



Wisconsin Water Use

2022 Water Withdrawal Report

Water supply systems in Wisconsin, capable of withdrawing 100,000 gallons or more per day, are required to register and report withdrawals annually. The state has nearly 11,000 active registered sources that include wells, ponds, streams, rivers, and lakes. The approximate 1.8 trillion gallons withdrawn in 2022 is roughly equivalent to 1.2 million liter-size sodas per person in Wisconsin.

How, when and where water is withdrawn varies seasonally throughout the state. Year-to-year, withdrawal volumes vary with precipitation trends.

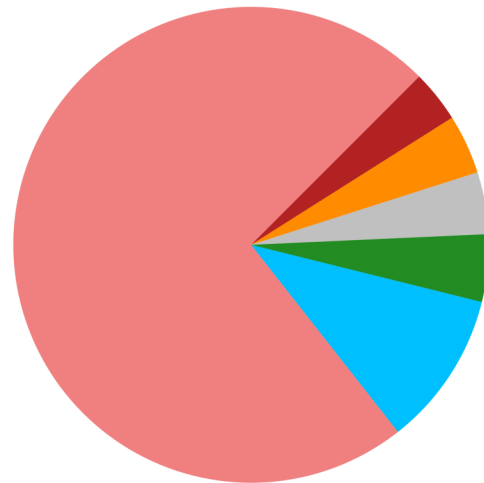
Compared to the 30-year average, in 2022:

- Wisconsin received 33 inches of precipitation, within an inch of the annual average.
- Annual statewide temperature was average in 2022.
- Winter precipitation was average, while temperatures were colder overall.
- Spring was wetter and cooler than normal statewide.
- Summer was slightly drier than average.
- Fall was drier and warmer than normal.

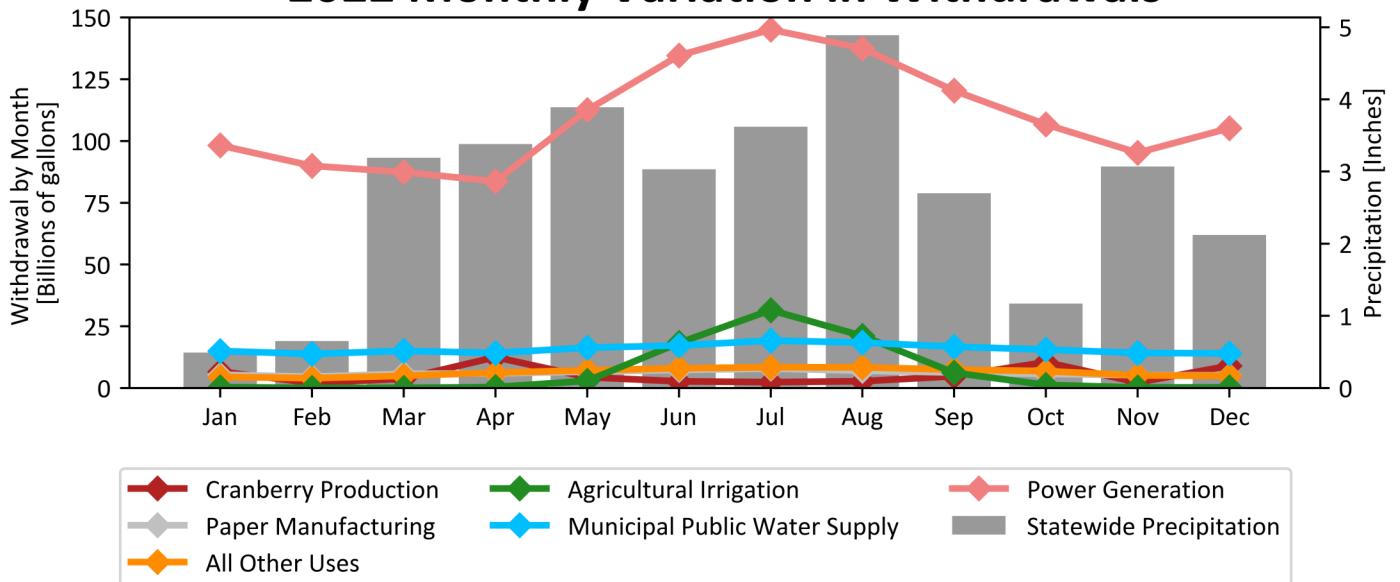
Total water withdrawals for 2022 were about 4% less than the average annual withdrawal for the period 2012 – 2022. Similar to past years' data, power generation and agricultural irrigation varied the most by season.

