WISCONSIN'S GREAT LAKES STRATEGY

Restoring and Protecting Our Great Lakes

Wisconsin Department of Natural Resources
Office of the Great Lakes

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Wisconsin's Great Lakes Strategy
Restoring and Protecting Our Great Lakes

2009 Update

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EXECUTIVE SUMMARY

The Great Lakes contain 20% of the world's available fresh surface water supply. Because of that, the Great Lakes are critical to the health and welfare of all the Great Lakes states and especially for us here in Wisconsin. They provide drinking water for millions of state residents. They support manufacturing and recreational industries providing thousands of jobs. They generate power and assimilate our wastewaters. But most importantly they define and support a huge freshwater system and related terrestrial ecosystem that is unique in the world. Effective management of both wetland and water quantity and quality is necessary if we are to fulfill our state's stewardship obligations for these world class resources. The Wisconsin Great Lakes Restoration and Protection Strategy serves as the state's road map in defining the actions needed to ensure that our Great Lakes are protected and restored where needed to sustain this system for future generations.

The Wisconsin Department of Natural Resources' (WDNR) Office of the Great Lakes, with the help of countless individuals and organizations, developed the initial proposals for a Wisconsin Great Lakes Restoration and Protection Strategy (Strategy) to parallel the Council of Great Lakes Governors' (CGLG) Priorities for the Great Lakes (http://www.cglg.org/projects/priorities/index.asp). These priorities were also the organizational framework for the Great Lakes Regional Collaboration Report (http://www.glrc.us/). This version of the Strategy is an update of the original document completed in June 2006, and like its predecessor, is designed to represent key concepts of major public and private stakeholders active in protecting and restoring our Great Lakes.

GREAT LAKES REGIONAL COLLABORATION

The Great Lakes Regional Collaboration process started in May 2004 with the issuance of a Presidential Executive Order. The Executive Order called for improved federal coordination and efficiency of Great Lakes programs and for the U.S. Environmental Protection Agency (USEPA) Administration to initiate "a regional collaboration of national significance" to create a national action agenda for Great Lakes. In December 2004, the collaboration started under the direction of five organizational partners:

- the eight Governors through the council of Great Lakes Governors
- the federal agencies through the inter-agency task force
- tribal governments
- the organization of the Great Lakes Mayors
- the Great Lakes congressional organization

However, because the regional collaboration reflects the needs of five lakes and eight states, the recommended actions are framed by common but somewhat generic issues. As an example, restoration of self-sustaining stocks of native fish species is an issue which transcends the eight states. Yet the species may differ from state to state or lake to lake: brook trout in Lake Superior versus lake trout in Lake Ontario. The Wisconsin Strategy provides the necessary specifics to help support and implement the recommended action items of the Great Lakes Regional Collaboration in Wisconsin.

BUILDING ON PAST EFFORTS

Over the past 20 years, a variety of planning efforts have developed remedies that would restore portions of the ecological integrity of the Great Lakes systems.

- The Joint Strategic Plan for Management of Great Lakes Fisheries, for example, serves as a tool for coordinating efforts to manage and protect the Great Lakes fisheries systems.
- Although lake sturgeon is listed as a rare species in the United States, it is common in many waters of Wisconsin including Lake Michigan. This is due largely as a result of a world-renown sturgeon management program and citizen commitment. As an example, in 2006, two Lake Michigan tributaries, the Milwaukee and Manitowoc/Branch Rivers, had stream-side rearing facilities installed so that lake sturgeon could be raised on local river water enabling them to imprint to the water as they grow.[1]
- The Lake Superior Binational program continues to be a successful program in the implementation of the Zero Discharge demonstration project as well as promoting a larger Lake Superior ecosystem strategy. http://dnr.wi.gov/org/water/greatlakes/lsprogram.html
- The mission of the Upper Mississippi River and Great Lakes Region Joint Venture (UMGLJV) is to deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape-oriented partnerships. In WI, the North American Wetlands Conservation Act (primary funder of the North American Waterfowl Management Plan (NAWMP) and all bird joint ventures) has accomplished 51 projects either completed or underway creating a combined total of 112,831 acres of restored and protected wildlife habitat. NAWCA funding of over $24.6 million stimulated partner contributions of over $76.6 million.
- Lakewide Management Plans (LaMP) are updated every two years for each Great Lakes, as agreed upon under the Great Lakes Water Quality Agreement, and report on the status of the chemical, physical, and biological integrity of the Lakes. For Lake Superior visit http://epa.gov/greatlakes/lamp/ls_2008/index.html; Lake Michigan visit http://epa.gov/greatlakes/lamp/lm_2008/index.html.
- The State's Comprehensive Wildlife Conservation Plan [http://dnr.wi.gov/org/land/er/WWAP/] identifies which of our native Wisconsin species are of greatest conservation need and through the Action Plan, presents priority conservation actions to protect the species and their habitats.
- The majority of our state surface waters are still free from the most problematic aquatic invasive species, and data show that the rate of spread for several key species has slowed in recent years.[2] The Clean Boats, Clean Water program has been a vital element in this success story.

These and similar efforts represent the work of science professionals, researchers, interested individuals, and policy makers but are often focused on a single problem, a single desire or a small geographic region. What has been lacking is a comprehensive action agenda for restoring our Great Lakes: an agenda that fully represents the needs and desires of the State of Wisconsin. In developing a Wisconsin strategy we strive to bring together information from the various past planning efforts to build a comprehensive state action agenda.

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[1] Wisconsin Department of Natural Resources, Lake Sturgeon Management Plan, http://dnr.wi.gov/fish/sturgeon/lsturmplan_eversion.pdf

[2] 2007-09 Report to the Legislature on Aquatic Invasive Species: http://dnr.wi.gov/lakes/aisreport2008/

REPORT LAYOUT

The Council of Great Lakes Governors identified nine priorities for the restoration and protection of the Great Lakes. The first priority, "*Ensure the sustainable use of our water resources while confirming that the States retain authority over water use and diversions of Great Lakes waters.* " is not addressed in this strategy nor in the GLRC. It is addressed through the Great Lakes Water Management Initiative of each Great Lakes State. The remaining eight priorities are addressed in individual chapters in this document. Each chapter in this document begins with a **Problem** statement related to the specific topic area *as it relates to the status in the Wisconsin portion of the Great Lakes basin*. This is followed by a section on **Goals** for achieving long term success in the basin. The **Recommended Actions** section articulates near term actions to help address the problems identified in the first section.

REPORT GOALS

We have several goals for the Wisconsin Great Lakes Strategy:

1. the strategy will translate the recommendations from the regional collaboration into Wisconsin specific actions,
2. the strategy will be a vehicle for coordinating efforts and developing shared priorities,
3. the strategy will serve as a menu for securing and allocating resources, and
4. the strategy will promote developing projects to be ready for implementation and better position Wisconsin for competing for federal restoration and protection funding.

2009 Strategy Update

The Strategy is, and rightfully needs to be, a dynamic document. As publisher of the Strategy, the WDNR fully expects to revise it periodically as more information is collected and as issues and priorities evolve. It has always been our intent to update this strategy through a public process of soliciting ideas and comments and reacting to what we learn in an adaptive approach.

The 2009 update reflects changes in priorities and actions since publishing of the 2006 report. In addition, we believe it is essential to highlight two new elements to the overall strategy-elements which permeate throughout each of the eight chapters even if not addressed specifically under a topic-specific strategy or action item.

Strategy Scope

The Strategy focuses on resources and ecosystems that are directly or indirectly impacted by the Great Lakes. More specifically, our focus is on:

- Tributary and groundwater connections to the Great Lakes
- Species dependent on the Great Lakes and their tributaries
- Land use influences on Great Lakes and tributary water quality and quantity.

Climate Change

Climate change will impact our water and water-dependent resources; the question is not if but when and by how much. How much of the change can be controlled or minimized through human action is not likely to be resolved soon, but it is now widely accepted that changes will be significant, can be anticipated in at least a general manner through sophisticated modeling, and that adaptive planning needs to begin now rather than later. As recently stated by the U.S. EPA Office of Research and Development, climate change should be of concern to everyone and the potential for climate change should be considered in all day-to-day operations and decision-making.

Major drivers of climate change impacts on water resources have been identified as:

- Increased air and water temperatures
- Changes in distribution, timing, frequency, and intensity of rainfall
- Reductions in ice cover and expanded growing season

Examples of implications of climate changes on water resources include:

- Increased rainfall intensity and flooding implications for dam safety, stormwater and wastewater management, water quality, beach health, etc.
- Generally lower lake levels due to increased evaporation and declining ice cover
- Changing baselines for determining minimum levels and flows, ordinary high water marks, flood frequency curves, and floodplains
- Wasteload assimilation capacity changes with increased temperatures and variability in flows
- Changes in precipitation patterns could result in hydrologic alterations to wetlands changing the composition and diversity of wetland plants
- Reduced groundwater availability and increased water demand, especially during dry spells
- Increased likelihood for new aquatic invasive species with warmer climate and less winter freeze
- Reduced habitat for cold-water fisheries – both streams and lakes
- Accelerated eutrophication of surface waters due to increased winter and spring runoff and hotter, drier summers that favor blue-green algae blooms

IMPLEMENTATION

Great Lakes Regional Collaboration Strategy Team recognizes that, "no one Collaboration partner can be the sole source of support for implementing the Strategy." Authorities, programs, and funding at all levels of government, including tribes and non-government organizations must be coordinated and managed as effectively and efficiently as possible.

Wisconsin Strategy: Continue to promote and support the breadth of projects already contributing to Great Lakes restoration. Make every attempt to move a significant number of additional implementation projects into a much more active phase with the aid of federal funding opportunities newly available or proposed at the time of publication. Seek implementation approaches that are flexible and adaptive, able to respond to the dynamic and evolving nature of funding availability, with the goal of implementing restoration and protection consistent with this strategy at the forefront.

The Office of the Great Lakes will seek a facilitative role in project development for the restoration and protection of the Great Lakes in Wisconsin and to coordinate with other states to help encourage implementation of this strategy and the Great Lakes Regional Collaboration.

- Promote and utilize existing mechanisms for accomplishing projects. The Lake Superior Binational Forum and the Lake Michigan Stakeholder Group are two examples of such groups. In addition internal WDNR teams, the Wisconsin Coastal Management Council and the Beach Network are just a few examples of entities already in place to implement projects consistent with this strategy.
- Define and pursue a facilitative role for project coordination and to ensure participation of all parties, including state, local, federal program partners, tribes, and private organizations.
    - Define roles and pursue liaisons among Wisconsin DNR divisions and programs to facilitate project coordination and implementation. Use those liaisons to help build a network among other state, local and federal agencies, tribes and private organizations for communication, expertise and funding sources.
- Explore and share financial resources described in each of the chapters to fund projects. Continue to seek out new funding sources.
- Promote cooperation with other non-government organizations, tribes, agencies and internal programs for education, outreach, permitting, etc, to insure projects are done properly.
- Facilitate the creation of a consistent project design process to include a tracking mechanism for transparency and accountability to ensure the greatest benefit to the environmental resources involved, and comply with funding requirements.
- Investigate and partner in efforts to restore national budgeting, legislation, and restoration that has not previously made it to the implementation stage.
- Facilitate partnership and consistency of action by sharing this strategy with other states, the Council of Great Lakes Governors and the Great Lakes Commission.

