2024 Water Use Advisory Council Report

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ARI	adverse resource impact			
AWE	Alliance for Water Efficiency			
BMP	Best Management Practices			
DEQ	Michigan Department of Environmental Quality			
DNR	Michigan Department of Natural Resources			
DTMB	Michigan Department of Technology, Management, and Budget			
DWEHD	Drinking Water and Environmental Health Division			
EGLE	Michigan Department of Environment, Great Lakes, and Energy			
EQuIS	Environmental Quality Information System			
ET	evaporation and transpiration			
FTE	Full-Time Equivalent			
GIS	Geographic Information System			
GRMD	Geologic Resources Management Division			
MDARD	Michigan Department of Agriculture and Rural Development			
MGS	Michigan Geological Survey			
MGWA	Michigan Ground Water Association			
MGRRE	Michigan Geological Repository for Research and Education			
MHF	Michigan Hydrologic Framework			
MIWMD	Michigan Integrated Water Management Database			
MPART	Michigan PFAS Action Response Team			
MSU	Michigan State University			
MSUE	Michigan State University Extension			
NGWMN	National Ground Water Monitoring Network			
NREPA	Natural Resources and Environmental Protection Act			
PFAS	per and polyfluoroalkyl substances			
RS&GIS	Remote Sensing and Geographic Information Systems Center			
SSR	Site Specific Review			
USGS	U.S. Geological Survey			
WMA	water management area			
WUAC	Water Use Advisory Council			
WUC	Water User Committee			
WWAT	Water Withdrawal Assessment Tool			

Acronyms

Executive Summary

The Water Use Advisory Council (WUAC) was codified in 2018 PA 509 which amended Part 328, Aquifer Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). Previous iterations of the WUAC were organized by the then Department of Environmental Quality (DEQ) Director, as he recognized the importance of a broad stakeholder council to advise DEQ in water resource issues. The Council produced reports making recommendations as charged by the Director until 2014.

2018 PA 509 provided permanency to the Council and gave it a charge to report biennially to the Legislature, the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Michigan Department of Natural Resources (DNR), and the Michigan Department of Agriculture and Rural Development (MDARD). The WUAC is pleased to present its recommendations for its 2024 report, which include a new research project to investigate streamflow depletion by large quantity withdrawals using detailed data collection and modeling, setting timelines and communication guidelines for Site Specific Reviews (SSRs) conducted by EGLE, and continuing our progress forward on previous recommendations by providing ongoing funding support for the operation, maintenance, and updates of that important scientific work. The WUAC has also provided an update in this report on funding and implementation of recommendations made in 2020 and 2022.

The following summarizes the highest priority activities necessary to continue and improve the Water Use Program's functions and operations. The WUAC urges the Legislature to approve appropriations to support these activities agreed upon by Council consensus, which will help Michigan fulfill its obligation to protect both the Great Lakes' water resources for current and future generations and the ability of our states' residents, businesses, farmers, and utilities to sustainably access it.

Water Use Advisory Council 2024 Recommendations: New and Ongoing

The WUAC recommends the following be implemented by EGLE and funded by the Legislature to ensure the progress and continuation of the vital work of the Water Use Program.

1) Investigate Streamflow Depletion by Large Quantity Withdrawals Using Detailed Data Collection and Modeling Amount: \$1,195,000.00

The Michigan Water Withdrawal Assessment Process takes a precautionary approach to prevent adverse resource impacts (ARIs) from surface or groundwater withdrawals to protect water resources and associated ecosystems. An overly conservative system will hamper economic growth, and an overly permissive registration system will lead to conflicts or ARIs. This study will conduct a field test of stream depletion by a nearby pumping well, model the source of water to high-capacity pumping wells, and evaluate the watershed water budget to improve EGLE's ability to assess potential streamflow depletion from large quantity withdrawals.

2) Assure Timeliness of SSRs Amount: \$0

The statute requires conventional SSRs be completed in 10 business days.¹ While EGLE can do this for many requests that are mainly administrative in nature, they are not able to complete more complex SSRs in such a short time frame. We recommend EGLE notify applicants within 10 business days if an SSR requires extra time and that it will be completed within 30 days. In the event of SSRs that take longer than 30 days, or when data is needed that the applicant cannot provide quickly, a due date will be negotiated between EGLE and the applicant in a work plan for when data can be sent and how long the review will take.

3) Ongoing <u>Annual</u> Support for Operations, Maintenance, and Implementation of WUAC Recommendations Amount: \$706,000.00

While some of the recommendations made by the WUAC are for one-time research, development, or implementation activities, many of them will incur ongoing expenses to continue operating and maintaining equipment and infrastructure, collecting data, and advancing the coordination of programs. **The WUAC strongly urges the Michigan Legislature to work with EGLE to develop a robust and secure ongoing process as part of the Department's annual budget** to provide this necessary funding moving forward so that approved and funded advancements are not lost by the inability to maintain them or collect and use the data these projects and infrastructure provide. These activities include:

- a) Operations and maintenance of the Michigan Hydrologic Framework (MHF) to facilitate the creation of groundwater/surface water models: \$36,000
- b) Operations and maintenance of existing streamflow gages: \$350,000
- c) Operation and maintenance of up to 20 new streamflow gages: \$320,000

4) Ongoing <u>Annual</u> Support for Detailed Geologic Mapping to the Michigan Geological Survey Amount: \$3,000,000.00

The work MGS performs is vital to the continuing success of the Water Use Program. Improved geologic data is needed to fine tune and verify predictions that large quantity withdrawals will not cause ARIs or to determine whether an ARI has occurred. Continued funding to the MGS in support of their work will dramatically improve the ability of EGLE to manage the groundwater resources of Michigan under NREPA Part 327 and will support numerous other programs in

¹ MCL 324.32706c (4).

EGLE (e.g., supporting the Michigan PFAS Action Response Team (MPART)), DNR and MDARD. The WUAC strongly urges the Michigan Legislature to continue funding MGS's vital geologic data collection and mapping.

