

Poster Presentations

TOPIC: Aquatic Invasive Species

Best Management Practices to Slow the Spread of AIS

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Generally, the focus of aquatic invasive species (AIS) outreach has been on recreational water users. However, there are components of the restoration, construction, farming, and landscaping industries that can also move AIS from infested locations to un-infested areas. Although not confirmed as the source, consider how non-native phragmites made its first appearance in Zeloski Marsh Wildlife Area (Jefferson County) within three years of earth moving equipment being brought in to restore hydrology and adapt the former muck farm to a hunting and birding area. Our poster provides information about the best management practices for those working in areas at high risk of new invasions as well as in those areas already impacted that need to be contained. Such information is important to equipment owners/users as well as those who may hire them. This poster is available as a pdf or PowerPoint for anyone who would like to use it.

Effect of 2, 4-D Herbicide Treatments Used to Control Eurasian Watermilfoil on Fish and Zooplankton in Northern Wisconsin Lakes

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Eurasian watermilfoil (EWM) is one of the most problematic invasive macrophytes in the United States. Dichlorophenoxyacetic acid (2, 4-D) herbicides are widely used to control EWM and have been used since the 1950's. However, little is known regarding the effects of 2, 4-D on zooplankton and fishes outside of laboratory experiments. Our objectives are to determine if 2, 4-D treatments affect: 1) the abundance, diversity, and size structure of fishes at different life history stages; 2) feeding, survival, and growth of larval fish, and 3) diversity, abundance, and size of zooplankton. This study is being conducted on six lakes in northern Wisconsin over a three year period, including a pre-treatment, treatment and post-treatment year. During the treatment year (i.e., 2016), three lakes served as reference systems, while three lakes received a whole lake 2, 4-D herbicide treatment. Preliminary results indicate no significant effect on zooplankton or larval fish abundance.

The Efficacy and Efficiency of a Portable Steam Cleaner for New Zealand Mudsnail Disinfection/Decontamination

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New Zealand mudsnails (NZMS) were first detected in Wisconsin at Black Earth Creek in 2013 and have since been detected at Badger Mill Creek in 2016. NZMS, as with most aquatic invasive species, are moved and introduced to new areas by recreational users and anglers moving from one waterbody to another without disinfecting their gear. NZMS are resistant to chemical approaches to disinfection and are capable of living in damp environments for up to almost a month. The use of an effective mobile device to disinfect gear has applications to every stream user. For this study, a portable steam cleaner will be used to evaluate its effectiveness in disinfecting gear and killing New Zealand mudsnails.

Evaluating Aquatic Invasive Species Disinfection and Decontamination Methods by Species

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The development and revision of a best management protocol for the disinfection of sampling gear for the Department of Natural Resources and boats and fishing gear for recreational users is imminently important to prevent the spread of aquatic invasive species (AIS) in Wisconsin. The periodic revision of the disinfection and decontamination best management practices and the uniform evaluation of known and new methods are important to most effectively prevent the introduction of AIS to new waterbodies. This poster will contain the results of an updated literature review of methods used for the decontamination and disinfection of gear against AIS.

Evaluation of Large-scale Low-dose 2, 4-D Treatments for Eurasian and Hybrid Watermilfoil Control across Multiple Wisconsin Lakes

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Twenty-three lakes were studied pre- and post-treatment to monitor large-scale and low-dose (73-500 µg/L) 2,4-D dissipation and degradation patterns, and determine the efficacy and selectivity of these treatments for lakewide Eurasian watermilfoil (*Myriophyllum spicatum*; EWM) and hybrid watermilfoil (*Myriophyllum spicatum* x *M. sibiricum*; HWM) control. Herbicide monitoring results revealed slow 2,4-D degradation rates and long exposure times with many of these treatments. Milfoil control ranged from 4-100%, with sustained multi-year control observed in some lakes. In comparison to pure EWM populations, reduced control was observed in many of the lakes with confirmed HWM populations. Several native plant species also showed significant declines post-treatment, with variation in recovery observed over time. Although milfoil control was achieved with some of these treatments, variation in herbicide persistence, observations of reduced control in some hybrid genotypes, non-target impacts to certain native plants, and uncertain long-term biotic and abiotic effects demonstrate the need for additional research, monitoring and field studies.

