Proposed Approach

2050 Water Demand Projections

METROPOLITAN COUNCIL

July 11, 2023 Greg Johnson, PE metrocouncil.org

Background (1/2)

2050 Water Resources Plan

The Metropolitan Council is updating the current Water Resources Policy Plan. It outlines water supply, water resources, and wastewater policies to align local and regional water priorities, set guidelines and expectations about our regional wastewater system, and help the region plan for future water supply needs until year 2050.

As part of this plan, Met Council's water supply planners are in the early stages analyzing updated Council regional forecasts and analyzing implications and projections for future water demands out to year 2050. This will be included in the next Metro Water Supply Plan.

Background (2/2)

Community Comprehensive Plan Updates

In addition, local comprehensive plans must address water supply and are expected to include information about water sources, including plans to protect public and private water supplies, in appropriate sections of their local comprehensive plan.

All communities in the metro region will need to include extended water demand projections for 2030, 2040, and 2050 that are consistent with population forecasts in the community's system statement.

Purpose of Demand Projections

Support Regional and Subregional Planning

The Met Council water demand projections are intended to:

1. Provide guidance for communities as they develop content for the water supply plan section of their comprehensive plan.
2. Help Met Council planners and policy makers, state agencies, and community planners to plan for future growth and address regional issues. These projections can help us understand where future water demand might bump up against, or exceed existing capacity - or where there is plenty of capacity to support growth.
3. Provide subregional and regional water demand data for Met Council's groundwater modeling projects, surface water analyses, and other studies.
4. Other purposes

Met Council Review of Local DNR Water Supply Plans (1/5)

Generation 3 Local Water Supply Plans

Generation 3 Local Water Supply Plans for 2016-2018 submitted to Met Council required community water systems to be reviewed for supplemental information to Table 7: Projected Annual Water Demand. Each community's projection method was summarized. The methods varied significantly across the region. Fifty-six (56) communities provided more details for their calculations such as:

1. Population projections
2. Gallons per capita per day (GPCD) calculation
3. Maximum Day: Average Day calculation
4. Assumptions

Met Council Review of Local DNR Water Supply Plans (2/5)

Population Projections

- Almost every community used their future population projections to project their future water demands through 2040, but their data sources were not consistent across the region.
- Most communities (85%) reported using Met Council's population projections.
- 10% of communities used independent city models to project population.

Met Council Review of Local DNR Water Supply Plans (3/5)

Population Projections (Continued)

- 3% of communities used state projection data (ex. Minnesota State Demographic Center)
- 54% of communities did not report how they projected or calculated their future gallons per capita per day (GPCD)
- 11% of communities reported using Met Council's GPCD estimates from the 2015 Master Water Supply Plan

Met Council Review of Local DNR Water Supply Plans (4/5)

Gallons Per Capita Per Day (GPCD) Projections

- Communities used a range of 4 to 10 years of past GPCD data when projecting their gallons per capita per day (GPCD) for the future. In most cases, the communities did not explain their reasoning for why a certain time range was used.
- 19 separate and unique water demand projection methods were used for the communities that described the method used.

Met Council Review of Local DNR Water Supply Plans (5/5)

Conclusion and next steps for water demand projections

Since many important aspects of water supply planning, such as establishing policy, community planning, ground and surface water modeling, and other purposes rely on accurate water demand projections, having a consistent and accurate projection method for the entire metro region is essential for the region's planning efforts as a whole to year 2050. The next step is to select the most practical and accurate water demand projection method for the metro region for the Water Supply Plan.

Typical Water Demand Projection Methods (1/2)

Per Capita Demand Method (2015 Master Water Supply Plan)

Use the average historical water use per capita demand and the community population projections to represent future (2050) water use as follows:

[Projected Water Use] = [Projected Population] x [Per Capita Water Use]

Advantages - Connects Met Council forecasting data across the entire region. Simple and easy to explain to non-technical audiences.

Disadvantages – Does not reflect exact water usage by customer type.

