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EXECUTIVE SUMMARY

SHIFTING CURRENTS

Progress, Setbacks, and Shifts in Policy and Practice

A Waters of Wisconsin Initiative Report of the Wisconsin Academy of Sciences Arts & Letters

Introduction

Between 2000 and 2003, the Wisconsin Academy's Waters of Wisconsin (WOW) project facilitated a statewide conversation around one main question: *How can we ensure healthy aquatic ecosystems and clean, abundant water supplies for tomorrow's Wisconsin?* All across Wisconsin we found common support for farsighted policies, based on sound science, to manage our water legacy.

More than a decade has passed since the first WOW project conversation and the report that captured its recommendations: *Waters of Wisconsin: The Future of Our Aquatic Ecosystems and Resources* (2003). Drawing from a diverse and growing set of stakeholders from around the state, in 2012 the Wisconsin Academy initiated a new conversation to assess our progress since the original WOW project and the status of waters in Wisconsin today.

The result of our new conversation begun in 2012 is a report titled *Shifting Currents: Progress, Setbacks, and Shifts in Policy and Practice* (2016). In *Shifting Currents* we:

- Review the context and frameworks for public decision-making about water;
- Examine root causes and ecological stressors that underlie many of the symptoms we see in the form of water pollution or aquatic ecosystem degradation;
- Summarize progress and setbacks related to our waters;
- Discuss particular challenges in water quantity, quality, and aquatic ecosystems, as well as emerging water issues that we are likely to face in the coming decade;
- Consider the current decision-making framework and related challenges surrounding water; and
- Identify a set of guiding values that should inform decisions about our water and offer nine broad recommendations to safeguard Wisconsin's waters in the decades ahead.

From WOWs inception in 2000 to its 2012 renewal, the project has brought together people from across the state, and from varied fields and areas of interest, to address challenges and seize opportunities related to our precious waters. WOW has done so as a matter of both principle and practical reality: the state of our waters reflects the ways we interact not only with them, but with one another and our institutions.

Recommendations from *Shifting Currents*

The WOW project has aimed to provide guidance for Wisconsin citizens in sustaining the health of our water resources and aquatic ecosystems over the long term.

The specific recommendations we offer below continue this effort and rest upon a set of broad values that must underlie a sustainable water future in Wisconsin. These include a commitment to:

- Recognizing the unique array of water resources and aquatic ecosystems in Wisconsin, our history of both exploitation and recovery, and our evolving set of values and ethics with regard to water, including the Public Trust Doctrine, which ensures that our waters are held in trust for all citizens by the State of Wisconsin.
- Science-based management and stewardship of all our waters.
- A more integrated and comprehensive approach to water management. As our waters are connected, so are our water problems and water stewardship opportunities.
- Sustainable and long-term water management approaches, as opposed to short-term "fixes" to immediate crises.
- Intelligent adaptive management as a means to meet our long-term water stewardship responsibilities.
- Our Wisconsin tradition of citizen engagement in water stewardship—in our communities, businesses, organizations, and governmental bodies. A fundamental aspect of this is the assurance of transparency in governmental decisions affecting all our citizens.
- Challenging all of our fellow citizens to engage in informed planning and cooperative caretaking of our shared waters—for ourselves, for future generations, and for all that depend on clean, abundant, and self-replenishing water in Wisconsin.

In this context, we recommend the following actions:

1. Develop an Integrated Water Management Framework

As we recommended in 2003, Wisconsin still needs an integrated water management strategy that acknowledges and addresses the connections between ground and surface water systems, and the common and unique challenges in both the Great Lakes and Mississippi Basins.

2. Safeguard Drinking Water

Wisconsin must take steps to reinvigorate water quality protections for drinking water and the healthy ecosystems that provide it through active prevention and also through restorative measures (wherever possible).

3. Control Nutrient Pollution

Wisconsin needs to invest in the implementation of the Wisconsin Phosphorus Rule by providing communities with technical support and resources, and documenting and sharing successful practices that advance effective adaptive management.