From Dock to Database: Tips for Formatting Aquatic Plant Surveys

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Since the mid-2000s, the Wisconsin Department of Natural Resources and numerous partners have conducted lake wide aquatic plant community point intercept (PI) surveys to better understand within-lake and statewide trends. These PI datasets are currently being compiled into a statewide Aquatic Plants Database (APDB), which now contains data from >1300 individual PI surveys conducted on ~700 waterbodies statewide. APDB data contributes to waterbody-specific management decisions and allows researchers to track aquatic plant community changes through time. However, sometimes this valuable data cannot be added to the APDB because PI datasheets contain errors, including missing/duplicated sample points, inaccurate plant taxonomy, or incorrect depths. Although errors often result from honest mistakes, each must be fixed – and sometimes if errors are too numerous or serious, an entire survey is excluded from the APDB. Here, we outline common data entry mistakes, demonstrate what correctly-entered vs. incorrectly-entered PI data means for your lake, and provide useful tips for preventing mistakes.

Frozen Down Under

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In 2012, the Oneida County Land and Water Conservation Department's (LWCD) Aquatic Invasive Species (AIS) Program debuted 'Icing Aquatic Invasive Species in Oneida County'. This outreach program focuses on reaching out to ice anglers to see what they know about AIS and where information may need to be directed. During the weekends, an AIS Team member traveled to ice fishing tournaments and area lakes that experienced heavy ice fishing pressure, to provide ice anglers with AIS education and outreach material. In addition, the anglers were asked to participate in an eleven question survey to help the LWCD understand this demography. From 2012-2014, an estimated 1,000 anglers were reached and over 300 surveys were completed. The LWCD's 'Frozen Down Under' poster details the project, survey results, and the future of ice angler outreach in Oneida County. This project was funded through a Wisconsin Environmental Education Board grant.

Genetic and Ecological Research of the Aquatic Invasive Japanese Hop Yields Practical Recommendations that will Aid Management Decisions and Educate Citizen Volunteers

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The invasive vine Japanese hop (*Humulus japonicus*) arrived in Wisconsin in the late 1990s in Grant County at the confluence of Blockhouse Creek and the Little Platte River. Since that time, it has infested the riparian zones of numerous waterways throughout Southwestern Wisconsin. Our basic scientific research aims to gather distributional, genetic, and ecological data on the plant in an effort to describe its history of invasion in Wisconsin, estimate population size, and predict future spread. In addition to answering questions of purely scientific merit, our group is dedicated to distilling our scientific results into practical information that will inform management decisions and educate citizen monitors on the species' vital characteristics and propensity to spread. In this spirit, we present the connections we have made between scientific data and practical recommendations that may help curtail the spread of this invasive species.

Invasive Species Prevention through Clean Trapping Practices

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This poster gives educators a checklist of things to cover while engaging new partnerships with trappers as well as other wetland users. It also informs trappers to prevent the spread of invasive species by cleaning equipment and footwear. Trappers typically cover many miles, reusing equipment in numerous waterbodies and properties. While many are aware of invasive species, prevention steps can be an oversight or perhaps not even thought of. Furthermore, trappers have a good knowledge of habitat and can be very useful eyes on the landscape. Increasing their invasive species awareness can take monitoring to many new places.

Mapping on the Web with the Lakes and AIS Viewer

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The Lakes and Aquatic Invasive Species (AIS) Viewer is a free and easy to use web mapping application developed by the Wisconsin Department of Natural Resources (DNR) in order to serve the mapping needs of

the Wisconsin Lakes Partnership and turn every citizen lakes scientist into an amateur cartographer. The web mapping application gives you free access to display and map all of the DNR's aquatic invasive species data, explore various volunteer monitoring projects, discover surface water grants awarded throughout the state, add your own data to the map, and create your own map files using our quick and easy map templates. Stop by to learn about recent improvements to the Lakes and AIS Viewer, get a sneak peek at what's coming next, and start making mindful connections about our water through the power of maps.

