A Toolkit for Managing High Quality Waters in SE Wisconsin

Southeastern Wisconsin Regional Planning Commission

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Contents

Watershed Development

Watershed development is often seen as an issue for those concerned with lake health. Increased development can lead to increases in polluted stormwater runoff and erosion; reduced groundwater contributions; and loss or degradation of wetlands, prairies, and forests. One common strategy for protecting against increased development is partnering with land trust organizations. Land trusts are non-profit organizations that are established to protect land and water resources for the public benefit. Land trusts can assist communities and partner organizations with purchasing land, developing conservation easements and protecting farmland.

In Wisconsin there are over 40 land trusts. 10 of which work in SE WI:

- Cedar Lakes Conservation Foundation
- Restoring Lands Initiative
- Milwaukee Area Land Conservancy
- Tall Pines Conservancy
- Waukesha County Land Conservancy
- Kettle Moraine Land Trust
- Geneva Lake Conservancy
- Seno K/RLT Conservancy
- The Nature Conservancy
- The Ice Age Trail Alliance

gathering waters
wisconsin's alliance for land trusts

For more information see:
https://gatheringwaters.org/

Shoreline Development

The WDNR has developed protocol for surveying, mapping and assessing habitat in lakeshore areas. This survey can be conducted by county staff, consultants, WDNR staff and other professionals (Hein et al 2020). This survey is also WDNR Surface water grant fund eligible.

Survey:

- data for nearly 30 parameters is collected on each tax parcel within 35 feet of the shoreline (amount of impervious surfaces and manicured lawn, number of buildings, any erosion or erosion control structures, number of piers or boat houses, if aquatic plants are present in the near shore area, and more).
- Recommended to be completed every 5-10 years to document changes
- Data that is collected during the survey can be used to identify areas of improvement and key sites to protect
- The data collected should be submitted to the WDNR to be displayed on the Lakes and AIS Viewer (https://dnrmaps.wi.gov/H5/?viewer=Lakes_AIS_Viewer).
- The protocol and data sheets for this survey can be found here: https://dnr.wisconsin.gov/topic/SurfaceWater/Monitoring.html, under “Lakes” and under “Lakeshore Habitat”.

County Resources for Shorelines

Ozaukee County

Shoreline and Floodplain Resources: https://www.ozaukeecounty.gov/2459/Shoreland-Floodplain-Resources

Shoreline Zoning Online Mapping Tool: https://experience.arcgis.com/experience/6ec9c51dc2954c6a95ed6743a58275d4/

Milwaukee County

City of Milwaukee handles the zoning ordinances on a local level. However, the county does have an Environmental Services department that assists land owners with shoreline projects and funding of said projects.

For more information see: https://county.milwaukee.gov/EN/Administrative-Services/Environmental-Services

Kenosha County

Shoreline Permitting and Resources: https://www.kenoshacountywi.gov/2190/Shoreland-Permitting

Racine County

Land Conservation Ordinances: https://www.racinecounty.com/departments/public-works-and-development-services/land-conservation/ordinances

Waukesha County

Shoreland and Floodland Ordinances: https://www.waukeshacounty.gov/parks-and-land-use/planning-and-zoning/zoning-and-land-use-information/waukesha-county-shoreland-and-floodland-subdivision-control-ordinance/

Shoreland Buffer Vegetation Plan User Guide: https://www.waukeshacounty.gov/media/ravj4l43/shoreland-buffer-vegetation-plan-user-guide.pdf

Walworth County

Land Use and Resource Management: https://www.co.walworth.wi.us/365/Land-Use-Resource-Management

Lake Homeowner Guide: https://www.co.walworth.wi.us/393/Homeowner-Guide

Washington County

Shoreline and Wetland Zoning: https://www.washcowisco.gov/departments/natural_resources/land_resources/permits___applications/shoreland___wetland

