



Wisconsin Water Use 2021 Withdrawal Summary

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 The approximate 1.8 trillion gallons withdrawn in 2021 is roughly equivalent to 1.2 million liter-size sodas per person in Wisconsin.

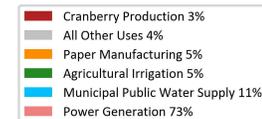
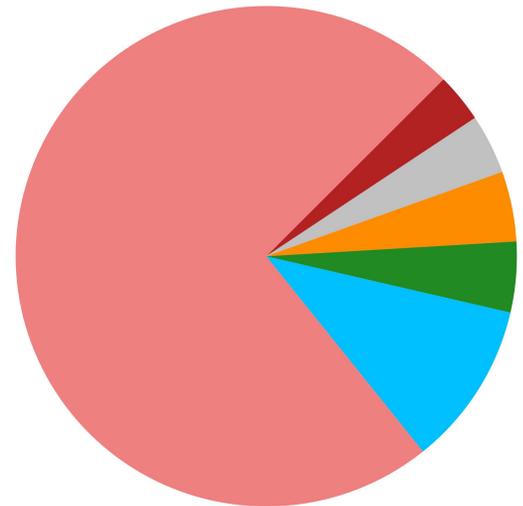
How, when and where water is withdrawn varies seasonally throughout the state. Year-to-year, withdrawal volumes vary with precipitation and temperature trends. Compared to the 20-year average, in 2021:

- Wisconsin experienced high summer temperatures.
- Growing season precipitation was variable.
- June and July precipitation was within two inches of normal.
- August precipitation was above average.
- September precipitation was below average across much of the state.

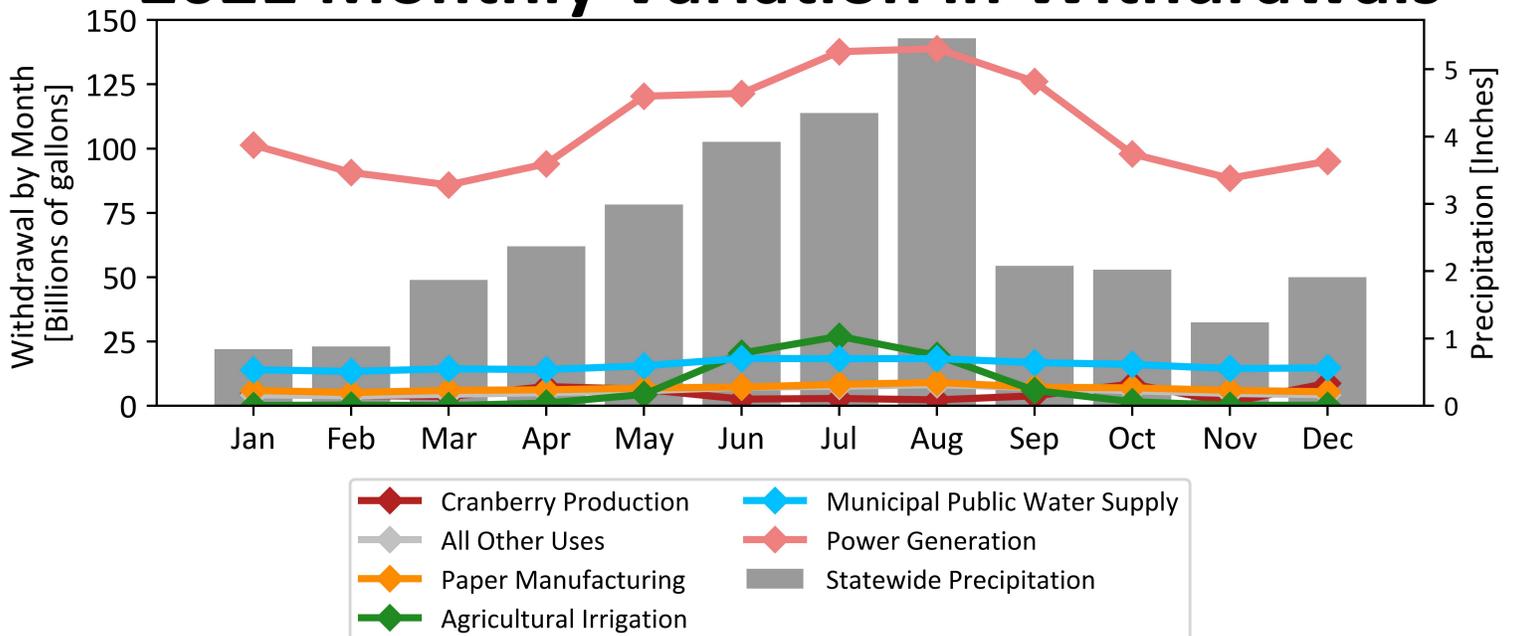
Total water withdrawals for 2021 were about 6% less than the average annual statewide water withdrawal for the period 2012—2021.

