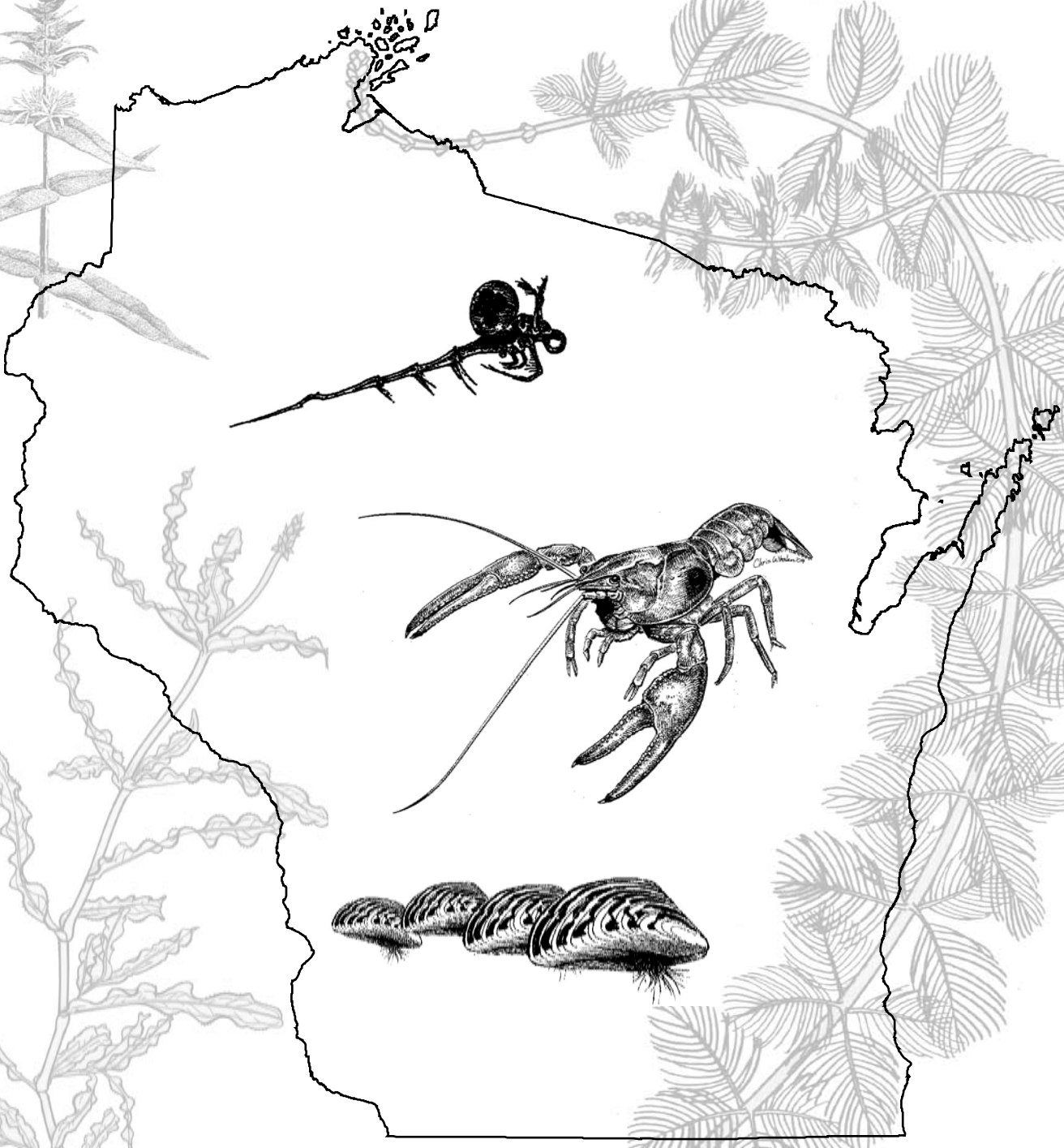
Aquatic Invasive Species

A Guide for Proactive & Reactive Management

2006



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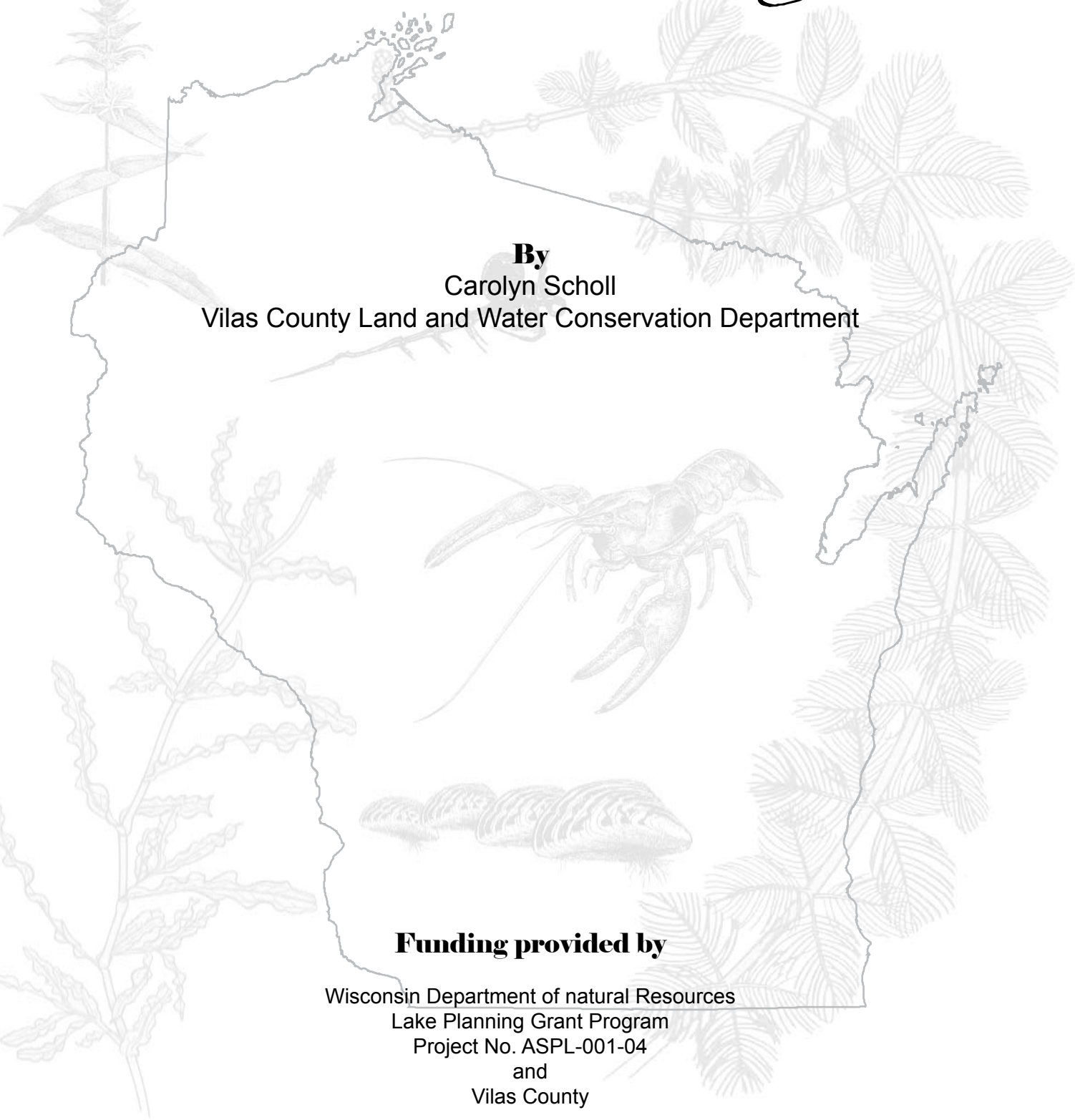

By
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List of Acronyms

AIS	Aquatic Invasive Species
APMP	Aquatic Plant Management Plan
CBCW	Clean Boats Clean Waters
CLP	Curly Leaf Pondweed
DATCP	Department of Agriculture, Trade, and Consumer Protection
EPA	Environmental Protection Agency
EWM	Eurasian Watermilfoil
LWCD	Land and Water Conservation Department
PL	Purple Loosestrife
RC	Rusty Crayfish
SWF	Spiny Water Flea
UWEX	University of Wisconsin-Extension
VCLA	Vilas County Lakes Association
WAL	Wisconsin Association of Lakes
WDNR	Wisconsin Department of Natural Resources
WTA	Wisconsin Towns Association
ZM	Zebra Mussel

Purpose

This guidebook will provide useful information to lake organizations, conservation groups, municipal governments, and others for the management of aquatic invasive species. The guide provides biological information about some of the aquatic invasives found in Wisconsin, current control and treatment options available, and tips about funding the various treatment methods. Ideas are offered about warding off potential introductions of aquatic invasive species (**proactive management**) and about how to cope with an existing infestation (**reactive management**). This source is not intended to provide a comprehensive literature/research review or reference listing, but instead is meant for use as a convenient starting point in the search for answers to tough questions about AIS management.

The guidebook includes five main objectives:

1. Biology of Aquatic Invasive Species,
2. Proactive Management Steps,
3. Funding Options,
4. Reactive Management Steps, and
5. Control Methods.

Introduction

The possibility of aquatic invasive species (AIS) colonizing Wisconsin waterways is a real problem that entire communities face today and will continue to face into the future. As a result of the aggressive reproductive potential of some of these species, ecological decline and financial constraint could become a reality for some communities. For these reasons, AIS issues have become a key topic of concern for citizen groups across the state.

Maintaining clean and healthy surface waters takes an enormous investment of time, thought, and money. But with proper goals set in place, constant vigilance, and ecosystem management planning, we can "out wit" these invaders and stop or slow the spread of unwanted invasive species in our communities.

The key concepts to acquire from this booklet are:

1. Learn all you can about the various invasive species and monitor for them routinely **NOW**. The control of invasive species will be more successful if you take a proactive management approach.
2. Prepare a contingency plan **NOW**. The possibility of discovering an invasive plant or animal is very real. If the homework is done and a plan is in place, the higher the chance that a pioneer infestation will be quickly and effectively controlled.
3. Take action **NOW** to effectively cope with an existing infestation. If your organization is currently facing one or more invasive species, there is hope. This guide offers reactive management steps to cope with AIS.

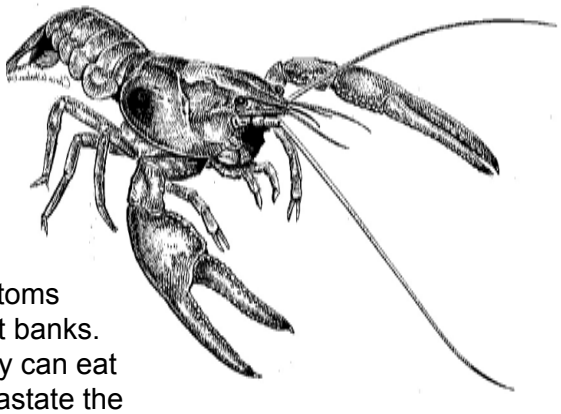
The more you know and plan for AIS management NOW, the more effectively you can manage potential AIS in the future.

Biology of Aquatic Invasive Species (AIS)

Of the162 invasive species on record, there are only 6 species that are most problematic in Wisconsin's inland surface waters. The following are descriptions of these six invasive animals and aquatic plants – Rusty Crayfish, Zebra Mussel, Spiny Water Flea, Eurasian Watermilfoil, Curly Leaf Pondweed, and Purple Loosestrife.

ANIMALS

Rusty Crayfish (*Orconectes rusticus*)



General Description

Rusty crayfish are large and aggressive invertebrate crustaceans. Crustaceans have an exoskeleton - a skeleton outside their bodies. They are opportunistic feeders and will feed on aquatic plants, small invertebrates, small fish, fish eggs, and decaying matter on the bottom of lakes. Their preferred habitat consists of lake, pond or stream bottoms that offer protective cover like rocks, logs, or undercut banks. Once introduced into an acceptable environment, they can eat just about anything, will become prolific, and can devastate the natural balance of the entire lake ecosystem (*Wisconsin Natural Resources Magazine*, June 2001).

Lifecycle & Mechanism of Spread

The mating seasons for mature RC are in early spring, late summer or early fall. Rusty crayfish reproduce sexually, via the mixing of egg and sperm. A male transfers sperm to a female which she stores until her eggs are ripened and ready to be fertilized. The female then releases the stored sperm and fertilization of the eggs occurs. "When water temperatures are suitable, females can potentially lay anywhere between 80-575 eggs" (*Rusty Crayfish: a nasty invader*. Minnesota Sea Grant, publication X34, rev. August 2002). Fertilized eggs will hatch within three to six weeks, and the young crayfish remain close to the mature female for several weeks thereafter. Because females store sperm for later release, it is feasible for just one mature female to begin a whole new infestation if she is transferred to a new location.

The primary mode of spread for rusty crayfish is thought to be anglers using them for bait and inadvertently releasing live crayfish into the environment. The best way to reduce the spread of this animal invader is to educate anglers and bait dealers about the negative impacts that rusty crayfish can cause. They threaten the lake ecosystem as a whole and have the potential to cause declines in fish populations.

Wisconsin fishing regulations prohibit the use of live crayfish for bait. (Administrative Code NR 19.27(4)(a)1.a.)

Wisconsin fishing regulations prohibit the use of live crayfish for bait (NR 19.27(4) (a)1.a.). Unused live bait should never be released into a water body; always dispose of bait in the trash.

Potential Impacts to Ecosystem

Rusty crayfish can cause a variety of negative impacts to an aquatic ecosystem. They are physically aggressive by nature, and can completely displace native crayfish populations by winning the competition for food resources and protective habitat. They have a voracious appetite and a high metabolism. Because of this, they feed continuously, mature and reproduce quickly, and can deplete available food resources quickly and completely. The preferred food choice for a rusty crayfish is aquatic plant material or fish eggs. A modest population of rusty crayfish can severely reduce aquatic vegetation, thus depriving native fish and their prey of vital "hideaway habitat" and food resources needed for survival. Once a decline in the natural aquatic ecosystem has begun, the balance of the entire food chain falters. In short, a rusty crayfish invasion may prove detrimental to the entire aquatic ecosystem of an infested lake.

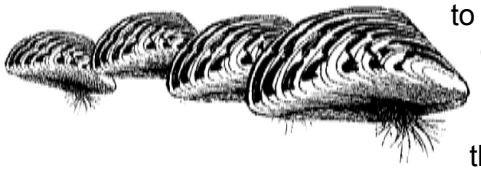
Identification Tips

Rusty crayfish have a few visible characteristics that distinguish them from native crayfish. Typically, at maturity the adults are larger than native crayfish, and can range in length from 4 to 7 inches (including the robust claws). The claws are typically larger than other species of crayfish and the very tips are black in color. As the name implies, rusty crayfish may exhibit "rust" colored spots on either side of their *carapace* (part of the exoskeleton) as though someone with paint on their fingers picked them up and the spots were left there to dry. These characteristics are easy to observe, but positive identification should always be left to the experts. Contact your local WDNR or County Land Conservation office for assistance.

Zebra Mussel (*Dreissena polymorpha*)

General Description

Zebra mussels are small, "D" shaped, freshwater clams, about the size of your thumbnail. They are the only mussel species found in Wisconsin that have "byssal threads" that allow them to attach firmly to any available surface. These animals live in large colonies that can wreak havoc in any environment they settle. Once attached, the only means to remove them are to physically scrape or power blast them off.



It was once believed that zebra mussels could only thrive in environments with certain definable conditions (i.e. certain ranges of pH, water temperature, etc.). But we now understand that zebra mussel populations are quite genetically diverse, allowing them to stretch their optimum range of habitat conditions. In other words, once introduced to a new environment, zebra mussels can adapt to a wide variety of physical conditions.

Lifecycle & Mechanism of Spread

One mature female zebra mussel can produce anywhere from 30,000 to 1 million eggs per year. Given the correct water temperatures and other physical environmental cues, egg and sperm production and spawning may occur almost continuously throughout a season. A fertilized egg is dispersed within the water column, develops into the larval stage (*veliger stage*), and remains free-floating in the water column for about 3 weeks. When young veliger larvae have formed byssal threads, they are able to "settle in" and stick to most surfaces. The lifespan of an individual mussel is highly variable and can range from 3 – 10 years.

"Zebra mussels can spread to other inland waters either as veligers transported in water or as adults attached to boat hulls, engines, aquatic plants, or other surfaces" (*Zebra Mussels in North America: The invasion and its implications.* Ohio Sea Grant, publication FS-045, 1994). And, once introduced into a new aquatic environment, zebra mussels can produce offspring in a very short time span.