Examples of Types of Projects to Fund:

- Education programs to eliminate other sources of aquatic invasive species introductions
- Lake Michigan and Lake Superior Basin tributary restoration projects in key locations for projects such as:
    - Dam removals
    - Fish passages
    - Wetland protection through acquisition or easement purchase
    - Wetland restoration
- Sediment remediation and habitat improvement projects in all Areas of Concern, and other locations in the Great Lakes Basin
    - Milwaukee River/Harbor
    - Sheboygan River/Harbor
    - Fox River/Green Bay
    - Menominee River
    - St. Louis River and Harbor
- Promote forested land cover in Lake Superior and Lake Michigan Basin to decrease runoff, where appropriate
- Projects to reduce mercury and other toxins delivery to the Great Lakes
- Education programs and other efforts to improve road maintenance and proper culvert sizing to improve fish and other species passage and reduce erosion
- Assessing near shore water quality and status of coastal wetlands
- On shore ballast water treatment demonstration projects
- On-board ballast water treatment demonstration projects

More specific examples of potential projects for implementation of the Great Lakes Strategy in Wisconsin may be found in the list of proposed projects for implementing the Strategy. Please be aware the project list is merely an example of known projects at the time of publication, is not all inclusive, and is subject to change.

AQUATIC INVASIVE SPECIES

Council of Great Lakes Governors' Priority: Stop the introduction and spread of non-native aquatic invasive species.

PROBLEM STATEMENT

Aquatic invasive species (AIS) have long been recognized as a serious problem in Wisconsin. Since 1810, 162 species of fish, plants, invertebrates, algae, and pathogens have been introduced into the Great Lakes (Hall et al., 2000; Ricciardi, 2001; Mills et al. 1993). Both intentional and unintentional releases of exotic species pose serious threats to the health, economic welfare, and ecological integrity of Wisconsin waters. Particularly problematic is preventing new introductions of AIS into Wisconsin waters and controlling the spread of existing AIS between waterbodies.

Zebra and Quagga Mussels: Photo courtesy of USGS

Wisconsin wetlands are particularly susceptible to invasive species especially in disturbed environments. Low water levels in Lake Michigan have facilitated invasion by Phragmites along the Green Bay shoreline[3]. Of the wetlands in the state that are classified as emergent, over 25% are dominated by reed canary grass, one of the most significant threats to Wisconsin wetlands.[4]

Under Wisconsin state statute 23.22, the Wisconsin Department of Natural Resources was charged with creating and implementing a statewide management program to control invasive species in the state. [5] Key components of the AIS program include information and education/outreach, watercraft inspection efforts, and policy and legislative initiatives. Other important activities include the Volunteer Lake Monitoring program, the Purple Loosestrife Biological Control project, and the Clean Boats/Clean Water, which is sponsored by the WDNR, UW Extension and the Wisconsin Association of Lakes. The Aquatic Invasive Species Control Grants are administered under the program which funds education, prevention, and planning projects [http://dnr.wi.gov/org/caer/cfa/Grants/Lakes/invasivespecies.html].

The Department of Natural Resources (WDNR), in cooperation with the University of Wisconsin-Sea Grant program and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), prepared a plan[6] to coordinate responses to the problems associated with AIS. Called *Wisconsin's Comprehensive Management Plan To Prevent Further Introductions and Control Existing Populations of Aquatic Invasive Species 2003*, it focuses on prevention as the key strategy for limiting the impacts of aquatic invasive species. The plan also recognizes that

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[3] Wisconsin Wetlands Association, Emerging Issues Surrounding Invasion and Control of *Phragmites australis* in Wisconsin's Wetlands: A Survey of Wetland Professionals

[4] Mapping Wisconsin Wetlands Dominated by Reed Canary Grass, *Phalaris arundinacea* L.: A landscape level assessment, Final Report to the U.S. Environmental Protection Agency, Wetland Grant #96544501-0, October 2008, Hatch, Bernthal

[5] Wisconsin state statue 23.22 http://www.legis.state.wi.us/statutes/Stat0023.pdf

[6] Wisconsin's Comprehensive Management Plan: To Prevent Further Introductions and Control Existing Populations of Aquatic Invasive Species; http://www.dnr.state.wi.us/invasives/iscouncil.htm

prevention strategies alone are not sufficient to address the impacts of AIS and recommends additional strategies such as mitigation and elimination are considered.

The key to preventing new AIS introductions is to control the transport mechanisms or pathways of release of AIS into Lakes Michigan and Superior and inland state waters. The highest prevention priority is the control of ballast water discharges. However other vectors of transport also need to be addressed, including commercial barge traffic and recreational boating. A thorough examination is needed to determine the threat that other industries such as the aquaculture and aquarium trade or bait and pet industries pose to Wisconsin waters.

Asian Carp: Photo courtesy of USFWS

CLIMATE CHANGE

While the full extent of impacts from climate change is not fully understood, it is widely accepted that it will alter hydrology and temperature regimes within the Great Lakes region. It is expected that some invasive species will benefit from these changes especially those that have generalized habitat and feeding requirements or rely more on warmer water temperatures.[7] The challenges for resource managers will be developing new prevention and control strategies in the face of uncertainties related to climate change, especially in the face of budget shortfalls.

GOALS

Prevent new introductions of nuisance exotic species; prevent newly-introduced nuisance exotic species from becoming naturalized or spreading to new areas; and minimize the impacts of existing invasive species.

[7] Union of Concern Scientists, Climate Change in Wisconsin [http://www.ucsusa.org/greatlakes/glregionwis_fis.html]

RECOMMENDED ACTIONS – AQUATIC INVASIVE SPECIES

<u>Great Lakes Regional Collaboration Recommendations (GLRC)</u>: Federal, state, and/or local governments must enact measures that ensure the region's canals and waterways are not a vector for Aquatic Invasive Species (AIS), including full federal funding of the Chicago Sanitary and Ship Canal dispersal barrier and the sea lamprey control program.

Wisconsin Strategy: Develop and implement actions to manage vectors other than ballast waters.

- Determine the threat that other vectors besides ballast waters pose to Wisconsin waters for AIS
- Conduct an inventory of AIS in coastal wetlands in order to prioritize areas for invasive species management and control
- Establish codes of best management practices for each industry to follow in order to minimize the threat of introduction of AIS from identified sources
- Continue to work with basin groups in developing goals for a basin wide initiative in dealing with AIS
- Participate through the Council of Great Lakes Governors in the regional effort to secure funding to complete construction and provide for long-term operation of the dispersal barriers in the Chicago Sanitary and Ship Canal
- Develop specific plans to control the spread and implement response strategies for particular problem species like the Asian Carp, in partnership with other Great Lakes and Mississippi River states
- Continue support for the State's Viral Hemorrhagic Septicemia (VHS) Prevention Rule [http://dnr.wi.gov/fish/vhs/vhs_prevent.html]
- Promote Wisconsin DNR's Proposed Invasive Species Identification, Classification and Control Rule – NR 40 that serves to prioritize control efforts, focusing on those species where identification and control will have the most benefit for the very limited resources that are available for such work

Wisconsin Strategy: Develop a focused education and outreach effort using existing frameworks or group efforts.

- Develop an Education Materials program specifically targeted towards Great Lakes issues in collaboration with the Governor's Council on Invasive Species
- Develop interactive displays for events such as the State Fair to heighten public awareness of problems associated with aquatic invasive species
- Develop and implement a Lake Superior vector prevention, control and management plan, working in partnership with the Lake Superior Binational Program [http://dnr.wi.gov/org/water/greatlakes/lsprogram.html] and other state and federal agencies
- Support the Lake Superior Binational Program's Total Prevention Plan for AIS, and support Wisconsin's endorsement of the final prevention plan

<u>Great Lakes Regional Collaboration Recommendations (GLRC)</u>: Ship and barge-mediated introductions and spread of Aquatic Invasive Species (AIS) in the Great Lakes should be eliminated through the immediate promulgation of environmentally protective standards for ballast water and the implementation of effective ship-board treatments and management measures.

- **Wisconsin Strategy:**
- Support partnerships like the Great Ships Initiative with the major players – U.S. Coast Guard, port authorities, shipping industry, environmental groups, and other stakeholders – to fund research, test options, and implement regional solutions where practical
- In the absence of a national solution, establish and implement a state regulatory permitted system to address ballast water management, and seek regulatory authority to implement a fee structure to support administration and enforcement of permit requirements. Coordinate with other Great Lakes states to achieve regional consistency while upholding Wisconsin-specific needs
- Support the Ballast Water Testing Facility at the University of Wisconsin Superior
- Examine the technical and financial feasibility of developing shore based treatment facilities for ballast water at the major ports of call in Wisconsin, and fund research to test viable approaches
- Examine the technical and financial feasibility of developing on-board treatments of ballast waters and fund research to test viable approaches

HABITAT AND SPECIES

Council of Great Lakes Governors' Priority: Enhance fish and wildlife by restoring and protecting coastal wetlands, fish and wildlife habitats.

PROBLEM STATEMENT

As the name implies, the "Great" Lakes region supports diverse and often unique ecosystems. For example, almost all of North America's alvars (a cluster of natural community types and associated species known collectively as alvar) occur within the Great Lakes basins and the region supports 46 species found nowhere else in the world[8].[9] Yet the health of the ecosystems in the region has been compromised over the years as a result of human activities and both habitat quantity and quality in the State have decreased. These conditions present serious challenges to existing programs to restore at risk or endangered species to self-sustaining levels in Wisconsin.

Piping Plover: Photo courtesy of the Nebraska Game and Parks Commission

Other habitat issues which have been raised are cormorant population/fish population relationships, yellow perch population fluctuations, unique geologic sites, forest cover/tributary stream hydrology relationships, near shore habitats and *Cladophora*. Riparian habitats have also been affected. Historic activities have altered regional hydrologic patterns resulting in changes to flood peaks and periods and low-flow volumes and duration. In the Wisconsin portion of the Lake Superior Basin, log driving activities and increased peak flood flows have severely degraded in-stream habitat features. Lake Michigan has over 600 dams located on its tributaries to the Lake blocking fish and mussel passage to critical spawning areas and fragmenting ecosystems. Species restoration plans are dependent on habitat quality and anadromous fishes (those that migrate from the Great Lakes to tributary streams for spawning) are dependent on tributaries for spawning and nursery areas. Together, these and other land uses have resulted in changes in stream morphology with reduced amounts of high quality habitat for fish and wildlife.

With much of the riparian ownership in private hands, educational efforts and incentive programs are needed to acquire or restore critical tributary stream riparian zones. Riparian buffer development and wetland restoration are key steps in restoring tributary habitat quality. Management of storm water flows to optimize infiltration and decrease run-off rates are also important restoration projects. Protecting remaining critical habitat in the headwaters of the watershed is another step in a long process of restoring down stream habitat. Key tools for implementing these measures are incentive programs like those authorized under the

[8] Binational Conservation Blueprint for the Great Lakes, TNC,
[9] Conserving Great Lakes Alvars: Final Technical Report of the International Alvar Conservation Initiative, March 1999

federal Farm Bill, i.e. the Conservation Reserve Enhancement Program (CREP), along with various other programs such as the WDNR Stream Bank Protection Program that address protection of riparian habitats and the Bird Protection Fund sponsored by the Wisconsin Natural Resources Foundation aimed at funding collaborative projects such as the Protecting Bird Migration Stopover Habitat in the Western Great Lakes.

Few will argue anymore the importance that wetlands play in providing benefits to wildlife, water quality, flood storage capacity or our own quality of life. Yet threats such as altered hydrology through ditches and tiles, infestations of invasive species, and disconnected floodplains continue to place these important resources in peril. Recognizing the importance that wetlands have on our quality of life, Wisconsin became the first State to adopt legislation to protect isolated wetlands that were no longer under federal protection as a result of a 2001 U.S. Supreme Court decision commonly referred to as SWANCC.[10]

Guided by such work as the Wisconsin Wetland Team's 2008 update to the *Reversing the Loss: A Strategy to Protect, Restore, and Explore Wisconsin* Wetlands [http://dnr.wi.gov/wetlands/strategy.html] and the Wisconsin Wetlands Association's (WWA) *Wetlands Threats Analysis [http://www.wisconsinwetlands.org/threatsintro.htm]* Wisconsin has several strategic tools to assist those working to protect and restore these precious gems.