4. Apply Watershed-Scale Strategies

As an investment in Wisconsin's long-term health and natural assets, Wisconsin should commit to wetland, shoreline, and streamside (riparian) conservation practices and work with local communities and watershed organizations to develop strategies to restore and sustain hydrological and ecological functions that enhance water quality, groundwater recharge, and habitat for native aquatic species.

5. Plan for Climate Change

Wisconsin needs a game plan for addressing climate change and its impacts on the state's waters.

6. Manage Invasive Species

Wisconsin must control, slow, and eliminate the spread of aquatic invasive species.

7. Modernize Water Infrastructure

Wisconsin's water management and planning agencies must work with municipalities, drinking water and wastewater utilities, sewerage districts, and other units of local governments to identify urgent needs for maintenance and new construction to reduce exposure to drinking water contaminants and modernize sewage treatment capacities, and secure a plan and funding mechanisms to address both urgent and routine maintenance.

8. Commit to Transparency and Public Participation

We urge those engaged in setting and implementing policy to examine public engagement processes and reinvigorate efforts to provide citizens of the state with meaningful mechanisms to deliberate, shape, and implement water polices in Wisconsin through open dialogue, transparency, and timely response to queries and requests for information.

9. Invest in Water Literacy

Reaffirming the recommendations from the first WOW report, we need to better articulate the pressing and emerging water concerns in Wisconsin and help people understand the economic, environmental, and social consequences of our decisions about water. Education and public engagement strategies should include concerted efforts to educate all Wisconsinites, from elementary students to policy-makers, about basic water science and social science, water history and water ethics, the role of water in our economy, the policy-making process for water, and the Public Trust Doctrine and what it means for our water resources.

These recommendations are the culmination of analysis that examines our decision-making frameworks for water, root causes of water challenges in the state, and the state of our waters and water policy in 2016. The chapters from the *Shifting Currents* report that discuss these topics are summarized below.

I. Frameworks for Decision-making

The *Shifting Currents* report looks at four frameworks for decision-making about water – science, economics, ethics, and governance—and considers how each has direct consequences for water. In order to ensure a healthy water future for Wisconsin's citizens and for all the life that depends upon our state's waters, our actions and decisions must be guided by:

- The appropriately rigorous scientific knowledge of the state of our waters and our human interactions with water;
- A comprehensive understanding of the full economic value of water;
- An appreciation of the ethical significance of water in our human and environmental relationships; and
- Policies that reflect the reality of water as an interconnected hydrologic system and as a common resource, that is essential to life and intrinsically involved in all our other public policy choices and decisions.

II. Stressors, Root Causes, and Trends

Many of the water issues that Wisconsin grapples with are symptoms of underlying stresses on ecological systems and water infrastructure. In *Shifting Currents*, we flag the following influences as essential considerations in developing future strategies for safeguarding Wisconsin's waters:

- Agricultural policy and practice;
- Energy policy and practice;
- Climate change impacts on aquatic ecosystems;
- Long-term impacts of hydrological change;
- Ecological changes driven by invasive species;
- Aging water infrastructure;
- Long-term impacts of hydrological change;
- Negative synergies; and
- Population shifts and consumption patterns.

More than any other driver, climate change will affect all aspects of water across Wisconsin, including our water quality and supply, aquatic habitat, human health, agriculture, and economy.

III. State of Our Waters: Summary Overview

Over the last decade, water outcomes have moved forward, backward, and sideways.

Water Supply

Gains	Setbacks
Great Lakes Compact adopted to manage Great Lakes water use. Groundwater Protection Act adopted.	The regulatory framework for high capacity wells has not kept pace with the rapid growth in new permits.

Water Quality

Gains	Setbacks
Wisconsin Phosphorus Rule adopted. Nutrient and sediment loadings reduced in target watersheds under the federal Mississippi River Basin Initiative. Combined sewer overflow incidents dramatically reduced through improvements in "green infrastructure," water conservation, and other watershed strategies.	Changes for promulgating administrative rules have hampered the DNR's ability to address serious problems in Clean Water Act permitting programs within the timeline set by the U.S. EPA. State mining policy was modified to relax and/or exempt the practice of iron mining from long-standing regulations that protect streams, lakes, wetlands, and groundwater. Monitoring capacity to assess surface water flow and water quality has generally decreased over the last decade. The Bay of Green Bay has experienced numerous "dead zone" episodes in the last several years. The number of waterways listed under EPA's "Impaired" status has increased, and many waters are unassessed. Chlorides (from road salts, de-icing chemicals, and water softeners) are an increasing problem in waterways. Bacteria, including fecal coliform, have become serious groundwater contaminants. The Livestock Facility Siting Law limits local control for siting Concentrated Animal Feeding Operations (CAFOs); and there is insufficient monitoring, oversight, and enforcement of water quality permits at CAFOs.

