



2021 State of the Great Lakes Report

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Office of the Great Lakes
March 10, 2022

EGLE

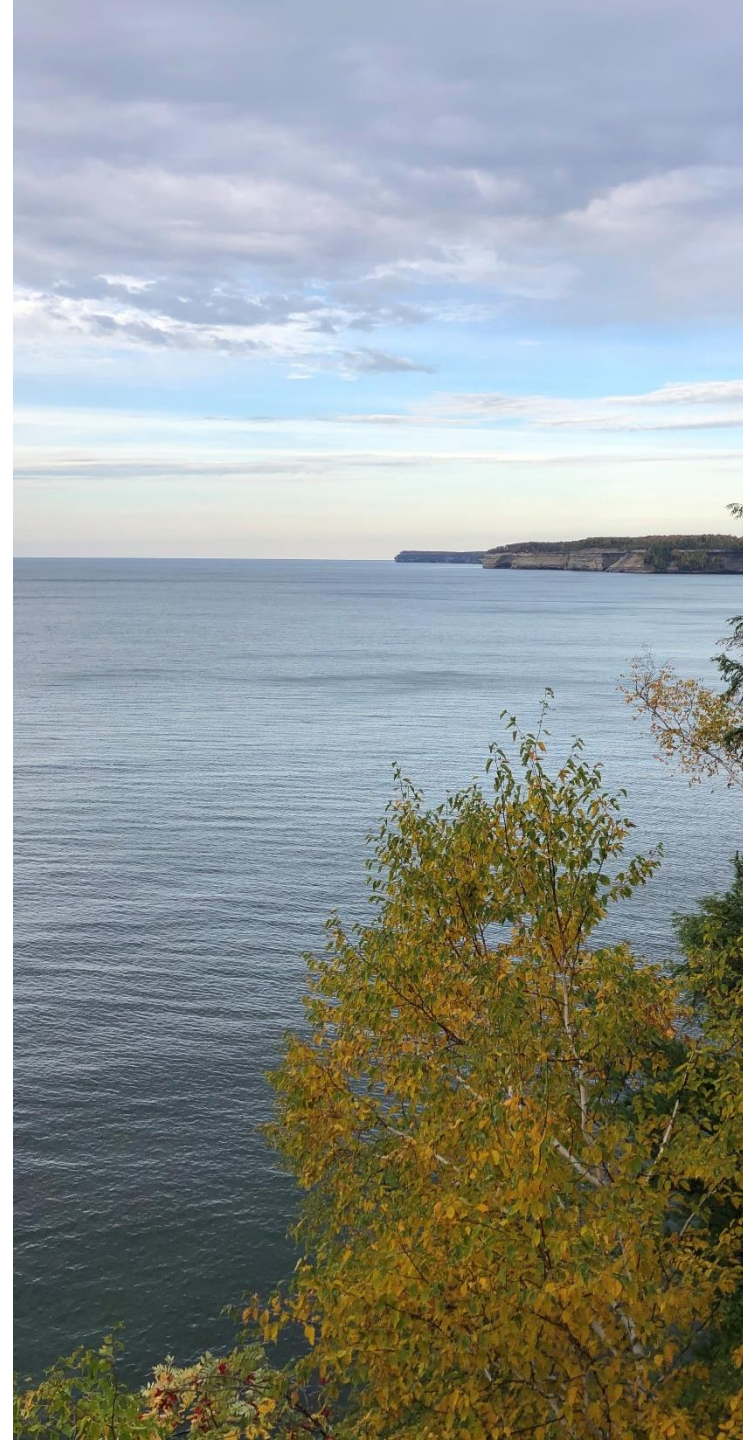


Office of the Great Lakes

- Leads policy development and strategic implementation of programs to protect, restore, and sustain the Great Lakes.
 - Protect and restore aquatic ecosystems
 - Support vibrant, healthy, and resilient communities
 - Build collaboration and shared governance for water
 - Promote water stewardship

Office of the Great Lakes

- Regional collaboration and governance to advance shared priorities
- Great Lakes water use
- Sustainable development of maritime resources and ports and harbors and tourism
- Great Lakes research to support policy and science-based decision making
- Foster Great Lakes literacy and stewardship for future generations