Water Quality

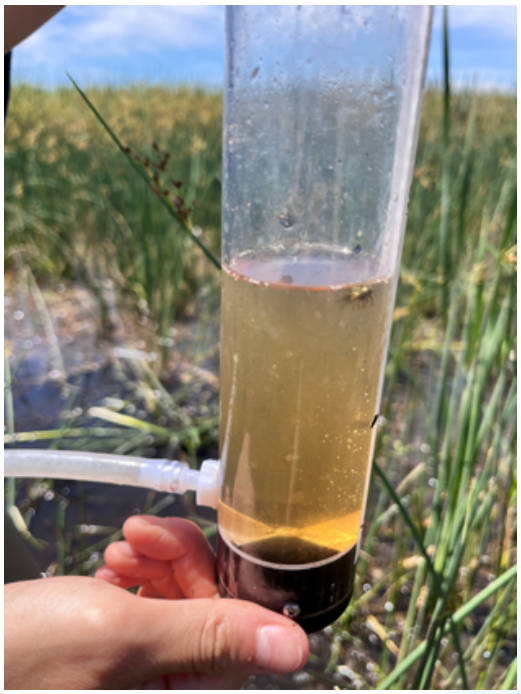
Water Quality encompasses many aspects of lake health.

- Most essential elements are whether lakes can:
  - Support fish and other aquatic organisms
  - Are safe for swimming and other recreation
  - Allow for human consumption of fish
- View available water quality from WDNR's SWIMS database for each lake using the Water Explorer:
  - https://dnr-wisconsin.shinyapps.io/WaterExplorer/
- Find information on beach advisories and closures for E. coli:
  - https://apps.dnr.wi.gov/beachhealth/

Recommended Baseline Parameters and Schedule

Parameters

- Weekly (at beaches)
  - E. coli – indicator of fecal contamination
- Monthly at “deep hole” during growing season (April – October)
  - Temperature, dissolved oxygen, and specific conductance
    - Information on lake mixing, suitability for fish species, and salt pollution
  - Secchi, total phosphorus, and chlorophyll-a
    - Information on lake trophic status (nutrient availability)
- Every 5 years
  - Chloride, hardness, and total nitrogen



Monitoring Programs

Citizen Lake Monitoring Network

- https://dnr.wisconsin.gov/topic/lakes/clmn

Water Action Volunteers

- https://wateractionvolunteers.org/

Self-conducted programs - submit data to SWIMS (WDNR database)

Contract with USGS, private consultant or another entity

Make sure that if the monitoring is funded by WDNR, that the data is shared with WDNR through their database SWIMS. That way partner organizations and future stakeholders can views and utilize the data.

Practices to Improve Water Quality

Reduce pollutant loading

- Minimize use of fertilizer, pesticides, and deicing salts near lake
- Encourage diversion and infiltration of runoff
- Implement best management practices for urban and agricultural areas

Consider in-lake intervention if conditions become severe

- Alum treatment, aeration, lake drawdown

Education materials

- Guide to interpreting lake chemistry measurements:
  - https://www3.uwsp.edu/cnr-ap/watershed/Documents/Interpreting%20Your%20Wisconsin%20Lake%20Chemistry.pdf
- Harmful Algal Bloom toolkit:
  - https://www.dhs.wisconsin.gov/publications/p0/p00853.pdf

Protection of natural areas, critical species habitat, and environmental corridors is a key strategy to protect water quality and wildlife in lakes. Use the webtool to find such areas in your lakes watershed.

View natural areas using SEWRPC's Natural Areas Explorer Webtool:

https://experience.arcgis.com/experience/f6c9f898efc0474eae09191beb0f7ebf/

Pollutant Loading

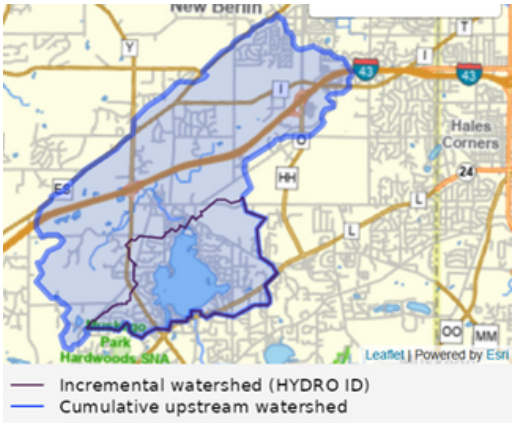
Pollutant Loads and Sources

- Excessive nutrients (phosphorus and nitrogen), sediment, and chloride are common reasons for poor water quality in southeastern Wisconsin
- Use Water Explorer tool to visualize phosphorus loads to lake and determine major sources by land use sector:
  - https://dnr-wisconsin.shinyapps.io/WaterExplorer/
- Work with natural resource professionals for more intensive study of other pollutant sources and loads (sediment, nitrogen, chloride) to lake.

