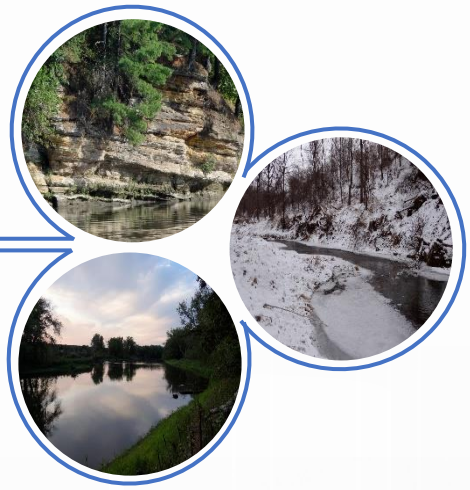
APRIL 2025



Rock River Region Water Resources Planning

2025 Addendum – Scenarios for the Driftless Area + Ogle County Subregion

Acknowledgements

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Contents

1. Introduction

The Rock River Region water resources planning area consists of eleven counties in northwest Illinois (Boone, Bureau, Carroll, Henry, Jo Daviess, Lee, Ogle, Rock Island, Stephenson, Whiteside, and Winnebago) and involves the following four regional planning organizations:

- Blackhawk Hills Regional Council (BHRC) - Carroll, Jo Daviess, Lee, Ogle, Stephenson, Whiteside
- Bi-State Regional Commission (BSRC) - Henry, Rock Island
- North Central Illinois Council of Governments (NCICG) - Bureau
- Region 1 Planning Council (R1PC) - Boone, Winnebago

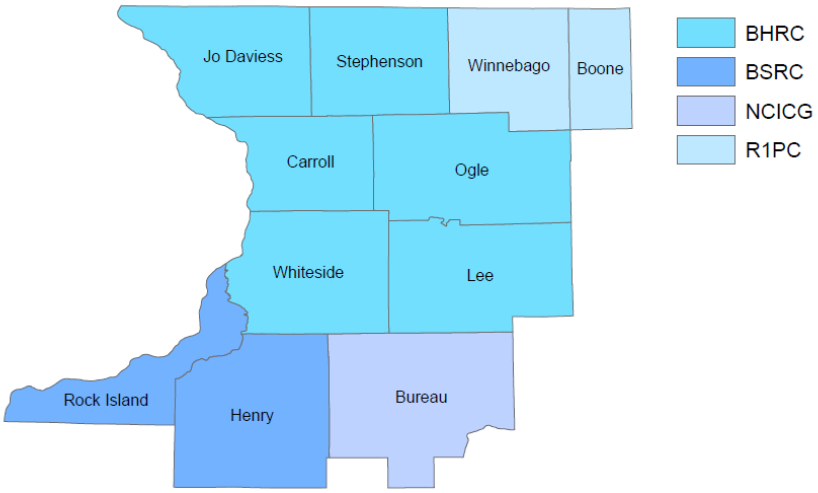


Image created in ArcMap using U.S. Census Bureau TIGER/Line Shapefiles: Counties (and equivalent), 2022.

BHRC and regional planning organization (RPO) partners began the Illinois Department of Natural Resources (IDNR)-funded water resources planning process in 2018, establishing an advisory committee, meeting with stakeholders, and surveying users. That year the Illinois State Water Survey (ISWS) also released a report entitled *Water Demand in the Rock River Water Supply Planning Region, 2010-2060* that examined current and future water demand in the area by five sectors – public supply; self-supplied domestic; self-supplied thermoelectric power generation; self-supplied industrial and commercial; and self-supplied irrigation, livestock, and environmental.

The ISWS report – vetted by local Rock River Region stakeholders before publication – addresses water demand in the area from 2010 to 2060. To further flesh out local perspectives and concerns, BHRC began work with IDNR, ISWS, and regional planning partners to undergo a scenario planning process. Subregions where scenario planning was undertaken by RPOs included:

Subregion	Counties	Lead
Boone and Winnebago counties (BWC)	Boone and Winnebago	R1PC
Green River Lowlands (GRL)	Bureau, Henry, Lee, and Whiteside	BHRC, BSRC, NCICG
Quad Cities (QC)	Rock Island and Henry	BSRC
Driftless Area + Ogle County (DAO)	Carroll, Jo Daviess, Ogle, and Stephenson	BHRC

This report summarizes the findings from the DAO subregion scenario planning effort. Summaries for the other subregions can be found in the February 2023 report, *Rock River Region Water Resources Planning: Scenarios for Northwest and North Central Illinois*.

2. Scenario Planning in the Rock River Region

"Will the Rock River Region have enough water to meet demand in 2060?"

Water availability is influenced by many variables. Even known variables can be unpredictable in occurrence, severity, detectability, etc. Scenario planning enables a diverse group of stakeholders, some with competing interests, to plan for uncertainty by helping participants imagine what might occur decades into the future. The scenario planning process helps people prepare for and respond to those futures and, in some cases, discourage or encourage certain actions.

Normative scenario planning (which is concerned with how the world should be) and explorative scenario planning (which is concerned with how the world could be) are the most common, although other and hybrid forms exist. Rock River Region scenario planning efforts primarily employed explorative approaches, although normative elements are present.

The scenarios contained in this and other reports were shaped using the most uncertain and impactful driving forces as determined by participants, which is typical in scenario planning. Participants also identified strategies, indicators, and measures. Like previous Rock River Region scenario planning efforts, the DAO subregion process resulted in:

1) Scenarios outlining plausible, though uncertain, futures for each subregion;
2) Strategies addressing each future should it arise;
3) Indicators monitoring real-world scenario development and the effectiveness of strategy implementation;
4) Stronger ties and consensus building among stakeholders.

3. Driftless Area + Ogle County Subregion

3.1 Introduction

3.1.1 Background and Setting

In June 2023, BHRC began water availability scenario planning for the DAO subregion. The Driftless Area covers a large portion of southwest Wisconsin as well as areas of southeast Minnesota, northeast Iowa, and northwest Illinois. The ecoregion is so named because it was not covered by glaciers during the Pleistocene, leaving no glacial (drift) deposits over the bedrock and resulting in an area with karst geography. Karst is:

> …both a surface and subsurface landscape formed by the interaction of relatively aggressive surface water and shallow groundwater with soluble bedrock (i.e., limestone, dolomite, or both). The result is the formation of an ever-growing system of connected porosity (fractures, crevices, conduits) through which groundwater can, under a normal range of hydraulic gradients, flow more rapidly than in any other aquifer type[1].

Because water in places with karst features moves quickly into and through the subsurface, karst aquifers are more susceptible to contamination. The DAO planning area includes both parts of the Driftless Area[a] and the Rock River Hills. The latter has the hilly topography of the Driftless Area, but these features are more subdued due to drift deposits.

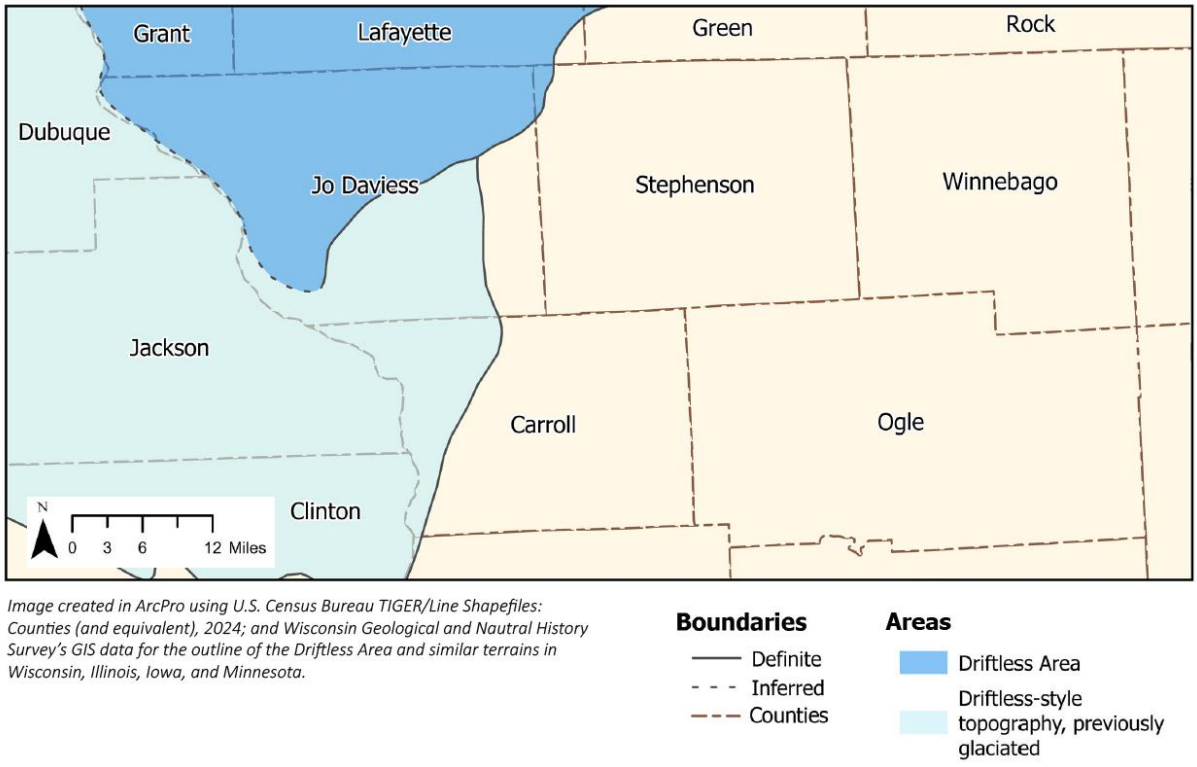


Image created in ArcPro using U.S. Census Bureau TIGER/Line Shapefiles: Counties (and equivalent), 2024; and Wisconsin Geological and Nautral History Survey's GIS data for the outline of the Driftless Area and similar terrains in Wisconsin, Illinois, Iowa, and Minnesota.

[a] The Driftless Area is sometimes described as containing considerably larger portions of both Carroll and Stephenson counties and beyond.

ISWS's 2019 Rock River Region water demand report[2] includes 2010 estimates for reported and weather-normalized (based on 1981-2010 climate "normals") water demand. The largest water demand sector in the DAO subregion is Thermoelectric Power Generation due to the Byron Nuclear Generating Station in Ogle County. The Public Supply sector had the second-largest reported demand, but Self-Supplied Irrigation, Livestock, and Environmental was second-largest for weather-normalized estimates.

3.1.2 Overview of the Water Availability Scenario Planning Process

The BHRC-facilitated DAO subregion process consisted of a pre-workshop webinar followed by two scenario planning workshops. A survey followed the first workshop. Both workshops were held in-person at the Heritage Center in Lanark. Attendance for the workshops and webinars varied but averaged approximately 11 people. Forty people responded to the survey.