Coordinating across the jurisdictional boundaries of eight states and two Canadian provinces and with a myriad of governmental agencies poses unique problems when managing shared resources. The State and its partners have invested time and money in the development of restoration and/or protection plans that should be fully implemented. Examples include the State's Wildlife Action Plan, the Wisconsin Lake Sturgeon Management Plan, and Wisconsin Lake Superior Basin Brook Trout Plan. The Great Lakes Fisheries Commission and the Lake Superior Binational Program[11] serve as models for how managing authorities can work together towards common goals.

CLIMATE CHANGE

Anticipated changes to ecosystems due to climate change include altered hydrology due to changes in precipitation patterns, changes in distribution of cold water fisheries due to warmer water temperatures, and poorer water quality and increase occurrence of nuisance algae due to additional release of phosphorus and other nutrients. Aquatic ecosystems are particularly vulnerable to climate change (Poff et al. 2002) due to their limited ability to adapt.

GOALS

Identify critical habitat and species needs and implement strategies to protect and restore habitats critical to meeting recovery targets, relying on existing recovery or management plans and strategies. Conservation of biological diversity through rehabilitation of native fish populations, species, communities, and their habitats has a high priority. Priority areas for protection and restoration are wetlands and tributary streams. Priority targets for fish and wildlife management include:

- Lake sturgeon

[10] *Reversing the Loss: A Strategy to Protect, Restore, and Explore Wisconsin Wetlands*, Wisconsin Wetland Team
[11] Lake Superior Binational Program http://www.epa.gov/glnpo/lakesuperior/index.html

- Lake trout
- Species of greatest conservation need[12]
- Great Lakes spotted musky in Green Bay
- Tern populations
- Brook trout in Lake Superior
- Walleye
- Trumpeter swans
- Increasing breeding pairs of waterfowl

12 Native wildlife species with low/declining population and most at risk of no longer being part of Wisconsin's fauna and their habitats (Wisconsin's Wildlife Action Plan, 2005) http://dnr.wi.gov/org/land/er/WWAP/

Recommended Actions – Habitat and Species

Great Lakes Regional Collaboration (GLRC) Recommendation for Riverine Habitats and Related Riparian Areas: Restore ten Great Lakes tributaries (five tributary barrier projects and five riparian habitat projects).

Wisconsin Strategy: Restore at least eight tributaries in the combined Lake Michigan and Lake Superior Basin areas. Criteria for tributary selection include:

- Listed as a priority for establishment and implementation of TMDL[13] standards
- Identified as providing critical habitat for "species of greatest conservation need"
- Headwaters for a watershed identified as providing critical and at risk habitat for "species of greatest conservation need"
- Contain structural impediments to fish and other wildlife connectivity along waterways and access to in-land wetlands

Wisconsin Strategy: Develop and implement a Lake Superior Basin comprehensive watershed management protocol and monitoring strategy that contains at a minimum:

- A Lake Superior Basin monitoring strategy
- A management planning protocol applicable for all the basin watersheds
- Watershed projects and strategies to address water runoff quantities, sediment volume and hydrological degradation in tributary watersheds

Great Lakes Regional Collaboration (GLRC) Recommendation on Open and Nearshore Waters: Develop and evaluate lake trout restoration efforts through strategies using guidance from existing fishery management plans.

Wisconsin Strategy: Support lake trout restoration strategies adopted pursuant to the Joint Strategic Plan. This includes strategies described in *A Lake Trout Restoration Plan for Lake Superior* and *A Fisheries Management Implementation Strategy for the Rehabilitation of Lake Trout in Lake Michigan* (under review), including stocking appropriate strains, maintaining protective fishing regulations and support of the Great Lakes Fisheries Commissions' sea lamprey control program.

[13] Total Maximum Daily Load. Wisconsin´s Impaired Waters Program is required by Section 303(d) of the Clean Water Act to identify and restore impaired waters by 1) Evaluating and assessing all waters of the state to determine if they meet water quality standards; 2) Creating an Impaired Waters list of waters that do not meet water quality standards; and 3) Conducting a TMDL analysis to set pollutant reduction goals needed to restore waters.

Great Lakes Regional Collaboration (GLRC) Recommendations for Wetlands:
Restore or protect 550,000 acres of wetlands and associated uplands.

Wisconsin Strategy: Protect and restore 55,000 acres of coastal, riparian, and wetland habitat and associated uplands in Wisconsin

- Adopt target areas for priority actions that are identified in management plans such as the North American Waterfowl Plan and the Upper Mississippi River/Great Lakes Joint Venture for wetland acreage increase goals in the Lake Superior basin, the west shore of Green Bay, the Milwaukee River basin or other areas that are important for wildlife habitat, especially for wildlife and plant species that are locally rare or listed as endangered
- Identify opportunities to address statewide needs and resources outlined in the Wisconsin Land Legacy Report [http://www.dnr.state.wi.us/Master_Planning/land_legacy/] as they relate to wetlands, undeveloped shorelines, scattered natural areas, large working forests, and prairies and savannas
- Support other coastal wetlands and shoreline protection and restoration efforts to restore regional hydrology and adjacent habitats and to manage and/or emulate hydrology in wetlands and adjacent habitats. Shorelines include those along lakes, streams and wetlands
- Identify and plan for short and long term impacts of global climate change on coastal wetlands, estuaries and watersheds

Wisconsin Strategy: Develop and implement programs to promote public sector awareness and understanding of the importance of wetland habitat restoration and protection and management requirements under state and federal laws.

- Educate the public about the functions and values of coastal and interior wetlands
- Educate the public about wetland regulations
- Promote the Wisconsin Wetland Team's *Reversing the Loss: A Strategy to Protect, Restore and Explore Wisconsin Wetlands* as a means to raise public awareness about the importance of wetlands in the State

Action Plan Recommendations:

Lake Michigan Basin area:

1) Priority areas for coastal, riparian and wetland habitat protection and restoration

- 7000 wetland acres on the west shore of Green Bay for birds
- Lake Winnebago System (nest colony area for the endangered Common Tern and Forster's Tern)
- Islands serving as rookeries such as Green Island in Green Bay and off the tip of Door County (Black-crowned Night Heron rookery)
- Fish spawning and wildlife nesting habitats
- Milwaukee River Basin

2) Priority areas for tributary restoration and protection

Water Management Units (WMU)	Projects
Green Bay	Menominee River
	Peshtigo River
Lower Fox	Fox River

Manitowoc	Manitowoc River
	Stony Brook
Milwaukee	Milwaukee River
	Mole Creek
	Ulao Creek
Sheboygan	Sheboygan River
	Onion River
	Otter Creek
	Willow Creek
Root-Pike	
Twin-Door-Kewaunee	Kewaunee River
Upper Fox	
Wolf	Willow River

Lake Superior Basin area:

1) Priority areas for coastal, riparian and wetland habitat protection and restoration

- Chequamegon Point and Long Island (endangered Piping Plover nesting areas)
- Wisconsin Point
- Allouez Bay
- Lower Nemadji River Marshes
- the Kakagon Sloughs ecosystem (fish spawning ground and waterfowl marsh)
- Hog Island/Newton Creek in the St. Louis River estuary
- Proposed National Estuary Research Reserve site
- Promote Ecosystem Goals through the Lake Superior Binational Program
- Other high quality wetlands identified in the Lake Superior Special Area Management Plan (SAMP). Consider compensatory mitigation through a combination of wetland creation, enhancement and preservation

2) Priority areas for tributary restoration and protection (there is only one water management unit in the Lake Superior Basin area)

- Whittlesey Creek
- Raspberry River
- Bois Brule River
- Bark River
- Saxine Creek
- Flag River
- Sioux River
- Cranberry River
- Iron River
- Onion River
- St Louis River
- Fish Creek
- Bad River and tributaries

3) Elements of a Lake Superior Basin comprehensive watershed management protocol and monitoring strategy

- Develop a Lake Superior Basin monitoring strategy that
    - Encompasses objectives of the Lake Superior Basin tributary strategy, the Binational Program Ecosystem Goals and the GLRC recommendations
    - Includes monitoring of coastal estuary marsh and is consistent with the Marsh monitoring program (Bird Studies Canada) which is used as one of the Great Lakes Coastal Wetland Consortium's indicators
- Develop a management planning protocol applicable for all the basin watersheds. Identify and prioritize subwatersheds with excessive runoff
    - Facilitate use of the hydrologic assessment guidance for watershed planning developed through the Lake Superior's Basin Partner Team's 2005-07 projects
- Support watershed projects and strategies to address water runoff quantities, sediment volume and hydrological degradation in tributary watersheds
    - Strategies should include watershed BMPs, stream restoration projects, assessments of sediment loads, and wetland restorations
    - Link projects and strategies to regional water quality management plans

COASTAL HEALTH

Council of Great Lakes Governors' Priority: "Promote programs to protect human health against adverse effects of pollution in the Great Lakes ecosystem."

PROBLEM STATEMENT

Potential sources of pathogens impacting recreational water and drinking water in Lakes Michigan and Superior are the result of both direct and indirect contamination sources. Nonpoint runoff from both urban and rural sources and inadequately treated wastes from publicly owned treatment works (POTWs) and wildbird feces are the most common source of contamination, resulting in beach closings and nutrient enrichment of nearshore waters.

Hika Bay Algae: WDNR Photo

Nonpoint runoff is a major vector for the nutrients which support algae growth, with phosphorus from urban lawns, agricultural operations, and golf courses being a major problem. Polluted run-off also contains contaminants potentially harmful to human and animal health. Inadequate protection of drinking water sources, including wellhead areas, increases potential risk from pathogens and emerging pollutants such as pharmaceuticals and personal care products.

Beaches

Wisconsin is blessed with beautiful beaches along both Lake Michigan and Lake Superior shorelines. Unfortunately, the number of beach closings due to elevated levels of bacteria has increased since 2003 with implementation of water quality monitoring under the federal BEACH Act.[14] Federal law requires notification of the public when E.coli exceeds recommended standards and Wisconsin has opted to require that signs be posted at beaches advising visitors of health risk when that happens. While *E. coli*, which is used as an indicator of potential human pathogens in water, poses a minimal health threat to swimmers, it may indicate the presence of other dangerous bacteria and viruses that can cause diseases. Potential sources of *E.coli* contamination at Wisconsin beaches include agricultural and urban storm water runoff, failing residential or municipal infrastructure, and sewage overflows. In addition, localized sources from wildlife and waterbird feces haven been proven to contribute to high levels of *E.coli* in both beach sand and surface waters.[15]

Water quality samples from many of Wisconsin's Great Lakes beaches have exceeded the health advisory threshold to some extent in each of the six years for which monitoring data

14 Beaches Environmental Assessment and Coastal Health (BEACH) Act, 2000, Section 406(b) of the Clean Water Act. http://www.epa.gov/waterscience/beaches/rules/act.html

[15] Wisconsin's Great Lakes Beaches Sanitary Survey Report; Beach Season 2007 [http://infotrek.er.usgs.gov/docs/beach/WIBeach_Sanitary_Survey_2007.pdf]

are available (2003-08). In 2006, 31 Great Lakes beaches were included on the impaired waters list[12], with an additional 10 proposed in 2008[13] due to chronic closure associated with the presence of high counts of *E. coli* bacteria.

On Lake Michigan beaches, Cladophora, a green algae which had largely disappeared in the late 70's, has since reemerged as a serious nuisance along the lake shoreline. It has a negative impact on the recreational use of beaches and may also be contributing to beach closures by providing a suitable environment for *E. coli to survive and multiply*.