Power generation and agricultural irrigation showed the largest seasonal variation in 2021, as in previous years.

2021 Withdrawals by Use
Total Withdrawals = 1.77 Trillion Gallons

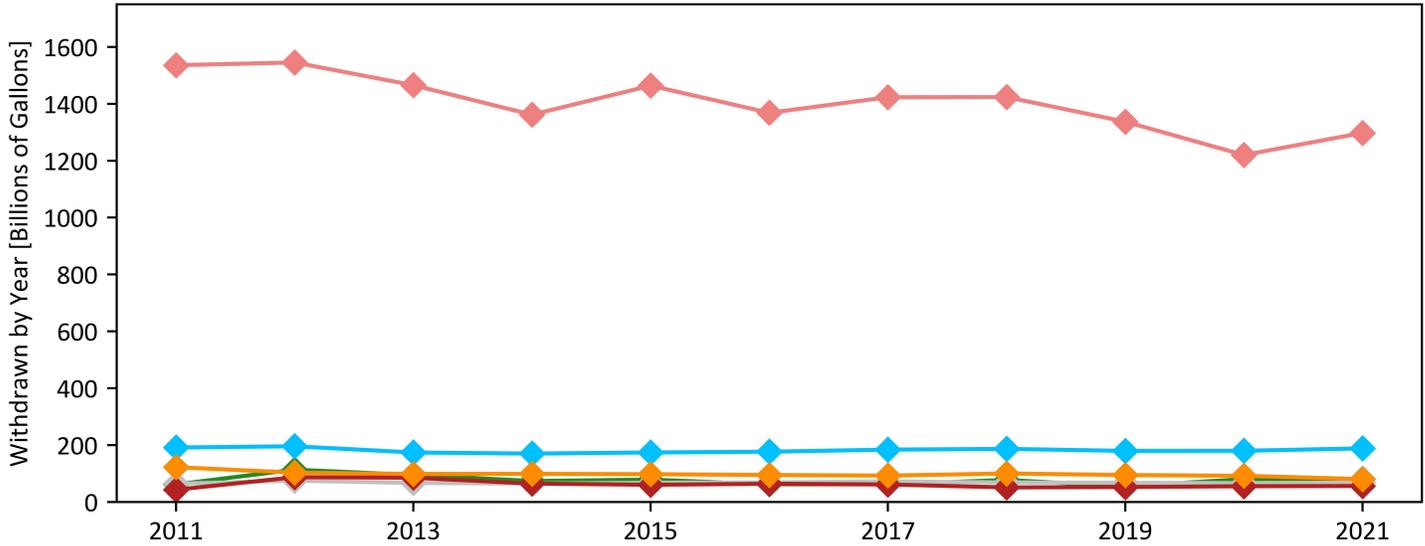


2021 Monthly Variation in Withdrawals

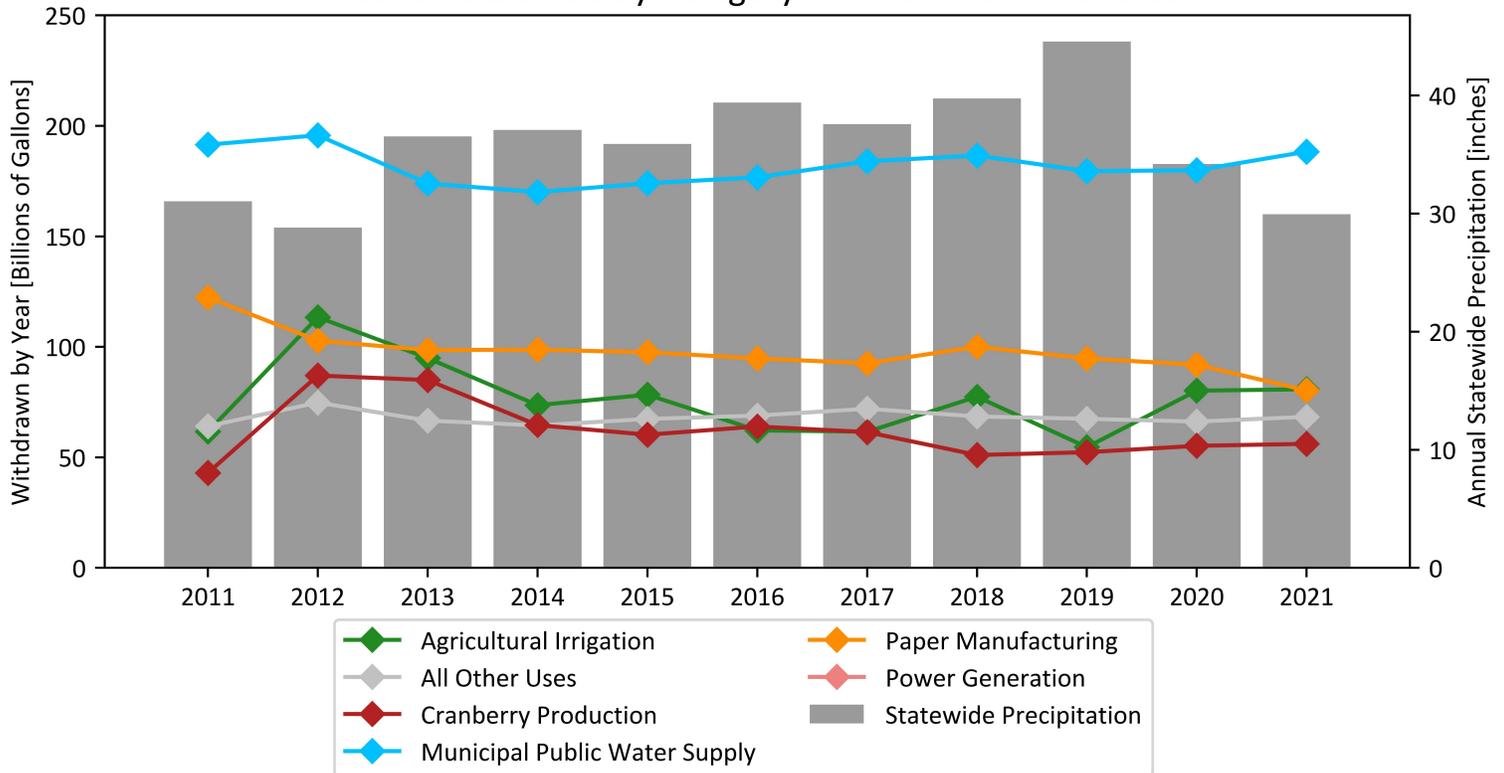


Annual Total Withdrawals by Category 2011 to 2021

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 supply. Additionally, seasonality of precipitation affects withdrawals; for instance, 2012 and 2021 saw similar annual precipitation, but 2012 saw low precipitation during the growing season.

2021 Water Withdrawals by Category and Source

Water Use	Total Active Sources	Total 2021 Withdrawals (Bgal)	Total Active Groundwater Sources	2021 Groundwater Withdrawals (Bgal)	Total Active Surface Water Sources	2021 Surface Water Withdrawals (Bgal)
Agricultural Irrigation	3772	80.9	3641	77.5	131	3.3
All Other Uses	1207	8.0	1107	4.8	100	3.2
Non-Municipal Public Supply	1648	4.6	1646	3.5	2	1.1
Municipal Public Water Supply	1558	188.3	1534	90.8	24	97.5
Cranberry Production	358	56.1	112	2.9	246	53.2