Source – AWWA Forecasting Urban Water Demand (2nd Edition)

Typical Water Demand Projection Methods (2/2)

Local Water Demand Projection Method

Analyze water-use patterns by customer class that focus on the dynamics and growth of the residential, commercial, industrial, and public sectors and their projected land use and calculate water demands.

Challenges for this method include:

1. Many communities do not separate and keep track of their water usage for their commercial, industrial, and public sectors or the data is not accurate enough for developing water projections.
2. Developing water demand projections (ex. gallons per acre per day or gallons per unit) by land use classification can be highly variable depending on the type of commercial, industrial, or public land use being planned by a community.

Source – AWWA Forecasting Urban Water Demand (2nd Edition)

Proposed Method (1/2)

2050 Water Demand Projections

Use the average historical water use per capita demand and Met Council's population projections for high, normal, and compact development for each community to represent a range of possible development and future (2050) water use as follows:

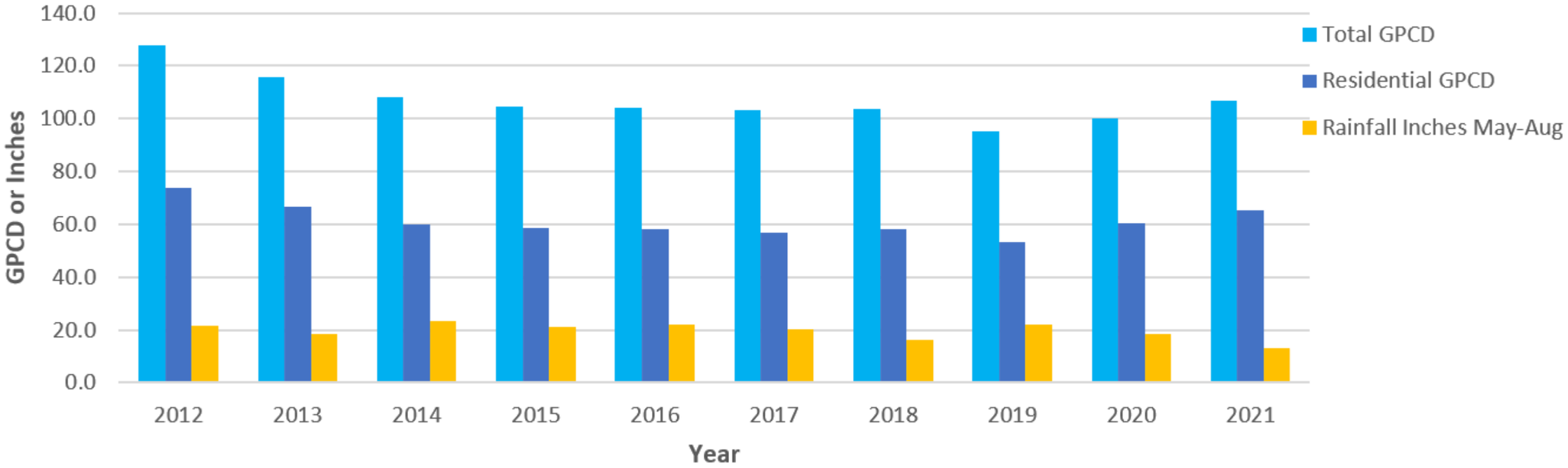
[Projected Water Use] = [Projected Population by Land Use Planning Scenario*] x [Per Capita Water Use] with a Variable Range (+/-)

** Note - Projected Population will vary based on land use planning scenario (high, medium, and compact development)*

Assign a variable range (percentage) to the water demand projections to account for anticipated uncertainties from year to year (droughts, wet year, water efficient projects, etc.).