Potential Impacts to Ecosystem

Zebra mussels pose a serious threat to native clam populations by competing for living space and food resources. Competition is such that native mussel populations cannot be sustained, and eventually die out. Zebra mussels feed by filtering large quantities of water filled with phytoplankton (tiny algae) and zooplankton (tiny invertebrates). Plankton, which represents the very basis of the aquatic food chain, is quickly depleted. This in turn can cause a negative "domino effect" by causing damages to the food chain of an otherwise balanced ecosystem. "Increasing water clarity that results from zebra mussels filtering the water may be perceived as a benefit, but there is a downside. Sunlight can penetrate deeper, creating more places for algae to grow and reach nuisance levels" ("Hitching a ride," *Wisconsin Natural Resources Magazine*, June 2005).

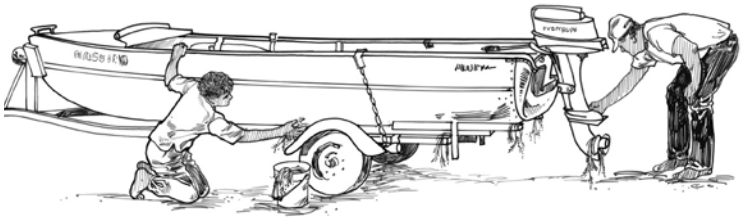
Potential negative impacts from zebra mussel colonies may also include physical damage to property. Damage to watercraft can occur simply by being moored in the water for extended periods. Colonies may become so encrusted on the surfaces of boat hulls or motors as to render them unusable. Private piers or inlet pipes have often been suitable surfaces for zebra mussel colonies to settle, and adjacent beach areas can become all but impossible to enjoy. Millions of sharp-sided mussel shells litter these areas which become dangerous and offensive, consequently reducing the real estate values of all adjacent properties.

Identification Tips

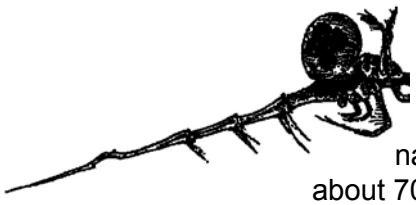
One thing to look for when identifying a zebra mussel is the definite "D" shaped bivalve shell. It ranges from 1/8 to 2 inches long and has distinctive "zebra-like" stripes. Unlike other mussels, zebra mussels settle in large colonies. Where there is one, there are probably several more in the immediate adjacent areas. A final tip for identifying zebra mussels is to look for visible "thread-like" growths (*byssal threads*). Byssal threads are distinctive to zebra mussels, and allow them to firmly attach to a variety of surfaces.

If fishing in any of the Great Lakes or inland lakes with known infestations, prevent further contaminations by thoroughly washing all fishing equipment and your boat/ trailer before entering another water body.

NOTE: It is illegal in Wisconsin to launch a boat with any aquatic plants or zebra mussels attached. (s. 30.715 Wis. Statutes)



Spiny Water Flea (*Bythotrephes cederstoemi*)



General Description

Spiny water fleas are tiny, almost transparent *zooplankton* (tiny macroscopic aquatic animals) about one centimeter in length. Spiny water fleas are aptly named because of the long barbed tail that makes up about 70% of their entire body length. These small predacious crustaceans have a voracious appetite for smaller native zooplankton species.

Lifecycle & Mechanism of Spread

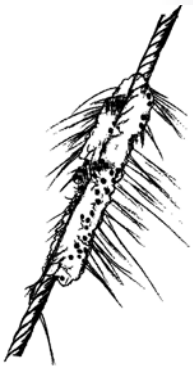
Spiny water fleas can reproduce rapidly by both sexual and asexual means. During the warm summer months, a single female flea can asexually produce up to 10 offspring every two weeks. "(They are) active in waters from late spring until late autumn. As water temperature warms in the spring, individuals hatch from 'resting' eggs that have over-wintered on the lake bottom. The lifespan (of water fleas) will vary from several days to a few weeks" (Berg, D.J.,1992).

Potential Impacts to Ecosystem

As predatory zooplankton, spiny water fleas have the potential to alter the natural balance of a lake's food chain from the bottom up. They compete directly with small fish for food supplies and will lessen the number of preferred zooplankton (*Daphnia spp.*) available to small fish (Hoffman, J.C., et al, 2001). Further complications follow when small fish try to eat the spiny water fleas and are not able to swallow them because of the long spine. Thus as spiny water fleas dominate the zooplankton community in a lake, the numbers of small fish decline. And, as the small fish decline, so will larger game fish and so on up the food chain. Scientists continue to research the effects of the spiny water flea on the dynamics of food chain alteration.

Identification Tips

Spiny water fleas are *planktonic*, which means that they are so small that they drift with the water currents. We cannot see individuals easily with the naked eye. When the population is abundant, accumulations become visible on fishing line, fishing reels, and downrigger cables. It is a good practice to note and report any abnormal "gel-like" or "cotton-like" collections on fishing lines. Contact your local WDNR office to report abnormal findings.



If fishing in any of the Great Lakes or inland lakes with known infestations, prevent further contaminations by thoroughly washing all fishing equipment and your boat / trailer before entering another water body.

PLANTS

Eurasian Watermilfoil (*Myriophyllum spicatum*)

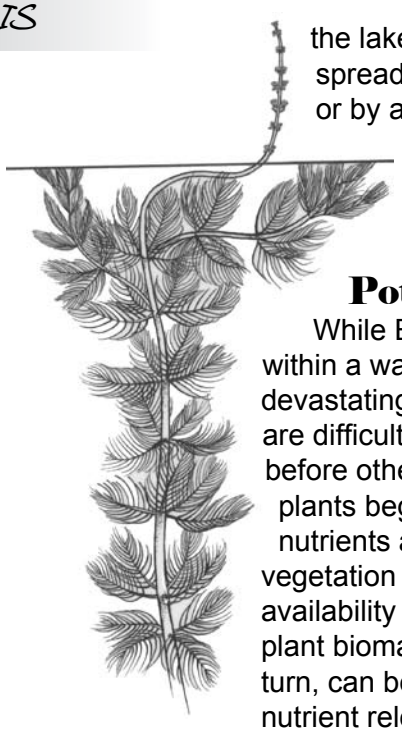
General Description

Eurasian watermilfoil (EWM) is an invasive aquatic plant that can literally "take over" in any mesotrophic (moderate nutrient level) to moderately eutrophic (higher nutrient level) aquatic environment (Madsen, J.D., 1998). It is an aggressive competitor and can form dense canopies of vegetation that shade out slower growing native aquatic plants and hinder boat navigation. Given optimum conditions, this plant species can grow up to two inches per day. Once infested with EWM, an aquatic ecosystem is at risk of several negative impacts, and the local community is in for numerous challenges. Great care and forethought must be taken in managing this plant effectively.

Lifecycle & Mechanism of Spread

EWM is particularly adept at reproducing and spreading rapidly. This species has four methods by which it can reproduce: by seed, fragmentation, stem runners, and rhizomes. A mature flowering plant will produce seed, but "although viable seeds are formed, they are not generally significant in the spread of the plant" (Madsen and Boylen, 1989). The primary mode of reproduction is via fragmentation. A whole new EWM colony may begin as a result of a two-inch fragment settling on the lake bottom and taking root. A third reproductive strategy is through stem runners. Simply put, the plant will "seek" additional nutrients by growing along the bottom of the lake until a fertile area has been found in which to root and grow. The fourth mechanism of reproduction is by underground rhizomes. Root runners (rhizomes) will fan out below ground in order to start new plants in more nutrient rich areas.

EWM spreads from one water body to another through fragmentation. Boaters carry fragments of EWM with them on boats, motors, or trailers. Upon launching into a new water body, the fragments float off, settle on



the lake bottom, and a new colony begins. A pioneer colony can easily spread further within a given lake by boat props breaking plants apart, or by a process called auto fragmentation. Near the end of each growing season, to further ensure reproductive success, the EWM plant will automatically break into fragments, enabling further spread of the species.

Potential Impacts to Ecosystem

While EWM interferes with recreational boating or swimming activities within a water body, the negative impacts to the ecosystem can be devastating. EWM is an opportunistic species, with survival strategies that are difficult to manage. First, it gets ahead of other plants by growing tall before other species even begin to emerge in spring. By the time native plants begin to grow, EWM has taken up the majority of the surrounding nutrients and has begun to shade out native plant competitors. Native vegetation loses the competition to EWM because of low nutrient availability and low light levels needed for photosynthesis. The amount of plant biomass that is produced by EWM colonies is immense, and this, in turn, can begin a whole series of negative environmental impacts. From nutrient releases and severe algae blooms to dissolved oxygen depletion and ill affects to wildlife and the fishery, this invader is simply bad news.

EWM can genetically cross with northern watermilfoil species, and hybrid plants result (Moody and Les, 2002). The only manner by which a hybrid plant can be identified is through genetic lab analysis. Consult a professional if you have trouble identifying a plant specimen.

Identification Tips

Although Eurasian watermilfoil looks very similar to native milfoils (especially northern watermilfoil), there are some characteristic traits typical of the invasive plant. Leaves of EWM come off the stem in whorls of four, and each leaflet typically has 12 to 21 pairs of “needle-like” leaflets. The numerous leaflets make EWM appear feathery. Often, EWM is limp and collapses upon the stem when removed from the water. Native milfoil may look and feel stiffer upon removal from the water.

Curly Leaf Pondweed (*Potamogeton crispus*)

General Description

Curly leaf pondweed (CLP) is a submersed aquatic plant that has the potential to form dense mats at the water surface and cause heavy mid-summer algae blooms. This invader is tolerant of poor light conditions and excessive nutrient levels. CLP has been in Wisconsin since 1905, and it is fairly common to find this invasive plant in the state’s lakes. It can remain relatively latent for years until the environmental conditions are just right for it to “take off” within a lake system. Curly leaf pondweed is a cold water specialist and can grow in extremely low light conditions.

Lifecycle & Mechanism of Spread

The lifecycle of CLP begins in the fall when a vegetative bud (called a turion) sprouts and grows until the winter months when it becomes dormant. Continued growth of CLP foliage occurs in early spring when nutrients are plentiful and are not bound up in root systems of other plants. Mature plants that have developed flowers and fruit early will release seed to the sediments, although seed plays an insignificant role in the reproduction of this species. Plants begin to die back in late June or July, but not before the turions have developed. Turions are the primary means of reproduction for CLP, and are extremely effective at germination the following fall when water temperatures drop. The heartier late spring & summer foliage develops and the cycle begins anew. Because the turions settle so effectively into the bottom sediments, this species is hard to manage or eradicate. Just a few turions transferred from one lake to another can mean the beginning of a whole new infestation. Plant fragments (containing turions) that are transferred from boats, trailers, anchors or fishing gear could be responsible for the spread of curly leaf pondweed.

NOTE: It is illegal in Wisconsin to launch a boat with any aquatic plants or zebra mussels attached. (s. 30.715 Wis. Statutes) Remember to thoroughly check your boat prior to launching.

Potential Impacts to Ecosystem

CLP has the potential to create excessive amounts of plant biomass. High biomass of aquatic plants may cause negative impacts later on when the plants die off. Nutrients, like phosphorus, are taken up into plant roots in order for growth to take place. The problem begins when the CLP plants die off naturally during mid-summer. When plants die back, high nutrient loads are then released into the water column and algae blooms are imminent. A mid-summer algae bloom is especially problematic because of warm water temperatures and nutrient availability that can sustain them for longer periods. The water body may become like “pea soup,” rendering it unappealing for the recreational lake user or riparian home owner. When excessive numbers of algae cells have died off, decaying organic matter uses up dissolved oxygen at alarming rates, and over a relatively short period of time this can spell disaster for the fish that need sustained oxygen levels to survive. Furthermore, elevated amounts of nutrient-rich decayed plants accumulate on the lake bottom, causing “mucky” lake sediments over time. As muck accumulates, nutrients get trapped in the sediments. As wave action and boating activities stir up the muck, the bound-up phosphorus is released time and time again in the water column. At that point either more plant material will take up the nutrient and create MORE plant biomass, or another algae bloom occurs. This cycle continues on and can get worse through time. This phenomenon is known as phosphorus recycling, or nutrient cycling (Horne, A.J., and C.R. Goldman, 1994).

Identification Tips

Summer foliage of curly leaf pondweed has been described as thick, waxy, and “crispy” to the touch. The alternate leaves (leaf placement is alternate along the stem) are between 3 to 8 centimeters long and 5 to 12 centimeters wide, and look like a wavy lasagna noodle when viewed from

the side. Upon close examination, the edges of the leaves look serrated, like the edge of a steak knife. CLP is the only pondweed in Wisconsin with serrated leaf edges. The stem of CLP is flattened and the plant may exhibit a reddish cast. Presence of turions (resembling small pinecones) would also be visible at this stage. The winter foliage of CLP is quite different than the thicker, more substantial summer foliage. During winter, the leaves have the same shape, but they are smaller, flattened, and are so thin that they appear translucent. If your ice fishing line comes up with any light green foliage, check for the winter foliage description above. If you suspect the presence of CLP, be sure to report your findings to a local professional for verification.

Purple Loosestrife (*Lythrum salicaria*)

General Description

Purple loosestrife (PL) is an emergent wetland plant that was introduced to North America from Europe in the 1800's. The hardy and adaptable PL plants can invade wet or moist soil environments including wetlands, lake or river shores, and roadside ditches. PL can also survive in drier areas such as upland flower gardens. Purple loosestrife is very difficult to eradicate or contain once established, but it is not impossible.

Lifecycle & Mechanism of Spread

Purple loosestrife is very effective at spreading by seed. However, given the correct habitat conditions, a fragment of stem or root can also establish a new plant. Seeds germinate and the young seedling quickly develops a taproot. The established taproot sends out numerous fibrous side shoots that form a dense "woody" mat. The annual emergent stems can grow up to 9 feet in height. A single mature plant will produce an attractive and showy purple flower spike that can produce and disperse millions of seeds. The seeds are easily dispersed through wind or water currents, or by people and animals. In Wisconsin, PL plants typically flower and "go to seed" from late June through September.

Potential Impacts to Ecosystem

PL has the ability to spread quickly, out-competing native wetland vegetation to form dense monocultures. A diverse stand of native wetland vegetation is vital for the survival of many wetland species. Monoculture stands of purple loosestrife provide little to no value as wildlife habitat or food nutrition for wetland animals.

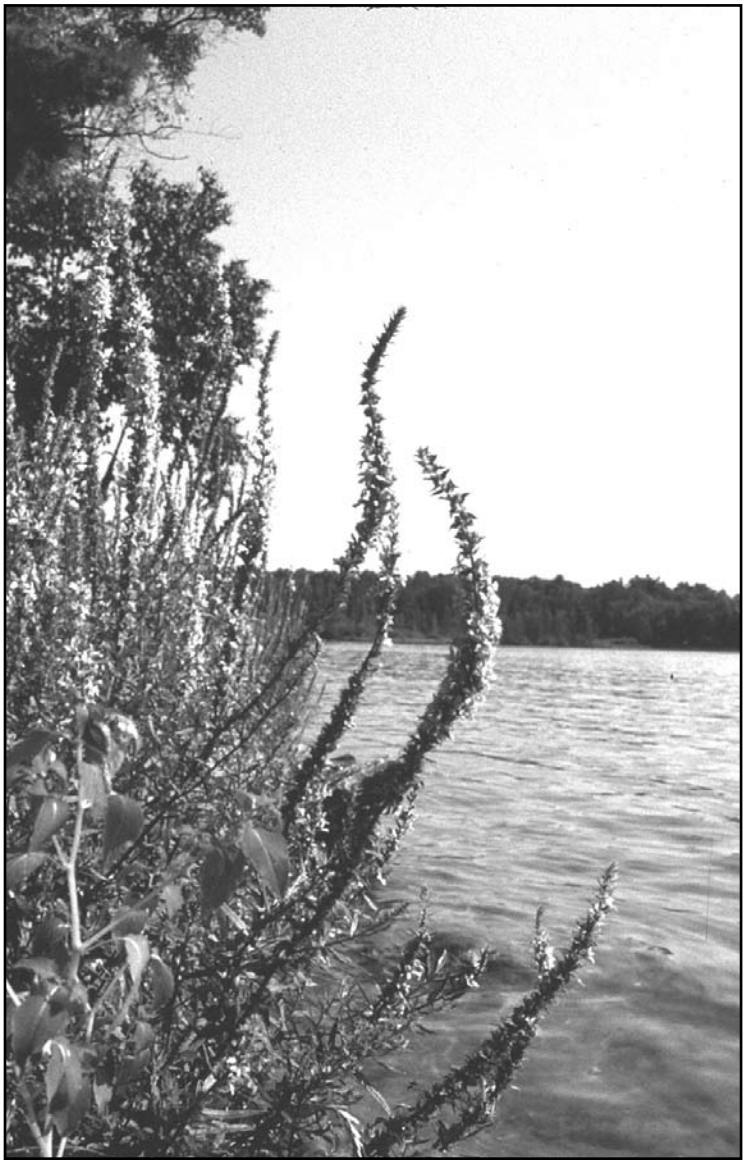
Identification Tips

Purple loosestrife plants have several distinguishing characteristics for identification. The sturdy stems can grow tall (between 2 to 9 feet), and have distinctive edges of four to six sides when rotated between your fingers. The leaves come to a distinct point at the tip and are attached directly to the plant stem. The leaf arrangement relates to the number of sides the stem has and can be *opposite*, *spiraled* or in *whorls* of three. Flower spikes are made up of hundreds of tiny individual flowers, five or

six petals each. Flower color can vary from light pink to a deep magenta. There are a number of beneficial native wetland species that can be easily confused with purple loosestrife. If you are not sure of the identity of a plant specimen, locate a resource professional to make a positive identification.