2022 Withdrawals by Use

Total Withdrawals = 1.8 Trillion Gallons

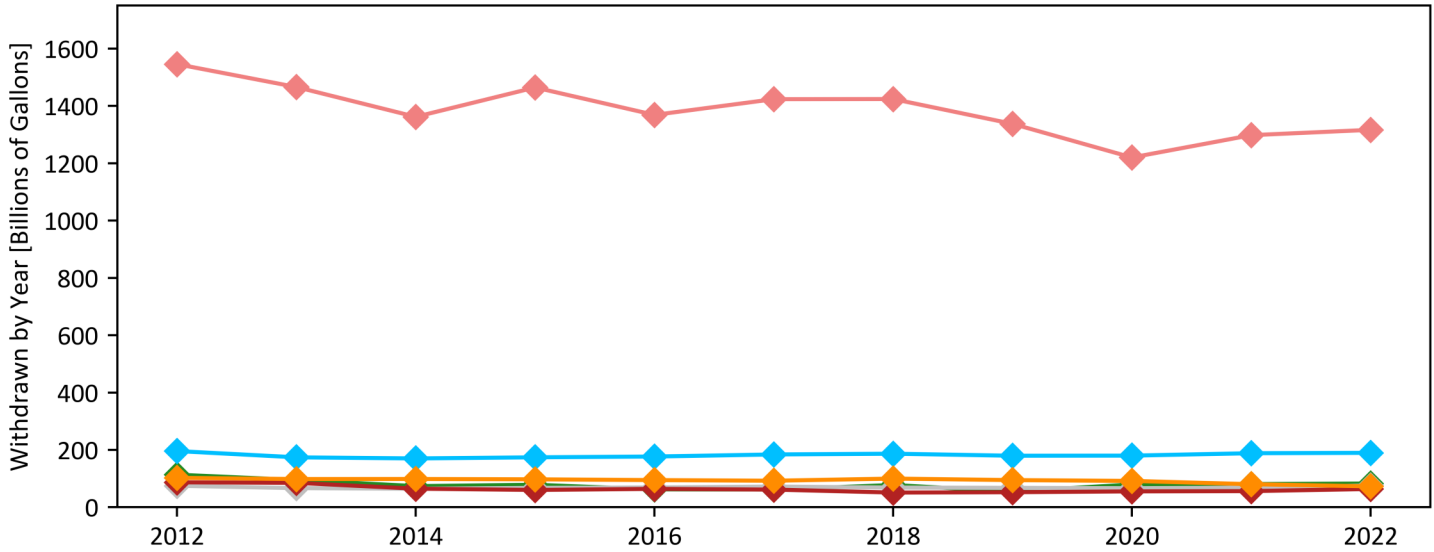


2022 Monthly Variation in Withdrawals

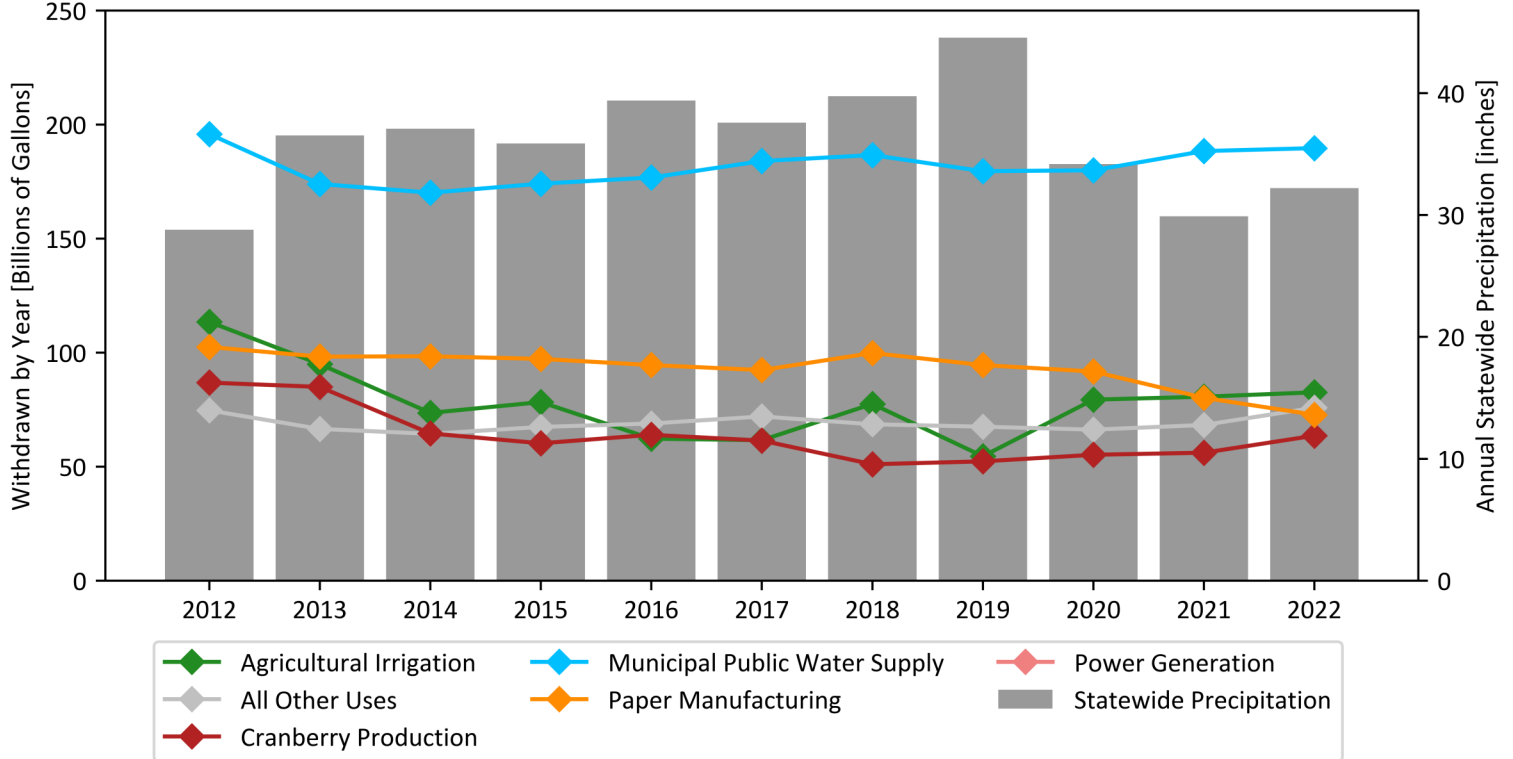


Annual Total Withdrawals by Category 2012 to 2022

Annual Withdrawals by Category



Annual Withdrawals by Category Without Power Generation



Power generation is the **primary** use for water withdrawals in Wisconsin and has been generally decreasing each year as power plants close or improve processes and efficiency. Water withdrawals are highest in years with higher temperatures and/or lower precipitation, due to increased need for power generation cooling and increased demand for agricultural irrigation and municipal public water supply. Additionally, seasonality of precipitation affects withdrawals; for instance, 2012 and 2021 experienced annual precipitation within one inch of each other, but 2012 had low precipitation during the growing season.

2022 Water Withdrawals by Category and Source

Water Use	Total Active Sources	Total 2022 Withdrawals (Bgal)	Total Active Groundwater Sources	2022 Groundwater Withdrawals (Bgal)	Total Active Surface Water Sources	2022 Surface Water Withdrawals (Bgal)
Agricultural Irrigation	3871	82.6	3737	79.8	134	2.8
All Other Uses	1226	6.6	1133	4.6	93	2.1
Non-Municipal Public Supply	1638	4.3	1636	3.2	2	1.1
Municipal Public Water Supply	1567	189.7	1543	91.8	24	97.9
Cranberry Production	360	63.6	121	2.4	239	61.2
Commercial	465	3.3	455	1.0	10	2.3
Dairy Production	808	6.9	807	6.9	1	0.0
Industrial (non-mining)	503	13.6	487	10.6	16	3.0
