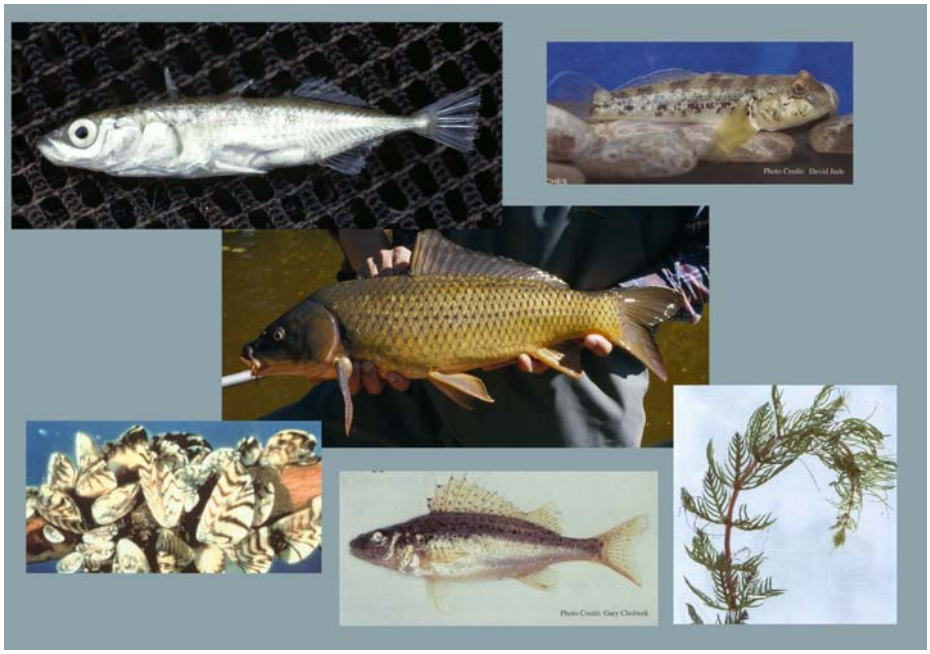
Wisconsin's Comprehensive Management Plan

To Prevent Further Introductions and Control Existing Populations of Aquatic Invasive Species



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Wisconsin Department of Natural Resources In cooperation with:

University of Wisconsin – Sea Grant

Great Lakes Indian Fish and Wildlife Commission

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INTRODUCTION

This plan was prepared by the Department of Natural Resources in cooperation with the University of Wisconsin-Sea Grant program and the Great Lakes Indian Fish and Wildlife Commission. A draft of the Wisconsin's Comprehensive State Management Plan was widely distributed in the fall of 2001 to local governments, state and federal agencies, state legislators, lake associations, conservation groups, the aquaculture association, fishing clubs and other interested parties. Comments received as part of this public review process on the draft document were incorporated into the final plan.

EXECUTIVE SUMMARY

Aquatic invasive species (AIS) have long been recognized as a serious problem in Wisconsin. In recent years, the magnitude of this problem has been rapidly expanding. This document is intended to serve as a guide for the state in developing coordinated responses to the problems associated with aquatic invasive species. This plan is one component of a comprehensive state effort to control invasive species that involves all affected state agencies and tribal governments working together to prevent the further introductions of invasive species (both aquatic and terrestrial) into Wisconsin's ecosystems. This plan focuses on prevention as the key strategy for limiting the impacts of aquatic invasive species by controlling their initial introduction and subsequent transfer from one water body to another. Prevention strategies rely heavily on information, education and communication. Therefore, this plan includes the full range of those activities needed to implement an effective prevention program.

However, prevention techniques alone are inadequate for limiting the negative impacts caused by aquatic invasive exotics. This plan also suggests that control, mitigation or elimination strategies must be considered. It incorporates information and education/outreach activities, watercraft inspection efforts and policy and legislative initiatives as key components of the overall program.

This document describes the major goals of prevention, control, and abatement, in

light of existing problems, necessary strategic actions, and specific future tasks. An essential component of the overall plan is to develop a state monitoring program and a resulting evaluation process to determine the effectiveness of the individual strategies.

This plan will form the framework for implementing a comprehensive state program consistent with the St. Croix Interstate Plan for Aquatic Nuisance Species approved by the Aquatic Nuisance Species Task Force in 1998. Similar to the St. Croix plan, other interstate AIS plans may be developed with adjoining states for other boundary waters.

The full implementation of this plan will result in a comprehensive state program to address the problems caused by aquatic invasive species in Wisconsin. The National Invasive Species Act (NISA) of 1996, which reauthorized and amended the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990, provides guidance for the development of such state program documents. The Governor of the State of Wisconsin, and the governments of the involved Indian tribes, will submit this plan to the Aquatic Nuisance Species Task Force for the purpose of seeking federal grants to implement this plan.

This document is designed to meet the specific requirements of Section 1204 (a) of NANPCA. That section relates to the development of a "comprehensive management plan, which identifies those areas or activities within the state, other than those related to public facilities..." Therefore, this plan deals with the issue from a broad natural resources perspective. More important than simply meeting the requirements of the act, however, is the expected value of having a comprehensive plan in place. The plan will provide the framework for a state program to guide future efforts in Wisconsin to combat problems caused by aquatic invasive species.

Comments were solicited from local and tribal governments and regional entities, the public and other interested parties. All the comments received were considered and incorporated as revisions to the plan as appropriate. A short survey form was sent out with the plan to facilitate the review process and to collect information for follow-up communications. A summary of the survey results and who provided comments on the plan are contained in Appendix E.

This plan describes the generalized approaches that must be followed to protect indigenous species and the socio-economic benefits that are threatened by aquatic invasive species. Individual species management plans on zebra mussels and Eurasian water milfoil, which are included as addenda to this plan, provide a greater level of detail on how Wisconsin has dealt with these specific aquatic nuisance species. It is likely that management plans for other individual species, or related species, will be developed as a result of this effort.

Concerns about aquatic invasive species are paramount for fisheries management on the Great Lakes, where 162 exotic species of fish, invertebrates, pathogens,

algae, and plants have been documented (Ricciardi 2001, Mills et al. 1993). However, the threat to inland waters and the resultant state impacts are staggering if the Great Lakes gateway cannot be closed.

Specific management actions, and a proposed work plan, detail specific tasks needed to effectively address the AIS problems facing the state. The work plan also serves as the funding proposal to the national ANS Task Force. The Wisconsin Department of Natural Resources, as the lead agency, will act as the grants coordinator and liaison with the Task Force for co-operating state agencies. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) will seek funding directly from the ANS Task Force for its programs approved in the plan. The agency and the tribes anticipate broad participation in the program and a coordinated effort with other state agencies involved in AIS issues, tribal governments, local authorities, and the private sector and perhaps most importantly, concerned citizens and individuals that use our water resources.

BACKGROUND ON AQUATIC INVASIVE SPECIES

This section provides a summary of the problems and concerns caused by aquatic invasive species. For a review of the regional situation on AIS refer to Appendix A.

The introduction of aquatic invasive species is not a new phenomenon in Wisconsin. All the species mentioned in Appendix A are causing, or have the potential to cause, significant problems throughout the state.

Numerous AIS have been introduced and dispersed in the Great Lakes and inland waters of Wisconsin by various pathways. The environmental and socioeconomic costs resulting from AIS infestations will continue to rise with new introductions. Although an awareness of the problems caused by AIS is emerging in Wisconsin, the solutions to these problems are not always readily apparent.

While the introduction of AIS via ballast water discharges has been well documented, other potential sources of AIS introductions have not been as well studied. Almost any transfer of aquatic life can become a carrier for transporting and introducing AIS. As a result, aquaculture operations, the sale and distribution of fishing bait, the pet trade, and individual boaters and anglers can unwittingly cause the introduction or the spread of aquatic invasive species.

There are also natural vectors, which can promote the spread of invasive species, e.g. aquatic birds, windblown seed dispersal etc. Collectively, these societal and natural sources of dispersal may be as significant to intra- and interstate transfer as ballast discharge is for new introductions.

Aquatic invasive species have transformed the Great Lakes ecosystems. Since 1810, 162 species of fish, plants, invertebrates, algae, and pathogens have been introduced into the Great Lakes (Hall et al. 2000, Ricciardi, 2001, Mills et al. 1993). Only about ten percent of these introductions have caused significant harm. Species like sea lamprey and alewives have caused serious problems, but they are also examples for which effective control measures have been undertaken. Attempts to control sea lamprey populations in the U.S. and Canadian waters of the Great Lakes are managed by the by the Great Lakes Fishery Commission. A large-scale program of predator stocking using salmon and trout has reduced alewife populations.

Two aquatic invasive plants have been particularly aggressive in replacing native plants in Wisconsin's inland waters and wetlands: purple loosestrife and Eurasian water milfoil. The abundance and geographic distribution of both species have increased rapidly over the last 20 years.

Priority Aquatic Invasive Species and Their Impacts

This section describes aquatic invasive species that are particularly problematic to waters of the state. State management actions and controls are focused primarily on these priority species. However, there are certainly other species of concern, and Wisconsin's efforts, as detailed in this plan, will focus on trying prevent the spread of all AIS in the state and controlling their impacts.

Specific priority species that are described below include:

- Purple loosestrife
- Eurasian water milfoil
- Curly leaf pondweed
- Zebra mussels
- Ruffe
- Rainbow smelt
- Common carp
- Rusty crayfish
- Round goby
- Reed canary grass
- Cylindrospermopsis raciborski

The management actions as described in this plan focus primarily on these priority species.

Purple Loosestrife

Purple loosestrife is currently in low densities in many wetland areas in Wisconsin where it has only recently been introduced. In wetlands where it has been established longer, it is present in very high densities. In those wetlands where purple loosestrife is present, there is significant cause for concern. Because of its capacity to aggressively invade new habitat, the wetland is soon dominated by purple loosestrife, thereby endangering the diversity of the wetland vegetation and threatening continued survival of rare and endangered plants. Wildlife species that depend on native vegetation for food and shelter, such as muskrat and waterfowl, also decline in numbers significantly while other species, such as marsh wrens and least bitterns, are displaced. Where populations are still small, landowners and others are encouraged to use a combination of cutting and use of approved herbicides to keep the population from spreading. Perhaps the most promising and viable long-term control strategy is the release of Galerucella beetles that feed primarily on shoots and leaves. In control efforts initiated in 1994 by the DNR, Galerucella beetles were released at two state properties in Wisconsin. This program has expanded over the last several years and shifted from a research to an implementation program. During the summers of 2001-02, beetles have been released at approximately 165 sites around the state with the aid of about 165 cooperators. In the last fiscal year from July 2001 - June 2002, $68,000 in state dollars have been used for the purple loosestrife bio-control program. Another $68,000 in state dollars has been allocated for the current fiscal year and similar

appropriations will continue in future years for this effort as part of baseline funding.

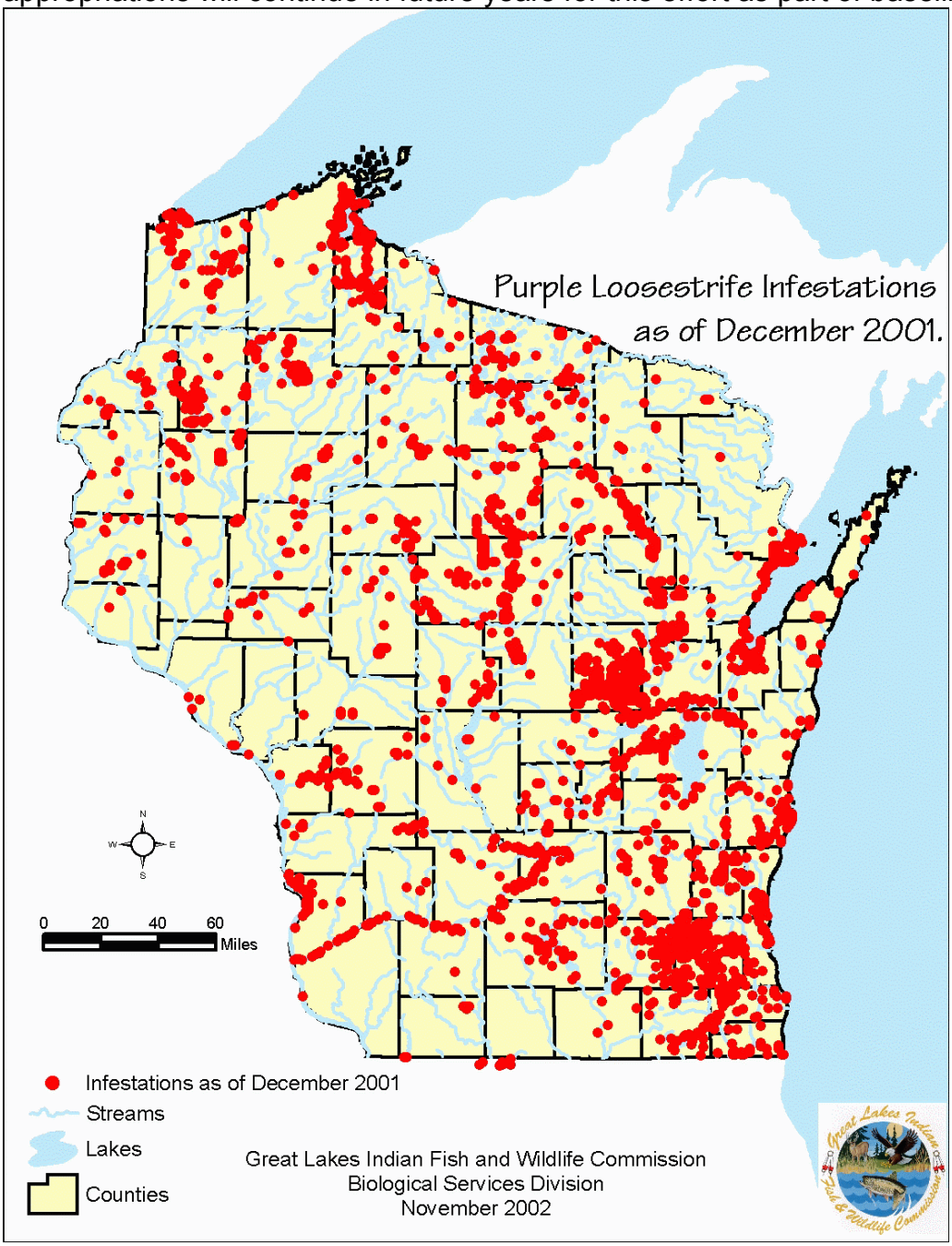

Figure 1. Distribution of purple loosestrife in Wisconsin.

GLIFWC and several member tribes have conducted purple loosestrife control since 1988 using both chemical and biological controls. GLIFWC's purple loosestrife distribution and control data (refer to Figure 1) has recently been compiled from a variety of information sources. The data has been published on the Internet to facilitate regional coordination of management efforts.