According to state statute s. 23.24 (5), it is illegal in the state of Wisconsin to distribute purple loosestrife.

State law also bans the sale or cultivation of PL in Wisconsin. Flower spikes of purple loosestrife are beautiful, and have been sold to the general public as a "hardy garden perennial" by the horticulture industry. Be aware of illegal PL sales in your area and report them to authorities!



Proactive Management Steps

It is in the best interest of any lake organization or community to initiate actions today in order to avoid AIS problems tomorrow. Take a "proactive management" approach to lake protection. Proactive management activities need not be costly, but they can make a world of difference.

Initiate actions today to avoid AIS problems tomorrow. Be prepared and <u>be proactive</u>!

As the old saying goes…*an ounce of prevention is worth a pound of cure*. So it can be said of preventing an AIS invasion in your favorite lake. If efforts can be kept at a "prevention level," the costs to your group (in time, money, and frustration) will be tremendously lower than having to deal with AIS at a "control level."

The 10 steps described on the following pages can be used to create an effective proactive management strategy. The method(s) your group decides to use will depend on three factors: the time available to develop a proactive strategy plan, resources available for financing a project(s), and the active work force available to your organization.

Step 1: Gather Information about Aquatic Invasive Species

Check Out Library Materials

Public or university libraries offer a variety of resources about AIS.

Scientific literature about aquatic plants and animals is abundant in university libraries throughout Wisconsin. A lot of research has already been done on aquatic invasive species; you just have to find it. Public libraries throughout the state offer informative AIS kits for loan. These kits may include written materials, ID cards, pamphlets, videos, and much more. Check your local library, UW-Extension or County Conservation Department for related information.

Research the Internet

The Internet is a wonderful research tool. Information and research about many AIS topics can be conducted right from your home computer. Use your internet provider's search engine (or the *Google* search engine) and type in key words to narrow down the topics of information you want to find. Many informative Internet sites will then lead you further into the details of your research topic or lead you to additional information.

Communicate with Natural Resource Professionals

Resource professionals from County Conservation Departments, WDNR, or UW-Extension offices are valuable human resources in your community. These people are very knowledgeable about the most current information, resources, and community or state events surrounding aquatic invasive species. They will try to answer your AIS questions, help you identify an unknown plant or animal, inform you about up-coming workshops in your area, and are often available for educational presentations.

Attend a Training Session or Workshop

Each year there are several opportunities statewide to attend AIS identification trainings or workshops. By attending one of these learning sessions you will gain the knowledge and materials you need to feel confident about identifying aquatic invasive species. For notices about upcoming educational workshops, consult local media, lake organization newsletters, or contact your county conservation or UW-Extension office. Workshops often require pre-registration. If sign up deadlines are missed there may be a waiting list, or workshops offered at other locations.

Step 2: Gather Information about a Specific Lake Ecosystem

Conduct a Lake Inventory

Every lake has physical, chemical, and biological characteristics that make it a unique aquatic ecosystem. Because lakes are all different, it is very important to understand what is "normal" for a particular lake under everyday circumstances. When lake water quality data is collected consistently over long periods of time, a good baseline of information can be established. But sometimes it is necessary to conduct a more in-depth analysis of a lake ecosystem in order to answer questions such as: What native aquatic plants exist, and in what densities are plants found in the lake? What are the physical, geological, or geographical characteristics that make the lake's watershed unique? Is the fishery healthy? Are there things we could do to improve the lake as it exists now? Should we be protecting ecologically sensitive areas? How? All of these questions and more could be answered by conducting a lake inventory.

Some lake groups have found that combining project efforts with other local organizations saved on time, money, and workload. For example, if several area lake groups were separately planning to conduct lake inventories or aquatic plant management plans (APMP), they could combine all efforts into one grant project, hire one consultant, and find representatives from each group to assist in the project. Often, consultants are agreeable to price reductions if several surveys are conducted simultaneously.

Lake inventories can range from simple to complex. No matter what route you take, there are people and resources available to assist you:

- Check your County Conservation Department for existing lake information records, or information about how to conduct lake inventories. For example, the *Vilas County Lake Resource Guide* contains information specifically focused on comprehensive lake planning and inventories (Lyden, 2001). The guide was written to help lake organizations understand each component of comprehensive lake studies.

To receive a permit for chemical treatment of aquatic invasive plants, an approved aquatic plant management plan (APMP) is required by the WDNR.

- Consult the *Guide to an Aquatic Plant Management Plan* for complete information about Wisconsin's APMP requirements. The guidelines are available online at (http://www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp).

- Private consultants can provide materials and information specific to lake inventories. For a statewide directory of consultants that can help in lake management projects and comprehensive lake inventories, consult the business section of the most current *Lake List* at the UW-Extension Lakes Program website (http://www.uwsp.edu/cnr/uwexlakes/lakelist).

- Communicate often with WDNR Lake Coordinators when your group is planning a lake inventory, they can assist you in the planning. Even if an in-depth study is not the goal at the present time, it is beneficial for all lake organizations to get involved with the *Citizen Lake Monitoring Network*. Citizen monitoring can help establish important baseline information about the lake water quality (so changes can be detected early), establish a proactive and consistent AIS monitoring program, and provide historical lake information for future lake studies. For more information or to get started in the *Citizen Lake Monitoring Network*, contact your local WDNR Lake Coordinator or log on to (http://www.dnr.state.wi.us/org/water/fhp/lakes/selfhelp/index.htm).

Why is a lake inventory important for proactive AIS management?

Two Reasons:

1. In the event that an unwanted plant or animal should colonize a lake, a lake inventory will make diagnosis and treatment much easier. If you know what is normal for a given lake system, changes can be detected early and your lake organization can be ready to respond quickly to those changes. The earlier the detection and response, the better off your lake will be in the long run. Treatments for pioneer populations are much more likely to have a successful outcome than if the population is well established. **Know what's normal for your lake.**

2. In order to receive approval to treat a lake chemically, an aquatic plant management plan (APMP) is normally required. If a baseline aquatic plant inventory has already been completed as part of a lake inventory, management options to control invasive species could move forward much quicker. Consult the Guide to an Aquatic Plant Management Plan for complete information about Wisconsin's APMP requirements. http://www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp

Native Terrestrial Vegetation

Terrestrial vegetation that grows on the banks of a water body works indirectly to keep invasive plants from colonizing in a lake. Terrestrial vegetation benefits lakes in several ways. Shoreline buffer vegetation protects the lake by diverting nutrients that would otherwise enter the lake and provide fuel for invasive aquatic plant growth. By slowing down the velocity of nutrient-rich runoff water from flowing into a lake, infiltration time of the runoff water is substantially increased. This allows more water to sink into the upland soil, and reduces the potential for soil and shoreline erosion. Terrestrial vegetation also provides biologically diverse and healthy habitats that are important to wildlife, takes up living space that would otherwise be open to colonization of invasive plants, and provides landowners with shoreland privacy.

Encourage shoreline buffer restorations. Professional and technical assistance with shoreline restorations is available from your local Land and Water Conservation Department or WDNR office. Ask about the availability of cost incentive programs that can help finance a restoration.

Protect existing native plant communities. Healthy and diverse native plant populations work to discourage the settling of invasive species.

Native Aquatic Vegetation

A healthy and diverse population of native aquatic vegetation is a vital component in the prevention of AIS. Research has shown that the abundance of EWM in a lake is inversely related to cumulative native plant cover (Madsen, 1998). For this reason it is important to maintain healthy and diverse native stands of vegetation. A thriving native plant population will compete for nutrients and living space, making it difficult for invasive species to become established. Other benefits to maintaining native plant populations are a healthy sport fishery, protection from bank erosion, bottom sediment stabilization, decreased potential for algae blooms, and increased water clarity.

Before

Restored Buffer

After

photos courtesy of Vilas County LWCD

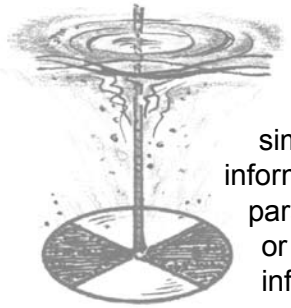
If an aquatic plant bed has been altered by chemical or mechanical means, consider restoring native aquatic vegetation in those areas. Filling the voids where vegetation once existed with native vegetation can greatly reduce the chances of acquiring invasive species. The publication entitled, *Update to the Propagation and Establishment of Aquatic Plants Handbook* by Smart, et al, 2005, is a great source of information about restoring plants in aquatic environments. Your local Land and Water Conservation Department or WDNR can also assist you with information specific to restoration of native aquatic plants.

Step 4: Conduct AIS Monitoring

How to get started

Thanks to dedicated citizens that are active in an AIS monitoring program, many AIS infestations have been detected early. Monitoring for aquatic invasive species is an opportunity for interested citizens to become involved in proactive AIS management.

Training sessions for AIS monitoring techniques are offered throughout Wisconsin. *Clean Boats Clean Waters* (CBCW) is a watercraft inspection volunteer training program sponsored by WDNR, UW Extension and WAL. Participants of CBCW workshops learn how to educate lake users in AIS prevention. Upon completion of the three-hour workshop, CBCW participants are equipped with the tools, knowledge, and confidence needed to educate lake users and perform watercraft inspections at boat landings. County Conservation Departments also hold informational workshops or presentations in local communities to help citizens get started with AIS identification and monitoring. Watch your local newspapers for programs and times or go to (http://www.uwsp.edu/cnr/uwexlakes/CBCW) for workshop listings.



The *Citizen Lake Monitoring Network* is a program designed to involve citizens in the collection of pertinent lake management data. The monitoring program for a given lake can range from simple to extensive data collections. Citizens can monitor and collect information about invasive species, native aquatic plants, water quality parameters and more. Contact your local WDNR Lake Coordinator or log on to the UW-Extension Lakes Program website for further information at (http://www.uwsp.edu/cnr/uwexlakes).

Critical Elements

Four elements that are vital to any successful volunteer AIS monitoring program are knowledge of AIS, location, consistency, and timing. Details of each element are incorporated in the *Clean Boats Clean Waters* workshops. Below are “briefs” about each element.

Knowledge of AIS - Be knowledgeable about the most common aquatic invasive species and how to monitor for them. There are native look-alike species that can easily be mistaken for invasive species. Training workshops can provide you with the resources you need to determine the differences. Educational brochures and waterproof watchcards of several

AIS species are readily available from the WDNR, UW Extension, or county land conservation offices.

Location – All areas of a lake should be monitored for invasive plants and animals. However, if your time or volunteer base is limited, consider focusing your efforts in key areas of the lake where pioneer colonies are likely to settle first: boat landings, marinas, fishing hot spots, resorts, downwind areas of the lake, and/or areas devoid of existing native aquatic vegetation.

Consistency – In today's mobile society, invasive plants and animals are a continuous possibility. A consistent and thorough monitoring program is crucial to finding new infestations. A realistic monitoring schedule should be set and followed each year on any given lake. It is recommended that monitoring be done at least once per month in the most critical locations of the lake, and at least twice per season in other areas of the lake. There are many general ways to schedule monitoring times for a lake, but the best way is do to what works for your specific volunteers.

Timing – To target certain species during monitoring, know what to look for during certain times of the calendar year. Plant species will sprout, reach maturity, and die off at different times during a growing season. The timetable shown in *Table 1* provides a visual guide for targeting different life stages of a given plant or animal species.

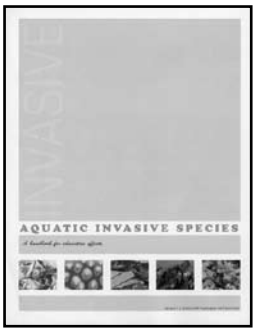
Table 1: Volunteer Monitoring Timetable

	April	May	June	July	August	September
Eurasian Watermilfoil						
Sprout						
Growth						
Bloom						
Die Back						
Curly Leaf Pondweed						
Sprout	→					
Growth	→					
Bloom						
Die Back						
Purple Loosestrife						
Sprout						
Growth						
Bloom						
Die Back						
Zebra Mussel						
Rusty Crayfish						
Spiny Water Flea						

Table 1: Life stages of some invasive plant and animal species and the best times of the open water season to monitor for them.

Step 5: Spread the Word about AIS

Aquatic Invasive Species – A handbook for education efforts ***provides excellent examples for conducting public AIS education and outreach. To view the handbook online, go to http://www.uwex.edu/erc/AquaInvHandbook.html***
(DNR Publication WT-825 2005)



Increasing public awareness of AIS is an important strategy in minimizing their spread. To facilitate proactive efforts from the general public regarding AIS prevention, people need to be made aware of the problems that AIS can cause. The following list is designed to give you ideas about how groups can "spread the word" about nuisance AIS. It does not need to stop here - be creative!

Distribute Educational Materials

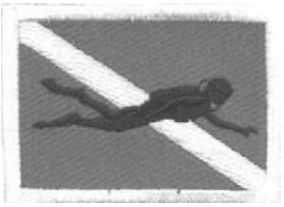
There are AIS pamphlets, videos, brochures, and watchcards available to help educate lake users. Make efforts to distribute these materials to local bait shops, dive shops, boat rental and sales shops, local chambers of commerce, resorts, restaurants, and other local businesses. Sponsor a lake fair in your community and distribute educational materials and publications. Community lake fairs provide a family fun atmosphere to celebrate lakes, and they create the opportunity to educate people about AIS at the same time! You can order the most current AIS publications for free or at minimal cost by logging on to (http://www.uwsp.edu/cnr/uwexlakes/CBCW/pubs.asp).

Lake Organization Newsletters

Lake organization newsletters are a great way to inform your membership about current community and lake events. Updates could be written about AIS research, community AIS prevention and control efforts, upcoming AIS workshops, and AIS monitoring efforts on the lake. Newsletters also provide an appropriate venue to publicly acknowledge and thank your citizen volunteers for their time, talents, and effort.

Involve Local Dive Shops

Local dive shops and divers can be a great resource. Increase the awareness level of aquatic invasives with this group of lake users. Divers could be hired to conduct underwater AIS searches as a supplement to surface AIS monitoring efforts. Dive shop personnel may connect you to local divers who would be happy to volunteer their services free of charge.



Many of these ideas could be funded by a state lake grant. Contact a WDNR Lake Coordinator, or consult the "Funding Options" section of this guidebook for more information.

Involve Youth

Increase awareness of AIS issues among the youth in your community. Science teachers at all grade levels are often searching for ways to get students involved with natural resource management, and the students themselves are often eager to become part of an important "cause." Students and their teachers can become a regular part of AIS monitoring efforts, community watercraft inspection programs, or may be put to work in other aspects of AIS awareness. What better way for them to learn about community and ecosystem stewardship than to become directly involved with real life issues facing local lake organizations!

Youth are often eager to become a part of AIS prevention efforts. Find ways to get local teachers and youth involved in your AIS projects.

Boat Landing Signage

WDNR will provide AIS signage free of charge for use at public boat landings, or consider creating an attractive sign or kiosk at the boat landing(s) that presents clear and concise AIS information. A "cluttered" signage area at the landing will prevent AIS messages from being noticed. Guard against creating cluttered sign areas at a landing. Contact your local WDNR or County Land Conservation Department to find out more about signage approvals or creating signage. You may also want to consult the business section of the Lake List for companies that offer signage services at the UW-Extension Lakes Program website. (http://www.uwsp.edu/cnr/uwexlakes/lakelist)

Step 6: Develop a Contingency Plan

Would you or your lake group be prepared to respond quickly to an AIS infestation? The best way to address this problem effectively is to develop and follow a plan of action BEFORE an infestation occurs. A contingency plan is your best insurance in the event that an invasive species should colonize the lake. The following suggestions can help with the development of an AIS contingency plan.