3.1.3 Methods

BHRC created a list of 161 stakeholders from city and county zoning offices, water and sewer districts, health departments, farm bureaus, etc. Of these, 105 were primary organizational contacts and invited to the workshops. Of those invited, 16 attended the pre-workshop live webinar, 8 participated in the first workshop, and 8 participated in the second workshop. The webinar was recorded and posted on BHRC's website. All 161 stakeholders were emailed a survey after the first workshop; 40 responded. (Note: Two people attended both workshops, and some workshop attendees answered the survey). Because agriculture and tourism are economic drivers in the DAO subregion, participants often focused on these sectors. However, they also covered areas like domestic and general commercial water use. During the workshops, BHRC staff primarily used exploratory scenario planning. Participants were asked to identify driving forces for water demand in the region that were used to fashion four scenarios. After identifying plausible futures, participants brainstormed implications, indicators, and strategies.

3.2 Water Scenario Planning Workshops

3.2.1 Pre-Workshop Webinar

On October 10, 2023, BHRC hosted a pre-workshop webinar on water demand and scenario planning. Vlad Iordache, hydrogeologist and assistant research scientist with ISWS, presented on the DAO subregion's hydrogeological features. Prior to the first workshop, BHRC created a worksheet of example driving forces and emailed it to stakeholders to help them prepare.

3.2.2 Workshop 1 Process and Results

Driving Forces

On October 24, 2023, BHRC hosted the DAO subregion's first workshop at the Heritage Center in Lanark. BHRC staff began by explaining driving forces. Dividing them into two groups, BHRC staff gave attendees an hour to brainstorm driving forces of water resources availability specific to the region. Each group

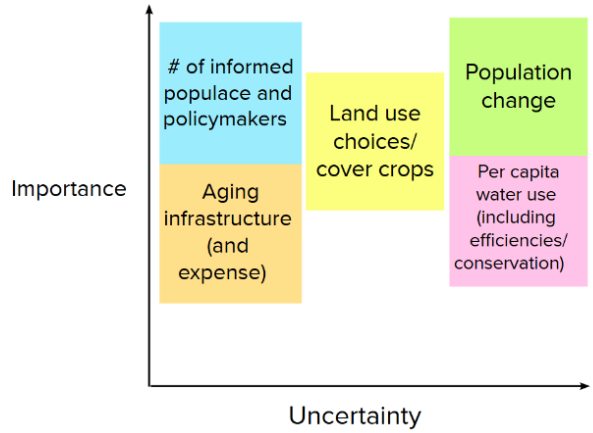
wrote their ideas on sticky notes, which were placed on large sheets of paper in the appropriate STEEP (Social/Demographic, Technology, Environment, Economy, and Policy/Political) category. The groups then consolidated and refined the driving forces. Next, stakeholders received three stickers and were asked to vote on their top three driving forces. The results are shown in Table 1, which lists each driving force and the total number of votes received. The top five are in orange.

Table 1 – Driving Forces

Social and Demographic	Technology	Economics
[0] Age change in population **[0]** Housing affordability **[2]** Population change **[0]** Population density **[5]** Aging infrastructure (and expense)	**[1]** Technology network **[0]** Private industrial water users **[0]** Unmetered water and flat fees **[5]** Per capita water use (with efficiencies/conservation)	**[0]** Utility rates **[0]** Employee costs/minimum wage compensation **[0]** Marketing water as a resource **[0]** Very old housing stock **[0]** High interest rates **[0]** Job market crisis
Environment	**Policy and Politics**	**Other**
[1] Climate change **[0]** CO2 sequestration **[0]** Increase solar for less erosion from flash events **[0]** # of wells abandoned/drawing on aquifers (affects quality and quantity) **[0]** Changing readiness for flash storms **[3]** Land use choices/cover crops **[1]** Nitrates reduction	**[0]** Unsewered communities **[0]** Ag policy and size **[4]** # of informed populace and policymakers **[0]** Unfunded mandates **[1]** State mandated minimum wage **[0]** No control over state budgeting **[0]** Poor municipal health **[0]** Federal interest rates	N/A

As a group, participants ranked the top five-voted driving forces by uncertainty (unpredictability) and importance (impact) regarding water demand. Figure 1 shows the results of the discussion:

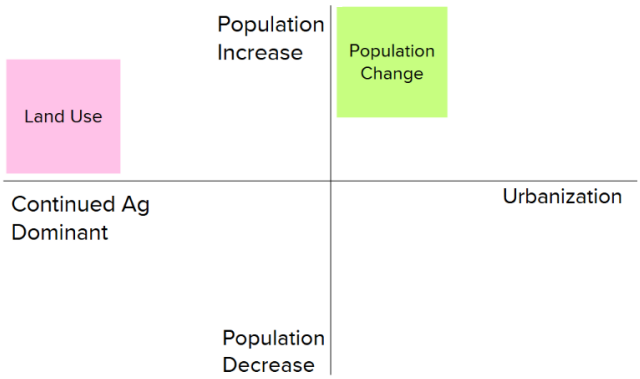
Figure 1 - Driving Forces Ranked



Critical Uncertainties

Population change and per capita water use (including efficiencies/conservation) emerged as the most uncertain and important driving forces. After a group discussion, participants concluded that per capital water use was closely related to population change. Consequently, land use choices/cover crops replaced per capita water use as one of the top driving forces. These driving forces were plotted on a graph, with population change on the Y-axis and land use on the X-axis.

Figure 2 – Workshop 1 Uncertainty Axes



Attendees continued by discussing driving force extremes. While the trend in the region (and for rural areas nationwide) is population decline, scenario planning is meant to help regions prepare for the unexpected, so population increase and decrease were chosen for extremes.

There was disagreement regarding land use. Some participants believed that the region would become more urbanized due to factors like farmers selling their land to developers, residents gravitating towards urban centers, or newcomers preferring the amenities of suburbs and cities. Other participants believed that the culture of the region was small and spread out and that residents – particularly farmers – would not want change. The group tentatively agreed to use agriculture dominant vs urban development as the two extremes, though BHRC staff said they would gather more information and adjust accordingly.

3.2.3 Driving Forces Survey

BHRC staff distributed an online survey to better gauge opinions on driving forces. The survey included driving forces gathered at the first workshop as well as BHRC staff recommendations. It separated them by STEEP category and had participants select up to two per category. Participants were asked to rank how impactful and uncertain their selections were on a scale of 1 (least impact/certain) to 5 (most impact/certain). Participants were also given the option to submit their own driving forces and make comments. The full survey can be seen in Appendix 6.3.1.

The survey was emailed to 161 stakeholders; 40 responded.

Results were averaged for uncertainty and impact. Nine driving forces were submitted under the "Other" option. These were found to be equivalent to driving forces already listed, so their point values were reassigned. For example, one participant wrote, "Increased use per household," which was placed under the driving force "Consumer demands/preferences locally or in large cities" in the Economic category. These comments can be seen in Appendix 6.3.2.

Participants could select from 34 driving forces. The top results were as follows (full results can be found in Appendix 6.3.2):

Table 2 – Survey Results: All Driving Forces

1st
2nd
3rd

Driving Force	Times Selected	Average Importance	Average Uncertainty
Changes in agricultural/industrial water conservation technology	30	4.10	3.60
Consumer demands/preferences locally or in large cities	29	3.97	3.45
Changes in consumer water conservation technology	29	3.86	3.59
Climate change	26	4.58	4.31
Water quality mandates	11	4.36	3.82
Local expertise (e.g., elected officials, access to experts)	10	4.40	3.80
Utility rates	5	4.00	4.60
Buffer/vegetation strips in farm fields	4	4.25	4.50
Budget priorities	4	4.25	4.50
Corn/soy production	8	4.25	4.38

The lower counts of some driving forces led to higher averages than those selected more often. As such, the data was broken down into two more tables: Top Ten Selected Driving Forces and Top Two Selected Driving Forces by Category. These tables follow:

Table 3 – Survey Results: Top Ten Selected Driving Forces

1st
2nd
3rd

Driving Force	Times Selected	Average Importance	Average Uncertainty
Changes in agricultural/industrial water conservation technology	30	4.10	3.60
Consumer demands/preferences locally or in large cities	29	3.97	3.45
Changes in consumer water conservation technology	29	3.86	3.59
Climate change	26	4.58	4.31
Drought/flooding	22	4.27	3.82
Affordability/cost of living	22	3.95	3.36
Population size	21	4.24	3.76
Manufacturing processes	21	4.05	3.43

Living within or outside municipal limits	20	3.65	3.25
State of public infrastructure (e.g., water, stormwater, wastewater)	19	4.16	3.79

Table 4 – Survey Results: Top Two Selected Driving Forces by Category

1st
2nd
3rd

STEEP Category	Driving Force	Times Selected	Average Importance	Average Uncertainty
Social	Affordability/cost of living	22	3.95	3.36
Social	Population size	21	4.24	3.76
Technology	Changes in agricultural/industrial water conservation technology	30	4.10	3.60
Technology	Changes in consumer water conservation technology	29	3.86	3.59
Environment	Climate change	26	4.58	4.31
Environment	Drought/flooding	22	4.27	3.82
Economic	Consumer demands/preferences locally or in large cities	29	3.97	3.45
Economic	Manufacturing processes	21	4.05	3.43
Policy/Politics	State of public infrastructure (e.g., water, stormwater, wastewater)	19	4.16	3.79
Policy/Politics	Water quality mandates	11	4.36	3.82

Reviewing the survey responses, BHRC staff noted that climate change was in the top four selected driving forces and that it had the highest average importance among all 34 driving forces. It also had the highest uncertainty when driving forces selected the least were removed from consideration.

While population size was not selected as often as other driving forces, it still broke into the top 10. Additionally, it had reasonably high importance (3rd) and high uncertainty (4th) averages in *Top Ten Selected Driving Forces*. Given this analysis and workshop rankings, BHRC staff decided to keep population change and replace land use with climate change. The new uncertainty axes to create scenarios looked like this:

Figure 3 – Final Uncertainty Axes

3.2.4 Pre-Workshop 2 – Scenario Construction

BHRC staff developed DAO subregion scenarios in-house. A draft was emailed to Vlad Iordache of ISWS for feedback. The scenario document eventually emailed to stakeholders is shown on pages 11-13.