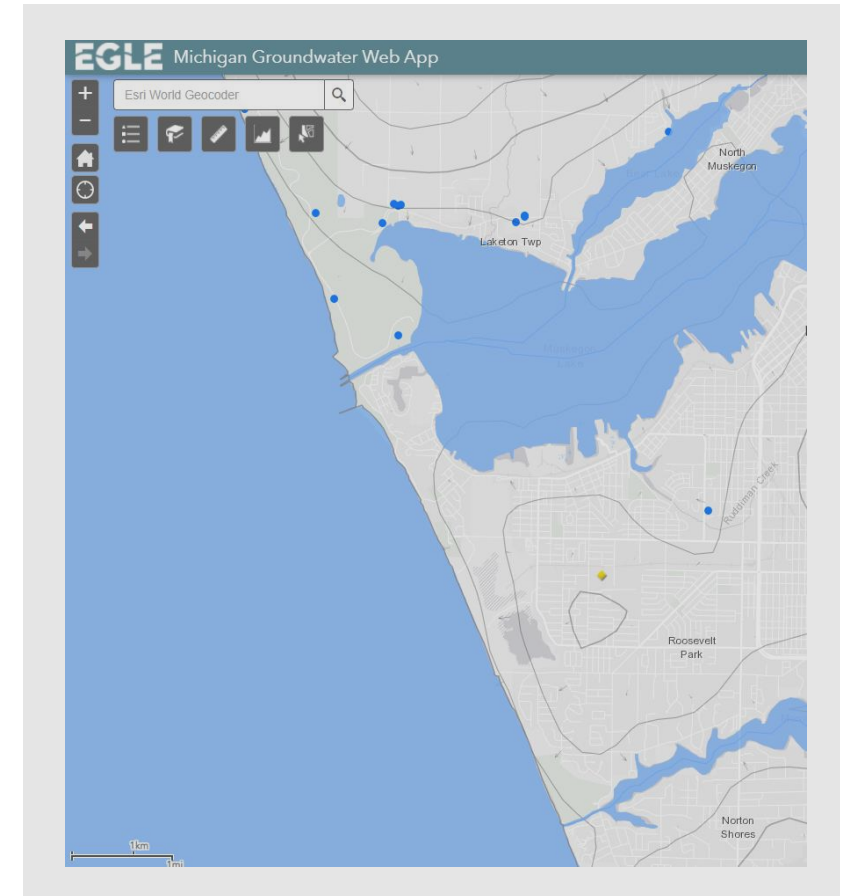


State of the Great Lakes Report 2021

Tackling today's challenges,
Leaving a legacy for future generations.

Improve Groundwater Resource Management

- Improve understanding about quality and quantity of groundwater resources
- Support science-based decision making and long-term sustainability of groundwater resources
 - Collaborate with researchers, regulators, groundwater users, nongovernmental organizations
 - Identify and address data gaps and scientific needs
 - Improve transparency in decision making
 - Increasing awareness of value and importance of groundwater stewardship
- Launched collaborative mapping effort of existing groundwater quality and quantity data
- Groundwater web-based application underdevelopment



Long Term Risk Groundwater Economic Study

- 2-year, 350k study
- Michigan State University - Institute for Water Research
- Long-term costs of implementing institutional controls as groundwater contamination response
- Multidisciplinary team - economists, policy analysts, and water scientists
- 8-12 case study sites
- Develop recommended framework to guide future decision-making for remedies at sites

Institutional controls - a method that allows groundwater contamination to be left in the ground, so long as human and environmental exposure pathways are controlled



