



IOWA WATER USE PROGRAM

UPDATE FOR JORDAN AQUIFER STAKEHOLDERS

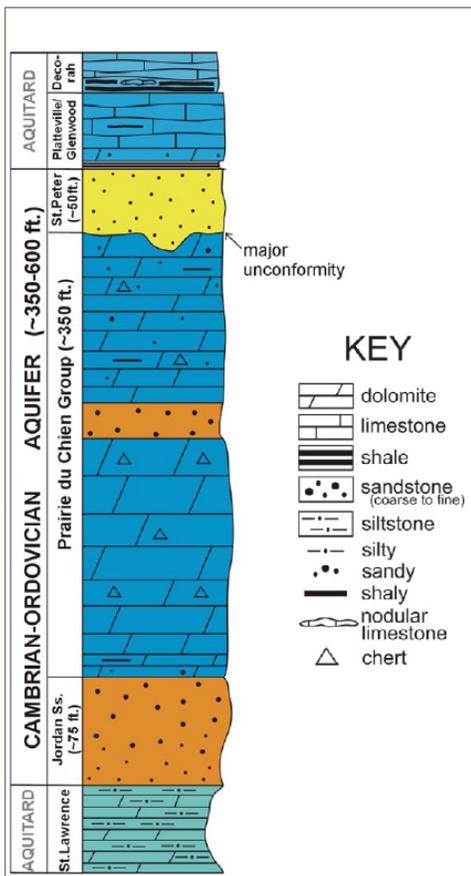
2019

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Jordan Aquifer

The Jordan aquifer, also known as the Cambrian-Ordovician aquifer, or Prairie du Chien aquifer, is the most productive and extensive bedrock aquifer in Iowa. The Jordan aquifer is the most utilized bedrock aquifer in the state, and is the principal source of water for numerous public water supplies and industries.

In Iowa, the Jordan aquifer is typically a deep and confined source of water. Only in extreme northeast regions of the state are the formations of the Jordan aquifer shallow enough to be exposed near the land surface. In these regions the geologic units that comprise the aquifer form dramatic bluffs along roads, streams and rivers.



There are three distinct geologic units in the Jordan aquifer: from top to bottom these are the St. Peter Sandstone Formation, the Prairie du Chien Group, and the Jordan Sandstone Formation.

The total thickness of these three units is generally around 500 feet. The majority of the thickness arises from the fractured dolomite of the Prairie du Chien Group (Figure 1).

Figure 1: Generalized stratigraphy and thickness of geologic formations that comprise the Jordan (Cambrian-Ordovician) aquifer in Iowa. Included are the aquitards above and below the aquifer (from DNR 2011).

Jordan Aquifer Rule

2018 marks the fourth full year of implementing Iowa’s Jordan aquifer rule, and the sixth year of collecting data to implement the rule. Since 2015, all Iowa water use permits utilizing the Jordan aquifer are regulated using a three-tier classification system. The three tier system uses well pumping water levels submitted annually to the DNR and compares these results to the potentiometric surface published by Horick and Steinhilber in 1978. Table 1 below shows the different tier classifications listed in the Jordan Rule.

	Declines from 1978 levels to current pumping levels in Jordan well	
	More than 600 feet of pressure head between aquifer and 1978 potentiometric surface	Less than 600 feet of pressure head between aquifer and 1978 potentiometric surface
Tier 1	< 300 feet	<50 percent
Tier 2	300-400 feet	50-75 percent
Tier 3	>400 feet	>75 percent

Table 1. Jordan aquifer rule tier classification.

Once a water use well’s pumping water level drops into Tier 2 or Tier 3, the water use permittee must submit and implement a water use reduction plan that outlines steps the system will take to raise the well’s pumping water levels back to Tier 1. These plans can also incorporate well maintenance, pumping management, and other methods in addition water use reduction strategies.