Eurasian Water-milfoil

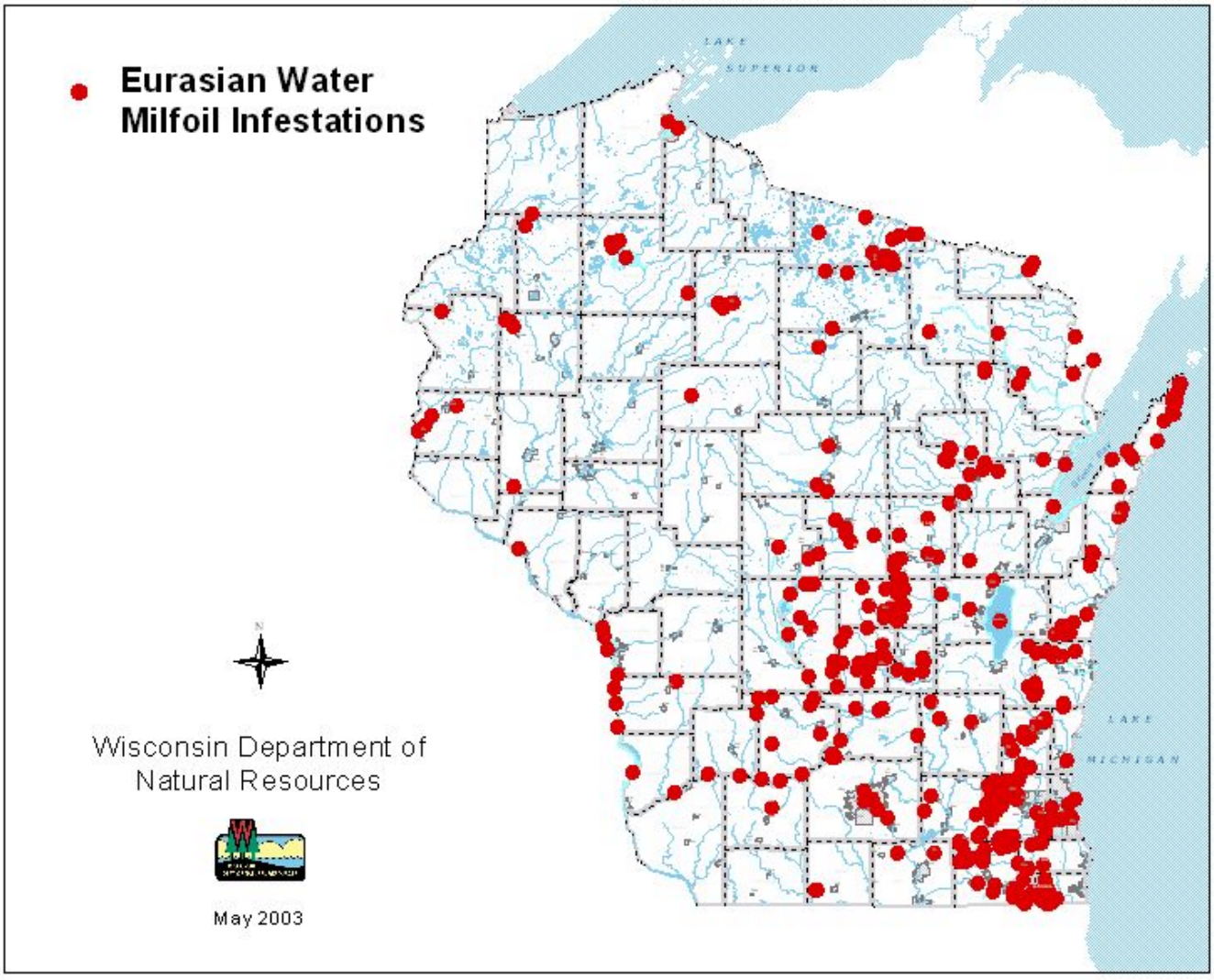

Figure 2. Distribution of Eurasian water-milfoil in Wisconsin.

Eurasian water-milfoil first appeared in Wisconsin's southern counties in the 1960's. In the past three decades, this aquatic invasive species has significantly expanded its range to 376 lakes in 59 of Wisconsin's 72 counties (based on data compiled through 2002). Refer to Figure 2 for the current distribution of Eurasian water-milfoil. Because of its potential for explosive growth and its incredible ability to regenerate, Eurasian water-milfoil can successfully out-compete most native aquatic plants, especially in disturbed areas.

In a number of Wisconsin lakes, Eurasian water-milfoil has formed huge monoculture stands with vast mats of surface foliage. Such stands of Eurasian water-milfoil shade out native aquatic plants resulting in ecological changes, loss of recreational opportunities and diminished aesthetic values. Because recreational activities like swimming, boating and sport fishing are limited by Eurasian water-milfoil on Wisconsin lakes, there have been many attempts to control this invader. A variety of

techniques have emerged for controlling Eurasian water-milfoil populations, including: mechanical cutting and harvesting in open areas, limited use of herbicide treatments and more recently the introduction of weevils as a biological control agent. The weevils are native to Wisconsin, and they are mass-reared and introduced for bio-control. Most lakes surveyed already have a low-level population of the weevil, but mass rearing provides a significant boast to control efforts.

Curly-leaf Pondweed

Curly-leaf pondweed was accidentally introduced along with the common carp. Until Eurasian water-milfoil arrived, curly-leaf pondweed was the most severe nuisance aquatic plant species in Wisconsin. It is widely distributed throughout Wisconsin lakes, but the actual number of waters infested is not known. Curly-leaf pondweed is native to northern Europe and Asia where it is especially well adapted to surviving in low temperature waters. It can actively grow under the ice while most plants are dormant, giving it a competitive advantage over native aquatic plant species. By June, curly-leaf pondweed can form dense surface mats that interfere with aquatic recreation. By mid-summer when other aquatic plants are just reaching their peak growth for the year, it dies off. Curly-leaf pondweed provides habitat for fish and invertebrates in the winter and spring when most other plants are reduced to rhizomes and buds, but the mid-summer decay creates a sudden loss of habitat. The die-off of curly-leaf pondweed also releases a surge of nutrients into the water column that can trigger algal blooms and create turbid water conditions. In lakes where curly-leaf pondweed is the dominant plant, the summer die-off can lead to habitat disturbance and degraded water quality. In other waters where there is a diversity of aquatic plants, the breakdown of curly-leaf may not cause a problem.

Zebra mussels

Zebra mussels are a more recent invader, having arrived in the Wisconsin waters of Lake Michigan in 1990. Since their initial discovery, zebra mussels have expanded their range in Wisconsin to include all of the nearshore areas of Lake Michigan (from Racine to Washington Island), Green Bay, Superior Harbor, the Mississippi River, the Lower St. Croix, portions of the Bark and Oconomowoc Rivers in Waukesha County, 43 inland lakes in 15 counties (based on data compiled through November, 2002), and a number of rivers that are tributary to Lake Michigan (refer to Figure 3). Zebra mussel populations are highest in Green Bay where densities are approaching levels found in Lake Erie. Because of the zebra mussel's tremendous filtering capability, resource managers are particularly concerned about the potential impacts to the food chain. In addition, zebra mussels can eliminate native mussels by colonizing on them. Studies have recently been completed on two inland Wisconsin lakes (Big Elkhart Lake in Sheboygan County and Silver Lake in Kenosha County) that have assessed some ecological impacts of zebra mussels on aquatic biota (Cuhel, et al., 1999).
Another resource of concern is the Mississippi River where the population of zebra mussels is steadily increasing. The zebra mussels pose a serious threat to the

commercial clamming industry on the Mississippi River. Native mussels are being smothered by high concentrations of zebra mussels that attach themselves to their shells. A recent survey by the Corps in the East Channel of the Mississippi River at Prairie du Chien has revealed a substantial reduction in the diversity and density of native mussels. The decline was likely the result of zebra mussel densities that reached over 10,000 per square meter in 1998. Future efforts may focus on relocating native mussel beds on the Mississippi River to other waters that are less likely to be impacted by zebra mussels.

Another concern on the Mississippi River is the unusually low dissolved oxygen concentrations in the range of 3-4 mg/L that were observed during the early summer periods of 1997 and 1998. High concentrations of zebra mussels stress dissolved oxygen levels in the river by creating respiratory demands and releasing waste products. The low dissolved oxygen levels further stir concerns of potential fish kills.

Water clarity improved dramatically in some parts of the Mississippi River in the late summer of 1997 which was likely influenced by the filter feeding activity of zebra mussels. While zebra mussels filter out many beneficial algae in the river, they leave behind the undesirable blue green algae. The result is that blue green algae populations frequently explode creating nuisance conditions for swimming, boating, and other water recreation.

Financial impacts of zebra mussels on Wisconsin residents have been significant because of new maintenance costs for Wisconsin's water utilities (about $4 million based on 1993 figures) and power plants (approximately $1 million in 1993).

Other concerns include:

- possible changes to the community structure and biodiversity of aquatic ecosystems from the invasion of zebra mussels,
- potential bioaccumulation of contaminants caused by zebra mussels, and
- dealing with the disposal of dead zebra mussel shells from beaches in environmentally sound and cost-effective ways.

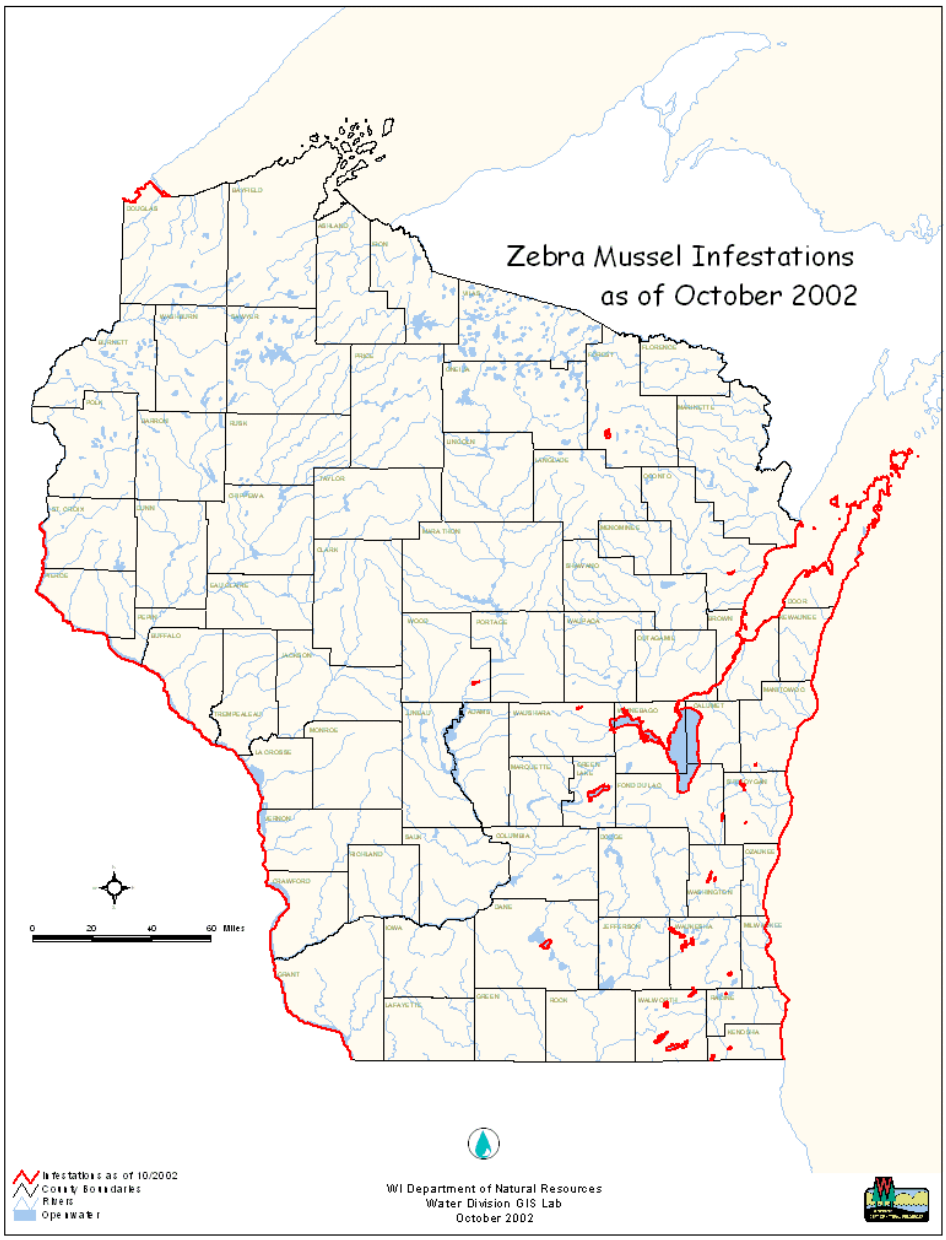

Figure 3. Distribution of zebra mussels in Wisconsin.

Ruffe

The ruffe is another recent aquatic invader to Wisconsin waters. Since it was first discovered in the St. Louis River in 1987, ruffe have moved eastward along the south shore of Lake Superior and have been transported, probably in the ballast water of ships, to the north shore of Lake Superior, Lake Huron, and the Green Bay waters of Lake Michigan. The species now inhabits all Wisconsin waters of Lake Superior and is the most abundant fish captured in bottom trawls in the St. Louis River estuary. Ruffe have not been shown to harm native species populations in the areas they

have been introduced, but mesocosm studies suggest they can affect the amount of energy available to yellow perch by consuming benthic macroinvertebrates (Schuldt, et al. 1999). Chemical treatment to control range expansion of the ruffe was examined as a control option, but has not been implemented because of the damage that would occur to native species and the lack of evidence that such treatment would be effective in slowing the spread of ruffe (Horns et al. 2000).

A ruffe control program was outlined by the Ruffe Control Committee, formed under the auspices of the ANS Task Force (Busiahn, 1997). Great Lakes shippers reduce the risk of transporting ruffe from western Lake Superior to other parts of the Great Lakes by voluntarily exchanging ballast water when leaving the St. Louis River for other ports. To reduce the risk of inadvertently transporting ruffe to inland waters, the Wisconsin DNR has prohibited the harvest of bait from Lake Superior.

Rainbow Smelt

The rainbow smelt is another aquatic invasive species that was introduced into Wisconsin's inland waters from the Great Lakes. Although the rainbow smelt is one of the less-publicized of exotic species, biologists are very concerned because it is taking its toll on native walleye populations and other fish species in some northern Wisconsin lakes. Smelt have been present in Wisconsin waters for over 70 years being first discovered in 1928 in Little Sturgeon Bay in Door County. Through the intentional or accidental efforts of private individuals, smelt continue to spread to more inland Wisconsin waters.

Only recently have DNR managers begun to realize the harm the rainbow smelt can do to our native fish communities. A number of lakes in Vilas County in northern Wisconsin are seeing significant declines in natural recruitment of walleyes. Lakes that once had healthy walleye fisheries now need to be stocked because smelt are present. Smelt compete directly with juvenile walleye for food, which may be the principal mechanism that limits walleye recruitment. Young smelt also compete for food with the young of some other native fish species. There is no ongoing monitoring program to determine the number of inland lakes infested with rainbow smelt, but it is likely to be relatively low.

Significant recreational fisheries for smelt exist on the Great Lakes and in some inland waters. One way to address the problem of accidental transport by anglers would be to prohibit the possession of live smelt.

Sparkling Lake in Vilas County provides a good example of an inland lake that has been impacted by smelt. The lake once had a good natural walleye fishery and needed no stocking. Smelt were first discovered there in low concentrations in 1981, and as their numbers increased, fisheries surveys started showing that young walleye weren't surviving into the fall of their first year. No naturally reproduced year classes have been found in fall surveys conducted since 1988. Figure 4 shows the l

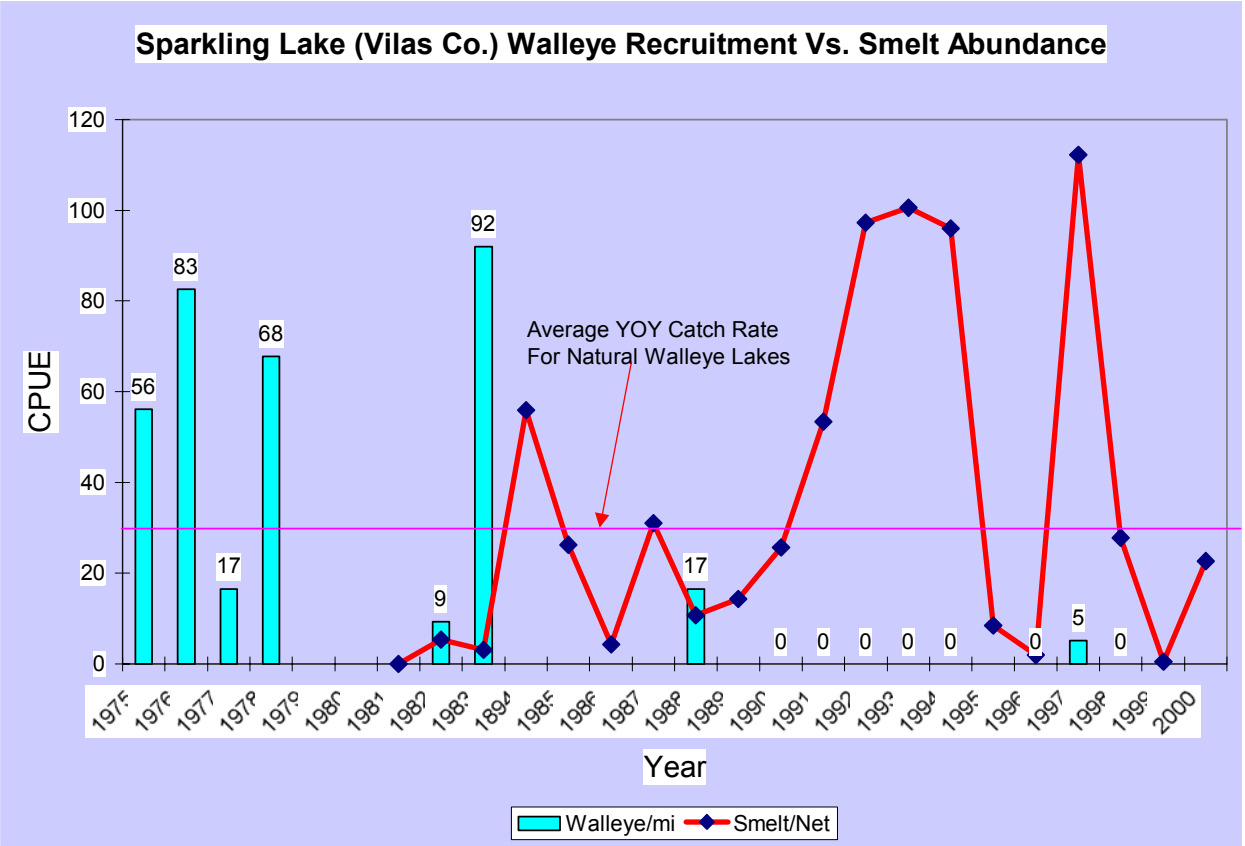

Figure 4: Sparkling Lake Walleye Recruitment vs. Smelt Abundance

impact that rainbow smelt have had on the walleye population in Sparkling Lake.