Source: WDNR and UW Extension

Where to Focus Efforts

- Watershed:lake ratio
  - Use WEx tool to determine by dividing watershed area by lake area.
  - If less than 10:1, focus efforts on nearshore properties.
  - If greater than 10:1, focus efforts on watershed programs.
- Watershed land use
  - Mostly natural with developed shorelines: focus on shoreline practices
  - Mostly developed and urban: focus on urban urban
  - Mostly developed and agricultural: focus on agricultural practices



Practices to Reduce Pollutant Loads

Shoreline

- Shoreline gardens and buffers – integrate with riprap
- Improve infiltration on riparian properties (e.g., rain gardens)
- Reduce fertilizer, pesticide, and deicing salt use
- Protect undeveloped lands

Urban

- Stormwater management – infiltrate and divert from lake
- Incentivize infiltration on residential properties
- Operate leaf pickup program
- Reduce salt usage in deicing operations
- Institute program to optimize water softeners
- Ensure compliance with septic maintenance requirements

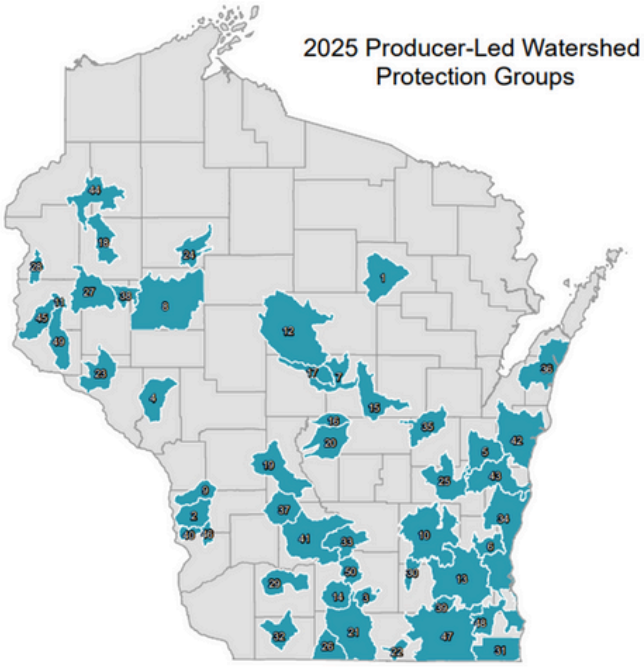
Agricultural

- Nutrient management planning
- Encourage greater use of cover crops and reduce tillage practices
- Retire less productive land
  - Convert to prairie, wetland, or woodland
- Install buffer strips, grassed waterways, and sediment control basins

Agriculture

Since 2016, there have been 50 active producer-led groups funded by the State of Wisconsin's Department of Agriculture, Trade and Consumer Products (DATCP). Of those 50, eight cover portions of SE WI:

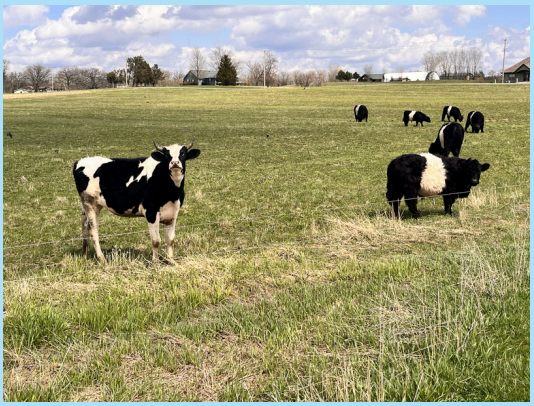
- Watershed Protection Committee of Racine County
- Walworth Alliance Teaching Environmental Regenerative Systems
- Cedar Creek Farmers
- Farmers for Lake Country
- Kenosha County Regenerative Farmers
- Milwaukee River Watershed Clean Farm Families
- Rock River Regenerative Grazers



Map Source: DATCP

They help sponsor and provide education on:

- low-disturbance manure application
- rotational grazing
- harvestable buffers
- cover crops
- no-till
- and more!