New Invasive Species Archive Can Guide Species Priorities and Control in Your Area

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The Department of Natural Resources/UW-Extension Wetland Invasives Team has accumulated over 114,000 records of all reported invasive species sites in the state as an offshoot of mining many on-line databases to find non-native Phragmites populations for control work. Now anyone interested in knowing what has been reported for any area in the state can access these data through the Team's LTE. Help is needed to visit many sites to confirm species identification and collect actionable control information, but simply accessing these reports is the single best way to understand what is likely invading where you live and work. No matter what habitat you work or play in, this is an incredible resource to use--and help improve through your site visits and reports!!

Rapid Response Actions Following the Discovery of Round Gobies in Little Lake

Butte des Morts

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In August 2015, a non-native round goby (*Neogobius melanostomus*) was caught and reported to the Wisconsin Department of Natural Resources by an angler directly below the Neenah Dam in Little Lake Butte des Morts, which is one of two dams located at the outlet of Lake Winnebago, Wisconsin. This confirmed report was the furthest upstream this invasive fish species has been recorded in the Fox River, and was upriver of Rapide Croche which serves as a physical barrier to prevent aquatic invasive species established in the Great Lakes from spreading upstream into the Winnebago system. This poster will highlight the rapid response actions taken in lieu of this unfortunate finding, and the steps which have occurred to prevent further upstream spread of this species into the Lake Winnebago system and beyond. We will summarize outreach and monitoring efforts which occurred after the initial discovery, and discuss future monitoring, management, and outreach efforts planned for 2017 and beyond.

Rapid Response Actions Following the Discovery of Starry Stonewort (*Nitellopsis obtuse*) in Wisconsin

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Starry stonewort (*Nitellopsis obtusa*; SSW) was first reported in the U.S. in 1978 and has since been documented in portions of the eastern Great Lakes as well as various inland lakes in Michigan, Indiana, New

York, and Minnesota. In September 2014, Wisconsin Department of Natural Resources staff were conducting a routine aquatic plant point-intercept (PI) survey on Little Muskego Lake, Waukesha Co., and discovered a small established population of SSW, marking the first time this non-native macroalgae had been reported in Wisconsin. SSW is currently verified in six inland lakes in southeast Wisconsin, as well as portions of Sturgeon Bay, Green Bay and northern Lake Michigan. This poster will highlight the response actions taken in lieu of this unfortunate finding, and the steps which have occurred to prevent further spread of this species. We will summarize outreach, monitoring, and management efforts which occurred after the initial discovery, and discuss future monitoring, management, and outreach efforts planned for 2017 and beyond.

Reed Manna Grass (*Glyceria maxima*): A New Riparian/Wetland Invader

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This poster introduces an aggressive exotic grass that has spread over nine southeast Wisconsin counties, and threatens to take over shorelines, usurp whole wetlands and clog shallow streams, virtually eliminating all native species of plants and animals when at high densities. Learn where it is currently found in the state, how to identify and distinguish it from similar native grasses and what you need to do to help keep it out of your lake, stream or wetland. The Wisconsin Department of Natural Resources is strategizing for its control, but needs all new infestations reported and a reduction in spread by resource users.

Trends in Herbicide Application in the Northwoods

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How much herbicide are we using in our lakes? Is it effective? What are the repercussions? This poster gives an objective perspective showing how much aquatic herbicide we are using and it illustrates the amount of treated acres through time. These data cover six northern counties from 2006 to 2016.

WDNR Aquatic Plant Management Strategic Analysis: Perspectives, Approaches, and the Future of Aquatic Plant Management in Wisconsin

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The Wisconsin Department of Natural Resources (WDNR) recently conducted a strategic analysis of the state's aquatic plant management (APM) program. Under NR 150, a strategic analysis is a process for assessing and documenting various management options for a program. It also requires multiple rounds of public review. Describing history, state, science, perspectives, and recommendations, the strategic analysis will serve, not only to help guide the APM program, but also as a resource for all those interested in understanding the complexities behind aquatic plant management in Wisconsin.

Wisconsin Department of Natural Resources Lakes Pages

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This poster will provide an overview of the Wisconsin Department of Natural Resources Lakes Pages and how to navigate them to access additional information pertaining to a specific lake. Information will be provided to help users understand how their data influences the data displayed on these pages and how other audiences can access that data. Navigation flows will be displayed as well to help the audience understand how to access information regarding Clean Boats Clean Waters, Citizen Lake Monitoring Network, grants and more.

