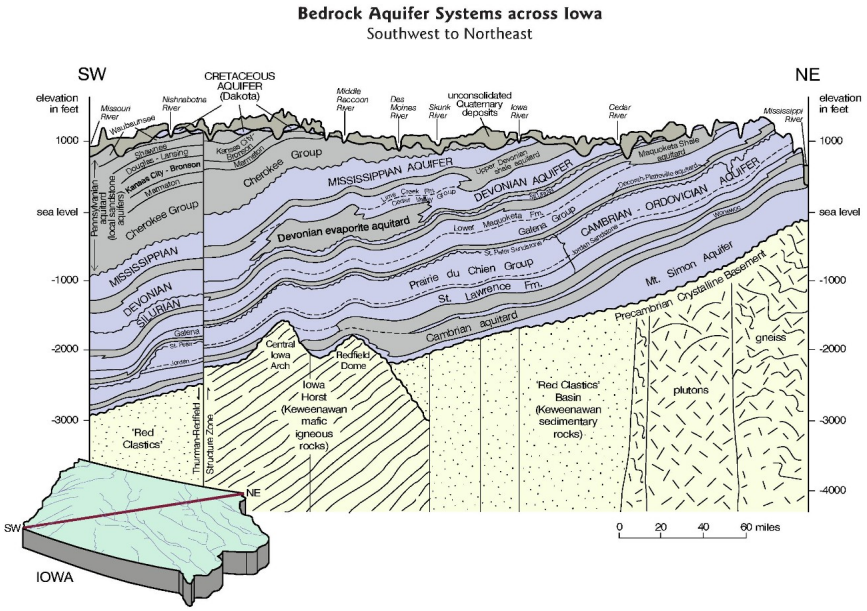
SIERRA CLUB
IOWA CHAPTER

WATER WOES: UNCOVERING THE TRUE COST OF SUMMIT'S CARBON CAPTURE PROJECT



28 *Iowa Department of Natural Resources*

Prepared by:

Wallace Taylor
Donald Johannsen
Jessica Wiskus
Jess Mazour
Pam Mackey Taylor
Steve Veysey

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About Sierra Club

Sierra Club is America's and Iowa's oldest and largest grass roots environmental organization. The Iowa Chapter has approximately 7,000 members throughout the state. Over the years protection of Iowa's waters has been a major issue for the Iowa Chapter. That includes water withdrawal and allocation.

In 2020 Sierra Club challenged the proposal by Pattison Sand Company to withdraw water from the Jordan aquifer in Clayton County. More recently we have challenged the withdrawal of water to supply the carbon dioxide capture facilities for Summit Carbon Solutions.

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INTRODUCTION

Many Iowans believe that Iowa's aquifers hold enough water to meet the state's needs for personal use, drinking water, livestock, and industrial uses.

Recent water concerns have raised issues concerning depletion of Iowa's water aquifers, such as extended drought, plans to use groundwater for carbon dioxide capture, increased use for irrigation, and expansion of ethanol production, including using ethanol for sustainable aviation fuel.

The Iowa Department of Natural Resources (DNR) has been granting water withdrawal permits to business and industries for large quantities of water each year with little regard for the impact on aquifers. At the same time, the quantity of water in the aquifers is largely unknown. And there have been no studies of the projected water withdrawal and the ability of the aquifers to sustain the withdrawal.

BACKGROUND

Water is life! This truth has been a rallying cry for efforts to protect our water resources. We know that our streams, lakes and rivers are polluted. In the most recent list of water segments impaired by pollution, there are 576 polluted water segments with 743 different pollutants causing the impairments.[1] Hundreds more have been removed from the current list but still impaired. But there is an aspect of Iowa's water resources that has received far less attention: water quantity.

The amount of water available for our use has never been a concern for Iowans. We have always been blessed with adequate rainfall and snowfall in order to recharge the aquifers under our rich soil.

Aquifers are underground bodies of water enclosed in areas between layers of rock or soil. There are two types of aquifers – bedrock aquifers and alluvial aquifers. Aquifers between layers of rock are called bedrock aquifers. Those between layers of soil near rivers and streams are called alluvial aquifers.[2] When we are digging a well, we are tapping into those aquifers.

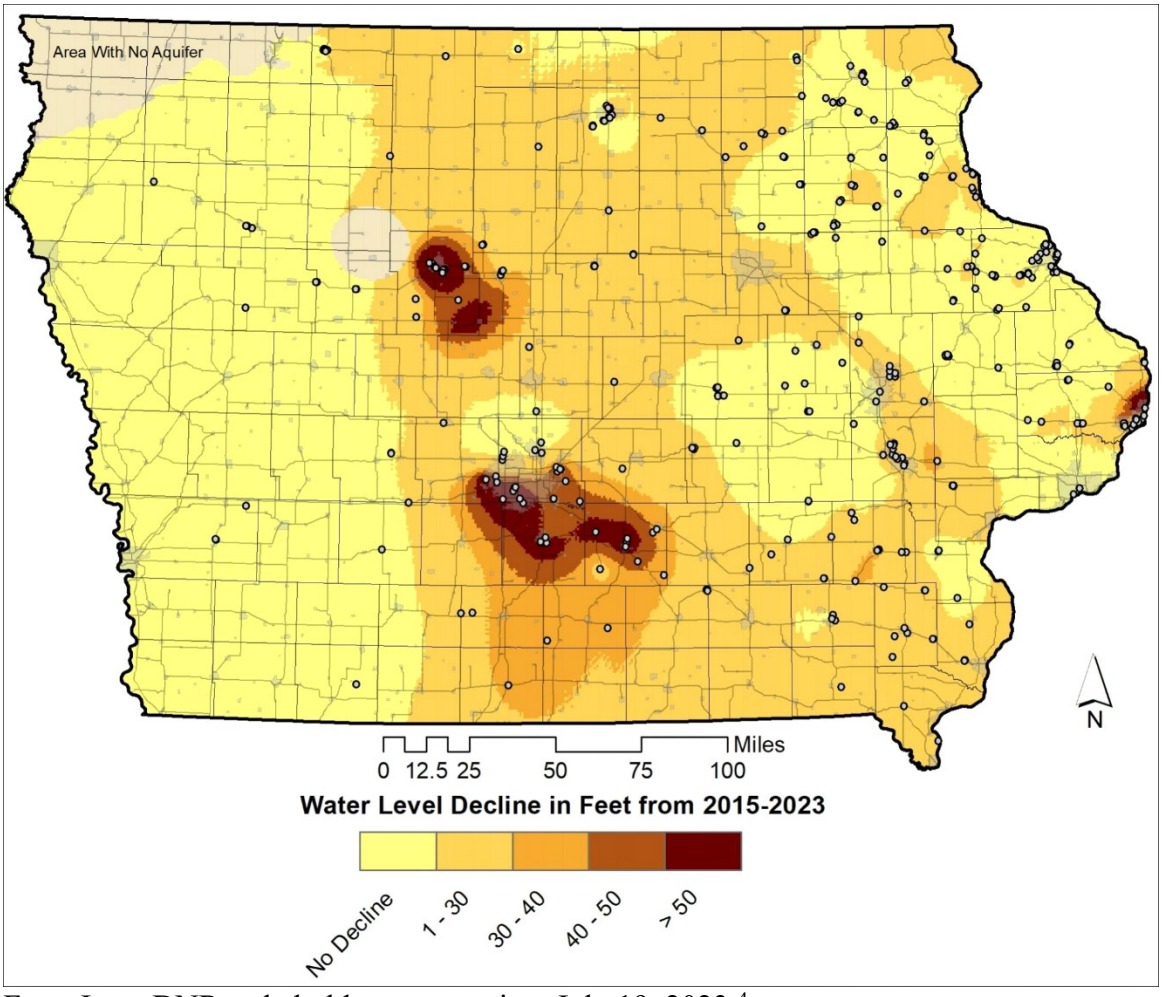
But what happens when there is not enough rainfall and snowfall to maintain the aquifers and we are withdrawing too much water to keep the aquifers sustainable for future use? As we will show in this report, that is what is happening now.