Proposed Method (2/2)

Comparison of 2012-2016 to 2017-2021 GPCD Data

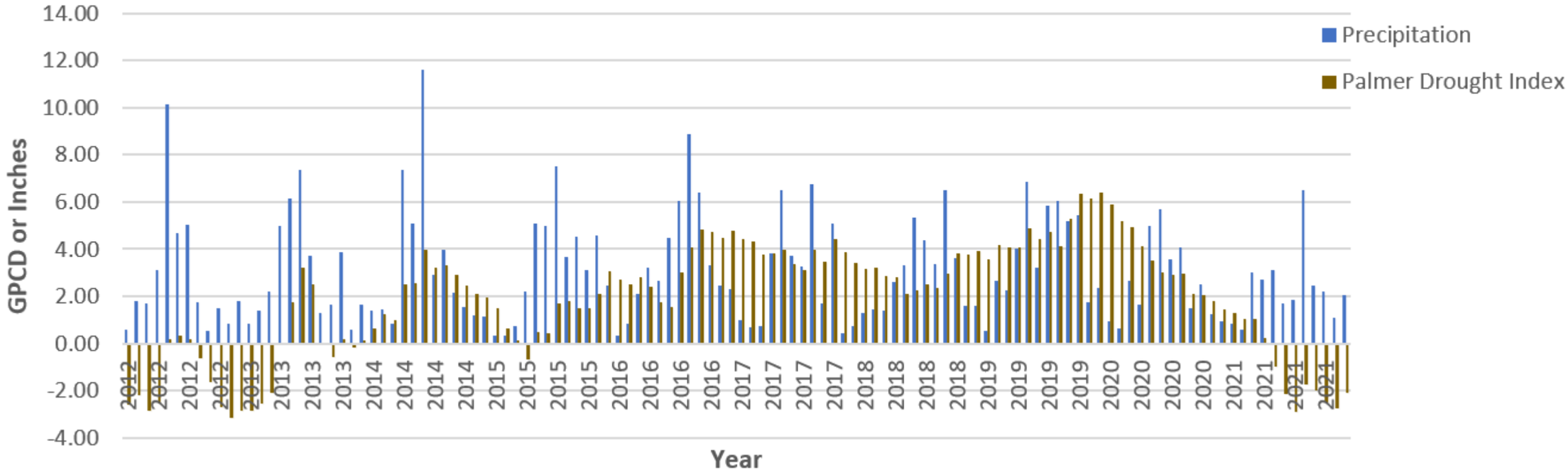


Metro region total GPCD decreased 9.9 percent from 2017-2021 in comparison to 2012-2016.

Metro region residential GPCD decreased 7.8 percent from 2017-2021 in comparison to 2012-2016.

Drought Data

Palmer Drought Index



Metropolitan Council

TAC Feedback on Proposed Approach (1/3)

2050 Water Demand Projections

Should we use the average historical water use per capita demand and Met Council's population projections for high, normal, and compact development for each community to represent a range of possible development and future (2050) water use as follows?:

[Projected Water Use] = [Projected Population by Land Use Planning Scenario*] x [Per Capita Water Use] with a Variable Range (+/-)

** Note - Projected Population will vary based on land use planning scenario (high, medium, and compact development)*

Assign a variable range (percentage) to the water demand projections to account for anticipated uncertainties from year to year (droughts, wet year, water efficient projects, etc.)

TAC Feedback on Proposed Approach (2/3)

What does TAC think of the proposed approach?

[Projected Water Use] =

[Projected Population by Land Use Planning Scenario]
x
[Per Capita Water Use]

with a Variable Range (+/-)