By making this annual investment part of a continuing and ongoing funding plan within the budget, the Legislature can ensure its investment continues to provide returns into the future that protect water resources and habitat, water use for production of food, fiber, renewable fuel, manufacturing, recreation, and many, many other uses. We look forward to discussing how the Legislature can act to secure this funding on an ongoing basis.



Introduction

A decade ago, Michigan's previous WUAC emphasized the importance of water and our shared responsibility to protect it:

A fundamental underlying reason that we address the issue of water conservation is that we love the Great Lakes and the ground water systems upon which they rely. We may ask ourselves—why do we do this work to preserve the water? ... The answer lies in the fact that unlike many other endeavors where failure may be inconvenient but otherwise has little effect on our lives, failure in this work that we are doing will have major negative impacts. If we are not able to develop the process for the shift in how our State and our communities use, conserve, protect and restore the water resources in the Great Lakes region our failure will impact our lives and the lives of our children, grandchildren and generations beyond.

The indigenous nations of the Great Lakes region have traditional teachings that guide them to seek balance in personal, family, community and national life. The strengths and perils of Fire, Wind, Earth and Water and the balance among them are of fundamental importance. These teachings inform that when people disrespect this balance, our collective future is endangered. Water is the lifeblood of Mother Earth; it flows in her veins and fills her oceans, lakes, rivers and streams. It is essential for the plants and animals with whom we share this wonderful creation. It surrounds us all in our Mothers' wombs before we are born; without it, life as we know it could not exist on Earth.²

That responsibility and the vital importance of Michigan's water resources—for ecological function and habitat, drinking, shipping, industrial production, agriculture, recreation, and more—has not changed. If anything, water's importance has increased as we see effects of climate change around the nation and the world, increasing competition for water access, a growing need for food, fiber, and fuel to supply populations, the need for more creative ways to generate power, and a more interconnected society linked by regional, national, and global shipping networks. There may also be increased water demand from new types of users as society changes, with such examples including the increased demand for data centers and associated cooling.

² Final Report of the Water Use Advisory Council, December 12, 2014, p. 75. Available at: <u>https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Reports/WRD/2014-Water-Use-Advisory-Council.pdf</u>.

Climate migration—the movement of populations caused by changing climate conditions—has become a global reality. Rising sea levels, extreme weather events, and severe droughts are forcing millions to seek safer regions. Michigan, with its access to the Great Lakes and relatively mild climate, could become a refuge for these displaced populations. While this shift may stimulate economic growth and stabilize the state's demographics, it also poses significant



challenges, particularly in sustainably managing water resources.

Climate migration could lead to increased food and water demand through both population growth and supplying sufficient water to support the volume of agricultural products. If most of the population growth occurs in regions that have undersized and/or aging systems to transport and treat water and wastewater, then this could have a significant negative impact on local resources. Rising water demand can also negatively impact water quality and environmental habitat through increasing industrial, residential, and agricultural discharges and runoff. Depending on where additional water comes from to meet increased demand, the natural flow of water within ecosystems could also be impacted if not thoughtfully planned.

Some movement into Michigan has already begun in certain areas for a suite of reasons, but not on a large scale. This is a critical moment in time to reflect on our past and plan for our future by compiling and understanding current population trends, climate impacts, land use changes, and water demands, and using this information in modeling, forecasting and scenario planning to address climate migration's potential impact on water resources in a complex and rapidly changing landscape. To build a compelling case for action, state agencies and policymakers must collaborate with academic institutions, water management organizations, and climate experts to ensure that Michigan's policies are informed by best available science and evidence-based research about the changing climate's impacts on surface and groundwater resources and aquatic ecosystems and how that may change given various future population scenarios.

Michigan is surrounded by one of the world's largest sources of surface freshwater on the planet and must balance protecting both water quantity and quality for habitats and ecosystems as well as human uses. To help meet this goal, Michigan along with seven other U.S. states and two Canadian provinces signed the Great Lakes–Saint Lawrence River Basin Sustainable Water Resources Agreement of 2005 and Compact of 2008. The Water Resources Agreement and Provinces bordering the Great Lakes to responsibly manage water resources. Michigan fulfilled this obligation by adopting what is now Part 327 of

NREPA. Part 327 created a water withdrawal assessment program managed by EGLE to prevent ARIs from being caused by water withdrawals on streams and lakes. The program requires registration for large capacity water withdrawals (withdrawals with a capacity of more than 100,000 gallons per day), creates an online process to streamline water withdrawal registration and authorization, and requires annual water use reporting and implementation of conservation measures.

Michigan's Water Use Program depends on the cooperation of all partners to be successful. EGLE administers and enforces the program, DNR conducts research and provides data on stream characteristics and fish habitats, MDARD collects water usage information and resolves conflicts for the agricultural users who depend on water access to provide a safe, affordable, and abundant food supply, and universities, the MGS, and U.S. Geological Survey (USGS) conduct research, collect and analyze data, and create and review models to inform water use analysis. A broad range of stakeholders make recommendations for needs and program improvements as well as assisting in outreach on program components and requirements.

In past iterations, Councils were brought together for specific purposes and then were disbanded. In 2012, the Council was reconvened to make program-wide recommendations to the EGLE Director. Its report in 2014 included a recommendation that a permanent advisory council should make recommendations to advance and improve the Water Use Program to both Administrative and Legislative branches of Michigan's government to prioritize funding needs and concerns. As a result of the collaboration of all partners, 2018 PA 509 was signed to create the WUAC as a permanent body.

The WUAC is charged to report biennially to the Legislature, EGLE, DNR, and MDARD with recommendations to improve the Water Use Program through advances in data collection, modeling, research, education, and outreach. The WUAC is appointed by the Governor, the Speaker of the House, the Senate Majority Leader, and EGLE's Director. Its members represent business, agriculture, utilities, conservation and environmental groups, lakes and streams associations, and local governments, as well as state agency staff in ex-officio roles, and technical advisors from universities, state and federal agencies, and industry professionals to assist with the WUAC's work. The WUAC makes its recommendations by consensus, holding meetings according to the Open Meetings Act, and its materials are available on the WUAC website, https://www.michigan.gov/egle/about/groups/water-use-advisory-council.