What Can Lake Groups Do?

Encourage implementation of best management practices on riparian properties

- Sponsor Healthy Lakes & Rivers Grants for shoreline and rain gardens:
  - https://healthylakeswi.com/
- Operate or adopt an incentive program
  - https://theconservationfoundation.org/conservation-home/
- Advocate for compliance with County shoreland zoning standards
- Provide educational materials to lake residents

Collaborate with partners to implement BMPs in watershed

- County, WDNR, and farmer-led groups to incentivize agricultural practices
  - List of farmer-led groups: https://datcp.wi.gov/pages/programs_services/producerledprojects.aspx
- Land trusts to conserve environmental corridors and open space
  - List of land trusts: https://gatheringwaters.org/land-trusts/find-a-land-trust/
- Work with municipalities and County to identify stormwater issues
  - https://apps.dnr.wi.gov/swampereporting/Stormwater/SearchMuni

Aquatic Plants

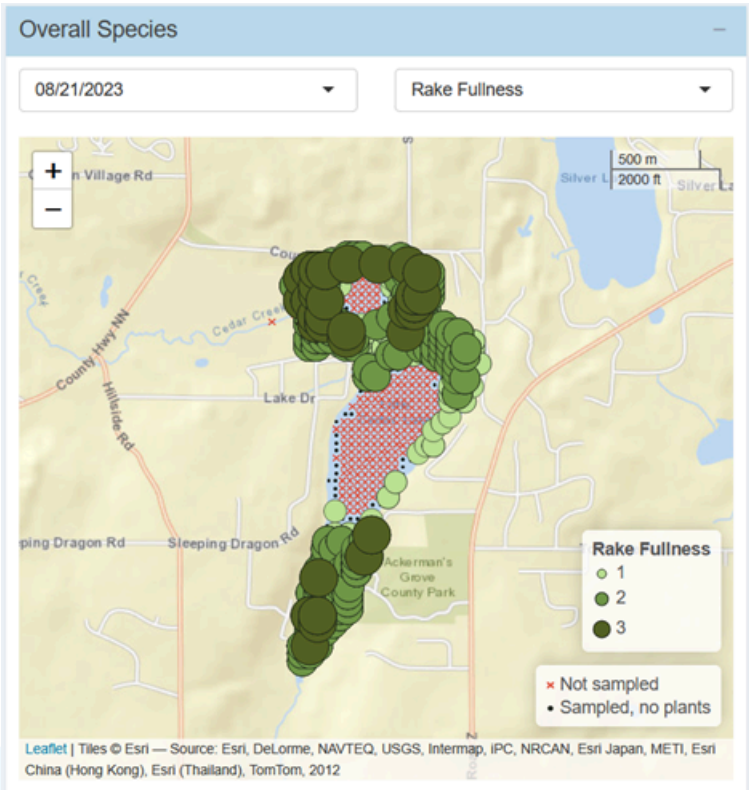
Benefits and Considerations

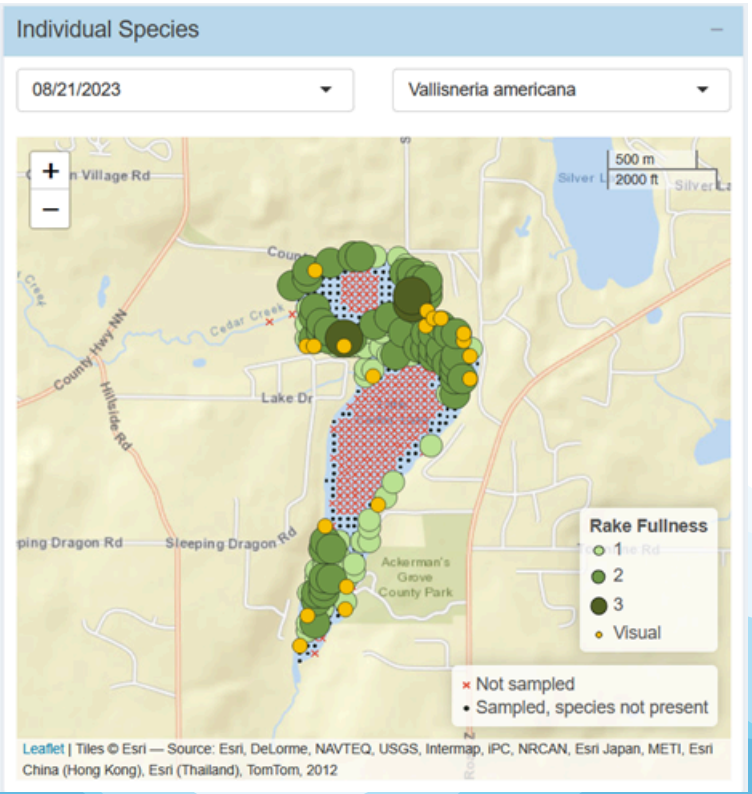
- Provide food and habitat for fish and aquatic insects
- Compete with algae for phosphorus
- Healthy plant community keeps lakes clear
- Act as water quality indicators
- Can grow in excessive or nuisance fashions
- Interfere with navigation and recreation
- Contribute to stunted game fish populations

Recommended Baseline Monitoring Schedule for Aquatic Plants

- Point-intercept grid used for full-lake survey
  - Developed by WDNR for each lake:

    https://apps.dnr.wi.gov/lakes/plants/samplingmaps/Default.aspx
- Lakes with permitted plant management
  - At least every five years
  - More frequently if novel invasive species observed
- Lakes without permitted plant management
  - At least one survey to characterize community
- View survey results using Aquatic Plant Explorer