WATER RESOURCES SCENARIOS FOR THE DRIFTLESS AREA + OGLE COUNTY PLANNING AREA

	Dial R for Rise	Fellowship of the Spring	Silence of the Lands	Dog Day Afternoons
	Extreme Climate Change + Population Increase	Mild Climate Change + Population Increase	Extreme Climate Change + Population Decrease	Mild Climate Change + Population Decrease
	Average global temperatures rise sharply and quickly; days ≥ 100° F and nights ≥ 70° F are normal during summer months. Precipitation significantly increases in the spring and winter. Because of rapidly escalating extreme weather events and water shortages nationally and worldwide, many move to the Upper Midwest. Consequences experienced:	Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), communities have time to adjust to climate threats. Because of an increase in extreme weather events and water shortages nationally and worldwide, many move to the Upper Midwest. Consequences experienced:	Average global temperatures rise sharply and quickly; days ≥ 100° F and nights ≥ 70° F are normal during summer months, while precipitation significantly increases in the spring and winter. Any newcomers choose urban areas with established social and physical infrastructure. Population in the Driftless Area and Ogle County steadily declines. Consequences experienced:	Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), communities have time to adjust to climate threats. Any newcomers choose urban areas with established social and physical infrastructure. Population in the Driftless Area and Ogle County steadily declines. Consequences experienced:
Economic	Spring flooding significantly delays planting and leads to soil-stripping washouts	Spring flooding occasionally delays planting	Spring flooding significantly delays planting and leads to soil-stripping washouts	Spring flooding occasionally delays planting
	Widespread erosion and higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for grazing and crop production; more land is dedicated to development	Localized erosion reduces some grazing and crop production; more land is dedicated to development	Widespread erosion and higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for grazing and crop production	Localized erosion reduces some grazing and crop production
	Staple crops like corn and soybeans are far less productive	Staple crops like corn and soybeans are somewhat less productive; new varieties are required for optimal output	Staple crops like corn and soybeans are far less productive	Staple crops like corn and soybeans are somewhat less productive; new varieties are required for optimal output
	Increased temperatures result in a longer but harsher growing season; agricultural producers are able to find workers to assist with planting and harvesting	Increased temperatures result in a slightly longer growing season; agricultural producers are able to find workers to assist with planting and harvesting	Increased temperatures result in a longer but harsher growing season; agricultural producers have a hard time finding workers to help with planting and harvesting	Increased temperatures result in a slightly longer growing season; agricultural producers have a hard time finding workers to help with planting and harvesting

	Increased temperatures limit recreational tourism (e.g., hiking, outdoor shopping and festivals) during the summer months but also extend summer activities into the fall - tourism industries are able to fill positions; traditional winter tourism is devastated (e.g., ice fishing, skiing, snowmobiling)	Increased temperatures somewhat limit winter tourism (e.g., skiing, snowmobiling); tourism industries are able to fill positions	Increased temperatures limit recreational tourism (e.g., hiking, outdoor shopping and festivals) during the summer months but also extend summer activities into the fall - tourism industry positions go unfilled; traditional winter tourism is devastated (e.g., ice fishing, skiing, snowmobiling)	Increased temperatures somewhat limit winter tourism (e.g., skiing, snowmobiling); tourism industry positions go unfilled
	Drought and flooding limit water-related commerce and recreation	Drought and flooding occasionally limit water-related commerce and recreation	Drought and flooding limit water-related commerce and recreation	Drought and flooding occasionally limit water-related commerce and recreation
Environmental	Algal blooms are common, including in the region's major lakes and rivers	Algal blooms occur but are manageable	Algal blooms are common, including in the region's major lakes and rivers	Algal blooms occur but are manageable
	Flash or short-term droughts occur yearly; long-term droughts are more frequent	Flash or short-term droughts may occur yearly	Flash or short-term droughts occur yearly; long-term droughts are more frequent	Flash or short-term droughts may occur yearly
	Annual riverine flooding increasingly occurs throughout the region, including unpredictable flash flooding; flooding events impact more homes and businesses	Annual riverine flooding occurs here and there; flooding events impact more homes and businesses	Annual riverine flooding increasingly occurs throughout the region, including unpredictable flash flooding	Annual riverine flooding occurs here and there
	Invasive species increasingly create public health, agricultural, and ecosystem challenges that are unmanageable	Invasive species create public health, agricultural, and ecosystem challenges; these are manageable if monitored and addressed regularly	Invasive species increasingly create public health, agricultural, and ecosystem challenges that are unmanageable	Invasive species create public health, agricultural, and ecosystem challenges; these are manageable if monitored and addressed regularly
	Trees are strained, and the canopies they create in municipalities are diminished	Trees are strained, but municipal tree canopies remain relatively healthy	Trees are strained, and the canopies they create in municipalities are diminished	Trees are strained, but municipal tree canopies remain relatively healthy
	Ground water levels continue to decrease as irrigation needs increase and recharge is limited	Ground water levels are somewhat stable and recharge rates are sufficient	Ground water levels continue to decrease as irrigation needs increase and recharge is limited	Ground water levels are somewhat stable and recharge rates are sufficient
	Outside requests to export the regions water increase		Outside requests to export the regions water increase	

Social	Residences/businesses consume much more energy (e.g., air conditioning)	Residents/businesses consume somewhat more energy (e.g., air conditioning)	Residences/businesses consume somewhat more energy (e.g., air conditioning)	Residences/businesses consume only slightly more energy (e.g., air conditioning)
	Urban flooding occurs in new areas and increases in places already prone to it	Urban flooding occurs in new areas	Urban flooding occurs in new areas and increases in places already prone to it	Urban flooding occurs in areas already prone to it
	Much higher taxes are distributed among a growing population to improve water/wastewater systems increasingly stressed by extreme weather events	Higher taxes are distributed among a larger population to improve water/wastewater systems	Higher taxes are distributed among a shrinking population to improve water/wastewater systems increasingly stressed by extreme weather events	Somewhat higher taxes are distributed among a shrinking population to improve water/wastewater systems
	Ground and surface water demand increases across all sectors due to more people and hotter weather; public water supply is strained	Ground and surface water demand increases across all sectors due to more people	Ground and surface water demand increases across all sectors due to hotter weather	Ground and surface water demand stays mostly the same
	Incidents of drinking water contamination in public systems and private wells increase		Incidents of drinking water contamination in public systems and private wells increase	

3.2.5 Workshop 2 Process and Results

Scenario Implications and Changes

The second workshop was held November 21, 2024, at the Heritage Center in Lanark, beginning with an overview of Workshop 1. Participants were divided into two groups and given 45 minutes to discuss any additions, insights, or implications for the first two scenarios and another 45 minutes for the second two scenarios. BHRC staff took notes for each group in the application Mural.

Comments were organized by scenario during the meeting; however, many pertained to more than one scenario. BHRC staff further organized comments as follows[b]:

Table 5 – Comments on Scenarios: Economic

Economic	

All Scenarios	<u>Tourism</u>
	• Galena is prone to flooding – too much flooding or drought hurts the tourism industry.
	• Temperature and tourism:
	  ○ Currently, the increase in temperature is not limiting tourism in our area.
	  ○ Drier seasons means less flow. Recently, commerce could not go out on the river due to increased flotsam from lower flows. Agencies would not rent out kayaks or canoes because of the dirty water.
	  ○ Tourism does adapt. Chestnut Mountain is year-round and uses chemicals to make snow in warmer weather.
	  ○ Tourism employment is linked to college cycles; businesses lose employees as students return to school. This may change as weather cycles no longer line up with school dates.
	• If ATVs replace snowmobiles, it will not change the amount of tourism. Will be exchanging one type of off-roading for another.
	
	<u>Agriculture</u>
	• Increased risk of major harvest losses.
	• Seed companies will adapt before farmers, producing new seeds.
	• Agriculture producers will adapt:
	  ○ Change what they grow if new seeds do not work/are not profitable.
	  ○ Change will be gradual – will change as they upgrade equipment.
	• For agriculture, spring flooding is too specific:
	  ○ Seeing heavy rainfall in spring, but not flooding.
	  ○ However, heavy rainfalls and saturated soils are a big issue.
	• Freezes:
	  ○ Will be more unpredictable.
	  ○ Hail and flash freezes can hurt fruit trees and vineyards.
	• May have more growing time but should still use short growing seasons. Waiting too long/being too complacent introduces more variables - especially with fluctuating weather - that can cause crop issues.
	
	<u>Industry</u>
	• Industrial and data centers use a lot of water and may move into the area. Due energy provided by Byron Nuclear Plant, a data center asked Ogle County to rezone an area for industrial use. The county did so.
	• Lowering surface water impacts industry.

[b] Note that some comments may represent opinions, others facts; overall, they represent the viewpoints of stakeholders who attended the workshop.

	Other
	• Business succession an issue in all scenarios, but exacerbated in low population scenario:
	  ○ Sometimes it is an older generation not wanting to give up its business. Sometimes it is family/employees leaving and not willing to take over.
	  ○ Hard to get people into workshops for this issue.

Extreme Climate Scenarios	Tourism
	• Mississippi River:
	  ○ If it doesn't freeze, run commercial and recreation outside of normal seasons.
	  ○ If flooding or low water levels, commerce and recreation are restricted.
	Agriculture
	• Livestock types will shift north:
	  ○ Current livestock in Illinois will move to Canada.
	  ○ Illinois may start rearing livestock from the southern US.
	• Cropland to pastureland:
	  ○ Animal agriculture's impact on grass feed will change.
	  ○ Agriculture producers will adapt – if farmland is made into pasture, they will find animals to graze it.
	• Heat stress affects all kinds of agriculture production:
	  ○ Chickens stop laying eggs.
	  ○ Swine and cows quit eating, become lethargic, muscle mass changes.
	  ○ Tomatoes quit growing at 85 degrees.
	• The tipping point for a lot of agriculture is the high overnight temperatures. High heat days are stressful, but if there's relief in the evening, systems can recover.
	• Climate change can boost yields – current year had 45-day drought and very high yields.
	• Wet seasons will be wetter, dry seasons will be drier. More precipitation overall.
	• Late growing seasons are drier – agriculture producers use less propane for grain dryers.

Mild Climate Scenarios	• N/A

Increasing Population Scenarios	• BHRC should separate land erosion and development:
	  ○ Good land tends to get developed.
	  ○ Suburban growth = more hardscape which leads to more erosion.
	• Trend of building housing up on hills causes all kinds of problems.
	• Slow, steady population growth is more predictable and manageable.

Decreasing Population Scenarios	• Livestock is labor intensive, so farmers wanting to transition to animals might not be able to. • Fewer workers for tourism, parks, charter operations, etc.

Individual Scenarios	**Silence of the Lands (Extreme Climate Change + Population Decrease)**
	• Farmers cannot use their land due to climate, lack of workers, or both:
	  ○ Land goes out of production.
	  ○ Land goes native.
	  ○ Consolidation and increase in larger agriculture operations.
	Dog day Afternoons (Mild Climate Change + Population Decrease)
	• Lack of workers in ag:
	  ○ For planting, machinery gets more involved, so fewer workers not as much of an issue.
	  ○ Milder climate means lack of workers isn't as bad as extreme climate scenario, but it will limit some alternative crops and direct food crops.

Table 6 – Comments on Scenarios: Environmental

Environmental	

All Scenarios	• Erosion is slowing down immensely due to cover cropping and government funding for erosion control.
	• Savanna and other river towns will need to deal with more flooding in winter.
	• Change "riverine" flooding to flooding throughout the watershed.
	• Water reuse is increasingly on the table, which means low flow is going to be even more of an issue. Low flow also means more effluent downriver.
	• Water exports
	  ○ Already seeing requests in the region to divert Lake Michigan or send water to western states.
	  ○ Water rights are riparian in Illinois, so there could be export that the state has little control over.
	• Storm infrastructure should be to 500-year standard.
	• Nuclear plants impact the temperature of surface water.
	• Consider infrastructure costs.
	• Invasive species:
	  ○ Make sure to distinguish between invasive species and native migrating species.
	  ○ We see armadillos and wild hogs already.
	  ○ Some species aren't migrating – Canada geese.
	• Better to talk about "extreme events" and "resiliency" than "climate change."
	• Switching from snowmobiles to ATVs – ATVs have much more impact on the environment.
	• Cannot spelunk if there are sudden, intense rain events that may flood caves.

