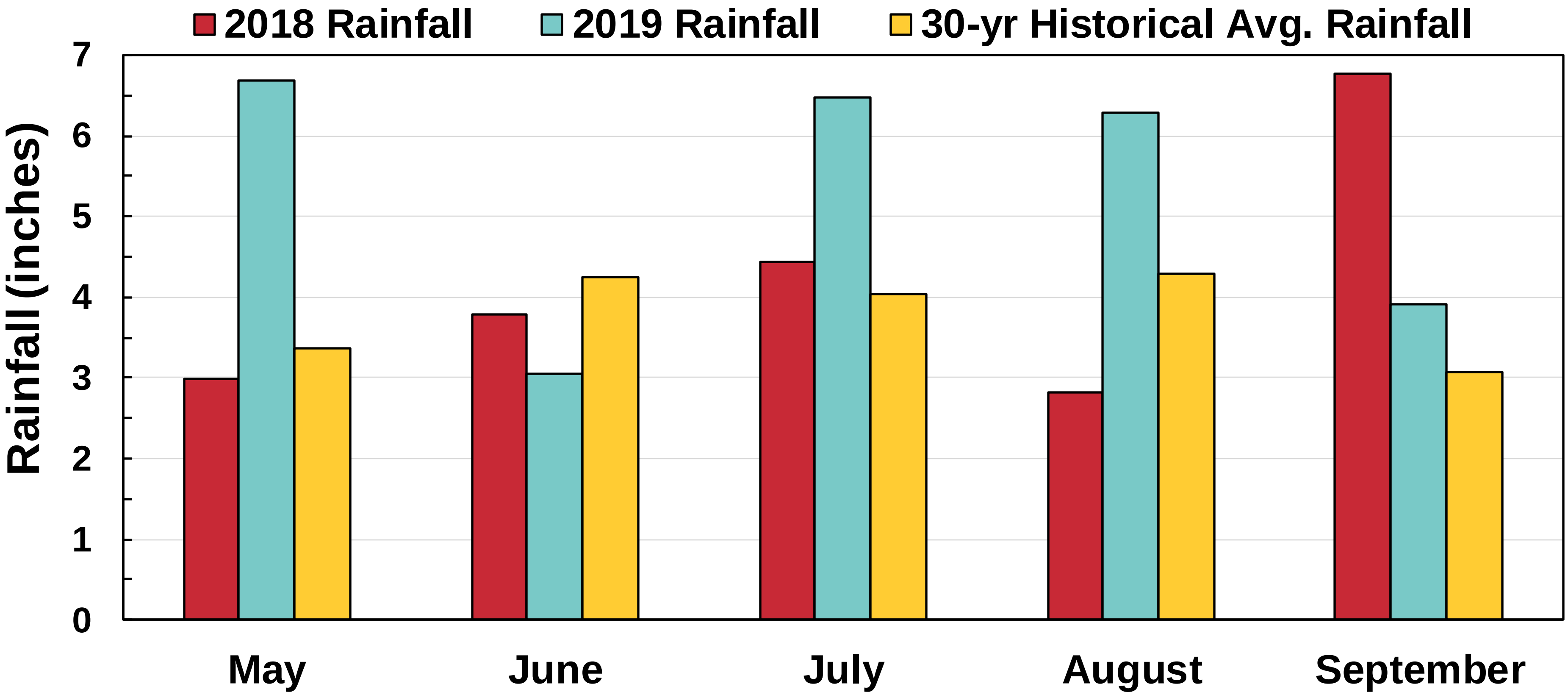
- Albert Lea Seed, Albert Lea, MN: http://www.alseed.com/
- Bachman's, Minneapolis, MN: http://www.bachmans.com/
- Beisswenger's Hardware and Power Equipment, New Brighton, MN: www.beisswengers.com
- Doug's Power Equipment, Blaine, MN: http://www.dougspower.com/
- Deer Creek Seed, Ashland, WI: http://www.deercreekseed.com/
- Drummers Garden Center, Mankato, MN: https://drummersgardencenter.com/
- Dundee Nursery and Landscaping, Plymouth, MN: http://www.dundeenursery.com/
- Gertens, Inver Grove Heights, MN: http://www.gertens.com/
- GreenLife Supply, Burnsville, MN: https://greenlifesupply.com/
- JRK Seed, Eagan, MN: http://www.jrkseed.com/
- Kern Landscape Resources, St. Paul, MN: http://www.kernlandscaping.com/

Search this site

Enter your keywords

Search

Irrigation: Want, or Need?