Iowa has four major aquifers: Cretaceous (Dakota), Mississippian, Silurian-Devonian, and Cambrian-Ordovician (Jordan). These aquifers are at different depths, even in different parts of the state, and somewhat overlap in the areas of the state in which they

1 https://programs.iowadnr.gov/adbnet/Assessments/Summary/2024
2 https://usgs.gov/publications/alluvial-and-bedrock-aquifers-denver-basin-eastern-colorados-dual-ground-water

occur.[3] In addition there are alluvial aquifers throughout the state in shallow sandy soils formed in river valleys. These aquifers are extremely vulnerable to pollution infiltration. In order for aquifers to remain viable, the water in them must be replenished, or recharged. Natural groundwater recharge occurs as precipitation falls on the land surface, infiltrates into soils, and moves through pore spaces down to the water table. Natural recharge also can occur as surface-water leakage from rivers, streams, lakes, and wetlands. Artificial recharge can be done through injection of water through wells. This method often is applied to recharge deep aquifers where natural recharge is not effective at recharging these aquifers.

Iowa's aquifers are in danger of not being adequately recharged. Confined aquifers can take hundreds of years to recharge despite annual fluctuations in rainfall. For example, the map below shows the water level decline in the Jordan Aquifer between 2015 and 2023.



From Iowa DNR stakeholder presentation, July 19, 2023.[4]

3 https://www.iowadnr.gov/environmental-protection/water-quality/water-monitoring/groundwater

4 Iowa Department of Natural Resources presentation from the Water Use Program Annual Stakeholder Meeting (July 19, 2023), available at

The Iowa Code and Iowa Department of Natural Resources (DNR) regulations establish requirements for the withdrawal of water from the state's aquifers. Iowa Code Section 455B.262(2) states:

> The general welfare of the people of the state requires that the water resources of the state be put to beneficial use which includes ensuring that the waste or unreasonable use, or unreasonable methods of use of water be prevented, and that the conservation and protection of water resources be required with the view to their reasonable and beneficial use in the interest of the people, and that the public and private funds for the promotion and expansion of the beneficial use of water resources be invested to the end that the best interests and welfare of the people are served.

Chapters 50 and 52 of the DNR regulations define the procedure and criteria for the DNR to issue permits for the withdrawal of groundwater from the aquifers. How DNR has not adequately regulated water withdrawal, resulting in too much water being withdrawn, will be detailed below in the section on DNR regulations and policies.

One of the primary uses causing depletion of the aquifers is the use of water by ethanol plants. Currently 31 of the 42 ethanol plants in Iowa will be using carbon capture technology for the pipeline proposed by Summit Carbon Solutions. Water use for those 31 ethanol plants in Iowa can range from 195 million gallons per year to 646 million gallons per year, depending on the size and amount of ethanol production per plant. Using data from the Department of Natural Resources reports, it is estimated that the 42 ethanol plants in Iowa withdraw over 12 billion gallons of water a year from the aquifers and 13.5 billion gallons per year from all sources. Can Iowa's aquifers continue to withstand this amount of water depletion? The evidence indicates the answer is no.

A significant concern now is that there are proposals to extract even more water at the ethanol plants to be used to capture carbon dioxide from the plants. The water would be used to compress the carbon dioxide so it can be transported in pipelines to be sequestered underground in other states or used to extract oil and gas from almost depleted oil and gas wells. A carbon dioxide capture facility would use an estimated 36 million gallons of water per year to 205 gallons of water per year. It is estimated that the Summit carbon capture process will require 3.36 billion gallons of water annually.

This report will explain how we can protect our aquifers and ensure that we have water for life.

https://www.iowadnr.gov/Portals/idnr/uploads/water/wse/2023stakeholderupdate.pdf&yed=2ahUKEwi8845_3pKGAxW638DHV31AG8QFnoECBYQAQ&usg=AOvVaw3dQOuzoayq6xPQPXi

WATER USE IN IOWA

Iowa's groundwater is siphoned up for many uses. The table below identifies those many uses and groundwater withdrawals in millions of gallons per year (MGY), during 2022, the most recent data.

Water usage for 2022, based on Iowa Department of Natural Resources Reports. Numbers are in millions of gallons per year.

Use Category	Percent Aquifer water source[5]	DNR Water Use Total Alluvial and Aquifer	Adjustment for ethanol plants receiving water from public water systems[6]	Water usage adjusted for Ethanol plant water sourced from public water systems	Aquifer Water Source	Alluvial Water Source
Ethanol Production	90%	7,653	5,847	13,500	12,150	1,350
Heating/ Cooling	70%	7,669		7,669	5,368	2,301
Animal Feeding Operation	40%	4,410		4,410	1,764	2,646
Industrial / Commercial	40%	95,686		95,686	38,274	57,412
Public Water System	35%	157,251	-5,847	151,404	52,991	98,413
Irrigation - Corn & Soybean	30%	31,846		31,846	9,554	22,292
Irrigation - Golf Course	30%	2,750		2,750	825	1,925
Irrigation – Specialty Crops	30%	2,975		2,975	893	2,083
Other	25%	511		511	128	383
Recreational	5%	11,994		11,994	600	11,394
Power Generation	1%	491,720		491,720	4,917	486,803
Quarry	1%	29,376		29,376	294	29,082
Totals		843,841		843,841	127,758	716,083

5 The determination of the percent aquifer vs. alluvial water was done by sampling a statistically significant number of permits from each DNR category.