Extreme Climate Scenarios	• Destructive flooding and hail; fish die-offs; generalized stress on ecosystem, especially aquatic. • Fire danger rising when lacking rain
Mild Climate Scenarios	• N/A
Increasing Population Scenarios	• As areas become more developed, we see concentration in areas where the water is filtering into the ground. This leads to puddling. Additionally, less filtering happens, so more contaminants in groundwater.
Decreasing Population Scenarios	• N/A
Individual Scenarios	• N/A

Table 7 – Comments on Scenarios: Social

Social	

All Scenarios	• Data centers coming into region will strain grid. Fighting over energy may cause tensions among population.
	• Legacy contamination is an issue.
	  ○ Important to focus on private water supplies since they are less equipped to deal with contamination.
	• Will see legal changes in allowable uses of water.
	• "It couldn't happen here."
	  ○ Local scale – developing areas outside of traditional flood zones or with the assumption that certain weather events will not happen. If dry seasons are more common, development might occur in flood-prone areas.
	  ○ Region scale – assuming extreme climate events will not happen to our region.
	• More individual energy consumption due to climate:
	  ○ Trends will change as seasons change.
	  ○ More consumption at night.
	• Limited housing stock and affordability means lower income populations will have to settle for housing in problem areas and housing not built to withstand new weather events.
	• Need to consider broadband in these scenarios.
	• Mental stress on farmers:
	  ○ Worse in extreme climate and low population scenarios.
	  ○ Farm Bureau currently has a 24/7 hotline, but it is underused – this includes new farming generation.
	• Mental stress due to climate effects can then be compounded by other factors.
	• We are behind on planning. Most local governments do not even have a general plan, let alone a climate-specific one.

Extreme Climate Scenarios	• Extreme events may need more emergency funding to address disasters like tornados and derechos. • Colder temperature impact on poor and homeless. Cost of winter home heating. • An increase in taxes impacts resources somewhere else in a community. • Current housing shortage may be exacerbated. Will housing lost to extreme weather events be replaced? • Flash flooding events could be even more extreme than stated in our current scenarios. • Lower and drier rivers will turn sentiment against dam removal as locals want to retain impounded water rather than seeing drier rivers and land.
Mild Climate Scenarios	• People will not consider the true cost of water as climate impacts will be milder.
Increasing Population Scenarios	• Larger impact on water quality from the septic system side. ○ Need to tighten oversight (Jo Daviess was specifically mentioned). • Increase in population with more taxation will help with infrastructure, particularly in mild-climate scenario where infrastructure is not taking as much of a beating. • If we have excess water, it would attract more population. • Need to prepare adequate government and emergency services. • Even with little growth, infrastructure needs to be upgraded.

Decreasing Population Scenarios	• Fewer people = less political leverage to protect regional water when outside groups demand a share. • Either taxes increase or infrastructure declines. A choice residents must make.
Individual Scenarios	• N/A

With this feedback, BHRC staff updated the scenarios after the workshop. Edits are in italics:

FINAL WATER RESOURCES SCENARIOS FOR THE DRIFTLESS AREA + OGLE COUNTY PLANNING AREA

	Dial R for Rise	Fellowship of the Spring	Silence of the Lands	Dog Day Afternoons
	Extreme Climate Change + Population Increase	Mild Climate Change + Population Increase	Extreme Climate Change + Population Decrease	Mild Climate Change + Population Decrease
	Average global temperatures rise sharply and quickly; days ≥ 100° F and nights ≥ 70° F are normal during summer months. Precipitation significantly increases in the spring and winter. Because of rapidly escalating extreme weather events and water shortages nationally and worldwide, many move to the Upper Midwest. Consequences experienced:	Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), communities have time to adjust to climate threats. Because of an increase in extreme weather events and water shortages nationally and worldwide, many move to the Upper Midwest. Consequences experienced:	Average global temperatures rise sharply and quickly; days ≥ 100° F and nights ≥ 70° F are normal during summer months, while precipitation significantly increases in the spring and winter. Any newcomers choose urban areas with established social and physical infrastructure. Population in the Driftless Area and Ogle County steadily declines. Consequences experienced:	Days ≥ 100° F and nights ≥ 70° F are atypical during summer months. As average global temperatures rise gradually and slowly (or stabilize), communities have time to adjust to climate threats. Any newcomers choose urban areas with established social and physical infrastructure. Population in the Driftless Area and Ogle County steadily declines. Consequences experienced:
Economic	Spring flooding significantly delays planting and leads to soil-stripping washouts	Spring flooding occasionally delays planting	Spring flooding significantly delays planting and leads to soil-stripping washouts	Spring flooding occasionally delays planting
	Higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for grazing and crop production.	*Higher temperatures reduce some grazing and crop production.*	*Higher temperatures lead to the loss of soil organic matter, rendering significant acreage unproductive for grazing and crop production.*	*Higher temperatures reduce some grazing and crop production.*
	Staple crops and livestock are far less productive.	*Staple crops and livestock are somewhat less productive; new varieties are required for optimal output*	*Staple crops and livestock are far less productive.*	*Staple crops and livestock are somewhat less productive; new varieties are required for optimal output*
	Increased temperatures result in a longer but harsher growing season; agricultural producers are able to find workers to assist with planting and harvesting	Increased temperatures result in a slightly longer growing season; agricultural producers are able to find workers to assist with planting and harvesting	Increased temperatures result in a longer but harsher growing season; agricultural producers have a hard time finding workers to help with planting and harvesting	Increased temperatures result in a slightly longer growing season; agricultural producers have a hard time finding workers to help with planting and harvesting

	Increased temperatures limit recreational tourism (e.g., hiking, outdoor shopping and festivals) during the summer months but also extend summer activities into the fall - tourism industries are able to fill positions; traditional winter tourism is devastated (e.g., ice fishing, skiing, snowmobiling)	Increased temperatures somewhat limit winter tourism (e.g., skiing, snowmobiling); tourism industries are able to fill positions	Increased temperatures limit recreational tourism (e.g., hiking, outdoor shopping and festivals) during the summer months but also extend summer activities into the fall - tourism industry positions go unfilled; traditional winter tourism is devastated (e.g., ice fishing, skiing, snowmobiling)	Increased temperatures somewhat limit winter tourism (e.g., skiing, snowmobiling); tourism industry positions go unfilled
	Drought and flooding limit water-related commerce and recreation	Drought and flooding occasionally limit water-related commerce and recreation	Drought and flooding limit water-related commerce and recreation	Drought and flooding occasionally limit water-related commerce and recreation
	Due to the Byron Nuclear Station, abundance of water, and growing workforce, industries that are heavy energy users begin locating in the area; there is increased competition between commercial and residential sectors for resources.	*Due to the Byron Nuclear Station, abundance of water, and growing workforce, industries that are heavy energy users begin locating in the area.*	*Due to the Byron Nuclear Station and abundance of water, some industries that are heavy energy users begin locating in the area; there is increased competition between commercial users for resources.*	*Due to the Byron Nuclear Station and abundance of water, some industries that are heavy energy users begin locating in the area.*
Environmental	Algal blooms are common, including in the region's major lakes and rivers	Algal blooms occur but are manageable	Algal blooms are common, including in the region's major lakes and rivers	Algal blooms occur but are manageable
	Flash or short-term droughts occur yearly; long-term droughts are more frequent	Flash or short-term droughts may occur yearly	Flash or short-term droughts occur yearly; long-term droughts are more frequent	Flash or short-term droughts may occur yearly
	Annual flooding increasingly occurs throughout the region, including unpredictable flash flooding; flooding events impact more homes and businesses	*Annual flooding occurs here and there; flooding events impact more homes and businesses*	*Annual flooding increasingly occurs throughout the region, including unpredictable flash flooding*	*Annual flooding occurs here and there*
	Invasive and migrating species increasingly create public health, agricultural, and ecosystem challenges that are unmanageable	*Invasive and migrating species create public health, agricultural, and ecosystem challenges; these are manageable if monitored and addressed regularly*	*Invasive and migrating species increasingly create public health, agricultural, and ecosystem challenges that are unmanageable*	*Invasive and migrating species create public health, agricultural, and ecosystem challenges; these are manageable if monitored and addressed regularly*

	Trees are strained, and the canopies they create in municipalities are diminished	Trees are strained, but municipal tree canopies remain relatively healthy	Trees are strained, and the canopies they create in municipalities are diminished	Trees are strained, but municipal tree canopies remain relatively healthy
	Ground water levels continue to decrease as irrigation needs increase and recharge is limited	Ground water levels are somewhat stable and recharge rates are sufficient	Ground water levels continue to decrease as irrigation needs increase and recharge is limited	Ground water levels are somewhat stable and recharge rates are sufficient
	Outside requests to export the regions water increase		Outside requests to export the regions water increase	
Social	Residences/businesses consume much more energy (e.g., air conditioning)	Residents/businesses consume somewhat more energy (e.g., air conditioning)	Residences/businesses consume somewhat more energy (e.g., air conditioning)	Residences/businesses consume only slightly more energy (e.g., air conditioning)
	Urban flooding occurs in new areas and increases in places already prone to it	Urban flooding occurs in new areas	Urban flooding occurs in new areas and increases in places already prone to it	Urban flooding occurs in areas already prone to it
	Much higher taxes are distributed among a growing population to improve water/wastewater systems increasingly stressed by extreme weather events	Higher taxes are distributed among a larger population to improve water/wastewater systems	Higher taxes are distributed among a shrinking population to improve water/wastewater systems increasingly stressed by extreme weather events	Somewhat higher taxes are distributed among a shrinking population to improve water/wastewater systems
	Ground and surface water demand increases across all sectors due to more people and hotter weather; public water supply is strained	Ground and surface water demand increases across all sectors due to more people	Ground and surface water demand increases across all sectors due to hotter weather	Ground and surface water demand stays mostly the same
	More land is dedicated to development; the increase in hardscape contributes to erosion and hinders filtration	*More land is dedicated to development; the increase in hardscape contributes to erosion and hinders filtration*		
	Incidents of drinking water contamination in public systems and private wells increase		Incidents of drinking water contamination in public systems and private wells increase	

Indicators

BHRC staff prompted attendees to discuss indicators for shifts in climate, population, or both that would necessitate action. Responses were recorded in Mural, which was shared on a large screen with all attendees. Table 8 shows the responses (with some modifications for clarity):

Table 8 – Indicators

Driving Force	Indicator	Data Source
Climate	Retirement trends - people taking/bringing their retirement funds	AARP
	Severe weather reports - flooding, drought, extreme heat/cold, etc.	National Oceanic and Atmospheric Administration; United States Department of Agriculture (USDA) Climate Hub
	Algae blooms	Illinois Environmental Protection Agency (IEPA); local land owners, including conservation foundations and farmers
	River flow	United States Geological Survey; United States Army Corps of Engineers
	Flood damage	Utility outage reports; Federal Emergency Management Agency repetitive loss records; county engineer interviews
	Insurance claims	Natural Resources Conservation Service (NRCS); USDA Farm Services Agency (FSA)
	Crop data	NRCS; USDA FSA
	Number of livestock	United States Census of Agriculture
Population	School enrollment	Illinois State Board of Education enrollment counts; local schools
	Building permits (be aware of vacation rentals)	County assessor and zoning departments
	Number of retirees	AARP; United States Census; economic development organizations; local government
	Industry consumption/discharge permits	IEPA
	Broadband service areas	Illinois Broadband Map