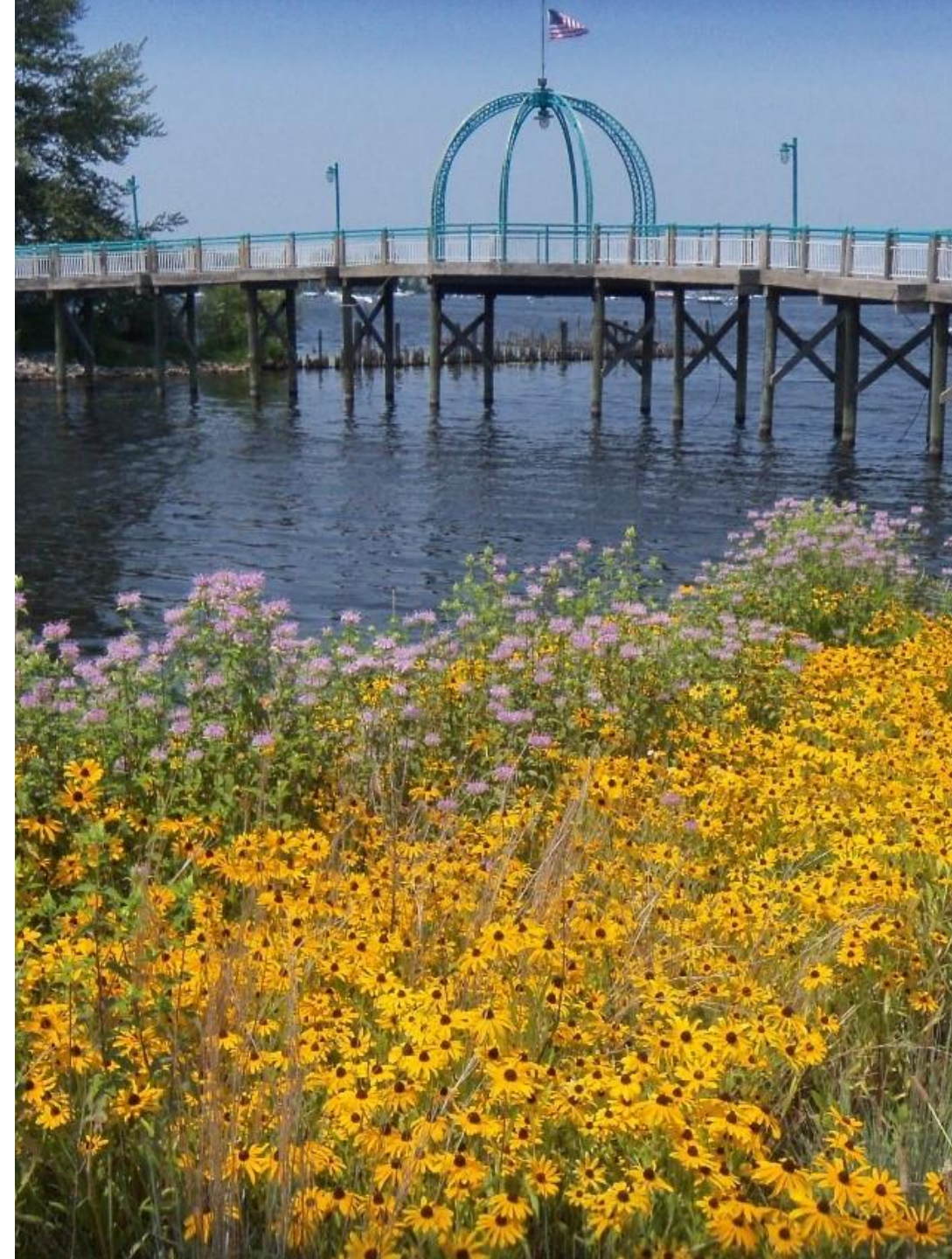
Great Lakes Water Quality Agreement (1972)



- Celebrating 50 Years
- A commitment between U.S. and Canada to protect and restore the shared waters of the Great Lakes
- EPA coordinates U.S. actions to fulfill the agreement, working with state, tribal and local agencies
- Amended in 1987 to address Areas of Concern and call for Lakewide Management Plans
- Amended in 2012 to broaden engagement and modernize agreement