  - https://dnr-wisconsin.shinyapps.io/AquaticPlantExplorer/





Aquatic Plant Management

- Use Integrated Pest Management Process
  - Regularly monitor population
  - Consider life history of target species
  - Establish thresholds to determine when action required
  - Develop plans for long-term control using variety of techniques
  - Minimize impact to nontarget species (e.g., spawning fish)

APM permits are available here: https://dnr.wisconsin.gov/topic/lakes/plants/forms

Observation Only

- Recommended when aquatic invasive species (AIS) populations are low

Manual removal

- Remove nuisance growth within 30-feet of property

Mechanical harvesting (requires permit)

- "Mow" aquatic plants – leave enough to provide habitat and stabilize bottom lake sediment.
- Produces plant fragments that can spread AIS and require maintenance to collect.
- Purchasing and operation equipment has high capital cost. Contracting may be better option for managing small lakes.

Chemical treatment (requires permit)

- Less expensive than harvesting but can impact nontarget species.
- Spot treatments are relatively inexpensive and can help reduce small AIS populations.
- Whole-lake treatments considered for highly invaded/degraded plant communities.

Diver-Assisted Suction Harvesting (DASH) (requires permit)

- Very selective method that minimizes nontarget impacts.
- Best used for small AIS populations – too expensive for whole lake treatments.

Photo: Riese Aquatics

Water level manipulation (requires permit)

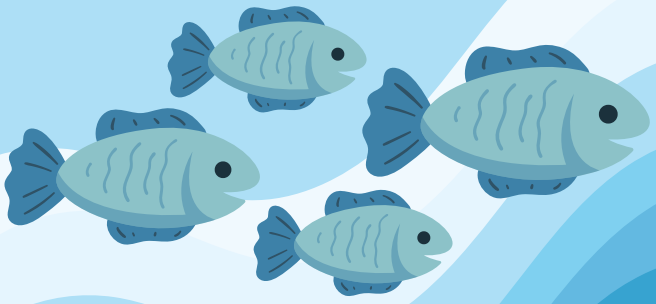
- Inexpensive means to treat large areas
- Only feasible in lakes with water control structures
- May require detailed water budget to use

Fisheries

A productive, diverse fishery is indicative of a healthy lake and important resource for recreation and tourism.