Commercial	448	3.3	440	1.2	8	2.1
Dairy Production	782	7.1	781	7.1	1	0.0
Industrial (non-mining)	499	13.7	483	10.4	16	3.3
Golf Course Irrigation	374	4.5	320	3.8	54	0.8
Non-Metallic Mining	147	14.6	62	1.4	85	13.2
Aquaculture	142	12.6	124	6.5	18	6.1
Power Generation	57	1297.8	34	1.7	23	1296.1
Paper Manufacturing	49	80.3	13	1.9	36	78.4
Total	11041	1771.8	10297	213.5	744	1558.3

Compared to water withdrawals during the last 10 years, in 2021:

- The power generation withdrawal volume was the second lowest, only greater than 2020 withdrawals.
- The agricultural irrigation withdrawal volume was the third largest, 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 on record in 10 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 report, 70% measure with meters versus 30% who estimate withdrawals.

Surface Water Withdrawals

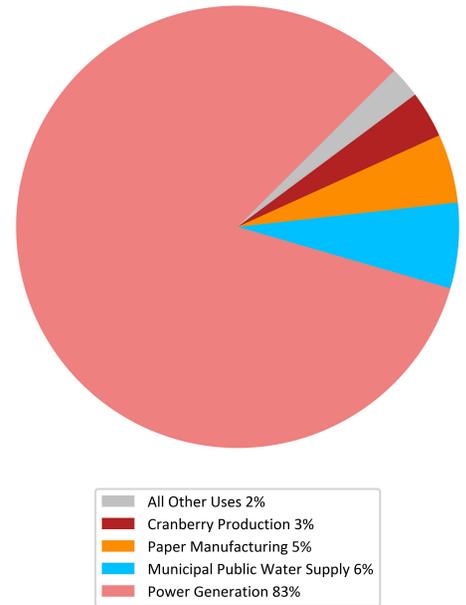
In 2021, surface water withdrawals account for nearly 90% or 1.6 trillion gallons of water. This ranks 2021 as the lowest year from 2012–2021 for surface water withdrawals, continuing a trend of decreasing surface water withdrawals for power generation.