6 Ethanol production for the 42 ethanol plants in Iowa per the Iowa Renewable Fuels association Director Mr. Monte Shaw was reported as 4.5 billion gallons for 2022. Analysis of the 31 ethanol plants on the Summit pipeline along with several other public sources indicate it requires at least 3 gallons of water to produce 1 gallon of ethanol. A ratio of 3 was used for this analysis. A total of 3 gal. water/ gal. ethanol x 4.5 billion gal. ethanol = 13.5 billion gallons of water that would be required to produce 4.5 billion gallons of ethanol. The DNR water permits for ethanol production in 2022 totals 7,653 MGY which is 5,847 MGY less than the 13,500 MGY that would be required. Of the 31 ethanol plants on the Summit pipeline 10 either do not have a DNR water permit or reported zero water usage. This would indicate that some ethanol plants are sourcing water from other sources such as the Public Water System. In order to provide a more accurate understanding of the total water use by ethanol plants 5,847 MGY will be moved from the Public water category to the Ethanol Production category.

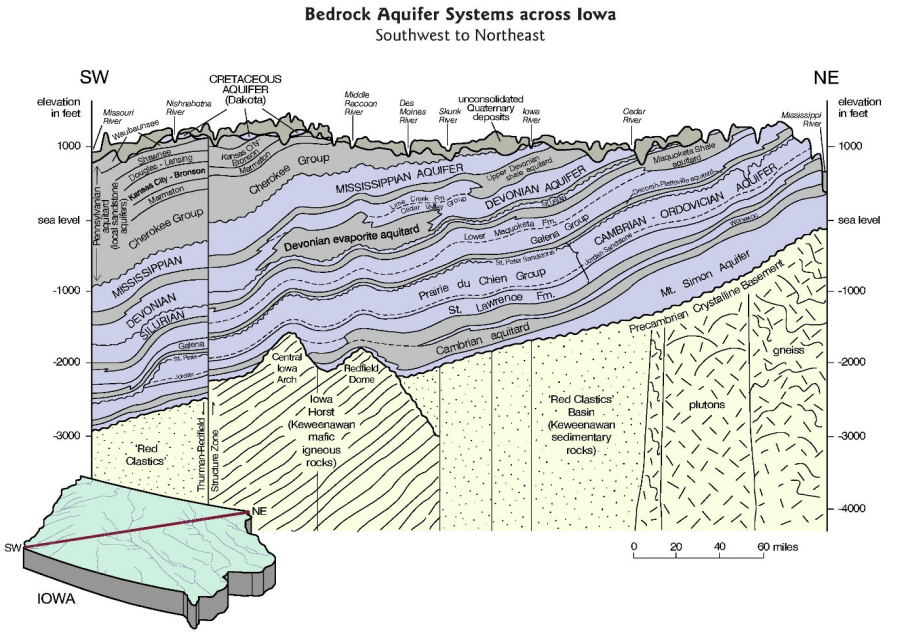
Based on information from Iowa DNR Water Use Annual Stakeholder Meeting, July 19, 2023

The total water withdrawn from the aquifers in 2022, from the table, is almost 128 **billion** gallons per year. Adding carbon capture processes for the 31 Summit ethanol plants in Iowa would require an additional 3.36 billion gallons of water per year from the aquifers.

AQUIFERS IN IOWA IMPACTED BY WATER WITHDRAWAL

As explained above, the two types of aquifers are alluvial aquifers and bedrock aquifers. Alluvial aquifers are fairly quickly recharged by rain and snow melt, but bedrock aquifers recharge very slowly.[7]

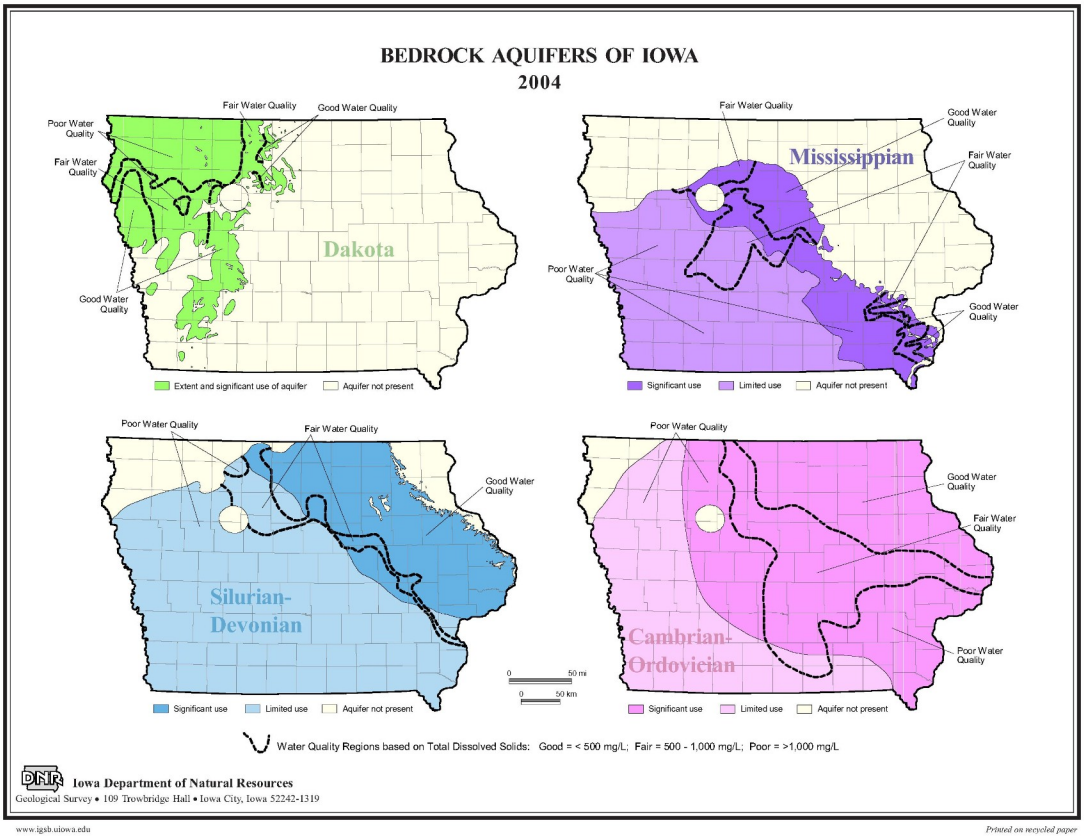
The focus of this report is on bedrock aquifers. Bedrock aquifers are underground rock formations with open spaces called pores in which water accumulates. The four major aquifers in Iowa, Cretaceous (Dakota), Mississippian, Silurian-Devonian, and Cambrian-Ordovician (Jordan), are at different depths and become deeper as they move from northeast to southwest, as shown by the diagram below.



28 *Iowa Department of Natural Resources*

7 https://usgs.gov/publications/alluvial-and-bedrock-aquifers-denver-basin-eastern-colorados-dual-ground-water

And the aquifers cover different, although somewhat overlapping, areas of the state, as shown by the diagram below.