Research by local communities has found that primary sources of contamination vary widely by beach and that most sources are local in nature. Sources of concern include:

- Storm water discharge from nearby outfalls
- Direct runoff from roads, parking lots, roofs and driveways
- Storm events that carry domestic and wild animal waste into waterways
- Malfunctioning septic systems
- Illegal sewer connections to municipal infrastructure, rivers, and streams that serve as a source of human derived bacterial contamination
- Illegal dumping by commercial and recreational watercraft holding tanks
- Avian and other animal populations on beaches
- Sanitary and combined sewer overflows

Inadequate funding for full implementation of the BEACH Act has increased the public health risk in Wisconsin. Two key drivers that prevent Wisconsin beach managers from full program rollout include: 1) Congress' annual appropriation of only one-third of the authorized $30 million for program implementation; and 2) a federal formula to allocate funds that is skewed toward highly populated areas regardless of the number and length of public beaches. While Wisconsin is fortunate to have strong partnerships and commitments from participating communities for monitoring and notification, low staffing levels at both the state and the local community level has also hampered full implementation of the program. And since the BEACH Act only covers monitoring and notification activities, there is no funding provided to conduct source identification and mitigation leaving the underlying causes unknown and unaddressed.[16]

Drinking Water Quality

Source water protection is essential to prevent biological and chemical contaminants from entering sources of drinking water that might otherwise compromise the quality of the water we depend on for daily use and other consumptive purposes. Threats to drinking water arise from sediment loading associated with stormwater run-off, contamination from improperly located or maintained private septic systems and wells, and less frequently through seepage from poorly maintained municipal sewer systems.

Contamination may also occur through chemical spills associated with industry and mining and mine processing activities. More recently attention has focused on contamination of drinking

[16] U.S. GOA, Testimony Before the Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives by Anu K. Mittal, Director Natural Resources and Environment, July 12, 2007

water from chemicals contained in pharmaceutical and other personal care items disposed of through municipal sewer systems and not removed by municipal wastewater treatment processes. There is also ongoing research to better understand the source and impact of pharmaceuticals in agricultural runoff.

CLIMATE CHANGE

Climate change models predict an increase in the frequency, duration, and distribution of precipitation in the Great Lakes region[17]. This could lead to an increase in waterborne disease and pathogens entering the Great Lakes placing further stresses on this resource. Other predictions include increase occurrences of nuisance algae which could have a negative impact on recreational beaches.

GOALS

Protect public health through identification and elimination of pollution sources that can cause bacterial closings at beaches or contaminate source drinking water supplies.

Photo by: Shaili Pfeiffer

[17] Climate Change and Waterborne Disease Rick in the Great Lakes Region of the U.S., Patz, Jonathan., et.al,

Recommended Actions – Coastal Health

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: By 2020, or sooner where possible, eliminate inputs of untreated or inadequately treated human and industrial waste to Great Lakes basin waters from municipal wastewater treatment systems and on-site disposal systems.

Wisconsin Strategy: Work with local governments and the WI Department of Commerce to reduce biological contamination from nonpoint sources of runoff.

- Identify barriers to county implementation of regulations to protect public health
- Encourage innovative approaches to system design to adapt to local conditions
- Support maintenance and expansion of bacteriological monitoring of waters, including tributaries
- Support Best Management Practices that would include riparian, floodplain, and wetland restoration

<u>Great Lakes Regional Collaboration (GLRC) Recommendation</u>: Achieve a 90-95 percent reduction in bacterial, algal, and chemical contamination at all local beaches.

Wisconsin Strategy: Decrease the number of Great Lakes closure dates at target beaches by 10% from 2006 levels by working with local agencies to identify and correct sources of pathogens which are resulting in beach closures through routine and annual beach surveys. Target beaches are those listed on the State's impaired waters list[18] for exceeding a rolling geometric mean of 126 cfu/mL *E.coli* more than 15% of the time over the past three years and which have submitted a minimum of 15 samples per beach season.

- Continue to enforce overflow requirements for all National Pollutant Discharge Elimination System (NPDES) permits
- Identify the extent of impacts from private septic systems and publically owned treatment works (POTW) and secure funding to update or replace failing systems

Wisconsin Strategy: Develop guidance for beach managers on measures to minimize *E. coli* contamination, manage build up of nuisance algae and conduct beach clean ups. Develop programs to improve reliability of volunteer beach monitoring programs. Encourage adoption of local signage ordinances covering the following topics:

- Bacteria are present in natural waters (in quantities that may or may not cause a health problem)
- Feeding waterbirds can increase avian waste at beaches
- Observing sanitary measures such as hand washing and staying out of the water with gastrointestinal illness to limit exposure
- Information on what the risk for illness is when there is a beach closure

[18] This list is maintained by WDNR and posted on their website: http://dnr.wi.gov/org/water/wm/wqs/303d/2008/2008updates.htm

- Promote proper boat waste disposal
- Promote proper pet waste disposal

<u>Great Lakes Regional Collaboration (GLRC) Recommendation</u>: Protect source drinking water quality.

Wisconsin Strategy: Identify and prioritize the major contributors to source drinking water contamination, including emerging pathogens and pollutants, looking at watersheds, wellhead protection plans, wastewater inputs and drinking water withdrawals. Seek funding to protect drinking water sources and monitor emerging contaminants.

- Fund planning and implementation of wellhead protection plans and replace existing water quality testing methodologies with real time testing methodologies
- Complete environmental inventories of emerging pathogens and other pollutants and evaluate the sources, fates, and potential reduction and public information strategies
- Implement a strategy to monitor emerging contaminants such as those on the Wisconsin Watch List, pharmaceuticals and personal care products

<u>Action Plan Recommendations</u>:
The following beaches are on the State's Great Lakes Beaches impaired waters list and should be targeted for reductions in beach closings.

Beach (Great Lake)	**County**
Maslowski (L. Superior)	Ashland
Sinissippi Lake-Neider Park Landing (L. Michigan)	Door
Sunset Beach - Sturgeon Bay (L. Michigan)	Door
Barker's Island Inner (L. Superior)	Douglas
Brule River State Forest #2 (L. Superior)	Douglas
Brule River State Forest #3 (L. Superior)	Douglas
Eichelman (L. Michigan)	Kenosha
Pennoyer Park (L. Michigan)	Kenosha
Simmons Island (L. Michigan)	Kenosha
City of Kewaunee (L. Michigan)	Kewaunee
Crescent (L. Michigan)	Kewaunee
Fischer Park Beaches (L. Michigan)	Manitowoc
Hika Park Bay (L. Michigan)	Manitowoc
Memorial Drive Wayside Beach (L. Michigan)	Manitowoc
Neshotah Beach (L. Michigan)	Manitowoc
Point Beach State Park Beach (L. Michigan)	Manitowoc
Red Arrow Park Beach (L. Michigan)	Manitowoc

YMCA Beach (L. Michigan)	Manitowoc
Warm Water Beach (L. Michigan)	Manitowoc
Atwater Beach (L. Michigan)	Milwaukee
Bender Beach (L. Michigan)	Milwaukee
Grant Park (L. Michigan)	Milwaukee
Bradford Beach (L. Michigan)	Milwaukee
McKinley Beach (L. Michigan)	Milwaukee
South Shore Beach (L. Michigan)	Milwaukee
Tietjen Beach/Doctor's Park (L. Michigan)	Milwaukee
Cedar Beach (L. Michigan)	Ozaukee
County Road D Boat Launch (L. Michigan)	Ozaukee
Harrington State Park (L. Michigan)	Ozaukee
Upper Lake Park (L. Michigan)	Ozaukee
Deland Park (L. Michigan)	Sheboygan
General King Beach (L. Michigan)	Sheboygan
Kohler Andrae (L. Michigan)	Sheboygan

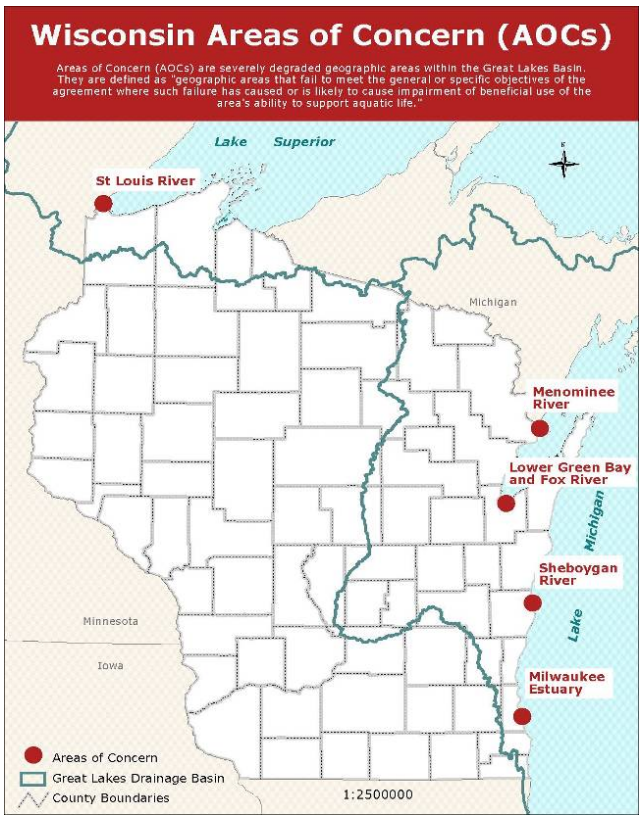
AREAS OF CONCERN / CONTAMINATED SEDIMENTS

Council of Great Lakes Governors' Priority: "Restore to environmental health the Areas of Concern identified by the International Joint Commission as needing remediation."

PROBLEM STATEMENT

Wisconsin has numerous contaminated sediment sites throughout the Great Lakes Basin–areas where water quality standards have been impaired or damaged by the presence of contaminated sediments. Many of these sites were created by decades of industrial and municipal discharges, combined sewer overflows, and urban and agricultural non-point source runoff. Contaminated sediments pose serious human and ecological health concerns about potential risks to aquatic organisms, wildlife, and humans. Five of these sites have been officially designated as Great Lakes Areas of Concern (AOCs) whose beneficial uses are impaired because of changes to the physical, chemical, or biological integrity of the system. The four major categories of Beneficial Use Impairments (BUIs) are contaminated sediments, habitat loss or destruction, nonpoint source pollution, and beach issues.

Five Wisconsin harbor and river areas have serious pollution problems that severely limit the beneficial uses of the waterways. These water bodies were designated "Areas of Concern" as defined by the Great Lakes Water Quality Agreement, in the mid-1980s. They were identified based on 14 beneficial use impairments (BUIs), which are broadly categorized as contaminated sediments, habitat loss or destruction, non-point pollution and beach issues. A full listing of the 14 BUIs is available on the Great Lakes Information Network website: http://www.great-lakes.net/envt/pollution/benefuse.html.



Areas of Concern (AOC)

The Great Lakes Water Quality Agreement, via a 1987 amendment, directed the U.S. and Canadian governments to develop and implement Remedial Action Plans (RAPs) for each AOC. Stage I RAPs and subsequent updates to them, or Stage II RAPs, have been prepared for each of the five Wisconsin AOCs. However, the AOC/RAP program effort in Wisconsin scaled back considerably in the late 1990s with the reduction in federal funding. WDNR discontinued staffing for local RAP teams and comprehensive RAP updates have not been produced since 1996.

Site-specific delisting criteria or targets against which to measure progress and completion are necessary for delisting AOCs or individual BUIs. Although progress has been achieved toward restoration of beneficial uses in all of the AOCs, none of the sites have been sufficiently evaluated or restored to be delisted. As of December 2008, the St. Louis River, Lower Menominee River, Sheboygan River, and Milwaukee Estuary AOCs all have developed initial BUI delisting targets. Delisting targets in concert with the Total Maximum Daily Loads standards (TMDLs), for nutrients and solids for the Lower Green Bay and Fox River AOC will be completed by mid-summer 2009.

Currently, a contaminated sediment management strategy exists in the Milwaukee Estuary RAP (1994) and a strategy regarding PAH-contaminated sediments was developed for the lower St. Louis River AOC in 2003. The St. Louis River Alliance is also working to draft a contaminated sediment action plan for the St. Louis River AOC, but to date has not yet completed the plan. All of the AOCs have some contaminated sediment hotspots that are being addressed under Federal Superfund or Resource Conservation Recovery Act authorities.