Waters at greatest risk from smelt invasions are smaller, deep, clear lakes lacking a diverse fishery. A number of northern Wisconsin lakes fall into this category. The presence of smelt has been documented in 21 lakes across six northern Wisconsin counties.

Common carp

The common carp, a native of Asia, was intentionally introduced into Wisconsin waters as a food source in the 1880s. Distribution of carp continued until 1895 when the program was discontinued. Fisherman considered carp a nuisance species soon after they were introduced (the early 1900s). Excessive carp populations uproot native underwater plants, attack plant species such as cattails and re-suspend sediments making the water cloudy. Carp survive very well in the state's warm waters with low oxygen content or under polluted conditions. They are widely distributed in Wisconsin waters.

Carp compete with game fish species for food and habitat and are especially abundant in large, shallow lakes and streams in the state. Historically carp have been controlled through seining, erection of barriers, electrical currents and chemical treatment. The fish toxicant, rotenone, has been used most recently to kill carp such

as in the Horicon Marsh, as part of a fishery habitat project. Unfortunately, rotenone is non-selective and kills the desirable fish population along with the carp. The goal of using rotenone to control carp is to keep their population levels low to reduce their impact.

Rusty crayfish

Rusty crayfish are native to streams in Ohio, Kentucky and Tennessee. They were brought into Wisconsin for bait in the 1960s, and their populations have rapidly expanded in lakes and streams in the northern part of the state. Rusty crayfish upset the ecological balance of waters they infest by reducing aquatic vegetation and depriving native fish of cover and food. They eat just about everything and use their claws to uproot vegetation making waters murky and decreasing plant growth. Other potential problems with rusty crayfish are that they eat fish eggs and displace native crayfish.

There is not a tracking program for rusty crayfish in the state, but at least 100 lakes and streams in northern Wisconsin are infested. The emphasis is on controlling the spread of rusty crayfish because there is no management strategy that is effective in eradicating this invader once it is established.

Round goby

Round gobies were introduced to the Great Lakes via the ballast water of ships in 1990. Since that time they have rapidly spread to all the Great Lakes. They are one of the most abundant fish in the near shore areas of Lake Michigan and the waters of Green Bay. They are also found in the Wisconsin waters of Lake Superior and are most abundant in the Duluth-Superior harbor. The round gobies displace native fish, eat their eggs and young and take over optimal habitat. Their ability to spawn multiple times a season and survive in poor water quality conditions gives them a competitive advantage. Gobies are easily caught by anglers and managers fear that the goby will be transferred to inland waters as baitfish. Wisconsin encourages anglers to learn to identify this fish, report any new sightings and not to use gobies as bait.

Reed canary grass

It is reported that there are native North American strains of reed canary grass. However, it was “improved” about 70 years ago to develop strains that would be vigorous and aggressive in wetlands to provide forage for cattle. Promoted by federal and state agencies, these new strains were planted extensively in wetlands throughout the Great Lakes region. This plant has been very successful, now forming monocultures that cover tens of thousands of acres in the region. Reed canary grass quickly out-competes native wetland plants, degrading the natural biological and structural diversity that are necessary for most native wildlife species.

Although most frequent in wetlands, reed canary grass can spread into upland grasslands. In floodplain forests, foresters are having great difficulty in getting trees to regenerate under a cover of reed canary grass. Even planted tree seedlings are quickly killed in a forest with reed canary grass infestation. Once established, reed canary grass is very difficult to eliminate, or even to control sufficiently to plant other species. Sedimentation from urban or agricultural runoff encourages the growth of this plant.

Biologists assume there are native reed canary grass populations still extant somewhere in the Great Lakes region, but no genetic studies have yet been done to verify their occurrence. Most of the populations that are seen in wetlands, disturbed grasslands and roadsides have very aggressive tendencies and are most likely non-native strains.

Cylindrospermopsis raciborski

Cylindrospermopsis raciborski (or "Cylindro" for short) is aquatic invasive blue - green algae. It is considered a subtropical species that was originally discovered in Brazil, but has been found in recent years in the southern United States and the Midwest. Cylindro was first documented in Wisconsin waters in 2002 in Lakes Wingra, Mendota, and Monona in Dane County. It typically reaches bloom densities in August and September. Of particular concern is the fact that Cylindro produces at least three distinct toxins. Lower levels of exposure to Cylindro (i.e. swimming in waters with moderate blooms) can cause skin rashes and stomach problems. Long-term exposure to low levels of toxins has been linked to cancer. The distribution of Cylindro in Wisconsin waters (outside the Dane County lakes) is currently unknown. Starting in 2004, the DNR will begin monitoring for Cylindro in some of Wisconsin's lakes.

Other aquatic invasive species of concern

There are other aquatic invasive species currently in the Great Lakes such as the spiny waterflea, the fish hook water flea, the quagga mussel, and white perch that could invade the inland waters of Wisconsin potentially causing future problems. Two aquatic invasive plants, water hyacinth and water lettuce, have recently were found in Wisconsin inland waters. Efforts are underway to eradicate the water hyacinth from a lagoon where it was discovered in northern Wisconsin. Asian carp are also cause for concern since they are in the Mississippi River and are likely to invade Wisconsin waters in the near future.

This comprehensive state plan on aquatic invasive species provides guidance for management actions to address the prevention, control or where possible, elimination these problem species in order to preserve native communities and reduce the societal costs associated with their infestations.

POLICY AND REGULATORY BACKGROUND

The prevention and control of aquatic invasive species requires regulations, policies and programs at various levels of government. Appendix B provides a summary of federal, regional, state and tribal roles in regard to NANPCA and NISA.

Appendix C contains a brief assessment of Wisconsin's existing laws and programs that address prevention and control of AIS and a listing of Wisconsin statutes and administrative rules pertaining to AIS in Wisconsin. Historically, most of these regulations have been developed to deal with specific issues rather than dealing with the full range of AIS issues, which confront this state. However, with the recent passage of Section 30.715, Statutes (2001 Wisconsin Act 16), the emphasis has shifted. State law now prohibits launching a boat or placing a trailer or boating equipment in navigable waters if it has aquatic plants or zebra mussels attached.

Because of the multitude of possible vectors and the importance of transportation and commerce activities, a consistent regulatory approach and program implementation is needed at both the federal and state level.

GOALS OF THE MANAGEMENT PLAN

The goals of Wisconsin's Comprehensive Management Plan are designed to address different stages of the AIS invasion:

1) the initial introductions of aquatic invasive species into Wisconsin waters from other parts of the continent or world;
2) the spread of AIS populations to previously unaffected state waters; and
3) the colonization of self-sustaining AIS populations within water bodies, including the harmful impacts resulting from such colonization.

The three goals on which Wisconsin's State Management Plan for AIS is based are as follows:

Goal 1: Implement procedures and practices to prevent new introductions of aquatic invasive species into Lakes Michigan and Superior, Wisconsin's boundary waters (the Mississippi and St. Croix Rivers) and the inland waters of the state.

Goal II: Establish management strategies to limit the spread of established populations of aquatic invasive species into uninfested waters of the state.

Goal III: Abate harmful ecological, economic, social and public health impacts resulting from infestation of aquatic invasive species and

where possible, eliminate those impacts.

The following section describes specific actions, which the state will undertake to achieve our goals. For example, Wisconsin will participate in interstate or international groups to ensure that coordination; communication and technology transfer are utilized to promote consistent regional approaches for managing AIS.

These partnerships will also ensure that practices are built on foundations of sound science and regional experiences. Through these processes, the state will coordinate prevention, control and abatement tasks, developed and implemented as part of this plan, with federal agencies, tribal and local governments, organizations and other entities, (NANPCA, Section 1202).

MANAGEMENT ACTIONS RELATED TO GOAL I

Goal I: Implement procedures and practices to prevent new introductions of aquatic invasive species into Lakes Michigan and Superior, Wisconsin's boundary waters (the Mississippi and St. Croix Rivers) and the inland waters of the state.

Some of the management actions in this section will also apply to Goal II and are not repeated there.

Background: As previously described, the introduction of aquatic invasive species into the Great Lakes region, including inland waters, has caused serious environmental, socioeconomic, and public health impacts. Because of the limited experience with these AIS, the full long-term consequences of these impacts are not yet known. This uncertainty limits the development of prevention programs because it is difficult to compare prevention program investments with corresponding societal costs of established populations of AIS. In the absence of regional prevention programs, we do know that since the early 1800s, over 160 nonindigenous aquatic species have been introduced into the Great Lakes ecosystem (Ricciardi 2001, Mills et al. 1993). About 10% of these exotic species have resulted in significant economic and/or ecological harm.

With a more robust global economy, we can anticipate that, absent new prevention programs, new introductions are highly likely. For that reason, prevention actions, at the national and regional level, as well as at the individual jurisdictional level, are critical. The highest prevention priority is the control of ballast water discharges. Because of the international aspects of Great Lakes commerce, the potential for transport of exotics is high and the systems needed to effectively prevent introductions are complex. Wisconsin has, and will continue to participate in efforts to control ballast water discharge to the Great Lakes.

There are several other potential transport mechanisms which could result in releases of AIS into the Great Lakes and inland state waters. Some of these possible vectors are: the transportation and rearing systems related to the aquaculture

industry, commercial barge traffic, and recreational boating; inter-Great Lake boating associated with research or management activities; SCUBA diving; the sale and distribution of fishing bait; the transfer or disposal of nonindigenous pets; plant nurseries; fish stocking activities and individual releases by anglers. All of these have the potential to introduce AIS with the associated parasites and other disease organisms.

In many cases, intra-state and inter-state transport activities are subject to little or no regulation or management oversight. In cases where laws/regulations do exist, they may not be well publicized or understood with obvious ineffectiveness as a result. As mentioned previously, there are often gaps in the current laws. User groups that could potentially introduce ANS into the Great Lakes region are generally not adequately informed of AIS prevention practices. A number of these have been identified in the Background Section.

Three of the potential AIS transport mechanisms have been selected for specific actions. They encompass the full range of efforts needed to reduce AIS releases. Additionally these areas reflect the lack of information about vectors and AIS transport mechanisms in general and the need to evaluate new technologies or management practices for effective control of AIS. By working with the industries and the involved public, information gained from these activities will be important in advancing state management capabilities. Three action areas are described below.

The sale and distribution of bait

The bait industry in Wisconsin generates an estimated $29.5 million of retail business annually (Meronek 1994). Meronek also estimated that 61% of the bait volume is wild-harvested. This process of capture, sale and transport represents a significant potential for unintentional transfer and introduction of ANS. Where bait is harvested from infested waters, this practice has increased the potential for expanding the number of infested water resources. This is particularly serious when anglers may use this bait or, more importantly, dispose of unwanted bait in riverine systems. In those situations, natural movement and current practices promote further distribution of AIS. In addition, interstate bait commerce, through commercial transportation systems, can result in “faster than natural” range expansion. Because bait suppliers, dealers and finally the bait users may not be aware of AIS problems or their potential to release or transfer AIS, limited information is available to allow a full analysis of real rather than potential impacts. The number of out-of-state bait dealers that export bait into Wisconsin, the types and volumes of bait and the sources of this bait are presently unknown. Inventory information is needed to determine the extent of the imported bait fish trade and the presence or absence of AIS in bait supplies. This information will help to determine whether or not this industry and its customers need to be engaged in program development to reduce the threat of AIS introductions from these sources.

Because inter-basin transport of AIS within Wisconsin through the bait industry is a

concern, regulations have been established to provide some protection. Lake Superior and all Great Lake tributaries are closed to bait harvest, and inland waters may be closed if detrimental aquatic invasive species are discovered. Michigan and Minnesota Sea Grant programs have collaborated on an ongoing study to investigate the potential of the bait industry for spreading AIS. The results have demonstrated that the bait industry ranks among the lowest threats for spreading AIS. Both the Sea Grant programs are continuing to work with the bait industry in teaching wholesalers and retailers to use the "Aquatic Nuisance Species Hazard Analysis and Critical Control Point (HACCP) approach for preventing the spread of AIS through bait marketing activities. Wisconsin will examine the protocols developed in the HACCP manual to determine what additional studies will be needed in this state. Because unknown quantities of bait are transported from one area to another in the state, the risk of unintentional introductions remains.

Strategy 1A: The first steps in determining whether a new management approach is needed would be to establish a panel of bait suppliers and bait dealers to provide advice based on their experiences. The panel would help design a process to develop an inventory of the types of bait grown or collected, the protocols for screening the bait for aquatic invasive species, transportation methods, equipment cleaning protocols, distribution networks and recording systems and awareness of AIS caused problems. Based on this analysis, the following types of actions would be taken.

Action IA1: Identify those sources, which supply or sell bait in Wisconsin. Working with some or all those suppliers, determine whether or not bait harvest locations are infested by AIS. With those sources examine imported bait species (those intentionally harvested) to determine if AIS are present in supplies and to what extent in terms of both number of species and individual species densities. Evaluate whether or not AIS are being unintentionally transported along with this bait (zebra mussel veligers, nuisance fish). As needed, establish specific protocols for bait collection, screening, disposal of AIS, and reporting.

Action IA2: The same steps should be implemented with licensed wild bait harvesters in Wisconsin. In addition, through these contacts with licensed harvesters, assess which harvest methods pose the greatest risks for unintentional transport (qualified and quantified) and what impacts the harvest timing has on AIS transport. Review screening and reporting protocols to assess effectiveness.

Action IA3: Conduct extensive angler surveys to determine the extent to which anglers can identify AIS, the awareness of problems caused by AIS and the resultant potential for AIS introductions from intentional bait releases. From the survey results, work with anglers to develop approaches to minimize the threats of introductions caused by bait releases.

ACTION 1A4: As needed, work with the appropriate sectors to develop manuals of practice for monitoring, reporting and control, or disposal, of AIS for the bait industry

and anglers. Work with trade associations or advocacy groups to promote outreach activities. Educational materials like brochures, videos or CDs and training sessions should also be developed and distributed.

Aquaculture and Aquarium Industries

Aquaculture is a growing industry in Wisconsin. In 1995 the Wisconsin Department of Agriculture Trade and Consumer Protection released the first aquaculture directory for this state. That report listed 72 trout producers, 72 pan fish producers, 67 game fish producers, 4 salmon producers, 37 bait fish producers, 51 fee fishing operations, 14 producers of aquatic plants or animals other than fish, and 3 tribal aquaculture facilities.

The report projected an 11 percent annual growth rate for the industry. With this rate of expansion and in the absence of consistent protocols for management responses when AIS are identified, there is a potential for aquatic exotic plants and animals to be held or propagated in private or commercial aquarium. As with bait rearing or collection, whenever invasive species are commercially raised or held in captivity, either knowingly or incidental to the rearing or culturing of native species, the potential exists for accidental release. Long distance transfer is often associated with pet commerce related to private and commercial aquariums. The volume and extent of aquatic pet commerce in Wisconsin is unknown. Mills et al. (1993) found that 34% of aquatic invasive species now established in the Great Lakes were released unintentionally.

In Wisconsin, non-native fish species may not be imported for fish farming (or for use as bait or stocking) without a permit from the Department of Natural Resources. The Department is considering promulgating rules to clarify the circumstances under which non-native fish species could be permitted. The rule proposal currently under discussion would create a permissible list of non-native species that could, under appropriate conditions and under permit, be imported. All other non-native species would not be permissible. The formal rule-making process has not been initiated.