TOPIC: Citizen Volunteers

Citizen Lake Level Monitoring

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To address the growing concern for the health of aquatic life in surface waters affected by drought, climate change, and groundwater withdrawals, the Wisconsin Department of Natural Resources (WDNR) and the University of Wisconsin-Extension launched a statewide volunteer lake-level monitoring program in 2015. The program draws upon volunteers in the Citizen Lake Monitoring Network (CLMN), county staff, and other local partners to record lake levels on 17 lakes across northern Wisconsin. WDNR, United States Geological Survey, and UW-Madison are also working together to compile historical lake level data in the state and model the natural hydrologic regimes of Wisconsin lakes. Together, these data sets may be used to understand how fluctuating lake levels influence wetland and emergent plants, fish habitat, navigation and recreation, and to explore regional patterns of interaction between climate, surface water, and groundwater.

Dane County Water-related Community Engagement Program

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Dane County is home to more than 70 organizations working to protect and improve the quality of our surface waters, preserve and restore natural landscapes, and enhance recreational opportunities. Recognizing the critical importance of engaged, informed, and effective community leadership, the Dane County Land and Water Resource Department expanded its Community Engagement Program in 2014. The expanded program has allowed the department to build more partnerships and collaborate on important issues, such as chlorides, phosphorus, storm water management, and others. It has also allowed the department to focus more energy on supporting the Dane County Watershed Network and host more Watershed Network Gatherings, bringing water-related groups and individuals together to develop a broader alliance and shared vision and also strengthen strategic partnerships. An important focus of the expanded program is to increase the diversity of audiences reached and engaged in water resources improvements.

Fox River Tributaries – Volunteer Monitoring

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The Lower Fox River and Lower Green Bay are impaired by excessive phosphorus and sediment loadings. This poster will present the results a citizen-based monitoring effort to collect and establish baseline information

that will be used by the Wisconsin Department of Natural Resources to evaluate the impact of land use changes on thirteen tributaries discharging into the Lower Fox River.

Volunteer Road Salt Monitoring in the Milwaukee River Basin

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Although important for keeping us safe during the winter, when road salt makes its way into our waterways it can have negative impacts on fish and wildlife living within the system. To help identify where toxic chloride levels are occurring within Milwaukee's Rivers, this winter 18 of Milwaukee Riverkeeper's toughest citizen scientists braved the icy temperatures to help us monitor road salt. Following precipitation or snow melt events, our volunteer monitors made their way to river stations to collect water samples which were then analyzed for chloride levels. Of the 32 river stations that our volunteers monitored, around one third exceeded water quality standards at least once. Some of our more urban stations exceeded water quality standards every time they were sampled. At our worst stations, we observed chloride levels over seven (7) times the healthy level for fish and wildlife.

TOPIC: Ecology

Identifying Long-term Lake Thermal Structure in Islands Lakes with the Great Lakes: Implications for Biota in a Changing Climate

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Water is an endangered resource in a world with a rapidly changing climate. The health of primary producers is vital to the function and services provided by freshwater. As the base of the aquatic food web, diatoms are key in understanding this essential resource. Recently, surface water temperatures have increased in lakes due to changing wind speeds and air temperatures, resulting in lake thermal structure flux. The long-term effects of this flux on biotic communities have considerable implications for food web structure and function. We implement a diatom-based inference model for lake mixing on island lakes within the Great Lakes to determine how thermal structure has changed over the last 150 years and compare these to Wisconsin Lakes: Pike and Crampton. We also compare diatom community change over time. Understanding the biotic effects of a varying thermal structure can have profound ecological implications particularly in light of a warming climate.

TOPIC: Healthy Lakes

A Second Life for Trees in Lakes

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Waterfront property owners can increase fish habitat by leaving fallen trees in place along shorelines.

Developing and Sustaining a Lakeshore Habitat Restoration Training for Professionals in Wisconsin

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The Wisconsin Lakes Partnership embarked on offering a three-day certification program on “Lakeshore habitat restoration training for professionals” in 2014. One hundred+ people have been certified in the program over the first three years as part of Crews 1, 2, & 3. Participants review state standards and regulations, permitting, designing and implementing conservation practices, strategies for forming partnerships and working effectively with lakefront property owners on projects, and basics of restoring habitat along lakeshores including soils ID, native plant selection, and other site analysis steps. Cost-share funding and grant resources that support lakeshore restoration were featured as well. The training culminates in a field day experience.