There are no reliable numbers for the amount of water in these aquifers, nor a comprehensive understanding of how quickly and substantially the aquifers are being depleted. However, the water levels in a majority of the Cretateous (Dakota) aquifer wells in northwest Iowa show long-term declines between 1984 and 2021, as shown in the graph below. Obviously, this pattern is not sustainable.

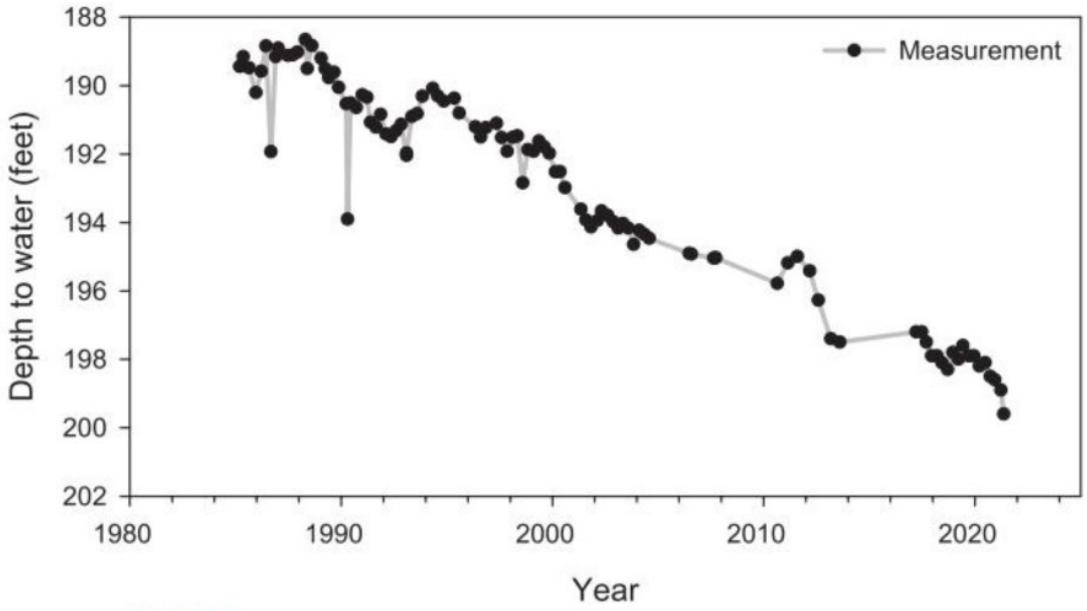


FIGURE 2.
Data from a Cretaceous Dakota aquifer well illustrating a steady decline in water levels over time.

From The IGS Geode, Activities of the Iowa Geological Survey, p. 10. 2020-2021

Likewise, water use from the Jordan Aquifer has become a concern. The Jordan Aquifer is "the most productive and extensive bedrock aquifer in Iowa" and "is the most utilized bedrock aquifer in the state" and "is the principal source of water for numerous public water supplies and industries."[8] But it is not an unlimited resource. The Jordan is a confined aquifer, meaning that the waters that comprise the source are ancient, and local rains do not penetrate into the aquifer to recharge it. A study published by the Iowa Geological Survey in 2017 found that the age of the water in the Jordan was between 69,000 and 178,000 years old.[9]

Water levels in the Jordan have been in decline this past decade. Some areas of the state have seen the aquifer go down by over 50 feet.[10] The map below from Iowa DNR illustrates the potentiometric surface – which is similar to a water table – of the Jordan

8 Update for Jordan Aquifer Stakeholders (2020), available at https://www.iowadnr.gov/Portals/idnr/uploads/water/wse/JordanAquiferStakeholderReport2020.pdf&ved=2ahUKEwiCm97Pqt6FAxVuCnkGHb1zBGsQFnoECBUQAQ&usg=AOvVaw2SG4lVtHSp2xAWBH9N_e6G

9 Schilling, et al., *Estimating groundwater age in the Cambrian-Ordovician aquifer in Iowa: implications for biofuel production and other water uses*, Environmental Earth Sciences, v. 76, no. 2 (2017).

10 https://www.iowadnr.gov/Portals/idnr/uploads/water/wse/2023stakeholderupdate.pdf&yed=2ahUKEwi8845_3pKGAxW638DHV31AG8QFnoECBYQAQ&usg=AOvVaw3dQOuzoayq6xPQPXi

Aquifer. Potentiometric surface applies to confined aquifers and represents the level to which the water would rise if the containing layers were not present. Static water level applies to unconfined aquifers.

