Control of Eurasian Water Milfoil & Large-scale Aquatic Herbicide Use

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Introduction

The spread of aquatic invasive plants is a growing problem statewide. Eurasian water milfoil (EWM) can have dramatic impacts on perception and use. No one wants to see our lakes damaged by an invasive species. People are rightfully concerned and want action. The Department of Natural Resources shares the concern and has been at the forefront of raising awareness, promoting prevention and researching, implementing and evaluating control methods. However, research in Wisconsin and in 45 others states with EWM suggest that the presence of the invasive plant is not as biologically harmful as first thought, and that not everyone is comfortable with chemical treatment options. EWM has never been eradicated from a Wisconsin lake; once established it may have to be managed forever. For some lakes that means that aquatic herbicides will be used annually, a choice that may involve thousands of pounds of herbicide. Research to date suggests there are no silver bullets and that success requires using a variety of tools and approaches. Lakefront property owners and lake organizations who are confronted with this invasive species need information about these plants and the pros and cons of control options available to them. This fact sheet attempts to answer some of common questions and help fill the information gap.

Current DNR Policy

A balanced aquatic plant community is a vital and necessary component of a healthy aquatic ecosystem. Our native aquatic plants are the principal habitat feature of lakes and they help maintain clean water and provide the oxygen that fish and other organisms need to survive. The Department is charged through state law to protect and develop diverse and stable communities of aquatic plants and regulate how they are managed. Properly applied herbicides are a useful tool for restoring natural plant communities and can be effective at controlling excessive plant growth that interferes with boating or other lake uses.

Growing public awareness and concern has resulted in increased numbers of grant funding requests and permit applications to use chemical treatments on a much larger scale than traditionally seen. There are a number of concerns about the effectiveness of these projects in controlling EWM, and about their impacts on water quality, native aquatic plant species, fish and other organisms that aren't the target of the chemicals but are exposed to them. DNR assesses these large-scale treatment proposals on a case-by-case basis and is planning to respond to these developments by assessing current regulations.

The department now uses a three-tiered strategy for controlling aquatic invasive species:

1) Prevention through education and planning
2) Controlling new or "pioneer" infestations
3) Controlling established infestations

Research has indicated that prevention is the most cost-effective measure. There is no known example in Wisconsin where Eurasian water milfoil was purposefully and permanently eradicated from a water body once it was established despite the expenditure of thousands of dollars. The state's priority is to prevent or at least significantly slow the spread of harmful invasions: i.e. "stop the bleeding". This is essential, if only to buy time until treatment methods are perfected. These elements include educating boaters, lake users and the general public to recognize invasive species, understand the harm they pose to our waters and practice prevention behaviors that will reduce their spread. It also includes working with lake groups and local government to develop plans to implement all three tiers of the strategy.

The second element of the strategy is to detect the presence of new or pioneer stands of invasive plants and work to bring them under control and prevent their establishment and spread. This approach requires careful consideration; disturbing EWM that is not a nuisance may actually stimulate its growth and spread.

The third element is to control well established infestations and restore healthy aquatic communities. This involves implementing long-term, integrated management plans that employ the latest research and control techniques at multiple levels and that includes enough monitoring to accurately measure results to be used to adjust and "tune" future management actions.

AIS grants

One way DNR is implementing this strategy is through NR 198 Aquatic Invasive Species Control Grants. In the last three years we have:

Cost-shared approximately $600,000 in chemical treatments for AIS in 18 different projects where there is *a well designed, long term, integrated management plan in place that targets native plant restoration and includes sufficient monitoring information so that we can learn, develop and adapt the best strategies for controlling AIS.*

Cost-shared $80,000 in a dozen projects to immediately chemically and manually treat new pioneer infestations of AIS and provide follow up monitoring, planning and prevention

Cost-shared $750,000 in over 80 prevention and planning projects that support five county AIS coordinator positions and several town and local lake inspection coordinators.

The 50% local share doubles the value of these efforts, much in the form of hundreds of citizen volunteers.

The 50% local match is required in state law.

Aquatic Plant Management (APM) permits

In 2003 DNR permitted over $1 million in chemical treatments of EWM statewide. The Department currently permits chemical treatments under NR107, under the following general guidelines:

The department may allow the management of nuisance-causing aquatic plants with chemicals registered and labeled by the U.S. Environmental Protection Agency and labeled and registered by firms licensed as pesticide manufacturers and labelers with the Wisconsin Department of Agriculture, Trade, and Consumer protection.

Chemical management is only allowed in a manner consistent with sound ecosystem management that minimizes the loss of ecological values in the water body.

Permit decisions must consider potential negative impacts to human health, non-target species, fish and fish habitat, and usually contain conditions to ensure proper use and application of the chemicals.

Permit Fees for managing the APM permit program are essential because there is currently no other funding available to support staff and provide oversight to applicants and their contractors. All fees collected (annually about $100,000) are returned to the field and dedicated to this purpose and by law are not to be used for any other purpose. Aquatic plant management activities are not eligible under the two other main sources of DNR Water Division funding: angling license fees and federal Clean Water Act grants. Permit fees and planning costs are eligible grant expenses under NR 198

Large-scale use of herbicides/Spring Treatments

Recent studies being conducted by the U.S. Army Corps of Engineers in Minnesota, as well as several projects permitted in Wisconsin, have demonstrated the potential effectiveness of using aquatic herbicides in innovative

ways to control EWM at larger scales and minimize the impacts on native species. The key elements of the technique are:
1) Applying the herbicide early in the growing season before native plants are present, milfoil is just emerging, and water temperatures are cold enough to maintain adequate levels of oxygen when the plants die off;
2) Using lower doses of chemicals and optimizing contact time with target species; and
3) Repeating the treatment over several years in order to reduce the re-growth of milfoil in the treated areas.