We are pleased to present our recommendations for the 2024 WUAC report, which include conducting research on streamflow depletion measurement and modeling from large capacity water withdrawals, improving communication on the timeliness of SSRs, and urging the Legislature to work with EGLE securing a sustainable, long-term funding solution for ongoing operations, maintenance, and other expenses associated with continuing the progress made toward improving the Water Use Program originally implemented through generous Legislative funding. In this report, we have also provided a status update on implementation of recommendations made by the WUAC in 2020 and 2022.



These funds are not only a wise investment to ensure maximum value from the Legislature's previous investment in implementing the WUAC's recommendations, but they are also vital to sustaining program improvements. Such funding for data collection, modeling, and education serves a much larger role beyond the Water Use Program. A key effort EGLE is implementing as part of the Water Use Program funding is to combine data sets from multiple divisions and agencies. This will allow information collected from several program areas to serve a common purpose. The funding for continuing research, education, data collection, and modeling will not only improve Michigan's management of its obligations under the Compact, but it will also improve the state's ability to track and assess impacts of legacy pollution as well as emerging contaminants like per- and polyfluoroalkyl substances (PFAS). It will help with habitat protection, assessment of climate change impacts, and assessing threats to native species. It will inform opportunities and needs for economic development and protection of the state's highly diverse agricultural production. It will also assist local governments with the information they need for urban planning and providing for their residents and visitors.

Overall, an investment in the Michigan Water Use Program serves needs far beyond its own program. Therefore, the WUAC urges the Legislature to fund recommendations in this report and to identify and assign ongoing funding to support the program's continuing work so it may proceed with maximum effectiveness and efficiency. We welcome discussion for how continuing funding may be implemented and how reporting on its progress may be communicated to meet the Legislature's needs.

2024 Recommendations

1. Investigate Streamflow Depletion by Large Quantity Withdrawals Using Detailed Data Collection and Modeling Amount: \$1,195,000

Introduction

Questions have been posed regarding the Michigan Water Withdrawal Assessment Process including: 1) the appropriateness of various analytical solutions for estimating streamflow depletion by high-capacity wells, 2) the effectiveness of groundwater-flow models in quantifying potential streamflow depletion by high-capacity wells, and 3) the availability of field data that would support the use of such models. We recognize that short-term, annual, and long-term climatic variability leads to complex streamflow records and varying irrigation needs, making direct observation of streamflow depletion by high-capacity well has been observed, the link between that observation to modeling tools and then to the assessment of cumulative streamflow depletion by high-capacity wells in a watershed needs to be strengthened.

Water resource development is important to Michigan and will likely grow in importance as climate variability and change motivate increased use of irrigation to provide economic stability. Industrial development, change in power generation, and population growth can also lead to increased use of high-capacity wells for water supply. The Michigan Water Withdrawal Assessment Process takes a precautionary approach. The screening tool and SSR process attempt to prevent ARIs from surface or groundwater withdrawals thereby protecting surface-water resources and associated ecosystems that provide cultural, environmental, and economic benefits. An overly conservative system will hamper economic growth, and an overly permissive registration system will lead to conflicts as either adverse impacts will have to be accepted or capital investments in high-capacity water withdrawals will yield less water than planned.

Running field tests will collect more data than typical SSRs and this data can be used to assess the water-budget response to local watersheds from pumping.

Objectives, Partnerships, and Outcomes

This study will conduct a field test of stream depletion by a nearby pumping well, model the source of water to high-capacity pumping wells, and evaluate the watershed's water budget. We propose to conduct an integrated field experiment and modeling study with the following objectives:

1. Empirically demonstrate streamflow depletion from adjacent high-capacity well pumping.

- 2. Monitor the water budget of the nearby landscape including adjacent fields and the groundwater and surface water resources within it.
- Build (or enhance) a regional-scale physics-based hydrogeologic model capable of reconstructing the observed streamflow depletion and water balance, alongside the effects of other existing high-capacity wells in the region.
 Test existing analytical approaches for quantifying stream depletion using both the field data and the regional model.

Conducting such a study will require a partnership that brings together water users, resource scientists, stakeholders, and regulators. We envision that, facilitated by the WUAC, a team will be built that spans sectors and includes individual landowners. While we intend to develop a more formal document to inform potential participants, some of these benefits will include:

Direct feedback on study design: Our first step will be to identify participating landowners and work with them to plan the timing and scope of fieldwork, as well as the objectives and outputs of the modeling studies.

Regular and informal discussions: More opportunity to represent both individual and community concerns more directly than through existing WUAC mechanisms. Project scientists are members and/or technical advisors of the WUAC and can better represent the needs of water users through user-informed discussions.

Additionally, this project's concept and broad outlines have been developed along with collaborators in Wisconsin. These collaborators, at the USGS and University of Wisconsin, Madison, will help form the technical team on this proposed project, collaborate on the execution of its work, and seek independent funding to run a parallel effort in their state. Wisconsin and Michigan face many of the same water use challenges and opportunities, with similar agricultural systems, climates, soils, and histories of regional irrigation practices now spreading to new areas. This collaboration will leverage the expertise and capabilities of both teams to produce a more robust set of outcomes, at no expense to the State of Michigan.

Over the duration of the project, we anticipate the following outcomes:

- 1. Collect empirical data demonstrating stream depletion from a nearby high capacity well under controlled conditions at one or more locations. While this has been previously demonstrated in studies, none have been conducted and published in recent decades, leaving room for improvement in methods, execution, and data publication.
- Collect data on landscape evaporation and transpiration (ET), made possible by advancements in field-scale instrumentation. This data will allow us to empirically "close the water balance", that is, to represent all major pieces of it.
- 3. Create a regional groundwater model capable of representing our field experiment(s) as well as the effects of all other high-capacity wells in the modeled region. Additionally, we will quantify uncertainties introduced by factors including the coarser simulation

required of regional modeling, relative to the refined models we will produce at each field site.