This problem has also been reviewed from a national perspective by the U.S. Congress' Office of Technology Assessment (1993) and by the national Aquatic Nuisance Species Task Force (1994). In addition, both the industry association and individual producers have recognized the potential problems, which unintentional introductions can cause for their operations and to the state’s aquatic resources.

Strategy IB: Establish a panel of experts to help assess the potential AIS impacts from aquaculture and commercial aquarium facilities. Through a survey or individual contacts, develop an inventory, which identifies the likelihood of introductions into or movements of invasive species within Wisconsin. Working with industry representatives, conduct a review of current aquatic plant and animal handling practices. Where this review indicates that significant potential exists for unintentional transport or release, develop management practices, which will reduce

or eliminate the chances for new introductions.

Action IB1: Work with the aquaculture and aquarium industry panel to develop guidance and policies and/or procedures and manuals to help minimize the risks of accidental release of aquatic invasive species and establish specific protocols for reporting new introductions.
Action 1B2: Promote and facilitate the development of training materials, communication procedures and opportunities for training or technology exchanges for producers.

Action IB3: Ensure that similar steps are implemented for aquatic plants as for the aquarium and pet industry.

Ballast Water Discharges

Ballast water discharges from transoceanic shipping present the greatest management challenges as the problem transcends the control authority of any single jurisdiction. Because of maritime laws and international commerce implications, state control is very limited and perhaps impossible. The technical issues related to ballast water management have not been solved yet nor have standards been established. Consideration of crew safety and welfare increase the complexity for developing environmentally sound and effective treatment technologies.

Ballast water discharges are the largest source of aquatic species introductions worldwide (Carton 1985). The absence of inter-jurisdictional authority is problematic in regulating ballast water introductions into the Great Lakes (Horns, 2002). Cooperation and coordination are necessary between state, federal, and international agencies to develop a ballast water management program, establish scientifically based standards, promulgate regulations and conduct enforcement activities. These efforts are essential to ensure that ballast management practices are uniformly developed and applied and duplication of efforts is avoided.

Many studies have been done which clearly document that ballast water is a major pathway for the introduction and spread of AIS. In an attempt to limit the potential survival of AIS in ballast water, regulations that have been in place since 1993 requiring open ocean ballast water exchange prior to entry into the St. Lawrence River. However, this exchange program does not affect all ships. Only those ships that are in ballast are covered by the regulations. Nearly 80 percent of the commercial vessels that entered the Great Lakes in 1995 reported no ballast on board (NOBOBs) (Weathers and Reeves 1996) compared to 51.8% in 1990 (Locke, et. al. 1991). These figures are based on voluntary reports from commercial vessels. The ratio between vessels retaining ballast water and vessels exchanging ballast water was 933 in 1993 and down to 125 in 1995. Problem cases have gone from 7.4% in 1993 to 3.9% in 1995.

Under the current regulatory regime, a minimum salinity of at least 30 parts per thousand must be achieved following a high-seas ballast water exchange. As a result of their current design, ballast tanks cannot be pumped dry. Consequently, a portion of the original ballast water and the organisms it contains remain in the tanks and are mixed with exchange water. In addition, open-ocean ballast exchange is not fully effective due to the survival of some resistant forms of AIS.

Given gaps and inconsistencies in existing ballast water regulations, new introductions of AIS into the Great Lakes and inland state waters are still occurring. Research on alternative strategies to high seas exchange is critical to effectively prevent new introductions from occurring.

U.S. and Canadian Coast Guard studies indicate that it is especially important to deal with the difficult problem posed by NOBOB vessels entering the Great Lakes with residual unpumpable ballast water and sediment in their tanks. This residual water and sediment, potentially harboring a variety of AIS, is often mixed with Great Lakes fresh water and later released to another Great Lakes port during cross transfers. Additional funding is needed that will support research efforts to develop new ballast water management practices and technologies.

Data from the 1995 navigation season suggests 40% of commercial vessels entering with No Ballast on Board engaged in a cross transfer with unpumpable ballast water (Weathers and Reeves 1996). A 1991 Canadian study found vessels with only unpumpable ballast were carrying on average 157.7 metric tons of water. In order to achieve more effective emptying or flushing of these tanks, the feasibility of altering the current design of ballast tanks needs to be examined. Additionally, retrofitting ships with treatment systems to meet national or international performance or technology standards must be pursued.

The Great Lakes Panel completed a policy statement on ballast water management (March 2001). This policy provides much-needed guidance in establishing a regional, unified approach to ballast water management.

Strategy IC: Participate in the development and implementation of a regional and/or national ballast water management program that will establish stringent interim standard with the long-term goal of eliminating AIS introductions into waters of the Great Lakes and the U.S. and reduce AIS dispersal between the lakes. The following action items will be taken by the state to address the introduction of AIS via ballast water.

Action IC1: Participate with the Great Lakes Panel, the Coast Guard and other regional interests to develop a unified, system-wide approach for ballast water management on the Great Lakes.

Action IC2: Participate in regional efforts to identify research needs and promote studies on new ballast water treatment technologies that will allow for full-scale

application on commercial vessels.

Action IC3: Promote strong national legislation to establish incrementally achievable standards that will over-time eliminate AIS introductions into the Great Lakes via ballast water.

MANAGEMENT ACTIONS RELATED TO GOAL II

Goal II: Establish management strategies to limit the spread of established populations of aquatic invasive species into uninfested waters of the state.

The spread of invasive AIS from infested intrastate waters (i.e., the Great Lakes or the Mississippi River) to uninfested inland waters can significantly increase ecological, economic, social, and public health impacts to Wisconsin waters.

The management actions detailed in this section of the plan are aimed at limiting the spread of established populations of AIS. Some of the activities identified as part of these management actions are already being implemented as part of Wisconsin's existing program while other actions represent new or expanded initiatives.

Background: The introduction of AIS into the Great Lakes has resulted in the spread of aquatic invasive species to uninfested inland waters. For example, since zebra mussels were first discovered in Wisconsin in 1990 in Racine harbor, they have spread through the coastal waters of lakes Michigan and Superior, the Mississippi River, several inland and coastal rivers and 43 inland Wisconsin lakes. The spread of established populations of AIS is primarily caused by human activities such as transfer of boats, bait handling and water transport.

Because aquatic invasive species can be introduced via many pathways, it is difficult to manage their spread. Having a management strategy in place is essential to more effectively limit their spread.

Water resource user groups are frequently not aware of which waters are infested with AIS, the problems associated with them and the precautions they should take to limit their spread. Uninfested waters that are hydrologically connected to infested waters can become infested without human intervention, complicating the situation. The following strategies incorporate the importance of individual actions, monitoring and reporting systems and effective communication and outreach efforts in limiting the spread of AIS.

Strategy IIA: Determine which species poses the greatest problems and should be listed as invasive. Document the most likely transport mechanisms that would facilitate their spread, develop identification guides and establish specific protocols for reporting AIS introductions to Wisconsin's inland waters. Both actions described under Strategy IIA represent new initiatives.

Action IIA1: Develop a process and criteria for classifying species according to their degree of invasiveness and recommend which species should be listed as invasive.

Action IIA2: Describe and quantify the threat posed by intrastate transport and release of harmful AIS from all potential sources.

Strategy IIB: Determine the level of monitoring effort needed to adequately document AIS distribution and track their spread in Wisconsin waters.

Action IIB1: Assess the ongoing sampling program for zebra mussels, both for adults and veligers, on inland waters and expand the monitoring efforts as needed. Evaluate the need for monitoring surveys for native mussels and other impacted species on waters that are infested with zebra mussels. Implement a monitoring program for these impacted species as needed.

Action IIB2: Establish monitoring programs for other priority aquatic invasive species that are identified in the Background Section. This represents a new initiative since no coordinated statewide monitoring efforts are ongoing for these invasive species other than some volunteer monitoring efforts for Eurasian water milfoil.

Action IIB3: Maintain the existing Geographic Information System (GIS) database network for zebra mussels and Eurasian water milfoil and include other priority species that may be monitored as part of Action IIB2 in order to track and document their spread. Establish and maintain a web site that details, which Wisconsin waters, are infested with aquatic invasive species.

GLIFWC has developed a GIS web site for purple loosestrife and similar applications are being developed for other AIS.

Strategy IIC: Implement an education and outreach program to increase public awareness of the AIS problem and the precautions that should be taken to avoid spreading aquatic invasive species, improve the public's understanding of the value of healthy ecosystems that are essential to supporting a diverse aquatic community. Some of the actions listed below are already being implemented as part of the existing AIS program, but will be expanded significantly.

Action IIC1: Ensure that signs are posted at all boat access sites around the state (both on infested and uninfested waters) to remind boaters of the procedures they should follow to maintain clean boats and clean waters.

Action IIC2: Expand the existing watercraft inspection program that involves periodic inspections of boats, trailers and other boating equipment that enter and leave navigable waters. As part of this program, watercraft inspectors educate boater on the threat that aquatic invasive species pose to Wisconsin’s lakes and rivers and how to identify problem species.

Action IIC3: Expand education and outreach efforts to increase public awareness of the problems/impacts of AIS and what can be done to effectively limit their spread. These education and outreach efforts will include: 1) airing TV and radio public service announcements; 2) establishing AIS educational programs for school and park curriculums; 3) developing interpretive AIS displays for user groups such as state parks, fishing expos, lake association meetings, schools and environmental organizations; and 4) distribution of pamphlets, brochures, identification cards and other literature.

Action IIC4: Evaluate the effectiveness of the education and outreach efforts on a periodic basis and restructure the program as necessary through surveys and other feedback techniques.

Strategy IID: Review existing AIS rules and legislation and recommend revisions to state policies and regulations as needed.

Action IID1: Identify gaps in administrative and statutory regulations on AIS and recommend revisions as needed.

Strategy IIE: Improve coordination efforts on AIS by encouraging cooperation with partner organizations and agencies. The actions listed under this strategy represent new initiatives.

Action IIE1: Train volunteers from lake associations and environmental, conservation and fishing organizations to assist in aquatic invasive species monitoring efforts on select waters.

Action IIE2: Partner with lake organizations and local units of government on watercraft inspection efforts. Assess the need for boat cleaning facilities at launching sites, and, if necessary, establish one or more demonstration projects to determine the cost of such an effort, the effectiveness in preventing the spread of problem AIS, and boaters' acceptance of such facilities.

Action IIE3: Partner with lake associations, schools and local community organizations to facilitate education and outreach efforts to promote public awareness and help minimize the introduction and spread of aquatic invasive species.

MANAGEMENT ACTIONS RELATED TO GOAL III

Goal III: Abate harmful ecological, economic, social and public health impacts resulting from infestation of aquatic invasive species and, where possible, eliminate those impacts.

Background: The infestation of aquatic invasive species has caused, to varying degrees, ecological, economic, social, and public health impacts to Wisconsin's

waters. Appropriate strategies to control AIS and abate their impacts may not be technically, economically, or environmentally feasible. Control strategies must always be designed so as not to cause significant environmental impacts. Additionally, native aquatic populations, which are at, or become at risk, because of direct or indirect impacts from AIS, may require protection or restoration strategies, particularly where those species are threatened or endangered.

Strategy IIIA: Assess the public health, social, economic and ecological impacts of AIS to Wisconsin waters and determine what control actions are appropriate to limit those impacts.

Action IIIA1: Identify which priority AIS should be targeted for abatement based on their impacts and the likelihood of successfully controlling or eradicating their populations. Purple loosestrife is one priority species where a biological control program is in place. This successful program, which is in its second summer of implementation, would be expanded under this initiative.

Action IIIA2: Determine which biological, physical or chemical control strategies would be the most cost effective and environmentally sound to implement for priority AIS.

Action IIIA3: Implement abatement strategies, where appropriate, for priority AIS (identified in Action IIIA1) in conformance with existing regulations and best available technology.

Action IIIA4: Work with partner organizations and agencies to develop cost-effective approaches and long-term solutions aimed at controlling species like zebra mussels and other priority AIS that are problematic

Action IIIA5: Evaluate the effectiveness of the control strategies after they have been in place and modify or discontinue implementation if it is shown to be ineffective or environmentally harmful.

PROGRAM EVALUATION AND REPORTING

The evaluation process for Wisconsin's Comprehensive State Management Plan will enable the state to monitor progress toward prevention, control, and abatement of AIS as well as ensure appropriate implementation of the management actions by making "mid-course" corrections as needed. In essence, by incorporating the best scientific and management knowledge with periodic public evaluation, we will be implementing an adaptive management program (sensu Lee, 1993). The process will involve evaluation and dissemination of information.

The evaluation effort will not only examine progress in meeting the goals of the plan, but also place a special emphasis on identifying funding needs to successfully accomplish objectives and associated tasks. This information will prove useful in future program planning processes. The evaluation component will also incorporate information from those groups affected by plan implementation. These include organizations (or people) involved with the responsibility of implementing management actions and resource user groups.

Dissemination of information will be accomplished through an annual report. The report will highlight the progress in meeting the management actions. It will include information on the successes in achieving the goals (prevention, control, and abatement) of the AIS Plan as well as future plans and directions. Successes, failures, and new directions for Wisconsin’s program will be evaluated and compared to other state and regional efforts. The report will be available to members of the general public and local, state, and federal officials.

DETAILED WORK PLAN

A detailed work plan for federal FY 2004 through FY 2008 is attached as Appendix D. Table D-1 identifies the tasks that will be accomplished as part of the comprehensive state plan over the next five years, assuming federal funding is provided. Ongoing initiatives that are listed in Tables D-1 through D-3 are being implemented through $300,000 in annual state funding. These state funds have been appropriated since FY 01-02 and are part of the baseline funding for Wisconsin’s aquatic invasive species program.

The work plan identifies those tasks the state of Wisconsin and the tribes consider the most important and what the budget requirements are to accomplish those tasks. The work plan will be reviewed periodically and amended as conditions warrant it.

LITERATURE CITED

Aquatic Nuisance Species Task Force. March 1994. *Findings, Conclusions, and Recommendations of the Intentional Introductions Policy Review.* Report to Congress.

Busiahn, T.R. 1997. Ruffe control: a case study of an aquatic nuisance species control program. Pages 69-86 in R.M. D'Itri, ed. Zebra mussels and aquatic nuisance species. Ann Arbor Press Inc., Chelsea, MI.

Carton, J. T. 1985. *Transoceanic and Interoceanic Dispersal of Coastal Marine Organisms: The Biology of Ballast Water*. Oceanography and Marine Biology, An Annual Review: volume 23.

Cuhel, R.L., Edgington, D.E., Kaster, J.L. 1999. Water, Natural Budget, and Trophic Status of Elkhart Lake, Sheboygan, WI from April 1993 to March 1996 (Special Report #51). Center for Great Lakes Studies & Waters Institute, UW-Milwaukee and Elkhart Lake Improvement Association.

Great Lakes Panel on ANS. November 1995. *A Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous ANS*. Report to the Great Lakes States, Final Draft.

Hall, S.R. and Mills, E.L. 2000. Exotic species in large lakes of the world. Journal of Aquatic Ecosystem Health and Management. 2000 (3): 105-135.

Horns, W.H. 2002. Let's put someone in charge of this-a proposal to create a Great Lakes ballast water commission. J. Great Lakes Res. 28(2): 117-118.

Horns, W.H., Brown, W.P., Hulse, S. R., Bronte, C.R. 2000. Seasonal changes in ruffe abundance in two Lake Superior tributaries: implications for control. North American Journal of Fisheries Management. 20:822-826.

Lee, K.N. 1993. *Compass and Gyroscope: Integrating Science and Politics for the Environment.* Island Press, Washington DC.

Locke, A., D.M. Reid, W.G. Sprules, J.T. Carton, and H.C. van Leeuwen. 1991. *Effectiveness of Mid-Ocean Exchange in Controlling Freshwater and Coastal Zooplankton in Ballast Water*. Canadian Technical Report of Fisheries and Aquatic Sciences: number 1822, Burlington, Ontario: Great Lakes Laboratory for Fisheries and Aquatic Sciences.

Meronek, T.G. 1994. Status of the Bait Industry in the North Central Region of the United States. M.S, Thesis, Univ. of Wisconsin-Stevens Point, Stevens Point,

WI.250 pp.

Mills E.L., Leach, J.H., Carlton, J.T., and Secor, C.L. 1993. Exotic species in the Great Lakes: history of biotic crises and anthropogenic introductions. Journal of Great Lakes Research 19 (1): 1-54.

New York State Department of Environmental Conservation, Division of Fish and Wildlife. 1993. *Nonindigenous ANS Comprehensive Management Plan*.