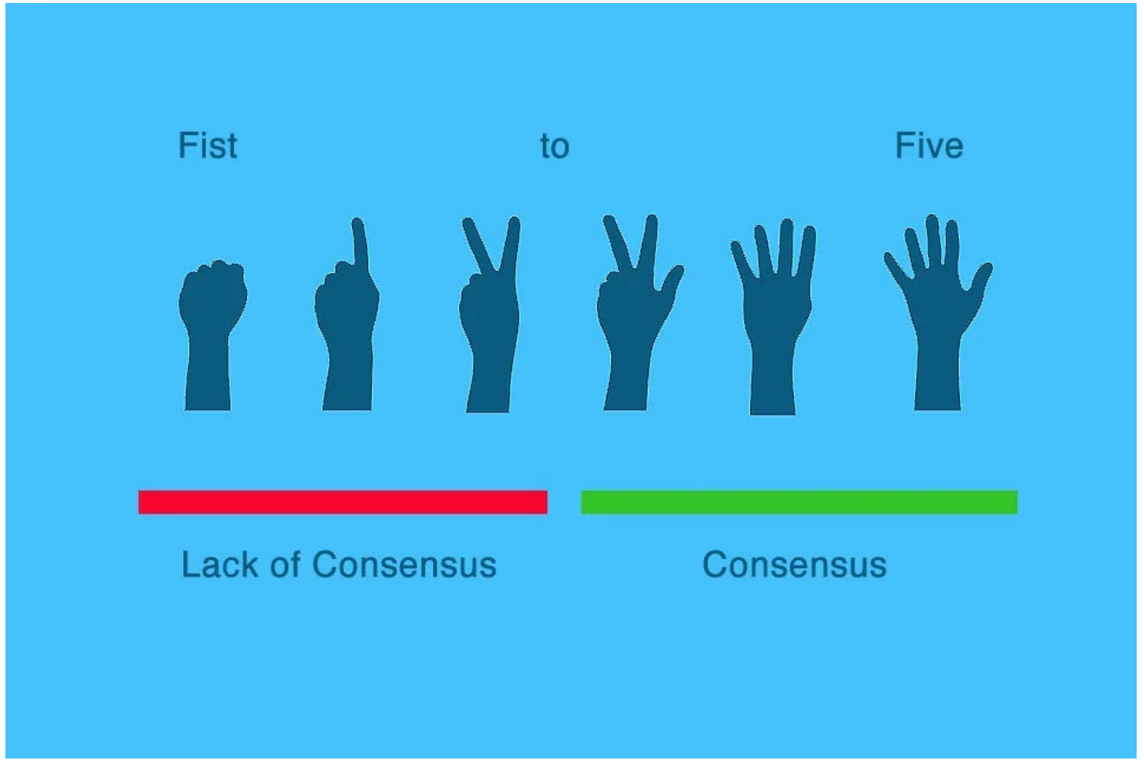


Image from https://t2informatik.de/en/smartpedia/fist-to-five/

TAC Feedback on Proposed Approach (3/3)

2050 Water Demand Projections

Should we use the average historical water use per capita demand and Met Council's population projections for high, normal, and compact development for each community to represent a range of possible development and future (2050) water use as follows?:

[Projected Water Use] = [Projected Population by Land Use Planning Scenario*] x [Per Capita Water Use] with a Variable Range (+/-)

** Note - Projected Population will vary based on land use planning scenario (high, medium, and compact development)*

Should we use previous 5 years or 10 years of water production data (MPARS) to project forward?

Should we assign a variable range of +/- 20 percent to the water demand projections to account for anticipated uncertainties from year to year (droughts, wet year, water efficient projects, etc.)?

White Bear Lake Area Water Demand Projections

Preliminary Development Scenarios for White Bear Lake Area

Scenario 1 (All Groundwater Supplies with GPCD Restrictions) - All public water systems remain unchanged with their current water supply sources and consume groundwater at a maximum 75 gpcd residential and 90 gpcd total per the court order.

Scenario 2 (All Groundwater Supplies with Current GPCD Water Usage) - All public water systems remain unchanged with their current water supply sources and do not follow the court order and continue consuming their typical recent gpcd for existing and future growth, exceed their appropriation permits if needed to grow, and pay DNR fines and/or civil penalties.

Scenario 3 (Combination Groundwater/Surface Water Supplies with GPCD Restrictions for Groundwater Systems) - The cites that are not planning to grow significantly remain on groundwater and consume groundwater at a maximum 75 gpcd residential and 90 gpcd total per the court order, but the cities that are planning to grow significantly (ex. Lake Elmo, Lino Lakes, and Hugo) are supplied by surface water (ex. SPRWS).