- In southeastern Wisconsin, water temperature and lake morphology are important for determining which fish species can thrive within a lake.
  - Healthy *warmwater* fisheries (largemouth bass, walleye, panfish) have warmer temperatures, are more heavily vegetated, and may have lower clarity.
  - Healthy *coolwater* fisheries (northern pike, lake trout, and cisco) have cooler temperatures, higher dissolved oxygen concentrations, and typically have greater clarity.

- You can learn more about fish species and their habitat requirements on this WDNR webpage: https://dnr.wisconsin.gov/topic/Fishing/species
- The WDNR Wisconsin Fishing Finder tool has information about lake fishery classification, fishing access points, stocking records, fishing regulations, and waterbody risks for each lake: https://dnrmaps.wi.gov/H5/?viewer=WFF



Monitoring of Fisheries

Nearshore surveys

- Can observe species not typically found in WDNR surveys, including rare species and those intolerant of water pollution.
- Also may help identify important fish habitat areas to protect as well as degraded areas in need of restoration.

Full lake surveys

- Typically conducted by WDNR using techniques and equipment that target fish in open water. These surveys may target all species or focus on a particular gamefish species.
- Recently published fishery survey reports can be found here: https://dnr.wisconsin.gov/topic/Fishing/reports

Practices to Protect and Enhance Fisheries

Fish stocking

- Can help maintain recreational fisheries that are not self-sustaining.
- Fish stocking requires a WDNR permit.

Fishery regulations

- WDNR sets bag limits on gamefish species. These limits vary by lake.
- You can find the bag limits for a lake using the following tool: https://apps.dnr.wi.gov/fisheriesmanagement/Public/LakeRegulation

Enhancing habitat

- Providing hunting grounds and spawning areas for fish can be one of the best methods for sustaining and improving fisheries long-term.
  - Fish sticks – nearshore large coarse wood in shallow areas
  - Fish cribs – submerged coarse wood or structures in deep water
- WDNR Healthy Lakes & Rivers program can help fund fish stick projects: https://healthylakeswi.com/

Potential Partnerships to Help Fund Fish Stocking

Chicagoland Muskie Hunters
https://www.chicagolandmuskiehunters.org/default.asp

Walleyes for Tomorrow
https://walleyesfortomorrow.org/

Trout Unlimited
https://wicouncil.tu.org/

Wisconsin Department of Natural Resources:
https://dnr.wisconsin.gov/topic/Fishing/stocking

Recreational Use

Intensive recreational use can reduce water quality, disrupt aquatic habitat, and disturb the behavior of fish, waterfowl, and other aquatic organisms. However, the Public Trust Doctrine ensures the rights of the public to access navigable waterways, including many large lakes. Consequently, lake managers must balance recreational uses while protecting the ecology of the lake that supports those uses.

Recreational Use Monitoring Strategies

Recreational use studies

- Count number of moored boats on lake as well as number of boats utilizing public and private launches.
- Conduct active boat counts (using drones and/or aerial imagery if necessary) to determine patterns of recreational use during low, normal, and peak activity periods.
- Survey lake residents and users to determine concerns regarding recreational use and preferred methods to address these concerns.

Lake carrying capacity analysis

- Compare observed recreational use density to recommended densities from published studies.
- Determine if/when lake is exceeding these recommended capacities.
- Use this information to help inform protective guidelines or ordinances (i.e., slow-no-wake zones or hours) and to appropriately size public launches.