Golf Course Irrigation	384	4.6	328	3.9	56	0.7
Non-Metallic Mining	137	23.9	59	1.7	78	22.2
Aquaculture	140	12.5	122	6.4	18	6.1
Power Generation	54	1316.4	33	1.8	21	1314.6
Paper Manufacturing	37	72.8	9	1.6	28	71.1
Total	11190	1800.9	10470	215.8	720	1585.0

Compared to water withdrawals during the last 11 years, in 2022:

- The power generation withdrawal volume was the third lowest, only greater than 2020 and 2021.
- The agricultural irrigation withdrawal volume was the third highest, with only 2012 and 2013 being greater.
- The municipal withdrawal volume was the second greatest, only less than 2012 withdrawals.
- The paper manufacturing withdrawal volume was the lowest in 11 years.

Water users measure withdrawals using one of several methods. For groundwater, these methods include totalizing flow meters, hour meters, horizontal pipe discharge measurement and other methods approved by the DNR on a case-by-case basis. For surface water, these methods include measurement from a rectangular or V-notch weir, horizontal pipe discharge measurement, estimation from flooding events based on area and other methods approved by the DNR on a case-by-case basis. For those who reported in 2022, 60% measured with flow or hour meters versus 40% who estimated their withdrawals.

Surface Water Withdrawals

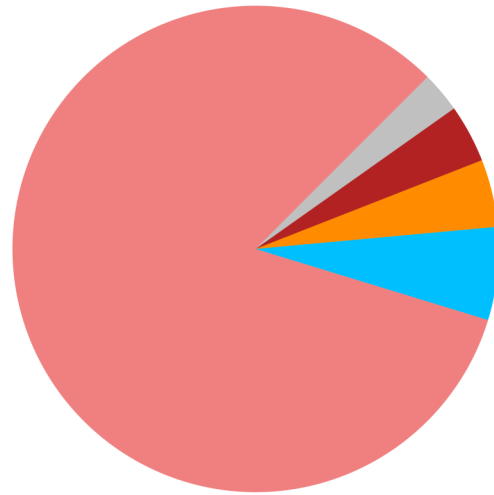
In 2022, surface water withdrawals accounted for nearly 90% or 1.6 trillion gallons of water. This ranks 2022 as the third lowest year from 2012 – 2022 for surface water withdrawals, continuing a general trend of decreasing surface water withdrawals for power generation.