The essence of the approach is to take away the plant's competitive advantages: early emergence and growth that shades out and "out competes" native plants for photosynthesis. Ideally, the need for chemical management is reduced over time.

We have permitted (and provided grant dollars to) several projects in Wisconsin making use of this early-season technique. However, there are still many unknowns and uncertainties regarding long term effectiveness and unintended impacts to native vegetation, water quality, and fish habitat. The Department is just beginning to systematically analyze this information. Adequate monitoring of vegetation and water quality before and after controls is essential to evaluate the effectiveness of these projects.

Mid- to late- summer chemical treatments have the least effective and lasting control on EWM and pose the highest risk of harming native plants. For these reasons, such treatments may actually open the door to expanding, rather than reducing EWM abundance. Such summer treatments are considered repeat nuisance control and are not grant eligible.

Because of the uncertainties and information gaps, DNR currently recommends that all projects involving chemical treatment of more than 100 acres or more than 30% of the area of a lake be reviewed by a statewide technical review team. This will help ensure that consistent methods are being implemented, that meaningful data is being collected and that evaluation of success or failure can be determined by a consistent set of criteria.

What about Harvesting?
Hand pulling by SCUBA divers can be an effective way to remove small stands or scattered growth of EWM that can't be effectively treated by herbicides. Hand pulling as a follow up to chemical treatments is an effective one-two combination for keeping small stands in check.

Mechanical harvesting may be used in conjunction with chemical treatments to help obtain restoration objective and appears to be an effective management method for dominant infestations.

> Early season, deep harvesting of EWM can take away the plants competitive advantages much like chemical use. Cutting the plant back before mid season can reduce the amount of plant that may auto-fragment in late summer and fall.
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> Harvesting removes plant biomass from the lake, where as chemical treated plants remain in the water and decompose adding threat of low dissolved oxygen and increased nutrient load.
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> A well managed harvesting operation will produce fewer fragments than what can be produced by recreational boating through topped-out plant beds.

What about weevils (bio-control)?
There are several documented "natural" declines of EWM infestations. Declines did not eliminate EWM, but resulted in reduced abundance and EWM did not achieve dominance. These declines are attributed to an ample population of native milfoil weevils (Euhrychiopsis lecontei). Weevils feed on native milfoils but will shift preference over to Eurasian. Lakes where weevils can become an effective control have an abundance of native Northern water milfoil and fairly extensive natural shoreline where the weevils can over winter.

Native milfoils are susceptible to higher doses of herbicides. Any control strategy for EWM that would also harm native milfoil may hinder the ability of this natural bio-control agent. The presence and efficacy of stocking weevils in EWM lakes is being evaluated in Wisconsin lakes. So far, stocking does not appear to be effective.

What about draw downs?

The water levels in lakes with a controlled outlet like a dam can be lowered, leaving the shallow water area dry and open to winter freezing. Simulating a natural drought like this favors native plants and can reduce EWM growth for several following seasons. This technique can have negative impacts on other lake attributes and requires careful consideration. Winter drawdown can have damaging effects to many non-plant aquatic species, and repeated too frequently may alter a plant community to drawdown resistant species that may also be problematic and nuisance causing. However, the public cost may be minimal while local residents and lake users will endure some inconvenience.

Research activity and future directions

There is a significant lack of long-term, comprehensive information on the effectiveness of chemical treatments in controlling EWM in Wisconsin. Most information on results and success of various treatments is anecdotal, based on a personal observation rather than a carefully designed scientific study.

To address this information gap, DNR is currently in the second year of an active statewide EWM research project looking at the history of EWM infestations, EWM treatments and results. From preliminary findings, it's apparent that Eurasian water milfoil does not mean the end of a lake. Of 54 sampled EWM lakes in 2005, 29 support the plant at low levels (< 10% frequency of occurrence). Of the 29 lakes that host these low-level populations, 12 have had EWM for more than 10 years.

Additionally, the intensity of past chemical management bears no relationship to current EWM density, indicating that the tendency of EWM to reach nuisance levels probably depends more on random disturbance events, the lake's trophic state, nutrient levels, and weevil density than degree of historic chemical management. Strategic informed management decisions may increase our ability to control problematic EWM invasions in the future and need further evaluation.

We are in the process of developing guidelines and criteria for evaluating large-scale to whole lake herbicide applications that are proposed as part of a lake or aquatic plant management plan. This may be done in the context of a statewide Environmental Assessment and will feed into the consolidation and revision of NR107 and NR109, as well as AIS grant ranking guidelines. Standardized plant monitoring and data reporting will be required from projects receiving state grant dollars. This will build a comparable data base and allow an assessment of results of management efforts.

Conclusions

The concern about invasive species and the desire to preserve the beauty, clean water and enjoyable recreation that lakes offer is shared by everyone.

Negative impacts of EWM are as much social as ecological. Most EWM infestations in WI have little harmful ecological impact on lakes.

Research shows that prevention is the most cost-effective measure and that all control methods have some drawbacks. The most effective measures involve multiple and redundant control techniques with robust monitoring that can assess results.

Chemical treatments can provide relief and are an important tool for lasting control. However, there are associated risks. Improper use of aquatic pesticides may have greater ecological impacts than no treatment.

There is more to learn about control techniques which require careful planning and monitoring.