Many of the sources that impact the AOCs are located outside the boundaries of the AOC and are therefore addressed in the other priorities. Like the Regional Collaboration process, the Wisconsin AOC strategy focuses on contaminated sediments. The contaminated sediment problem is linked to multiple use impairments in every one of Wisconsin's AOCs.

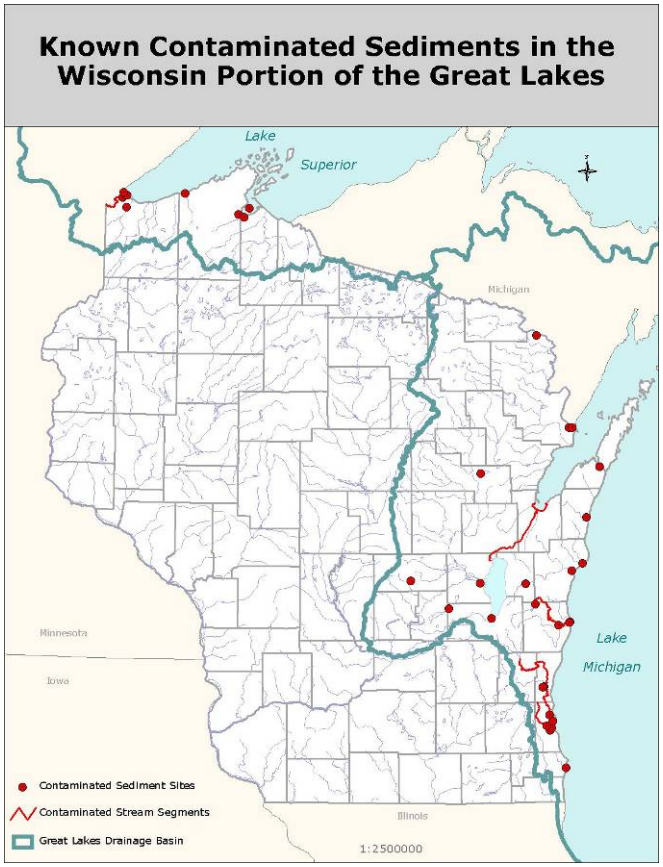
The Great Lakes Legacy Act

The Great Lakes Legacy (Legacy) Act was signed into law on November 27, 2002 authorizing $270 million in funding over five years to assist with the remediation of contaminated sediments in any of the 31 designated U.S. AOCs. Legacy projects were awarded for two of Wisconsin's five AOCs - the Hog Island Inlet in the St. Louis River AOC and the Kinnickinnic River in the Milwaukee Estuary AOC. Projects for the remaining three AOCs were not selected for Legacy funding.

In October 2008, Congress signed a law reauthorizing the Legacy Act and authorizing two more years of funding at the same base level of funding. The reauthorization also includes several new provisions to improve the program. Key among the new provisions are the elimination of the maintenance of effort provision, allowing funding for habitat improvement in conjunction with sediment remediation projects, expanding the range of classes allowed for in-kind contributions and restructuring of cost calculations.

Non-AOC sites

A contaminated sediment site list was prepared by the WDNR's Contaminated Sediments Standing Team in the mid-1990s. The GLRC recommends sites outside of AOCs proceed with cleanup under other existing remediation authorities. Superfund and/or RCRA or the state's Environmental Repair Fund have been and are being used in cleanups outside the AOCs; examples include Chequamegon Bay, Manitowoc, and on numerous tributary rivers to the Great Lakes. All funding programs for sediment clean up, including the Legacy Act, are complex and time consuming - some have taken decades to work through negotiations with the responsible party/parties to develop an appropriate remedial design prior to any sediment remediation occurring. This has consequently facilitated sediment contamination that spreads both within the AOCs and other sites throughout the Great Lakes.



GOALS

Develop delisting targets for each AOC in Wisconsin, a reasonable timeline for achieving delisting goals, and monitor and report on progress towards delisting of targets. Expand AOC Legacy projects to include related habitat improvements and expand clean up activities on non-AOC sites. Add projects that address coal tar and the Hayton Area Remediation Project (HARP).

Recommended Actions – AOCs / Contaminated Sediment

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: Areas of Concern (AOC) Program Capacity - The Administration should request and Congress should appropriate $10 million annually to the Great Lakes states and community-based coordinating councils in the AOCs, and $1.7 million to U.S. EPA's Great Lakes National Program Office for regional coordination and program implementation.

Wisconsin Strategy: Set priorities for funding and implementation of remedial actions to meet AOC-specific BUI delisting goals for the five AOCs in Wisconsin. Priority actions differ for each AOC but address elements such as:

- Complete delisting targets
- Evaluate and delist BUIs when monitoring demonstrates that targets have been met
- Use the strategy to support resource requests for AOC clean up and habitat restoration
- Support polychlorinated biphenyls (PCB) remedial actions

Wisconsin Strategy: Educate and engage local communities in implementation of AOC remediation plans and actions.

- Engage local communities in each AOC in development of implementation priorities for the actions listed in the AOC delisting targets
- Use outreach and education activities to maintain a well-informed and motivated network of citizens that understand the benefits of "taking back" their river; these individuals could be deployed to move agencies and responsible parties to action

<u>Great Lakes Regional Collaboration (GLRC) Recommendations:</u> Existing U.S. EPA/State Remedial Action Plan (RAP) Work Group should be expanded to a Federal-State AOC Coordinating Committee to better coordinate efforts and optimize existing programs and authorities to advance restoration in the AOCs.

Wisconsin Strategy: Participate in the Federal-State AOC Coordinating Committee to ensure Wisconsin needs are addressed.

- Monitor progress in delisting of BUI targets established for each AOC
- Seek funding for restoration of sites after remediation if restoration is a priority need

<u>Action Plan Recommendations</u>:

1. AOC- specific priorities for funding and implementation of remedial actions to meet BUI delisting goals:

- Lake Superior Basin (St. Louis River AOC):
  - Revitalize efforts to institute a multi-state/government strategy/GIS database for contaminated sediments based on MPCA, WDNR and St. Louis River Alliance work
  - Use the strategy to support resource requests for AOC clean up and habitat restoration
  - Support remediation of the Chequamegon Bay sediment contaminated with Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals at the Ashland/Northern States Power Superfund site

2. *Lake Michigan Basin:*

- Lower Menominee River AOC:
  - Support the remedial actions at the Ansul site and Marinette Wisconsin Public Service Manufactured Gas Plant
  - Evaluate and delist BUIs when monitoring demonstrates that targets have been met
- Fox River and Lower Green Bay AOC:
  - Continue implementing the PCB remedial action
  - Support and implement actions and projects for the TMDL
  - Complete delisting targets and evaluate and delist BUIs when monitoring demonstrates that targets have been met
- Sheboygan River AOC:
  - Continue implementing the PCB remedial action
  - Implement floodplain PCB remedial action
  - Support and implement the remedial action at the Camp Marina Wisconsin Public Service Manufactured Gas Plant site
  - Evaluate and delist BUIs when monitoring demonstrates that targets have been met
- Milwaukee Estuary AOC:
  - Support and implement the remedial actions at Little Menomonee River, Cedar Creek, Milwaukee River, and Kinnickinnic River
  - Identify additional sediment contamination and support remediation
  - Evaluate and delist BUIs when monitoring demonstrates that targets have been met

NONPOINT POLLUTION

Council of Great Lakes Governors' Priority: Control pollution from diffuse sources into water, land and air.

PROBLEM STATEMENT

Wisconsin continues to experience water quality problems in bays, harbors, and nearshore waters of Lake Michigan and in direct tributaries to both Lakes Michigan and Lake Superior. "Lower" Green Bay continues to have low dissolved oxygen levels and poor water clarity due to phosphorus and sediment carried by the Fox River and nearby tributaries to the bay. About a 50% reduction in phosphorus and sediment is needed to restore the quality of the bay. Mats of *Cladophora*, a stringy filamentous algae, are found along Lake Michigan beaches from Door County south to the Illinois border. The recent increases in Cladophora are due primarily to greater nearshore concentrations of phosphorus and exacerbated by the presence of aquatic invasives such as zebra and quagga mussels.

Beaches along Lake Michigan are also impacted by nonpoint contamination. Many are closed and health advisories are posted due to bacteria levels, some of which come from nonpoint sources. Streams directly contributing to Lake Michigan have some of the highest phosphorus concentrations of any streams in Wisconsin. A number of Lake Superior tributaries important to Lake Superior fish have experienced fish habitat degradation due to channel morphology changes and sedimentation caused by high rates of water runoff from the landscape, resulting from land use changes and the unique soils of the area.

Wisconsin continues to address these needs through a variety of federal, state and local programs. However, there needs to be increased financial, technical, and educational assistance if these needs are to be addressed in a reasonable time frame. Compliance assurance is also needed for implementation of permits and performance standards and prohibitions.

WDNR offers a number of grant and technical assistance programs to address runoff management. The Nonpoint Priority Watershed and Priority Lake Program, funded through state and federal appropriations, provides cost-sharing grants to reimburse landowners for installing voluntary best management practices (BMPs). Thirty-three of the 86 projects funded through the Program were in Wisconsin Great Lakes watersheds, impacting about two-thirds of rural and urban areas with over $100 million spent in the Great Lakes projects alone. In 1995 the Legislature halted the designation of priority watersheds in favor of the next generation of runoff management grants, the Targeted Runoff Management grants [http://dnr.wi.gov/org/caer/cfa/EF/NPS/nonpoint.html]. Funding for similar projects is now

channeled through the NRCS grant program Environmental Quality Incentives Program (EQIP)[19].

Annual report data from these projects indicate successful progress towards reducing phosphorus from barnyards and upland sediment/soil loss. Between 50 and 60% of the projects met their barnyard phosphorus reduction goals and upland sediment/soil loss reduction goals by 50% or more. Each year it is estimated that approximately 235,000 pounds of phosphorus from barnyards and about 57,000 tons of sediment from eroding streambanks or shorelines are prevented from entering waterways through the installation of BMPs in priority watersheds and lakes. Over 354,000 feet of streambanks or shorelines have had best management practices put in place to prevent erosion and enhance habitat and about 750 acres of wetlands have been restored.

Wisconsin's rule to control nonpoint source pollution runoff from farms, as well as from other sources, went into effect in 2002. NR 151 sets nonpoint source performance standards and prohibitions for farms to control polluted runoff. It also sets urban performance standards to control site erosion, manage runoff from streets and roads, and manage fertilizer use on large turf areas.

The WDNR completed revisions to administrative rule NR 243 in July 2007 to better address water quality impacts associated with point source discharges from large livestock and poultry operations - those requiring a water quality protection permit (WPDES) from the WDNR. This rule and permits issued under it require all larger-scale farms to meet standards to keep manure from contaminating private wells, lakes and rivers. The revisions place additional restrictions on the application of manure during winter months, prohibiting surface applications of liquid manure on frozen or snow-covered ground and requiring a minimum of 180-days of storage for liquid manure. These and other changes in manure management will reduce runoff risks from winter landspreading of manure from WDNR permitted operations. NR 243 also requires a shift to phosphorus-based nutrient management plans statewide for all larger-scale livestock and poultry operations.

State rules affecting farms of all sizes reference NRCS 590, the state technical standard for nutrient management. WDNR and DATCP have updated their rules to reflect the updated version of this technical standard that addresses phosphorus in addition to nitrogen applications on cropland for all farms in Wisconsin if cost-sharing is provided. Cost-sharing is not required for WDNR permitted livestock operations.