While most water withdrawals in Wisconsin are from surface water, water loss is minimal relative to the amount withdrawn because water is used and discharged near the point of withdrawal. Power generation facilities withdrew the largest volume of surface water in the state (1.29 trillion gallons). These facilities are concentrated along Lake Michigan and the Wisconsin and Mississippi Rivers.

Municipal public water supply was the next highest use for surface water (0.094 trillion gallons) and was concentrated in counties with large populations bordering Lake Michigan. The ‘All Other Uses’ category includes mining, industry, commercial uses, other-than-municipal water systems, non-transient, non-community water systems, schools, fire protection, remediation and other uses.

2022 Surface Water Withdrawals by Use

Total Surface Water Withdrawals = 1.6 Trillion Gallons

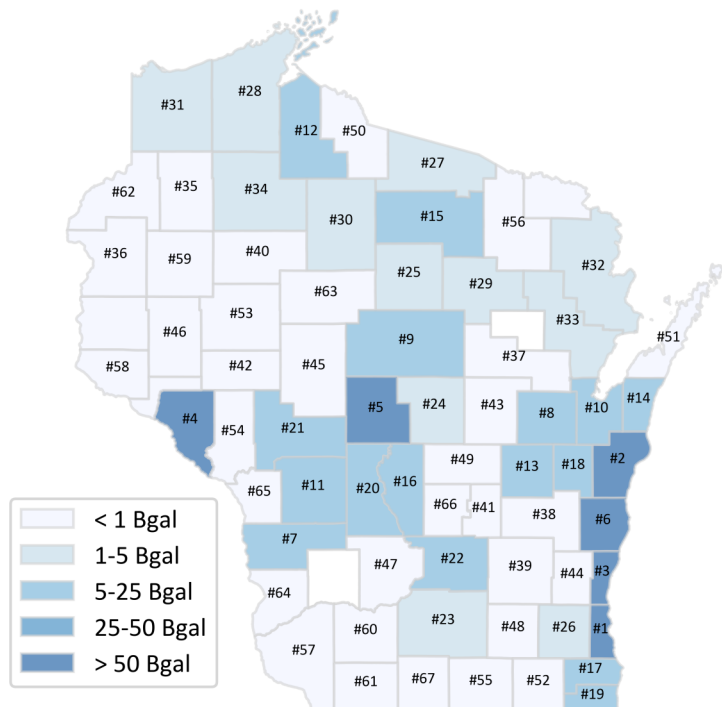


2022 Surface Water Withdrawals by County

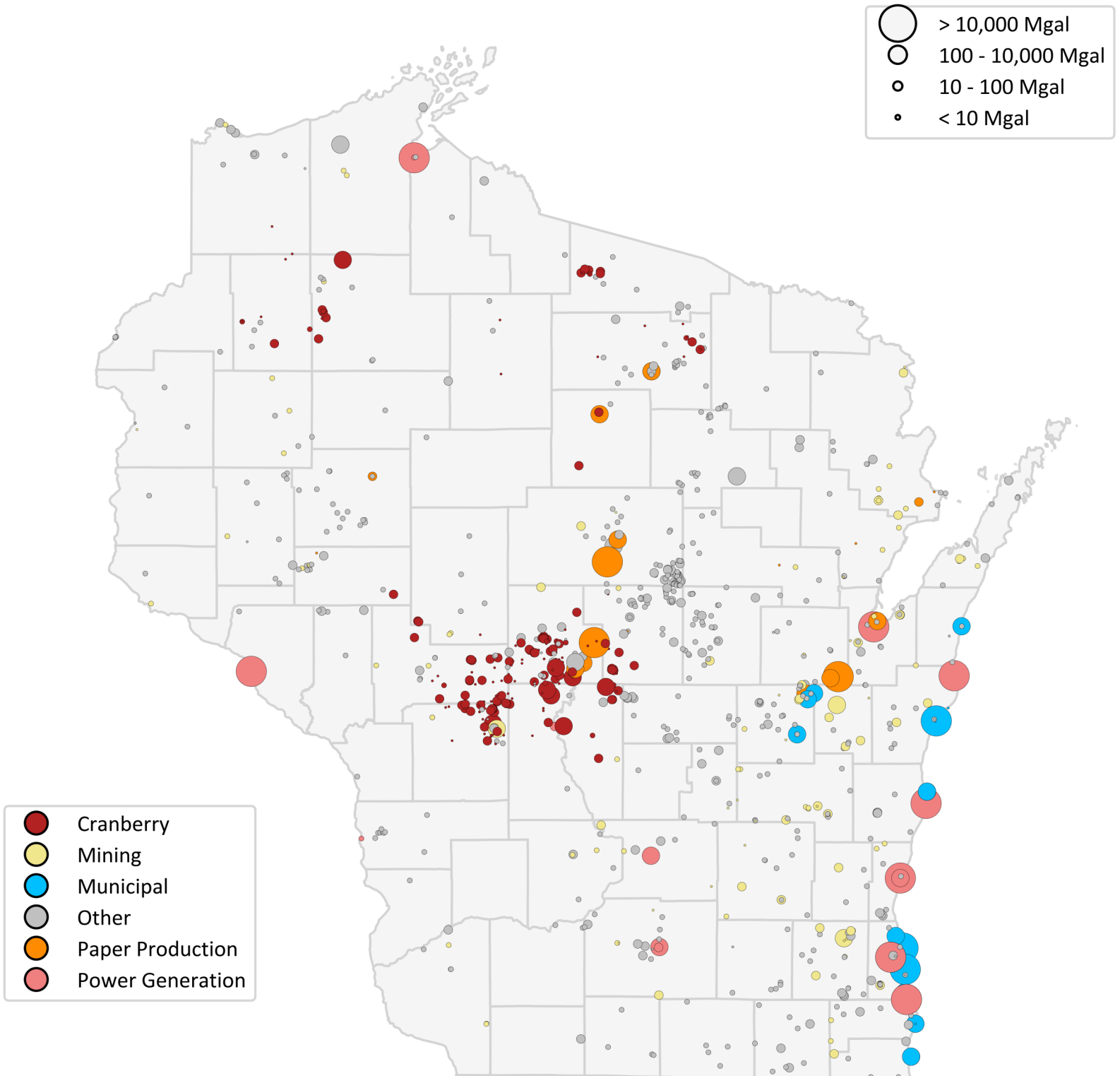
Surface water withdrawals from the top five ranked counties made up 84% of total surface water withdrawals in 2022.

The top-ten counties used surface water for power generation or paper manufacturing, with Milwaukee (#1), Manitowoc (#2), Ozaukee (#3), Buffalo (#4), Sheboygan (#6), Vernon (#7), and Brown (#10) using most of their surface water for power generation. Wood (#5), Outagamie (#8), and Marathon (#9) counties used their surface water primarily for paper manufacturing.