- 4. This paired field dataset and physics-based model will then serve as a testbed for evaluating other analytical approaches for streamflow depletion, helping to benchmark approaches for the Water Withdrawal Assessment Tool (WWAT) and SSR procedural enhancement.
- Package the data collected in an educational module aimed at enhancing both academic and professional understanding of streamflow depletion processes in humid regions like Michigan.
- 6. Present project findings, team efforts, our cross-collaboration at academic and professional conferences, as well as peer-reviewed scientific publications. Michigan has developed a reputation as a leader in cooperatively and proactively managing its groundwater resources to the benefit of society while preserving ecosystem health. Bringing further attention to existing efforts and investments, the work proposed here will serve to create cross-state connections and foster innovation and improvements of water-resource management regionally.

Approach

Tests will be conducted in a watershed with existing high-capacity wells where the individual impacts of wells on streamflow are undocumented. We propose to design a local-scale test near a small stream in the watershed that will induce local streamflow depletion. Special consideration will be given to the timing of the depletion to replicate typical irrigation schedules in the local area. The observed depletion will then be analyzed with analytical and numerical models to test the applicability of the different approaches and document limitations. Information from the local test will then be used to help understand the cumulative watershed response to existing or proposed highcapacity wells. Note that stakeholders in Wisconsin are posing similar questions and although the proposed test will be conducted in Michigan, we expect to collaborate with colleagues to strengthen the design and analysis.



Preliminary discussions between USGS, MSU, University of Wisconsin (UW), Wisconsin Potato and Vegetable Growers (WPVGA), and Wisconsin Department of Natural Resources have identified some features of proposed tests including:

- Site identification: Identify a site or sites where hydrogeologic conditions imply that local streamflow depletion by a pumping well near a stream is likely in a watershed with existing high-capacity wells.
- **Test Design**: Design a test or series of tests to observe the response of the system to pumping.
 - Install several monitoring wells at varying distances from the pumping well including placing some on the side of the pumping well opposite the stream and distant wells placed to monitor background conditions. The stream at the test site should be quite small so that impacts can be reliably measured.
 - Fully monitor the test site for more than one growing season with a local ET-flux tower, precipitation, air temperature, wind speed, and soil moisture monitoring to better characterize the entire water budget. This includes monitoring streamflow immediately upstream and downstream of the test site, monitoring water levels in piezometers and observation wells, and monitoring water withdrawal/application rates from irrigation wells to the field. We will observe stream temperature profiles to identify potential areas of groundwater discharge. The goal of the monitoring is to provide adequate data to understand the water budget response to high-capacity pumping.
 - Establish a stream gage downstream from the test area, for example, at the outlet of the watershed under study, to monitor potential downstream response of the tests and cumulative behavior of the larger test watershed.
 - At a site where local streamflow depletion is noted, run two tests: in the first test, pipe the water produced by the well away from the test area to avoid potential interference, and in the second test allow the produced water to be used for irrigation.
- **Model development**: The test watersheds will be included in a numerical groundwaterflow model of the local region. The role of the model is to bridge the spatial scales between local data collection, local water table response, watershed response, and regional response. The model can also be used to test various analytical solutions to better understand the limitations.
- **Stakeholder engagement**: Stakeholders will be fully engaged in the tests, and they will be able to observe the data collection and participate in the data analysis. All data and analysis will be made publicly available through reports and data releases.

Budget					
Activity	Cost	Notes			
Staff support field test	\$110,000.00				
Staff support modeling	\$200,000.00				
Student researcher	\$160,000.00				
Stream gaging, equipment and operation	\$200,000.00				
Monitoring wells, installation and	\$150,000.00				
operation					
Weather stations and soil moisture	\$25,000.00				
High capacity well, pump rental, piping	\$200,000.00	Contracted work.			
Flux towers equipment and support	\$110,000.00				
Modeling array support	\$10,000.00				
Supplies materials	\$10,000.00				
Travel	\$20,000.00				
Total	\$1,195,000.00				

2. Assure Timeliness of Site-Specific Reviews (SSRs)

Amount: \$0

Issue

The statute requires conventional SSRs be completed in 10 business days.³ While EGLE can do this for many requests that are mainly administrative in nature, the ability to complete more complex situations in such a short time frame poses a challenge to the Department.

Background

The Office of the Auditor General audited the Water Withdrawal Assessment Program.⁴ They found the program did not complete 54% of the SSRs within 10 business days during the audit period of January 1, 2022, to June 30, 2023. They recommend the program ensure it timely completes SSRs.

Findings

EGLE provided information on how long it took to complete SSRs from January 1, 2023, to March 29, 2024. The SSRs fall into three general categories: 1) administrative review; 2) desktop geology review; and 3) technical review. Based on the information shown in Figure 1, 82% of administrative reviews are completed within 10 business days, 95% of desktop reviews are completed within 30 days, and 96% of technical reviews are completed within 30 days.

³ MCL 324.32706c (4).

⁴ Michigan Office of the Auditor General, Performance Audit Report: Water Withdrawal Program, May 2024, available at <u>https://audgen.michigan.gov/wp-content/uploads/2024/05/r761015323-7178.pdf</u>.



SSR Workdays by Category (2023 - Present)

Figure 1

Recommendation

The Council recommends the Department continue to complete SSRs as quickly as possible. We recognize more complicated requests will take more than 10 days. Therefore, we recommend that the Department notify the applicant within 10 business days if the review requires extra time and will be completed within 30 days. For SSRs that take longer than 30 days, or where data is needed that the applicant cannot provide quickly, a due date will be negotiated in a work plan between EGLE and the applicant including when data can be sent and how long EGLE's review will take.

The Department should make this commitment publicly, so applicants will know what to expect. This may be done through posting on the Water Use web page and/or on the WWAT user interface.

The Department should report how long it takes to complete SSRs based on the categories of administrative, desktop geology, and technical reviews.

Recommendations for Continued Funding

While some of the recommendations made by the WUAC are for one-time research, development, or implementation activities, many of them will incur ongoing expenses to continue operating and maintaining equipment and infrastructure, collecting data, and advancing the coordination of programs previously funded by Legislative appropriations. The WUAC strongly urges the Michigan Legislature to work with EGLE to develop a robust and secure ongoing process to provide this necessary funding moving forward so that important advancements are not lost by the inability to maintain them or collect and use the data these projects and infrastructure provide.