Freshwater Ecosystems

Gains	Setbacks
New rule adopted to regulate the transportation, possession, transfer, and introduction of invasive species. Water quality and habitat improvements advanced through the federal Great Lakes Restoration Initiative (GLRI). Naturally occurring aquatic communities within high-functioning ecosystems protected by the DNR State Natural Area program. Habitat restoration projects advanced in many key watersheds through the U.S.D.A. and U.S Fish & Wildlife Service programs. The State Legislature and Congress both enacted policy to ban microbeads in personal care products.	Loss of wetlands protections through modifications to existing policy increase risks to wild rice habitat and coastal wetlands. Loss of local authority to protect waters and shoreland zoning through local regulations. Loss of state tax funding support for state parks increased park user fees. Wetland degradation for sediments, nutrients, and other pollutants. The pace of climate change is increasing, and with it increasing stresses from warming waters, intense storms, and other factors. Ecological damage in Wisconsin waters from invasive species has increased over the last decade, degrading habitat for native species, exacerbating algal blooms, and altering aquatic food webs.

Continuing Challenges

Many concerns in the 2003 WOW project report are still concerns today. Some are at a larger scale with wider impacts; others are issues that remain unresolved. Among the most significant are:

- Nutrient pollution and resulting harmful algal blooms;
- Groundwater: water quality and water supply protection;
- Mercury contamination in Wisconsin fish; and
- Wisconsin's lack of adequate plans for climate change resilience in the context of its freshwater ecosystems and water needs.

Emerging Challenges

- Pharmaceutical compounds, cosmetic pollutants, and microplastics were barely on the radar in 2003, but concern has grown over the last decade.
- Concerns have emerged about fossil fuel transportation in the era of Bakken oil development, as well as frac sand mining and its potential impacts on ground and surface water.
- Incremental steps toward water privatization are also raising concerns, as they signal a potential shift away from the long-held practice of water as a commons in Wisconsin under the Public Trust Doctrine.

IV. Exploring the Major Challenges

Water Supply

The lack of a systemic approach to water resources management threatens to undermine progress toward a truly comprehensive framework that can address the complex water management needs of the state. Not all aquifers are the same across the state; some have plentiful supplies, some aquifers are nearly depleted; some are contaminated (from high-levels of substances such as nitrates, arsenic, or radionuclides), while others have high quality waters. Thus, any water supply strategy for Wisconsin needs to both address the full scope of impacts across the state, as well as be responsive to local conditions. However, in the absence of an integrated strategy that addresses both the Mississippi and Great Lakes basins, and that does so in a way that recognizes the connections between ground and surface waters, Wisconsin will fall short in providing a long-term framework for conserving its water resources and ensuring their sustainable use. Michigan and Minnesota both have more rigorous water management and allocation policies. Wisconsin could gain insights from the frameworks of these neighboring states.

Water Quality

Wisconsin is falling short in providing safe drinking water for all of its citizens, as well as in sustaining healthy aquatic ecosystems. Many Wisconsin residents do not have reliable access to safe drinking water, or are dependent on drinking water supplies that are vulnerable to contamination risks. More than one-third of the wells in Kewaunee County do not meet health standards for nitrates or bacteria, and many Wisconsin communities still have lead pipes in their drinking water systems.