Ricciardi, A. 2001. Facilitative interactions among aquatic invaders: is an "invasional meltdown" occuring in the Great Lakes? Can J. Fish. Aquat. Sci. 58:2513-2525.

Ruiz, G.M., A.H. Hines, L.D. Smith, J.T. Carton 1995. *A Historical Perspective on Invasion of North American Waters by Nonindigenous Aquatic Species*. ANS Digest, volume 1, number 1.

Schuldt, J.A., C. Richards, and R.M. Newman. 1999. Effects of Eurasian ruffe on food resources and native yellow perch in experimental mesocosms. Bulletin of the North American Benthological Society 16(1): 163.

US Congress, Office of Technology Assessment. 1993. *Harmful non-indigenous species in the United States* OTA-F565.

US Fish and Wildlife Service, Department of the Interior. 1994. *Great Lakes Fishery Resources Restoration Study: Report to Congress*. (Draft Report). ANS Digest: volume 1, number 1.

Weathers, Katherine and Eric Reeves. 1996. *The Defense of the Great Lakes against the Invasion of Nonindigenous Species in Ballast Water*. US Coast Guard Study.

APPENDIX A

Background on Aquatic Invasive Species - Federal and Great Lakes Regional Perspectives

The introduction of aquatic invasive species (AIS) into the Great Lakes and inland state waters is a source of biological pollution that threatens not only the ecology of the region and the state's water resources, but also the economic, societal and public health conditions of the region and states. The Great Lakes and connecting channels and rivers form the largest surface freshwater system in the world. The water resources of the Great Lakes region are an integral part of activities like recreation and tourism that are valued at $15 billion annually, of which $6.89 billion is related to the fishing industry. Sport fisheries support approximately 75,000 jobs, and commercial fisheries provide an additional 9,000 jobs (US Fish & Wildlife Service 1994).

The Great Lakes region has been subject to the invasion of AIS since the settlement of the region by Europeans. Since the 1800's, more than 140 aquatic exotics have colonized habitats of the Great Lakes ecosystem. The bulk of these species include plants (59), fish (25), algae (24), mollusks (14) and oligochaetes (7). About 55 percent of these species are native to Eurasia; 13 percent are native to the Atlantic Coast. Approximately 10 percent of the 140 exotic species that have been introduced into the Great Lakes region have resulted in significant economic and/or ecological harm. The direct and indirect impact of the majority of introduced species is unknown.

As the use of the Great Lakes for commercial transportation intensified, the rate of introduction of AIS also increased. More than one-third of the organisms have been introduced in the past 30 years, a surge that closely followed the opening of the St. Lawrence Seaway in 1960. Human activities contributing to the transport and dispersal of AIS in the Great Lakes and inland state waters include: 1) release of organisms from the ballast water of ships, 2) transport and release from the bottom of ships, 3) movement or intentional release of aquaculture and fishery species along with their associated (free-living and parasitic) organisms, 4) release of organisms associated with pet industries or pest management practices, 5) recreational boating, 6) bait handling, 7) water transport and 8) ornamental and landscape practices.

A newly introduced species, if it becomes established through reproduction, can disrupt the natural ecosystem balance by altering the composition, density and interactions of native species. This disruption can cause significant changes to the ecosystem, such as alterations to food webs, nutrient dynamics and biodiversity. The new introductions can also cause costly socioeconomic impacts even if effective prevention and control mechanisms are established. Eventually, each newly introduced species will become integrated into an ecosystem that is in a constant

state of flux; or the population will not survive and become extinct (New York State Department of Environmental Conservation 1993).

The following examples portray the extensive ecological and economic impacts caused by some of the AIS that have been introduced into the Great Lakes region.

The invasion of the sea lamprey in the 1940's has resulted in substantial economic losses to recreational and commercial fisheries, and has required annual expenditures of millions of dollars to finance control programs. During the 1940's and 1950's, the sea lamprey, a top predator which kills fish by attaching to prey and feeding on body fluids, devastated populations of whitefish and lake trout. The predation of the sea lamprey on this valuable commercial fishery permitted populations of commercially less valuable fish to proliferate. In 1992, the cost of sea lamprey control and research to reduce its predation was approximately $10 million annually. The total value of the lost fishing opportunities plus indirect economic impacts could exceed $500 million annually (Office of Technology Assessment 1993).

Like the lamprey, alewives gained access to the Great Lakes through the Welland Canal. Populations of alewife increased rapidly in the Great Lakes during the 1940's and 1950's because of the suitability of the habitat and the fact that predators were not sufficiently abundant to check their growth. Consequently, periodic die-off fouled recreational beaches and blocked municipal and industrial water intakes. While the alewife out-competed and suppressed whitefish, yellow perch, emerald shiners and rainbow smelt, it subsequently became a prey fish for introduced trout and salmon. The alewife has permanently altered the existing predator-prey relationships in the Great Lakes ecosystem.

The ruffe, a Eurasian fish of the perch family, was introduced to North America in the 1980's, most likely through the ballast water of a seagoing vessel. This AIS has few predators, no commercial or recreational value and may be displacing valuable native fishes. Since its introduction, the ruffe has become established in the near shore waters of western Lake Superior with an estimated average range expansion of 18 shoreline miles per year. By the fall of 1994, ruffe populations were found in Michigan waters of Lake Superior, and in August of 1995, three ruffe were discovered in a commercial harbor in northern Lake Huron, more than 300 miles east of the previously known range. The ruffe has become very abundant in Duluth Harbor. Most recently in August 2002, ruffe were discovered in Lake Michigan waters off Escanaba, Michigan. Based on observations of present ruffe migration rates and life history aspects of the ruffe in Europe, it appears they may negatively impact valuable native fish populations.

The round goby and the tubenose goby were introduced via ballast water into the Great Lakes (in the St. Clair River, near Detroit) in 1990. The tubenose goby has not thrived, but the round goby has rapidly spread into many areas of the Great Lakes with the largest populations being found in Lakes Erie and Michigan. The round goby

was observed in the St. Louis River Estuary in Lake Superior during the summer of 1995. The primary concern with the round goby is the tremendous range expansion exhibited since its introduction in 1990. It is a very aggressive fish, and feeds voraciously upon bottom-feeding fishes (e.g., sculpin, darters and logperch), snails, mussels and aquatic insects. The Great Lakes fisheries, particularly those in Lake Michigan and Lake Erie, may be impacted by this species due to its robust characteristics and potential to displace native species from prime habitat and spawning areas.

The spiny water flea, a likely ballast water introduction, is a tiny crustacean with a sharply barbed tail spine. The northern European native was first found in Lake Huron in 1984. The spiny water flea is now found throughout the Great Lakes and in some inland lakes. Although researchers do not know what effect this invader will have on the ecosystem, resource managers suspect that the water flea competes for food (e.g., zooplankton) with small native fish species.

The fish hook water flea, which is a relative of the spiny water flea, was introduced to the Great Lakes in the 1980s. It originates from the Caspian Sea in Eastern Europe where it has invaded lakes in Finland and Russia. The fish hook water flea is only about one centimeter in length but, like the spiny water flea, has a long spiny tail. The long spiny tail of this species can become entangled on fishing lines. This creates havoc for anglers as the guides on the fishing rod become clogged with these organisms. The fish hook water flea feeds on zooplankton, an important food source for fish and invertebrates. Although the fish hook water flea could affect juvenile fish populations by feeding on zooplankton, it is still too early to verify the impacts that this AIS will have on the Great Lakes ecosystem.

Daphnia lumholtzi, a type of water flea barely visible to the naked eye, has recently invaded the Great Lakes. This AIS has head and tail spines that may be as long as the body. The large spines make it difficult for young fish to consume this exotic species. This protection from predation may allow *Daphnia lumholtzi* to replace native species of Daphnia. However, it is still too early to know what the impacts this Daphnia species will have on the Great Lakes ecosystem.

The zebra mussel, another ballast water introduction, is one of the best known invaders of the Great Lakes region and other areas of the country where it has spread. This AIS has caused serious economic and ecosystem impacts. The zebra mussel, a highly opportunistic mollusk, reproduces rapidly and consumes microscopic aquatic plants and animals from the water column in large quantities. The potential impact on the fishery can be profound due to changes in food availability and spawning areas, to name a few. Economic impacts are as pervasive as the ecosystem impacts. Great Lakes municipalities, utilities and industries—due to the infestation of zebra mussels in their intake/discharge pipes—have experienced significant costs associated with monitoring, cleaning and controlling infestations. By the end of this century, water users across the country will likely have spend between $2 billion and $3 billion cleaning clogged water intakes (Ruiz et al. 1995).

Commercial and recreational vessels and beach areas are also vulnerable to the negative impacts of the zebra mussel.

Invasive plants also have been introduced to the Great Lakes region and inland waters. Purple loosestrife is a wetland plant from Europe and Asia that was introduced to the east coast of North America in the 1800's. Purple loosestrife invades marshes and lakeshores, replacing valuable native wetland plants. It is unsuitable as cover, food or nesting sites for a wide range of native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads and turtles.

Eurasian water milfoil, unintentionally introduced to North America from Europe, has spread into inland lakes primarily by boats. Milfoil can proliferate in high densities in lakes producing habitat conditions that cause serious impairments to commercial fishing and water recreation such as boating, fishing and swimming. The plant's surface canopy can also out-compete and eliminate native aquatic vegetation as well as threaten native fish and wildlife populations.

APPENDIX B

Policy Background- Federal, Regional, State and Tribal

The complex environmental and economic impacts posed by the introduction of AIS require policies and programs to address prevention and control at various levels of government. In addition, improved coordination of new and existing policies could more effectively focus attention on the problems and achieve more positive results. The following overview describes the federal, state and tribal roles and the regional cooperation that is necessary to implement the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990 and the National Invasive Species Act (NISA) of 1996.

Federal Role

NANPCA directs the states to develop and implement comprehensive state management plans to prevent the introduction and control the spread of AIS. Specifically the objectives of the law are to:

- ·prevent further unintentional introductions of aquatic invasive species;
- coordinate federally funded research, control efforts and information dissemination;
- develop and carry out environmentally sound methods to prevent, monitor and control unintentional introductions;
- understand and minimize economic and ecological damage; and
- establish a program of research and technology development to assist state governments.

The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 was passed primarily in response to the zebra mussel invasion, which has caused extensive ecological and socioeconomic impacts to the Great Lakes region. Although the zebra mussel issue played a key role in prompting passage of the legislation, NANPCA clearly was established to prevent occurrence of new unintentional introductions of AIS and to limit dispersal and adverse impacts of problem species currently inhabiting United States waters. With the passage of NISA in 1996, programs under NANPCA were reauthorized and prevention and control shifted from just a Great Lakes focus to move of a national effort.

Section 1201 of NANPCA established the national Aquatic Nuisance Species (ANS) Task Force, co-chaired by the U. S. Fish and Wildlife Service (USFWS) and the

National Oceanic and Atmospheric Administration (NOAA). The Task Force is charged with coordinating governmental efforts related to AIS issues with those of the private sector and other North American interests.

The Task Force also facilitates national policy direction. The ANS Task Force (consisting of federal agency representatives and ex officio members from nonfederal governmental agencies) has adopted the AIS program under Section 1202 of NANPCA. That program recommends the following essential elements:

> ***Prevention***: Establish a systematic risk identification, assessment and management process to identify and modify pathways by which AIS spread.
>
> ***Detection and Monitoring***: Create a National Nonindigenous Aquatic Nuisance Species Information Center to coordinate efforts to detect the presence and monitor the distribution changes of all AIS, identify and monitor native species and other effects, and serve as a repository for that information.
>
> ***Control***: The Task Force or any potentially affected entity may recommend initiation of an AIS control program. If the Task Force determines, using a decision process outlined in the control program, that the species is a nuisance and control is feasible, a cost effective and environmentally sound control program may be approved.

The ANS Task Force recommends research, education and technical assistance as strategies to support the elements listed above. The ANS Task Force also provides national policy direction as a result of protocols and guidance that have been developed through the efforts of the following working committees: Research Protocol/Coordination Committee, Intentional Introduction Policy Review Committee, Great Lakes Panel on Aquatic Nuisance Species, Ruffe Control Committee, Risk Assessment and Management Committee, Detection and Monitoring Committee, Zebra Mussel Coordination Committee, Brown Tree Snake Control Committee.

One specific charge of the federal government under Section 1101 of NANPCA was the establishment of ballast water management regulations to limit new introductions through transoceanic shipping. Regulations adopted by the Coast Guard in 1993 apply to all vessels with ballast water aboard that have been operating outside the Exclusive Economic Zone (EEZ) of the U. S. or Canada and that enter the Snell Lock in New York. Vessel masters have three options under these regulations: (1) demonstrate that a ballast exchange was done at sea beyond the EEZ in a depth exceeding 2000 meters, (2) retain the ballast during the vessel's entire Great Lakes voyage, in which case tanks may be sealed, or (3) have an alternative environmentally-sound method of ballast water management approved by the Coast Guard. All vessels are checked, and ports being visited are notified of the ballast water conditions in place. Seaway authorities and the Canadian Coast Guard assist in enforcement of the regulations.

The Coast Guard is addressing the problem with vessels reporting "no ballast on board" or NOBOB. Approximately 80% of vessels entering the lakes do carry some residue (a mixture of sediment and water) that eventually can enter the system when water is exchanged within the Great Lakes. In addition, a federal research program is examining alternative methods of ballast water management.

Regional Role

Great Lakes regional coordination is addressed under Section 1203 of NANPCA, which calls upon the Great Lakes Commission to convene the Great Lakes Panel on Aquatic Nuisance Species. Panel membership is drawn from a wide range of federal, state, provincial and regional agencies, private sector user groups, Sea Grant Programs, and environmental organizations, to ensure that the positions of the Panel provide a balanced and regional perspective on Great Lakes issues. The Panel's responsibilities for the Great Lakes region are fivefold: (1) identify Great Lakes priorities on AIS; (2) make recommendations to the national ANS Task Force; (3) assist the ANS Task Force in coordinating federal programs within the region; (4) advise the public and private individuals on control efforts; and (5) submit an annual report to the Task Force describing prevention, research and control activities in the Great Lakes Basin.

Section 1203 of NISA provides funding for the development of interstate watershed management plans. Wisconsin has submitted a joint interstate plan with Minnesota and the tribes to manage and control aquatic invasive species problems on the St. Croix River. The national ANS Task Force approved the St. Croix interstate plan in 1998. A total of $85,000 has been allocated annually for implementation of the plan in each of the last few years; Wisconsin’s share is $20,000; GLIFWC’s share is $5,000.

Another regional effort involves the work of the Mississippi River Interstate Cooperative Association. The Association’s invasive species committee deals specifically with the problems of aquatic invasive species on the Mississippi River.

State Role

The comprehensive state management plans for AIS are addressed in Section 1204 of NANPCA. Under requirements of the Act, state plans must identify "those areas or activities within the state, other than those related to public facilities, for which technical and financial assistance is needed to eliminate or reduce the environmental, public health, and safety risks associated with aquatic nuisance species." The content of each state plan is to focus on the identification of feasible, cost-effective management practices and measures to be implemented by state and local programs to prevent and control AIS infestations in a manner that is environmentally sound. As part of the plan, federal activities are to be identified for prevention and control measures, including direction on how these activities should

be coordinated with state and local efforts. In the development and implementation of the management plan, each state is required to involve appropriate local, state and regional entities, as well as public and private organizations that have expertise in AIS prevention and control.

The state management plans are to be submitted to the national ANS Task Force for approval. If the plan meets the requirements of the ANS Task Force, the plan becomes eligible for federal cost-share support. Plans may also be implemented with other funds supplied by state and cooperative agencies.

Tribal Role

Tribal Governments

Wisconsin's tribes are committed to protecting, enhancing, and preserving reservation ecosystems. Tribal governments exercise management and regulatory authority over reservation lands and natural resources, and many of them have adopted comprehensive Integrated Resource Management Plans or other similar plans. Participation in this management plan will enhance tribal capacity to manage AIS in areas within tribal jurisdiction and will promote cooperation with state and federal agencies. All of Wisconsin's tribes are eligible to ratify and participate in this plan to implement programs affecting their reservations natural resources.

Great Lakes Indian Fish and Wildlife Commission (GLIFWC)

GLIFWC is an organization exercising delegated authority from eleven federally recognized Indian tribes in Wisconsin, Michigan and Minnesota. Those tribes have reserved hunting, fishing and gathering rights in territories ceded to the United States in various treaties with the United States. Portions of Wisconsin are within the territory ceded to the United States in 1837 and 1842 Treaties with the Chippewa.