Ongoing Annual Expenses

Ongoing annual expenses that will affect the actions being undertaken to improve Michigan's Water Use Program total \$706,000.00 for EGLE beginning in FY 2026, with additional ongoing operations and maintenance expenses for monitoring wells that will be installed as part of EGLE's upcoming agreement with the USGS and which the WUAC will make additional recommendations to fund before implementation on September 30, 2026; and annual ongoing expenses of \$3,000,000.00 for the MGS. Those annual expenses will include:

Annual Expense 1

EGLE's ongoing operations and maintenance of current projects previously appropriated from the Legislature: \$706,000.00 annually, which includes:

a. MHF to facilitate the creation of groundwater/surface water models: \$36,000.00 annually for ongoing operations and maintenance.

The MHF will facilitate the creation of groundwater/surface water models to improve water management decision making through centralized access to upto-date hydrologic data, comprehensive hydrologic analysis, and other models. The creation of models will be expedited by Geographic Information System (GIS) linked databases, existing models' input and output, and a statewide interpretation of the water table surface. To assist professionals and the public understand and use hydrologic information, the MHF will function as a statewide "smart map" that describes the distribution, abundance, status, and trends of the linked atmospheric, surface water and groundwater systems. The Michigan Legislature appropriated \$2,100,000.00 to develop the framework, which will incorporate new data and analysis, link GIS databases and the Michigan Integrated Water Management Database to help create regional models, complete three regional models to assess water withdrawal impacts, and assess metamodeling for its potential to be used as a rapid evaluation method. It is expected to be complete by the end of FY 2026. Ongoing annual expenses of \$36,000.00 will begin in FY 2027 to operate and maintain the modeling framework, and will be necessary to continue using, deriving valuable modeling

analysis, and performing maintenance on this framework to make use of the investment made to create it.

- b. Operations and maintenance of existing streamflow gages: \$350,000.00 annually
 - i. EGLE contracts with the USGS annually to collect streamflow data each year from 12 active stream gages funded by the Water Use Program plus 66 additional sites where miscellaneous streamflow data is collected but no gage has been installed. The funds previously used for this data collection have expired and while generous funding for WUAC recommendations have allowed these gages and site collections to continue providing their critical information on streamflow and depletions, the funds will need replacement by FY 2026. Many of the streamflow gages already in place have been funded by different sources; however, the cost to continue this program's existing level of investment in streamflow data is approximately \$350,000.00 per year.
- c. Long-term planning to install up to 20 new streamflow gages: \$320,000.00 annually for operations and maintenance
 - Michigan contains over 70,000 miles of rivers and streams. For this program, these miles are grouped into approximately 5,600 distinct water management areas (WMAs). In addition to the active stream gages installed and site measurements taken under existing programs and funding described above, EGLE and USGS entered into a joint agreement to install 8 new stream gages by the end of 2024. Additionally, EGLE is working on agreements to install an additional 12 gages. While historical Legislative funding mechanisms have been able to plan and install these gages, ongoing maintenance and operation expenses will be required to gather and use the data they collect. This will be an estimated \$320,000.00 in annual expense beginning in FY 2026.
- d. Long-term planning for installing additional monitoring wells and adding groundwater data to the USGS National Ground Water Monitoring Network. EGLE and USGS are working on a new review proposal for annual operations and maintenance costs that will be incurred after September 30, 2026. The WUAC will provide an update on ongoing operations and maintenance costs when it becomes available.

Annual Expense 2

Geologic Mapping and Well Driller training by the MGS: \$3,000,000.00 annually for detailed data collection on geologic formations and to train well drillers on best practices to record lithologic information from drilling.

a. The Michigan Legislature has been providing this funding in an annual budgetary line item separate from WUAC recommendations, and the work MGS performs is vital to the continuing success of the water use program. Improved geologic data are needed to fine tune and verify predictions that large quantity withdrawals will not cause adverse resource impacts, and to determine whether an ARI has occurred. Continued funding to the MGS in support of their work will dramatically improve the ability of EGLE to manage the groundwater resources of Michigan under NREPA Part 327 and will support numerous other programs in EGLE (e.g., supporting the Michigan PFAS Action Response Team (MPART)), DNR and MDARD for years to come. These MGS mapping projects are expanding existing geologic information with data from drilling, soil sampling, passive seismic, and gamma-ray logging to produce composite surficial geology maps that include bedrock topography, thickness and type of glacial deposits, static groundwater elevations and near-surface sand and gravel. Additionally, MGS and the Michigan Ground Water Association (MGWA) initiated a program of trainings to standardize how well drillers identify and enter data on the subsurface sediments encountered during drilling, to improve the information quality and utilization of data being entered into Michigan's well database, Wellogic. With the Wellogic database being the primary source of data useable for various purposes, the standardization of lithologic descriptions, accuracy and reliability of data entered is of upmost importance and represents a cost-effective approach to increase the accuracy of the subsurface geologic data in the state (compared with collecting new data from separate efforts) (\$3,000,000.00 annually).

By making this annual investment part of a continuing, ongoing funding plan within the budget, the Legislature can ensure its investment continues to provide returns into the future that protect water resources and habitat, water use for production of food, fiber, renewable fuel, manufacturing, recreation, and many, many other uses. We look forward to discussing how the Legislature can act to secure this funding on an ongoing basis.



Accomplishments from 2020 Recommendations

2018 PA 509 codified the WUAC to make reports to EGLE, MDARD, DNR, and the Michigan Legislature on the implementation of the water withdrawal assessment process at least every two years. As a result, the WUAC submitted its first report in December of 2020, including a list of recommendations for funding to improve data collection, modeling, water conservation, and education related to water withdrawal and natural resources protection across the state. 2022 PA 53 and 2022 PA 166 appropriated \$13.0 million to provide this vital work. The WUAC is pleased to report that work is underway to implement or complete all 2020 recommendations. A summary of work underway or completed thanks to the Legislature's 2022 appropriation is below. Several items are highlighted as requiring additional funding for operations, maintenance, and as part of ongoing projects and data collection, which the WUAC urges the Legislature to continue funding as part of EGLE's ongoing budget, and which are also summarized in the section titled, "Recommendations for Continued Funding" highlighting new funding requests:

2020 Funded Recommendations

RECOMMENDATIONS TO ADVANCE WATER CONSERVATION

- 1. Advance Michigan's Water Conservation and Efficiency Efforts through State Climate, Energy, and Water Infrastructure Initiatives
 - Assess current climate, energy, sustainability, and water infrastructure policies and programs to identify gaps and opportunities to incorporate water conservation and efficiency, technological improvements, other state and national programs, and education.
 - b. \$50,000.00 for one year.