Source: GHCND:USW00014922; https://www.ncdc.noaa.gov/cdo-web/datatools/normals


21 August 2018


04 September 2018

Conduct an Irrigation Audit Annually





Technology Required by Statute

https://www.revisor.mn.gov/statutes/cite/103G.298

Office of the Revisor of Statutes

Statutes | Laws | Rules | Court Rules | Constitution | Revisor's Office | Search Law by Keyword

2018 Minnesota Statutes > WATER > Chapter 103G > Section 103G.298

103G.297 | 103G.299

2018 Minnesota Statutes

Authenticate

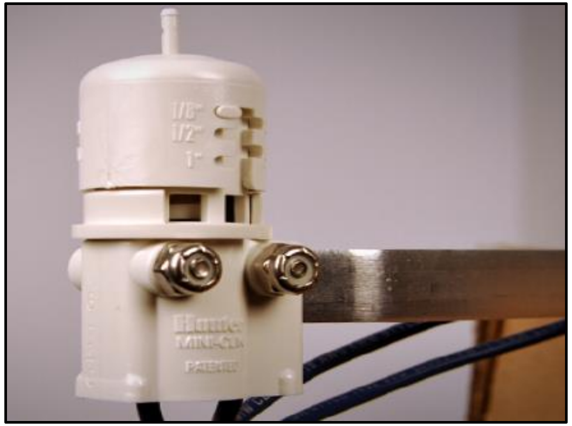
103G.298 LANDSCAPE IRRIGATION SYSTEMS.

All automatically operated landscape irrigation systems shall have furnished and installed technology that inhibits or interrupts operation of the landscape irrigation system during periods of sufficient moisture. The technology must be adjustable either by the end user or the professional practitioner of landscape irrigation services.