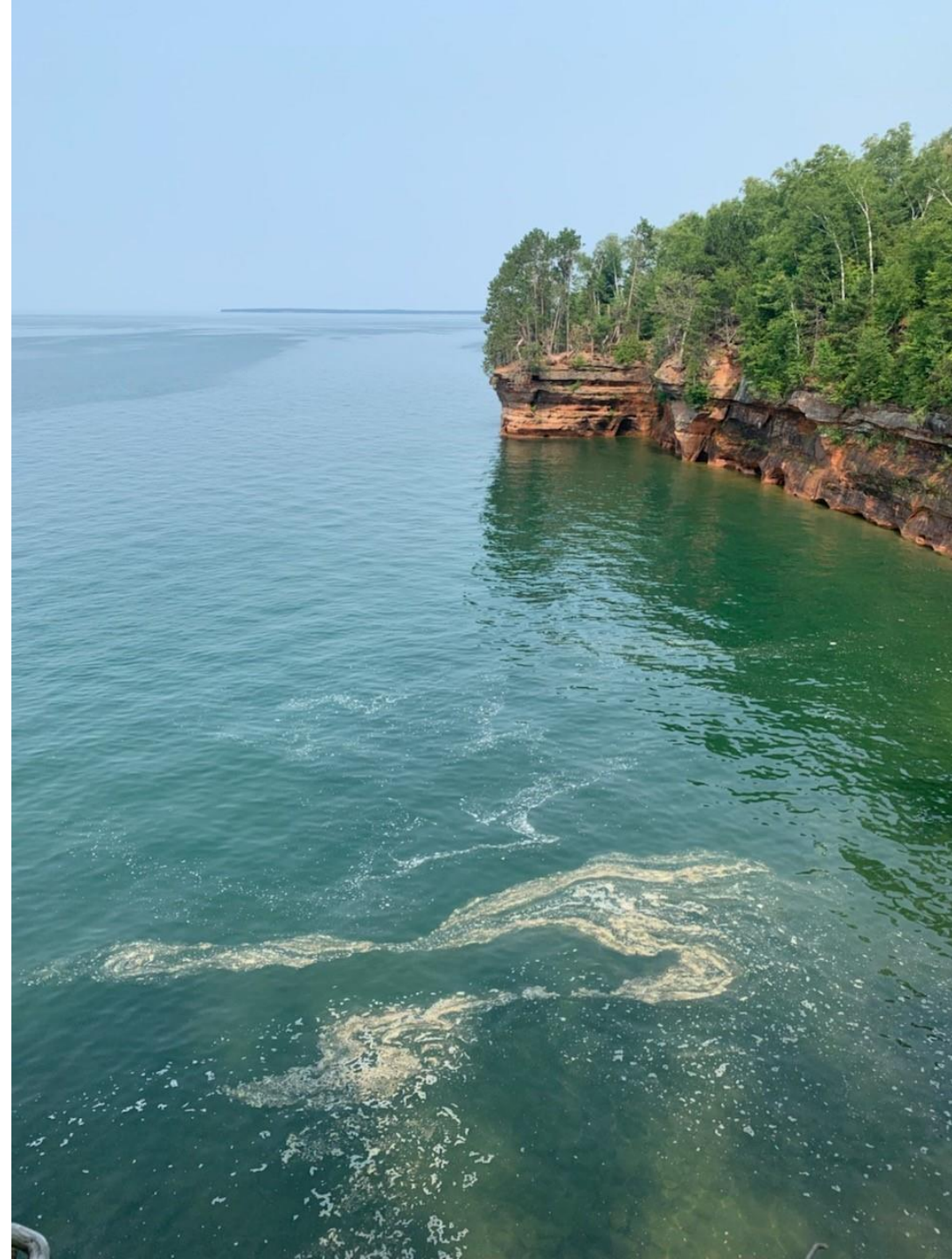
The Great Lakes Restoration Initiative

- Federal program to protect and restore the Great Lakes
- 5 Year Action Plan
- Addresses:
 - Degraded habitat
 - Aquatic invasive species
 - Contaminated sediment
 - Nutrients
- \$300-475 million annually, Michigan received approximately 1/3 of the funding annually
- Increase by \$1 billion over the next 5 years
 - Targeting restoring Areas of Concern



Harmful Algal Blooms in the Great Lakes

- Since mid 1990s, occurring throughout the Great Lakes
 - Most recently occurring in Lake Superior
- Increasing threat to human and ecological health
- Drivers of HABS are complex
 - Changes in agriculture practices
 - Extreme weather events in spring and summer droughts
 - Increased air and water temperature
 - Reduced winter ice cover
 - Aquatic invasive species
- More research, modeling, monitoring and forecasting needed to improve understanding of HABS



Managing European Frogbit

- Over 180 nonnative aquatic organisms that have colonized the Great Lakes since the 1800s
- \$5.7 billion total economic impact of aquatic invasive species in the Great Lakes region
- \$24 million spent each year to control aquatic invasive plants in Michigan
- European Frogbit detected in 1996 in Michigan
- Easily spread along coastal areas and inland waters due to recreational activities
- Partners working on early detection, surveillance, and research on control measures