Summary of Success: A 12-month grant has been awarded to the Alliance for Water Efficiency (AWE) to identify innovations and technological advancements in water conservation practices and summarize sectors' existing processes and best management practices, with a focus on business and industry sectors. The team will also collect information and research water sectors implementing innovative and advanced water conservation best management practices (BMPs) across the region and broader U.S. to inform Michigan's Water Conservation and Efficiency Program.

- 2. Increasing Water Efficiency and Conservation Practices in the Agriculture Industry
 - Provide funding for two Full-Time Equivalent (FTE) positions through Michigan State University Extension (MSUE) to develop and launch an educational program for agricultural water use efficiency for both plant and animal industries.
 - b. \$600,000 over three years (\$200,000 per year).

Summary of Success: MSUE has hired two Extension positions to launch this educational program: one in May of 2024 and one in August of 2024. MSUE may need to request an

extension of this program given the additional time involved in bringing the new hires into this educational program.

RECOMMENDATIONS TO CONTINUE AND IMPROVE CURRENT OPERATIONS AND DATA COLLECTION

- 1. Michigan Integrated Water Management Database (MIWMD)
 - a. A database to facilitate geologic and hydrologic data collection and modeling by making current data accessible and available in a common geospatial format.
 - b. \$250,000.00 over two years (\$125,000.00 each year).

Summary of Success: The Remote Sensing and Geographic Information Systems Center (RS&GIS) is a subcontractor to the Institute of Water Research at MSU for this project. MSU and EGLE signed a grant agreement for MSU to fold this project into the larger MHF projects for operational efficiency.

2. Well Driller Trainings for Improved Data

- a. Information collected for the water withdrawal assessment program depends on accurate and consistent subsurface data input to the Wellogic database submitted by well drillers, who must be trained to accurately identify and submit subsurface and well data.
- b. \$4,000.00 over 2 years (\$2,000.00 each year).

Summary of Success: MGS and the MGWA conduct this training with private well drillers as part of a program to improve knowledge and capacity for accurate Wellogic data submission. MGS brings geologic core samples from the Michigan Geological Repository for Research and Education (MGRRE) to these training sessions to improve the drillers' geologic descriptions in their well logs. MGS also invites EGLE staff from the Drinking Water and Environmental Health (DWEHD) and Geologic Resources Management Division (GRMD) to give presentations on their respective programs during these training courses.

3. USGS and EGLE Streamflow Gages

a. This program is funded from several local, state and federal sources. State funding sources include legislative appropriations to implement the 2020 and 2022 WUAC recommendations, as well as groundwater proposal for change (PFC) funding. Long-term funding needs to be provided for both the installation of new gages, operation and maintenance of existing and new gages, and miscellaneous (one-time) flow measurements.

Summary of Success: EGLE and USGS have entered into a joint agreement to install 8 new stream gages by the end of 2024, and EGLE is working on additional agreements to install an additional 12 gages. \$4.5 million out of \$15.0 million total in EGLE's budget for stream gages, miscellaneous streamflow measurements, and monitoring wells will go toward these 8 gages to depleted water management areas and other high priority areas for updated data collection.

RECOMMENDATIONS FOR NEW OPERATIONS TO IMPROVE DATA COLLECTION AND MODELING

- 1. Michigan Hydrologic Framework
 - a. Facilitate the creation of groundwater/surface water models to improve water management decision making through centralized access to up-to-date hydrologic data, comprehensive hydrologic analysis, and other models. The MHF will incorporate new data and analysis, and link GIS databases and the MIWMD to help create regional models.
 - b. Create three regional models to more accurately assess water withdrawal impacts within the MHF, and to assess its functionality.
 - c. Assess metamodeling processes on a regional model to develop a rapid method to evaluate potential water use impacts.
 - d. \$2,100,000.00 over three years (\$900,000.00 in year 1, \$700,000.00 in year 2, and \$500,000.00 in year 3).

Summary of Success: The Institute of Water Research at MSU is the primary contractor for this project. The USGS Midwest Water Science Center, is a subcontractor to MSU for the modeling portion of this grant project. The MSU and USGS project teams have ongoing meetings with both EGLE staff and members of the WUAC Models Committee. The MIWMD was folded into this project for operational efficiency (see Item 1 in the Recommendations to Continue and Improve Current Operations and Data Collection).

2. Geologic Data Collection and Mapping in up to 25 targeted areas of Michigan

- a. Expands geologic information with data from drilling, soil sampling, seismic and gamma ray logging to produce accurate geological maps, static groundwater levels, and bedrock topography.
- b. Michigan Geologic Survey will conduct data collection, which can be used in multiple program areas including the water withdrawal assessment program, PFAS tracking, waste leachate tracking, sand and gravel assessments, and others.
- c. \$3,000,000.00 annually.

Summary of Success: MGS received funding to conduct this work via 2022 PA 53. This funding will be critical to continue so that MGS can not only perform its data collection but also expand to additional priority counties to complete its goal of 25 targeted areas.

3. Monitoring Well Network.

- a. Install monitoring wells and join the NGWMN.
- b. EGLE and USGS to partner on effort.
- c. \$259,000.00 for first year and then \$226,000.00 thereafter.

Summary of Success: EGLE received a two-year grant (ending in July 2025) for \$92,915.00 to become a new data provider to the NGWMN. The initial grant provides funding for EGLE to link its databases to the NGMWN and begin providing groundwater elevation data from inactive USGS wells and new wells installed by MGS. EGLE can apply for future grants for activities such

as adding additional wells to the network, repairing or abandoning damaged wells, and adding equipment (e.g., transducers) in the wells. Once EGLE's Groundwater Data Management System (using the Environmental Quality Information System (EQUIS) software) is created, it will be linked to the NGWMN so that EGLE can query EQUIS to report data directly to the NGWMN.