	Transportation networks	Illinois Department of Transportation; county highway departments; municipal governments
	Daycare availability	Illinois Cares for Kids; Birth to Five
	Affordable housing	State and local housing agencies, realtor listings; Northwest Illinois Alliance of Realtors
	Crime statistics	FBI Crime Data Explorer
Both	Water use	Illinois Water Inventory Program; utility reporting
	Power use	United States Energy Information Administration (US EIA), Illinois Power Agency
	Number of meters	Local utility companies
	Number of tourists (some people may settle after visiting)	Illinois Office of Tourism; Illinois Department of Commerce and Economic Opportunity (DCEO)
	Wastewater treatment plant status	IEPA
	Wells drilled or deepened	Illinois State Geological Survey
	Well drilling permits	Local health departments
	Water quality tests	Local health departments
	Energy availability and outages	US EIA; local utilities
	Land use	Land use and zoning maps; USDA National Agricultural Statistics Service

Strategies

Finally, participants were asked to contribute strategies that could mitigate aspects of scenarios perceived as negative. Responses were again recorded in Mural. The suggested strategies included:

Table 9 – Strategies

Strategy	*Notes*
Charging for water intake by industry.	*State-level action*
Required to sample water quality when buying or selling a property with well.	*Possibly state and/or county action*
Economic incentives for environmental compliance (C-PACE).	*Allowed by state, but counties and municipalities must opt in*
Water distribution pipes need to be replaced. Motivate by making it more expensive to lose water than repair the problem.	*Possibly federal and/or state action*
County-wide water data collection.	
Regionalism between states - work together, not in competition.	
Thoughtful land use and zoning discussions.	
Better data collection or reporting - still struggles with agriculture water reporting for center pivots.	
Invest in infrastructure (especially for population growth): • Tax Increment Financing (TIF) • Grants (including DCEO-administered grants) • Sponsorship from large businesses or businesses that are large water consumers (public-private partnerships)	
Support legislation like the farm bill and other funding for infrastructure and resiliency.	
Farm-in-farm - lease part of land to new farmers, schools, or community colleges for students. Internships on local farms. Helps with succession planning and getting new farmers into the business.	
Invest in agriculture outreach programs (e.g., FFA and 4-H).	
Get teachers and educators involved. Teach next generation how much technology is involved in farming. Science teachers and guidance counselors can encourage careers in agriculture.	
Pair up agriculture students with mentors and internships.	
Look into NRCS grazing programs where new farmers start out helping and eventually take over.	
Set up Regional Water Authority for BHRC region or by watershed.	

Rainwater management: • Permeable pavement • Bee Branch Creek Restoration example (Dubuque project)	
Water reuse and conservation education: • Rainscaping programs (University of Illinois) • See examples in south and southwest states	

Educate new residents:
• Welcome packet with community and dwelling unit water consumption information
• Mailing on utility incentives for energy efficiency and renewable energy projects
  ○ Municipalities could do this too
  ○ US EPA WaterSense links
• Open house for public works
• Have local businesses give out item for energy efficiency (Book-It program for water?)	

PR and branding for conserving water (e.g., Joliet and Bedford Park).	
Give local businesses publicity for best management practices.	
More programs to get people certifications and jobs in water management fields.	
Reconsider cost of water to make people think about use.	
Install smart meters.	

3.3 Conclusion

While reports from ISWS[3] and The Nature Conservancy[4] hypothesize that the state is most likely to have an abundance of water in the coming decades, localized dry wells are occasionally reported, and contamination issues have eliminated or required modifications to production sources in the DAO subregion. Besides population and climate, water availability will depend on many factors, such as season, ownership, and quality. Regularly updating plans and implementing action items will help ensure that water resources in the DAO subregion remain plentiful for years to come. However, vigilance is needed, especially as external forces develop.

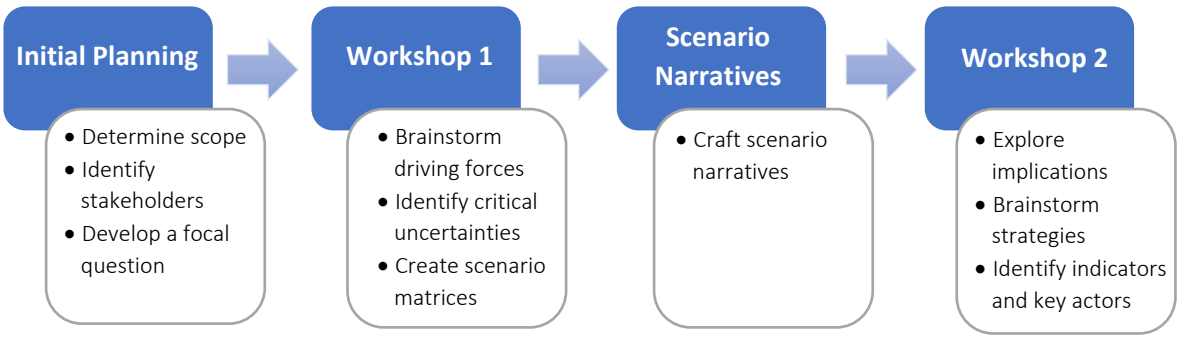
4. Summary

4.1 Workshops

4.1.1 Overview

A typical scenario planning process is structured as follows:

Figure 4 – Typical Scenario Planning Process



In general, this structure was used by all four subregions.

4.1.2 Stakeholders

The BHRC's DAO subregion workshops had considerably fewer participants than BHRC's GRL subregion workshops (the DAO subregion workshops had 14 unique attendees, 2 of which attended both workshops; the GRL subregion workshops had 23 unique attendees, 5 of which attended both workshops). While in-person engagement during the GRL subregion process was greater, BHRC received significant input from stakeholders during the DAO subregion survey. Timing, travel distances, perceived urgency – these and other factors influenced both processes.

4.1.3 Structure

BSRC and R1PC's planning structures can be viewed in the February 2023 report. This section compares the DAO subregion and GRL subregion planning efforts, both led by BHRC.

Each effort included kick-off webinars to introduce stakeholders to the scenario planning process. Driving forces for water demand were identified at the first workshops, and two of these driving forces were identified as critical uncertainties to be used in scenario creation. Due to low attendance at DAO subregion Workshop 1 and disagreement over the critical uncertainties, BHRC staff created a survey to better understand driving forces in the DAO subregion. BHRC crafted the scenarios for both subregions. The second workshops focused on refining the scenario narratives and identifying strategies to address each scenario.

Figure 5 – Scenario Planning Process for Greenriver Lowlands

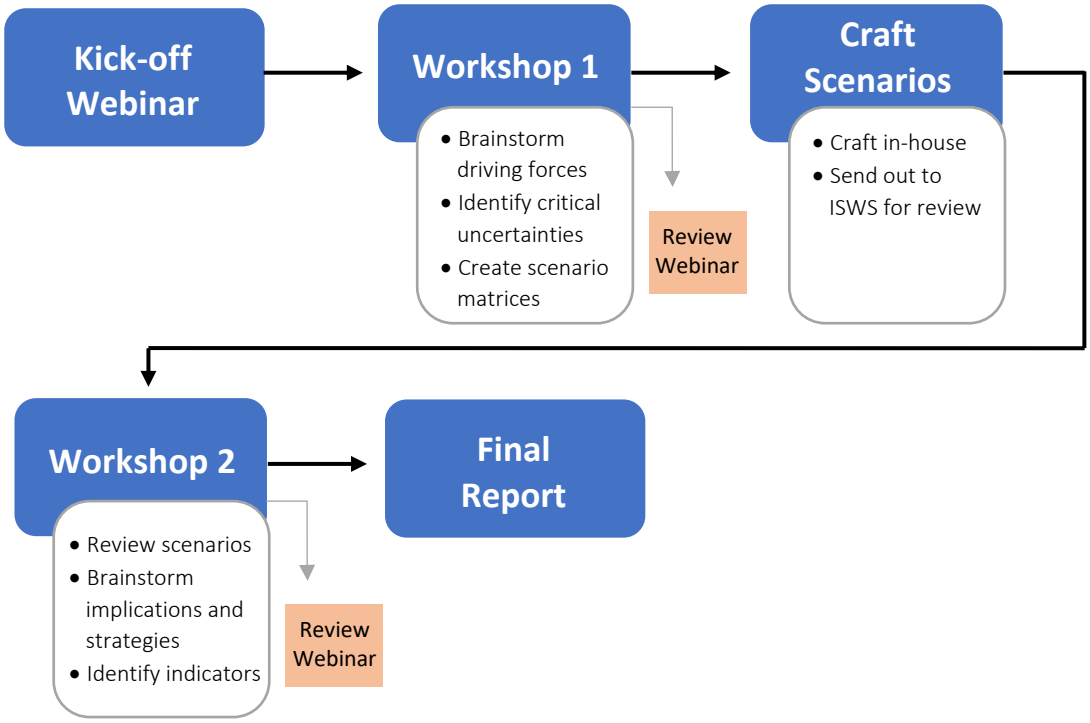
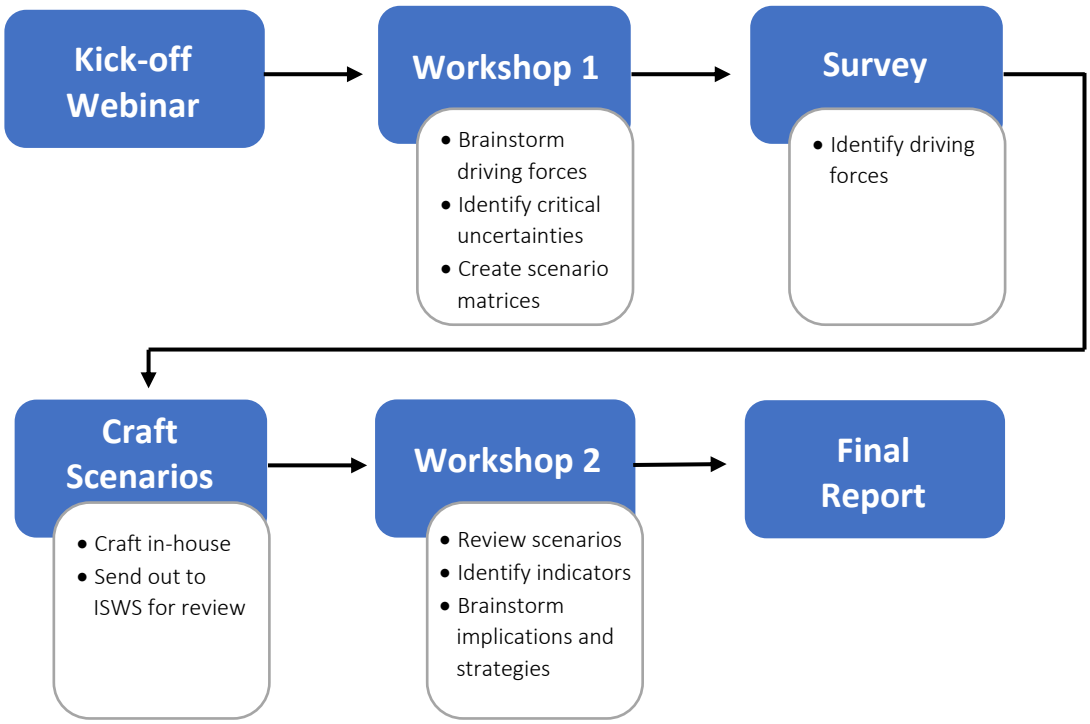


Figure 6 – Scenario Planning Process for Driftless Area + Ogle County



4.2 Driving Forces

4.2.1 Overview

Though each effort covered different geographies – a bistate metropolitan population, a heavily irrigated agricultural area, a two-county region with one of Illinois' largest cities, and a four-county area of various topographies – many of the driving forces discussed were the same or similar.