If you are interested in the specific language of Iowa’s Jordan aquifer rule, please visit [www.legis.iowa.gov/law/administrativeRules/rules?agency=567&chapter=52](http://www.legis.iowa.gov/law/administrativeRules/rules?agency=567&chapter=52).

Jordan Water Use Permit Changes

In 2018, there was a net increase of one water use permit utilizing the Jordan aquifer, to a current total of 208 active permits. There were three new Jordan water use permits added, two Jordan water use permits dropped, and nine new Jordan aquifer wells drilled in 2018.

A substantial majority of the new permits and wells are for agriculture or ag-industrial purposes, including water for meat processing, dairies, ethanol production, and a confined animal feeding facility. Seven of nine new water use wells



water use can be expected. Figure 4 shows changes in annual water use by county from 2014 (before the new Jordan aquifer rule was implemented) and 2018 (four years after rule implementation). Although water use totals have increased from the Jordan aquifer statewide (see Figure 3), county data indicates that a majority of counties that have Jordan aquifer permits have decreased their annual withdrawals during the past four years (31 out of 54 counties). Water use declines were most substantial in the eastern part of the state, with Linn (-323 mgy), Scott (-196 mgy) and Washington (-104 mgy) counties each decreasing their water use by over 100 mgy over the four year span. With the exception of Chickasaw County, which increased use by 196 mgy, most counties in north central and northeastern Iowa decreased their Jordan aquifer use, typically between 20 to 90 mgy.

Though fewer counties increased their water use from the Jordan during the past four years, the degree of increase in these counties was so substantial that it wholly offset the aggregate decreases noted in the majority of other counties. Exceptionally large growths in water use occur in central and south central Iowa, with Marion (+513 mgy), Polk (+315 mgy), Monroe (+311 mgy) and Jasper (+112 mgy) counties all exceeding 100 mgy. Cerro Gordo County in north central

Iowa also had a large use increase of +347 mgy. Overall, analysis shows how dramatically water use can change over a five-year period. Many of these changes occur due to a single large public water supply or business switching water sources, new industries being established, or businesses expanding their water use.

### Jordan Aquifer Water Levels

Both static and pumping water levels are required to be submitted to the department every year through the water use program's annual report form. Last year, 268 out of 359 water use Jordan wells, or 75%, submitted approved water levels to the program. To be approved, all Jordan well water level readings should be measured and submitted in feet to water (depth) from ground surface. The 75% submittal rate is somewhat lower than previous average of 80%, and might be due to less water use staff involvement with proper submittal of those records.

A total of 180 static water level readings were selected from submitted annual reports to make the 2018 potentiometric surface map for Iowa (Figure 5). The highest potentiometric surface of the Jordan aquifer, as determined by subtracting static water level readings from the land surface elevation,