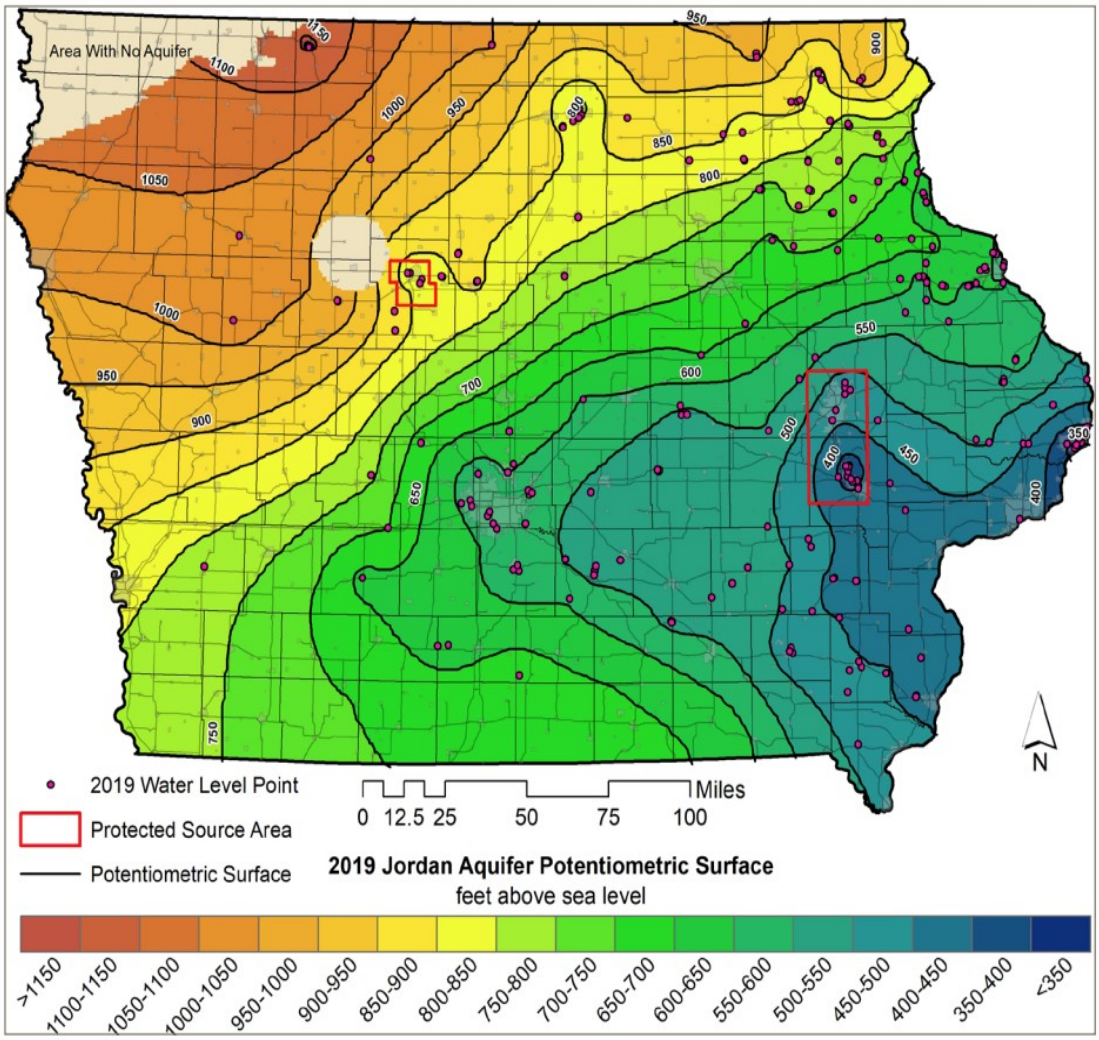


Figure 5. The 2019 potentiometric surface elevation of the Jordan aquifer derived from selected observed static water level information from Jordan water users.

The depletion of this source is so concerning that the DNR recently developed special rules about the use of this aquifer.[11] DNR has a plan for lowering consumption of water from the Jordan Aquifer in general, and two areas have been designated as special

11 567 Iowa Administrative Code § 52.4(3)

concern, which have been termed Protected Source areas, outlined in red on the map above. These Protected Source areas are currently located in Webster, Linn and Johnson Counties. These are areas where, according to this DNR document, "cones of depression" have been noted, where the constant pumping of groundwater lowers the potentiometric surface, forming a sort of conical, downward shape. A cone of depression is the "canary in the coal mine," telling us that we are in particular danger.

Nevertheless, even with these new protections, the Jordan continues to be subject to overuse. The authors of the 2017 study on the Jordan recommended that ethanol production not be located in places where deep groundwater reserves, like the Jordan Aquifer, would be consumed.[12] They also detailed the way that ethanol production has drawn increasingly on water from bedrock aquifers across the state. Over the course of a decade, for example, use of the Jordan for ethanol increased by 36%. In conclusion, the authors recommended that ethanol production not be located in places where deep groundwater reserves, like the Jordan Aquifer, would be consumed. Despite this warning, Iowa DNR water supply engineer Chad Fields said recently, "We've seen an increase in use. There's about, on average, 25 billion gallons that are taken out of the Jordan Aquifer per year. And we see an increase of about 8%... every year from that aquifer in use."[13]

This year the Iowa Legislature passed a law that appropriates $250,000 for "purposes of supporting a groundwater planning and resource assessment project to be administered by the Iowa geological survey."[14] This study will provide a much needed assessment of the status of our aquifers and should guide the DNR in determining how to address permit applications for water withdrawal.

DNR REGULATIONS AND POLICIES ON WATER WITHDRAWAL

The Iowa Legislature has tasked the Iowa DNR with the obligation to protect Iowa's groundwater resource and regulate water withdrawal from the groundwater in the aquifers. Unfortunately, the DNR has not taken this task seriously.

Section 455B.262 of the Iowa Code states:

> It is recognized that . . . the orderly development, wise use, protection, and conservation of the water resources of the state by their considered and proper use is of paramount importance to the welfare and prosperity of the people of the state, and to realize these objectives it is the policy of the state to correlate and vest the powers of the state in a single agency, the [DNR], with the duty and authority to assess the water needs of all water users . . . .

12 Schilling, et al., *Estimating groundwater age in the Cambrian-Ordovician aquifer in Iowa: implications for biofuel production and other water uses*, Environmental Earth Sciences, v. 76, no. 2 (2017).
13 https://www.kcrg.com/2024/04/19/drought-high-usage-stressing-iowas-water-resources/.
14 https://www.legis.iowa.gov/legislation/BillBook?ba=SF2421&ga=90.

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> The general welfare of the people of the state requires that the water resources of the state be put to beneficial use which includes ensuring that the waste or unreasonable use, or unreasonable methods of use of water be prevented, and that the conservation and protection of water resources be required with the view to their reasonable and beneficial use in the interest of the people, and that the public and private funds for the promotion and expansion of the beneficial use of water resources be invested to the end that the best interests and welfare of the people are served.

The legislative intent could not be more clear. Iowa's groundwater resource must be protected. That is the DNR's responsibility.

DNR regulation 50.1 states:

> The department has jurisdiction over the surface and groundwater of the state to establish and administer a comprehensive program to ensure that the water resources of the state be put to beneficial use to the fullest extent possible, that the waste or unreasonable use, or unreasonable methods of use of water be prevented, and that the conservation and protection of water resources be required with the view to their reasonable and beneficial use in the interest of the people.

The DNR purports to carry out this duty by requiring any entity that proposes to obtain more than 25,000 gallons of water during a period of 24 hours or less from any source of groundwater to apply for a permit. The DNR's permit application requests very little information that would properly inform the DNR's decision on issuing a permit. The application simply asks for identity of the persons involved in making the application, the water use category, the total allocation of water requested, and minimal details of the location of the proposed water withdrawal. The only water use categories listed are: animal feeding or dairy operations, ethanol production, heating/cooling, industrial/commercial, crop irrigation, golf course/country club, power generation, public water supply, quarry operation, and recreational water.

These use categories are limited and arbitrary. There is nothing in the statutes or the regulations that specify those uses nor justify limiting the DNR's review to just those uses. As noted above, the privilege of using the public water resource is available only for a beneficial use. And there is nothing in the statutes or regulations that defines a beneficial use in terms of categories. Each specific application for water withdrawal must be evaluated on its own merits. For example, the data discussed previously shows that water use for an ethanol plant might range from 195 million gallons per year to 646 million gallons per year. The larger ethanol plant's water withdrawal should not be approved just because it is an ethanol plant. But that is how the DNR views its obligation.

DNR rule 50.6(1) requires that the application to withdraw water must identify the aquifer from which the water will be withdrawn, predict the effects of pumping with a reasonable degree of confidence, and information to determine any permit conditions for well interference. The application form does not require any of that information and the DNR routinely does not require the information to be provided.

DNR rule 50.7(2) says that before making an initial decision on a water withdrawal application, the DNR must prepare a summary report stating "whether the withdrawal or use of the water conforms to relevant criteria," identifying "the information used to determine the potential for a proposed use of water to adversely affect other water users," describing "the effects on water levels anticipated to occur from the proposed use," and describing "if well interference has been found; and provid[ing] options for resolving" any well interference. But in general, DNR's summary reports are cursory two-page conclusions with no supporting evidence provided. They conclude with a boilerplate statement that, "The ability and intent of the applicant to devote a reasonable amount of water to a beneficial use seem evident."[15] That conclusion cannot be evident without supporting evidence.