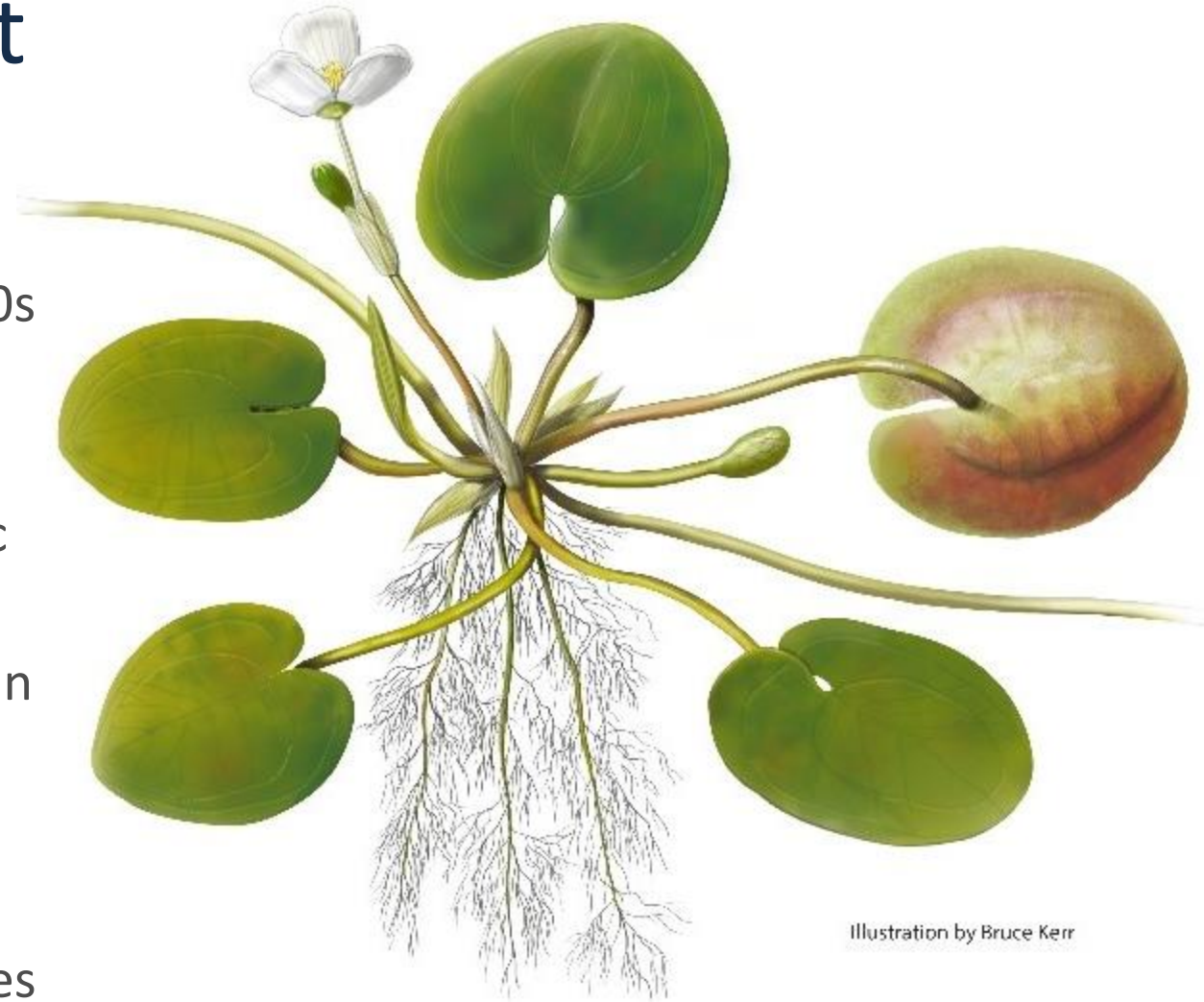


Illustration by Bruce Kerr

Figure 1: European frog-bit with leaves, flower, and turions all shown



Bringing Back the Whitefishes

- Economically and ecologically important Group of fish called coregonines (lake herring, whitefish, ciscos)
- Threats: Over-fishing, habitat loss, invasive species, warming temperatures
- Research and rehabilitation efforts underway by state, federal, tribal governments
 - Great Lakes reef restoration (Buffalo Reef, Lake Superior)
 - Research and restocking experiments

Planning for Climate Change

- Regional changes in ice cover, precipitation, and temperature affecting hydrology
 - The amount of precipitation falling in the most intense 1% of precipitation events increased by 42% in the Midwest from 1958 through 2016.
 - Projected 20-30% increase in winter and spring events.
- Introduction or increase in certain insects, viruses, diseases
- Increase in extreme heat events