RECOMMENDATIONS FOR ADDITIONAL ACTIVITIES TO IMPROVE DATA COLLECTION AND MODELING AS CONTINUED AND NEW OPERATIONS ARE UNDERWAY

1. Long-term planning

- a. Analysis of streamflow, groundwater, and geologic data to identify critical gaps and needs, and identify data collection priorities.
- b. \$100,000.00 over two years (\$50,000.00 each year).

Summary of Success: EGLE entered into an agreement with MGS to implement this recommendation.

2. WWAT user interface update

- a. Display registration information and status of water management areas.
- b. \$50,000 single expense in one year.

Summary of Success: The Michigan Department of Technology, Management, and Budget (DTMB), and EGLE combined the user interface and compiling key aquifer properties projects into a larger information technology (IT) project to improve the WWAT. The contract between the State of Michigan and Stafford Gray was signed by both parties as of October 18, 2024.

3. Compiling Key Aquifer Properties for use in the WWAT

- a. Update statewide estimates of transmissivity and identify water management areas where storage coefficients may be changed to more accurately reflect geologic conditions
- b. \$110,000 over two years (\$55,000 each year).

Summary of Success: Updating the aquifer properties used by the WWAT's groundwater model proposal was reviewed by DTMB and the contract with Stafford Gray was signed as of October 18, 2024.

4. 3D Glacial Aquifer Mapping in Two Counties

- Use transition probability geostatistical mapping in two Michigan counties: Cass and Calhoun, to assess the ability of this mapping process to identify glacial aquifer properties and compare with Geological Survey 3D interpretations.
- b. \$80,000 over two years (\$40,000 each year).

Summary of Success: A contract has been awarded to Barr Engineering. They are obtaining data sets from the MGS and have begun their analysis work.

5. Wellogic Digitization and Database Population

- a. A two-year project to be conducted by MGS to digitize and geolocate Wellogic records to improve data collection and capacity.
- b. \$1.7 million over two years.

Summary of Success: MGS is working on the digitization project and maintains an online dashboard to detail their progress on this project.

NEW AND ONGOING ACTIVITIES THAT DO NOT NEED ADDITIONAL STATE FUNDING

- 1. Develop Water User Committee (WUC) User's Manual
 - a. This manual will equip WUCs with information, tools, and resources to develop realistic shared solutions to sustainably manage water use.
 - b. \$250,000 will be provided by the EGLE Office of the Great Lakes through the Michigan Great Lakes Protection Fund to develop this manual and convene one to two WUCs as case studies to inform the manual development.
- 2. Develop standards & protocols for collection and use of new data within the program
 - a. This process is ongoing with EGLE staff and the WUAC.
- 3. Well-owner outreach on registration completion requirements
 - a. This process is ongoing with EGLE staff and the WUAC.
- 4. Continue review and work on Cass County water use pilot study model
 - a. This process is ongoing with EGLE staff, partners, and steering and technical committee members for the pilot project.

The first three projects are underway and nearing completion. No additional work has been done on the Cass County water use pilot study model. EGLE WUAU staff use the data collected by the Cass County study, when appropriate, in their site-specific reviews.



Accomplishments from 2022 Recommendations

In December 2022, the WUAC submitted recommendations for additional funding to implement projects to continue improving the Water Use Program's knowledge base and performance. The recommendations are summarized below. We are grateful for the support of the Legislature through 2024 PA 121, which appropriated \$1,200,000.00 to support the 2022 recommendations.

2022 Funded Recommendations

1. Water Conservation and Efficiency: A Pilot of Michigan Agricultural Irrigation Water and Energy Efficiency Program Amount: \$600,000.00 (Total for a 3-Year Pilot)

This funding request is to conduct a three-year pilot to evaluate and retrofit existing irrigation systems to improve water and energy efficiency. The goal of this pilot program is to develop Irrigation BMPs through on-farm demonstrations, including evaluating and retrofitting the existing irrigation systems, measuring the improved water and energy use efficiency, and estimating the potential reduction of greenhouse gas emission and cost savings.

2. Research WWAT Streamflow Depletion Allocations Between Water Management Areas (WMAs) Amount: \$0 (using existing program funds).

This recommendation evaluates a proposed revised methodology for the WWAT screening tool to:

- Determine the feasibility of using the revised methodology in the screening tool.
 Develop techniques that will allow timely calculations in the online use of the tool.
 Determine the feasibility of conducting a field investigation to show improvement of the revised methodology versus the half-max rule.
- ii. Determine the results of applying the revised methodology to the entire database of registered large quantity withdrawals. Evaluate what, if any, impacts there would be of water availability and potential ARIs. Identify possible measures to mitigate impacts on registered users while avoiding ARIs.
- iii. Prepare recommendations, based on findings, for the WUAC regarding the implementation of the revised methodology and any new or revised policies necessary for successful implementation.
 - 3. Conduct Downstream Accounting Research Amount: \$180,000.00 (Total for 2-Year Project).

The current withdrawal assessment process only considers streamflow depletions in the WMAs immediately adjacent to proposed withdrawals. There is concern that downstream reaches could have impacts from upstream withdrawals and return flows. This recommendation encompasses the following:

- i. Complete an exhaustive literature review of existing research on observed or modeled downstream propagation of streamflow depletions.
- ii. Examine relationships between long-term changes in index flows and index flow yield (e.g., inches of runoff for the catchment divided by inches of precipitation in the catchment for an appropriate time) relative to climatic conditions at gaged streams throughout Michigan.
- iii. Conduct literature review and empirical analyses to identify and provide underlying support for the appropriate spatial scale (e.g., WMA, entire upstream catchment of the WMA or a lesser portion of the WMA's catchment) for totaling cumulative withdrawals that potentially affect the index flow of each WMA.

4. Evaluate Downstream Streamflow Depletion Effects Through a Stream Network Amount: \$235,000.00 (Total for a 2 to 2.5 Year Project).