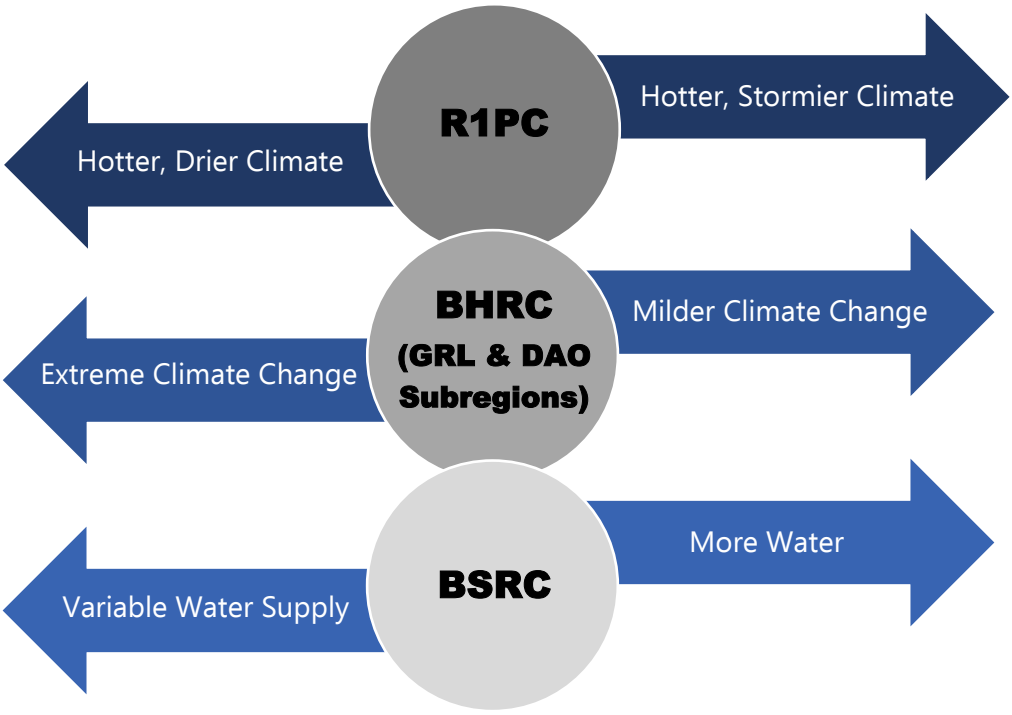
Table 10 - Common Driving Forces

<table>
<tr><th colspan="2">Common to All</th></tr>
<tr><td colspan="2">• Climate change
• Informed populace
• Aging and updated infrastructure
• Population changes
• Regulatory environment
• Funding and effectiveness of government
• Water quality</td></tr>
<tr><td>R1PC, BHRC (GRL Subregion), & BHRC (DAO Subregion)</td><td>R1PC, BSRC, & BHRC (GRL Subregion)</td></tr>
<tr><td>• Economic development in industry and agriculture
• Restoration and enhancement of natural resources
• Community wealth</td><td>• Green technology</td></tr>
<tr><td>BSRC & BHRC (GRL Subregion)</td><td>R1PC & BHRC (DAO Subregion)</td></tr>
<tr><td>• Fossil fuels</td><td>• Land use</td></tr>
<tr><td>R1PC & BSRC</td><td>BSRC & BHRC (DAO Subregion)</td></tr>
<tr><td>• Social equity and water resources
• Flood mitigation
• Ecosystem collapse</td><td>• Affordable housing</td></tr>
</table>

4.2.2 Climate Change

In each scenario planning process, participants identified climate change as a critical uncertainty. It consistently placed high in the categories of uncertainty and impact on water demand. Each process defined extents differently – apparent testimony to climate change's uncertainty.

Figure 11 – Climate Change Extents

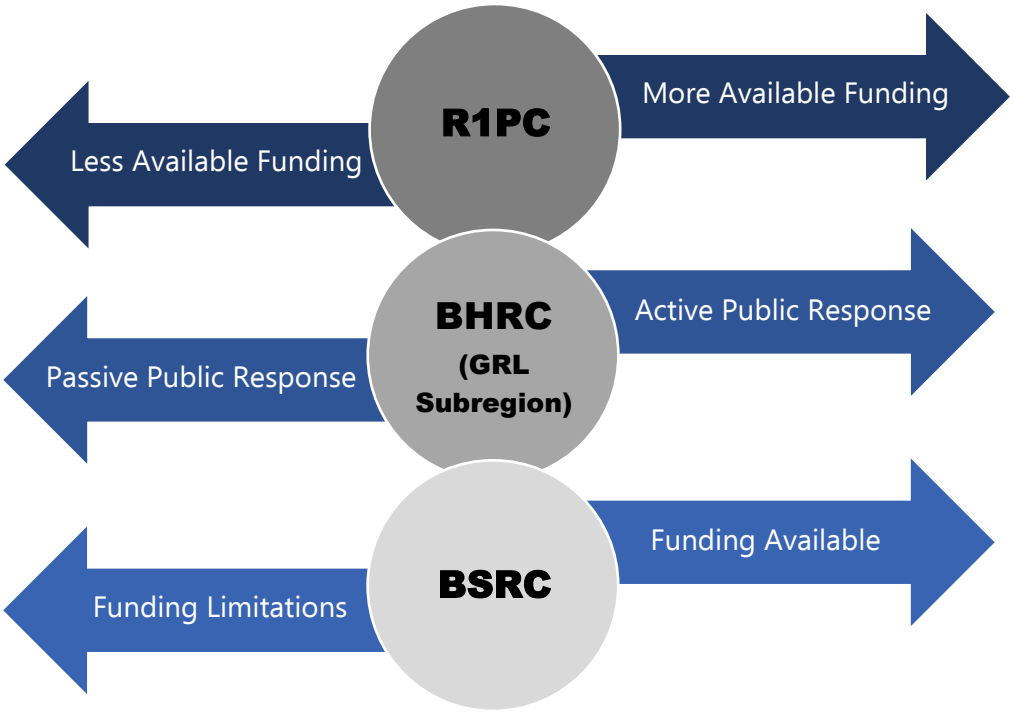


R1PC and BSRC had the most similar climate scenarios: one extreme indicated more variability in precipitation across the seasons, and the other suggested more precipitation all year. Both of BHRC's climate scenarios agreed with the drier (R1PC) and variable (BSRC) scenarios, but BHRC did not have a scenario with a wetter future year-round. BHRC's two poles looked at climate variability. Both R1PC and BHRC agreed that temperatures would rise regardless of the scenario. BHRC went into greater detail, proposing that in one possible future, temperatures would rise rapidly and extreme temperature days would occur with more frequency. BSRC mentioned that temperatures would swing between hot and cold extremes.

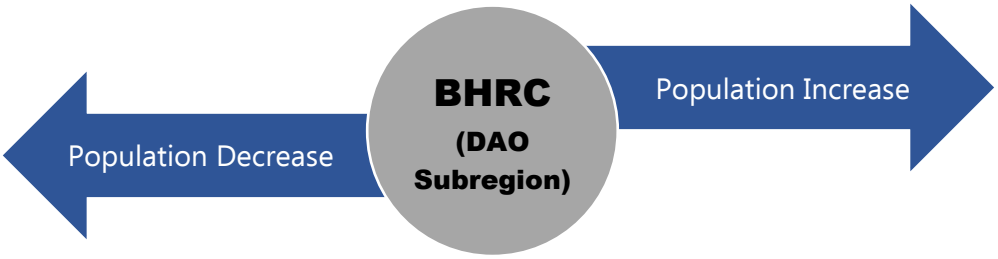
4.2.3 Public Response & Population Change

The second driving force for the first subregion workshops differed, but all were concerned with public response. R1PC and BSRC focused on funding availability to address water demand, whereas BHRC took a broader view on reactions to water regulations.

Figure 12 – Public Response Extents



The DAO subregion's second driving force was population change instead of public response.



In increasing population scenarios, there is further stress on local infrastructure and water demand, but similar to the active response/increased funding scenarios in the other regions, these effects might be balanced by more funding and advocacy. Conversely, in decreasing population scenarios, especially with milder climate change, there is potentially less pressure on public infrastructure. However, infrastructure will still need to be operated and maintained; similar to the passive response/limited funding scenarios, this may be more difficult if funding does not keep up.

4.3 Strategies

4.3.1 Overview

Scenario planning often results in strategies that are common to all scenarios and those unique to each scenario. Common strategies can be implemented regardless of which future occurs, whereas unique strategies tend to be implemented based on indicators for a particular scenario.

Both R1PC and BHRC consolidated their strategies. BSRC's unique strategies are noted in Section 5.2.3 of the February 2023 document. We have distilled the strategies from the four workshops into a limited list of regional action items. Strategies added since the last report are in italics. These strategies were further refined into action items that can be found in the 2025 *Rock River Region Water Resources Action Plan*.