WDNR Photo

WDNR funds Targeted Runoff Management grants, Urban Nonpoint Source Pollution and Storm water grants annually, when funding levels permit. These grants provide cost sharing for local units of government to implement urban and rural BMPs. BMPs are implemented with the goals of reducing nonpoint

[19] NRCS EQIP Program: http://www.nrcs.usda.gov/PROGRAMS/EQIP/

source pollution such as phosphorus, sediment, bacteria in surface waters, and protecting groundwater. Rural projects center primarily on implementing performance standards and prohibitions under NR 151, and addressing 303(d), or impaired waters.

CLIMATE CHANGE

Recent flooding events in Wisconsin point to an increase in major storm events that are expected to continue based on climate change models. This suggests that climate change will cause changes to local hydrology resulting in higher stream base flows, more runoff and erosion, and potentially higher volumes of sediment and phosphorus reaching surface waters[20].

GOALS

Reduce the amount of phosphorus, sediment and bacteria from urban and rural nonpoint sources and establish 80,000 acres of riparian buffers on agricultural lands along lakes and streams throughout the Great Lakes Basin. The approach should include large-scale watershed initiatives focusing on protection in the Lake Michigan Basin and restoration in the Lake Superior Basin.

Photo by Lisa Berenschot

[20] The Lake Connection: *Why We Should Care About Climate Change; A Watery View;* Magnuson, John J.,

Recommended Actions – Nonpoint Source Management

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: Between $77 million and $188.7 million should be provided annually over five years to fund restoration of 550,000 acres of wetlands.

Wisconsin Strategy: Expand wetland restoration to preserve and restore wetlands functionality and wetland protection to reduce loss of watershed water storage capacity.

- Work through the federal-state programs such as the Wetlands Reserve Program[21], (USDA – Natural Resources Conservation Service) and the National Coastal Wetlands Conservation Grant Program, (U.S. Fish and Wildlife Service)
- Coordinate wetlands preservation, restoration and protection for nonpoint source management with wetland habitation and species strategies
- Develop riparian forest strategies to shift forest succession to reduce beaver activity in priority fish habitat tributaries

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: $335 million should be provided to restore 335,000 acres of buffers over five years.

Wisconsin Strategy: Expand implementation of the Conservation Reserve Enhancement Program (CREP).

- Focus on cropland and marginal pastureland in eligible areas
- Consider expanding eligibility to all agricultural lands within the Great Lakes Basin
- Enforce buffer requirements on new developments
- Develop recommendations for forest lands in Lake Superior red clay region and in trout stream watersheds draining to Lake Superior

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: $120 million should be allocated by 2010 to achieve a 40 percent reduction in soil loss in ten selected watersheds.

Wisconsin Strategy: Control soil erosion and sediment delivery to streams from croplands.

- Manage runoff in locations of concentrated flow through establishment of grassed waterways and other management practices
    - In the Lake Michigan basin, focus on critical geographic areas including Green Bay, the nearshore of Lake Michigan, and Areas of Concern (AOC)
    - In the Lake Superior basin, focus on reduction of water runoff rates to rehabilitate priority tributaries by encouraging greater forested land cover and establishment of timber harvest schedules in priority sub-watersheds

- Promote watershed planning and implementation approaches including protection of headwater areas, forest harvesting and flood control. Develop pilot management plans that can serve as a model for multiple watershed areas.

[21] A cooperative, multi-agency effort involving a number of federal or state programs.

Support road building and maintenance techniques such as proper culvert sizing and placement to minimize erosion. Evaluate options to address agricultural drainage structures which serve as landscape drainage features even on land no longer used for farming.

Support efforts to map habitat and monitor nutrient and sediment loads using geo-referenced data systems to determine past and present land use, land cover and other activities necessary for effective nonpoint source management. Periodically update GIS and other datasets. (See end of this section for priorities in the Lake Superior and Lake Michigan basins.)

Target EQIP, CREP, county agriculture cost-share programs in watersheds where agricultural land use practices contribute to watershed degradation for important aquatic habitat.

Wisconsin Strategy: Minimize impacts from nonpoint sources of pollution in urban areas through regulatory programs and voluntary actions.

***Municipal permits*:** Municipal separate storm sewer systems (MS4) serving a population over 10,000 that are located outside of an urbanized area are required to obtain a WDNR storm water discharge permit.

- Assist regulated municipalities in identifying strategies to meet permit requirements. Examples include pollution trading schemes, cooperative work efforts among municipalities, additional funding programs
- Consider approaches working with municipalities not required to obtain a permit, such as through education/outreach and voluntary grant or incentive programs

Construction permits: WDNR Storm water discharge permits are required to manage construction erosion and sediment flow and to control post-construction storm water runoff.

- Identify strategies to improve compliance with construction discharge permits including NR 151 performance standards. Examples include increasing WDNR staff inspection frequency, developing a certification program for inspections at WDNR administered sites, and improving coordination with other state agencies regarding management practices on state construction sites

Industrial permits: Certain industrial facilities must obtain storm water discharge permits and develop a site-specific Storm Water Pollution Prevention Plan (SWPPP).

- Consider expanding the permit and SPPP requirements to other categories of industrial operations
- Identify a methodology to better identify industrial facilities requiring permits, and increase frequency of site inspections

Great Lakes Regional Collaboration (GLRC) Recommendations: $106 million in funding should be provided to support the development and implementation of comprehensive nutrient and manure management on livestock farms.

Wisconsin Strategy: Through federal-state-local technical assistance, continue to promote proper manure management to minimize the amount of nutrients in runoff waters from livestock farms.

- Develop and implement comprehensive phosphorus-based nutrient management plans on all Great Lakes drainage basin farms that are over a certain size (in acres) if not already required under state law
- Explore the technical and economic viability and market infrastructure for developing manure product markets (compost, pelletized fuel) or using manure as an energy source (manure digesters)

Action Plan Recommendations:

1. Priority areas for habitat and nutrient mapping:

- In the Lake Superior Basin area:
  - Evaluate nutrient and sediment delivery of Lake Superior tributary streams and nutrient status of nearshore areas such as Chequamegon Bay and the St. Louis River Estuary
  - Prioritize sub watersheds with excessive runoff, using GIS open land and young forest data layers
  - Implement projects and programs to reduce water runoff rates from basin landscapes to address hydrologic degradation and rehabilitate priority tributaries. Target EQIP, CREP and county agriculture cost-share programs in watersheds where agricultural land use practices contribute to watershed degradation for important aquatic habitat
  - Update the Lake Superior Best Management Practice Guidance (2003)
  - Promote public outreach and the capacity for local governments to address nonpoint source issues and work with the Lake Superior Partner Team
  - Support development and implementation of ecologically sustainable forest management plans as coordinated public and private forestry sectors initiatives

- In the Lake Michigan Basin area:
  - Evaluate nutrient and sediment delivery of Lake Michigan tributary streams and nutrient status of nearshore areas
  - Promote buffers along all waterways
  - Promote public outreach and the capacity for local governments to address nonpoint source issues
  - Support implementation of the nutrient and solids TMDL for the Fox River and Lower Green Bay

PERSISTENT BIOACCUMULATIVE TOXINS (PBT)

Council of Great Lakes Governors' Priority: Continue to reduce the introduction of PBTs into the Great Lakes ecosystem.

PROBLEM STATEMENT

Persistent Bioaccumulative Toxins (PBT) are chemicals that last a long time in the environment. Animals and people accumulate some types of PBTs in their bodies, primarily from the food they eat, but also from inadvertent ingestion and inhalation of soil and dust. PBTs are toxic substances that can cause a wide range of health effects in fish, wildlife, and humans.

Green Bay, WI: Photo by Michigan Sea Grant

Mercury and polychlorinated biphenyl (PCBs) are the contaminants of greatest concern in Wisconsin's fish. Currently, there are fish advisories for Lakes Michigan and Superior and their tributaries, in addition to a statewide fish consumption advisory that applies to inland (non-Great Lakes) waters. Exceptions to the statewide fish advisory are provided where contaminants have been found at higher concentrations, requiring more stringent advice. People who eat fish should consult Wisconsin's consumption advice to avoid potential health issues. Advice is provided on how many meals you can safely eat of fish from different waters of the state [http://dnr.wi.gov/fish/consumption/].

Fish consumption advice for Lakes Michigan, Superior, and their tributaries are due to PCBs, mercury, and for some species dioxin and furans. PCBs are a man-made group of chemicals that were used by a wide variety of industries. Manufacturing in the U.S. was banned in 1977 but PCBs remain at high concentrations in the sediments of many rivers and the Great Lakes. PCBs are transported in the atmosphere globally and low levels can be found in locations remote from industries. PCBs are resistant to degradation, are lipophillic or fat-loving, and accumulate in aquatic organisms and to higher levels in long-lived, fatty fish and fish-eating wildlife. Efforts to clean up rivers with PCB-contaminated sediment are on-going.

Mercury is an element of the earth but is released to the atmosphere by natural and human caused events. Mercury is released by coal-burning power plants, incinerators, and some other industries. After release, mercury is also transported with weather systems and deposited locally and distant to the many sources. Methylated mercury accumulates in aquatic organisms and builds up in the aquatic food chain. It reaches high concentrations in long-lived predator fish and fish-eating wildlife species, particularly in areas where methylation rates are high. Controlling emissions of mercury to the atmosphere is ongoing. The contribution of mercury from in-state sources versus more distant sources is difficult to quantify but emission reductions are expected to reduce mercury concentrations in fish.

Dioxin and furans and formerly used pesticides have generally declined in fish since mandated changes in manufacturing processes or bans were put in effect. Other chemicals (often referred to as "emerging chemicals") have recently been found in the Great Lakes. Continued monitoring and assessment of health risks are needed to ensure appropriate actions or controls are put into place to prevent these chemicals from becoming a problem to humans, wildlife, or fish. Examples of these potentially emerging problematic chemicals include polybrominated diphenyl ethers (PBDEs) and perflourinated chemicals (PFCs), perfluoroalkyl acids (PFAAs) and other chemicals used in pharmaceuticals and personal care items.

Contaminated sediments contain many PBTs that have accumulated in our waterways as a result of soil erosion, non-point source runoff, and direct discharges. Direct discharges are covered under the WPDES permit process but other sources and the lingering effects of sediments contaminated through former discharges provide a continual source of PBTs. Public awareness and educational efforts through work at Areas of Concern (AOC) and Remedial Action Plans (RAP) are addressing contaminated sediments and their cleanup. Other programs, especially the WDNR Remediation and Redevelopment Program, work on clean-up and rehabilitation of contaminated sites such as manufactured coal gas sites, brownfields, and hazardous waste spills in an effort to remove and keep PBTs out of the environment.

Municipal wastewater treatment plants are not meeting water-quality-based effluent limits for mercury and therefore local communities will need to implement mercury pollutant minimization programs that reduce mercury discharges to sanitary sewers. WDNR's wastewater management program now includes mercury effluent limits and requires mercury pollutant minimization plans as part of the WPDES permit process. All the largest municipalities in Wisconsin are well along in implementing local mercury reduction programs. While the driver for this mercury reduction is a wastewater requirement, the sectors of the community that need to reduce their use of mercury-containing products (and increase recycling for those products that continue to be used) include hospitals, dental offices, schools, and HVAC contractors that will produce a hazardous (but universal) waste for recycling as they comply with the water-driven reductions.

Wisconsin is substantially behind other Great Lakes states in the adoption of legislation promoting the reduction and recycling of specific mercury-containing products, e.g., product labeling, product manufacturer stewardship, mandatory product recycling, product sales or use bans, etc. WDNR is a participant in the Great Lakes Mercury in Products Phase-Down Strategy workgroup, a project of the Great Lakes Regional Collaboration and comprised of other Great Lakes states and tribes. The Workgroup submitted recommendations for the highest priority mercury product actions in 2008, although some of the subgroups are still finalizing their reports. One outcome of this initiative is WDNR's support of recently introduced mercury product legislation.