Practices for Balancing Recreational Use

Ordinances

- Develop and enforce ordinances that help protect the lake from excessive and/or intensive recreational use.
- Expand slow-no-wake zones in sensitive ecological areas (e.g., fish spawning habitat).
- Utilize slow-no-wake hours to ensure that all recreational uses are accommodated.
- Use the WDNR guide to develop waterway ordinances: https://widnr.widen.net/s/lldpzrbl2s/le0317.
- Enforce parking ordinances and consider raising fines as necessary.
- Collaborate with nearby lake groups to maintain a water safety patrol

Outreach

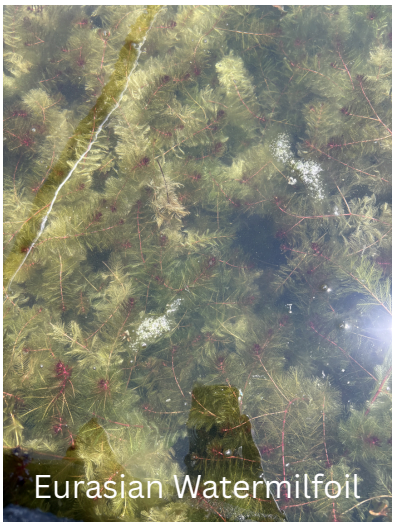
- Maintain staff and/or volunteers at public launches to provide information about boating on lake and responsible boating practices.
- Use newsletters to educate lake residents about responsible boating practices.
- Post information about slow-no-wake zones, sensitive areas, and/or boating guidance areas (e.g., preferred wake surf zones) at public and private launches.

Invasive Species

Wisconsin has a variety of non-native aquatic species that have found their way into lakes. The table on the following page lists some of the more commonly found or newly added aquatic invasive species in SE WI. Some of these species are manageable even once they have established themselves in a waterbody. It is common to use harvesting, manual removal or chemical applications to reduce populations of nonnative plants such as Eurasian watermilfoil and curly leaf pondweed. When it comes to aquatic invertebrate species such as the zebra mussel or banded mystery snail, removal and management can be costly, time consuming, and often resulting with little impact on the population.

A comprehensive list of regulated invasive species in Wisconsin can be found here: https://dnr.wisconsin.gov/topic/Invasives/RegulatedSpecies

Notable AIS in SE Wisconsin



Eurasian Watermilfoil

Banded Mystery Snail

Starry Stonewort

Common Name (*Scientific Name*)	Informational Link
Eurasian watermilfoil (Myriophyllum spicatum)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/07EurasianWatermilfoil.pdf
Curly-leaf pondweed (Potamogeton crispus)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/06CurlyLeafPondweed.pdf
Starry stonewort (Nitellopsis obtusa)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/17StarryStonewort.pdf
Zebra mussel (Dreissena polymorpha)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/21ZM.pdf
Quagga mussel (Dreissena bugensis)	https://dnr.wisconsin.gov/topic/Invasives/fact/QuaggaMussel
Chinese mystery snail (Cipangopaludina chinensis)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/05ChineseMysterySnail.pdf
Banded mystery snail (Viviparus georgianus)	https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/CLMN/AISfactsheets/02BandedMysterySnail.pdf

Monitoring Methods and Strategies for AIS

Conduct brief monthly checks near boat launches for novel AIS species to ensure rapid detection and response to new population.

Methods for AIS monitoring may include visual inspection of public piers and nearshore lake bottom, rake tosses, and use of a D-net on the lake bottom.

For more AIS monitoring information see: https://dnr.wisconsin.gov/topic/Lakes/AIS/Monitoring.html

Decontamination protocols

- Clean, drain, and dry. Ensure that all boaters entering or leaving the lake clean their boat and trailer; drain all water from the ballast, motor, and livewell, and allowing the boat and equipment to dry for 6+ days before entering a different waterbody.
- For heavily used public launches, invest in AIS removal equipment (hand tools, bleach solution with sprayer, hot water pressure washer).
- See more information at the UW-Seagrant page: https://www.seagrant.wisc.edu/our-work/focus-areas/ais/water-decontamination/decontamination-protocols/.