4.3.2 Strategies

Category 1. Partnerships and Regional Efforts		
#	**Strategy**	**Actors**
1.1	Explore the creation of a regional water authority to regulate and permit large capacity withdrawals for industrial and commercial use	Water Utilities, Non-governmental organizations (NGOs), Agricultural Producers, Consultants, Local Governments
1.2	Explore the creation of a water utility consortium to expand data sharing and access to funding for more expensive infrastructure	Water Utilities, NGOs, Local Businesses and Agriculture, Consultants, Local Governments, Government Agencies
1.3	Create a regional water group that facilitates collaboration with regional organizations for communication, monitoring, and data sharing	Water Utilities, Consultants, NGOs, Local Businesses and Agriculture, Government Agencies
1.4	Enhance volunteer efforts by water stakeholders at all levels	NGOs, Educational Institutions, Water Utilities

Category 2. Planning		
#	**Strategy**	**Actors**
2.1	Develop and implement a regional plan of best management practices that can be used to establish comprehensive water conservation requirements	Government Agencies, Consultants, Water Utilities, NGOs

2.2	Using the best management practices plan in 2.1, make water-focused updates to established plans such as: • Land use plans as well as zoning, subdivision, and storm water ordinances • Hazard mitigation and floodplain management plans • Building codes • Design and construction standards	Local Governments, Planning Organizations
2.3	Assess floodplain land with high intensity uses and switch to lower intensity land use if necessary	Local Governments, Planning Organizations
2.4	Set priorities through efforts such as capital improvement plans to minimize competing budgets and ensure money is allocated to areas where vulnerable populations are at risk	Local Governments, Planning Organizations
2.5	*Plan for the long-term impacts of new development*	*Local Governments, NGOs*

Category 3. Local Government		
#	**Strategy**	**Actors**
3.1	Advocate for sustainability-minded public policy and back regional and local organizations in water planning and conservation efforts	Local Governments
3.2	Assist home and business owners with water conservation efforts by: • Providing water-use evaluations • Subsidizing installation of low-flow fixtures and appliances	Local Governments, Government Agencies, Water Utilities, NGOs
3.3	Be transparent in funding and data decision-making to maintain public trust in and support of conservation efforts	Local Governments

Category 4. Business and Economy		
#	**Strategy**	**Actors**
4.1	Partner with power producers to reduce energy inefficiencies on site	Government Agencies, Water Utilities, Power Producers
4.2	Tie business permitting, incentive programs, and/or impact fees to exceptional water management performance	Government Agencies, Local Government, Economic Development Organizations
4.3	Highlight businesses that meet best practice standards as outlined in 2.1	Government Agencies, Local Government
4.4	Evaluate and assess current water pricing, charge users rates based on use, and institute temporary higher rates in times of scarcity	Government Agencies, Local Government, Water Utilities

4.5	Make water management practices a part of the request for information review process for business attraction	Local Government, Economic Development Organizations
4.6	Incentivize agricultural producers to diversify crops planted and livestock reared	Government Agencies, Local Government, Agricultural Producers
4.7	Support voluntary reporting among agricultural producers to track local changes	Government Agencies, Local Government, Agricultural Producers, NGOs
4.8	If current trends continue, water abundance may be marketed as an asset	Local Government, Tourism, and Economic Development Organizations

Category 5. Infrastructure		
#	**Strategy**	**Actors**
5.1	Use increased fees from any water rate hikes and conservation pricing to improve water infrastructure	Government Agencies, Local Government, NGOs
5.2	*Support water recycling in industry and agriculture*	*Businesses, Local Government, Agricultural Producers, Government Agencies*
5.3	Update infrastructure in a comprehensive manner, including: • Use green infrastructure such as cover crops, filter strips, and bioswales • Reduce the extent of impervious surfaces • Increase floodplain storage capacity • Enhance existing and restore depleted wetlands • Update wastewater treatment facilities as well as public water supply and disposal systems	Government Agencies, Local Government, NGOs

Category 6. Education		
#	**Strategy**	**Actors**
6.1	Communicate true cost of water production and treatment; address cost impacts of past and potential future deferred maintenance	Government Agencies, Local Government, NGOs, Educational Institutions
6.2	Promote conservation habits among the public such as: • Reducing imported (e.g., bottled water) consumption • Rainwater capture and storage for non-potable purposes such as landscaping and agriculture • Demonstrations of comparative water use	Local Government, NGOs, Educational Institutions
6.3	Evaluate and develop water supply/demand curriculum in local schools and at other educational venues (e.g., community colleges, libraries, and park districts)	Educational Institutions, NGOs, Government Agencies, Consultants

6.4	Introduce water-supply careers and related educational opportunities in schools	Educational Institutions, Government Agencies
6.5	*Connect agricultural producers with technical assistance and funding opportunities*	*ISWS, Community Colleges, State colleges*
6.6	Expand training offerings for local water professionals, including public officials	Government Agencies, NGOs, Educational Institutions, Consultants

Category 7. Technology and Data Collection		
#	**Strategy**	**Actors**
7.1	Reduce water loss through implementing advanced metering infrastructure	Government Agencies, Local Government, Water Utilities
7.2	Model selected stormwater flows and field tile drainage	Government Agencies, NGOs
7.3	Continuously integrate new water monitoring and conservation technologies into existing infrastructure	Government Agencies, Local Government, Water Utilities
7.4	Incorporate advanced treatment technology for emerging contaminants and non-conventional sources of water	Government Agencies, Local Government, Water Utilities, NGOs
7.5	Track or improve data tracking in the following areas: • Land use changes • Conservation programs enrollment • Growth/decline in water-dependent industries • Use rates/aquifer levels related to central-pivot and other agriculture and industrial irrigation systems • Water consumption in households	Government Agencies, Local Government, Water Utilities

Category 8. Hyper-Local Projects		
#	**Strategy**	**Actors**
8.1	Invest in Hennepin Canal Feeder infrastructure in the Green River Lowlands to regulate water level	County and Municipal Governments, Government Agencies, Local NGOs

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5.1 Endnotes

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5.3 Photography

Cover photos were provided by Andrew Shaw of Blackhawk Hills Regional Council.

6. Appendices

6.1 Glossary of Acronyms

BHRC	Blackhawk Hills Regional Council	**NCICG**	North Central Illinois Council of Governments
BSRC	Bi-State Regional Commission		
DAO	Driftless Area + Ogle	**NGO**	Non-Governmental Organization
DCEO	Illinois Department of Commerce and Economic Opportunity	**NRCS**	Natural Resources Conservation Service
		R1PC	Region 1 Planning Council
GRL	Green River Lowlands	**RPO**	Regional Planning Organization
IEPA	Illinois Environmental Protection Agency	**TIF**	Tax Increment Financing
IDNR	Illinois Department of Natural Resources	**USDA**	United States Department of Agriculture
ISWS	Illinois State Water Survey	**US EPA**	United State Environmental Protection Agency

6.2 Workshop Attendees

6.1.1 Blackhawk Hills Regional Council (DAO)

Workshop 1

BHRC Staff

- Abby Ebelherr, BHRC Regional Planner
- Andy Shaw, BHRC GIS Mapping and Enterprise Zone Specialist

Attendees

- Heather Coyle, University of Illinois Extension
- Zach Diaz, Constellation Energy
- Nicole Haas, Jo Daviess County Soil and Water Conservation District/Greater Freeport Partnership
- Marcia Heuer, Ogle County Board
- Vlad Iordache, Illinois State Water Survey
- Bill Jahnke, Northwest Illinois Economic Development
- Ashly Whaley, Ogle County Health Department

Workshop 2

BHRC Staff

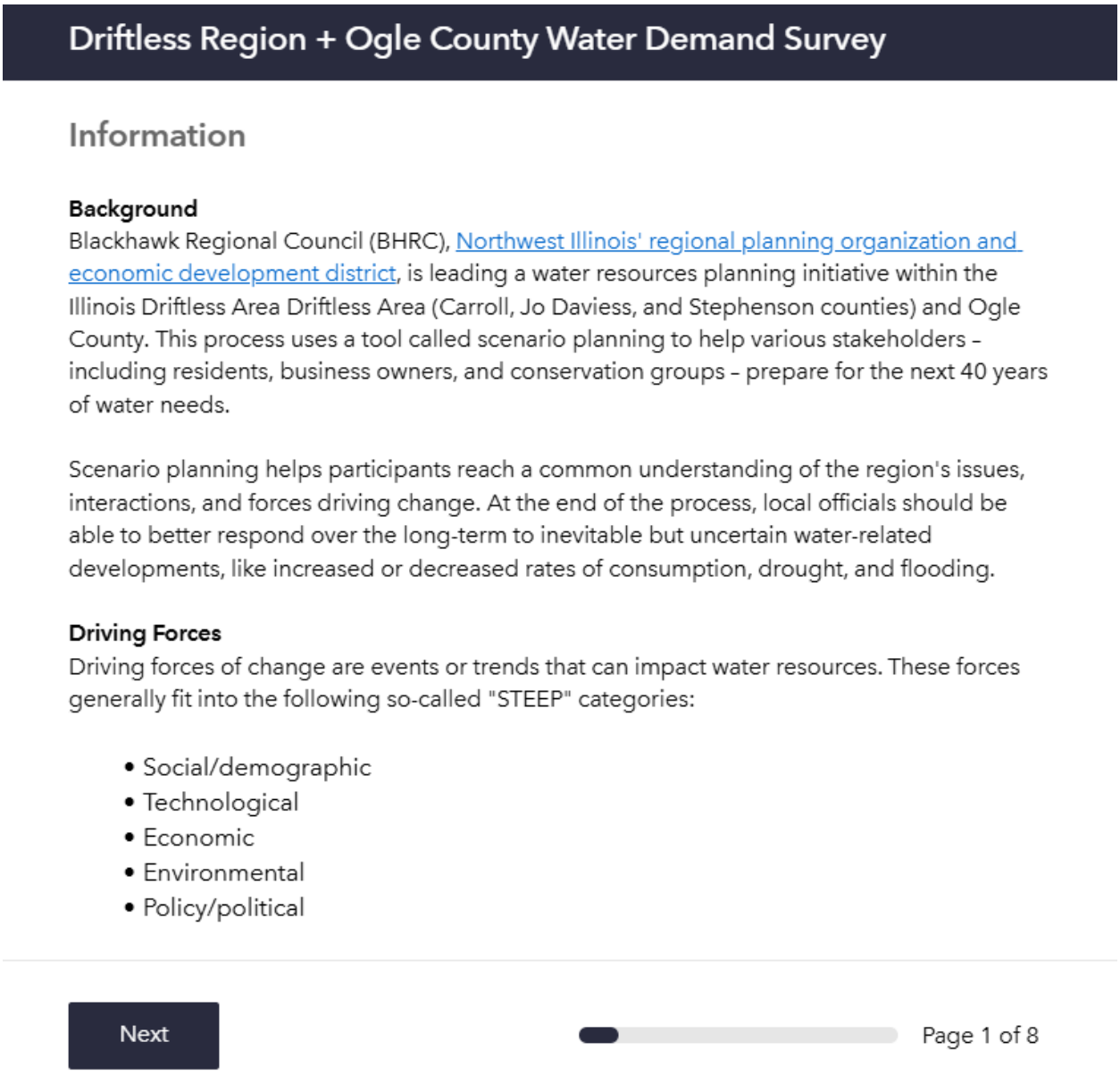
- Abby Ebelherr, BHRC Regional Planner
- Andy Shaw, BHRC GIS Mapping and Enterprise Zone Specialist

Attendees

- Wei Han, Illinois Department of Natural Resources
- Marcia Heuer, BHRC board member
- Ed Juracek, BHRC President
- Beckie Maddox, Constellation Nuclear
- Devin Mannix, Illinois State Water Survey
- David Schmit, Northwest Illinois Economic Development
- Stanley Solomon, University of Illinois Extension

6.3 Driving Forces Survey

6.3.1 Survey



Driftless Region + Ogle County Water Demand Survey

Information

Background

Blackhawk Regional Council (BHRC), Northwest Illinois' regional planning organization and economic development district, is leading a water resources planning initiative within the Illinois Driftless Area Driftless Area (Carroll, Jo Daviess, and Stephenson counties) and Ogle County. This process uses a tool called scenario planning to help various stakeholders – including residents, business owners, and conservation groups – prepare for the next 40 years of water needs.