In other words, Iowa DNR has been granting water withdrawal permits without any reasonable determination as to the impacts on the aquifers. That is a violation of the letter and intent of the law.

PROTECTION OF IOWA'S WATER RESOURCES ARE AT RISK DUE TO THE GOVERNOR'S EXECUTIVE ORDER 10

The DNR is currently revising its rules to comply with the Governor's Executive Order 10. The executive order requires all state agencies to repeal and then revise all of their rules so the rules use fewer words, fewer restrictive terms, and are less burdensome on the entities that are supposed to be regulated to protect the public and the environment.

One of the proposed revisions is to delete the following paragraph from rule 50.1:

> The department has jurisdiction over the surface and groundwater of the state to establish and administer a comprehensive program to ensure that the water resources of the state be put to beneficial use to the fullest extent possible, that the waste or unreasonable use or unreasonable methods of use of water be prevented and that the conservation and protection of water resources be required with the view to their reasonable and beneficial use in the interest of the people.

That paragraph should not be deleted, because it puts the concept of beneficial use in the proper context of public benefit.

15 See, for example, Attachment A.

More significantly, however, the rules and DNR policy in water use permitting should not be based on classifications of beneficial use. As explained previously, the current DNR protocol is to treat every application in a general classification as automatically being permitted if the applicant is in the established use category. More significantly, however, the rules and DNR policy in water use permitting should not be based on classifications of beneficial use. As explained previously, the current DNR protocol is to treat every application in a general classification as automatically being permitted if the applicant is in the established use category. But these use categories are limited and arbitrary. By contrast, the Iowa Code is very clear in its mandate: the privilege of using the public water resource is available only for a beneficial use. Accordingly, DNR regulations must be clear that water use permits should not be based on categories of use. For example, an animal feeding operation of 500 animals will have less impact on the groundwater than an operation of 5,000 animals. The 5,000 head operation should not be approved just because it is an animal feeding operation. But that is how the DNR views its obligation. Iowa Code and DNR regulations must be clear that water use permits should not be based on categories of uses.

Proposed rule 50.13(3) deletes the previous requirement for public notice of an application for renewal of a permit. That requirement should be retained. A renewal can involve a significant modification or there may be new facts that make the renewal problematic. Renewal should not be automatic. The public should be informed of these applications.

Proposed rule 50.14(3) requires an appeal of an initial decision to the director within 30 days of mailing the notice. Of course the notice will only be mailed to the applicant, any person who commented, and any person who requested a copy of the decision. So many people who will be aggrieved by the decision will not have received a copy of the decision. There should be no requirement for an appeal to the director. The decision should be subject to judicial review pursuant to § 17A.19 of the Iowa Code just like any other decision of the department that is not a contested case.

It is noted that Iowa Code § 455B.365(1) says that, subject to appeal, the department or director may determine the duration, frequency, and amount of water withdrawal. But, for the reasons stated above, that requirement for appeal should be limited to the applicant. The public should not be forced to appeal to the director, since the public is not a party. Instead, the public should be allowed to appeal a decision to district court. We believe that is the intent of the law.

In proposed rule 50.20(2), withdrawal for industrial use and power generation is too broad and vague. There are different types and levels of industrial use and power generation. Each application should be evaluated on its own merits.

In proposed rule 50.20(3), withdrawal for community water supply does not consider the size and nature of the community. Again, each application should be evaluated on its own merits.

In proposed rule 50.20(4), withdrawal for recreational and aesthetic uses is determined on a case-by-case basis. This is the way it should be done for all uses.

Sierra Club has asked the DNR to modify its proposed rules so that they are consistent with the comments in this section. That way, our aquifers can be better protected.

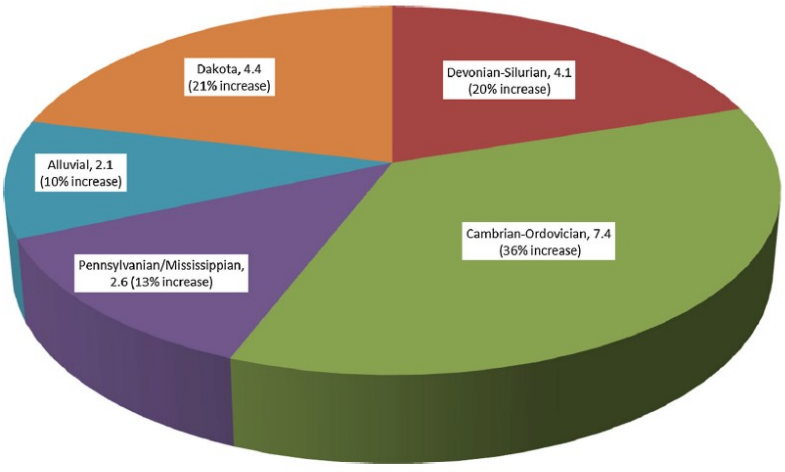
USE OF WATER BY ETHANOL PLANTS

An ethanol plant uses water for several aspects of the ethanol production process. Cooling tower water needs make up well over half (60 percent) of an ethanol plant's utility water use. Next is reverse osmosis feed water for steam (19 percent), followed by scrubber water (17 percent) and then backwash/miscellaneous (4 percent).[16] As noted above in the background section, water use for ethanol plants in Iowa can range from 195 million gallons per year to 646 million gallons per year, depending on the size and amount of ethanol production per plant.

According to the table above of Iowa water usage, the total amount of water used by ethanol plants from aquifers in Iowa in 2022 was over 12 billion gallons for water from aquifers and 13.5 **billion** gallons per year from all sources.

The amount of water ethanol plants have been withdrawing from aquifers has been increasing, as shown in the pie chart below.[17]

Fig. 1 Increase in groundwater use for ethanol production in Iowa by aquifer from 2004 to 2013 (in billions of liters of water per year)



16 https://ethanolproducer.com/articles/strategies-to-step-down-water-use-19717.

17 Schilling, et al., *Estimating groundwater age in the Cambrian-Ordovician aquifer in Iowa: implications for biofuel production and other water uses*, Environmental Earth Sciences, v. 76, no. 2 (2017).

WATER USE FOR CARBON CAPTURE

Water is used in the operation to capture carbon dioxide at the ethanol plants for dewatering, dust control, hydrostatic testing, and to cool the carbon dioxide because compression of the carbon dioxide generates heat.[18] At the individual ethanol plants, this water usage for the carbon dioxide capture facility will be in addition to the water usage for the ethanol process discussed above.

At the hearing before the Iowa Utilities Board on September 5, 2023, Summit's Chief Operating Officer, James Powell, described the process as follows:[19]

> So, as you increase the pressure on the CO2 to reach the dense phase, that product heats up. And so we'll have a cooling system that circulates through that compression cycle that keeps the product cooler. And then we'll dehydrate that in the later stages of compression. We'll pull the water out of the stream in the later stages of compression.