While the majority of water withdrawals in Wisconsin are from surface water, these are used and discharged near their point of withdrawal, resulting in minimal water loss relative to the amount withdrawn. Power generation facilities withdrew the largest volume of surface water in the state (1.30 trillion gallons). These facilities are concentrated along Lake Michigan and the Wisconsin and Mississippi rivers.

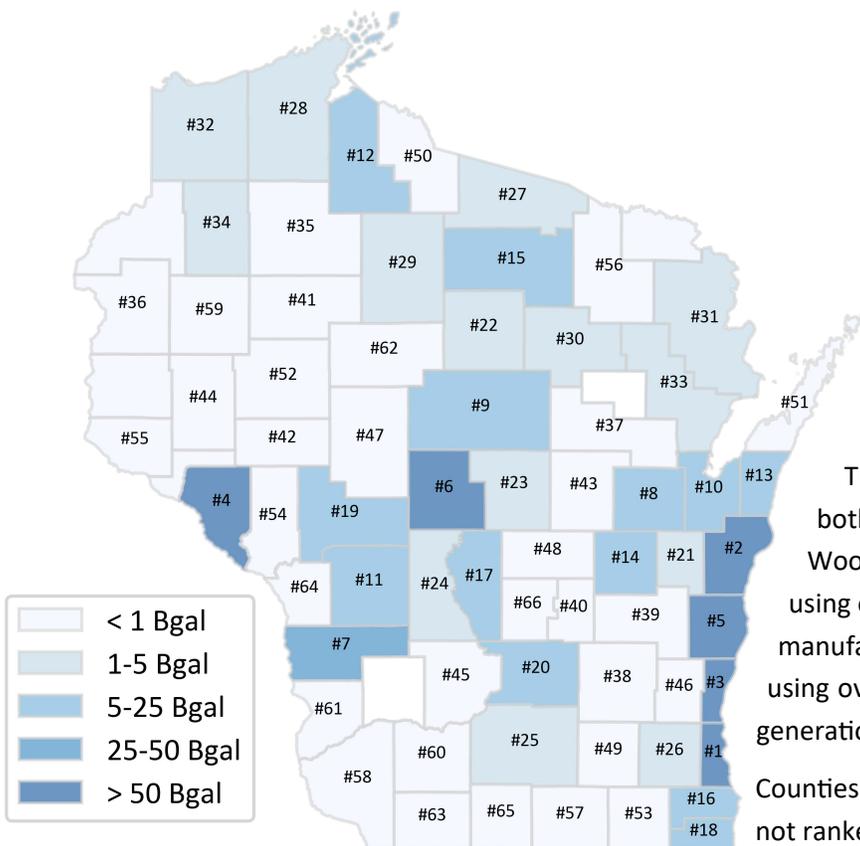
Municipal public water supply was the next highest use for surface water (0.097 trillion gallons) and was concentrated in counties with large populations bordering Lake Michigan.

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.