GLIFWC was authorized by its Voigt Intertribal Task Force (VITTF) to participate in the development of this management plan and to implement programs within the Wisconsin portions of the ceded territories. The VITTF is comprised of nine of GLIFWC's member tribes (see note below) and was established by these tribes to protect and regulate the use of their natural resources in 1837 and 1842 ceded territories.

GLIFWC is a member of the Great Lakes Panel on Aquatic Nuisance Species, serves as an ex-officio member of the national ANS Task Force and is a participant in implementing the St. Croix Interstate Management Plan. GLIFWC is directly involved in educational outreach, management and research activities on several AIS including purple loosestrife, sea lamprey, zebra mussels, Eurasian water milfoil and ruffe. Several hundred exotic plant species are currently being reviewed by GLIFWC staff to assess their threats to local ecosystems and develop priorities for their management. Distribution data for purple loosestrife has recently been

compiled into an interactive Internet GIS platform to enhance the coordination of regional management efforts. This effort is currently being expanded to include Eurasian water milfoil and zebra mussels.

GLIFWC, on behalf of its member tribes, and the GLIFWC member tribes signatory to the treaties of 1837 and 1842 (see note below), in their own sovereign capacity, are eligible to participate in this plan to implement programs affecting the tribes' off-reservation treaty rights in the Wisconsin portions of the ceded territories. This will enhance tribal ceded territory AIS management capacity and will promote intergovernmental partnerships.

Note: These nine tribes are the Bad River Band of Lake Superior Tribe of Chippewa Indians, Lac du Flambeau Band of Lake Superior Chippewa Indians, Lac Courte Oreilles Band of Lake Superior Chippewa Indians, St. Croix Chippewa Tribe, Mole Lake Band of Sokaogon Chippewa Indians, Red Cliff Band of Lake Superior Chippewa Indians, Mille Lacs Band of Ojibwe Indians, Keweenaw Bay Indian Community and Lac Vieux Desert Band of Lake Superior Chippewa Indians. Another of GLIFWC's member tribes, the Fond du Lac Band of Lake Superior Chippewa Indians, is a party to both the 1837 and 1842 treaties.

APPENDIX C

Wisconsin's Authorities and Programs

Wisconsin has a number of statutory and administrative rules with which it addresses, or potentially can address, the issue of prevention and control of aquatic invasive species. These rules have been developed over time in response to problems from individual species or as issues related to AIS arose.

With the recent passage of 2001 Wisconsin Act 16, the framework for a comprehensive state AIS program has been established and the ability to carry out the key components of this plan has been greatly enhanced. Specifically, Wisconsin Act 16 involves statutory creation of the following elements:

- a statewide invasive species program to combat the introduction and spread of invasive species;
- an Invasive Species Council to oversee the state program and to help communicate and coordinate activities among state agencies;
- a watercraft inspection program under the supervision of the Department of Natural Resources that involves periodic inspections of boats, boating equipment, and boat trailers entering and leaving navigable waters and education of boaters about the threat of aquatic invasive species;
- a biennial report to the legislature, governor and the Invasive Species Council that details the administration of the program and the progress being made to control invasive species in the state;
- a re-write of section 23.23 of the statutes dealing with control efforts, research and education of nuisance weeds such as purple loosestrife and multiflora rose;
- a re-write of section 23.24 of the statutes that deals with the permitting of aquatic plants; and
- regulations that prohibit launching a boat or placing a trailer or boating equipment in navigable waters if there are aquatic plants or zebra mussels attached.

Although Wisconsin Act 16 provides the framework for a state invasive species program, there are still gaps in existing authority. Some of the strategic actions contained in the plan describe a process to identify shortcomings in existing rules and the possible need for future regulations to assist in implementing the plan's goals.

Wisconsin Statutes and Administrative Rules Pertaining to AIS

The following list of statutes and administrative rules are applicable to management of AIS in Wisconsin. Some of these rules deal more broadly with species that invade terrestrial or transitional ecosystems, as well as aquatic ecosystems.

23-093 Carp control research. The department of natural resources may enter into contracts with public or private agencies for the accelerated research and development of a specific toxic material for the control and eradication of carp in the waters of the state.

Unofficial text from 91-92 Wis Statues databases updated to 93 Wis Act 26.

29-137 Bait dealer license. **(1)** A bait dealer license may be issued by the department to any resident of this state who has complied with the department's rules governing the taking, handling and storing of

bait, specifications of equipment, and the filing of reports.

(2) As used in this section unless the context requires otherwise:

(a) "Bait" means any species of frog, crayfish or minnow used for fishing purposes.

(b) "Bait dealer, Class A" means any person who buys for resale, barters, gives or sells bait to the amount of $2,000 or more each year.

(c) "Bait dealer, Class B" means any person who buys or gives for resale, barters, or sells bait to the amount of less than $2,000 each year.

(3) No person shall engage in the business of bait dealer without obtaining a license therefor from the department issued pursuant to this section, except that resident children under 16 years of age, without license or permit, may barter or sell bait to consumers and shall be allowed to have a possession limit of 5,000 of each species of bait, but no such resident child shall make bait sales totaling more than $500 annually.

(5) In accordance with the public policy declared in s. 29.174 (1), the department may promulgate rules pursuant to s. 29.174, governing the methods of taking, handling and storing bait, specification of equipment used, and making of reports.

(5m) Each licensee shall keep a correct and complete book record in the English language of all transactions in the production, buying and selling of bait carried on by the licensee, except that retail sales to consumers need not be recorded. This record shall show the name and post-office address from which bait was purchased and to whom sold, together with the date of each transaction and the value of such bait. This record shall be open to the inspection of the department and its wardens at all reasonable hours. The record shall be kept intact for a period of 2 years after the expiration of any license issued under this section, as to all transactions carried on while such license was effective.

(7) The department may issue permits for the taking of bait from specified waters and restrict the number of permits that may be issued for any designated body of water. Such permits shall be issued in the order of application up to the limit established by the department.

(8) This section does not apply to bait produced in a private fish hatchery licensed under s. 29.52.

(9) Any person who molests, damages, destroys or takes the bait traps of another, regardless of intent, shall forfeit not more than $100.

History: 1975 c. 365; 1981 c. 226, 1983 a. 27; 1985 a. 332 s. 251 (3); 1989 a. 359; 1991 a. 316.

Unofficial text from 91-92 Wis Statues databases updated to 93 Wis Act 26.

29.47 (6)

(6) Injurious fish. No live rough fish except goldfish, dace and suckers shall be transported into or within the state at any time without a permit from the department except any person holding a state contract to remove rough fish pursuant to s. 29.62 may transport rough fish taken by the person under the authority of such contract.

Unofficial test from 91-92 Wis Statues databases updated to 93 Wis Act 26.

29.513 Permit for private management. **(1)** Any person or persons owning all of the land bordering on any navigable lake that is completely landlocked may apply to the department for a permit to remove, destroy or introduce fish in such lake.

(2) Upon receiving such application the department shall hold a public hearing in the vicinity of such lake, and if the hearing is favorable the department may issue a permit authorizing the applicant to remove, destroy or introduce fish in such lake.

(3) Such permit shall be subject to such terms, conditions and limitations, as the department deems proper. All work done under the authority of such permit shall be under the supervision of the department or its agents, who shall be afforded free access to such lake at all times for such purpose by the permittee. The expenses of such supervision shall be paid by the permittee.

(4) All fish removed from such lake under such permit shall be turned over to the department.

Unofficial text from 91-92 Wis Statues databases updated to 93 Wis Act. 26.

29.535 Introducing fish and game. **(1)** (a) Unless the person has a permit, no person may bring into the state for the purpose of stocking or introducing, any fish or spawn thereof or any wild or animal of any kind.

(b) Applications for such Permits shall be made in writing to the department.

(c) Permits for stocking shall be issued by the department only after investigation and inspection of fish, birds or animals as it determines is necessary.

(d) Permits to import into the state fish or spawn thereof of the family salmonid, including trout, char or salmon, may be issued only if the source of the fish or eggs is certified free of such diseases as are designated by the department.

(e) Fish or spawn thereof imported under a permit is subject to inspection by the department and such inspection may include removal of reasonable samples of fish or eggs for biological examination.

(f) The department may seize or destroy, or both, any fish or spawn thereof found to be infected with any disease organisms as are designated by the department.

(2) Nothing in this section shall prohibit the department or its duly authorized agents from bringing into the state for the purpose of planting, introducing or stocking, or to plant, introduce or stock

in this state, fish, bird or animal.

(3) This section shall not apply to civic organizations, operating newspapers or television stations or promoters of sport shows when and in connection with publicly showing or exhibiting or giving demonstrations with brook, brown or rainbow trout for periods of not to exceed 10 days. Brook, brown rainbow trout used for such purposes shall be obtained only from resident Class A or Class B private fish hatchery operators licensed under s. 29.52 (4). Such private fish hatchery operators shall keep a record of all brook, brown or rainbow trout introduced in or delivered for introduction in any public waters and shall make a report of such introduction or delivery for such introduction to the department on or before December 31 each year on forms furnished by the department.

History: 1975c. 360, 421.

Unofficial text from 91-92 Wis Statues databases updated to 93 Wis Act 26.

29-625 Permit to take rough fish. **(1)** Permission may be granted to any person by the department upon such terms and conditions as it may require to take carp and other undesirable rough fish, which are detrimental game fish in the following bays or harbors in Door county, namely: Sturgeon Bay, Little Sturgeon Bay, Riley's bay, Egg harbor, Fish creek harbor, Eagle harbor, Bailey's harbor, Mud bay, North bay, Rowley's bay, and Washington harbor, Jackson harbor and Detroit harbor in Washington Island.

(2) A person having a contract to take rough fish under s. 29.62 or this section may be authorized by the department to erect and maintain a temporary pond in any navigable water pending the sale of such fish, provided that such pond does not unreasonably interfere with navigation or other public rights in such water.

History: 1981 c. 390 s. 252.

Unofficial text form 91-92 Wis Statues databases updated to 93 Wis Act 26.

29.623 Control of detrimental fish. When the department finds that any species of fish is detrimental to any of the waters of the state it may, by rule, designate such species of fish and specify the waters in which such fish are found to be detrimental. Thereupon the department may remove such fish from the waters specified or cause them to be removed therefrom.

Unofficial text from 91-92 Wis Statues databases updated to 93 Wis Act 26.

NR 1.02 Inland Fisheries Management

(4) PROPAGATION, REARING AND DISTRIBUTION. The department shall rear fish for stocking in waters lacking adequate natural reproduction and where reasonable returns are demonstrated by surveys. Stocking priorities will be based on use opportunities, hatchery production capabilities, cost and habitat potential. Stocking of exotic species shall be thoroughly evaluated.

NR 19. Miscellaneous Fur, Fish, Game and Outdoor Recreation

NR 19.05 Release and importation of fish and wildlife. (1) It shall be unlawful for any person, persons, firm or corporation to bring into the state to introduce or release or cause to be introduced or released in any manner into the inland or outlying waters, forests or fields of this state any variety or species of wild animal, hybrid of a wild animal, and any bird or fish or the eggs or spawn thereof, without first applying for in writing and receiving a written permit from the department or its duly authorized agents. Such permit shall be granted only after the department or its agents investigates and inspects such wild animals, hybrids of wild animals, or birds or fish, or the eggs or spawn thereof as it deems necessary to determine that such introduction or release will not de detrimental in any manner to the conservation of the natural resources of the state. Inspection may include removal of reasonable samples of fish and eggs for biological examination. The responsibility of licensees holding private fish hatchery licenses is stated in s. 29.52(10), Statues.
NR 19 Miscellaneous Fur, Fish, Game and Outdoor Recreation

(4) ADDITIONAL RESTRICTIONS. (a) Crayfish. 1. Prohibitions. No person may:

a. Use live crayfish as bait on the inland waters except on the Mississippi River;

b. Possess live crayfish while on any inland waters of the state, except the Mississippi River, unless that person is engaged in crayfish removal. Simultaneous possession of live crayfish and hook and line fishing equipment while on the inland waters, except the Mississippi river, shall be considered prima facie evidence of a violation of this subsection.

c. Place, deposit, throw or otherwise introduce live crayfish into any waters of the state unless a permit-authorizing introduction has been issued by the department.

NR 20: Fishing: Inland Waters; Outlying Waters.

(7) It shall be unlawful to use goldfish or alewife in any form or manner for bait or to have goldfish or alewife in possession on the inland, boundary or Lake Superior waters of the state. Alewife but not goldfish may be possessed and used for bait in Lake Michigan waters.

15.347 (18) INVASIVE SPECIES COUNCIL. (a) There is created an invasive species council, attached to the department of natural resources under s. 15.03.
(b) The council consists of the following members:
1. The secretary of natural resources or his or her designee.
2. The secretary of administration or his or her designee.
3. The secretary of agriculture, trade and consumer protection or his or her designee.
4. The secretary of commerce or his or her designee.
5. The secretary of tourism or his or her designee.
6. The secretary of transportation or his or her designee.
7. Seven other members appointed by the governor to serve 5–year terms.

(c) The members appointed under par. (b) shall represent public and private interests that are affected by the presence of invasive species in this state for successive terms.
(e) The council shall meet 4 times each year and shall also meet on the call of the chairperson of the council or on the call of a majority of its members. Notwithstanding s. 15.09 (3), the council shall meet at such locations within this state as may be designated by the chairperson of the council or by a majority of its members.
Unofficial text from 99-00 Wis. Statues databases updated 2001 Wis Act 16.

23.22 Invasive species. (1) DEFINITIONS. In this section:
(a) “Control” means to cut, remove, destroy, suppress, or prevent the introduction or spread of.
(b) “Council” means the invasive species council.
(c) “Invasive species” means nonindigenous species whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
(d) “State agency” means a board, commission, committee, department, or office in the state government.
(2) DEPARTMENT RESPONSIBILITIES. (a) The department shall establish a statewide program to control invasive species in this state.
(b) As part of the program established under par. (a), the department shall do all of the following:
1. Create and implement a statewide management plan to control invasive species in this state, which shall include inspections as specified under sub. (5).
2. Administer the program established under s. 23.24 as it relates to invasive aquatic plants.
3. Encourage cooperation among state agencies and other entities to control invasive species in this state.
4. Seek public and private funding for the program.
5. Provide education and encourage and conduct research concerning invasive species.
6. Promulgate rules to classify invasive species for purposes of the program. In promulgating these rules, the department shall consider the recommendations of the council under sub. (3) (a).
(c) Under the program established under par. (a), the department shall promulgate rules to establish a procedure to award cost–sharing grants to public and private entities for up to 50% of the costs of projects to control invasive species. Any rules promulgated under this paragraph shall establish criteria for determining eligible projects and eligible grant recipients and shall allow cost–share contributions to be in the form of money or in–kind goods or services or any combination thereof. In promulgating these rules, the department shall consider the recommendations of the council under sub. (3) (c).
(3) COUNCIL DUTIES. (a) The council shall make recommendations to the department for a system for classifying invasive species under the program established under sub. (2). The recommendations shall contain criteria for each classification to be used, the allowed activities associated with each classification, criteria for determining state priorities for controlling invasive species under each classification, and criteria for determining the types of actions to be taken in response to the introduction or spread of a native species under each classification.
(b) Under the program established under sub. (2), the council shall conduct studies of issues related to controlling invasive species. The studies shall address all of the following:
1.The effect of the state’s bait industry on the introduction and spread of invasive species.
2.The effect of the state’s pet industry on the introduction and spread of invasive species.
3. The acquisition of invasive species through mail order and Internet sales.
4. Any other issue as determined by the council.
(c) The council shall make recommendations to the department on establishment of a procedure for

awarding cost-sharing grants under sub. (2) (c) to public and private entities for up to 50% of the costs of eligible projects to control invasive species. The recommendations shall contain criteria for determining eligibility for these grants and for determining which applicants should be awarded the grants.
(d) To assist the council in its work, the council shall create 4 subcommittees on the subjects of education, research, regulation, and interagency coordination. The council may create additional subcommittees on other subjects.