New Chemicals of Concern

With the ever-increasing production of chemicals, more chemicals are likely to be added to the list of PBTs. Currently scientists are looking at potential effects of flame retardants and the massive amounts of pharmaceuticals and personal care compounds that pass through our wastewater treatment systems. As more information becomes available on these compounds, measures may need to be taken to limit exposure to them in the environment.

U.S. EPA needs to be more active in developing and approving better, more sensitive methods for measuring levels of pollutants. Even with some of the long-standing pollutants like PCBs we are unable to measure levels in the water column and discharges down to the necessary level to say where we should take action. The relatively recent improvement in mercury testing methods has allowed us to begin to better direct our activities. The information we get from monitoring levels will allow us to better direct our efforts in the area of pollution minimization for other PBTs. As the new chemicals come under scrutiny, it will be useful to have methods in development.

GOALS

Reduce fish consumption advisories by addressing PBTs in the system. This includes reducing the amounts of PBTs in the Great Lakes ecosystem using pollution prevention, hazardous waste collection, waste minimization techniques, recycling, remediation and educational programs. Priority pollutants are those which pose the greatest threats to human health through consumption: mercury, PCB's, and pesticides.

Recommended Actions – Persistent Bioaccumulative Toxins

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: Protect human health through consistent and easily accessible basin-wide messages on fish consumption and toxic reduction methods and choices.

Wisconsin Strategy: Protect public health through monitoring and public information programs.

- Continue to monitor fish tissue and issue consumption advisories for fish and wildlife
- Continue and enhance monitoring of industrial air toxins and public information programs
- Improve the effectiveness of advisory notices using social marketing and message mapping techniques and considering the most effective medium for reaching target and vulnerable audiences

Wisconsin Strategy: Protect public health through remediation of contaminated sediment sites.

- Support implementation of sediment remediation actions, including those designated as Areas of Concern (AOCs)
  - Lake Michigan priority areas include the Fox, Manitowoc, Sheboygan and Milwaukee rivers and Cedar Creek
  - Lake Superior priority areas include sites associated with St. Louis River AOC and Ashland Waterfront site
  - Develop strategies and policies to deal with emerging Persistent Bioaccumulative Toxins such as endocrine disruptors, personal care products, pharmaceuticals, etc.

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: Reduce and virtually eliminate the principal sources of mercury, PCBs, dioxins and furans, pesticides and other toxic substances that threaten the health of the Great Lakes basin ecosystem, through coordinated intergovernmental strategies.

Wisconsin Strategy: Promote a Community Mercury Reduction program. Because multiple sectors of the community need to reduce their use of mercury-containing products and increase recycling for those products (hospitals, dental offices, etc), this should be a multi-media initiative that lends itself to creative government/municipal partnerships for successful mercury reduction. This activity has occurred in pilot municipal mercury reduction programs over the last ten years and will occur via WPDES discharge permits over the next ten years.

Wisconsin Strategy: Promote mercury product reduction.

- Support mercury product legislation
- Support establishment of a Mercury Product Reduction program using the success in the Lake Superior Basin as a model. This work is both timely and greatly enhances the community mercury reduction initiative noted above. Target products based on recommendations developed by the Great Lakes Mercury Product Strategy workgroup
- Support efforts that make hazardous waste collections more affordable in rural areas

Wisconsin Strategy: Work towards elimination of toxic discharges into Lake Superior and Lake Michigan Basins through continued participation in stakeholder groups such as the Lake Superior BiNational Program.

- Continue implementation of the Lake Michigan LaMP strategies
- Continue implementation of the Lake Superior LaMP in support of the Zero Discharge demonstration project
- Work with EPA, the Binational Toxics Strategy[22], the Great Lakes Binational Program Executive Committee and the Lake Superior Binational Program to further develop a strategy to reduce nonpoint pollution, with a focus on pesticides. Consider:
  - Installation of buffer zones
  - Outreach on alternatives to pesticides
  - Partnering with efforts of other watershed and nonprofit groups

Wisconsin Strategy: Support public/private program and public policy initiatives to address emerging PBTs (flame retardants, endocrine disruptors, personal care products, pharmaceuticals, etc.).

- Consider approaches applying principles of product stewardship, product labeling and mandatory sale and disposal bans
- Support programs and regulatory policies to reduce or eliminate preventable sources of dioxin and other PBT releases to the atmosphere, with a focus on burn barrels and illegal open burning

[22] http://www.epa.gov/bns/

SUSTAINABLE DEVELOPMENT

Council of Great Lakes Governors' Priority: "Adopt sustainable use practices that protect environmental resources and enhance the recreational and commercial value of our Great Lakes."

PROBLEM STATEMENT

WDNR Photo

Sustainable development is the practice that balances economic, societal, and ecological factors to "meet the needs of the present without compromising the ability of future generations to meet their own needs." (UN Brundtland Commission, 1987). Every corner of the Wisconsin Great Lakes basin has been impacted by development in some way or another; the challenge is to manage development and change to achieve a balance between economic, societal and ecological needs of these communities. Key trends identified by the GLRC that challenge this balance include:

- Loss of natural and agricultural lands at rates exceeding population growth
- Fragmentation of natural land and water wildlife corridors
- Increased demands on ecosystems for recreation
- Aging transportation and water/wastewater infrastructure coupled with increased demand for these services
- Disconnected programs for planning and management of ecosystems
- Outdated perceptions of the "rust belt" which fail to recognize its potential for sustainable ecosystem services

Wisconsin's Great Lakes communities range from densely populated and highly industrialized especially along the coast southward from Green Bay to the Illinois border, to the more sparsely populated rural and agricultural areas inland and in the Lake Superior Basin. The State's population grew between 1990 and 2000 by 9.5% and is projected to grow another 7.2% in the current decade.[23] Growing populations and expanding communities place additional stress on the remaining undeveloped areas. The State's Stewardship Fund provides funding to acquire land for trails, natural areas, state and county forests, wildlife habitat, urban green space, state and local parks, river and stream corridors, flowages, and wild lakes. This ensures access to open space for current and future generations.

Land Use and Development

Wisconsin has approximately 35 million acres of land; 2.8% is developed, 37% is agricultural lands, 1.7% is grasslands, 38.2% is forested, 11.8% is wetlands and 1.1% is barrens or

[23] Wisconsin Population 2030: A report on Projected State, County and Municipal Populations and Households for the Period 2000-2030, March 2004

shrubland[24]. Similar to other parts of the Great Lakes region, much of Wisconsin's Great Lakes Basin area is experiencing the impacts of urban sprawl – low-density disjointed development on previously undeveloped land. For example, between 1982 and 1997 the population of the Milwaukee Metropolitan area grew by 6.5 percent while its urbanized areas grew by 24.9 percent and vehicle miles traveled increased by 23 percent.

Impacts of sprawl include greater areas of impervious surfaces which increases storm water runoff causing flooding and transport of pollutants to waterways, including phosphorus from fertilizer used on lawns and golf courses. In addition, the increase in impervious areas also reduces infiltration that recharges groundwater thereby reducing stream flow and recharge of natural springs. Development of open space also results in a loss of habitat.

A significant amount of Wisconsin's coastline consists of relatively high bluffs some of which are considered unstable and prone to slumping. Coastal erosion poses a significant risk to human health and property when structures are built on these bluffs. Yet the lure of living on the Great Lakes with panoramic views entices many to build in high hazard areas.[25] Wisconsin's Coastal Management Program has sponsored several studies and community work shops to provide information to residents and local officials on the risks of building in high hazard areas along the coasts.

In 1999, Wisconsin passed comprehensive planning legislation that focuses on public participation in creating comprehensive plans for local units of government. The legislation required that all local governments adopt their plans in entirety and comply with those plans for land use decisions after 2010. Wisconsin also has several brownfield financial and liability incentive programs to clean up and redevelop abandoned or under utilized contaminated properties. Since 1998, the programs have assisted 150 brownfield redevelopment projects with significant economic impact in their communities, converting abandoned or under-used environmentally contaminated properties into safe productive sites. In addition, it is estimated that financial support of these projects resulted in the creation of 5,860 new full-time jobs, an increase in taxable property value of $210 million and the environmental cleanup and reuse of 1,350 acres.

Agriculture and Forestry

A survey of Wisconsin forests[26], conducted in 1996, found that Wisconsin forests acres increased by 4% since the last survey in 1983, but remained relatively stable at 38% between 1992 and 2001[27]. This study found that available timber is increasing at a faster rate than is being harvested. Between 1996 and 2007 forestland in Wisconsin increased by 2.8% from 15,964,800 acres to 16,408,000 acres. Growth continues to exceed removals by a wide margin. Annual removals were 59% of net annual growth in 2007. Removals were 349 million cubic feet while net growth was 592 million cubic feet.

Wisconsin is currently losing prime farmland to development. Particularly in the Lake Michigan basin, with the growing Fox River Corridor and the Milwaukee metropolitan area, farmland is

[24] USGS National Land Cover Data (http://lcat.usgs.gov/) with data for 1992 and 2001.
[25] [25] Managing Land Use in Wisconsin's Coastal Erosion Hazard Areas, Lulloff, Keillor, Draft January 2008
[26] Wisconsin Forests at the Millennium, 2000. WDNR. http://dnr.wi.gov/forestry/assessment/FRresources.htm.
[27] USGS National Land Cover Database (http://lcat.usgs.gov/).

under extreme pressure to be developed. For example, between 1992 and 2001, the percentage of Wisconsin agricultural land decreased by 17%, while the percentage of developed land increased by about 8%[28]. Property tax reductions through use value assessments have helped alleviate some of this pressure, however, the high property values still exert pressure to develop.

Animal waste management continues to be a critical issue in the Lake Michigan basin with an increasing number of cows and manure spills. Conservation tillage, stream buffers, wetland restoration, integrated pest management, fertilizer best management practices and reduced phosphorus content in fertilizer and enrollment in conservation programs directed toward agricultural lands are all efforts to reduce soil erosion, improve water quality, reduce pesticide load to the environment and improve habitat. A new federal program, the USDA/NRCS Conservation Security Program[29] (CSP), started in 2004 provides payments to farmers who practice good stewardship. However, enrollment is still well below CSP targets. Strategies to address runoff management from nonpoint sources, such as agricultural operations, are included under the section "Nonpoint Source Management".

Transportation

Wisconsin relies heavily on roadways to meet transportation needs, yet this has caused air pollution problems in counties on Lake Michigan. A number of state grant programs to enhance public transportation, bicycle/pedestrian options, ridesharing programs and congestion are available for these counties. A requirement for gas reformulation has reduced the frequency of high ozone levels. A high speed rail line has been proposed by Amtrak to connect Chicago, Milwaukee, Madison, and Minneapolis, although action on this is not expected within the next few years. An aging transportation infrastructure impedes intermodal systems. Providing commuter rail such as the one between Milwaukee-Racine-Kenosha (MRC) corridor is perceived by some as a logical solution to congested roadways in the most heavily populated area of the state. Shipping is another major economic factor for Wisconsin with 15 commercial ports that handle over 40 million tons of cargo annually. The global economic downturn starting in 2008 has had a serious adverse impact on Great Lakes commercial shipping, with tonnages of cargo transported at record lows.

Tourism and Recreation

Tourism and recreation make a significant contribution to the economy, generating about $55 billion in tourism and recreation for the eight state regions annually. Fishing and boating are among the biggest draws; one-third of all the boats registered in the U.S. are registered in the Great Lakes States. Boaters alone spend an estimated $22 billion annually. Nationally Americans spend 122.3 billion on wildlife-related recreation. Expenditures include equipment purchases, travel related expenses, license fees, and membership dues to name a few.[30]

[28] USGS National Land Cover Database (http://lcat.usgs.gov/).

[29] The Conservation Security Program (CSP), administered by the NRCS, is a voluntary program that provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. (http://www.nrcs.usda.gov/programs/csp/)

[30] U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S.