Wisconsin’s New Healthy Lakes Initiative: Technical Assistance and Funding for Lakeshore Best Practices

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The Wisconsin Lakes Partnership recently implemented a new statewide initiative providing technical assistance and funding for simple and relatively inexpensive shoreland habitat and runoff and erosion control best practices. “Healthy Lakes” is the outcome of a lean government project to streamline the administrative process for grant funding while simultaneously simplifying technical information for lakeshore property owners and lake groups, municipalities, and other partner organizations. Launched in late 2014, Healthy Lakes has already received positive feedback and widespread geographic interest. Public participation and lessons learned from social marketing studies shaped Healthy Lakes and will continue to be the keys to its success. Next steps include refining a user-friendly, autonomous website, program and best practice evaluation, and integrating the initiative into long-term administrative code. The poster will share an overview of Healthy Lakes, including the five best practices being promoted.

TOPIC: Physical Science

Management of Cold-water Fish Habitat in Wisconsin Inland Lakes

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Climate changes have caused significant loss of biodiversity and changes in species distribution in freshwater lakes. In Wisconsin lakes, habitat of cold- and cool-water fish within a lake is constrained by water temperature and available dissolved oxygen, and this constraint is met within the bottom waters of the lake during summer months. Warming has squeezed the available thermal habitat within many lakes, and fostered prolonged periods of low oxygen in the bottom waters, sometimes reducing habitat entirely. For one species, cisco (*Coregonus artedii*), we evaluated the effectiveness of alternative strategies to retain habitat. Using two Southern Wisconsin lakes as a case study, we find that physical conditions within the lake and characteristics of the surrounding watershed both mediate the loss of cisco habitat. We will describe new work to understand where ongoing warming will further reduce or eliminate cisco habitat across Wisconsin.

Observed Changes in Water Chemistry at 13 Lakes in Wisconsin over the Past 25 Years

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Thirteen lakes in Wisconsin were sampled for water chemistry between 1987 and 1994 and again in 2013. Using data from the National Land Cover Dataset (1992) and National Land Cover Database (2011), a geospatial comparative analysis was performed to quantify changes in land cover surrounding each of these lakes between these two sampling periods. Temperature and precipitation data for the period 1984-2013 were obtained from the PRISM Climate Group and extracted for each of the lake locations to derive decadal averages at each site. Multivariate analysis of the differences in water chemistry between the years will be presented, as will the effects that changes in climate and land cover have had on these lakes in Wisconsin over the past 25 years.

Rates of Nutrient Cycling

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Life cycles in lakes have dissolved nutrients in equilibrium with all organisms in the food chain. Cycling rates are set by the characteristics and the number of biological pumps on the surface of the microbes. Bacteria collect organic nutrients such as amino acids and phosphorus. Rates are described by an equation presented in preference to the usual one from 1913. It specifies both the rates of transport and the natural concentrations of the nutrients involved. To do this a radiolabeled nutrient is added to fresh water samples at various concentrations, and the rate of label incorporation into the microbes is measured. Rates are slowed by competition from any target nutrient that is naturally present. Unlabeled nutrient is also added for calibration. Rates and concentrations are then specified by the new equation as shown here for amino acids.

TOPIC: Policy & Politics

The Impact of Water Clarity on Home Prices in Northwestern Wisconsin

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This study estimates the property value gains associated with improvements in water clarity on 20 Northern Wisconsin lakes. Using a two stage hedonic model applied to Wisconsin Department of Natural Resources water studies and sales data on over 300 homes obtained from Zillow.com we estimate that a 3 foot improvement in water clarity would produce a 9 - 16% improvement in the market price of an average property on lakes with the lowest clarity.

TOPIC: Social Science

Central Wisconsin Water Walk 2016

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Central Wisconsin holds one of the largest cleanest aquifers in the state, but it has increasingly been subjected to stresses on both the quality and quantity in the past few years. The first Central Wisconsin Water Walk was held on 9/17/16. This walk was an extension of a series of water walks started by Josephine Mandamin, an Ojibwe Elder, who has walked around all the Great Lakes and several other places to emphasize how important it is that we "mind our water". Over 100 citizens participated in this first walk and annual walks are planned for the next 4 years.