2021 Surface Water Withdrawals by Use
Total Surface Water Withdrawals = 1.6 Trillion Gallons



2021 Surface Water Withdrawals by County



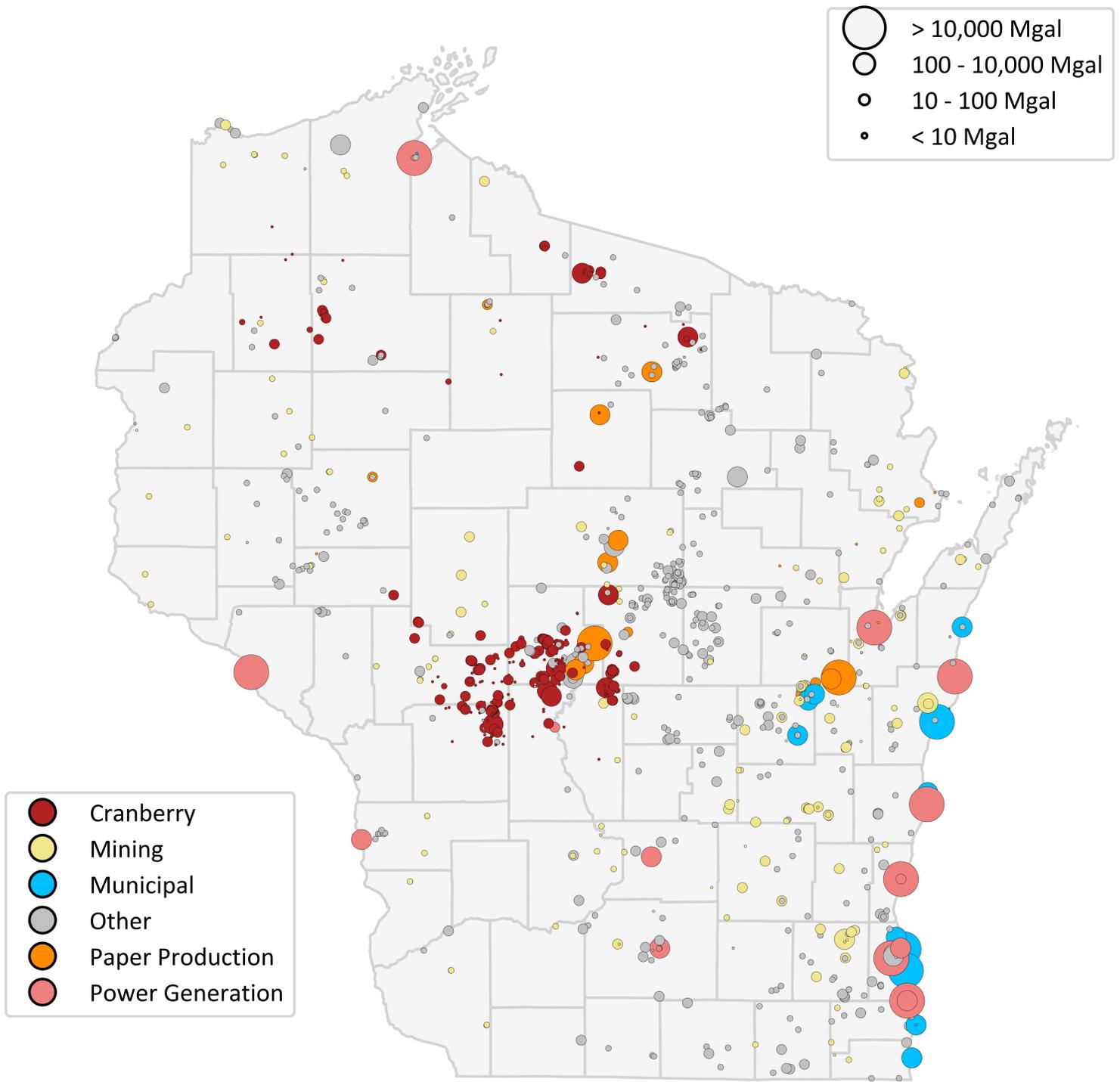
Surface water withdrawals from the top five ranked counties made up 83% of total surface water withdrawals in 2021.

The top-five ranked counties: Milwaukee (#1), Manitowoc (#2), Ozaukee (#3), Buffalo (#4) and Sheboygan (#5) made up 83% of the total surface water withdrawals in 2021. Of the total surface water withdrawal, power generation used 90%.

The next five highest counties used surface water for both power generation and paper manufacturing with Wood (#6), Outagamie (#8) and Marathon (#9) counties using over 70% of their surface water withdrawals for paper manufacturing and Brown (#10) and Vernon (#7) counties using over 60% of their surface water withdrawals for power generation.

Counties without any surface water withdrawals in 2021 are not ranked.

2021 Surface Water Withdrawals



Each dot on this map represents a site of surface water withdrawal. The size of the dot corresponds to the scale of surface water withdrawal, with the smallest less than 10 million gallons annually and the largest 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.

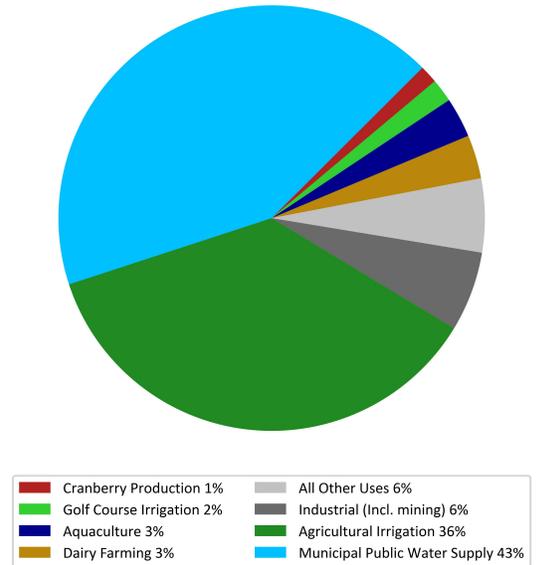
These withdrawals totaled 214 billion gallons from over 11,000 high capacity wells in 2021. This ranks 2021 as the third highest year for groundwater with-drawals since 2012.