Counties without any surface water withdrawals in 2022 are not ranked.



2022 Surface Water Withdrawals



The size of the dot corresponds to the scale of surface water withdrawal, with the smallest dot indicating less than 10 million gallons annually and the largest indicating over 10 billion gallons annually. Municipal public supply and power generation surface water withdrawals consist of fewer large-volume withdrawal sites, while cranberry production consists of numerous lower volume withdrawals. Water users withdraw water at different times of the year, based on need. For example, withdrawals for power generation peak in late summer when cooling needs are highest, and cranberry growers' peak use for withdrawals is in late spring and again in late fall.

Groundwater Withdrawals

Groundwater withdrawals accounted for 12% of all statewide withdrawals. These withdrawals totaled 216 billion gallons from just over 10,000 high-capacity wells in 2022.

Municipal public water systems remained the largest withdrawer of groundwater, withdrawing nearly 92 billion gallons of groundwater in 2022. These wells are typically owned by cities and deliver drinking water for residential, commercial, institutional and industrial uses. Municipal suppliers provide more than two-thirds of Wisconsinites with their drinking water.

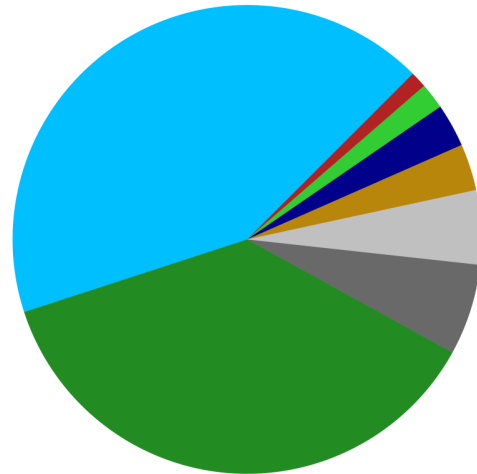
Agricultural irrigation is the second largest use for groundwater in the state, pumping 80 billion gallons.