In our rivers, lakes, and coastal waters, Wisconsin continues to face long-standing challenges from nutrient pollution, particularly from phosphorus. Reducing polluted runoff was a key recommendation of WOW in 2003. In 2010, building on more than a decade of efforts to curb nutrient and sediment pollution in water, the DNR adopted a new suite of administrative rules aimed at cutting phosphorus loadings. However, even with the phosphorus rules in place, the purpose, design, and function of nutrient-reduction projects throughout troubled watersheds may not be large enough to grapple with the challenge, nor rapid enough to meet water quality goals. Moreover, many watershed communities lack access to resources, expertise, technical skills, and the capacity to develop collaborative processes that can support responsive actions. This is a significant barrier to progress.

Without changes at the systemic scale (e.g. the Farm Bill and other structures that shape farm practices) Wisconsin is likely to continue to be a net importer of phosphorus for fertilizer and feed, with the result being that our waterways will continue to be over-burdened with nutrients for the foreseeable future.

Over the last 15 years, the state has repeatedly cut the regulatory and enforcement workforce in the DNR. At the same time, the workload has increased with the rapid growth in permit applications for high capacity wells, CAFOs, and other needs. This has led to a backlog of permit applications, limited time and resources for permit review, and diminished capacity to perform routine inspections or required triennial reviews for federal Clean Water Act compliance. Monitoring programs that can detect problems have also been reduced.

Wisconsin's 2016 list of "impaired waters"—a federal designation directed by the EPA, indicating waterbodies that do not meet the standards set forth by the Clean Water Act—has more than doubled from 2004 to 2016. The majority of the new listings are due to phosphorus levels.

Healthy Aquatic Ecosystems

Wisconsin, state, tribal, and federal agencies have invested substantial public and private resources and countless hours of volunteer time to protect and restore important waters in Wisconsin. There has been promising progress in trout stream, wetland, and coastal habitat restoration through the Great Lakes Restoration Initiative. The Initiative has also driven significant progress on cleaning up contaminated harbor and river sites. Likewise, the Mississippi River Basin Initiative has also helped reduce polluted runoff in key Mississippi River watersheds, improving water quality and habitat.

That said, such advances risk being offset by state regulatory changes, budget cuts, or policy restrictions. These include changes to the state's mining law, loss of stewardship funds to acquire priority lands, loss of funding support for state parks, and loss of local authority to protect waters through local regulations.

V. Status of Decision-making Frameworks

In the realm of science, over the last two decades, Wisconsin has seen notable growth in freshwater research investments in the academic sector in the form of new research centers and institutes. Advances in analytical technologies have increased the sophistication of water quality analysis and water management capabilities. At the same time, resources devoted to water science have been reduced in public agencies and research institutions, constraining the capacities for research, monitoring, and teaching.

In the economic arena, Milwaukee's Water Council is demonstrating how to link Wisconsin's water knowledge to economic development in the water technology industry. However, if Wisconsin fails to safeguard its water assets, it places the state's long-term economic health at risk.

In governance, the cumulative impacts of legislative and administrative actions are reducing the state's capacity to anticipate and respond to emerging environmental challenges, through loss of scientific capacity, institutional memory, and expertise in the DNR, as well as cuts in environmental education, and other actions that have reduced or constrained local government authority to enact local protections. In addition, legislative action has explicitly constrained the DNR's authority to act and its discretion to respond to emerging needs through rulemaking. In response, many local governments and watershed groups are trying to fill gaps. There are also growing concerns about opportunities for meaningful public engagement and transparency in public decision-making processes.

In the ethical arena, there are growing concerns about the erosion of the state's Public Trust Doctrine. At the same time, over the last decade, there has been a growing awareness that our water issues fundamentally involve not only technical information and policy shifts, but ways of valuing our waters.

Key Observations

The *Shifting Currents* report offers these observations to guide strategies for safeguarding Wisconsin's waters:

- While there have been gains as a result of local volunteer conservation efforts and federal water protection programs, the state's capacity to manage and protect Wisconsin's waters has diminished through cuts in budget and personnel and regulatory changes and legislative restrictions. The state needs to be a full partner in safeguarding Wisconsin's freshwater ecosystems for the future.
- Wisconsin's long-standing tradition of robust public engagement and science-based decision-making in water management is shifting. The value of evidence, data, and scientific perspectives appears to be less salient in Wisconsin's policy-making than in the past. Management of water resources and related public policy will be more effective and longer lasting when informed by science.