History: *2003 c 44 s 1*

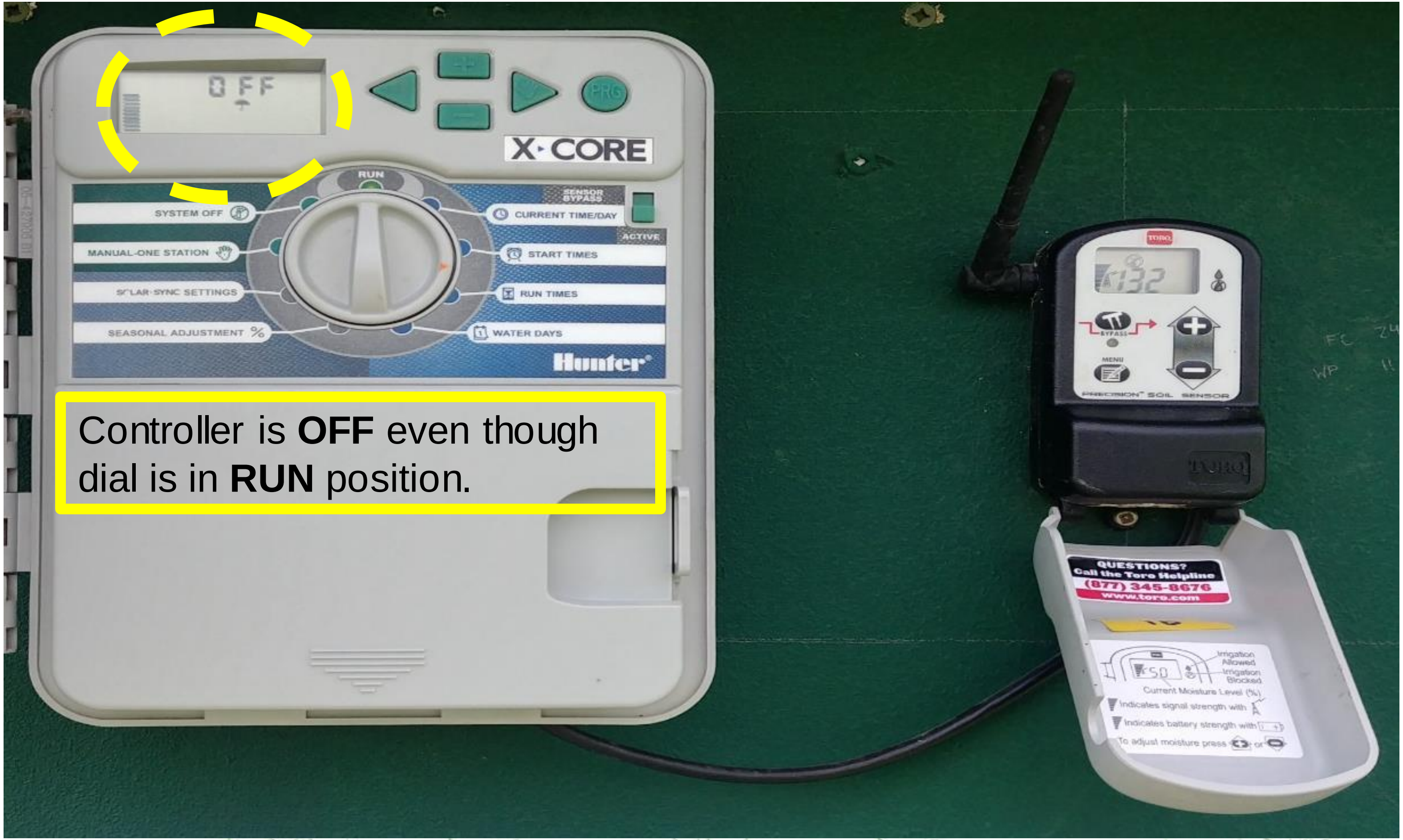
Rain Sensors

- Bypass irrigation using a rainfall threshold
- Hygroscopic cork discs swell upon wetting, triggering a signal to interrupt / inhibit irrigation
- Dry-out time of discs affects duration in which irrigation is bypassed
- $20 to $30



Soil Moisture Sensors

- Continuously monitor soil moisture
  - Bypass scheduled irrigation programs if plenty of water in turfgrass rootzone.
- Prevents watering when soil moisture is above a default-calibrated or user-adjustable moisture threshold
- $120 to $160


OFF
X-CORE
RUN
SYSTEM OFF
MANUAL-ONE STATION
SEASONAL ADJUSTMENT %
SENSOR BYPASS
ACTIVE
CURRENT TIME/DAY
START TIMES
RUN TIMES
WATER DAYS
Hunter
Controller is **OFF** even though dial is in **RUN** position.
QUESTIONS?
Call the Toro Helpline
(877) 345-8676
www.toro.com
PRECISION SOIL SENSOR
MENU
BYPASS
132

Smart Controllers

- Utilize weather data from local weather stations and/or add-on weather sensors
- Adjust run times based on environmental conditions
- Many work with smartphones and utilize Wi-Fi
- Cost(s) dependent on number of zones (~$200- $300)