We know that in Iowa, Summit has obtained a water withdrawal permit from Iowa DNR for the carbon dioxide capture facility at the Homeland Energy Solutions ethanol plant near Lawler, Iowa, allowing the withdrawal of 55.9 million gallons of water per year.[20] Summit also applied to withdraw 27.6 million gallons of water per year for the carbon dioxide capture facility at the Corn L.P. ethanol plant near Goldfield, Iowa. A draft permit was issued, but has not been finalized.[21]

After Sierra Club raised concerns about Iowa DNR's indiscriminate permitting of water withdrawal, Summit has withdrawn its applications for any additional permits at this time, or has not made applications for additional withdrawals.

IMPACT OF SUMMIT CARBON CAPTURE ON WATER USE

Summit now proposes to capture carbon dioxide from 31 ethanol plants that would impact Iowa's aquifers. Summit initially designated 12 Iowa ethanol plants that would use its pipeline.[22] Then, on June 19, 2023, Summit added another ethanol plant, in Mitchell County, Iowa, to its proposed pipeline project.[23] On March 4, 2024, Summit added yet another 18 ethanol plants to its project.[24]

18 Summit Carbon Solutions Otter Tail to Wilkin Project Route Permit Application, p. 134, available at https://apps.commerce.state.mn.us/web/project/14959.
19 James Powell testimony, September 5, 2023, available at https://efs.iowa.gov/filing/4533255.
20 See Attachment A.
21 See Attachment B.
22 https://efs.iowa.gov/filing/4340573.
23 https://efs.iowa.gov/filing/4501600.
24 https://efs.iowa.gov/filing/4630212.

Using a ratio of 1.05 gallons of water for the carbon dioxide capture facility per gallon of ethanol produced, based on an Illinois State Geological Survey circular[25], the total water usage for carbon dioxide capture at Summit's 31 ethanol plant partners is 3.36 billion gallons of water per year.[26] When that amount of water is added to the water already used for the ethanol production process, the total water usage for the 31 ethanol plants is 13.5 billion gallons of water per year, equivalent to the ethanol industry's current total water usage. Summit's water needs for CCS are also equivalent to adding 10 or 11 more ethanol plants in Iowa.[27]

As noted above, Iowa DNR has already given a permit to Summit for the carbon dioxide facility at Homeland Energy Solutions. Summit submitted its application for the permit on a form provided by Iowa DNR.[28] However, the application did not include information specifically required by 199 I.A.C. § 50.6(1) to identify the aquifer from which the water would be withdrawn, predict the effects of pumping with a reasonable degree of confidence, and information to determine any permit conditions for well interference. Thus, Iowa DNR had insufficient information to make a decision to issue the permit. The Water Use Summary Report prepared by Iowa DNR[29] in support of the issuance of the water withdrawal permit to Summit for the Homeland Energy capture facility states, "The ability and intent of the applicant to devote a reasonable amount of water to a beneficial use seem evident." Unfortunately, the application for water use for the carbon dioxide capture facility at the Homeland Energy plant was approved before the public knew about it.

A second application by Summit for water withdrawal at the Corn LP ethanol plant in Wright County has been put on hold due to public opposition.

In the meantime, Sierra Club, with the help of impacted landowner and retired engineer, Don Johannsen, has produced an analysis of the impact of Summit's water needs for carbon dioxide capture. As shown by Attachments E through II, the carbon dioxide capture facilities at Summit's 31 designated ethanol plants will significantly impact the aquifers and the communities surrounding the ethanol plants.

With the addition of the carbon dioxide capture equipment, the water use for the ethanol production and the carbon dioxide capture process at many of the 31 ethanol plants will surpass the usage of the cities and towns within 10 miles of the ethanol plant. See the chart below.

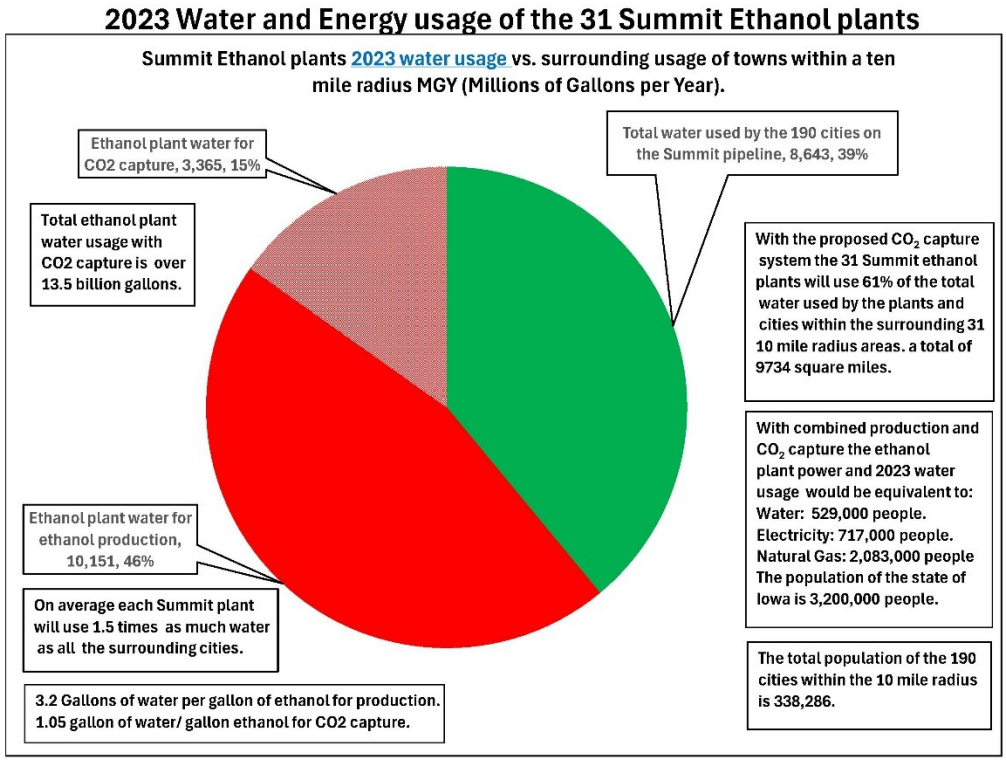
25 Illinois State Geological Survey Circular 595 (2018), available at https://www.ideals.illinois.edu/items/107988. The Illinois data are based on actual experience. There is also a report based on modeling for the Red Trail project in North Dakota, using an estimate of .4 gallons of water per gallon of ethanol produced. We believe the Illinois data, based on actual experience, is more accurate. But the Red Trail estimates are included in our analysis for comparison.