(5) INSPECTIONS. As part of the statewide management plan, the department shall create a watercraft inspection program, under which the department shall conduct periodic inspections of boats, boating equipment, and boat trailers entering and leaving navigable waters and shall educate boaters about the threat of invasive species that are aquatic species. The department shall encourage the use of volunteers or may use department employees for these inspections.
(6) REPORTS. (a) The department shall submit to the legislature under s. 13.172 (2), and to the governor and the council, a biennial report that includes all of the following:
1. Details on the administration of the program established under sub. (2), including an assessment as to the progress that is being made in controlling invasive species in this state.
2. A description of state funding that has been expended under the program.
3. A description of funding from other sources that has been expended to control invasive species in this state.
4. An assessment of the future needs of the program.
(b) The department shall submit the biennial report under par. (a) before July 1 of each even–numbered year. The first biennial report shall be submitted no later than July 1, 2004. Each report shall cover the 24–month period ending on the March 31 that immediately precedes the date of the report.
(c) In addition to the report required under par. (a), the department shall submit an interim performance report to the legislature under s. 13.172 (2), and to the governor and the council, on the progress that has been made on the control of invasive species. The department shall submit this interim performance report before July 1 of each odd–numbered year. The first interim performance report shall be submitted no later than July 1, 2005. Each interim performance report shall cover the 12–month period ending on the March 31 that immediately precedes the date of the interim performance report.
(7) APPEARANCE BEFORE LEGISLATURE. Upon request of a standing committee of the legislature with jurisdiction over matters related to the environment, natural resources, or agriculture, the director of the program shall appear to testify.

23.235 Nuisance weeds. (1) DEFINITIONS. In this section:
(a) “Nuisance weeds” means purple loosestrife or hybrids thereof and multiflora rose.
(b) “Purple loosestrife” means any nonnative member of the genus Lythrum.
(2) PROHIBITION. Except as provided in sub. (3m), no person may sell, offer for sale, distribute, plant, or cultivate any multiflora rose or seeds thereof.
(2m) CONTROL EFFORTS. (a) Under the program established under s. 23.22, the department shall make a reasonable effort to develop a statewide plan to control purple loosestrife on both public and private lands, as provided in this subsection.
(b) The department shall make a reasonable effort to implement control and quarantine methods on public lands as soon as practicable. The department shall make a reasonable effort to employ the least environmentally harmful methods available that are effective, based on research conducted under sub. (3m).
(c) The department may conduct a pilot project using employees or other persons to engage in labor

intensive efforts to control purple loosestrife on all public lands.
(d) The department shall request permission from private land-owners to enter onto the land to control stands of purple loosestrife which significantly threaten environmental resources or which threaten to invade a nearby watershed or subwatershed. If the landowner denies the department permission to enter onto the land, the department may not enter the land but shall inform the landowner of the seminars available under sub. (4) (c).
(e) The department may provide grants to other public agencies to allow the public agencies to control purple loosestrife on lands under their control.
(3m) RESEARCH. Under the program established under s. 23.22, the department shall make a reasonable effort to conduct research to determine alternative methods to contain and control purple loosestrife in the most environmentally sound manner and may conduct other research on the control of nuisance weeds. The secretaries of natural resources and of agriculture, trade and consumer protection may authorize any person to plant or cultivate nuisance weeds for the purpose of controlled experimentation.
(4) EDUCATION. (a) Under the program established under s. 23.22, the department shall make a reasonable effort to develop a statewide education effort on the effects of nuisance weeds, as provided in this subsection.
(b) The department shall make a reasonable effort to educate the authorities in charge of the maintenance of all federal, state and county trunk highways and all forest and parkland in this state on methods to identify and control nuisance weeds. The department of transportation and all other authorities in charge of the maintenance of highways, forests and parks may cooperate with the department in efforts under this paragraph.
(c) The department shall make a reasonable effort to educate private landowners on methods to identify and control purple loosestrife. The department shall make a reasonable effort to conduct seminars periodically, at times determined by the department, to train private landowners in environmentally sound methods to identify and control purple loosestrife.
(5) PENALTY. Any person who knowingly violates sub. (2) shall forfeit not more than $100. Each violation of this section is a separate offense.
History: 1987 a. 41; 1999 a. 150 s. 616; Stats. 1999 s. 23.235; 2001 a. 16; 2001 a. 109 ss. 72td to 72wj.

23.24 Aquatic plants. (1) DEFINITIONS. In this section:
(a) “Aquaculture” has the meaning given in s. 93.01 (1d).
(b) “Aquatic plant” means a planktonic, submergent, emergent, or floating–leaf plant or any part thereof.
(c) “Control” means to cut, remove, destroy, or suppress.
(d) “Cultivate” means to intentionally maintain the growth or existence of.
(e) “Distribute” means to sell, offer to sell, distribute for no consideration, or offer to distribute for no consideration.
(f) “Introduce” means to plant, cultivate, stock, or release.
(g) “Invasive aquatic plant” means an aquatic plant that is designated under sub. (2) (b).
(h) “Manage” means to introduce or control.
(i) “Native” means indigenous to the waters of this state.
(j) “Nonnative” means not indigenous to the waters of this state.
(k) “Waters of this state” means any surface waters within the territorial limits of this state.
(2) DEPARTMENT DUTIES. (a) The department shall establish a program for the waters of this state to do all of the following:
1. Implement efforts to protect and develop diverse and stable communities of native aquatic plants.

2. Regulate how aquatic plants are managed.
4. Administer and establish by rule procedures and requirements for the issuing of aquatic plants management permits required under sub. (3).
(b) Under the program implemented under par. (a), the department shall designate by rule which aquatic plants are invasive aquatic plants for purposes of this section. The department shall designate Eurasian water milfoil, curly leaf pondweed, and purple loosestrife as invasive aquatic plants and may designate any other aquatic plant as an invasive aquatic plant if it has the ability to cause significant adverse change to desirable aquatic habitat, to significantly displace desirable aquatic vegetation, or to reduce the yield of products produced by aquaculture.
(c) The requirements promulgated under par. (a) 4. may specify any of the following:
1. The quantity of aquatic plants that may be managed under an aquatic plant management permit.
2. The species of aquatic plants that may be managed under an aquatic plant management permit.
3. The areas in which aquatic plants may be managed under an aquatic plant management permit.
4. The methods that may be used to manage aquatic plants under an aquatic plant management permit.
5. The times during which aquatic plants may be managed under an aquatic plant management permit.
6. The allowable methods for disposing or using aquatic plants that are removed or controlled under an aquatic plant management permit.
7. The requirements for plans that the department may require under sub. (3) (b).
(3) PERMITS. (a) Unless a person has a valid aquatic plant management permit issued by the department, no person may do any of the following:
1. Introduce nonnative aquatic plants into waters of this state.
2. Manually remove aquatic plants from navigable waters.
3. Control aquatic plants in waters of this state by the use of chemicals.
4. Control aquatic plants in navigable waters by introducing biological agents, by using a process that involves dewatering, desiccation, burning, or freezing, or by using mechanical means.
(b) The department may require that an application for an aquatic plant management permit contain a plan for the department's approval as to how the aquatic plants will be introduced, removed, or controlled.
(c) The department may promulgate a rule to establish fees for aquatic plant management permits. Under the rule, the department may establish a different fee for an aquatic plant management permit to manage aquatic plants that are located in a body of water that is entirely confined on the property of one property owner.
(4) EXEMPTIONS FROM PERMITS. (a) In this subsection:
1. "Local governmental unit" means a political subdivision of this state, a special purpose district in this state, an instrumentality or corporation of the political subdivision or special purpose district, or a combination or subunit of any of the foregoing.
2. "State agency" means any office, department, independent agency, or attached board or commission within the executive branch of state government, or any special purpose authority created by statute.
(b) The permit requirement under sub. (3) does not apply to any of the following:
1. A person who manually removes aquatic plants from privately owned streambeds with the permission of the landowner.
2. A person who engages in an activity listed under sub. (3) (a) in the course of harvesting wild rice as authorized under s. 29.607.
3. A person who engages in an activity listed under sub. (3) (a) in the course of operating a fish farm as authorized under s. 95.60.
(c) The department may promulgate a rule to waive the permit requirement under sub. (3) (a) 2. for any

of the following:
1. A person who owns property on which there is a body of water that is entirely confined on the property of that person.
2. A riparian owner who manually removes aquatic plants from a body of water that abuts the owner's property provided that the removal does not interfere with the rights of other riparian owners.
3. A person who is controlling purple loosestrife.
4. A person who uses chemicals in a body of water for the purpose of controlling bacteria on bathing beaches.
5. A person who uses chemicals on plants to prevent the plants from interfering with the use of water for drinking purposes.
6. A state agency or a local governmental unit that uses a chemical treatment in a body of water for the purpose of protecting the public health.
(5) DISTRIBUTION PROHIBITED. No person may distribute an invasive aquatic plant.
(6) PENALTIES. (a) Except as provided in par. (b), any person who violates sub. (3) shall forfeit not more than $200.
(b) A person who violates sub. (3) and who, within 5 years before the arrest of the current conviction, was previously convicted of a violation of sub. (3) shall forfeit not less than $700 nor more than $2,000 or shall be imprisoned for not less than 6 months nor more than 9 months or both.
(c) The court may order a person who is convicted under par. (b) to abate any nuisance caused by the violation, restore any natural resource damaged by the violation, or take other appropriate action to eliminate or minimize any environmental damage caused by the violation.
(d) A person who violates sub. (5) shall forfeit not more than $100.
History: 2001 a. 16, 109.

Unofficial text from 99-00 Wis Statues databases updated to 2001 Wis Act 16.

30.715 Placement of boats, trailers, and equipment in navigable waters. (1) In this section:
(a) "Aquatic plant" means a submergent, emergent, or floating–leaf plant or any part thereof. "Aquatic plant" does not mean wild rice.
(b) "Public boat access site" means a site that provides access to a navigable water for boats and that is open to the general public for free or for a charge or that is open only to certain groups of persons for a charge.
(2) No person may place or use a boat or boating equipment or place a boat trailer in a navigable water if the person has reason to believe that the boat, boat trailer, or boating equipment has any aquatic plants attached.
(3) No person may place or use a boat or boating equipment or place a boat trailer in the Lower St. Croix River if the person has reason to believe that the boat, boat trailer or boating equipment has zebra mussels attached.
(4) A law enforcement officer may order a person to do any of the following:
(a) Remove aquatic plants from a boat, boat trailer, or boating equipment before placing it in a navigable water.
(b) Remove or not place a boat, boat trailer, or boating equipment in a navigable water if the law enforcement officer has reason to believe that the boat, boat trailer, or boating equipment has aquatic plants attached.
(c) Remove zebra mussels from a boat, boat trailer or boating equipment before placing it in the Lower

St. Croix River.
(d) Remove or not place a boat, boat trailer or boating equipment in a navigable water if the law enforcement officer has reason to believe that the boat, boat trailer or boating equipment has zebra mussels attached.
(5) (a) The department shall prepare a notice that contains a summary of the provisions under this section and shall make copies of the notice available to owners required to post the notice under par. (b).
(b) Each owner of a public boat access site shall post and maintain the notice described in par. (a).
(6) No person may refuse to obey the order of a law enforcement officer who is acting under sub. (4).
History: 2001 a. 16 ss. 1307 to 1317.

Unofficial text from 99-00 Wis Statues databases updated to Wis Act 16.

APPENDIX D

Wisconsin's Work plan for Aquatic Invasive Species from Federal FY 2004-2008

Introduction

This work plan identifies tasks for implementation that focus on 1) preventing future AIS introductions into Wisconsin waters from ballast water; release of bait fish; and accidental release from aquarium and aquaculture facilities and 2) on reducing the risk of intrastate transfer of AIS species from recreational boaters and anglers. The priority tasks identified in this work plan are aimed at implementing the strategic actions in the State Implementation Plan (SIP) and helping correct some of the most pressing AIS issues facing Wisconsin. However, even with full implementation of the activities identified in this plan, not all AIS problems will be adequately addressed as environmental and economic costs from infestations continue to escalate. The activities identified in this work plan will be implemented over a five-year period to coincide with federal fiscal years 2004 through 2008 (from October 2003 to September 2008).

Summary

To implement the tasks described in this work plan, Wisconsin is requesting $466,683 annually in federal funding. Of this amount, $246,683 would be allocated to fund four FTEs for each year of the plan. The remaining $220,000 is for non-personnel costs associated with implementing various elements of the plan including support for monitoring, watercraft inspections, and outreach and education efforts and to partner with lake or watershed associations and lake districts. One of the four FTE's would function as the program coordinator for aquatic invasive species. The other three would coordinate specific problem invasive species related to fish, plants and invertebrates. Research activities would be supported by $100,000 per year for studies ranging from life history and species interactions work to management practice efficacy or control or containment technologies. Tables D-1, D-2 and D-3 describe the tasks to be accomplished for each year of the plan, the implementing agency and cooperating organizations, the funding source(s), the recent and proposed levels of effort, and the status. The implementation tables are organized by goals and tasks (one goal for each table) as identified in the SIP. Below are the tasks that will be accomplished as described in Tables D-1 through D-3.

Years One and Two- FY 2004 and FY 2005

Efforts in the first two years will focus on gathering information and quantifying the threat AIS introductions pose from the bait industry, wild bait harvesters, and the aquaculture and aquarium industries including the related roles of individual customers or users (refer to Table D-1). Obtaining this information represents an important first step in understanding and quantifying the risks to Wisconsin's aquatic environment from accidental AIS release from these sources.

Efforts in the first two years will also be directed towards developing a process and criteria for classifying species based on their degree of invasiveness and describing and quantifying intrastate transfer of AIS (refer to Table D-2). The plan includes additional analytical support for monitoring problem AIS and increased funding support for I & E efforts such as TV and radio public service

announcements, brochures and pamphlets, and signage at boat landings. The work plan also includes new initiatives such as an evaluation component designed to examine the effectiveness of implementing I & E activities related to Goal 2. In addition, an AIS policy will be developed at the state level to guide decisions and actions on aquatic invasive species.

Other efforts in the first two years of the plan will include providing financial assistance to lake associations and lake districts for: 1) outreach and education, 2) monitoring the ecological impacts to lakes from AIS invasions, and 3) establishing boat cleaning stations, if necessary, at several launching sites as demonstration projects to assess their effectiveness.

Lastly efforts will be focused on identifying which species should be targeted for abatement based on their impacts and/ or potential for eradication and also to examine which control strategies would be the most effective and environmentally sound to implement. (Refer to Table D-3).

Years three through five- FY 2006-2008

The emphasis in FY05-07 will shift from gathering data and quantifying the problem to more specific actions. Based on the information generated in the first two years, policies and regulations will be developed and put into place as needed to address the threats associated with interstate transport of baitfish and aquaculture and aquarium species. Depending on the study results generated from the first two years of the plan, it may be necessary to put in place new policies and regulations.

Efforts will be expanded in the last three years of the plan for monitoring AIS, watercraft inspections and information and education and outreach efforts. Partnerships developed with local communities in the initial two years of the project will be enhanced. Finally, additional efforts will be targeted for abatement of problem AIS and evaluation of the effectiveness of various aspects of the program.

Other actions and tasks identified in the plan as annual ongoing activities in the initial two years will also be implemented in the last three years of the plan.

Annual Updates

The tasks/actions to be implemented (as presented in Tables D-1, D-2 and D-3) will be reviewed annually and updated as necessary based on existing conditions. The actions described in the state strategy and the work plan represent the blueprint for Wisconsin's Comprehensive Management Plan for AIS. Any annual changes in priorities will be reflected in a revision to the work plan which, in turn, would be submitted to the Aquatic Nuisance Task Force for review and approval.