SkyDrop

Rachio

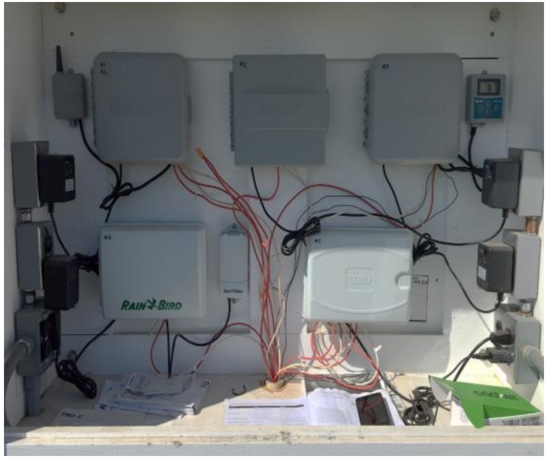
Smart Controllers

Rain Bird LNK Wi-Fi Module + Rain Bird Smartphone App

Toro Evolution

Hunter Hydrawise + Hydrawise Smartphone App

Let’s See How Much You Can Save



REDUCING WATER USE ON TWIN CITIES LAWNS THROUGH RESEARCH EDUCATION AND OUTREACH

University of Minnesota Extension

Extension
Turfgrass Science

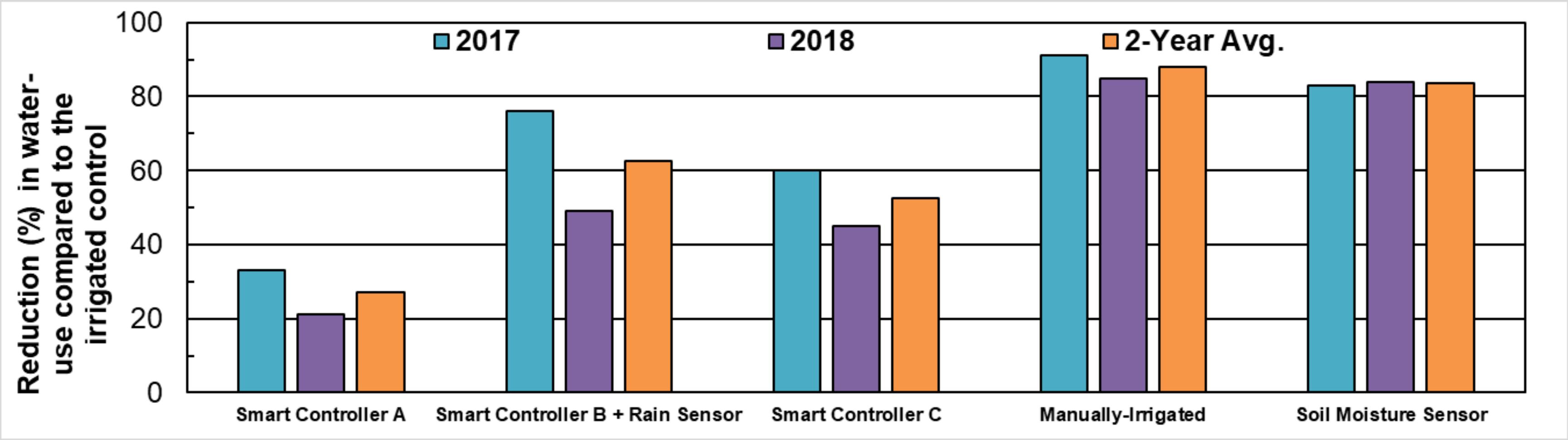
CLEAN WATER LAND & LEGACY AMENDMENT

METROPOLITAN COUNCIL

January 2019

https://metrocouncil.org/Wastewater-Water/Publications-And-Resources/WATER-SUPPLY-PLANNING/Irrigation-Systems-Demonstration-Project.aspx

Savings of 30% to 80%!



Water savings relative to 0.33” irrigation on every odd-numbered day during the summer

Saving Money Through Efficiency

- Assess the economic benefits of residential-focused water efficiency programs for growing communities in the Twin Cities region which rely on groundwater.

- Can a reduction in peak daily use delay or eliminate the need for a new well(s)? If so, how many dollars could be saved?

The Economic Analysis Model

AS IS Scenario

Community Inputs
Model Assumptions

→

Estimate water demand to 2040
Estimated number of new wells
Estimated cost of new wells
Present value of costs*

EFFICIENCY Scenario

Selected Efficiency Measures
Community Inputs
Model Assumptions

→

Re-estimate water demand to 2040
Estimated cost of implementation
Estimated number of new wells
Estimated cost of new wells
Present value of costs*

RESULTS

Difference in number of new wells
Difference in costs

Estimate Efficiency Savings

Select Measure or Combination of Measures for Community			Cost	Reduction of Peak
☑	Marketing & Educational Material	$ per capita	$ 0.50	2%
☐	Sprinklerhead Replacement (10 per participant)	$ per participant	$ 70.00	5%
☑	Smart (Weather-based) Controller	$ per participant	$ 200.00	20%
☐	Irrigation System Audit	$ per participant	$ 100.00	3%
☐	Native Landscaping Rebate	$ per participant	$ 1,500.00	13%
		Administrative cost per Participant:	$ 2.00	