The category 'All Other Uses' includes: silviculture, commercial use, non-dairy livestock use, paper manufacturing, power generation, other-than-

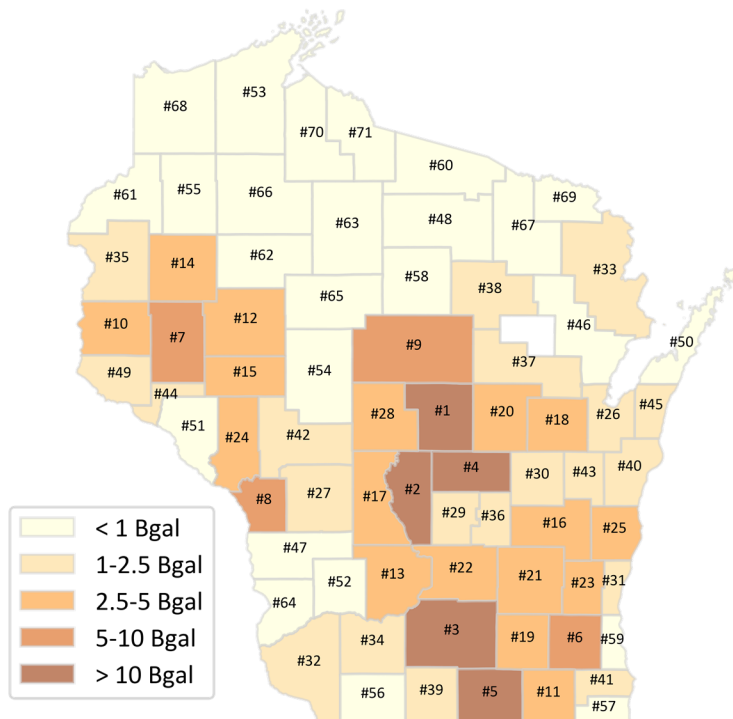
municipal water supply, non-transient non-community water supply, transient non-community water supply and schools. In contrast to surface water withdrawals, the top five ranked counties for groundwater withdrawal made up almost 40% of total groundwater withdrawals.

2022 Groundwater Withdrawals by Use

Total Groundwater Withdrawals = 216 Billion Gallons



2022 Groundwater Withdrawals by County



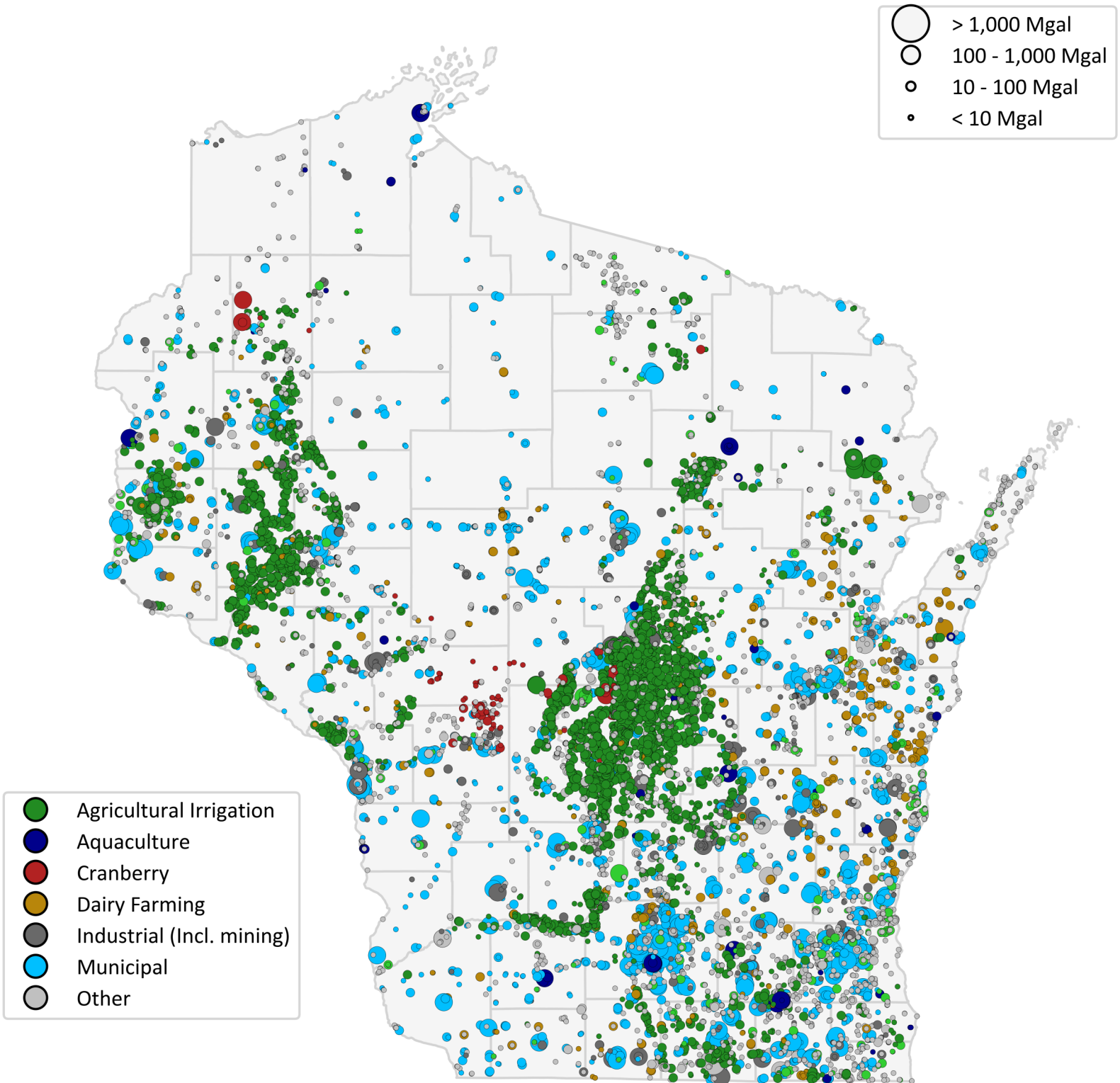
Groundwater users in the top-ten ranked counties used withdrawals primarily for agricultural irrigation or municipal public water supply.