26 See Attachment C.

27 See Attachment C.

28 See Attachment D.

29 See Attachment A.



IMPACT OF SUSTAINABLE AVIATION FUEL FROM ETHANOL

With the advent of electric vehicles creating a trend away from using ethanol as an additive to gasoline, the Iowa ethanol industry is now promoting the use of ethanol for sustainable aviation fuel (SAF).[30] And, of course, just as with carbon capture and storage, the federal government has provided a tax credit as an incentive for the production of SAF.[31] Producers of SAF are eligible for a tax credit of $1.25 per gallon of SAF produced. To qualify for the tax credit, the SAF must reduce greenhouse gas emissions by 50%. SAF that reduces greenhouse gas emissions by more than 50% is eligible for an additional $0.01 per gallon for each percent the reduction exceeds 50%, up to $0.50 per gallon.

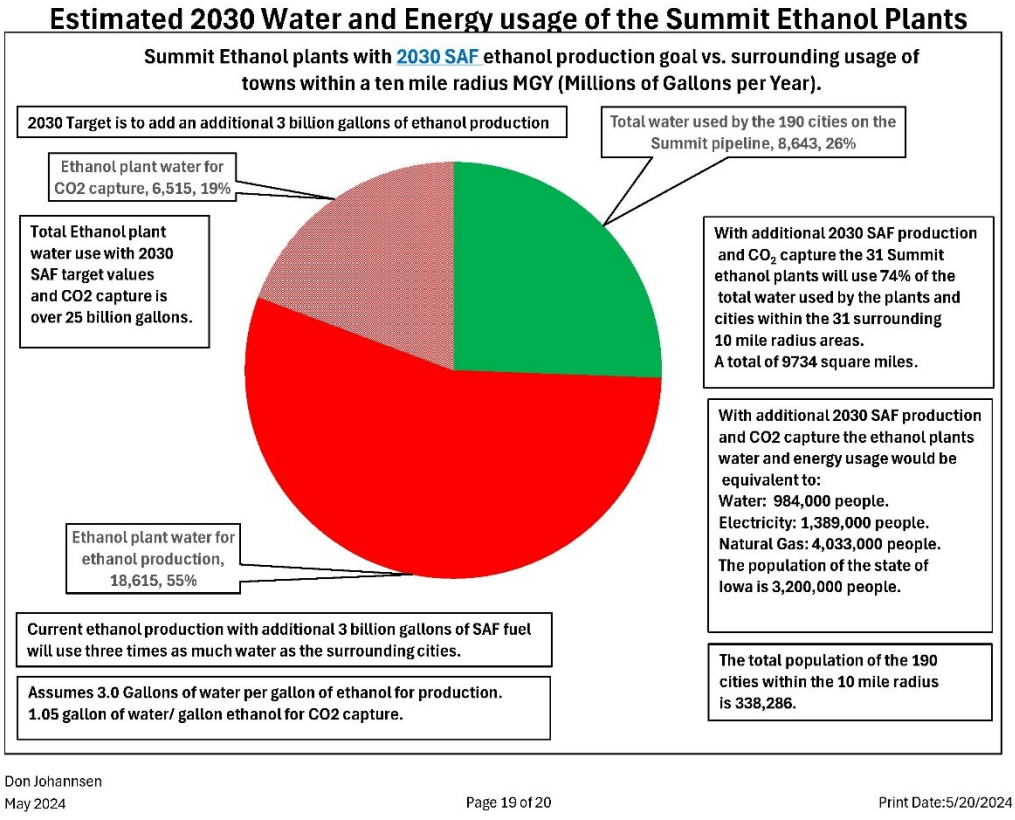
At this point, it is unknown whether Iowa ethanol will actually be used for SAF and what quantity of SAF might be produced and what amount of water will be used in the process.

30 https://www.desmoinesregister.com/story/opinion/columnists/iowa-view/2024/01/24/us-ethanol-role-ustainable-aviation-fuel/72334412007/; https://www.desmoinesregister.com/story/money/business/2023/12/16/sustainable-aviation-fuel-standard-greet-model-corn-based-fuels-iowa-ethanol/71937161007/.

31 https://afdc.energy.gov/laws/13160.

But it behooves Iowa authorities to plan for this possibility. The increase in the use of groundwater for SAF is significant.

As the chart below shows, with the addition of estimated production of SAF in 2030, water use for ethanol production and carbon dioxide capture at the 31 ethanol plants tied to Summit's pipeline is estimated to be 74% of the total water used by the ethanol plants and cities within the 31 surrounding 10 mile radius areas.



RECOMMENDATIONS FOR POLICIES AND ACTIONS

1. In order to protect Iowa's water resources we must accurately determine the nature and extent of those resources. We can't know whether, or to what extent, applications for water withdrawal from aquifers should be granted if we don't know the impact on the aquifers. So the first action that needs to be undertaken is a thorough study of Iowa's aquifers to determine how much water is available, how quickly the aquifer can be recharged, and the impact of any further water withdrawal. This study should be done by the Iowa DNR in cooperation with the Iowa Geological Survey.

2. The Iowa Legislature should fund an aquifer study annually in order to have current and accurate information to determine how much water can be appropriately withdrawn from the aquifers.

3. The Iowa Legislature should clarify, or perhaps remove, the concept of beneficial use in the Iowa Code. Section 455B.261(4) of the Iowa Code defines beneficial use as "the application of water to a useful purpose that inures to the benefit of the water user." But in Section 455B.262 of the Code, as set out above, beneficial use is discussed in the context of public benefit, not as the benefit to the user. The legislature should at least change the definition to clarify that beneficial use means benefit to the public, not simply benefit to the water user. Alternatively, the privilege of using the public resource of Iowa's water could be based strictly on the public interest, not a beneficial use.

4. The DNR should revise its rules as explained above that ensure that the water is not being overdrawn from the aquifers, that it is being withdrawn for a beneficial use, and that the applications are evaluated on a case-by-case basis.

CONCLUSION

Iowa's precious resource of groundwater is under assault. Cities, industries, and farming are depleting the aquifers more quickly than they can be recharged. Iowa legislators and state officials must take this problem seriously.

Unfortunately, the Iowa DNR has not considered the condition of the aquifers when granting permission for withdrawing water from the aquifers. Permits are granted as a matter of course, without addressing whether the proposed use is actually a beneficial use and whether the amount of water withdrawal requested is justified. And now, with the advent of carbon dioxide capture and other uses for ethanol, including sustainable aviation fuel, the situation will only become worse. We need to determine whether carbon dioxide capture is really a beneficial use and whether there are better sources than ethanol for sustainable aviation fuel.

There are many important questions that we cannot answer here, such as how much water remains in Iowa's aquifers, how fast are our aquifers depleting, and how many years of water do we have left if Iowa approves public water for carbon capture and storage, and most importantly, what do we do when we run out of water? We have these questions because no entity has gathered the information needed to answer all of these questions. The legislature needs to allocate funding so that the data can be collected. All of these questions must be answered before we wind up in a water crisis because plain and simple: water is life.