Municipal public water supplies remained the largest withdrawer of groundwater. These wells are typically owned by cities and deliver water for residential, commercial, institutional and industrial uses. Municipal suppliers withdrew nearly 91 billion gallons of groundwater in 2021, providing more than two thirds of Wisconsin with their drinking water.

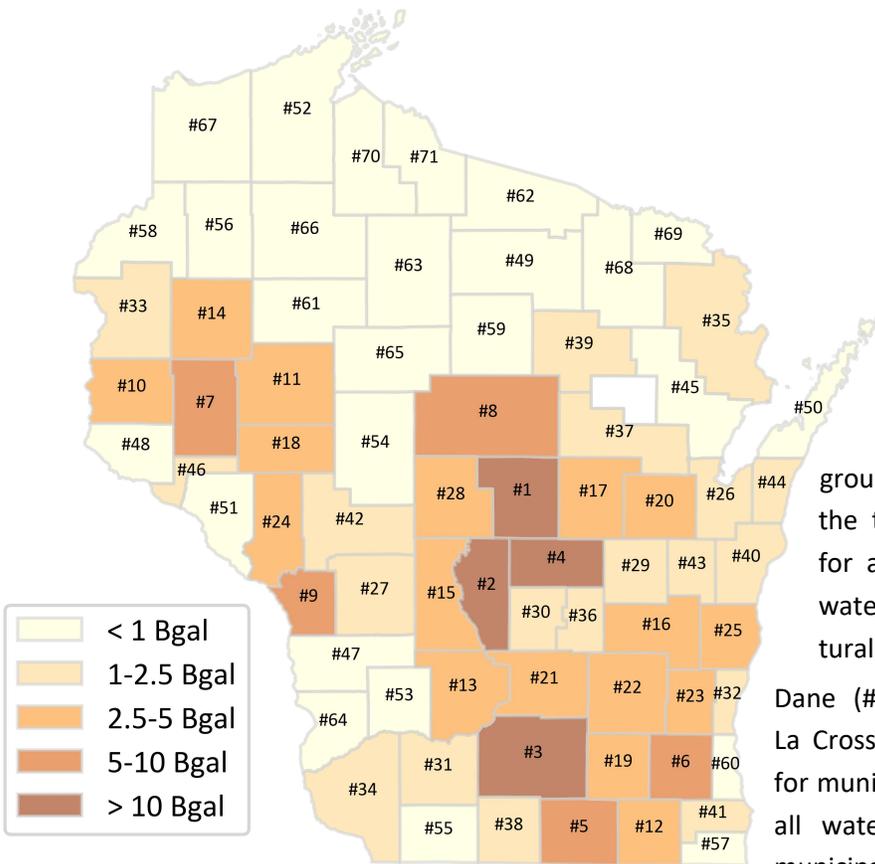
Agricultural irrigation is the second largest use for groundwater in the state, pumping 76 billion gallons.

The category 'All Other Uses' include 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.