Tourism and recreation are equally important in the Wisconsin Great Lakes basin areas. Wisconsin's eighteen designated harbor towns attract visitors from within the state and around the world, and have earned a reputation as tourist destination points in Wisconsin through the cooperative efforts of the local Chambers of Commerce, the Wisconsin Harbor Towns Association and the WI Department of Tourism (Tourism). Wisconsin's harbor towns range from industrialized urban cities to quaint fishing villages featuring a range of outdoor recreation, museums, shopping, arts, dining and relaxing scenery.

CLIMATE CHANGE

According to the Union of Concerned Scientists, certain recreational industries will most likely feel the impacts of climate change.[31] Communities and businesses dependent on winter sporting activities for example may need to adjust their services to accommodate for longer warm weather months in order to make up for lost revenues from winter sports. Low lake levels are already impacting recreational boating in communities along Lake Michigan especially in areas that have dredging restrictions due to contaminated sediments. Adaptive management strategies related to managing coastal erosion hazard areas need to account for these changing climate conditions[32].

GOALS

A vibrant sustainable economy and a healthy ecosystem that co-exists and synergistically supports each other and that can adapt to a changing climate.

Ashland Harbor: Kathryn H. Lederhause

Census Bureau. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation ,

[31] Union of Concerned Scientists, [http://www.ucsusa.org/greatlakes/glregionwis.html]

[32] Managing Land Use in Wisconsin's Coastal Erosion Hazard Areas, Lulloff, Keillor, Draft January 2008

Recommended Actions – Sustainable Development

Great Lakes Regional Collaboration (GLRC) Recommendations: Align governance to enhance sustainable planning and management of resources.

Wisconsin Strategy:

- Support funding for redevelopment and revitalization of Great Lakes waterfront areas, with a focus on brownfields redevelopment
- Support long-term sustainable planning for and implementation of shoreline protection, conservation, economic development, and outreach/education
- Assist communities in sustainable development as part of their Comprehensive Planning
- Inform communities of funding and grant resources such as the Coastal Zone Management Program, WDNR grants program, USDA Rural Planning program and the state Focus on Energy program

Great Lakes Regional Collaboration (GLRC) Recommendations: Build outreach that brands the Great Lakes as an exceptional, healthy, and competitive place to live, work, invest, and play.

Wisconsin Strategy: Work with state, federal and local agencies and institutions to promote sustainable businesses using a sector approach. Examples include:

- Wisconsin Department of Tourism's Travel Green Wisconsin program to promote certification of green tourism businesses and explore expanding this approach to other business sectors
- Wisconsin Department of Commerce to assist communities in making changes in local recreational activities that may be impacted by climate change
- University of Wisconsin's Sea Grant Clean Marina project to educate marine facilities and boaters regarding environmentally friendly practices and promote "Clean Marinas" as tourism destination points by demonstrating a commitment implementing environmental best management practices
- Wisconsin Harbor Towns Association to promote harbor towns as tourism destination points by capitalizing on their unique characters

Action Item Recommendations

Potential funding sources for redevelopment include:

- Federal Great Lakes Cleanup program and other federal brownfield grant and loan programs or tax incentives
- State of Wisconsin grant and loan programs, including WDNR's Brownfield Site Assessment Grants, Green Space and Public Facilities Grants, and Department of Commerce's Brownfield Grants
- Community Development Block Grants
- Coastal Management/Restoration Grants

Specific recommendations for sustainable planning initiatives:

- Develop a vision and strategy on climate change for each of the Lake basin ecosystems or subsystems
- Ensure shoreline protection through development and implementation of shoreline protection rules
- Revitalize and create beachfront facilities such as bike and walking trails
- Work with partners to protect sensitive shorelines and minimize damage due to shoreline development
- Support training and communication sharing for local governments and agencies on sustainability, conservation practices, development principles and the economic value of Great Lakes' environmental assets
- Support efforts to promote economic development, especially in economically depressed areas
- Support shoreline protection and restoration efforts of local conservation and zoning offices and watershed groups through funding and matching for cost-sharing
- Support increased funding for cost-share incentive programs for landowner shoreline and wetlands restoration projects

INDICATORS AND INFORMATION

Council of Great Lakes Governors' Priority: "Standardize and enhance the methods by which information is collected, recorded and shared within the region."

PROBLEM STATEMENT

WDNR Photo

There are numerous organizations, governmental agencies, and researchers studying the Great Lakes and its tributaries and surrounding landscape. The Wisconsin Land Information Program (WLIP), which started in 1990 to advance land information programs across the State, has been instrumental in building GIS and information technology capacity at the county and local level. While Wisconsin stands out among other states in utilizing geo-spatial data, restrictive data sharing policies hamper efficient and timely access to information. The National Spatial Data Infrastructure concept and associated federal agency initiatives, such as the National Map and Geospatial One Stop Portal and the U.S. Geologic Service (USGS) National Land Cover Database provide frameworks for data access and integration. The geospatial industry and public agencies have joined efforts to advance a variety of tools and standards such as Open Geospatial Consortium standards to facilitate data discovery and data integration. However, these have yet to be fully utilized within the State.

Long-term trends analyses, one important tool for determining the health of the Great Lakes, depend on consistent and compatible data being collected over the entire geographic extent of the Great Lakes basins. Yet specific study objectives and funding criteria can prevent agreement on specific sampling protocols or compliance with content standards. This lack of agreement is compounded by inadequate funding which continues to strain existing monitoring programs.

Although technology trends are moving towards a more open environment, Wisconsin still lacks an efficient or comprehensive system for discovering and accessing data on the Great Lakes. Due to the shear amount of data that is generated, it is doubtful that any one entity could serve as the clearinghouse for all data. A more realistic approach is using data discovery tools to search for the most relevant data on any particular project. One such approach is used by the Great Lakes GIS, which provides an inventory of aquatic habitat data for each of the Great Lakes. The site is sponsored by the Great Lakes Fisheries Commission and, as part of the Joint Strategic Plan for Management of Great Lakes Fisheries, satisfies their agreement to share data, particularly through compatible, automated information systems.

Standards should be promoted and adhered to across the spectrum of data management activities to ensure compatibility across jurisdictional boundaries. U.S. EPA's Environmental Sampling Analysis and Results (ESAR) Standards were developed by the Environmental Data Standards Council (EDSC), a partnership among U.S. EPA, states, and tribes to promote the

efficient sharing of environmental information through the cooperative development of data standards. These standards, when final, are intended to serve as a foundation for information exchange across environmental media and currently serve as the basis for U.S. EPA Office of Water's pilot project to exchange water quality monitoring data via the Exchange Network. Several database projects within the WDNR's Division of Water are implementing these protocols when reporting data to U.S. EPA.

INDICATORS

Indicators provide information on the state of the Great Lakes ecological health and provide a measurement of the impacts of human activities on the resources. The State of the Lakes Ecosystem Conference (SOLEC) began addressing environmental indicators in 1994 with emphasis on aquatic community health, human health, aquatic habitat, toxic contaminants and nutrients in the waters, and the changing Great Lakes economy. Since 1998, reports for over 50 indicators have been prepared and presented at the biennial SOLEC meetings. The WDNR currently maintains several statewide database management systems (DBMS). These include U.S. EPA's STORET system, Fish & Habitat DBMS, Toxic Fish and Contaminated Sediment DBMS, and the Waterbody Assessment Display and Reporting System DBMS. WDNR is also developing the Surface Water Monitoring System DBMS, which will store monitoring data collected by WDNR staff on the surface waters of the state including information on the presence/absence of aquatic invasive species. Other WDNR programs collect much needed information, such as mercury deposition data monitored by the Air Program.

USGS has considerable water quantity, water quality, and biology information available in their electronic databases. Additionally, they maintain one of WDNR's biology databases. Linking these databases together, however, is still a challenge.

The Great Lakes Commission convened the Great Lakes Coastal Wetlands Consortium to expand the monitoring and reporting capabilities on Great Lakes coastal wetlands of the U.S. and Canada under the Great Lakes Water Quality Agreement. The Great Lakes Commission is also leading development of an integrated Great Lakes Observing System (GLOS) to provide critical real-time data for multiple users, including, among others, resource managers, researchers, homeland security interests, the commercial shipping industry and the recreational boating community. GLOS will be a regional node of NOAA's multi-year, national Integrated Ocean Observing System (IOOS) initiative.

Acceptance of indicators across the Great Lakes basins has been slow despite these efforts. Researchers with the Great Lakes Environmental Indicators Project have developed an integrated set of environmental indicators that can be used to assess the condition of the coastal margins of all five Great Lakes. Their work could help bridge the gap between the process of developing indicators and applying them through the activities in the monitoring community.

The lack of baseline information to better define the tributary and Great Lakes indicators data set as well as the nearshore areas has hampered assessment of these ecosystem components. We also need protocols or a mechanism for better integrated land (watershed-based) data with open water observations. Indicators play a key role in tracking progress toward achieving Remedial Action Plan (RAP) goals and highlight problems that require further management.

Current monitoring is performed at a variety of levels all the way from federal to local and volunteer organizations but there is insufficient effort to coordinate these activities much less ensure compatibility. Shrinking budgets and the need for rapid response during disasters will require a more comprehensive and coordinated approach to monitoring and data collection/data distribution across the basin. Development of a standardized baseline of information would help promote integration across jurisdictions.

GOALS

Easy access to comprehensive, up-to-date and standardized data for policy makers and resource managers in order to assess the condition of the Great Lakes ecosystems
Other goals include:

- Open access and sharing of data by all custodians across the state.
- Sufficient biological information on sturgeon/dynamics to effectively manage these species on a statewide or watershed basis. All aspects of target populations must be adequately assessed if this species is to be effectively managed in the future.
- Development of a full range of indicators that are broadly understood across the basin.
- Standardization of data collection methodologies across jurisdictional boundaries such as counties and states.
- Development of data standards that are adopted by all entities responsible for collecting data.
- Coordination of monitoring activities across the basin that are also sufficient to address the needs of the scientific and regulatory community.

Recommended Actions – Information and Indicators

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: In order to provide accurate, complete and consistent information, the Great Lakes region must increase and better coordinate the collection of critical data regarding the Great Lakes ecosystem. The Great Lakes Interagency Task Force and other stakeholders need to implement the U.S. contribution to the Integrated Earth Observation System and the Integrated Ocean Observing System as part of the Global Earth Observing System of System. Monitoring must be better coordinated through the existing Great Lakes management entities, both at a lake-wide and region-wide basis.

Wisconsin Strategy: Assist in convening annual meetings to present monitoring results in a public forum using existing Great Lakes' partnership groups.

- Develop and implement a monitoring strategy for coastal wetland habitats that can be used to establish baseline conditions to evaluate and assess impacts
- Provide funding for continued work on incorporation of the Digital Wisconsin Wetland Inventory (DWWI) data into the National Wetlands Inventory (NWI) database
- Support continued development of GIS tools to assess watershed health, identify stressors, and monitor progress of restoration and protection activities

<u>Great Lakes Regional Collaboration (GLRC) Recommendations</u>: Promote the continued development and implementation of science-based indicators, including implementation of indicators developed through the SOLEC process.

Wisconsin strategy: Work with stakeholders, other state and federal agencies and the WDNR to evaluate monitoring protocols established through the WDNR Water Division's Monitoring Strategy to determine if the SOLEC indicators are addressed sufficiently.

<u>Great Lakes Regional Collaboration (GLRC) GLRC Recommendations</u>: The Great Lakes Interagency Task Force and all regional partners should augment the regional information management infrastructure (i.e. establish a network of networks), adopt standardized data management protocols and commit to open data availability.

Wisconsin Strategy: Support and implement actions to augment the state's information management infrastructure.

- Support activities of the State Cartographer Office addressing clearinghouse and metadata needs
- Inventory WDNR GIS data and make this available to the public through a clearing house
- Support and implement interoperability standards starting at the state agency level and continuing through to the local government and institutional levels
- Support and seek grant funding for the Lake Superior Decision Support System