Creating Resilient Communities

- New tools to help communities plan and thrive
- Michigan Coastal Zone Management Program
 - Grants and technical assistance
 - Michigan.gov/ResilientCoast
- Resilient Communities Collaborative
 - Resilient Master Plans and Ordinances
 - Community Sustainability Tool
 - ResilientMichigan.org
- Coastal Leadership Academy
- Catalyst Communities



Identify Assets

Natural Resources, Outdoor Recreation, Residential

Understand Disturbances

Ecological and Socioeconomic

Assess Vulnerabilities

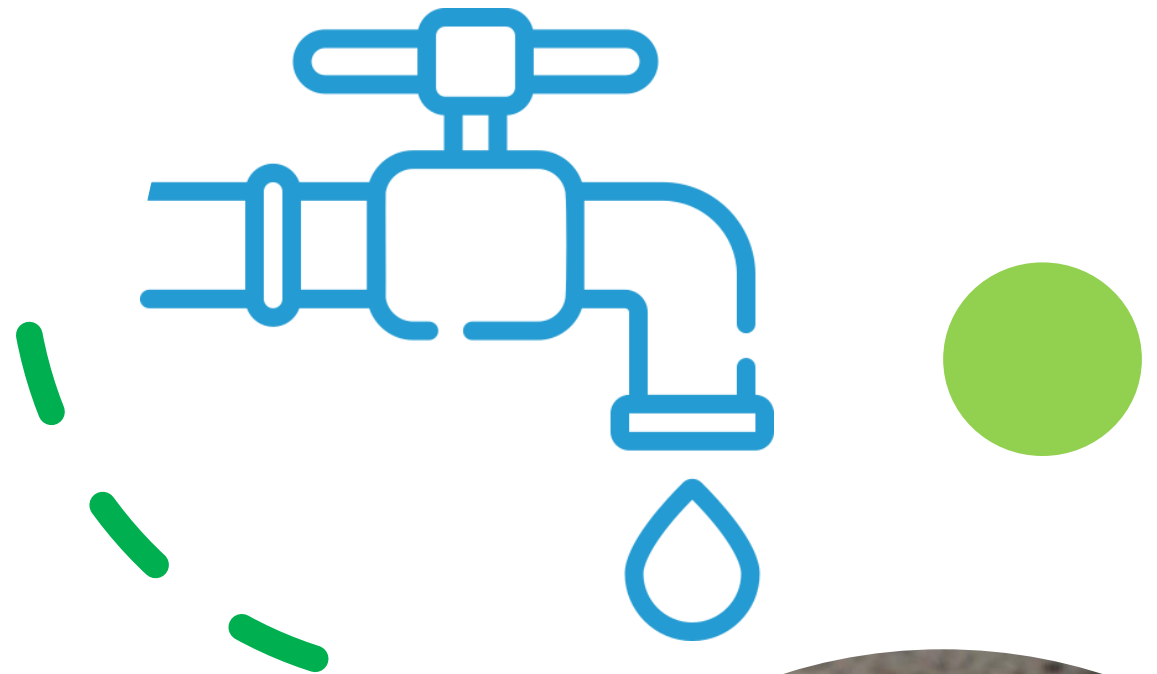
Sensitivity and Capacity to Adapt

**Resilience
Strategies**

Adopt and Implement
Evaluate and Refine

Water Energy Nexus

- Significant energy consumption in treatment and distribution of drinking water and wastewater
- Research shows water infrastructure improvements achieve water and energy savings
 - Water lost from service lines leaks exceeds main breaks
 - Service line leaks result in over 21.5 billion gallons of water wasted per year statewide
 - Amount of energy wasted is equivalent to heating 5,000 homes
 - Advance Michigan's water conservation and energy efficiency goals and objectives under Great Lakes Compact



Advancing Marine Autonomous Technologies

- Smart Ships Coalition and Lake Superior Marine Autonomous Research Site launched in 2018
- Advance Great Lakes science, research and data collection to inform management decisions
- Build public-private partnerships with Universities and colleges, linking innovation, research and development, entrepreneurialism
- Advance STEM education, water stewardship, high quality educational opportunities, and build inclusive STEM workforce
- Create new jobs for Great Lakes scientific, research, shipping, manufacturing, and other maritime interests





MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

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