Other Upcoming Water Demand Analysis

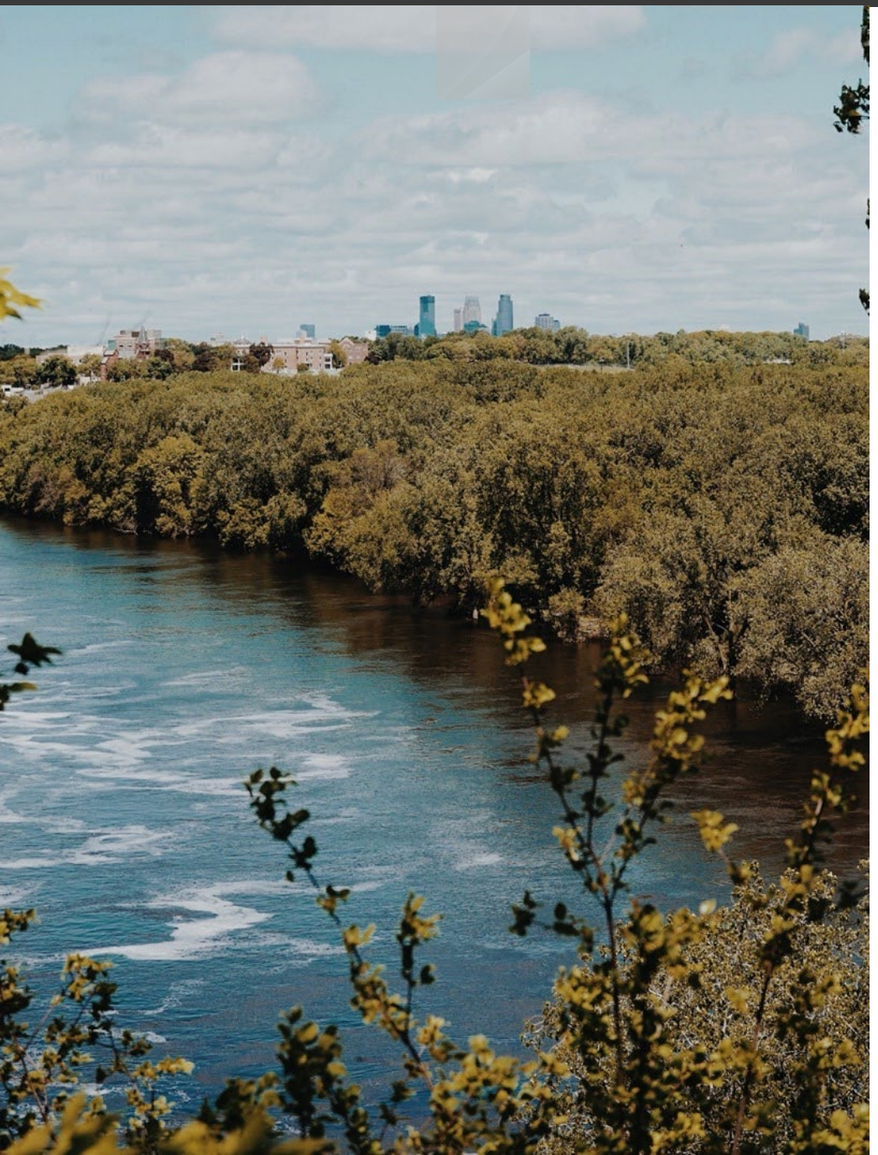
Additional Met Council Water Demand Analysis

Comparing wastewater discharge volumes from each community to water demand projections while accounting for water lost in the distribution system and water gained in the wastewater collection system from inflow and infiltration.

Analyzing and estimating projected water use for each of Met Council's wastewater treatment plant sewersheds to confirm adequate future wastewater treatment capacity with assumptions made for water lost in distribution systems and water gained from inflow/infiltration in the wastewater collection system.

Adding employment analysis and comparing water demand projections from proposed approach to employment water demand projections in addition to residential demands and other demands.

Next Steps



- Work with the DNR to fill-in the missing data gaps from MPARS. Request missing date from communities for remaining data that the DNR cannot provide.
- Communicate water demand projection method at subregional workshops.
- Obtain final 2050 population projections from Met Council forecasting staff for high, medium, and compact development scenarios.
- Calculate and develop water demand projections to year 2050.
- Complete other water demand analysis (ex. comparison to wastewater flows, analyzing water demands by individual wastewater sewershed areas, add employment projections, etc.)

Thank you

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