Getting Started

Contingency planning should be a priority on your next lake organization meeting agenda. Make it a point to discuss the importance of contingency planning, and decide what primary actions would be taken in the event that AIS management becomes reality. Thoughtful planning and prioritizing now will reduce the potential for hasty decision making in the future.

A well-organized contingency plan is good insurance in the event that an invasive plant or animal is discovered.

Ask Questions

Give serious thought to what you would do if you needed to react today. As part of your contingency plan development, ask these important questions:

- Do we have a functional *proactive* management strategy (or could improvements be made in our existing strategy)?
- What would we do if an invasive species was discovered in the lake today?
- Who would handle the situation? Who would take the lead?
- Are we knowledgeable about aquatic invasive plants and animals?
- What are the treatment options available for AIS and what are the "pros" and "cons" of each?
- How would we finance treatment operations?
- Do we need an emergency AIS treatment contingency fund?
- Is a written contingency plan of action available for future AIS threats?
- Should we form a committee to accomplish this task?
- When do we want the planning completed? Timeline?
- Are there other questions that the group needs to discuss?

Know the Answers

Know what your group will do, who will be responsible for action(s), and who to contact upon the discovery of an invasive plant or animal. From the start, set your carefully designed contingency plan into motion, and be sure to contact your local WDNR Lake Coordinator. Refer to the contact list in *Appendix A* for assistance.

Step 7: Distribute the Workload

Managing invasive species, even on a proactive level, can be a tremendous workload. By distributing the workload and allocating tasks as per individual interest, a great deal can be accomplished. Consider the creation of active committees or sub-committees within your group in order to accomplish multiple tasks. The following committees are suggested to distribute the workload.

Invasive Species Monitoring Committee

This committee could be responsible for overseeing the volunteer AIS monitoring effort for the lake organization. They would establish a core of volunteers and coordinate an effective and consistent monitoring program. Members of this committee would stay informed of the latest news and information regarding invasive species and report information back to the organization board. This group could hold workshops for interested participants to learn more about identifying AIS, establish a working base of citizen volunteer monitors, or hire AIS monitors or watercraft inspectors.

Aquatic Plant Monitoring Committee

The focus of this committee would be to assess the current population of native aquatic plants in the lake. Aquatic plants are an important part of a functioning lake ecosystem and this committee would oversee the health of this resource. They might be directly or indirectly involved with a comprehensive lake inventory and assist in the collection of data about the native aquatic plant population. Since an aquatic plant

management plan would be required for the treatment of invasive plants, this committee would ensure that baseline native plant information was collected. Committee members may take data collection one step further by collecting, pressing, and laminating plant specimens to establish a herbarium. If the lake has been treated for invasive species or if natural habitat areas are scarce, this committee might also take the initiative to conduct a native plant restoration effort in the voided areas, or work with a WDNR Lake Coordinator to establish sensitive area designations in the lake. To learn more about sensitive area designations log on to (http://www.dnr.state.wi.us/org/water/fhp/lakes/sensitiveareas.asp).

Boat Launch Monitoring Committee

Responsibilities of a boat launch committee can be quite diverse. This committee might be involved in organizing volunteers for a *Clean Boats Clean Waters* monitoring program conducted at the boat landing(s) during the open water season. Their organized CBCW program may involve just a few volunteers or several. Volunteers may be scheduled at set time slots throughout the open water season, or only for certain "high use" days (holidays, weekends, fishing tournaments). Other responsibilities may include: general upkeep and maintenance at the landings, building and maintenance of an AIS informational kiosk, or looking into boat washing options at the landing(s). (For more information about boat washing facilities, refer to *Appendix C* in this guidebook.)

Education Committee

The primary responsibility of an education committee is to raise the awareness level of local the community about lake protection and stewardship issues. The educators' responsibilities can extend beyond AIS issues to include overall lake ecosystem health, economic considerations, or even matters of sociological lake management. The responsibilities of this committee would be quite diverse in scope and determined by the interests and talents of the committee members. There may be overlap between members of this sub-committee and others. They could conduct thorough research or literature reviews to report findings in a newsletter, create an informational brochure, conduct surveys of the lakeshore residents and report results, sponsor or coordinate educational workshops or lake fairs in the community, or they may be involved in the creation of boat landing signage.

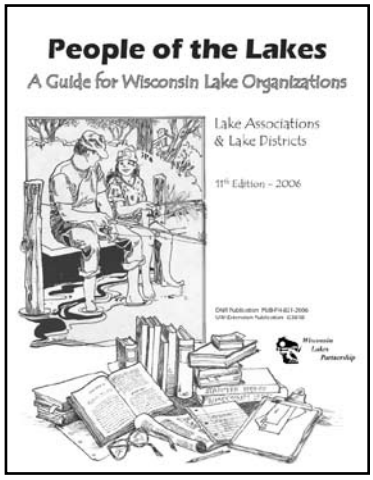
Grant Committee

The primary responsibility of a grant committee is to work toward financing the projects of all other committees. They can research grant options available to them as a lake organization or municipality, apply for grants, administer grant finances and paperwork, and work with the other committees to see that projects are being completed as outlined in the grant proposals. Upon completion of a grant project, it would be the responsibility of this committee to ensure

that all conditions of the grant(s) were met and submit final reports and documentation. The committee could also hire a professional grant writer/ administrator for the same purposes.

Fund Raising Committee

The scope of this committee is somewhat different than that of a grant committee. The fund raising committee raises money for activities and projects. Lake organizations are in need of funding on many levels: dollars for match portions of cost share grants, establishing a contingency fund for emergency AIS treatments, improvement projects, education programs, newsletter operations, etc. The possibilities for this committee are endless, and would go as far as the members' creativity allowed. The following are some of the creative ways that Wisconsin lake organizations have raised money: annual community-wide bake sales, community rummage sales, car washes, raffles, special membership dues charged for the establishment of a "rainy day" fund, increases in annual lake association dues or district tax levy, pancake breakfasts, volunteer donation boxes at private boat landings, and newsletter or community newspaper pleas. The idea is to be creative, have fun, and have several concurrent fund raiser events.



Many Wisconsin lake groups have gone beyond the creation of committees in an effort to distribute AIS workloads and finances. The primary concern for some groups has been one of a financial scope. It doesn't seem quite fair to finance AIS matters strictly from those lake organization members willing to contribute to the cause, when in reality all shoreland landowners will reap rewards. Instead, some groups have formed lake districts to equalize AIS financing. By requiring tax payments from all district taxpayers through a tax levy, everyone contributes to the cost of AIS control efforts. To learn more about Wisconsin Lake Management Law and forming lake districts, log on to the UW-Extension Lakes Program website at (http://www.uwsp.edu/cnr/uwexlakes).

Comprehensive Lake Plan Committee

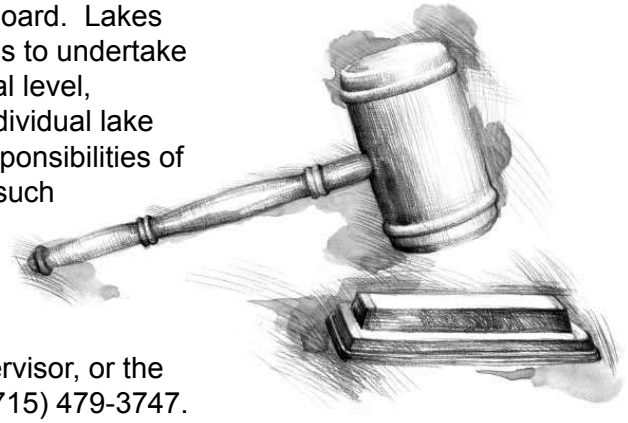
Comprehensive lake studies are vital to understanding lake ecosystem dynamics prior to any problems with aquatic invasive species. The main focus of this committee is to ensure the completion of a comprehensive lake inventory. Responsibilities might include placing the project out for bid to consultants, hiring the professional consultant that would complete the project, and working closely with the lake organization grant committee to fund the project. This committee would act as a liaison between the private consultant and the lake organization. As a lake inventory project moves forward (potentially in phases over many years), members of this committee may support the consultant by way of volunteer work or materials donated to the project.

Step 8: Involve Local Government

Local town or county governments can be wonderful resources to tap in AIS matters. Below are a few creative ways that local government actions have been beneficial in community AIS efforts.

Town Government

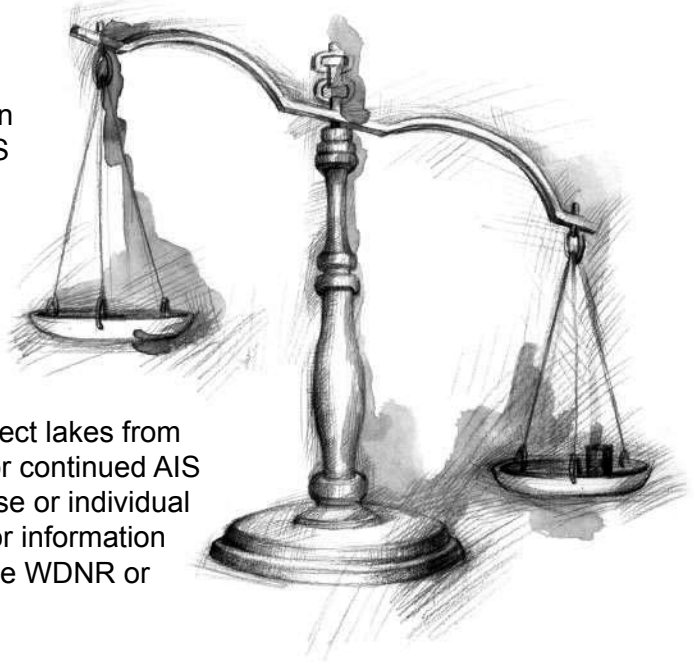
Town Lakes Committee – Some town governments in Wisconsin have recognized an increasing need and inherent responsibility to support local lake management efforts. They have responded by appointing a town lakes committee as a standing committee of the town board. Lakes committees have limited authority and specific responsibilities to undertake lake projects in their local community. Working at a municipal level, town government committees may be more effective than individual lake associations in accomplishing lake management goals. Responsibilities of this committee may include the planning of various projects such as aquatic plant management plans or lake inventories, sponsorship of community lake fairs, applying for grant funding, implementing watercraft inspection programs, or promoting volunteerism. For additional information about town level lake committees contact a local Town Board Supervisor, or the Vilas County Land and Water Conservation Department at (715) 479-3747.



Grant Sponsorship – Town governments can take an active role in the sponsorship of state lake grants. Local municipalities, tribal governments, and school & lake districts often receive priority for approved funding through the state AIS grant program. Because of the grant eligibility status of local governments, local lake associations can work directly with their town boards to support grant applications on AIS focused (or other types of) lake projects. To learn more about the state lake grant programs, log on to (http://www.dnr.state.wi.us/org/water/fhp/lakes).

County Government

Community AIS Partnerships – County governments can offer a unique community support system pertaining to AIS efforts. Counties can coordinate and encourage several area townships to work together in unified lake protection efforts. In Vilas County, for example, state lake grant funds have been used to hire a temporary AIS Project Coordinator to assemble a county-wide AIS Partnership. The partnership includes persons from many entities throughout the county (county, towns, tribes, lake groups, businesses, etc.), and their main goals are to protect lakes from invasive plants and animals and to help build a strategy for continued AIS prevention in the county. By working together, the expertise or individual interest of each partner can be utilized to full potential. For information about establishing an AIS Partnership program, contact the WDNR or your County Land Conservation Department.



Grant Sponsorship – County government can take an active role in the sponsorship of state administered AIS grants. Local government bodies (including counties) receive priority for project funding through the state AIS grant program. Counties can help local lake associations seek grants

for many types of lake protection projects, including projects focused on AIS issues. County governments can also initiate AIS projects to be completed by county personnel. Examples of county AIS projects include AIS partnership coordination, in-lake AIS monitoring efforts, or coordinated watercraft inspection programs.

Conservation Departments – The actions of Land and Water Conservation Departments (LWCD) are directed by elected county board supervisors. AIS projects would typically fall under the duties of Land and Water Conservation Departments. LWCD personnel are natural resource management professionals and are often well versed in all aspects of AIS matters. Contact your local LWCD office to find out how they may assist in local lake protection efforts, stewardship programs, or county-wide AIS initiatives.

Step 9: Plug-In to the Lake Community Network

Wisconsin is proud of its lake rich heritage and is host to hundreds of lake organizations. No matter what kind of lake organization you may (or may not) belong to, it is important to stay well connected with the "Lake Community." Stay on top of local and state lake stewardship issues. One way to achieve this is to keep the lines of communication open between lake groups. Below are suggestions on networking with other lake groups.

Statewide Lake Organization

Wisconsin Association of Lakes (WAL) is a not-for-profit statewide lake group working to protect Wisconsin's lakes through public policy, education, and local lake group assistance. Through WAL, the "Lake Community" can keep updated on current public policies that may ultimately affect the health of lakes throughout Wisconsin, they can attend annual regional workshops that target key lake issues, and they can gain the support they need for individual lake group projects. For more information about WAL, log on to their website (http://www.wisconsinlakes.org).

Statewide Lakes Convention

Attendance at the annual statewide lakes convention is fundamental to maintaining a strong connection with the "Lake Community." This is an outstanding educational event that has brought hundreds of lake groups, state leaders, and natural resource professionals together in a celebration of Wisconsin's lakes. The convention is highly recommended for staying "plugged in" to the most current issues facing lake organizations. It provides an annual opportunity for learning, sharing, and discussing issues that are important to your lake organization. For more information about the annual Wisconsin Lake Convention, log on to the UW-Extension Lakes Program website (http://www.uwsp.edu/cnr/uwexlakes).

County-wide Lake Organizations

County-wide lake associations provide an excellent opportunity to stay connected with the local "Lake Community." County-wide associations can provide lake education and grant support to many individual lake groups in one given county or region. These associations can host

educational programs and workshops, conduct annual meetings and/or picnics, participate in area lake fairs to promote lake stewardship, compile and distribute informative newsletters, participate in localized governmental meetings and provide a unified voice for lake protection, move state legislative actions forward, sponsor and support lake planning and protection grants, and actively participate in area AIS prevention efforts. Membership in a county-wide lake organization provides another opportunity to stay in touch with the "Lake Community" network.

Individual Lake Organizations

Individual lake organizations are full of valuable histories and information. Make an effort to communicate regularly with other lake groups in your region. What types of AIS efforts have they tried? What has worked best for them? What has not worked? Who are the resource professionals to contact in our area? Who are some reputable contractors that work in our area? How much have their AIS efforts cost? How did they apply for that grant? These are all very valid questions that can be answered by people right in your own back yard! Many organizations have struggled with the same issues – lack of funding, lack of volunteer interest or commitment, lack of information – and you can learn from each other. Organize and host "Information Exchange" meetings. The meetings could be small and informal (potluck picnic style), or larger and more formal affairs (wine and appetizers). Whatever form your meetings take on, the goal would be the same – to exchange information and learn from each other.

Host an information exchange meeting to learn from people in your own backyard!

Step 10: Be Creative!

Just as each lake is unique, so are the individuals that make up lake organizations. There is no "one-size-fits-all" management criteria made to fit all lake situations. The important similarity between lake organizations is that they all need to create and follow a plan of action that is conductive to a healthy lake ecosystem and is realistic in time, money, and commitment. Consider using several of the proactive management steps for the best results.

If the proactive management section has not spurred any thoughts to fit your unique group situation, sit down with your membership and brainstorm ideas that will work for you. The important thing is that you DO talk about it.

Wisconsin waterways will always be vulnerable to invasions of aquatic invasive plants and animals. Proactive management is the best way of avoiding future AIS infestations.
Remain consistent and vigilant.

Funding Options

The costs of controlling invasive species in and around waterways are significant. Permit fees, contractor fees, chemical treatments, harvesting programs – all cost money. How do communities come up with the money to manage invasive species either proactively or reactively? What funding options exist that will assist in project cost management?

Whether you are coping with AIS management proactively or reactively, there is financial assistance available from the state for control and prevention projects. If you do your part in grant research and writing, money is available to local units of government and/or qualified lake organizations for these purposes. The following is a list of grants currently available through the state of Wisconsin that pertain to AIS. For further information or assistance in acquiring grant funding, contact a County Land & Water Conservation or WDNR office nearest you.