Table D-1. Goal 1: Prevent New Introductions of AIS

Tasks/Actions		Implementing Agency	Cooperating Organizations	Fund Sources	Recent Efforts	Planned Efforts ($000/FTEs)					Status
#	Description				FY 02 & FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	
1A1	Describe and quantify live bait movement from the bait industry	DNR	UW- Stevens Point	FWS	0	5/0.2	5/0.2				NI
1A2	Describe and quantify live bait movement from licensed wild bait harvesters	DNR		FWS	0	5/0.2	5/0.2				NI
1A3	Survey angler bait handling habits	DNR		FWS	0	10/0.2	10/0.2				NI
1A4	Develop manuals for AIS monitoring, reporting, controlling or disposal for various sectors	DNR		FWS	0			5/0.2	5/0.2	5/0.2	NI
1B1	Develop guidance to minimize accidental releases from the aquaculture and aquarium industries	DNR	DATCP	FWS	0	5/0.2	5/0.2	5/0.2	5/0.2	5/0.2	NI
1B2	Facilitate technology exchanges for producers	DNR	DATCP/UW Sea Grant	FWS	0			5/0.2	5/0.2	5/0.2	NI
1B3	Develop similar guidance and technology exchange materials (as in 1B1 and 1B2) for aquatic plants & pet industry	DNR		FWS	0	5/0.2	5/0.2	0.1	0.1	0.1	NI
1C1	Participate in efforts to develop a unified, system-wide approach for ballast water management on the Great Lakes	DNR	UW Sea Grant/port authorities	State	0.1	0.1	0.1	0.1	0.1	0.1	A

Table D-1. Goal 1: Prevent New Introductions of AIS

Tasks/Actions		Implementing Agency	Cooperating Organizations	Fund Sources	Recent Efforts	Planned Efforts ($000/FTEs)					Status
#	Description				FY 02 & FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	
1C2	Participate in regional efforts to identify research need and promote studies on new ballast water treatment technologies for commercial vessels	DNR	UW Sea Grant/port authorities	State	0.1	0.1	0.1	0.1	0.1	0.1	A
1C3	Promote strong natinal legislation to establish incrementally achievable standards for eliminating AIS introductions into the Great Lakes via ballast water	DNR	UW Sea Grant/port authorities	State	0.1	0.1	0.1	0.1	0.1	0.1	A

Status: A = Annual Ongoing
E = Expanded Initiative
NI = Proposed New Initiative

DNR=Department of Natural Resources
DATCP=Department of Agriculture, Trade & Consumer Protection

Table D-2. Goal 2: Limiting the Spread of Established Populations of AIS

Tasks/Actions		Implementing Agency	Cooperating Organizations	Fund Sources	Recent Efforts	Planned Efforts ($000/FTEs)					Status
#	Description				FY 02 & FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	
IIA1	Develop criteria for classifying species based on their degree of invasiveness	DNR	DATCP/ UW Sea Grant	FWS	0	0.2	0.2				NI
IIA2	Describe and quantify intrastate transport of problems AIS	DNR	FWS/ UW Sea Grant	FWS	0	0.2	0.2				NI
IIB1	Determine adequate level of AIS monitoring for zebra mussels and implement a sampling program based on that analysis	DNR	FWS/ UW Sea Grant/ Citizen Volunteers	State	50/1.5	50/1.5	50/1.5	50/1.5	50/1.5	50/1.5	A
IIB2	Establish monitoring programs for other priority AIS	DNR	FWS/ UW Sea Grant/ Citizen Volunteers	FWS/State	0.5	50/0.7	50/0.7	50/1	50/1	50/1	A & E
IIB3	Maintain GIS database to track & document the spread of problem AIS	DNR	FWS/ UW Sea Grant	FWS/State	0.1	0.2	0.2	0.2	0.2	0.2	A & E
IIC1	Post signs at boat access sites on both infested and uninfested waters	DNR	UW Sea Grant/Citizen Volunteers	State	15/0.5	15/0.5	15/0.5	15/0.5	15/0.5	15/0.5	A
IIC2	Expand the existing watercraft inspection program that involves inspection of boats, trailers and other boating equipment	DNR	Lake Associations	FWS/State	50/2	60/2.3	60/2.3	85/3	85/3	85/3	A & E
IIC3	Expand the education and outreach efforts to increase public awareness of the problems/ impacts of AIS	DNR	Lake Ass./ UW Sea Grant/ UW-Extension	FWS/State	60/1	70/1	70/1	100/1	100/1	100/1	A & E

Table D-2. Goal 2: Limiting the Spread of Established Populations of AIS

Tasks/Actions		Implementing Agency	Cooperating Organizations	Fund Sources	Recent Efforts	Planned Efforts ($000/FTEs)					Status
#	Description				FY 02 & FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	
IIC4	Evaluate effectiveness of I & E efforts & restructure the program as necessary	DNR	UWSea Grant/Coastal Zone Program	FWS/State	0	0.1	0.1	0.1	0.1	0.1	NI
IID1	Identify gaps in existing AIS regulation for adequacy and recommend revisions as needed	DNR	DATCP/ UW Sea Grant	FWS/State	0.1	0.2	0.2	0.2	0.2	0.2	A & E
IIE1	Train volunteers for AIS monitoring	DNR	Lake Ass./ Local Communities	FWS/State	0.2	0.4	0.4	0.4	0.4	0.4	A & E
IIE2	Create partnerships for watercraft inspections, assess the need for boat cleaning facilities and if necessary establish a demonstration project	DNR	Lake Ass./ Local Communities	FWS	0	40/0.2	40/0.2	0.2	0.2	0.2	NI
IIE3	Partner with lake associations, schools and local community organizations to promote public awareness of AIS	DNR	Lake Ass./ Local Communities	FWS	0	0.2	0.2	0.2	0.2	0.2	NI

Status: A = Annual Ongoing
E = Expanded Initiative
NI = Proposed New Initiative

Table D-3. Goal 3: Abating Adverse Impacts of AIS

Tasks/Actions		Implementing Agency	Cooperating Organizations	Fund Sources	Recent Efforts	Planned Efforts ($000/FTEs)					Status
#	Description				FY 02 & FY03	FY 04	FY 05	FY 06	FY 07	FY 08	
IIIA1	Identify which species should be targeted for abatement based on impacts and /or potential for eradication	DNR	DATCP	FWS	0	0.2	0.2				NI
IIIA2	Examine which control strategies would be the most cost effective and environmentally sound to implement for specific problem AIS	DNR	DATCP	FWS	0	0.2	0.2				NI
IIIA3	Implement abatement strategies for problem AIS that conforms to existing regulations & Best Available Technology	DNR	DATCP	FWS/State	20/1.0	100/ 1.5	100/ 1.5	100/ 1.5	100/ 1.5	100/ 1.5	A & E
IIIA4	Work with partner organizations and agencies to develop effective, long-term solutions to controlling AIS populations	DNR	DATCP	FWS	0	0.2	0.2	0.2	0.2	0.2	NI
IIIA5	Evaluate the effectiveness of the control strategies and modify or discontinue implementation if ineffective or environmentally harmful	DNR	DATCP	FWS	0	0.1	0.1	0.2	0.2	0.2	NI

Status: A = Annual Ongoing
E = Expanded Initiative
NI = Proposed New Initiative

Appendix E

GLIFWC's Work plan for Aquatic Invasive Species from Federal FY 2004-2008

Introduction

GLIFWC has been controlling purple loosestrife in the Bad River – Chequamegon Bay watershed since 1988. Over the past 14 years, this program has evolved and currently consists of 6 comprehensive elements – educational outreach, inventory and monitoring, control, evaluation, research, and technical assistance to GLIFWC member tribes. Each of these elements is coordinated with local cooperators (Tribes, USFS, WI DNR, TNC, and numerous private landowners) and funding agencies (BIA Noxious Weed Program, EPA-GLNPO, and NRCS) to maximize the efficient use of limited resources.

Educational Outreach

The objectives of this program are to raise public awareness of this important issue and prevent new introductions of exotic plants in the future. GLIFWC provides educational materials to cooperating agencies and private individuals throughout the ceded territories. These materials include brochures, slide presentations at local schools and community events, and a comprehensive web site developed in 1998 for purple loosestrife that continues to grow as new information is added for additional exotic plants (http://www.glifwc.org/epicenter).

Inventory and Monitoring

Because purple loosestrife does not recognize land ownership boundaries, watershed scale planning and coordination among landowners is critical to achieve successful long-term control. The foundation for successful watershed-scale planning depends on complete and accurate inventory data. In 1994 and 1995, a basin-wide inventory was conducted (Edblom et al. 1995, Gilbert et al. 1995) to determine the distribution of purple loosestrife within the Bad River watershed. Subsequent inventories and compilation of data from other sources have expanded this database to cover all of Wisconsin and Michigan. These data are overlain with relevant spatial data (e.g. roads, water bodies, land ownership, etc.) using GIS to help plan and direct annual purple loosestrife control efforts. GLIFWC's purple loosestrife database is readily accessible over the Internet (http://www.glifwc-maps.org) to facilitate regional coordination of loosestrife control efforts.

Control

The emphasis of GLIFWC's integrated control effort has focused on purple loosestrife within the Bad River/Chequamegon Bay watershed. Control crews use a combination of non-persistent herbicides and biological control agents to control purple loosestrife depending on several site-specific factors. Because the floating seeds of purple loosestrife are dispersed primarily by water, it is important to identify source populations in upper reaches of the focus watershed. Small sites in upper reaches of the watershed receive high priority for chemical control, while larger sites in downstream reaches receive high priority for biological control.

Research

Previous research by GLIFWC staff (Gilbert and Parisien 1989, Gilbert et al. 1998) continues to guide purple loosestrife control methods today. GLIFWC control crews currently use methods proven to be efficient and effective at purple loosestrife control, while minimizing impacts to non-target species. In 1998, staff from GLIFWC and the Lac Courte Oreilles Conservation Department established study plots on the Chippewa Flowage to compare the effectiveness of chemical and biological controls (*Galerucella* beetles) in various habitat types. These sites continue to be monitored and preliminary results continue to guide the selection of biological control release sites.

Ongoing research is focused on evaluating the relative threats posed by exotic plants other than purple loosestrife (e.g. Eurasian water-milfoil, flowering rush, European frog-bit, hydrilla, and water chestnut). The objective of this research is to prioritize exotic plants based on their current and potential ecological impact, and feasibility of successful control. This information will then be used to guide and develop future management actions.

Evaluation

GLIFWC evaluates the progress of purple loosestrife control work every 5 years. GLIFWC staff re-evaluated the 1994-95 survey in 2000 to determine the effectiveness of the previous 5-year's control efforts (Falck 2001). This information is being used to direct and refine ongoing control efforts. Further direction and guidance is also provided by an annual report that is produced each year. GLIFWC's annual noxious weed report (see - http://www.glifwc.org/epicenter) summarizes each year's various noxious weed activities into one synthesized document. Successes as well as shortcomings are reported and opportunities for improvement are identified.

Technical Assistance

GLIFWC provides technical and logistical support to its member tribes to help manage several aquatic invasive species including purple loosestrife, Eurasian water milfoil, and sea lamprey. Ongoing tribal programs include:

- Purple loosestrife monitoring and control
    - Bad River Indian Reservation
    - Lac Courte Oreilles Indian Reservation
    - Lac du Flambeau Indian Reservation
    - Red Cliff Indian Reservation

- Sea lamprey control
    - Bad River Indian Reservation

- Eurasian water-milfoil monitoring and control
    - Lac Courte Oreilles Indian Reservation

Summary

Using the purple loosestrife program as a model, and the goals identified in Wisconsin's Comprehensive State Management Plan, GLIFWC has identified several opportunities to enhance AIS management in Wisconsin. To implement the tasks described in this work plan, the Commission is requesting $53,100 annually in federal funding. Of this amount $38,800 would be allocated to fund 1 FTE and 4 LTE's for each year of the plan, and $14,300 would be allocated for supplies, travel, and printing expenses in each year of the plan.

Year One

- **Goal IIB1 & IIB2** - Expand monitoring efforts to include select inland lakes within the ceded territories to determine distribution of AIS in addition to purple loosestrife.
- **Goal IIB3** - Maintain Internet GIS database for AIS distribution and management activities.
- **Goal IIC2** - Update and disseminate existing educational media (brochures, presentations, web site).
- **Goal IIC2** - Identify unmet educational needs and develop appropriate educational materials to raise awareness of AIS issues.
- **Goal IIE** - Consult with GLIFWC member tribe's natural resource staff to determine needs for on-reservation AIS management and identify opportunities for cooperation.
- **Goal IIIA1** - Continue evaluation and prioritization of problem species for future control efforts.
- **Goal IIIA2** - Identify effective and environmentally sound control methods for species identified as high priority for control.
- **Goal IIIA3** - Continue control activities for purple loosestrife, sea lamprey, and other AIS based on evaluation and prioritization process.

Year two – five

- Expand on-reservation AIS management as determined in year one.

- Continue efforts initiated in year one.

Annual Updates

Tasks will continue to be reviewed annually and management actions refined appropriately. Any changes in management priority will be reflected in a revision to the work plan and submitted to the ANS Task Force for approval.

Tasks/Actions		Implementing Agency	Cooperating Organizations	Funding Sources	Recent Efforts	Planned Efforts					Status
#	Description			FY 02 & 03		FY 04	FY 05	FY 06	FY 07	FY 08	
IIA1	Develop criteria for classifying species based on their ecological impact and feasibility of control.	GLIFWC	IPAW	EPA – GLNPO BIA NRCS	$10 .0 K	$ 3.0 K	$ 3.0 K	$ 3.0 K	$ 3.0 K	$ 3.0 K	Ongoing
IIB2	Monitor select inland waters in the ceded territory for AIS, including Eurasian water milfoil, purple loosestrife, hydrilla, European frog-bit, flowering rush, water chestnut, and zebra mussles.	GLIFWC	Tribes	EPA-GLNPO BIA ANS TASK FORCE	$ 24.0 K	$ 15.0 K	$ 15.0 K	$ 15.0 K	$ 15.0 K	$ 15.0 K	Expanded Initiative
IIB3	Maintain and expand Internet GIS database to track & document the spread of problem AIS.	GLIFWC	LICGF	EPA-GLNPO BIA ANA	$ 12.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	Expanded Initiative
IIC3	Expand the education and outreach efforts to increase public awareness of the problems/ impacts of AIS.	GLIFWC	USFS, IPAW, TNC, WI DNR, NRCS	BIA NRCS	$ 14.0 K	$ 8.0 K	$ 8.0 K	$ 8.0 K	$ 8.0 K	$ 8.0 K	Expanded Initiative
IIE	Consult with GLIFWC member tribes to develop and/or coordinate AIS programs.	GLIFWC	Tribes	BIA	$ 1.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	$ 2.0 K	Ongoing
IIIA1	Identify which species should be targeted for abatement based on results from IIA1 above.	GLIFWC		EPA-GLNPO BIA	$ 8.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	Ongoing
IIIA2	Examine which control strategies would be the most cost effective and environmentally sound to implement for species identified in IIIA1 above.	GLIFWC		EPA-GLNPO BIA	$ 8.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	$ 5.0 K	Ongoing
IIIA3	Implement abatement strategies for problem AIS identified in IIIA2 above that conform to existing regulations & best available technology.	GLIFWC	TNC, Tribes	BIA NRCS	$ 55.0 K	$ 11.0 K	$ 11.0 K	$ 11.0 K	$ 11.0 K	$ 11.0 K	Expanded Initiative
IIIA5	Evaluate the effectiveness of the control strategies and modify or discontinue implementation if ineffective or environmentally harmful.	GLIFWC		BIA	$ 5.0 K	$ 2.1 K	$ 2.1 K	$ 2.1 K	$ 2.1 K	$ 2.1 K	Ongoing
Totals					$137.0 K	$ 53.1 K	$ 53.1 K	$ 53.1 K	$ 53.1 K	$ 53.1 K	

ANA = Administration for Native Americans
BIA = Bureau of Indian Affairs
EPA-GLNPO = Environmental Protection Agency – Great Lakes National Program Office
IPAW = Invasive Plant Association of Wisconsin
LICGF = Line Information & Computer Graphics Facility (UW - Madison)
NRCS = Natural Resources Conservation Service
TNC = The Nature Conservancy
USFS = US Forest Service

APPENDIX F

Summary of the comments on the draft plan

A draft of Wisconsin's Comprehensive State Management Plan was distributed to 20 organizations for their review and comment in the fall of 2001. These organizations represented local governments, state and federal agencies, state legislators, lake associations, conservation groups, the aquaculture association, fishing clubs and other interested parties. Of the 500 copies that were printed, about 480 were distributed for review. In addition, the draft plan was posted on the DNR web page. A press release in the Wisconsin Outdoor News announced the release of the document and the public comment period. A short survey form was also sent out with the plan to facilitate the review process and to collect information for follow-up communications. This appendix provides a summary of the survey results and the public comments received on the draft state plan.

The DNR received very little feedback on the survey forms. Of the several hundred survey forms that were mailed out, only 4 responses were returned. The responses to survey questions were as follows:

- Is the issue of aquatic invasive species something that you think is important to your organization?

  Yes - 4
  Somewhat - 0
  No - 0

- Is the concept of a state management plan, in your opinion, a good way to address the issue?

  Yes - 3
  Probably -1
  Don't know - 0
  No - 0

- Does the draft plan provide the proper framework for dealing with the invasive species issue? That is, are the goals, strategies and actions in the plan appropriate to address the problems?

  Yes - 1
  Probably - 3
  Not sure - 0
  No - 0

- Do you have any interest in further involvement in this issue?

  Yes - 4
  No - 0

Comments on the draft plan were received by National Aquatic Nuisance Species Task Force, the US Fish and Wildlife Service, the Great Lakes Indian Fish and Wildlife Commission, the Wisconsin Aquaculture Association and from Department of Natural Resources staff. All the comments received were considered and incorporated as revisions to the plan as appropriate.