- Test different combinations of measures
- Maximize savings

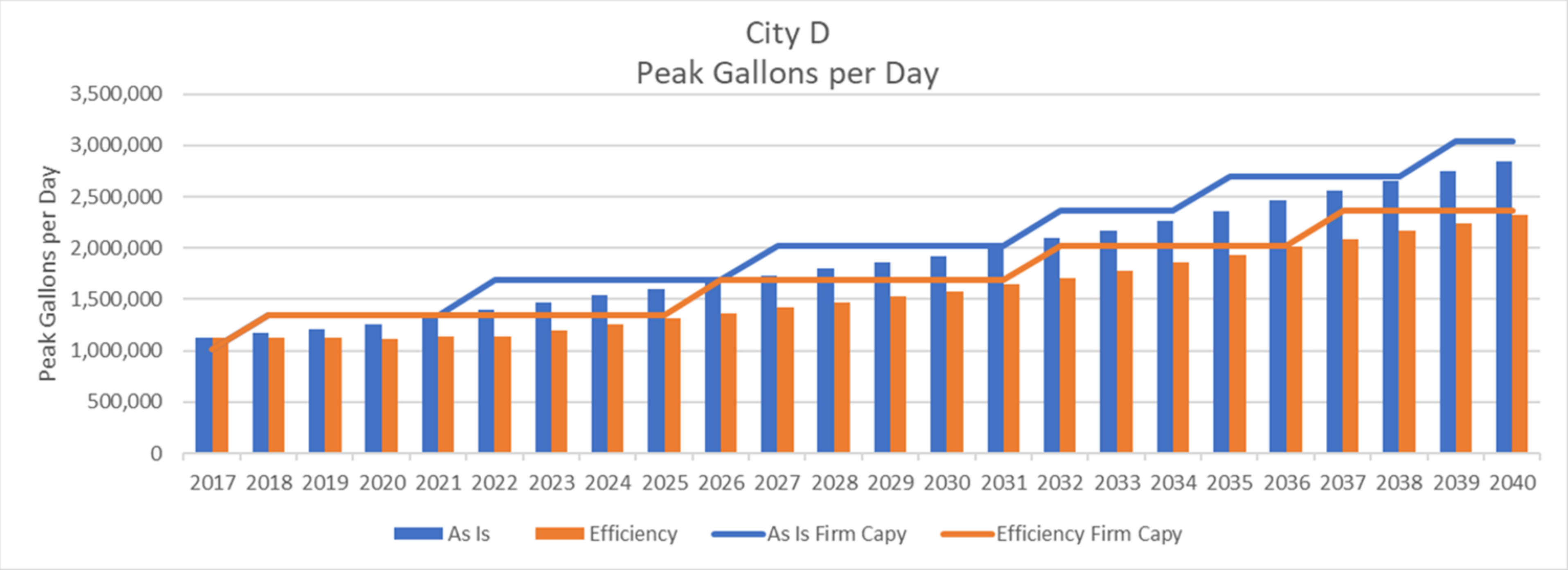
Efficiency Measures Optimize Benefits

Community	Marketing & Education	Sprinklerhead Replacement	Smart Controller	Irrigation System Audit	Native Landscaping Rebate
	100% Incentive				
City A	✔		✔		
City B	✔				
City C	✔	✔			
City D	✔	✔	✔	✔	
City E	✔	✔	✔	✔	
City F	✔		✔		
City G	✔	✔	✔		
City H	✔	✔	✔	✔	
City I	✔	✔	✔		
City J	✔	✔	✔		
City K	✔	✔	✔		
City L	✔	✔	✔		
City M	✔		✔		
City N	✔		✔		
City O	✔		✔		