2021 Groundwater Withdrawals by Use
Total Groundwater Withdrawals = 213 Billion Gallons



2021 Groundwater Withdrawals by County



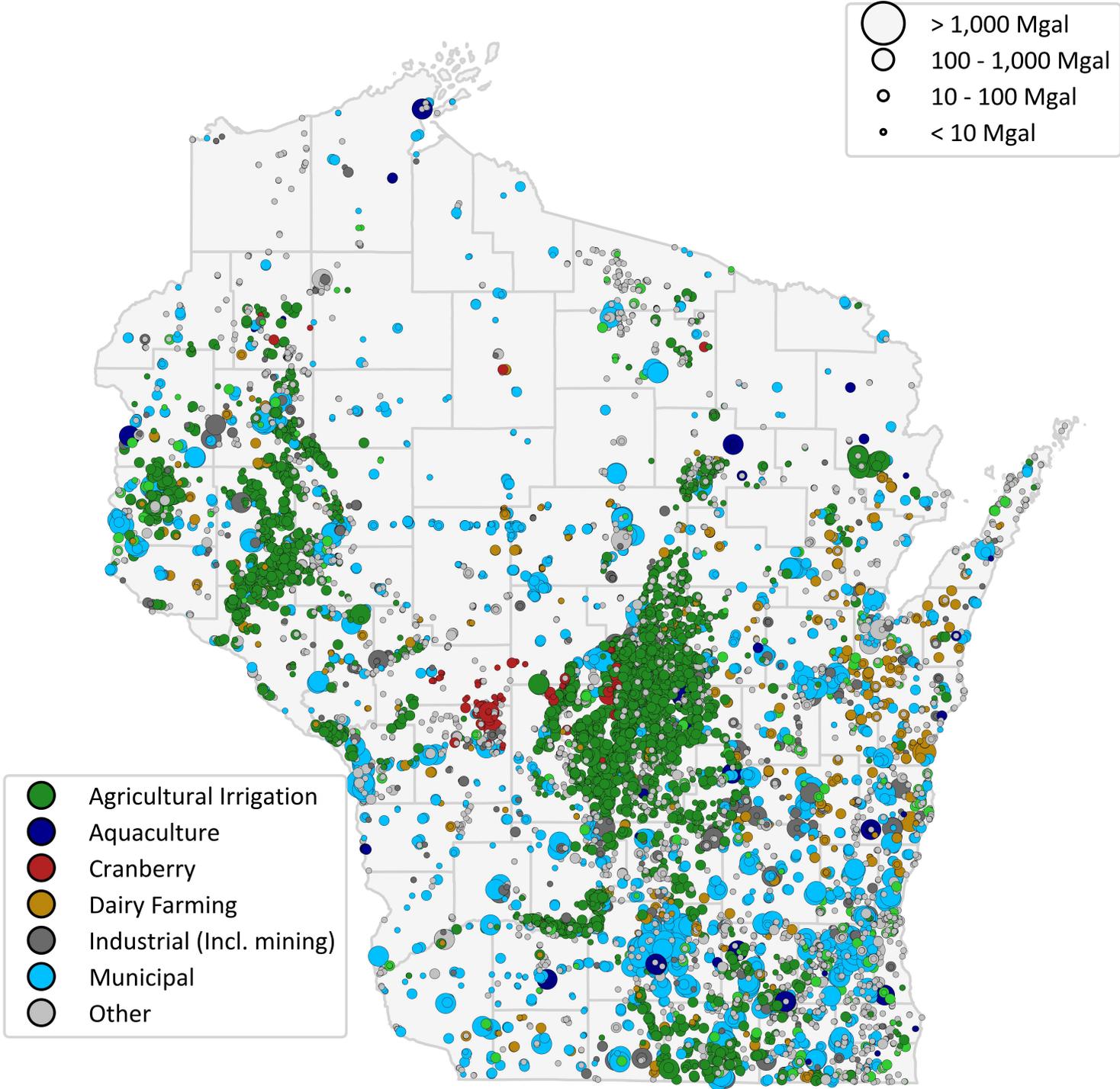
In contrast to surface water withdrawals, the top five ranked counties for groundwater withdrawals made up almost 40% of total groundwater withdrawals.

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

Portage (#1), Adams (#2), Waushara (#4), Dunn (#7) and St. Croix (#10) counties primarily withdrew groundwater for agricultural irrigation. More than half of the total withdrawals in the county went to agriculture for all but St. Croix County, which has municipal public water supply withdrawals almost as high as their agricultural withdrawals.