Programs for AIS

- **Clean Boats, Clean Waters**
  - WDNR program to staff public launches to inspect boats and trailers for AIS as well as educate boaters about AIS species.
  - https://dnr.wisconsin.gov/topic/lakes/cbcw
- **Surface Water Grants**
  - WDNR program that can help fund purchasing of AIS removal equipment, pay watercraft inspectors at public launches, and/or conduct AIS planning and removal projects.
  - https://dnr.wisconsin.gov/aid/SurfaceWater.html
- **Citizen Lake Monitoring Network**
  - University of Wisconsin - Stephens Point Extension and WDNR program that can provide training, protocols and equipment for monitoring for AIS
  - https://www3.uwsp.edu/cnr-ap/UWEXLakes/Pages/programs/clmn/AIS.aspx

Outreach and Engagement

Outreach

Outreach efforts, often called “education” efforts, are a one-way communication tactic where organizations or groups can provide information and services to stakeholders or communities. It is often considered the “one-way street” of communication. Outreach is the first step in stakeholder involvement by giving information and raising awareness for topics and issues surrounding lake and watershed health.

Engagement

Engagement is the “two-way street” of stakeholder involvement. Engagement allows for the sharing on knowledge and experiences both to and from the stakeholder and thus builds working relationships among managers and stakeholders. Engagement often occurs after initial outreach efforts have been successful. Stakeholder engagement allows for groups to take an active role in managing their lakes through volunteering, personal property management, board membership, attending meetings and so much more.

Outreach and Engagement Topics and Resources

Resources that can help guide lake groups and lake managers in effective education, outreach and engagement:

- https://www.epa.gov/sites/default/files/2015-11/documents/stakeholderguide.pdf
- https://ms4resource.nationalstormwateralliance.org/index.php/conducting-watershed-outreach-campaigns/
- https://www3.uwsp.edu/cnr-ap/UWEXLakes/Pages/resources/CapacityCorner/default.aspx

Examples of common outreach and education efforts and topics:

- Boat launch signage for: AIS, ordinances, boating recommendations
- AIS Identification workshops
- Shoreline landscaping education
- Septic system upkeep
- Leaf litter/animal waste pickup

Think outside the box for unique ways to spark conversations about lake management:

Secchi Disk Cookies

Funding

WDNR Surface Water Grant Program

- https://dnr.wisconsin.gov/aid/SurfaceWater.html

Knowles-Nelson Stewardship Grants

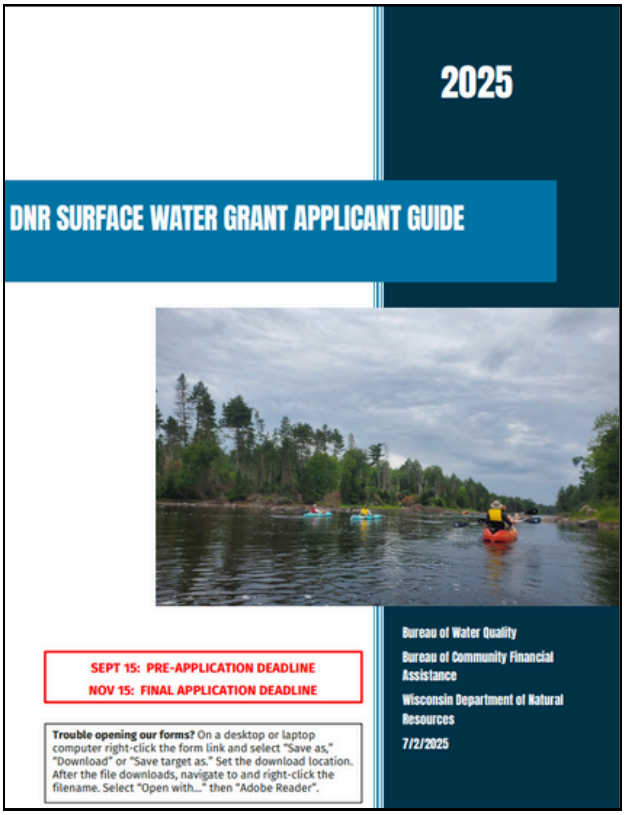
- https://dnr.wisconsin.gov/topic/Stewardship/GrantHome

County

- Some counties have their own cost-share programs to help offset the cost of conservation practices. Reach out to your local county conservationist for information.

Producer-Led Watershed Protection Grants

- DATCP Home Producer-Led Watershed Protection Grants



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