Scenario planning helps participants reach a common understanding of the region's issues, interactions, and forces driving change. At the end of the process, local officials should be able to better respond over the long-term to inevitable but uncertain water-related developments, like increased or decreased rates of consumption, drought, and flooding.

Driving Forces

Driving forces of change are events or trends that can impact water resources. These forces generally fit into the following so-called "STEEP" categories:

- Social/demographic
- Technological
- Economic
- Environmental
- Policy/political

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Driftless Region + Ogle County Water Demand Survey

How to Complete This Survey

In October 2023, BHRC held a scenario planning workshop for the Illinois Driftless Area and Ogle County. From that meeting and other discussions, BHRC developed a list of driving forces related to water resources.

In this survey, you will select up to two driving forces in each STEEP category, choosing those most critical to the Illinois Driftless Area (Carroll, Jo Daviess, and Stephenson counties) and Ogle County.

Next, you will rank your choice(s) using the following criteria:

- Importance (i.e., the driving force is critical)
- Uncertainty (i.e., the driving force is unpredictable)

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Driftless Region + Ogle County Water Demand Survey

Social/Demographic

Driving Forces*

Please select up to two choices that you think will have an impact on water resources in the Illinois Driftless Area and Ogle County over the next 40 years. Remember: Think out to 2064!

- [ ] Affordability/cost of living
- [ ] Living within or outside municipal limits
- [x] Population size
- [ ] Population age
- [ ] Other

Importance

How **important** will this driving force's impact be?

- 1 indicates that the driving force will have the **least impact**
- 5 indicates that the driving force will have the **most impact**

Population size*

1 5

Reset

Uncertainty

How **certain** will this driving force's impact be?

- 1 indicates that the driving force is **least certain**
- 5 indicates that the driving force is **most certain**

Population size*

1 5

Reset

Comments

1000

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Driftless Region + Ogle County Water Demand Survey

Technology

Driving Forces*

Please select up to two choices that you think will have an impact on water resources in the Illinois Driftless Area and Ogle County over the next 40 years. Remember: Think out to 2064!

- [ ] Changes in agricultural/-industrial water conservation technology
- [ ] Changes in consumer water conservation technology
- [ ] Genetically modified crops
- [ ] Water use metering/-monitoring
- [ ] Other

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Driftless Region + Ogle County Water Demand Survey

Environment

Driving Forces*

Please select up to two choices that you think will have an impact on water resources in the Illinois Driftless Area and Ogle County over the next 40 years. Remember: Think out to 2064!

- [ ] Buffer/vegetation strips in farm fields
- [ ] Climate change
- [ ] Erosion/runoff
- [ ] Drought/flooding
- [ ] New private wells
- [ ] Planting native plants/trees
- [ ] Use of rain gardens/-bioswales in municipalities
- [ ] Unsewered households
- [ ] Water retention/-detention systems
- [ ] Waterway/-streambank stabilization in farm fields
- [ ] Other

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Driftless Region + Ogle County Water Demand Survey

Economic

Driving Forces*

Please select up to two choices that you think will have an impact on water resources in the Illinois Driftless Area and Ogle County over the next 40 years. Remember: Think out to 2064!

- [ ] Consumer demands/-preferences locally or in large cities
- [ ] Corn/soy production
- [ ] Manufacturing processes
- [ ] Meat/milk/egg production
- [ ] Planting different kinds of crops (e.g., fruits, vegetables, nuts, hemp)
- [ ] Remote work
- [ ] Solar/wind energy developments
- [ ] Other

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Driftless Region + Ogle County Water Demand Survey

Policy/Politics

Driving Forces*

Please select up to two choices that you think will have an impact on water resources in the Illinois Driftless Area and Ogle County over the next 40 years. Remember: Think out to 2064!

- [ ] Budget priorities
- [ ] Funding availability
- [ ] Local expertise (e.g., elected officials, access to experts)
- [ ] State of public infrastructure (e.g., water, stormwater, wastewater)
- [ ] Subdivision/land use policies
- [ ] Utility rates
- [ ] Water quality mandates
- [ ] Water reporting requirements
- [ ] Water withdrawal limits
- [ ] Other

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Driftless Region + Ogle County Water Demand Survey

Contact Information

Zip code*

Name

Organization

Email

Final Comments

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6.3.2 Responses

Driving Forces – "Other" Selection

Driving Force	Best Fit STEEP Category	Best Fit Driving Force	Importance Score	Uncertainty Score
Because we have abundant water in the aquifer underneath us, I think there will be a time in the next 40 years where we will be asked to ship our water to other parts of the US.	Economic	Consumer demands/ preferences locally or in large cities	3	2
Increased use per household	Economic	Consumer demands/ preferences locally or in large cities	4	4
Over use of ground water by agriculture.	Economic	Corn/soy production	4	5
climate	Environment	Climate change	5	4
climate change	Environment	Climate change	5	5
climate related issues that affect the availability of water	Environment	Climate change	5	4
Climate Change Deniers	Policy/Politics	Local expertise (e.g., elected officials, access to experts)	5	2

All Results Ordered by Times Selected

Driving Force	Times Selected	Average Importance	Average Uncertainty
Changes in agricultural/industrial water conservation technology	30	4.10	3.60
Consumer demands/preferences locally or in large cities	29	3.97	3.45
Changes in consumer water conservation technology	29	3.86	3.59
Climate change	26	4.58	4.31
Drought/flooding	22	4.27	3.82
Affordability/cost of living	22	3.95	3.36
Population size	21	4.24	3.76
Manufacturing processes	21	4.05	3.43
Living within or outside municipal limits	20	3.65	3.25

State of public infrastructure (e.g., water, stormwater, wastewater)	19	4.16	3.79
Water use metering/monitoring	13	4.23	3.85
Water quality mandates	11	4.36	3.82
Local expertise (e.g., elected officials, access to experts)	10	4.40	3.80
Funding availability	9	4.33	3.56
Erosion/runoff	9	3.67	3.22
Subdivision/land use policies	9	3.44	3.56
Corn/soy production	8	4.25	4.38
Water withdrawal limits	7	4.29	4.14
Meat/milk/egg production	7	4.00	3.57
Population age	6	3.67	3.83
Utility rates	5	4.00	4.60
Water reporting requirements	5	4.00	2.80
New private wells	5	3.80	3.40
Water retention/detention systems	5	3.60	3.40
Buffer/vegetation strips in farm fields	4	4.25	4.5
Budget priorities	4	4.25	4.50
Planting different kinds of crops (e.g., fruits, vegetables, nuts, hemp)	4	3.75	3.50
Solar/wind energy developments	4	3.50	4.00
Remote work	4	3.50	3.50
Use of rain gardens/bioswales in municipalities	3	4.00	3.67
Genetically modified crops	3	3.33	3.00
Planting native plants/trees	2	4.00	4.00
Unsewered households	2	4.00	3.50
Waterway/streambank stabilization in farm fields	1	4.00	4.00

Comments (edited for clarity)

Social	Number of people in any area directly impacts all of nature.
	Water use is closely tied to population in all aspects including domestic consumption, industrial and commercial activities, agricultural produce, etc. As a result, water resources could be a limiting factor to a region's population and economic growth. It's not clear to me how the population of the study area will change in next 40 years.
	Climate change is a critical component in water accessibility as is usage.
	Population growth is a crucial issue. It should be managed carefully.
	Population in this area is expected to decrease, which would reduce water use, causing less strain. However, water use per household has been steadily increasing.
	We need to have the availability of stores, schools, and job opportunities.
Technology	I remember old wash machines that used a ton of water and now we have low water machines. In the next 40 years, I can see a new invention that cleans with even less. I think we will get more and more ideas to conserve water. With GMO crops, I think seed companies will be able to develop new products that can still produce high yields with less water. I visited the Monsanto field research farming facility in Monmouth, IL, about 10 years ago, and they were already experimenting with drought resistant crops. It will make a big difference.
	Water conservation will reduce water use. Agricultural/industrial activities use more water than domestic consumers and thus have larger impact on water resources.
	I don't have a lot of confidence that the public will take these challenges seriously until they personally feel the impact, and then it might be too late.
Environment	Water shortage or water excess, as well as climate change, will change the region's environment.
	Drought and flooding are tied to climate change.
	While climate change will affect drought/flooding, it is necessary to develop the appropriate systems to accommodate the uncertain future. We know there will be change; we just cannot anticipate if there will be a water surplus or shortage, and we should work on developing a system that would work with either scenario.
	By water retention I assume you mean any artificially retained water on the surface or in tanks such as artificial ponds as well as livestock waste retention tanks. These I see as potential to grow and break and flood and create pollution in our waterways. I choose erosion/runoff because it encompasses several other categories you list. I feel that there is already too much runoff of soil and chemicals from farm fields and not enough buffer strips in farm fields and not enough no-till farming.
	All are important, but climate change overshadows all others.
	Climate change the category of drought/flooding. Ag buffer strips should be planted with native species, which will help slow down water runoff and allow more water to soak back into the ground. The deep root systems will also reduce erosion, stabilize streamlines, reduce

	erosion and runoff. These buffers should be promoted wherever possible outside of ag systems as well.
Economic	I think as we saw with Covid that more and more people from the urban areas are moving to the more rural areas, and we will see more wells being drilled and a strain on small municipalities that can't grow fast enough to be able to get water and sewer to new residents. Also, as I stated earlier with GMO, I think new strains of corn and beans will be more drought-resistant and use way less water.
	Industrial and agricultural sectors demand a large quantity of water use.
	Once the uncertainty regarding water availability is removed, it may be necessary to make unpopular decisions for consumer demand/usage. Manufacturing should be shifting now to reduce the amount of water used in their processes.
	I worry about population growth which leads to more farming, more manufacturing, and more building pushing out to the rural areas. I wish I could say by 2064 that humans have figured out how to live lightly on the planet instead of having the mindset that more consumerism is good.
	Consumer demand when unchecked can be devastating.
	Manufacturing demands will probably have a larger impact on water demand than consumer demands. With proximity to Lake Michigan, it's much more likely that will be used as a future water source for larger cities then tapping our aquifers.
Policy/Politics	These small municipalities with the higher cost will have to have grants from state and federal places or they will not be able to afford it. Also, the smaller municipalities have aging infrastructure and will not be able to afford it on their own.
	Both factors (withdrawal limit and utility rate) will promote water conservation and preserve source water.
	We need people who actually understand and are concerned about our natural resources. Unfortunately, budget concerns often override the necessity of protecting those resources.
	In the event of drought and water shortages, it will be necessary to set withdrawal limits. Infrastructure will be vitally important in maintaining water quality and volume.
	I see that land use is most important and influences the rest (budgets, funding, infrastructure, etc.). I think housing is likely to grow (if given all other things about our society stay similar to now). Water quality mandates (or lack thereof) are very important but uncertain (because we usually don't seem to have mandates or rules or laws enough to protect water resources).
	Mandates can overshadow consumer demands.
Final Comments	Good luck!
	People affect nature in many ways. Good and bad outdoor activities are important to all.
	Great survey. I need to invest more time to understand what your organization's goals are.
	Thank you for covering this topic.
	Thank you for the survey. Will join the water study meeting on March 6.
	Thank you for doing this. Hopefully the very necessary appropriate actions will be taken!
	Need this for other counties.