Benefits by Measure – City D

Efficiency Measure(s)	Percent Peak Reduction	At 15% Participation per Year		At 15% Participation per Year	
		Years of Implementation: 5 Years		Years of Implementation: 5 Years	
		100% Incentive		50% Incentive	
		Cost per Participant	Net Savings ($million)	Cost per Participant	Net Savings ($million)
No program	-	$0.00	-	$0.00	-
Marketing & Education (M&E)	2%	$1.56	$12,517	$1.56	$12,517
M&E + Irrigation Audit	5%	$102.00	$45,662	$52.00	$73,258
M&E + Sprinklerhead	7%	$72.00	$0.209	$37.00	$0.228
M&E + Irrigation Audit + Sprinklerhead	10%	$172.00	$0.809	$87.00	$0.856
M&E + Native Landscaping	15%	$1,502.00	$0.268	$752.00	$0.682
M&E + Smart Controller	22%	$202.00	$1.221	$102.00	$1.277
M&E + Smart Controller + Sprinklerhead	27%	$272.00	$1.364	$137.00	$1.438
M&E + Irrigation Audit + Smart Controller + Sprinklerhead	30%	$372.00	**$2.004**	$187.00	**$2.106**
M&E + Native Landscaping + Smart Controller	35%	$1,702.00	$1.408	$852.00	$1.877
M&E + Native Landscaping + Smart Controller + Sprinklerhead	40%	$1,772.00	$1.504	$887.00	$1.993
M&E + Native Landscaping + Smart Controller + Sprinklerhead + Irrigation Audit	43%	$1,872.00	$1.543	$937.00	$2.059

Fewer Wells = $2 Million in Savings



21 Wells Eliminated, $20.7 Million Saved

Community	Without Efficiency		With Irrigation Efficiency				Difference (# of Wells from Implementation)	Difference (Savings from Implementation) ($)	Rank by Savings from Efficiency
	# New Wells	Discount Well Cost ($)	# New Wells	Discount Efficiency Program Costs ($)	Discount Well Cost ($)	Total Discount Cost ($)			
City A	2	$13,112,285	1	$656,952	$6,749,964	$7,406,916	1	$5,705,369	1
City E	7	$9,733,067	3	$1,543,970	$4,479,456	$6,023,425	4	$3,709,642	2
City O	4	$10,587,532	2	$2,473,953	$5,788,046	$8,261,999	2	$2,325,534	3
City F	2	$6,511,554	1	$1,194,619	$3,255,777	$4,450,396	1	$2,061,158	4
City D	6	$7,056,190	4	$234,293	$4,818,156	$5,052,450	2	$2,003,740	5
City K	2	$3,666,642	1	$637,891	$1,075,736	$1,713,628	1	$1,953,014	6
City J	7	$6,456,446	3	$2,615,109	$2,624,152	$5,239,261	4	$1,217,185	7
City I	3	$3,804,909	2	$157,580	$2,628,720	$2,786,300	1	$1,018,609	8
City L	3	$3,471,700	1	$1,180,839	$1,501,359	$2,682,199	2	$789,502	9
City N	2	$2,939,457	1	$276,073	$1,972,657	$2,248,730	1	$690,727	10
City H	4	$2,398,995	2	$731,278	$1,114,425	$1,845,703	2	$553,292	11
City M	3	$1,675,657	2	$445,475	$990,514	$1,435,990	1	$239,667	12
City C	3	$5,156,234	1	$3,193,859	$1,863,635	$5,057,493	2	$98,740	13
City G	2	$2,942,273	1	$1,342,343	$1,501,359	$2,843,702	1	$98,572	14
City B	2	$4,167,155	2	$346,569	$4,167,155	$4,513,725	0	($346,569)	15

Smart Irrigation Learning Site

- Smart controllers
- Soil moisture sensors
- Non-irrigated turfgrass
- Low-input turfgrass species

Minnesota Landscape
ARBORETUM
UNIVERSITY OF MINNESOTA





Minnesota Landscape Arboretum

Turfgrass Irrigation Efficiency Trailer

Maximizing Water Efficiency for Minnesota Turfgrass

Brian Davis, Ph.D., P.G., P.E.

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Shane Evans, M.S.

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TURFGRASS SCIENCE

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