This study is designed to investigate how streamflow depletions might propagate downstream and combine to effect downstream reaches and will:

- i. Conduct a series of modeling analyses to test mechanisms that would lead to attenuation of the streamflow depletion rates.
- ii. Identify key features of the surface-water/groundwater system that help propagate or attenuate upstream depletion response.
- iii. Identify stream networks in the state that are more susceptible to upstream withdrawal and those that may be more buffered from upstream withdrawals.
 - 5. Develop an Inland Lakes ARI conceptual Framework and Pilot Data Acquisition Assessment Amount: \$200,000.00 (Total for a 3-year implementation)

The WUAC recommends a one-time financial investment of \$200,000.00, that would be used over two years to acquire technical support for the WUAC's committees to engage limnological expertise, facilitative modeling capacity, and to conduct multiple targeted pilot scale data acquisition assessments. This technical support is deemed necessary to make progress on the inland lakes ARI assessment topic.

6. Maintain Current Index Flow Values Amount: \$0

The WUAC conducted a review of Index Flows, a value representing lowest summer flow of stream reaches in the Water Use program over its period of record or extrapolated from analyses of USGS flow gages. We recommend no changes to those Index Flows at this time, and

additionally recommend those Index Flow values continue to be assessed every 5 years for any needed adjustments to reflect changing values.

7. Continued Funding for Implementation of 2020 WUAC Report Priorities Amount: \$6,000,000.00 (\$3,000,000.00 annually).

Funding appropriated by 2022 PA 53 will support implementation, operations, and maintenance of the 2020 Report priorities not including the MGS geologic mapping, through 2026. 2022 PA 166 provided one year of funding for the MGS geologic mapping work, in Article 4, Part 1, Section 102 of that bill assigned to departmental administration and support anticipated to need ongoing funding. Ongoing annual expense for MGS geologic mapping for the next two fiscal years (FY 2023-2024) is \$6,000,000.00 total (\$3,000,000.00 annually) to continue its progress on collecting data to provide accurate subsurface geologic and aquifer properties in priority counties and conduct well driller training to improve lithologic data recording during well drilling. Funding appropriated by 2022 PA 53 will support implementation, operations, and maintenance of the 2020 Report priorities not including the MGS geologic mapping, through 2026. After 2026, ongoing expenses to maintain and continue to collect data from the implemented priorities of the WUAC's 2020 Report will include:

- i. MHF to facilitate the creation of groundwater/surface water models: \$36,000.00 annually for ongoing operations and maintenance.
- ii. Operations and maintenance of existing streamflow gages: \$350,000.00 annually for operations and maintenance.
- iii. Long-term planning to determine and install up to 20 new streamflow gages: \$320,000.0 annually for operations and maintenance.
- iv. Long-term planning for installing additional monitoring wells and adding groundwater data to the USGS National Ground Water Monitoring Network: \$226,000.00 for annual operations and maintenance costs.
- v. Geologic Data Collection and Mapping: \$3,000,000.00 annually, plus \$2,000.00 annually for well driller training to improve lithologic data collection. Total annual investment needed for ongoing data collection, operations, and maintenance beginning in FY 2027 for WUAC 2020 Report priorities: \$3,934,000.00.

Having recently received this appropriation, EGLE is working with the WUAC on necessary steps to incorporate the funding from 2024 PA 121 into recommendations 1-6, with an anticipated completion date by September 30, 2029. Recommendation 7 requests additional funding to continue work on existing projects initially funded by 2022 PA 53 and 2022 PA 166. The WUAC discusses ongoing funding in the section titled, "Recommendations for Continued Funding" in this report.

First Name	Last Name	Organization	Representing	Appointed By
Bryan	Burroughs	Michigan Trout Unlimited	Statewide Angler Association	Senate Majority Leader
Laura	Campbell	Michigan	Statewide Agricultural	Senate Majority
lames	Clift *		Office of the Great Lakes	EGLE Director
Junes	Ciijt	Director		
Abby	Eaton *	Bureau of	MDARD	MDARD
		Environment		Director
		and Sustainability		
Frank	Ettawageshik	United Tribes	Indian Tribes	Governor
		of Michigan		
Тот	Frazier		Local Units of Government	Speaker of the
				House of
Dava	Uamilton	The Nature	Statowida Conservation	Representatives
Dave	Hamilton		Organization	Governor
Steve	Kohler	Kalamazoo	Local Watershed Councils	EGLE Director
		River		
		Watershed		
		Council		
Katy	Lindstrom	Barr	Professional Hydrologists and	Governor
		Engineering	Hydrogeologists	
Davia	N <i>A a b b b b b b b b b b</i>	CO.	Statewide Diseries	Courses
Dave	waturen	Iviichigan		Governor
		Streams	Landowners Association	
		Associations		
		Inc.		
Elizabeth	Morrisseau *		Michigan Attorney General	Attorney General
Megan	Napier	AKT Peerless	Business and Manufacturing	Senate Majority
			Interests	Leader
Doug	Needham	Michigan	Aggregate Industry	EGLE Director
		Aggregates		
Carrow	0*	Association	Mishison Coolestado	
Sara	Pearson *	Director	iviichigan Geological Survey	MGS Director

Water Use Advisory Council Members

Rachel	Proctor		Consumers Energy	Senate Majority Leader
Kyle	Rorah		Wetlands Conservation Organization	Speaker of the House of Representatives
Charlie	Scott	Owner, Gull Lake View Golf Course (for Michigan Golf Course Owners Association)	Nonagricultural Irrigators	EGLE Director
Buddy	Sebastian	Sebastian and Sons Well Drilling (for Michigan Groundwater Association)	Registered Well Drilling Contractors with Hydrology and Drilling Field Experience	Speaker of the House of Representatives
Pat	Staskiewicz	Michigan Section – American Water Works	Municipal Water Suppliers	Governor
Megan	Tinsley	Michigan Environmental Council	Environmental Organizations	EGLE Director
Jay	Wesley *	Senior Water Policy Advisor	DNR	DNR Director

* Ex-Officio (non-voting) member