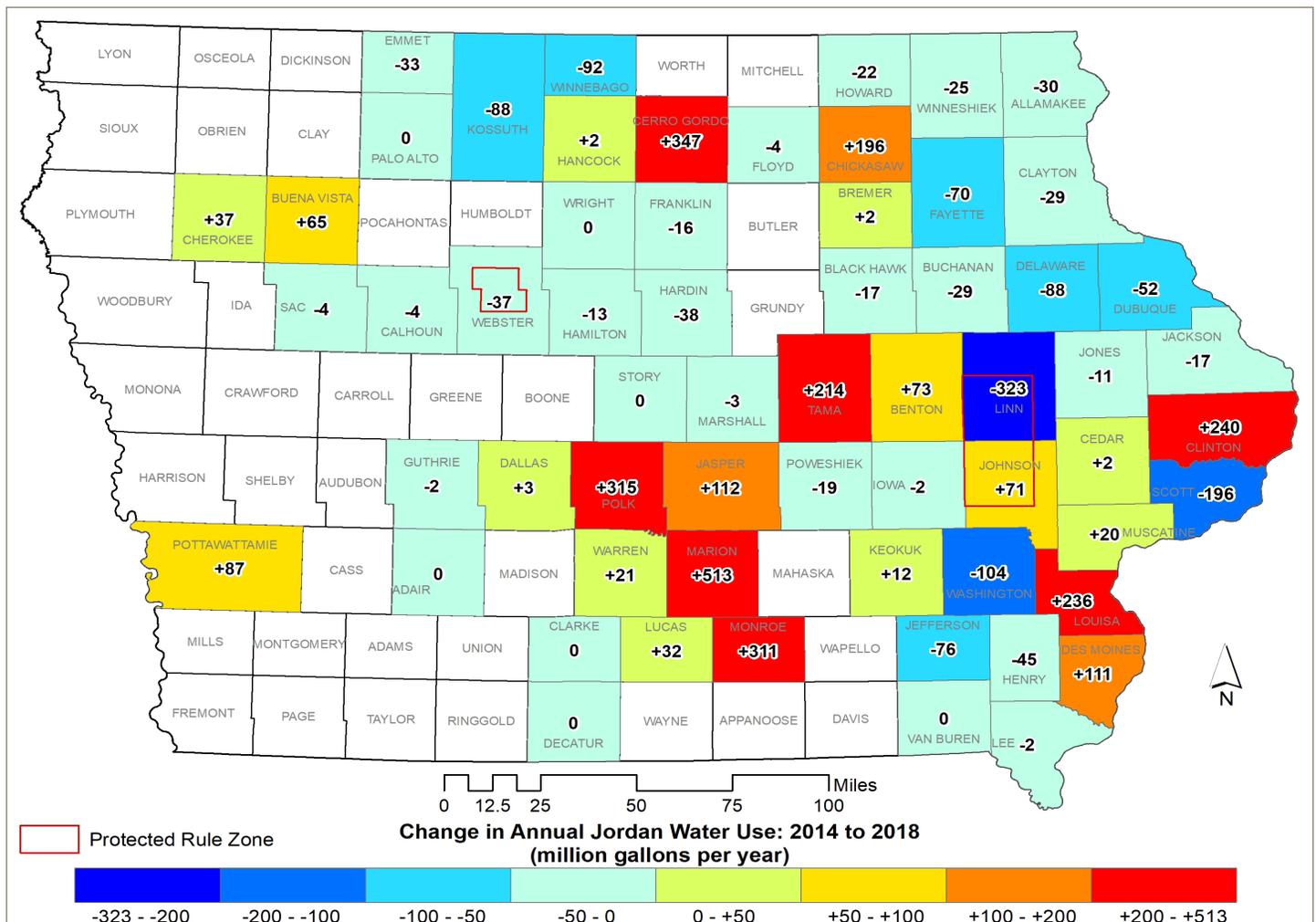


Figure 4. Iowa water use program changes in annual withdrawals from the Jordan aquifer by county from 2014-2018.