- Wisconsin Department of Natural Resources, AIS Grant Program (ch. NR 198 Admin Code):
  The WDNR offers competitive 50/50 cost share reimbursement grants that help lessen the financial burden of AIS focused projects undertaken by local governmental units or lake organizations. Applications are accepted on a continual basis, with grants awarded two times per year (except for projects that involve early detection/rapid response situations). AIS grant categories include: Education and Prevention, Early Detection, and Control of Existing Infestations. For detailed information about these grants, refer to the following website (http://www.uwsp.edu/cnr/uwexlakes/grants/AIS_long.pdf).

- Wisconsin Department of Natural Resources, Lake Planning and Protection or River Protection Grant Programs (ch. NR 190, ch. NR 191, ch. NR 195 Admin Code):
  There are 75/25 cost share reimbursement grants available that can assist local governments or lake and river organizations with projects that involve AIS indirectly or as one component of a larger management focus. Applications are accepted continuously. Lake planning grant applications are due February 1 and August 1 each year, and lake protection grants and river grants are due May 1. These grant programs fund projects that have a water quality dimension as one of the long term goals. For information specific to these grant types, refer to the following:
  (http://www.uwsp.edu/cnr/uwexlakes/grants)
  (http://www.dnr.state.wi.us/org/caer/cfa/BUREAU/RiverProtection.pdf)

- WDNR, Wisconsin Waterway Commission Grants (ch. NR 7 Admin Code):
  The Wisconsin Waterway Commission offers from 50 to 80 percent cost share to local governments or lake groups for the purchase of aquatic plant harvesting equipment or a “one time only” treatment of a pioneer Eurasian Watermilfoil colony. Applications are accepted on a continuous basis and grants are awarded as projects are approved. For detailed information about these grants, contact your local WDNR

Community Services Specialist or refer to the following (http://www.dnr.state.wi.us/org/caer/cfa/grants/Forms/RBFGuide06.pdf).

Lake organizations and municipalities throughout Wisconsin have been very creative in securing money for AIS education, treatment or control. Many of the ideas outlined in the Proactive Management Steps section of this guidebook would be eligible grant projects.

The likelihood of funding your AIS project with a grant is promising, especially if you communicate early with WDNR personnel. They can give you assistance to get your project started in the right direction.

For further funding options, take a few minutes to search on the internet for federal agency grants or grant opportunities that may be available from non-profit organizations or foundations. You will be amazed at the amount of money available to your group if you meet eligibility criteria. It will require time and research on your part, but it pays off in the end!

Reactive Management Steps

Do not panic or make impulsive decisions regarding AIS management. There are people and resources that can help you.

An invasive plant and/or animal already exists in the lake. What are you supposed to do now? Where do you begin? First, do not panic or make impulsive decisions. There are people and other resources available to help you. Below are steps that your group can follow in the event that a suspicious aquatic plant or animal has been discovered in your lake.

Step 1: Identify the Aquatic Invasive Species

Identify

If an invasive plant or animal is suspected, note the location in the lake (by coordinate labels or GPS points), and collect a sample specimen to help with the identification procedure. There are many identification tools at your disposal – ID watch-cards and publications, laminated ID cards or plant scans as provided in the *Clean Boats Clean Waters* handbook, or a resource professional from your local WDNR or County Land and Water Conservation Department. If an invasive species is suspected, contact the local WDNR office immediately.

Step 2: Verify the Aquatic Invasive Species

Verify

When a resource professional confirms the positive identification of an invasive species, two things will happen during the verification phase: 1) WDNR staff will make an on-site visit to verify location(s) and assess other factors, and 2) a sample will be collected for formal verification. Vouchering of each confirmed AIS helps the state to compile and track all infested waterbodies.

If the sample is a suspected hybrid of Eurasian watermilfoil, DNA genetic laboratory analysis and verification of the specimen is required. Hybrid species are difficult to identify by traditional means, and if not correctly identified as hybrids, may be very difficult to treat effectively with existing control methods. Following the verification process, a WDNR resource professional will help you with the best treatment options available for the unique lake situation.

Step 3: React to a Pioneer Colony

If the infestation has been confirmed as a pioneer colony you may want to apply for funding from the WDNR AIS rapid response grant program. During the application process for a rapid response grant, your group will need to submit a “Notice of Intent to Proceed” form to the WDNR to proceed with appropriate AIS treatment(s). WDNR personnel can assist

you with the correct procedure for this situation. For detailed information about AIS Rapid Response Grants, refer to the Funding Options section of this guide or log on to the WDNR lake information website at (http://www.dnr.state.wi.us/org/water/fhp/lakes/). The website will lead you to specific information and application materials for the aquatic invasive species grant program.

"…a pioneer infestation is defined as a localized (plant) bed that has been present less than 5 years, and is less than 5 acres in size or less than 5% of lake area, whichever is greater."
WDNR AIS Lake Grant Fact Sheet

For protocol procedure on rapid response management of a pioneer colony, contact your local WDNR Lake Coordinator immediately or log on to (http://www.uwsp.edu/cnr/uwexlakes/grants/AIS_long.pdf).

Step 4: Set a Contingency Plan into Motion

It is time to put your contingency plan into action. If your lake organization has already developed a contingency plan in the event of an AIS infestation, you hold a time saving advantage. Call your lake organization board members together for a special meeting, review your plan, make minor adjustments to the plan if necessary, and set the plan into motion. At this time notify the membership about the discovery of the AIS, and what the board of directors has planned to do about it.

Step 5: Hire a Consultant

Once an invasive species has been identified, consider hiring a professional lake management consultant. If the AIS will be treated in any way, it would be advantageous to get the consultant involved from the beginning (see "Environmental Consultants - Buyer Beware" in *Appendix D*). The professional consultant can assist you with decisions regarding treatment options, determining the extent and location(s) of the infestation (see below), and implementation of the control treatment(s).

Step 6: Determine the Extent & Location(s) of the Infestation

To select the most practical treatment options, the extent and locations of the infestations will need to be assessed. The questions below will need consideration (even if working from an existing contingency plan). To make a determination of the extent of infestation(s), either quantitative or qualitative assessments will need to be made.

1. What is the extent or level of the infestation? Is it a pioneer colony, or has it spread beyond the initial colonization phase?

2. Where is the invasive species located in the lake? Is it contained in just one area or are there several colonies in the lake?

3. What is the potential of the invasive species contaminating nearby area surface waters? What species is it? Is the colony located at a public boat access area? Is the lake a "closed ecosystem" or does it have an inlet or outlet stream? Where is the outlet located in relation to the invasive plant or animal?

Step 7: Prepare for AIS Management Decisions

Once the questions listed above are answered, well-informed management decisions can be made. Because the method of control selected will depend on the type of invasive species that is being sought, consider the sampling protocols and assessment techniques listed below. Invasive plants and animals can be assessed *qualitatively* (subjective visual evaluation of the population) or *quantitatively* (numerical measurement of the population which has potential for statistical analysis). Quick reference sampling procedures are listed below. For detailed *Citizen Lake Monitoring Network* sampling protocol, go to the UW-Extension Lakes Program website.

Consider using a combination of sampling techniques (qualitative and quantitative) to make your overall assessment more accurate.

Once the information and data has been gathered, share it with your professional consultant and/or a WDNR resource professional.

Plant Sampling Protocol

Qualitative Assessment - Plants

Mapping Survey – Prepare a map of all the plant beds found around the lake that contain the invasive plant. Wear polarized sunglasses to see invasive plant beds more easily. If possible, take GPS location readings for each colony that is sighted. Determine the extent of infestation at each bed via qualitative assessment by noting small, medium, or large population.

Scuba Dive Survey – Use volunteer divers or hired diving professionals to survey the areas around the lake that are known to be infested with an invasive species. Divers can visually inspect the AIS and the extent of infestation can be determined.

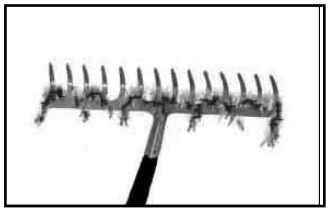
Underwater Camera Survey – Lake management consultants or avid fishermen around your lake may have access to this equipment; or there may be an opportunity to rent an underwater camera for the purpose of conducting an AIS inspection.

Quantitative Assessment - Plants

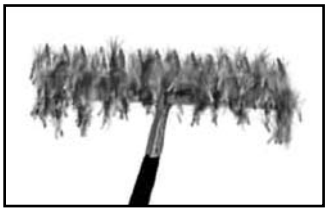
By the use of a weighted double-sided sampling rake, a citizen volunteer can make rough *quantitative* determinations of the extent of plant infestation(s) in the lake.

Rake Survey – Plant sampling rakes look very similar to double-sided garden rakes. They are substantially weighted and have tines on two sides. These types of rakes are typically used for citizen volunteer aquatic plant monitoring. If the lake organization has access to an aquatic plant sampling rake, use this technique to help assess the population density

of plant infestation. Rough quantitative assessments can be done by assigning densities (1=Low, 2=Medium, 3=High) of invasive plants on each rake throw and an average density per bed can then be calculated, or percentages of AIS presence/absence could be compared to whole lake plant populations. (See photos below, courtesy of Jennifer Hauxwell, WDNR). Your local WDNR or LWCD may have a sampling rake available for use, or simple assembly instructions may be made available. They may also be available to help you with quantitative assessments.



Low Density



Medium Density

High Density

Animal Sampling Protocol

Qualitative Assessment - Animals

Mapping Survey – Preparing a location map for rusty crayfish or spiny water flea is not feasible. However, it is possible to map "hot" zones where zebra mussels exist in the lake. For all invasive animals, determine the extent of infestation via *qualitative* assessment by noting low, medium, or high density population.

Scuba Dive Survey – By using a few volunteer divers or hired diving professionals, the areas around the lake that are known to be infested with an invasive species can be visually inspected and the extent of infestation can be determined.

Underwater Camera Survey – Lake management consultants or avid fishermen around your lake may have access to this equipment; or there may be an opportunity to rent an underwater camera for the purpose of conducting an AIS inspection.

Quantitative Assessment - Animals

Techniques used to make quantitative assessments for invasive aquatic animals include the use of substrate samplers (for zebra mussles), traps (for rusty crayfish), or water sampling (for spiny water flea).

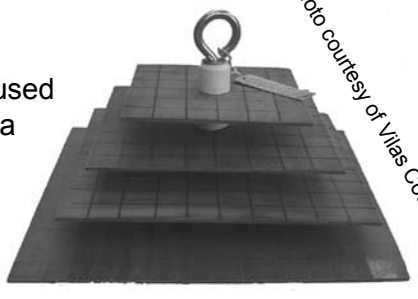


photo courtesy of Vilas County LWCD

Substrate Samplers (Zebra Mussels) – A substrate sampler is used to quantitatively monitor "suspect" or "confirmed" lakes for zebra mussels. They can be obtained from the local WDNR office at no cost to you. These samplers consist of a series of vertically layered plates that are attached at the center and can then be labeled and secured to a pier. To check for zebra mussels, a volunteer can easily lift the sampler out of the water for visual inspection. If evidence of a zebra mussel colony has been found on the sampler, quantitative assessments can be made fairly easily by use of the one inch grid markers etched on the plates. By counting the mussels found on 3 to 5 one inch grids, an average number of zebra mussels can be calculated. Wisconsin has a defined zebra mussel sampling protocol. Contact your local WDNR office for details.

There are crayfish trapping regulations set by the State of Wisconsin. Refer to the Control Methods section of this guidebook or the Wisconsin Fishing Regulations for specific trapping regulations.

Trapping (Rusty Crayfish) – Crayfish traps can be placed in several areas around the lake to determine the extent of the rusty crayfish population. The number of trapped crayfish can then be counted and averages per day calculated, or a simple presence/absence per trap can be noted. By conducting a quantitative assessment of the rusty crayfish population, suitable and attainable goals for managing the infestation can be set. By completing subsequent assessments at a later time, the effectiveness of the trapping program can be evaluated and adjustments made as necessary.

Water Sampling (Spiny Water Flea) – There is no known method of quantitatively assessing a spiny water flea population other than by a formal laboratory analysis of a lake water sample. During an on-site visit, WDNR personnel will take a composite water sample with the use of a large diameter zooplankton net (½ - 1 meter mouth opening). The sample will then be examined at a state laboratory.

Step 8: Know the Control Methods

There are many different ways to potentially eliminate or control the population of invasive plants and animals from an infested water body. The task of selecting the best method for a given situation can be daunting, and questions about the various methods are many. What control methods are available today? What methods are legal for use in Wisconsin? Are permits required? Should we use chemicals? How might human or ecosystem health be affected by chemical usage? What are the costs of using each method, and how do they compare with others?

Choices about which control method(s) your group uses will depend on many factors, including: species of concern; size of infestation; physical and chemical characteristics of the water body; time of year; community opinion and/or endorsement; and financing. These questions will need serious consideration (and open group discussion) when management decisions are being made about treating an infestation. Research and assistance from a WDNR resource professional will be necessary to narrow down the treatment options for the present circumstances. In certain instances, the use of more than one treatment method for a given lake might be necessary.

The following are descriptions of legal treatment methods in Wisconsin. The three general categories of treatment methods include physical, biological, or chemical means. For a listing of research sites about a particular treatment method, refer to the website listing in Appendix B of this guidebook.

Physical Controls

General

Definition: Methods of control that utilize manual or mechanical manipulation of the environment to control unwanted aquatic species.

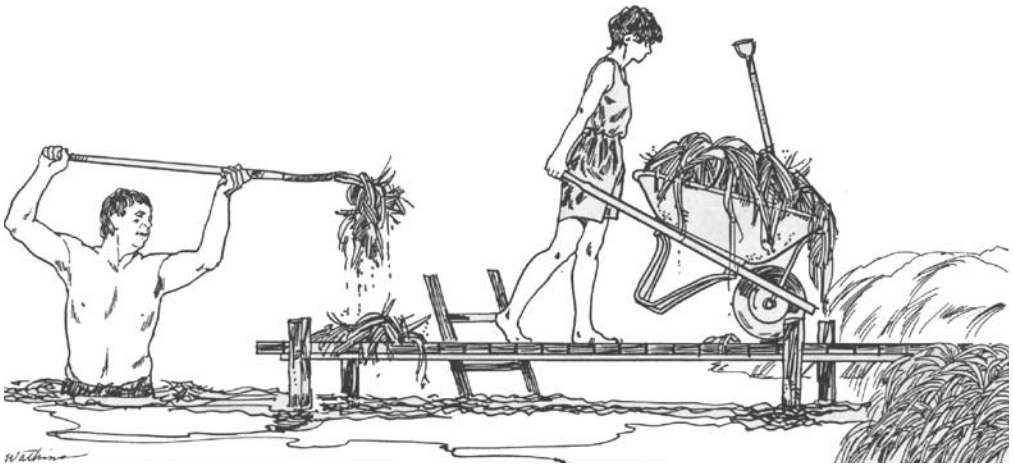
Consult with a WDNR resource professional to discuss physical control options. They can provide answers to your pre-treatment questions about costs and permitting, as well as project set up and implementation.

Safety Matters: As with all other treatment methods, caution must be used when a physical method of control is selected as an option. Care must be taken to assure that no damage to existing native plant habitat occurs during treatment of the invasive species. The decision to use a physical treatment in a lake ecosystem must be an educated one. Do extensive research and communicate often with your local WDNR resource professional.

Permits: A WDNR permit or license may be required for certain physical treatments. In general, a permit is not required for manual removal of invasive plants in small areas, but a permit is required for mechanical harvesting or larger manipulations of the lake environment. A regular fishing license is required for the live trapping of rusty crayfish. Be aware that there are some physical treatment options that are not permitted in Wisconsin, but are readily available and legal in other states. Clarification of the permitting requirements for aquatic plant management in the state of Wisconsin can be found in *Appendix E* of this guidebook.

Current Options - Plants

Hand Pulling (Manual): The removal of invasive plants in small areas by pulling or raking out the plants. This method is economical, but can be labor intensive. Fragments of plant roots may remain in the lake sediments, so the removal process needs to be repeated periodically during the growing season as the plants grow back. Care must be taken to protect the native vegetation. By keeping native aquatic vegetation intact, the chances for invasive species to completely take over the area will be lessened. This is a good option to use in conjunction with an aquatic plant restoration. Your local Land Conservation Department may be able to provide you with more information about native plant restorations.



Harvesting (Mechanical): The removal of aquatic plants from a lake by use of a machine that cuts the plants and gathers them up for disposal on shore. The plants are cut to a depth of about 5 feet below the water surface. Harvesting is labor intensive because typically it involves larger areas and densities of plant infestation, and needs to be repeated during the growing season (much like mowing a lawn). Several points need to be considered when selecting this method of treatment: the cost of equipment; harvester operations and scheduling; transportation, storage, maintenance of equipment; and details related to the disposal of cut vegetation.