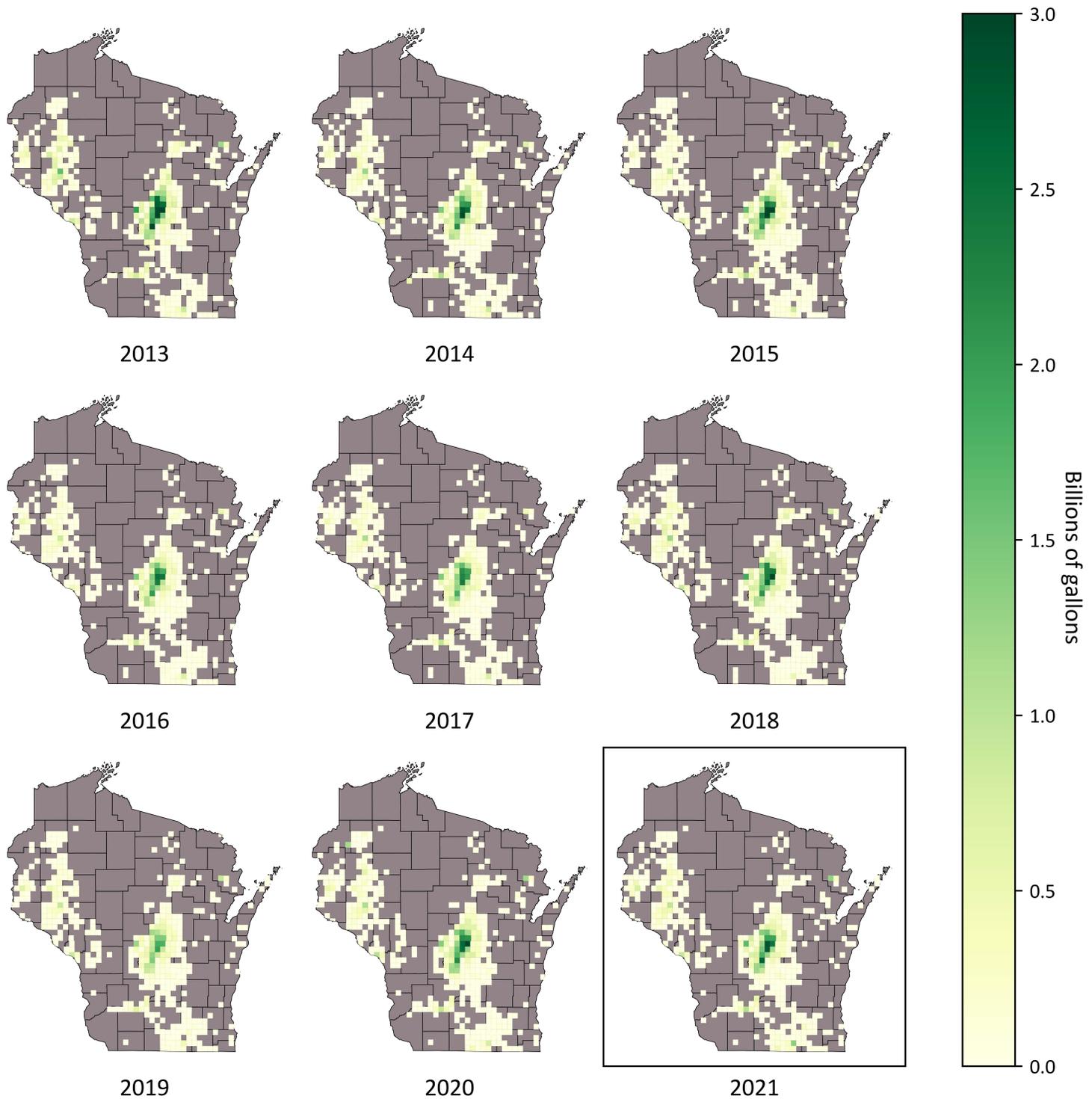
Dane (#3), Rock (#5), Waukesha (#6), Marathon (#8) and La Crosse (#9) counties primarily withdrew groundwater for municipal public water supply, with more than 60% of all water withdrawn in these counties being used for municipal supply.

2021 Groundwater Withdrawals



Each dot on this map represents a site of groundwater withdrawal. The size of the dot corresponds to the scale of groundwater withdrawal, with the smallest less than 10 million gallons annually and the largest 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.

Agricultural Irrigation Pumping per Township & Range



Agricultural irrigation groundwater withdrawals from the previous nine years show the geographic variation in total pumping across the state. Because seasonal precipitation varies with latitude and longitude in the state, different areas withdraw water at different times in the growing season to meet the needs of a given crop. Drought years such as 2013, 2014 and 2015 reflect increased demand for groundwater withdrawals while years with high precipitation such as 2019 and 2020 reflect greatly decreased demand for groundwater withdrawals. Each white-to-green square represents a survey township with agricultural irrigation water withdrawals; grey areas had no agricultural irrigation associated groundwater withdrawals in 2021.

2021 Fact Sheet

- **11,047 active sources** withdrew water throughout the year. In 2021, Wisconsin had 10,302 high-capacity wells and 745 surface water withdrawals.
- In 2021, water users in Wisconsin withdrew **1.77 trillion gallons** from surface and groundwater.
- **2021** ranked as the second lowest year for total withdrawals since 2012.
- Surface water withdrawals accounted for **88% (1,558.8 billion gallons)** of the annual water withdrawal volume.
- Power generation and municipal water supply users withdrew **84% (1,486.1 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% (213.5 billion gallons)** of total water withdrawals, with the majority used for municipal water supply and agricultural irrigation.
- **Power plants and municipalities** were the primary users of Lake Michigan in southeastern Wisconsin.
- **Agricultural irrigation and municipalities** primarily used high amounts of groundwater in the Central Sands and south central Wisconsin.

For more information regarding the Water Use Reporting program or to request more specific information on withdrawals, please visit our website or contact Water Use Program staff: dnr.wi.gov keyword “Water Use”

DNRWaterUseRegistration@Wisconsin.gov 606.266.2299