Portage (#1), Adams (#2), Waushara (#4), Dunn (#7), and St. Croix (#10) counties mostly withdrew groundwater for agricultural irrigation.

Agricultural irrigation accounted for two-thirds of total withdrawals in each of the above counties, except for St. Croix County which used almost an equal amount of groundwater for municipal and agricultural uses.

Dane (#3), Rock (#5), Waukesha (#6), La Crosse (#8), and Marathon (#9) counties primarily withdrew groundwater for municipal public water supply.

2022 Groundwater Withdrawals



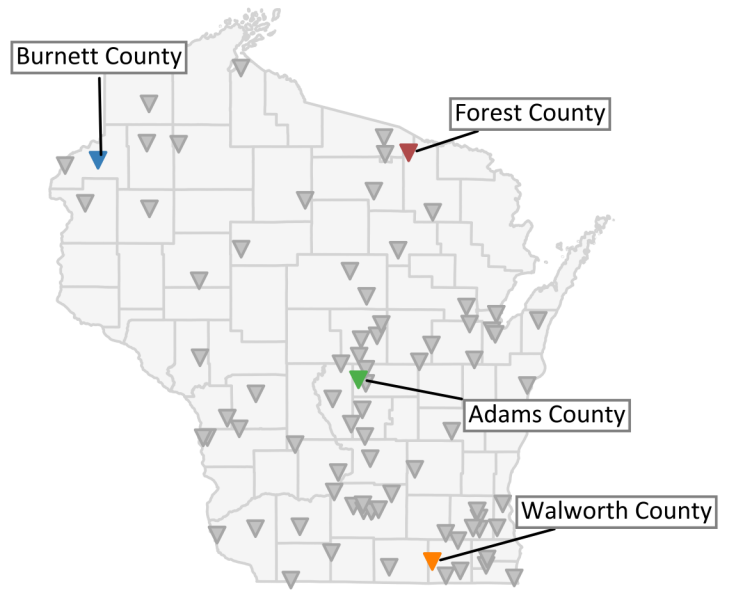
Each dot on this map represents a groundwater withdrawal site. The size of the dot corresponds to the scale of groundwater withdrawal, with the smallest representing less than 10 million gallons annually and the largest representing over 1 billion gallons annually. Groundwater withdrawals for municipal public supply are highest in areas where large surface water sources are unavailable. While agricultural irrigation made up a similar share of total groundwater withdrawals as municipal public supply, agricultural irrigation withdrawals occur almost exclusively during the growing season from May to September.

The chart below shows groundwater levels from 2017 to 2022. Groundwater levels naturally fluctuate, and when they fall within the middle gray box, they are within the normal range of variability.