Repeated harvesting of aquatic plants may ultimately change a fragile native plant community to one that is more obnoxious, hearty, and tolerant of disturbance (Nichols, 1998).

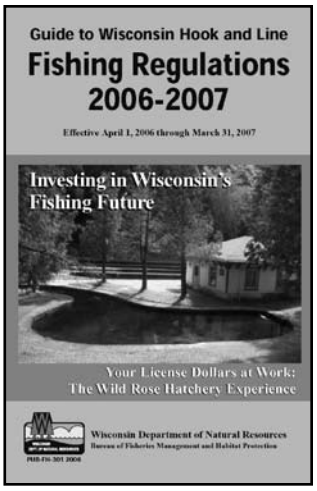
Drawdown (Physical Manipulation): The lowering of the water level of a water body for the purpose of disrupting normal plant growth within the *littoral zone* (shallow, near-shore areas of the lake where most aquatic plants grow). Water level drawdown is only feasible for bodies of water that have operational water level control structures. Following a drawdown, bottom sediments within the near-shore areas are exposed to air, dry out, and freeze over the winter months. An important concept to note here is that drawdowns affect all plants and animals that reside in the near-shore area and not just the unwanted species. The outcomes of drawdown procedures in controlling aquatic invasive species may be variable and inconsistent (Cooke, 1980). The water level drawdown is a physical manipulation of the aquatic environment and several factors will be considered prior to use of this option (attributes of unwanted species, critical timing of drawdown procedure to lessen negative environmental impacts, etc.). Communication with a WDNR resource professional is critical for this option.

Current Options – Animals

Trapping (Mechanical): One control option currently available to help reduce problematic rusty crayfish is live trapping. Eradication of the crayfish population is not the management goal with this method. Instead, the aim is to reduce the large adult population enough to minimize the potential negative impacts on the lake ecosystem. Let it be noted that crayfish trapping will need to be a continuous and consistent annual effort in order to be of any consequence in population control of rusty crayfish. This method used in conjunction with catch and release fishing (top-down food chain management) can help to reduce the rusty population within a lake.

There are a variety of crayfish traps available on the market today at minimal cost. Crayfish trapping regulations in place by the state of Wisconsin are as follows: 1) trap size at greatest diagonal measure should not exceed 2 ½ inches, 2) traps must bear the name and address of the owner, 3) traps must be raised and emptied at least once daily

following the set date, 4) trap markers may not exceed 5 inches in size, nor extend more than 4 inches above the water surface, and 5) trap markers should not be orange or fluorescent in coloration. For updated information about live trapping of crayfish, consult the most current *Wisconsin Hook and Line Fishing Regulations* handbook available at most bait shops or online at (http://www.fishingwisconsin.org).



Biological Controls

General

Definition: A control method that utilizes one plant or animal as a means to control another plant or animal that resides within the same environment.

Safety Matters: Caution must be taken when a biological method of AIS control is selected as a treatment option. The end result(s) of introducing a new species of animal or plant to the environment may be uncertain. The unwanted target species might vanish following the introduction, but then what? The newly introduced species could become the driving force of the next environmental problem. The decision to use a biological method of treatment in a lake ecosystem must be an educated one. Do the necessary research and communicate often with local WDNR resource professionals.

Permits: It is illegal in Wisconsin to introduce any biological agents into public surface waters without a WDNR permit (s. 23.24 (3) Wis. Statutes). The permits are free of charge, and the type of permit required will depend on the species being introduced. The purpose behind the permit requirement is to protect the environment from introductions of any new or potentially hazardous invasive species. Consult *Appendix E* of this guide for state permit requirements.

Time Table: The desired result of biological control is to reduce the spread and weaken the unwanted population to the point of eventual eradication. The results of biological control methods are not immediate. It is normal for a considerable amount of time to pass before suppression becomes noticeable.

Consult with the WDNR to discuss biological treatments. They can help you with answers to your questions about costs, permitting, project set up, and implementation.

Why not use rusty crayfish to reduce aquatic plants?

Bad Idea!

When rusty crayfish are introduced into a new environment with abundant food resources such as aquatic plants or EWM, their populations may explode. It is safe to say that over a relatively short time period, there will be a reduction in EWM, as well as the entire native aquatic plant population! Once the lake is devoid of aquatic vegetation, what was once only an invasive plant problem will be replaced by all time high algae blooms, a marked reduction in water clarity, decreased oxygen levels, and finally a marked decline in the sport fishery of the lake.

Biological Options

Native Vegetation

Deterrent: The mere presence of intact native aquatic vegetation within lakes and terrestrial vegetation in the near-shore areas of lake shorelines are very effective deterrents of aquatic invasive species (Smart and Doyle 1995). Native vegetation hampers the ability of an invasive plant species to "move in" and become established. A healthy native plant population has the tendency to inhibit a would-be invasion by competing for nutrient resources and living space. "However, even healthy, well-developed communities may eventually be invaded and dominated by non-native species" (Madsen, et al, 1991).

Advantages: There are several advantages to intact native vegetation within a lake and along a lakeshore. Vegetation will: help to slow down the nutrient-rich runoff water from the watershed; provide a "sink" for nutrients that would otherwise get into the lake ecosystem; substantially reduce the potential for bank erosion; and provide crucial habitat for wildlife and beneficial insects (including weevil over-wintering habitat). By reducing the overall nutrient load that enters a lake from watershed runoff, there's a marked reduction in the amount of food that could otherwise feed the growth of EWM or other aquatic invaders. The presence of native aquatic vegetation in the shallow areas of lakes not only provides habitat for fish, but also keeps bottom sediments stabilized, provides a nutrient sink for runoff that makes it to the lake, and protects the shoreline from the erosive forces of wind and wave action.

Do Not Disturb: Try to leave native stands of vegetation undisturbed. If disruption has already occurred, there are ways to re-establish native terrestrial and aquatic vegetation to Wisconsin shorelines and aquatic habitats (Smart, et al 2005). Contact your local County Land Conservation Department or the WDNR for details.

Milfoil Weevils

General: Aquatic weevils (*Euhrychiopsis lecontei*) are insect *herbivores* (plant-eaters) that are used in the management of Eurasian watermilfoil (EWM). Weevils are native to Wisconsin lakes and are normally found in water bodies with healthy stands of northern watermilfoil. However, researchers have found that weevils prefer EWM as a food source over northern watermilfoil (Lillie and Helsel, 1997). By supplementing

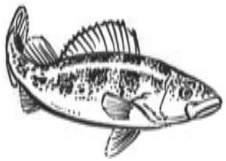
the native weevil populations in a lake, suppression of EWM may be achieved over time. As part of an environmentally-friendly patented "MiddFoil" management process, weevils can be purchased from *EnviroScience, Inc.* (a biological service and supply company), for the cost of about $1.25 - $1.50 per insect. To learn more about how the "MiddFoil Process" works, refer to the *EnviroScience* website (http://www.enviroscienceinc.com). A WDNR resource professional can also provide you with current information pertaining to biological control treatment with weevils.

Lifecycle: It is the weevil lifecycle that eventually destroys EWM plants. Weevils lay their eggs on the active growth areas of the plants and the hatching larvae actively feed on the new shoots and stems. Weevil larvae burrow into the stems. Burrowing destroys vascular plant tissues and opens the plant up to various diseases. This will ultimately cause the entire plant to collapse to the bottom of the lake. Once collapsed, *photosynthesis* (a metabolic process that utilizes energy from sunlight to produce energy for plant growth) is hampered and the plants will die. Adult weevils will over-winter in vegetated and leaf littered near-shore areas of a lake. The successful and continuous lifecycle of native weevils from year to year depends on the availability of leaf littered habitats, such as those existing on natural, undeveloped shorelines (Jester and Bozek, 1999).

Purple Loosestrife Beetles

General: (*Galerucella calmariensis* and *G. pusilla*) Galerucella beetles are 3-6 millimeters in length and prefer to feed on actively growing shoot tips of Purple loosestrife (PL). The feeding activity of adult beetles creates stress on the plants and reduces the spread of the PL population by minimizing flower and seed production. Beetle populations remain relatively localized, and it may take from 3 to 5 years for the beetle population to build up to levels that will affect the PL plant population. Purple loosestrife beetles are very susceptible to chemical pesticides, and exposure to any chemicals while using them as a treatment method should be avoided. The rearing of new beetle populations has been the focus of many citizen and classroom based projects throughout Wisconsin. Written protocol for successful and economical beetle rearing has been established. For more information about beetle rearing, log on to (http://dnr.wi.gov/org/es/science/publications/ss981_2003.htm).

Lifecycle: Adult beetles hibernate in leaf litter over the winter months and emerge in the spring. Active feeding on the spring shoots and leaves of purple loosestrife plants begins immediately. Females may lay anywhere from 300 to 400 eggs per year. Beetle larvae actively feed on buds, leaves and stem tissues which will cause further stress on a plant's growth potential. Over time, the entire stand of purple loosestrife is affected and suppressed. Beetle populations will actively seek out new PL stands to sustain themselves and insect populations will naturally decline as their preferred food source runs low.



Food Chain Dynamics

Top-Down Dynamics: It is possible to reduce the population of small rusty crayfish from a lake by manipulating the food chain with a top-down management approach. Small crayfish are a food resource for several popular game fish such as walleye and bass (especially smallmouth bass). The larger game fish are on a higher tier of the lake's food chain and act as a natural predator to smaller animals. By increasing protection of the game fish through restrictive fishing regulations and voluntary catch and release by anglers, the predator population is allowed to increase. This enables the larger fish predators to significantly reduce the population of crayfish that could otherwise harm the aquatic environment.

Chemical Controls

General

Definition: A control method that utilizes chemical herbicides or pesticides to treat unwanted aquatic species.

Safety Matters: The federal Environmental Protection Agency (EPA) conducts research studies on pesticides and registers them for usage in public waterways. When a certain chemical becomes registered, the EPA has concluded that the benefits of using the chemical outweigh the risks (WDNR, 1990). Federal registration status is the determining factor for which chemicals are approved or disapproved for use in Wisconsin's waterways. The take-home message here is this: do not assume that the use of pesticides is safe or without risk. Realistic decisions must be made that will determine the potential effectiveness of a chemical treatment or continued treatments within a lake. The decision to use chemical in a lake ecosystem must be a cautious and educated one. Do the necessary research and communicate often with your local WDNR natural resource professional and consultant.

"…do not assume that the use of pesticides is safe or without risk. The decision to use chemical treatment in a lake ecosystem must be a cautious and educated one. Do extensive research and communicate often with your local WDNR resource professional and consultant."

Permits: The application of chemicals in Wisconsin waters is regulated by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). A permit for use of chemicals in the environment is required by the WDNR. As part of the permitting process, chemical permit applications are reviewed by a fisheries biologist, a wildlife biologist, and a toxicology review team. The purpose behind the permit review process is to study potential impacts of human health and aquatic life in an effort to sustain the healthiest ecosystems possible. Chemical permits approved for use in Wisconsin waterways require a fee and prior approval of an Aquatic Plant Management Plan (APMP) by the WDNR. The APMP will clarify short and long term water management goals and limit unnecessary, excessive, or impulsive use of chemicals in public waters. The WDNR or your consultant can assist you with the specifics of an APMP. For details and planning guidance on the Wisconsin's Aquatic Plant Management program, go to (http://www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp).

Licensed Consultants: Experienced consultants understand and respect the conditions set forth in WDNR chemical treatment permits. Individuals that apply chemical pesticides in public waters must be certified and licensed by DATCP. When your group hires a contractor for this purpose, be certain that he or she has a current license and that they respect the permit conditions set forth by the state.

For a listing of businesses that offer services in chemical application, refer to (http://www.uwsp.edu/cnr/uwexlakes/lakelist).

For helpful tips on hiring a contractor, refer to *Appendix D* of this guidebook.

Chemical Options

Animal Pesticides: There are no known pesticides available that will *selectively* eradicate rusty crayfish, spiny water fleas (SWF), or zebra mussels (ZM), without also harming other animal species in the same environment.

Rotenone – This pesticide (a *Piscicide*), is used in waterways when the management goal is to remove the entire fish population. Piscicides can only be applied by agency personnel when implementing a fishery management project. Fishery biologists will sometimes remove undesirable species in order to manage and restore balance to a sport fishery (e.g., removal of invasive common carp when their populations have upset the balanced fishery of a water body). Rotenone works at the cellular level by inhibiting oxygen absorption in the blood. A few registered product names on the market are Prentox® and Fish-Tox-5®.

Herbicides are divided into categories of "systemic," "contact," "broad spectrum," or "selective." Understand the differences in order to select the right type of chemical for a given treatment.

Plant Pesticides: The most commonly used pesticides used in Wisconsin waterways are called herbicides or algaecides, used to treat problematic plant or algae species. Herbicides are categorized as: **systemic** herbicides which are taken up within the plant tissues resulting in the death of the entire plant; contact herbicides affecting only those surfaces of the plant that are exposed (i.e., some plant tissues may survive); **broad spectrum** herbicides that kill many different plant species; or **selective** herbicides which kill targeted plant species and do not affect others they may come into contact with.

2,4-D (*2,4-dichlorophenoxyacetic acid*) – a systemic herbicide that inhibits normal plant growth by interfering with the process of cellular division. 2,4-D is a relatively selective chemical useful for control of targeted invasive species such as EWM. A few registered product names on the market are Navigate® and Aquacide®.

Trichlopyr (*pyridinecarboxylic acid*) – a systemic herbicide that enters through plant foliage and stems, disrupting normal metabolism. Trichlopyr is a relatively selective herbicide used for control of targeted invasive species such as EWM or PL. A few registered product names on the market include Renovate® and Garlon®.

Endothall (*endothall acid*) – a contact herbicide that works by blocking the plant's ability to produce certain proteins that it needs to survive. Endothall is a broad spectrum herbicide sometimes used for control of invasive species such as EWM or CL. A few registered trade names on the market include Aquathall K® or Hydrothall®.

Fluridone (*1-methyl-3-phenyl-5-[3-(trifluoromethyl) phenol*]-4(1H)-*pyridinone*) – a systemic herbicide absorbed slowly by the plant's roots, inhibiting the production of carbohydrate which is the primary source of energy needed for plant growth. Fluridone is a selective herbicide used for control of targeted invasive species such as EWM or CL. It is only effective on closed lake systems (seepage lakes) as "whole lake" treatments. Registered trade names on the market include Sonar® or Avast!®.

Long term and short term APMP goals play an important role in which chemical to use for treatment. WDNR staff will always consider the management goals when advising the best product to use.

Glyphosate (*[isopropylamine salt of n-(phosphonomethyl) glycine]*) – a systemic herbicide that blocks the production of certain proteins needed for plant growth when absorbed through the leaves. Glyphosate is a broad spectrum herbicide used for control of terrestrial and aquatic invasive species such as PL. Registered trade names on the market include Rodeo®, Aqua Neat®, or Eagre®.

Diquat (*[diquat dibromide (6,7 dihydrodipyrido (1,2-a:2',1'-c) pyrazinediium dibromide]*) – a contact herbicide that damages cell tissues when absorbed by the foliage. Diquat is a fast acting, broad spectrum herbicide and will damage any parts of a plant that come in contact with it. A few registered product names on the market include Weedtrine-D® or Reward®.

Copper Chelates (*metallic copper*) – copper products are used in conjunction with other herbicides as an algaecide. Excessive copper works to prohibit photosynthesis and growth of algal cells. Depending on lake conditions, copper treatment may follow an herbicide treatment as a means to avoid a severe algae bloom. Registered copper products on the market include Cutrine-Plus®, K-Tea Algaecide®, or Aquatrine Algaecide®.

Step 9: Select Management Goals & Treatment Options

Once a consultant has been hired, a map of the AIS area(s) has been created, and the extent of infestation has been determined, the lake group will be in good standing to make sound decisions about the treatment option(s) and management goals that best fit the situation. The aim of this section is to give you basic information about AIS management options. It will ultimately be the lake organization, the consultant, and the local WDNR resource professional working together to make the most sensible decisions for the unique lake situation. Refer to the *Know the Control Methods* section of this guidebook for specific information about physical, biological, or chemical control methods.

An aquatic plant management plan (APMP) should either be in progress or completed in order for a chemical treatment to take place within the lake.

Described below are the AIS management options currently available. Options are categorized into Plant or Animal, and further separated by species of concern and extent of infestation. Management goals and treatment options are directly related to the extent of infestation as determined - low, medium, or high (Helsel, 2000). Besides the options listed below, groups may elect to do no AIS treatments, or they may select a combination of treatments.