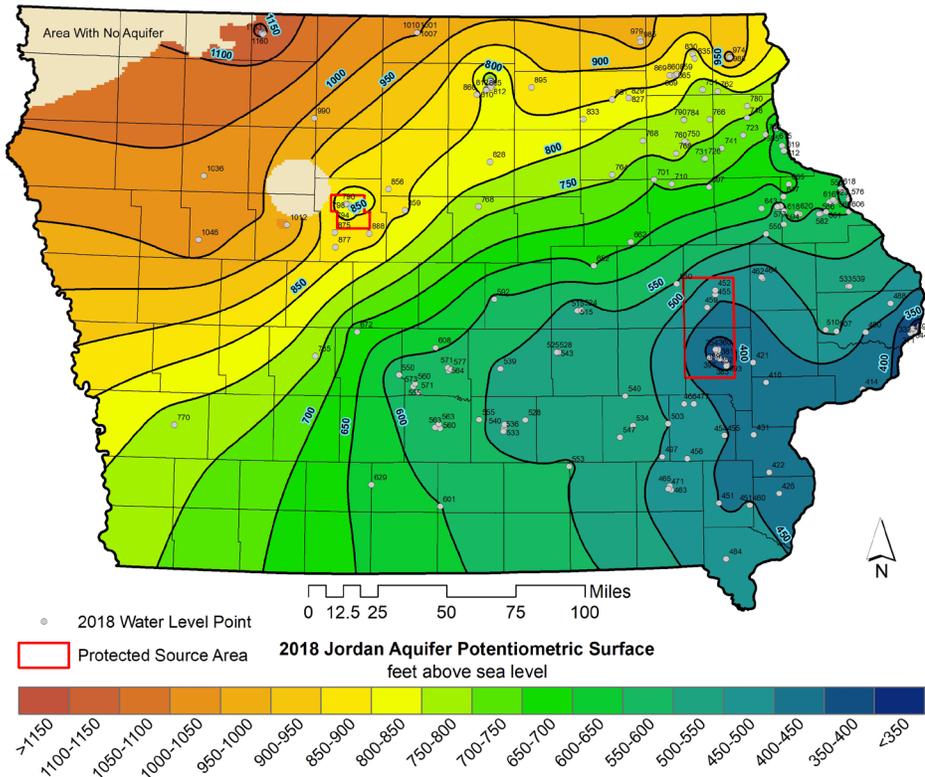


Figure 5. The 2018 potentiometric surface elevation of the Jordan aquifer derived from selected observed static water level information from Jordan water users.

was in Emmet County, where the Jordan potentiometric surface is estimated to be consistently above 1,150 feet above sea level (ft. ASL). The lowest potentiometric surface readings were from Clinton County, where it is estimated to be below 350 ft. ASL. In addition to the established and well known cones of depression noted around Johnson and Webster counties, new regional cones of depression are developing and expanding around central Iowa in Polk and Marion counties, and in north central Iowa around Cerro Gordo County.

## Permits Reaching Tier 2

Results from 2018 annual report forms indicate two additional Jordan Water Use permit holders reached Tier 2 last year: the City of Center Point in Linn County, and Archer Daniels Midland in Clinton County. The Water Use Program is working with each of the systems to develop and implement a water use reduction plan aiming to bring the wells and permits back into Tier 1.

## References and Additional Resources

Horick, P.J., and Steinhilber, W.L., 1978, Jordan aquifer of Iowa: Iowa City, Iowa Geological Survey Miscellaneous Map Series 6, 3 sheets, scale 1:1,000,000.

Iowa Department of Natural Resources, 2011, Water Quality of the Cambrian Ordovician Aquifer in Iowa: Iowa Geological and Water Survey Resource Information Fact Sheet 2011-2, 4 pages.

Iowa Department of Natural Resources, 2016, Measuring Water Levels in Wells: Iowa Department of Natural Resources Water Use Program Guide, 4 pages.

Iowa Department of Natural Resources, 2017, Iowa Water Use Program Update for Jordan Aquifer Stakeholders: Iowa Water Use Information Fact Sheet, 4 pages.

Iowa Department of Natural Resources, 2018, Iowa Water Use Program Update for Jordan Aquifer Stakeholders: Iowa Water Use Information Fact Sheet, 4 pages.

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[www.iowadnr.gov/wateruse](http://www.iowadnr.gov/wateruse)

## Other Water Use Program News

This past winter, the Water Use Program's online web application, Water Allocation Compliance and Online Permitting (WACOP), had some minor updates. Changes included an improved home page, improved user dashboard and improved buttons, among many other small changes. We encourage you to sign up for a WACOP account, or view all your active permit information on the WACOP application at: <http://programs.iowadnr.gov/wateruse/>.

Heidi Cline was recently hired to replace Charlotte Henderson, who retired from the Water Use Program. Heidi assists permittees in Iowa's water use program, including changing contact names, answering questions about fees and forms, and even setting up WACOP online accounts. You can reach Heidi at 515-725-0341 or [Heidi.Cline@dnr.iowa.gov](mailto:Heidi.Cline@dnr.iowa.gov).