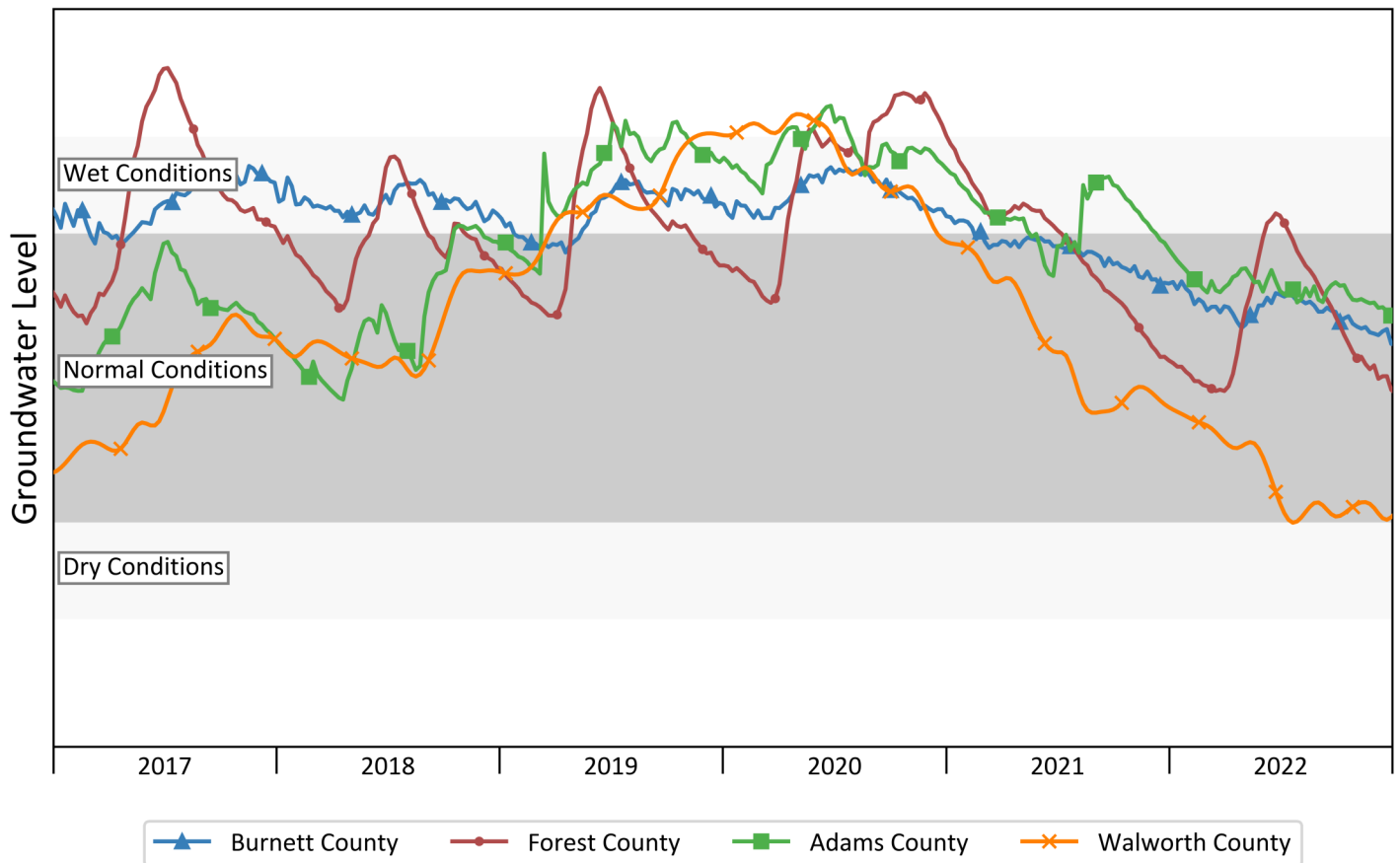
From 2017 to 2020, Wisconsin experienced above-average precipitation that recharged aquifers and elevated groundwater levels to all-time or near-all-time highs. Through 2021 and 2022, groundwater levels began to return to normal levels as statewide precipitation decreased to average amounts statewide.

The colored triangles represent groundwater monitoring wells that have been recording water levels for between 65 and 85 years of measurement. Other groundwater monitoring network wells are shown in gray on the map to the right.

Locations of Wisconsin Groundwater Monitoring Network Wells



Wisconsin Groundwater Levels 2017 - 2022



Normal conditions include the middle 75% range of recorded groundwater levels. Groundwater levels higher than normal occur during times of higher-than-normal precipitation and are associated with groundwater flooding. Levels lower than normal conditions occur during periods of low precipitation and are associated with low water levels in surface waters.

Groundwater Withdrawals

- **11,163 active sources** withdrew water throughout the year. In 2022, Wisconsin had 10,443 high-capacity wells and 720 surface water withdrawals.
- In 2022, water users in Wisconsin withdrew **1.8 trillion gallons** from surface and groundwater.
- **2022 ranked as the third lowest year** for total withdrawals with only 2020 and 2021 being lower.
- Surface water withdrawals accounted for **88% (1,585 billion gallons)** of the annual water withdrawal volume.
- Power generation and municipal water supply users withdrew **84% (1,506 billion gallons)** of the annual withdrawal volume.
- **Water withdrawals peaked in the summer** when power generation increased withdrawals to cool power plants and agricultural irrigation withdrew water to supplement rainfall.
- Groundwater withdrawals accounted for **12% (216 billion gallons)** of the annual withdrawal volume, with the majority used for municipal water supply and agricultural irrigation.
- **Power plants and municipalities** were the primary users of Lake Michigan water in southeastern Wisconsin.
- **Agricultural irrigation and municipalities** primarily used high amounts of groundwater in the Central Sands and south-central Wisconsin.
- **Groundwater levels were high** or normal throughout the state in 2022.