Invasive Plants

Purple Loosestrife (PL)

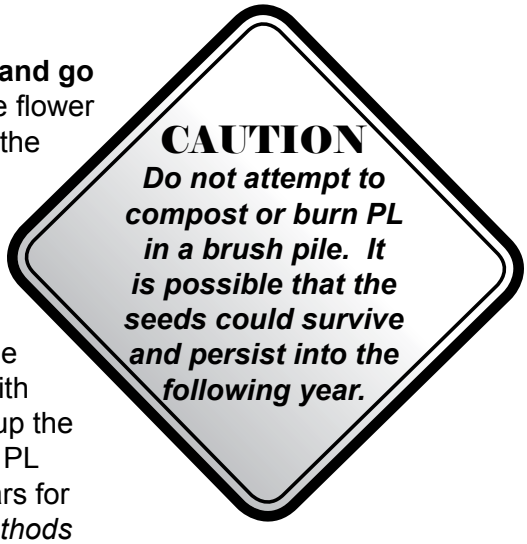
Low Level Infestation –

Management Goal: To eradicate existing PL plants.

Treatment Options:

Physical Control - Cut the flower heads **before they mature and go to seed**, and then dig up the entire plant by the roots. Seal the flower heads or entire plants tightly in a plastic bag and dispose of in the garbage.

Chemical Control – Before treatment with chemical, cut the flower heads before they mature, seal them in a plastic bag, and dispose of in the garbage. Once this step is completed, spray the chemical directly onto the remaining plants. Read the label instructions thoroughly and use as directed. Follow up with more chemical if you observe surviving PL stems. Do not dig up the dead PL plants, as this may disturb soil and stimulate a stored PL "seed bank". Be sure to watch the area closely for several years for evidence of new PL shoots. Refer to the *Know the Control Methods* section of this guide for specific chemical herbicide information.



Medium Level Infestation –

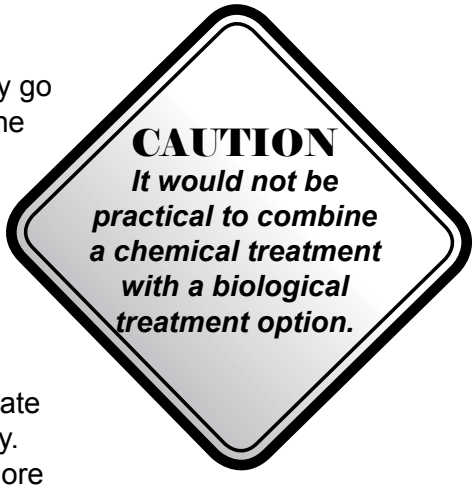
Management Goals: To inhibit further spread of PL and attempt to eradicate the existing plants.

Treatment Options:

Physical Control – Annual cutting of the flower heads before they go to seed will help to inhibit the spread of the PL population. Seal the flower heads in a plastic bag and dispose of in the garbage.

Biological Control – Place Galerucella sp. beetles directly onto the PL plants to begin the process of biological control of the population.

Chemical Control – attempt to eradicate existing PL plants by using chemical herbicides. It may take several attempts to eradicate the entire population under the "medium level" infestation category. Refer to the *Know the Control Methods* section of this guide for more information about physical, biological, or chemical treatments.



High Level Infestation –

Management Goal: Try to control further spread of the PL population by weakening the existing population. This may take several years to achieve. Eradication may not be possible.

Treatment Options:

Biological Control – Place *Galerucella sp.* beetles directly onto the plants to begin the process of biological control.

Chemical Control – Try to weaken the population of PL by use of chemical herbicides. It may take several applications to sufficiently weaken the population by chemicals. Refer to the *Know the Control Methods* section of this guide for more information about biological or chemical treatments.

Eurasian Water Milfoil (EWM) & Curly Leaf Pondweed (CL)

Low Level Infestation –

Define: Due to the unpredictable nature of spread for some invasive species (especially EWM), only a narrow window of time may exist during which a *pioneer* infestation remains at a low level.

The WDNR defines a low level or "pioneer" infestation as "a localized bed that has been present less than 5 years and is less than 5 acres in size or less than 5% of lake area, whichever is greater."

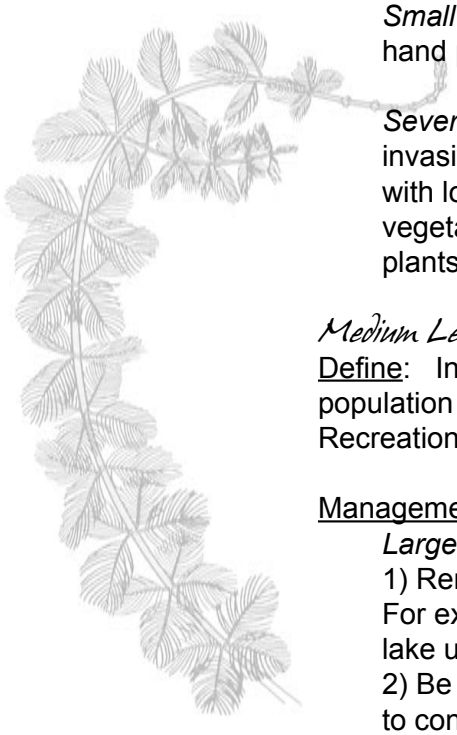
Management Goals:

Small Isolated Colony: To eradicate the small invasive plant population and protect the native plant population.

Several Small Isolated Colonies: Concentrate eradication efforts on localized areas and reduce the chances of further spread. To inhibit spread, make it a high priority to protect native aquatic plant beds.

Treatment Options:

Small Isolated Colony: Physically remove all visible invasive plants by hand pulling – be careful to collect and remove all fragments.



Several Small Isolated Colonies: Physically remove all visible invasive plants by hand pulling and removal of fragments. Follow up with localized chemical treatments and restoration of native aquatic vegetation. Monitor closely in subsequent years for new invasive plants emerging in the area.

Medium Level Infestation –

Define: Invasive colony has spread enough to become a "moderate level" population and eradication as a management goal is no longer realistic. Recreational lake use problems may not yet be apparent.

Management Goals:

Large Isolated Colony:

1) Remain focused on lake management requirements at this time. For example - to open up an access area, or open up a recreational lake use area, etc.

2) Be realistic and adaptable when setting goals. Important questions to consider are: What goals are we striving toward? Is the goal a 30% reduction by next year or an 80% reduction by tomorrow? How

many acres can we afford to control? Should chemicals be used at all? Is there an existing contingency plan that already clarifies some of these questions?
3) Protect native aquatic plants as much as possible. By maintaining a strong and diverse native plant population, the chances of attaining management goals and keeping the invasive colony isolated will increase.

Several Isolated Large Colonies: Keep colonies at bay or keep navigational pathways open. An example of this situation would be "high level" infestation in one bay of the lake, but as a whole, the lake is still at "moderate level." You might consider "high level" treatment in the largest colonies, and "medium level" treatment in the remaining colonies around the lake. Important questions to consider in this situation are: Should we wait and see where problems arise and then treat them? What areas of the lake should receive treatment priorities, and why? Should all infested areas be treated with chemicals or should alternative methods be used to treat some of the smaller areas?

Treatment Options:

Large Isolated Colony: Limit chemical or biological treatment to the specific area.

Several Isolated Large Colonies:

Physical Control – hand-pull plants in some of the smaller colonies and **collect and remove all fragments**. DO NOT use a mechanical harvester at this time, the risk of further spread is too high.

Chemical Control – try selective chemical herbicide treatments.

Biological Control – biological controls may be an effective treatment to reduce or weaken the invasive population to a more manageable size.

High Level Infestation –

Define: The population of EWM or CL has become extensive and recreational lake use problems and/or ecological degradation have occurred (e.g., boat travel corridors are choked with plants, stinky beach scum, degraded habitat, multiple invasive species colonizing the lake, reduced biological diversity, etc.).

Management Goals:

Long Term Management Goals: Manage the entire lake as per recommendations of an existing (or currently underway) aquatic plant management plan (APMP) or comprehensive lake plan. Management planning helps to clarify long term desired results. Components of a plan may include: an outline of all problem areas on the lake with a clear plan to treat invasive species; a strategy set in place to restore native aquatic vegetation to discourage future AIS colonization; a clear understanding of treatment costs and project(s) funding; methods by which to evaluate the successes or failures of treatment(s), and an understanding that the plan may need revisions at a later date.

Short Term Management Goals: Manage the most prevalent problems in the lake as they arise. The focus of this management strategy is to localize AIS treatments to produce short term results. This approach may have initial cost advantages, but management planning should be on-going, with goals evolving through time.

Treatment Option/s:

Chemical Control – treat with a selective use herbicide in focused area(s) followed by native aquatic plant restoration. This treatment option may be useful as part of a long or short term management scenario. Large scale or whole lake chemical treatments are not advised for a lake with high level infestation. This type of treatment would be cost prohibitive and will likely produce poor results.

Physical Control – physical options for high level infestations include selective cutting (with the use of a mechanical harvester) in problematic areas, or whole lake water level draw-downs.

Biological Control – treatment with weevils may be effective at weakening a EWM population, but chances of eradication are very low in highly infested areas.

Invasive Animals

A lake group that is facing an invasive animal species is faced with somewhat different challenges than lake groups dealing with invasive plants. Once a lake is infested with a population of invasive animals, there is no reasonable way to eradicate that population. Secondly, it is ineffective to target treatment areas within the lake because animals are mobile. Third, there are no means of treating aquatic invasive animals without also causing distress to the native animal species.

The control methods available today for treating invasive aquatic animals are not as varied as those for invasive aquatic plants. Regardless of the level of the animal infestation, the only treatment method available will be of a "physical" type. Other control methods under investigation by the scientific community are UV radiation, bacteria, radio waves, and fish augmentation (11th International Conference on AIS, 2002).

Rusty Crayfish (RC)

Low, Medium, High Levels of Infestation –

Management Goal: To reduce existing population of rusty crayfish to within a manageable level. To reduce the population of rusty crayfish enough to minimize (or avoid) negative impacts on the ecosystem.

Treatment Option:

Physical Control – live trapping of the crayfish population in combination with voluntary catch and release fishing.

Zebra Mussel (ZM)

Low, Medium, or High Level of Infestation –

Management Goal: To protect boats and other personal property from high level accumulations of zebra mussels. To clear inlet or outlet pipes. Attempt to reduce bio-accumulations of zebra mussel shells on shorelines or beach areas. To protect other area water bodies by preventing further spread of ZM.

Treatment Options:

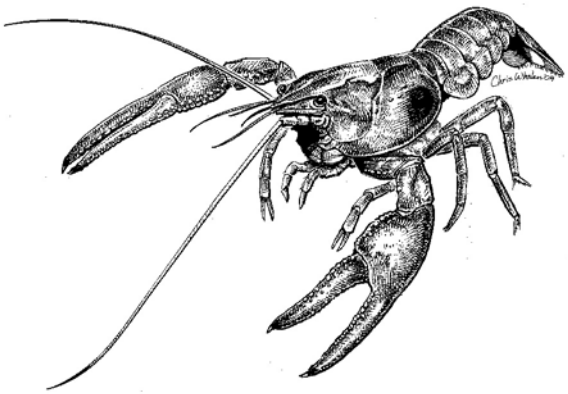
Physical Control – there are no means available to eradicate a live and thriving zebra mussel population. However, there are ways to cope with shell accumulations. These include high pressure washing of personal property or pipes; and hand raking and disposal of shells along shorelines. Prevent ZM infestation of other surface waters by organizing a boat inspection program at all landings and practice preventative steps as follows: remove visible vegetation from boat; thoroughly flush boat and trailer with hot water; air dry boats and equipment for at least 5 days before launching into “non-invested” waters; examine the exterior of the boat for veligers or adults; and empty bait buckets on land.

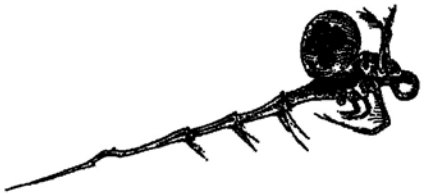
Spiny Water Flea (SWF)

Low, Medium, or High Levels of Infestation –

Management Goals: To communicate and work closely with fishery biologists to protect the health of the predator fish population. To protect other area water bodies against infestations of SWF.

Treatment Option: Organize a watercraft inspection program at all area landings. Rinse boat and trailer with hot tap water and dry off thoroughly between uses.





Other Considerations

Other things to remember while coping with AIS on proactive or reactive levels include the following.

DNR Violation Hotline

You may confidentially report suspicious wildlife, recreational, or environmental violations at any time to the Wisconsin Department of Natural Resources by calling 1-800-TIP-WDNR (1-800-847-9367). This number is monitored 24 hours a day, 7 days a week.

Boat Landing Signage

Be certain that all signage at public or private boat landings is maintained and updated with current information about existing AIS infestations or information about new invasive species. If you notice that updating of state signage is necessary, contact the local WDNR office to replace old signs.

Citizen Monitoring

The search for aquatic invasive species is an on-going process. In addition to the current invaders to be on the look out for, there will always be other new ones "looming." Always keep a vigilant eye out for suspicious plants or animals that seem to suddenly appear in any lake. You may be the person who catches an infestation in its earliest stages. Obtain a sample, and contact a resource professional in your area with questions.

Tailoring Your Plan

There is no "one-size-fits-all" solution for lake groups when coping with AIS. All lakes and lake groups are unique and have different sets of circumstances to consider. Tailor your mixture of management measures to what works best in your situation. You will always be able to make changes to original plans and adapt plans later as changes become necessary.

Works Consulted

Books:

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Hitching a ride, Wisconsin Natural Resources Magazine - WDNR, June 2005.

Nichols, Stan. *The Other Side of Harvesting.* Article in *Lakeline* magazine, North American Lake Management Society, 18(1):14-15, March 1998.

Out of Place - How aquatic exotic species alter Wisconsin waterways, Wisconsin Natural Resources Magazine - WDNR, June 2001.

Publications:

Aquatic Invasive Species – A handbook for education efforts, WDNR publication WT-825 2005.

Boaters: Take action against zebra mussels, Ohio Sea Grant publication FS-054.

Borman, S., R. Korth, and J. Temte (1997). *Through the Looking Glass…A Field Guide to Aquatic Plants*. Wisconsin Lakes Partnership, DNR publication FH-207-97.

Doyle, R. D., and Smart, R. M. *Competitive interactions of native plants with nuisance species in Guntersville Reservoir, Alabama*. Misc paper, A-95-3, U.S. Army Engineer Waterways Experiment Station, Vicksberg, MS, 1995, pgs 237-242.

Lyden, Tiffany. *The Vilas County Lake Resource Guide*, publication from Vilas County (WI) Land and Water Conservation Department, 2001.

Renovate® Aquatic Herbicide Technical Bulletin, SePro Corporation, rev1 2/2004.

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Smart, R. M., Dick, G. O., and Snow, J. R. (2005). *Update to the Propagation and Establishment of Aquatic Plants Handbook*. Publication ERDC/EL TR-05-4, U.S. Army Engineer Research and Development Center, Lewisville, TX.

WDNR Chemical Fact Sheet series, publications WR-235, 236,237,238,239,240, May 1990.

WDNR Hook and Line Fishing Regulations 2004-2005, pg.10.

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Cooke, G.D. (1980). *Lake Level Drawdown as a macrophyte control technique*. Water Resources Bulletin, 16:317-322.

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Madsen, J.D., and C.W. Boylen (1989). *Eurasian Watermilfoil seed ecology from an oligotrophic and eutrophic lake*, Journal of Aquatic Plant Management, 27:119-121.

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Moody, M. and D. Les (2002). *Evidence of hybridity in invasive watermilfoil (Myriophyllum) populations*, Proceedings of the National Academy of the Sciences of the United States of America, 99(23):14867.

Websites:

http://www.sara-lake.org/ws/weevil.htm

http://www.nysaes.cornell.edu/ent/biocontrol/weedfeeders/galerucella.html - information about purple loosestrife beetle lifecycle, etc.

http://www.cips.msu.edu/ncr125/GuideGalerucella.htm - information about PL and recommendations for management.

http://www.ecy.wa.gov/programs/wq/plants/management/drawdown_strategies.html

Appendix A
Contact List

County

Land and Water Conservation Departments
To locate phone numbers and general contact information for a specific county in Wisconsin, go to: www.wicounties.org/Default.asp, then click on “County Directory”.

State

Wisconsin Department of Natural Resources
101 S. Webster Street
PO Box 7921
Madison, WI 53707-7921

To locate phone numbers and contact information for a specific program or regional employee, go to: http://www.dnr.state.wi.us/org/water/fhp/lakes/, then click on “Lake Contacts”.

University of Wisconsin Extension – Lakes Program
College of Natural Resources, University of WI – Stevens Point
800 Reserve Street
Stevens Point, WI 54481
Phone: (715) 346-2116
http://www.uwsp.edu/cnr/uwexlakes

Laura Herman
Citizen Volunteers Lake Monitoring Network Educator
Phone: (715) 346-3989
Email: Laura.Herman@uwsp.edu

Laura Felda-Marquardt
Clean Boats, Clean Waters Statewide Coordinator
Phone: (715) 365-2659
Email: laura.felda@dnr.state.wi.us

Wisconsin Association of Lakes
One Point Place, Suite 101
Madison, WI 53719
Phone: 608-662-0923 or Toll free (WI only) 800-542-5253
http://www.wisconsinlakes.org

Appendix B

Websites for Further Information

Control Methods Information

http://www.fisheries.org/rotenone
A good website for information about rotenone

http://www.epa.gov
http://www.epa.gov/pesticides
US Environmental Protection Agency - information about chemicals

http://www.sara-lake.org/ws/weevil.htm
Information about weevils

http://www.cnr.umn.edu/fwcb/research/milfoil/milfoilbc.html
Information and research listings about plant bio-control

http://www.nysaes.cornell.edu/ent/biocontrol/index.html
Information page for biological controls

http://www.dnr.state.wi.us/org/water/wm/glwsp/exotics/publications/protectyourboat.pdf
Information about how to protect your boat from bioaccumulations of zebra mussels and prevent transport to other surface waters

http://www.aquatics.org/aquatic_bmp.pdf
Excellent resource for information about different control methods in management of invasive species. Aquatic Plant Management – Best Management Practices Handbook in support of Fish and Wildlife Habitat

http://www.aquatics.org/pubs/madsen2.htm
Information about advantages and disadvantages of aquatic plant management techniques

http://www.ducks.ca/purple/abstracts/index.html
Research abstracts about purple loosestrife control

http://dnr.wi.gov/org/es/science/publications/ss981_2003.htm
WDNR website for information about rearing Purple Loosestrife beetles

http://www.aquarius-systems.com/Default.htm
Information about mechanical harvesting techniques and products

http://www.ecy.wa.gov/programs/wq/plants/management/milfoil_strategies.html
Excellent “one stop” resource for questions about EWM treatment

http://www.trapperarne.com/wherelive.htm
Information, supplies, and tips about crayfish trapping….even recipes!

http://www.enviroscienceinc.com/cgi-bin/displayContent.pl?type=section&id=1
Information about biological control and purchase of weevils

Grant Information

http://www.uwsp.edu/cnr/uwexlakes/grants/AIS_long.pdf
WDNR AIS grant information and application forms

http://www.dnr.state.wi.us/org/caer/cfa/grants/recboat.html
Information about Wisconsin Waterway Commission grants, EWM treatments

http://www.glhabitat.org
Great Lakes Aquatic Habitat Network funding opportunities

http://www.nrfwis.org/
Natural Resources Foundation of Wisconsin – offer small scale finding opportunities to educate local communities

http://atriweb.info/CBM/index.cfm
Citizen-Based Monitoring Network of Wisconsin awards funds to non-profit and other groups for the purpose of educating and collecting resource data. Check the website for details.

Aquatic Invasive Species Information & Research

http://www.icais.org/
Comprehensive international forum for the review of accumulated scientific knowledge on AIS

http://www.invasivespeciesinfo.gov/
Good starting point for information or research on aquatic invasive species

http://www.sgnis.org/index.htm
Sea grant site packed with scientific research and publications

http://www.seagrant.umn.edu/exotics/index.html
General information and pictures about many invasive species

http://www.dnr.state.wi.us/org/water/fhp/lakes/aquaplan.htm
Information about WI APM program in the WDNR

http://www.dnr.state.wi.us/org/water/wm/glwsp/exotics/zebra.html
WDNR information specific to zebra mussels

http://www.protectyourwaters.net/hitchhikers/mollusks_zebra_mussel.php#why
Information about aquatic nuisance species from the US Fish & Wildlife Service and US Coast Guard

Miscellaneous

http://www.uwsp.edu/cnr/uwexlakes
Comprehensive lake information about ecology, lake management, research, grant opportunities, and more

http://www.uwsp.edu/cnr/uwexlakes/CBCW/pubs.asp
Information about the Clean Boats/ Clean Waters program and to order AIS educational publications

http://www.uwsp.edu/cnr/uwexlakes/ecology/APMguide.asp
WI Aquatic Plant Management guidebook - specific information about Aquatic Plant Management planning in Wisconsin

http://www.wri.wisc.edu/library/
General water information and research. Information updated periodically about AIS research

http://limnology.wisc.edu/index.php?pr=Trout_Lake_Station
Information about lake research happening in northern Wisconsin

http://www.dnr.state.wi.us/org/water/fhp/lakes/under/
Nice summary of how to understand volunteer lake monitoring data

Appendix C
Boat wash facilities

So you're considering a boat washing facility…

DNR and Extension staff receives a number of questions on the feasibility of installing boat washing stations at water access sites. (See Chapter 3 for legal questions and answers concerning boat launches and wash stations.) The stations could be used by lake communities as tools to reduce the risk of transport of aquatic nuisance species by recreational boaters. Wisconsin has not conducted any studies to determine the feasibility of using boat wash facilities. However, other states and provinces (Minnesota and Ontario) have tested various applications of boat washing stations, both permanent and portable, under mandatory and volunteer situations. From those studies, we have learned:

1. **Boat washing facilities should not be considered as a substitute for the steps that the aquatic invasive species program asks boaters to take when leaving the launch site.**

    a. The cornerstone of Wisconsin's invasive species program is a consistent list of prevention steps, which is emphasized in all of our public education brochures, pamphlets, watch cards, public service announcements and signage. Those steps include:
    b. Inspect and remove aquatic plants, animals, and mud from your boat and equipment;
    c. Drain water from your boat and equipment (motor, livewell, and bilge);
    d. Dispose of unwanted bait in the trash;
    e. Spray/rinse your boat and equipment with hot and/or high pressure water, especially if moored for more than a day, OR
    f. Dry your boat and equipment for at least 5 days.

    Boat washing is just one of the prevention steps, and installation of a wash station should accompany other education efforts focusing on all of the steps (presented in the order listed above).

2. **Boat washing stations are a costly alternative to an effective watercraft inspection program and a well-planned education campaign.**

    There are several issues to consider before the installation of washing stations:
    a. Costs for construction and maintenance of these facilities,
    b. Physical constraints for installation of the stations,
    c. Washing cannot be made mandatory for all boaters,
    d. Safety of the facility and liability are issues,
    e. Practical concerns about how best to capture and treat the waste water;
    f. Boaters acceptance of delays due to washing; and
    g. Unresolved legal questions related to whether fees can be charged for cleaning boats as a condition of launching.

3. **There are circumstances and situations under which it may be advisable to install a boat wash facility.**

   If prevention and containment is a serious issue or a condition of a permit or if there is a venue where heavy use is occurring as a result of a specific activity (boating and fishing tournaments or sailing regattas) or heavy boating periods (July 4th and Labor Day), a boat wash facility may serve an important purpose. In these situations a portable washing unit could work well as an educational and awareness tool to show boaters how to properly clean their boats.

If lake organizations are considering installing and operating a boat wash station, the following is a list of guidelines that should be followed:

- The wash station should be part of an overall watercraft inspection and education program, not simply a substitute for other prevention steps.
- Do not require washing as a condition of launching but rather treat boat washing as a voluntary option to ensure that boaters are doing everything possible to protect the resource.
- Use common sense in designing the facility—do not drain the water back to the lake and compost or put all the waste in the trash
- Give serious thought to whether the facility should be manned or unmanned, portable or permanent.
- Make sure that a reliable construction firm is in charge of the design, construction and maintenance of the facility,
- Be aware of the safety issues and liability of a wash station and follow all OSHA regulations.
- Seek feedback on boater acceptance of the facility, if possible, to improve statewide understanding of the issue.
- Consider installing a boat washing facility for boaters leaving an infested waterbody to prevent the spread of invasive aquatic species to other waters.
- Stay at least 75 feet back from the lake with the placement of any wash station to avoid conflicts with shoreland zoning regulations.
- Use the lake water as a source for the washing facility if possible.
- Restrict the use of detergents, algaecides or disinfecting agents that could harm the lake or nearby residents.
- Provide clear instructions on how to use the boat washing facility properly and safely and include an educational message as to why it's important.
- Use high-pressure hot water for the wash facility if possible (it is most effective).
- Charge only a reasonable fee for cleaning a boat before launching (such a fee would be based on the resident state park daily entrance fee).

Please note that specifications on the types of boat washing facilities that are most effective are not readily available, and are likely to vary based on specific needs. Therefore, they are not included in the guidelines presented above. Lake organizations can contact their local DNR staff to obtain information on vendors in their area that could help the community decide what type of wash facility would be most effective for their particular launch site(s).

The key message that should be shared with all groups that may be interested in installing a boat wash facility is as follows: wash stations are a poor substitute for an effective education and watercraft inspection program that emphasizes the basic 'inspection and removal message', BUT washing stations can be one component of an overall prevention and control strategy.

Appendix D

Environmental Consultants - Buyer Beware

When your group is in need of consultant services for a lake project, it is important to do your homework and shop around. In the selection and hiring process, remember that you are shopping for professional knowledge and services. Essentially, this person will be working for you. Your group has the right to interview consultants as if you were hiring an employee. A good working rapport with the professional consultant will be vital to a successful project outcome. Listed below are helpful steps to consider during your search for employing a consultant.

Step 1: **Research** potential companies with specific knowledge pertaining to your project idea.

A good place to start your search for companies is by consulting the current Lake List, an online directory that can be found at http://www.uwsp.edu/cnr/uwexlakes. You want to find a company that:

- Conducts business in your geographic location.
- Has a good reputation with state and/or other regulatory agencies.
- Sets realistic work goals for each field season and is able to deliver what is promised (how many employees in the company?, and how many current projects are underway?).
- Has had a good rapport in the past with lake organizations.
- Final products have a professional appearance, and are completed in a timely manner.

Step 2: Make **initial phone contact** with potential companies. Ask to speak directly with a consultant that you would work with. Ask basic questions about the project that you are considering. During the conversation, note the following:

Are you speaking directly to the field consultant, or to the salesman or manager of the company?

- Does he/she demonstrate proper communication and professionalism?
- Is this person comfortable to converse with (is not intimidating, demeaning, or abrasive)?
- Are they willing to share work references, a resume, examples of past work?
- Does he/she seem knowledgeable about the services offered by the company?
- Is he/she familiar with (or demonstrates a willingness to learn) current state protocols?

Step 3: **Write** a proposal/bid letter and send to at least 3 potential consultants. In the letter, specify exactly what you are seeking a bid for.

a) Describe the project with as much detail as possible (APM planning, acreage, etc.).
b) Describe what services and project deliverables you expect to receive from the project (field study, written management plan, oral reports, etc.).
c) Indicate what your group intends to contribute to the project (volunteer assistance, boats, supplies, etc.).
d) Specify a deadline date for itemized bids and a contact person from your organization.

Step 4: **Select** and **interview** the top candidates. Before the interviews, have your selection committee outline the most important criteria for hiring this person. Also, consider the following:

- Do you trust that they are offering a fair market price for their service(s)?
- Be sure that they offer you a contract which spells out project details & expectations (no hidden surprises).
- Are they good communicators – email, verbal and written skills? Will they be available when you need to communicate?
- A common (but challenging) interview question might be: What would you offer to us that other companies could not?

Step 5: **Draw up** and **sign an agreement** for the services proposed. This agreement would protect both sides in the unlikely event of a dispute. Be sure that fees, project start and end dates, finished products, responsibilities, etc. are openly stated in the document. Be sure that they:

- Seek your input, suggestions, or concerns for the project.
- Demonstrate honesty in the business transaction.

Step 6: **Plan** and **implement** the project. During this final phase, make sure:

- That someone from your group understands every detail of the project.
- You trust that they are not selling you more than you need.
- The consultant remains easy to converse with and approachable with questions and concerns.
- He/She works in compliance with conditions set forth by project permit(s).
- He/She continues to meet the conditions set forth by the signed contract (or has a respectable reason as to why the conditions have not been met).

Appendix E

Aquatic Plant Management Laws & Regulations

Activities	Water Bodies					
	[1]Wetlands (nonnavigable)	Streams	Flowages	Lakes <10 Acres Entirely Confined on One Property	Lakes	Fish Farms s. 95.96
Manual Removal of Native Plants	No Permit	No Permit	109 Permit Required if > 30 ft. wide	No Permit	109 Permit Required if > 30 ft. wide	No Permit
Manual Removal of Invasive Plants	No Permit	No Permit	No Permit	No Permit	No Permit	No Permit
Mechanical Harvest	No Permit	109 Permit Required	109 Permit Required	No Permit	109 Permit Required	No Permit
Chemical Control	107 Permit Required	107 Permit Required	107 Permit Required	107 Permit Required	107 Permit Required	No Permit
[2]Biological Control	Stocking Permit Required	Stocking Permit Required	Stocking Permit Required	Stocking Permit Required	Stocking Permit Required	No Permit
Burning	No Permit	Permit Required	Permit Required	Permit Required	Permit Required	No Permit
[3]Purple Loosestrife Control	107 Permit Required	107 Permit Required	107 Permit Required	107 Permit Required	107 Permit Required	No Permit
Native Planting/ Stocking	No Permit	No Permit	No Permit	No Permit	Approval of Project	No Permit
Non-native Planting/ Stocking	109 Permit Required	109 Permit Required	109 Permit Required	109 Permit Required	109 Permit Required	No Permit
Incidental or Scientific Removal	No Permit	No Permit	No Permit	No Permit	No Permit	No Permit

- All activities must be conducted in an environmentally sound manner.
- Any activities on privately owned land or adjacent to privately owned lake front property, or lakes confined on the property of one person must have the permission of that property owner.

[1] Confirm with water management specialist that wetland is nonnavigable to be exempt of permit.
[2] Use Stocking Permit for Eurasion Water Milfoil weevils, form 9400-60, pursuant to s. 29.753 and NR 19. 05.
[3] Must be a state cooperator if using Purple Loosetrife beetles for Biocontrol..

Appendix E

Wisconsin's New Aquatic Plant Laws

In September 2001, new laws were passed that represent some of the most significant changes to Wisconsin aquatic plant management to come along in decades.

Wisconsin State Statutes s. 23.24, relating to aquatic plants, requires the Department of Natural Resources (DNR) to establish a program to:

- Protect and develop diverse and stable communities of aquatic plants.
- Regulate how aquatic plants are managed.
- Provide education and conduct research on invasive aquatic plants.

A second law, s. 30.715 Wis. Stats., prohibits the launching of boats or boating equipment or trailers in navigable water if the person has reason to believe that the boat, boat trailer, or boating equipment has any aquatic plants or zebra mussels attached.

Major Changes

- A permit will be needed for the removal and harvesting of aquatic plants.
- Mechanical harvesting will require a permit.
- The launching of boats or boating equipment in navigable waters is prohibited if there is reason to believe the equipment has aquatic plants or zebra mussels attached.
- Manual cutting and raking will be exempt from the permit requirement if the area of plant removal is no more than 30 feet along the shoreline and any piers, boatlifts, swim rafts, and other recreational and water use devices are located within that 30 feet.

What are the next steps?

As a result of these changes, the Department of Natural Resources is drafting a new set of rules to manage aquatic plants. An Emergency Rule was adopted by the DNR in Spring 2002 to provide a permit program as required by the new legislation to regulate cutting and harvesting, planting aquatic plants, and any other methods of plant control. The final version of the Administrative Rule numbered and titled NR 109, "Aquatic Plants: Introduction, Manual Removal, and Mechanical Control Regulations" is open for public comment until August 23, 2002 during the public hearing period. ***The DNR is seeking input from lake organizations, aquatic plant service providers and individuals interested in protecting our valuable aquatic plant communities.*** **Written Comments on NR 109 may be sent to Frank Koshere, WDNR, 1401 Tower Ave, Superior, WI 54880.**

What is proposed in the new rule?

Wisconsin Administrative Code s. NR 109 will create a permit program for introducing aquatic plants, manual removal, and mechanical cutting and harvesting. As proposed in an early draft:

- Manual cutting and raking will be exempted from a permit if the area of plant removal is a single area with a maximum width of no more than 30' along the shoreline provided that any piers, boatlifts, swim rafts, and other recreational and water use devices are located within the 30' zone. All cut plants must be removed from the water.
- Mechanical harvesting will require a permit. Initially permits will be issued annually, and after completion of an approved Aquatic Plant Management Plan, permits may be issued for multiple years.

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